

# ZODIAC<sup>®</sup>

ZODIAC COMMUNICATIONS

## FA/MA-81/161 General Description

### Introduction

The Zodiac MA-81/161 are mobile transceivers for simplex operated FM radio communication in the 68-88 MHz and 146-174 MHz bands.

The MA-81/161 can be delivered in a choice of channel spacings between 50 - 12,5 KHz, and for both versions there is a choice of RF power outputs between 1 - 25 W.

### Construction

The MA-81/161 are intended for dash mounting in a mounting bracket, and operation by direct control of the control elements on the front plate.

The solid-state circuitry is built up as functional module units for ease in service.

The functional modules are contained in a steel plate chassis. The chassis slides into the cabinet from the front and is held in place by a screw from the rear of the cabinet. The cabinet is made of an extruded aluminium profile.

A type plate located on the cabinet states the type designation of the transceiver showing the service for which it is intended.

## FA/MA-81/161

### General specifications

Unless otherwise stated, specifications are based on the measuring methods prescribed in CEPT recommendation T/R 17, and annex I and II.

Figures in brackets are guaranteed values.

### Frequency Range

MA-81 : 68 - 88 MHz

MA-161 : 146 - 174 MHz

### Min. Channel Separation

MA-81/161: 25 KHz

### Frequency Deviation

MA-81/161 :  $\pm 5$  KHz

### Frequency Stability

Meets government specifications

### Max. RF Bandwidth

1 MHz

### Number of Channels

Max. 16

### Antenna Impedance

50 ohm

### Temperative Range

- 25<sup>0</sup> - + 50<sup>0</sup>

### Dimensions

250 x 190 x 66

### Weight

2.9 kg



Transmitter Specifications

RF Power Output

25, 15, 10, 6, 3, 1 W,  
adjustable

Type of Modulation

Phase

AF Response

6 dB/octave preemphasis,  
300-3000 Hz  
+ 1/ - 3 dB

Modulation Distortion

3% (10%)

Modulation Sensitivity

2 mV

AF Input Impedance

600 ohm

Adjacent Channel Power

75 dB (70 dB)

Residual Modulation

50 dB (40 dB)

Spurious Emission

Max. 0,2  $\mu$ W

Harmonic Emission

Max 2  $\mu$ W

Receiver Specifications

Sensitivity

0.4  $\mu$ V (0.7  $\mu$ V) e.m.f.  
for 20 dB SINAD

Adjacent Channel Selectivity

80 dB (70 dB)

Intermodulation Response

75 dB (70 dB)

Blocking

Min. 90 dB/ $\mu$ V

Co-Channel Rejection

- 6 dB (- 8 dB)

Spurious Response Rejection

75 dB (70 dB)

Conducted Spurious Emissions

1 nW (2 nW)

AF Output Power

2 W in 4 ohm

AF Distortion

3% (10%)

AF Response

6 dB/octave deemphasis  
300-3000 Hz  
+ 1/ - 3 dB

Noise and Hum

50 dB (40 dB)

Power Supply Specifications

Supply Voltage

10.8-15V, 13.2 nominal

Current Consumption

13.2 V

Stand by: 0.2 A

Transmit: 4 A

Receive, 2W AF output: 0.5 A



MA-81/161

## 1. Circuit Description

See Block Diagram, Dwg No. 7230-6 and  
Wiring Diagram, Dwg No. 7230-39.

### 1.1 General

The nominal 12V supply from the battery is applied to the 12V supply pins in the multiconnector Pl. The supply voltage is via the ON/OFF switch fed to the transient filter which also contains a protection against incorrect supply polarity.

The filtered battery voltage is applied to the transmitter power amplifier and two 10V regulators which supply the transmitter and receiver sections.

The incoming signal passes through the antenna switching unit to the input of the receiver.

In the single channel editions of MA-81/161 a crystal controlled oscillator is incorporated in the transmitter section. Similarly, a single oscillator is provided in the receiver section.

Channel switching units are fitted in the multichannel editions of MA-81/161 and are controlled by the channel selector.

The audio output from the receiver is applied to the loudspeaker. The output level is adjusted by means of the volume control.

The SQ TEST position of the ON/OFF switch is provided to override the squelch function of the receiver.

As may be seen from the simplified block diagram, the receiver output signal may be connected to a tone receiver used in selective calling systems.

The modulating signal to the transmitter is derived from the microphone via the tone generator for selective calling, if fitted.

During transmission of tone calls the microphone will be switched off automatically so that the transmitter is modulated by the tone signal only.

The transmitter is keyed by depressing the transmit button on the microphone. This will block the receiver and cancel the blocking of the transmitter voltage regulator. When the transmitter voltage regulator operates, supply voltage is applied to the transmitter section.

The "transmitter on" condition is indicated by the transmit indicator lamp.

## 2. Receiver

The MA-81/161 receiver is a double conversion superheterodyne using intermediate frequencies of 10.7 MHz and 455 KHz. The high RF sensitivity characteristic of the receiver is provided by the low noise RF amplifier.

Adjacent channel selectivity is obtained using a 8 pole 10.7 MHz crystal filter.

When more than one channel is required, the transceiver will be provided with a channel switching unit.

The receiver comprises the following subunits:

Antenna switching unit	LPF 72310 (2 m)
	LPF 72310/4 (4 m)
RF-unit with 1. mixer and X-tal filter	RF 7231 (2 m)
	RF 7231/4 (4 m)
IF-unit with 2. mixer, 455 KHz IF-amplifier, limiter, detector and squelch circuit	IF 7232
Oscillator and multiplier	XR-7234 (2 m)
	XR-7234/4 (4 m)
AF-amplifier	AF-7333
Channel switching unit:	
Maximum 2 channels	CS 75316
- 6 -	CS 75315
- 12 -	CS 74313
- 16 -	CS 76319

### 2.1 Signal Path

From the antenna switching unit the input signal is fed to the RF-unit. After passing through the preselector filter the signal is amplified by a low noise dual gate MOSFET-transistor. Before applying the amplified signal to the mixer, the signal passes through a filter consisting of three inductively coupled tuned circuits.

The mixer is a balanced broadband schottky diode mixer.

The mixer output at 10.7 MHz is amplified by a field-effect transistor and passed through a 10.7 MHz crystal filter which provides the channel selectivity of the receiver.

This approach has resulted in a high sensitivity and superior blocking, selectivity and intermodulation characteristics of the receiver. The RF-amplifier, mixer, IF-amplifier, and crystal filter are contained in the units RF-7231 (2 m) or RF-7231/4 (4 m).



## 2.2 Injection

The local oscillator signal is generated in an oscillator operating on the fundamental frequency of the crystal. The oscillator operates within the frequency range 11,275 MHz to 13,608 MHz for the 2 m edition, and 14,325 MHz to 16,125 MHz or 10,750 MHz to 12,8833 MHz for the 4 m edition, depending on the crystal frequency used.

The signal from the oscillator is applied to the multiplier chain, consisting of three doubler stages in the 2 m edition, and two doubler stages or a tripler and a doubler stage in the 4 m edition. The output frequency is thus 12 times, respectively 4 and 6 times the fundamental frequency of the oscillator.

The multiplier stages are coupled by bandpass filters consisting of capacitatively coupled tuned circuits. The filters attenuate undesired frequencies generated by the multipliers, and prevents these from reaching the mixer stage.

The injection signal is 10.7 MHz below the received signal and is calculated as follows:

$$f_x = \frac{f_a - 10.7}{12} \text{ MHz} \quad (2 \text{ m edition})$$

$$f_x = \frac{f_a - 10.7}{4} \text{ MHz by } f_a \text{ greater 75.2 MHz or}$$

$$\frac{f_a - 10.7}{6} \text{ MHz by } f_a \text{ below 75.2 MHz (4 m edition)}$$

The oscillator and the multipliers are contained in the unit XR-7234 (2 m) and XR-7234/4 (4 m). When more than one channel is required the transceiver will be provided with a channel switching unit.

## 2.3 Intermediate Frequency Circuits

The 10.7 MHz first IF-signal from the RF-unit is amplified in a single IF amplifier stage. It is then applied to the 2nd mixer stage, and converted to the second IF signal of 455 KHz.

The injection signal to the mixer stage is generated by a crystal controlled oscillator whose frequency is normally 455 KHz below 10.7 MHz. In instances where a harmonic of the local oscillator coincides with the frequency of the received signal, a crystal oscillator frequency of 455 KHz above 10.7 MHz is chosen.

In the first case the crystal frequency is:  
 $10.7\text{MHz} - 0.455 \text{ MHz} = 10.245 \text{ MHz}.$

In the second case the crystal frequency is:  
 $10.7\text{MHz} + 0.455 \text{ MHz} = 11.155 \text{ MHz}.$



The second intermediate frequency signal from the mixer stage proceeds through a bandpass filter consisting of two capacitively coupled tuned circuits, and is then applied to the integrated IF amplifier, limiter, and phase detector. The detector is of the balanced quadrature type, and it provides efficient rejection of any amplitude modulated signals that may be present.

The detector has only one tuned circuit, and is simple to adjust.

## 2.4 AF Circuits

The demodulated signal is fed through a deemphasis network to a single stage AF preamplifier. The amplified signal is passed to loudspeaker amplifier, and to a buffer stage, feeding the tone receiver.

The loudspeaker amplifier amplifies the AF input signal to an output level of 2 W into a 4 ohm load.

Manual gain adjustment, and thus the loudspeaker output level, is effected by the volume control on the frontpanel of the transceiver. Electrically, the volume control is connected between the preamplifier and the loudspeaker amplifier.

The AF output stage consists of two complementary power transistors operating in class AB push-pull. Negative feedback is employed to improve stabilization.

## 2.5 Squelch Circuit

The squelch circuit is operated by noise components contained in the demodulated signal.

The AF signal from the detector is passed to an active highpass filter, where the noise component of the AF signal is filtered out. After passing a single stage noise amplifier the noise signal is rectified and applied to the switch circuit which controls the electronic AF switch in the integrated detector circuit.

When the noise level exceeds a certain value, i.e. when the signal to noise ratio falls below a certain value, the switch circuit is activated, and the AF output is switched off.

The switch circuit is also activated by the T/R switch, blocking the receiver during transmission. In conjunction with a tonereceiver, the switch will operate the "engaged" lamp when there is traffic on the channel.

The squelch sensitivity is adjusted by a potentiometer located at the input of the active highpass filter.

The switch can be blocked manually by means of the SQ TEST button on the frontpanel of the transceiver, thus overriding the squelch circuit.

### 3. Transmitter

The transmitter is phase modulated. Its output frequency is 16 times the oscillator frequency. Phase modulation is performed at the fundamental frequency.

The transmitter comprises the following subunits:

Transmitter multiplier	XT-7237 (2 m) XT 7237/4 (4 m)
Driver	DR-7236 (2 m) DR-7236/4 (4 m)
RF power amplifier	PA-7235 (2 m) PA-7235/4 (4 m)
Modulation amplifier	MA-7238
Lowpass filter, antenna switch	LPF 72310 (2 m) LPF 72310/4 (4 m)
Channel switching unit:	
Maximum 2 channels	CS-75316
- 6 -	CS-75315
- 12 -	CS-74313
- 16 -	CS-76319

#### 3.1 AF-Circuits

The modulating signal from the microphone is fed, through the tone generator, if fitted, to the modulation amplifier where it is amplified, differentiated, filtered, limited, integrated, and filtered. The modulation amplifier transforms the microphone output to a signal suitable for the phase modulator, and limits the signal amplitude so that the maximum permissible frequency deviation is not exceeded.

The modulation amplifier is designed around an integrated transistor array, containing 5 equal transistors.

The signal from the microphone is preamplified by a low noise AF-transistor before being applied to the first transistor of the array. A high degree of negative feedback ensures constant gain of the preamplifier. Before being applied to the first active low pass filter, the signal is passed through a differentiation network consisting of an RC combination. Then the signal is applied to the amplitude limiter. This limiter has been provided to prevent the modulator from being overdriven. For normal deviations the limiter will be inoperative.

Before being applied to the phase modulator, the modulation signal is integrated by an RC combination, and filtered in a splatter filter which has been designed as an active pass filter.

A potentiometer located at the output of the modulation amplifier is used to adjust the maximum frequency deviation.



### 3.2 RF Circuits

The fundamental RF signal is generated in a crystal controlled oscillator contained in the transmitter multiplier XT 7237 (2 m) or XT 7237/4 (4 m).

When more than one channel is required, the transceiver will be provided with a channel switching unit.

The RF signal from the oscillator is applied to a buffer amplifier, then to the phase modulator, followed by the first multiplier stage. The buffer provides constant input level and correct impedance matching.

The phase modulator is performed by a varactor tuned band pass filter producing a large linear phase swing.

From the modulator the signal is fed to a multiplier chain consisting of free doubler stages. The multipliers are coupled with double tuned band pass filters having a close to critical coupling. These filters limit the bandwidth of the transmitter multiplier and attenuate undesired harmonics generated in the frequency multiplication process.

The output from the third doubler is applied to the driver unit DR-7236 (2 m) or DR 7236/4 (4 m). In the first stage the input signal is doubled. The transmitter output frequency therefore is 16 times the crystal frequency. The output is via a capacitive coupled band pass filter applied to a buffer amplifier. Through an inductive coupled band pass filter the signal is applied to the output stage of the driver unit which raises the signal to the level required by the RF power amplifier. The nominal output power is 0.5 W into a 50 ohm load.

The bandwidth of the transmitter and thus the maximum frequency spread of the channels is determined by the selectivity of the driver and multiplier which is 1 MHz.

The driver and RF power amplifier are protected against high temperatures by a NTC-resistor mounted on the heat sink of the RF power amplifier. The NTC-resistor controls the power output from the driver at high temperatures, thereby reducing the dissipated power of the RF-power amplifier to a safe value.

The RF-power amplifier PA 7235 (2 m) or PA 7235/4 (4 m) contains two transistor amplifier stages. The coupling between the stages consists of tuned matching networks with low loaded Q values. It is a high efficiency class C amplifier with a maximum power output of 25 W, and it withstands all load conditions in the normal supply voltage range.

### 3.3 Antenna Circuits

The signal generated by the transmitter is passed through an antenna relay and a low pass filter to the antenna.

The low pass antenna filter is a 7-pole Chebishev filter having low insertion, loss, and ripple. The filter attenuates signals at undesired frequencies to an acceptable low level, e.g. harmonics of the transmitter frequency.



4. Power Supply

The MA-81/161 is powered directly from a 12V car battery. The negative battery terminal connects directly to the cabinet of the transceiver.

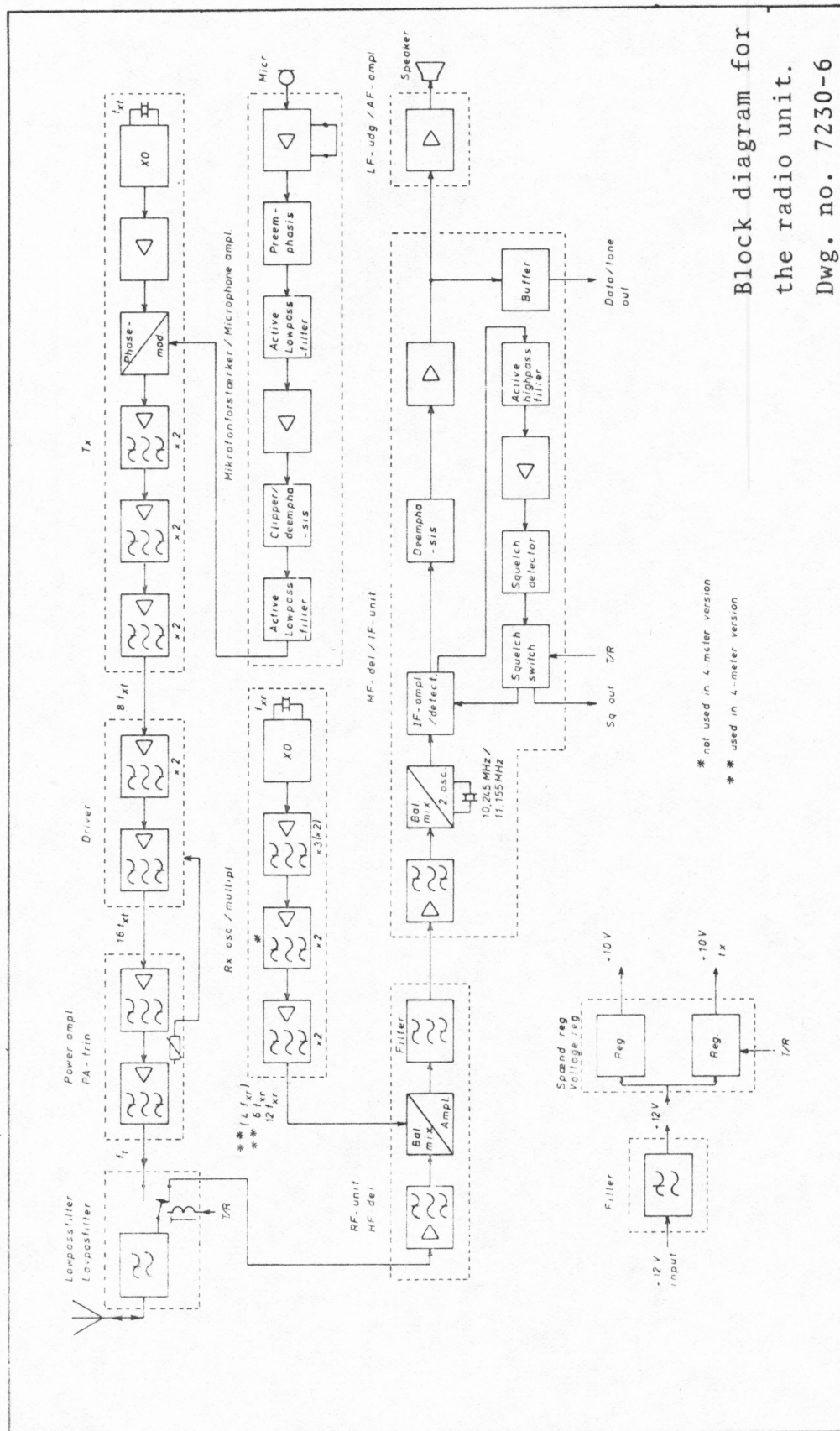
A transient filter FU-72311 is provided to suppress noise and transients generated by the vehicle's electrical system.

A reverse biased diode connected across the output terminals of the filter protects the transceiver against damage caused by incorrect supply polarity. Incorrect battery connection will cause the diode to conduct and blow the fuse fitted in the filter unit.

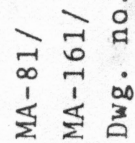
The output voltage of the filter unit is applied to the driver, the RF power amplifier and two identical voltage regulator circuits contained in the unit PS-7239 which deliver 10V stabilized supply voltage for operating the transmitter and receiver sections of the transceiver.

The voltage regulators are protected against short circuit by limiting the maximum current to a safe value.

With the transceiver in the stand by or receive condition the operation of the transmitter voltage regulator is blocked. If the transmitter is activated, the blocking function will be released, and the transmitter will operate.

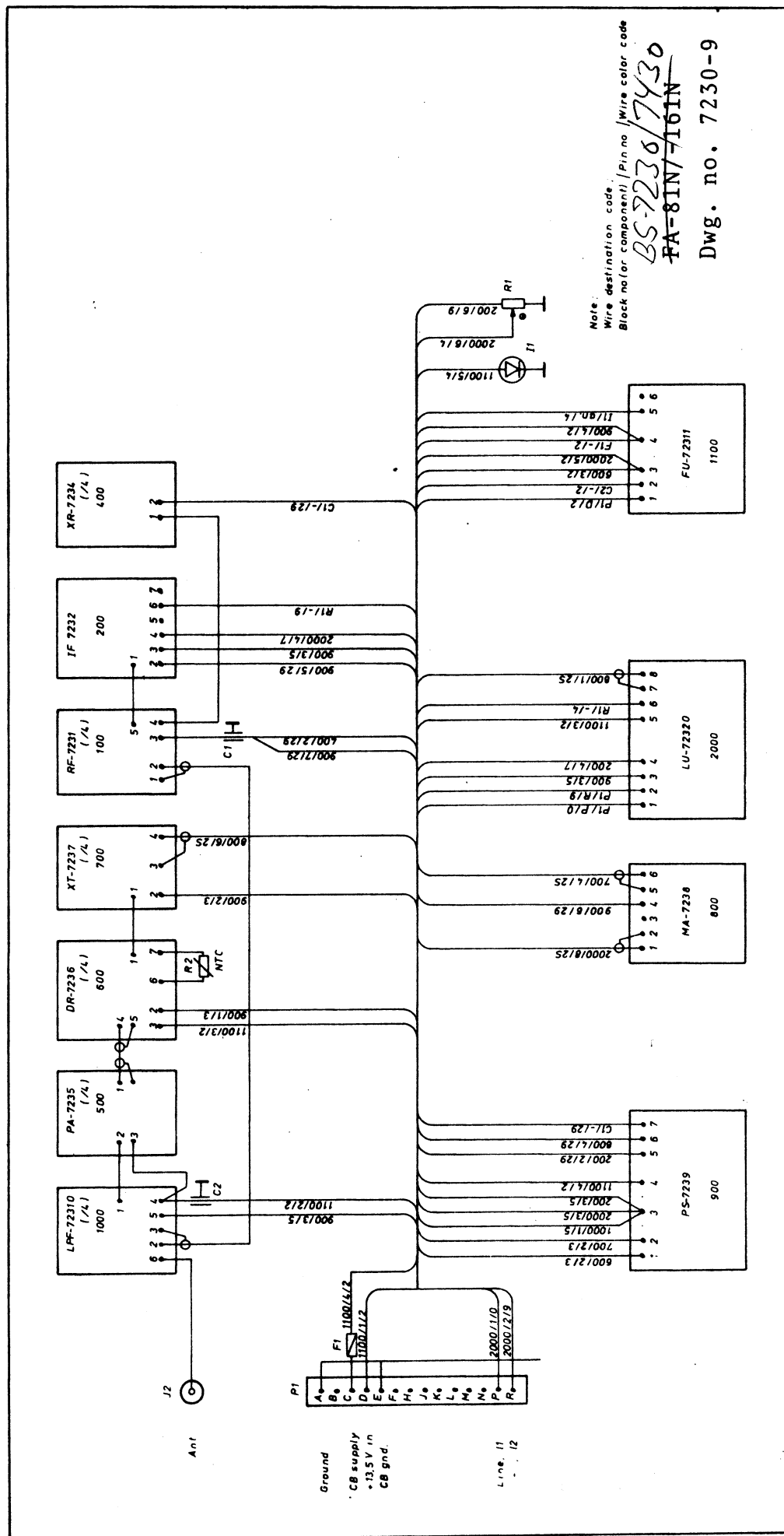


Block diagram for  
the radio unit.  
Dwg. no. 7230-6



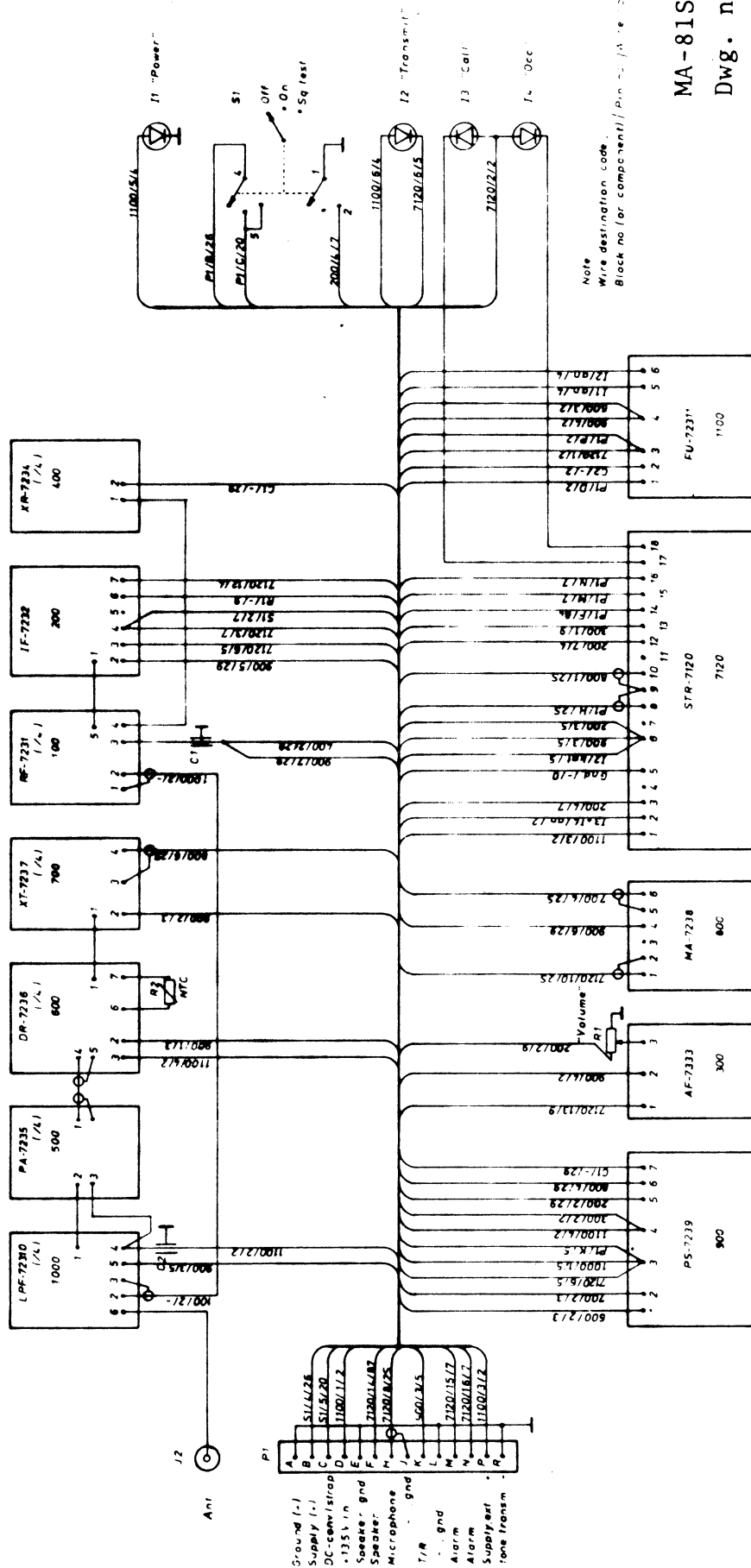
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MA-81S/-161S

Dwg. no. 7230-8

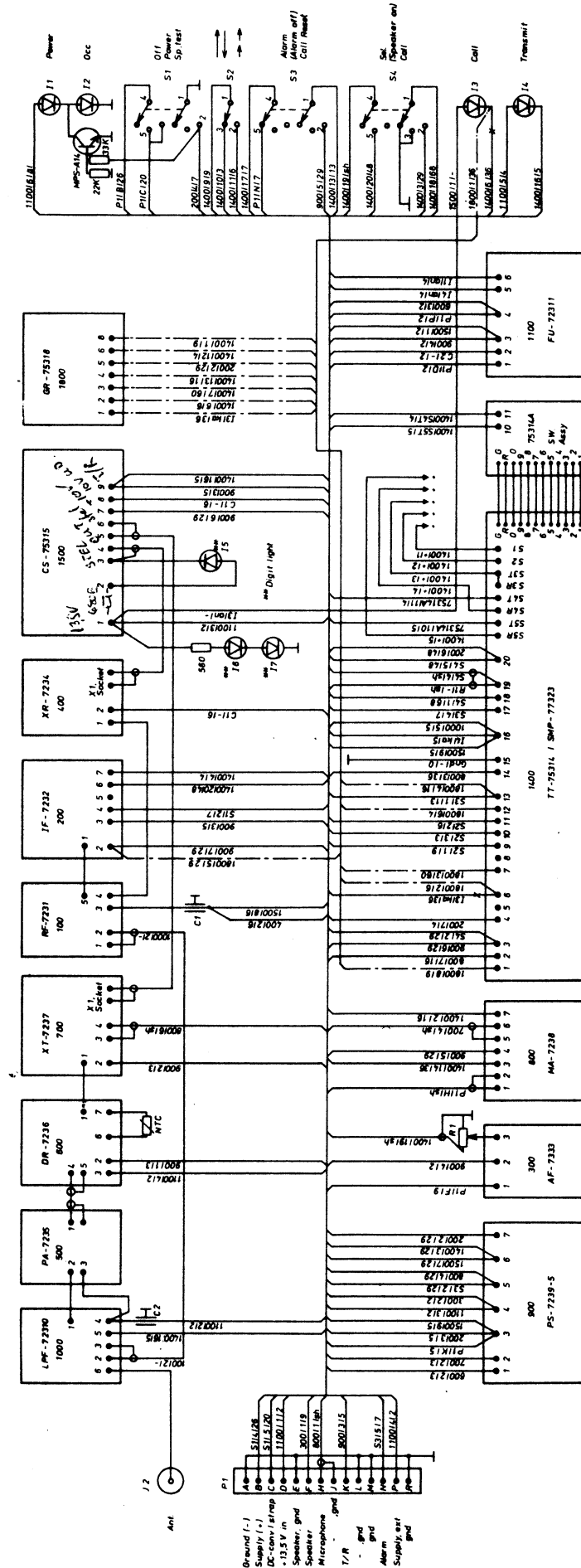


Note  
Wire designation code:  
Block no (or component)/pin no /A/B/C/D/E/F/G/H/I/J/K/L/M/N/O/P/Q/R/S/T/U/V/W/X/Y/Z

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Kanalskift



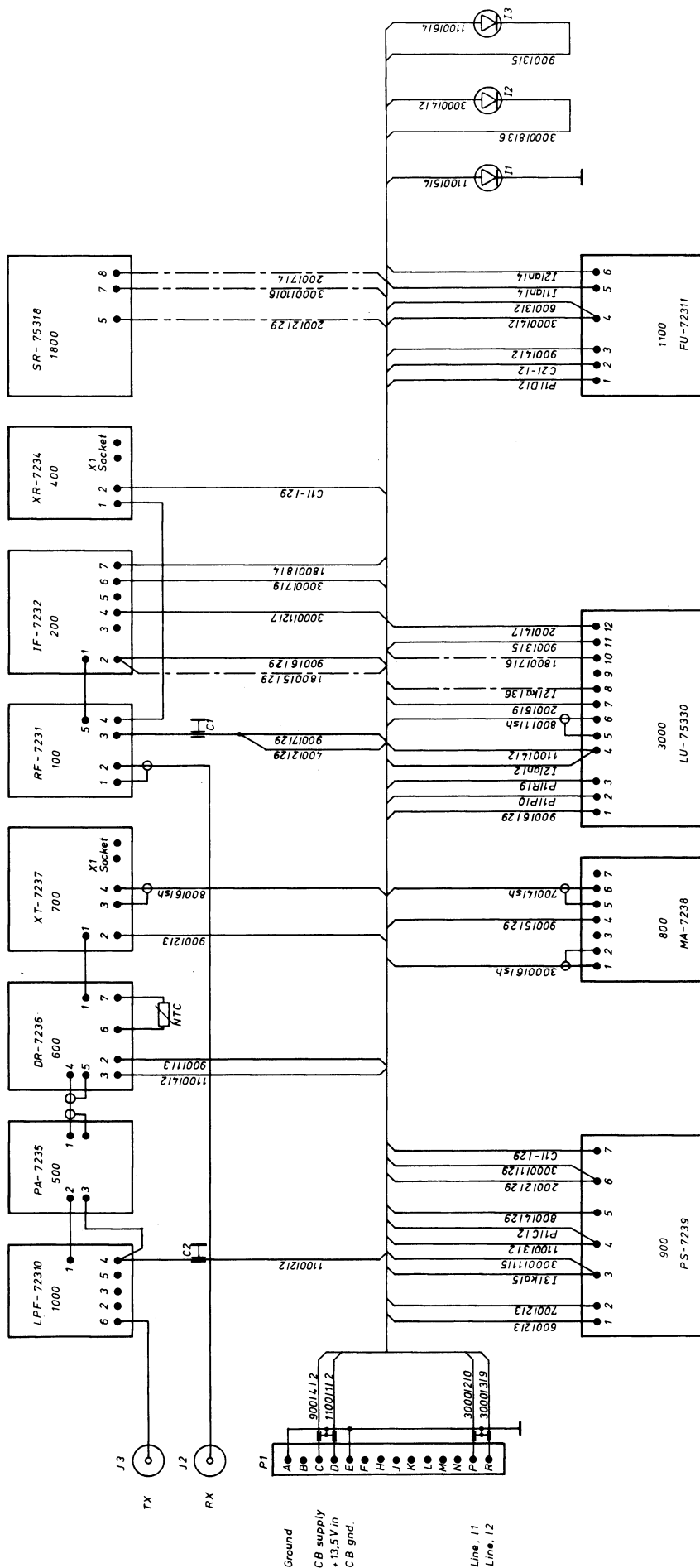
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Cabling diagram  
Mobile 5-tone  
Dwg. no. 7230-63



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Wire destination code:  
Block (for component) / no. / Pin no. / Wire color code

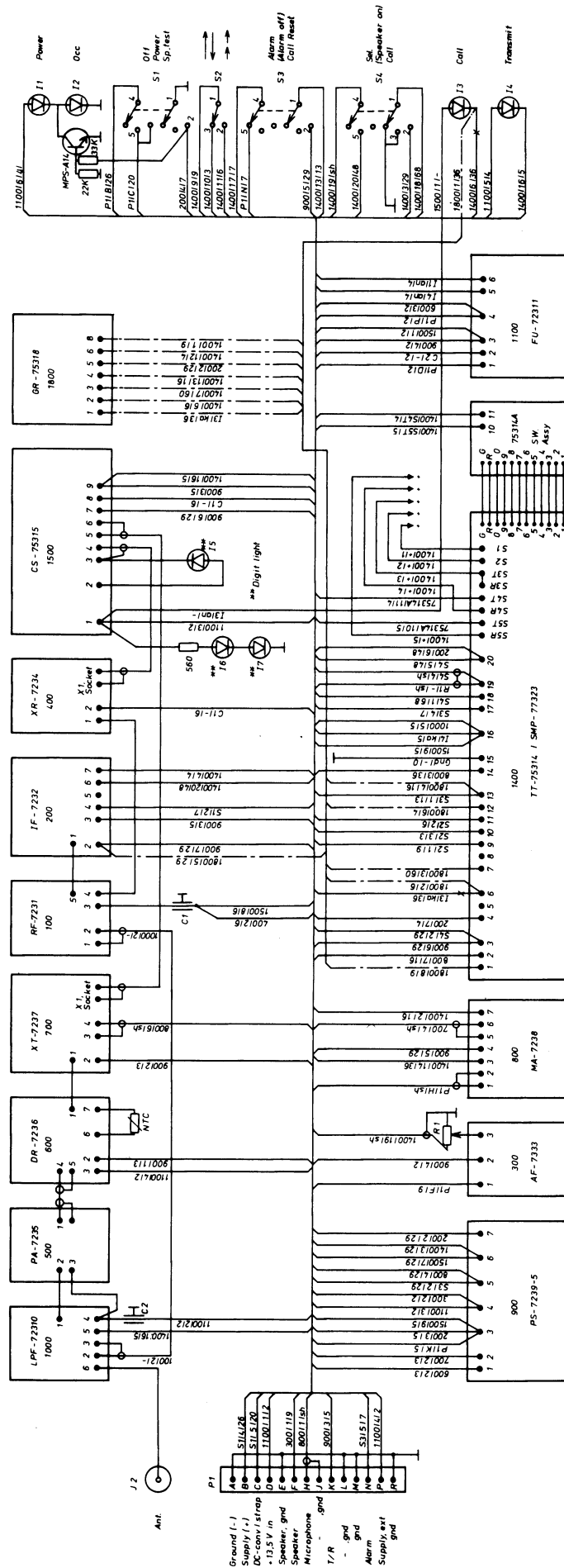
----- Cabling only for Reparter

ZODIAC

Cabling Diagram  
Dwg.no. 7239-64  
Tegn.nr. 9600711

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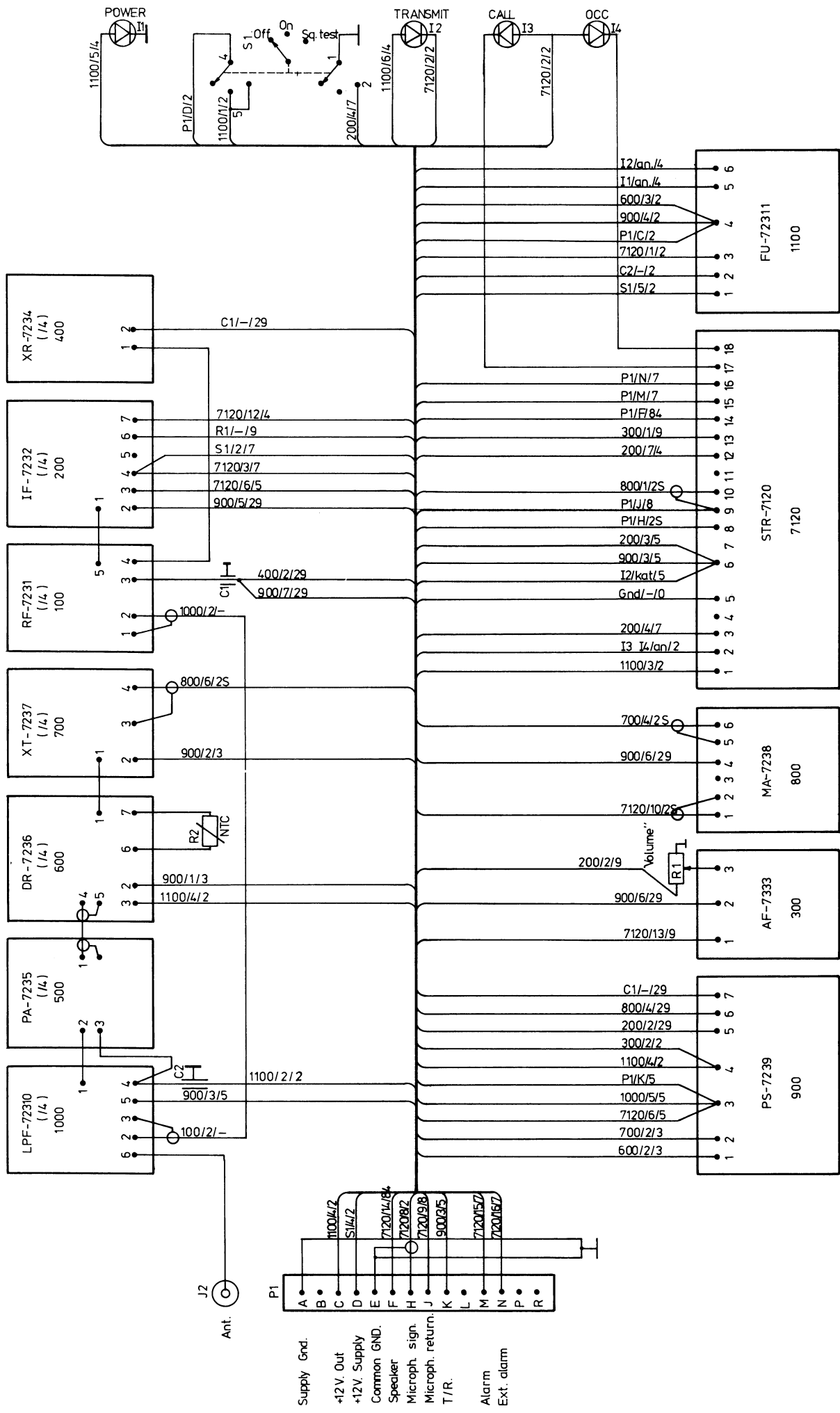


Wire destination code:  
Block (or component) No. /  
Pin no. / Wire color code

X No connection with Group Call  
Cabling only for Group Call  
\* Connected to pin 1 - G, depending on the 5 tone code sequence

## ZODIAC-COMMUNICATIONS

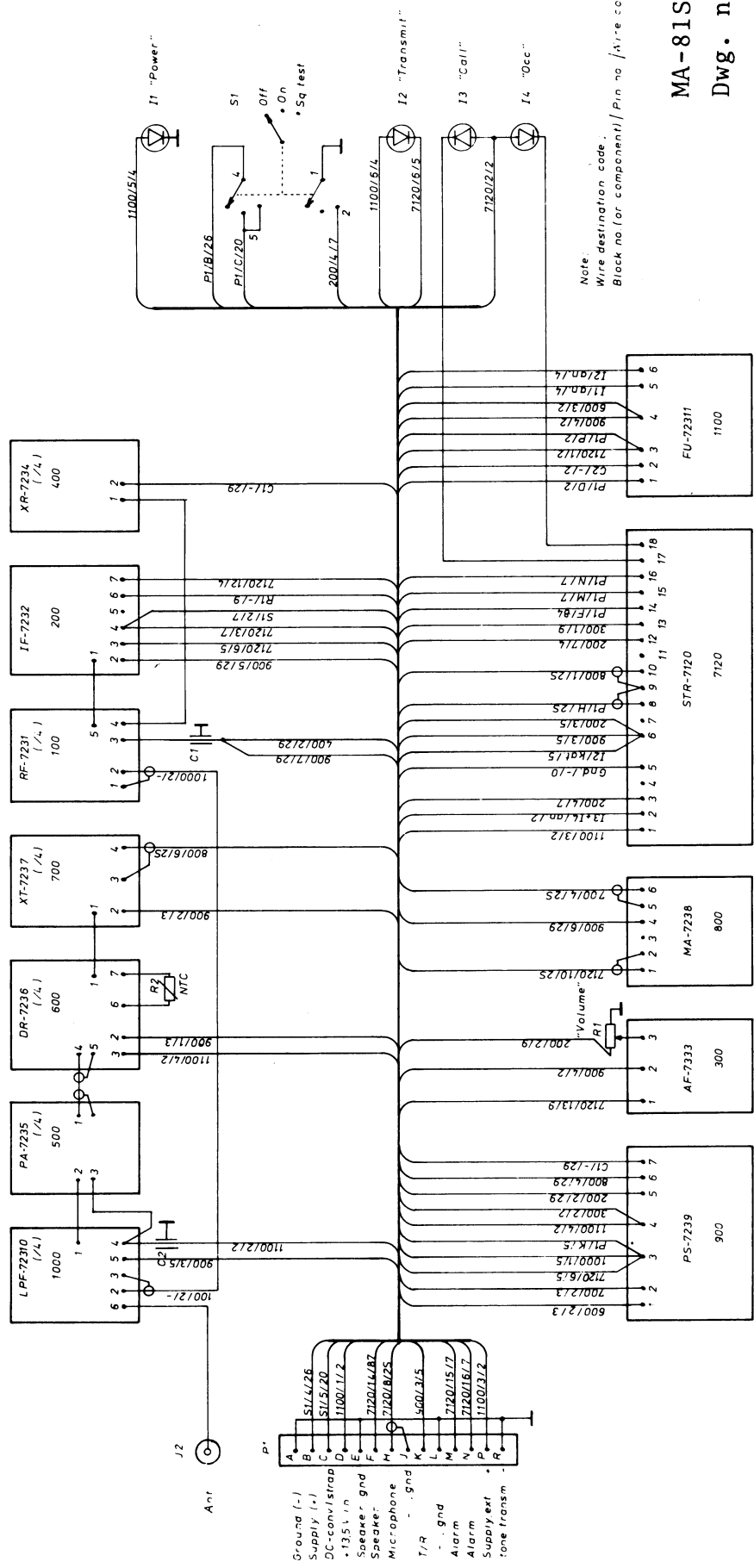
Cabling diagram  
Mobile 5-tone  
Dwg. no. 7230-63



Målestok		Tegn	JHN
Konf		Dato	84.10.12
Matr.		960.2501	
ZODIAC		CABLING DIAGRAM	
		MA 815/161 S	
		CASSETTE	

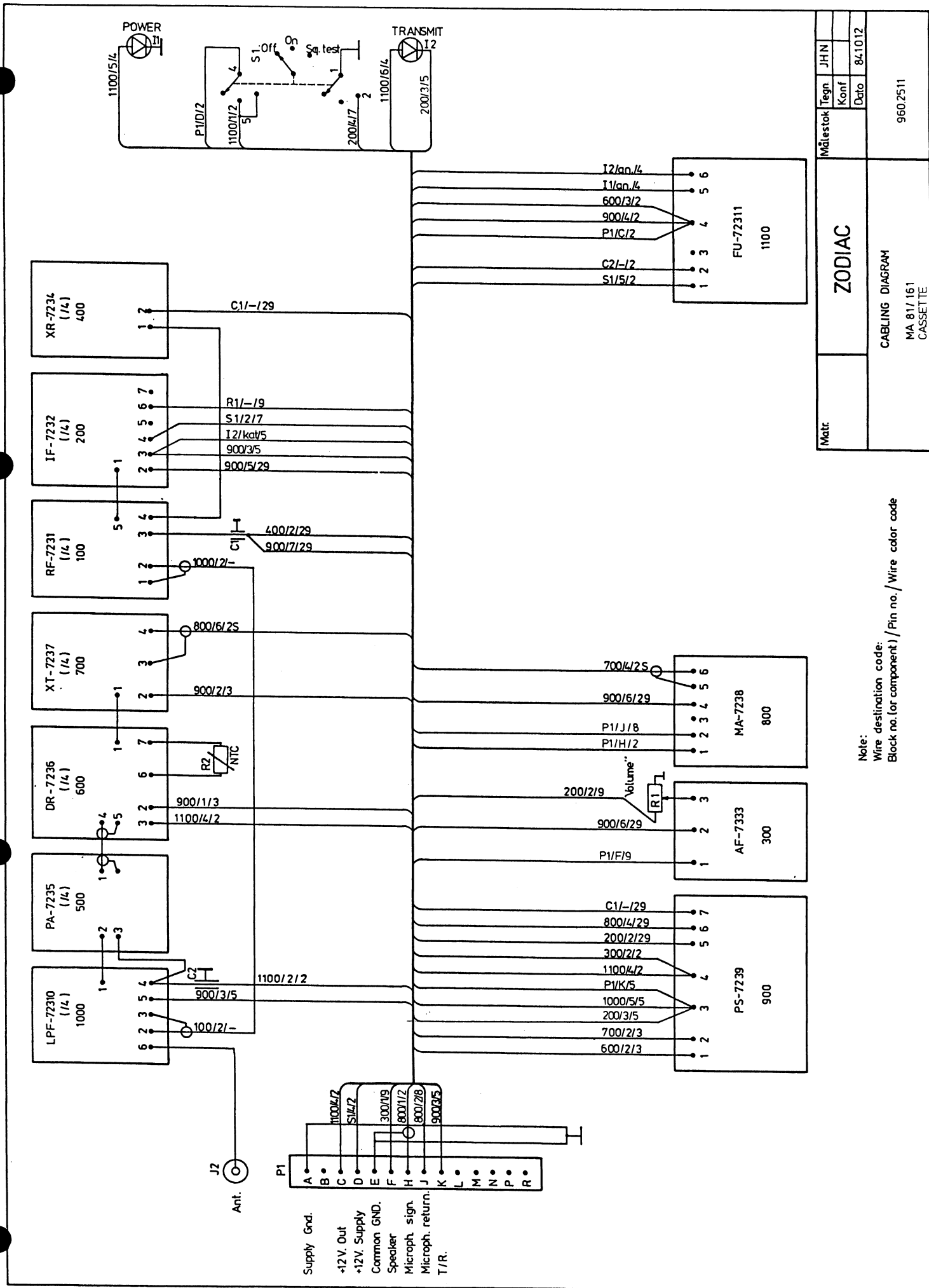
Note:  
Wire destination code:  
Block no. (or component) / Pin no. / Wire color code





Note:  
Wire destination code:  
Block no (or component) / Pin no / Wire color code

MA-81S/-161S  
Dwg. no. 7230-8



Note:  
Wire destination code:  
Block no. (or component) / Pin no. / Wire color code

Matr.	ZODIAC			960.2511
	Målestok	Tegn	JHN	
	CABLING DIAGRAM			MA 81/161 CASSETTE
	Konf	Dato	84.10.12	

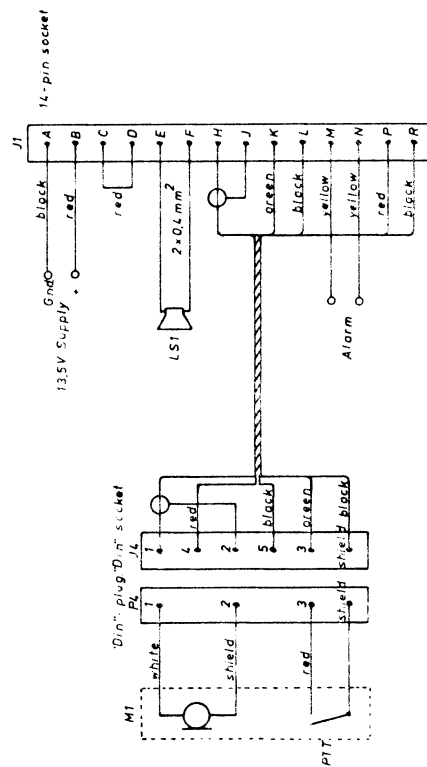




Kasette. m.k.

Huid	-	
Stem	-	
Gras	-	K - T/R.
Gul	-	/ HT.
BOET	-	
RED	-	Ext. Pad.
BROWN	-	H - M.K
Stem	-	J. -

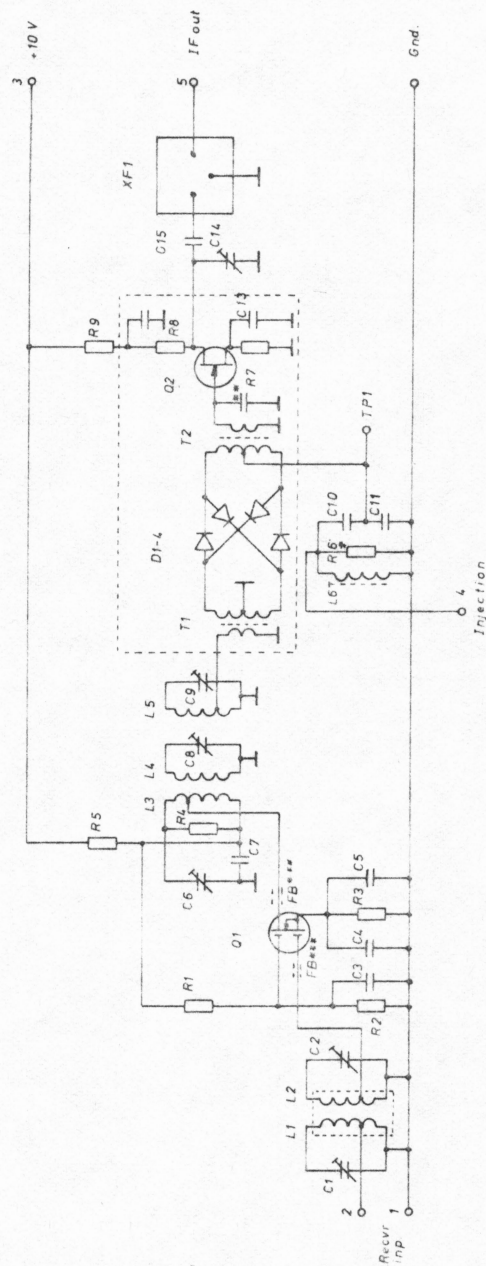




External cabling  
MA-81/-161

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\* selected value  
 \*\* only used in 4-meter version  
 \*\*\* not used in 4-meter version

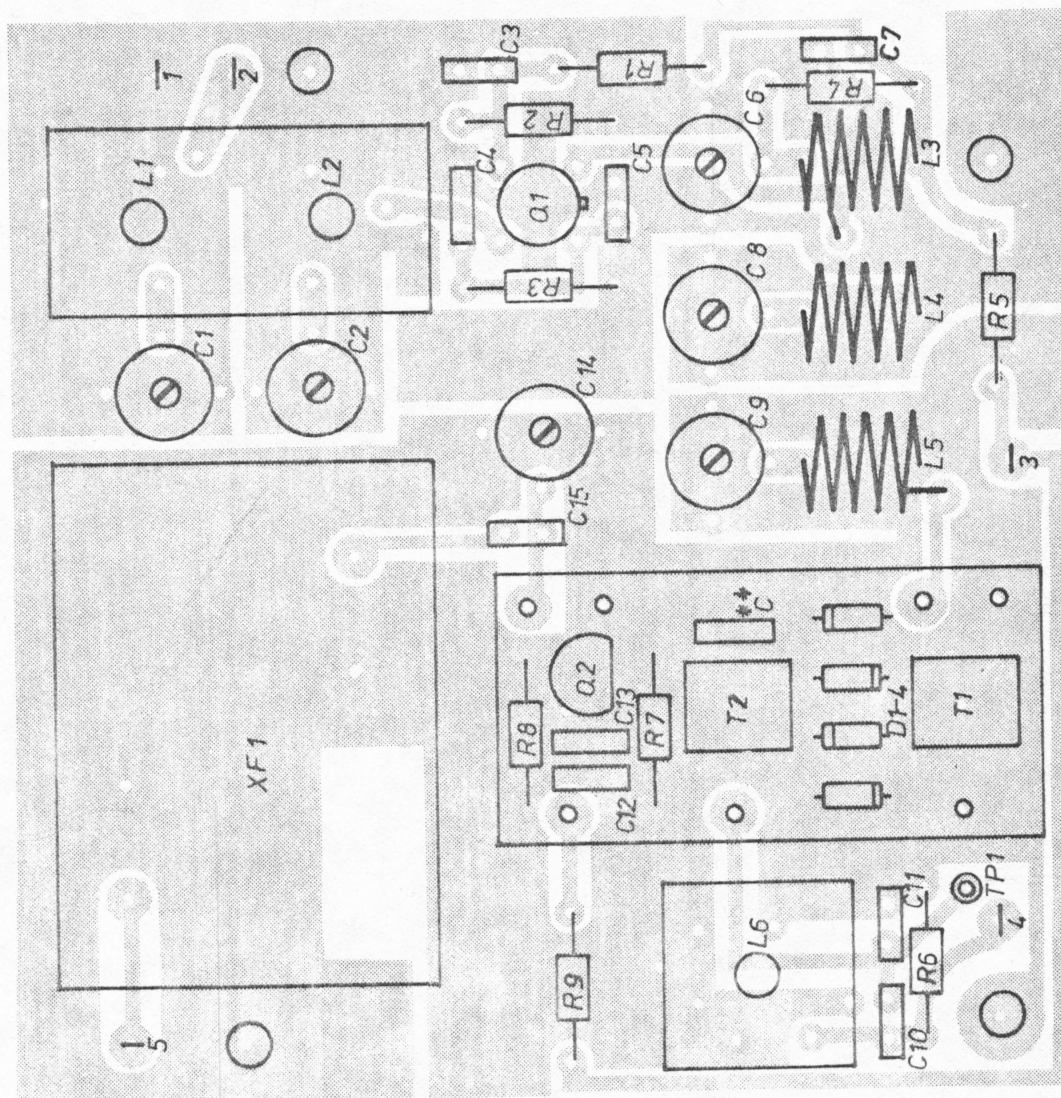
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RF-unit  
 RF-7231 (/4)  
 Dwg.no.7231-2



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**ZODIAC-COMMUNICATIONS**

RF-unit  
RF-7231 (1/4)  
Dwg. no. 7231-2

# Component List

RF-unit - RF-7231

<u>Ckt. Symbol</u>	<u>Description</u>	<u>Value or type</u>
Q1	Transistor	3N2o4
Q2	-	TIS88A
D1	Diode	MBD 1o2 (HP 5o82 28o6 )
D2	-	MBD 1o2
D3	-	MBD 1o2
D4	-	MBD 1o2
XF1	Crystal filter	ITT 445 LQU 9o1 BM
R1	Resistor	33K 1/8 W
R2	-	22K
R3	-	22o ohm
R4	-	1oK
R5	-	1oo ohm
<del>R6</del>	-	<del>6,8K</del>
R7	-	1K
R8	-	1K
R9	-	1oo ohm
C1	Trimmer	15 pf
C2	-	15 pf
C3	Capacitor	2,2nf-ceramic
C4	-	2,2nf-ceramic
C5	-	2,2nf-ceramic
C6	Trimmer	15 pf
C7	Capacitor	2,2nf-ceramic
C8	Trimmer	15 pf
C9	-	15 pf
C1o	Capacitor	1o pf-ceramic
C11	-	1oo <del>12o</del> pf-ceramic
C12	-	2,2 nf-ceramic
C13	-	2,2 nf-ceramic
C14	Trimmer	27 pf
C15	Capacitor	2,2 nf-ceramic
T1	Transformer	
T2	-	



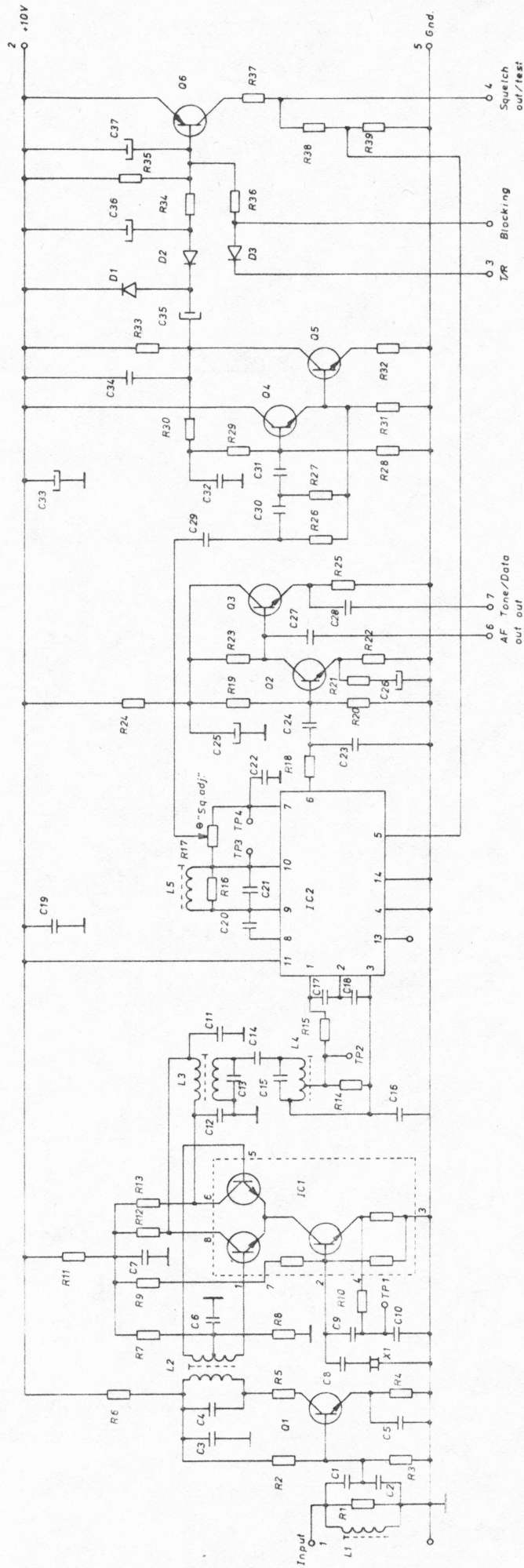
# Component List

## RF-unit - RF-7231/4

<u>Ckt. Symbol</u>	<u>Description</u>	<u>Value or type</u>
Q1	Transistor	40822
Q2	-	TIS 88A
D1	Diode	MBD 102
D2	-	MBD 102
D3	-	MBD 102
D4	-	MBD 102
XF1	Crystal filter	014 BD/901 BM-ITT BP 4130-Cathodeon
R1	Resistor	33K/1/8 W
R2	-	22K
R3	-	220 ohm
R4	-	6,8K
R5	-	100 ohm
R6	-	Selected
R7	-	1K
R8	-	1K
R9	-	100 ohm
C1	Trimmer	27 pf
C2	-	27 pf
C3	Capacitor	2,2 nf-ceramic
C4	-	2,2 nf-ceramic
C5	-	2,2 nf-ceramic
C6	Trimmer	27 pf
C7	Capaciter	2,2 nf-ceramic
C8	Trimmer	27 pf
C9	-	27 pf
C10	Capaciter	22 pf-ceramic
C11	-	150 pf-ceramic
C12	-	2,2 nf-ceramic
C13	-	2,2 nf-ceramic
C14	Trimmer	27 pf
C15	Capaciter	2,2 pf-ceramic

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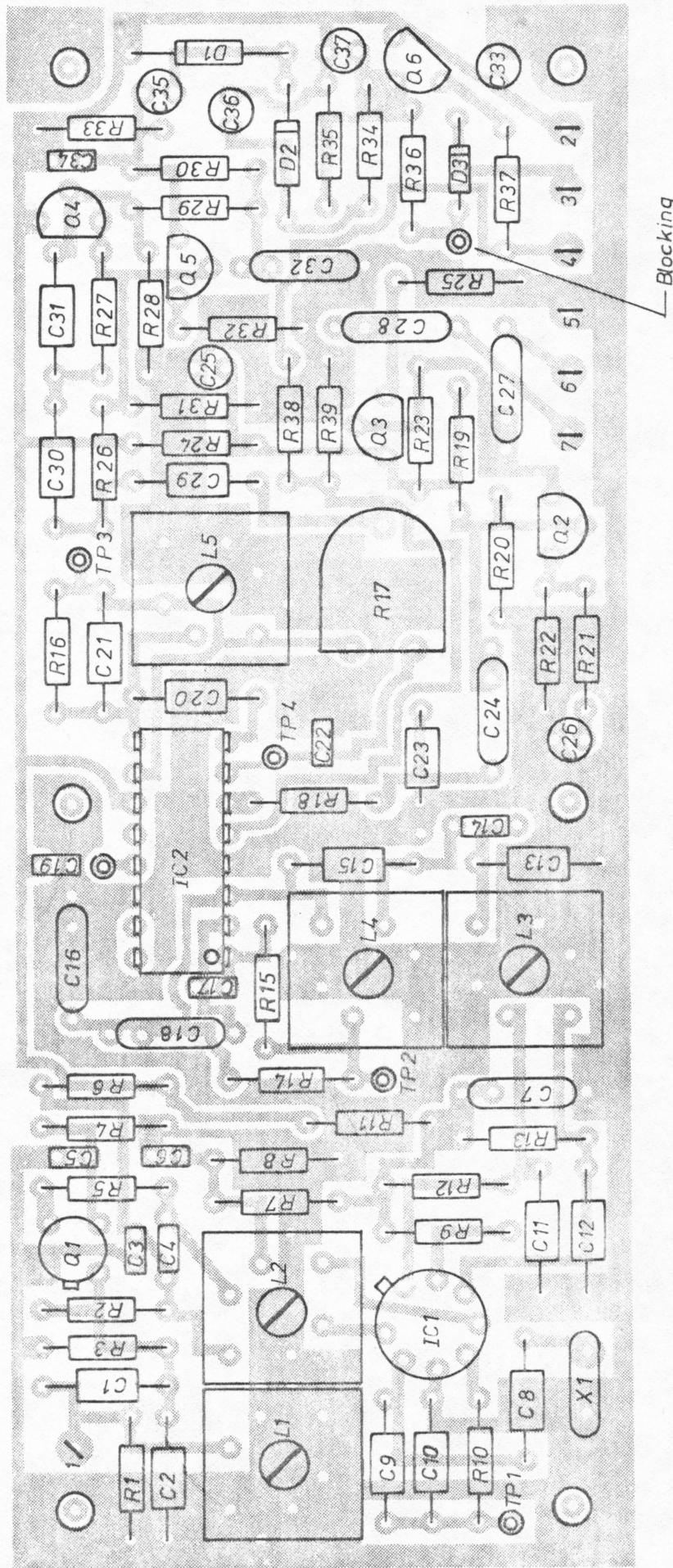
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IF-unit  
IF-7232  
Dwg. no. 7232-2



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# ZODIAC-COMMUNICATIONS

IF-unit  
IF-7232  
Dwg. no. 7232-2

# Component List

IF-unit - IF-7232

Ckt. Symbol	Description	Value or type
IC1	IC	CA 3o53
IC2	IC	CA 3o89E
Q1	Transistor	BF 167
Q2	-	BC 183
Q3	-	BC 183
Q4	-	BC 183
Q5	-	BC 183
Q6	-	BC 213
D1	Diode	AA 143
D2	-	AA 143
D3	-	1N 4148
X1	Krystal HC 18/U	1o.245 or 11.155 Mhz
R1	Resistor	3,9K 1/8 W
R2	-	22K -
R3	-	4,7K -
R4	-	1K -
R5	-	1K -
R6	-	33o ohm
R7	-	1oK
R8	-	1oK
R9	-	4,7K
R1o	-	1o ohm
R11	-	1oo -
R12	-	1,5K
R13	-	1,5K
R14	-	33o ohm
R14	-	33o -
R16	-	3,9K
R17	Trimnepotm.	4,7K
R18	Resistor	2,7K
R19	-	1ooK
R2o	-	22K
R21	-	12o <del>1oo</del> ohm-selected value.
R22	-	1,2K
R23	-	4,7K
R24	-	22o ohm
R25	-	4,7K

# Component List

## IF-unit - IF-7232

Ckt. Symbol	Description	Value or type
R26	Resistor	10K
R27	-	10K
R28	-	39K
R29	-	68K
R30	-	39K
R31	-	4,7K
R32	-	220 Ohm
R33	-	4,7 K
R34	-	12K
R35	-	12K
R36	-	47K
R37	-	4,7K
R38	-	22K
R39	-	22K
C1	Capacitor	680 pf
C2	-	680 pf
C3	-	4,7 nf-ceramic
C4	-	47 pf-ceramic
C5	-	4,7 nf-ceramic
C6	-	4,7 nf-ceramic
C7	-	100 nf-polyester
C8	-	47 pf-styroflex
C9	-	220 pf-styroflex
C10	-	120 pf-styroflex
C11	-	220 pf-styroflex
C12	-	220 pf-styroflex
C13	-	1,6 nf-styroflex
C14	-	56 pf-ceramic
C15	-	1,6 nf-styroflex
C16	-	100 nf-polyester
C17	-	470 pf-ceramic
C18	-	100 nf-polyester
C19	-	2,2 nf-ceramic
C20	-	68 pf-styroflex
C21	-	1,6 nf-styroflex
C22	-	2,2 nf-ceramic
C23	-	330 nf-polyester



# Component List

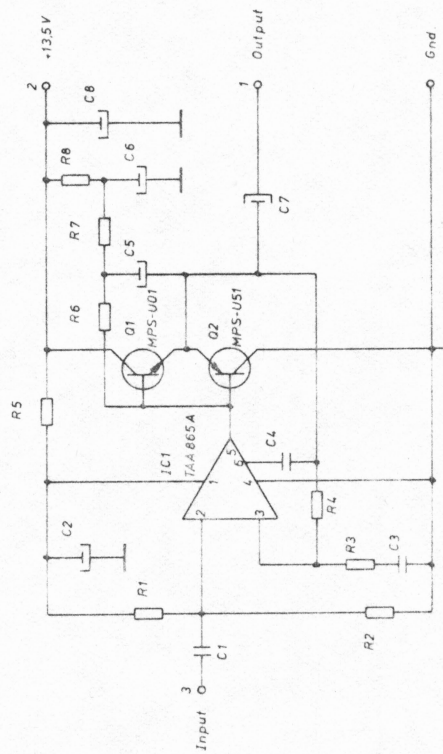
## IF-unit - IF-7232

Ckt. Symbol	Description	Value or type
C24	Capacitor	220 nf-polyester
C25	-	22 uF/16V-tantal
C26	-	22 - - -
C27	-	100 nf-polyester
C28	-	100 nf-polyester
C29	-	1,6 nf-styroflex
C30	-	1,6 nf-styroflex
C31	-	1,6 nf-styroflex
C32	-	100 nf-polyester
C33	-	22 uF/16V-tantal
C 34	-	2,2 nf-ceramic
C35	-	1 uF/16V-tantal
C36	-	1 uF/16V-tantal
C37	-	1 uF/16V-tantal
L1	Coil	
L2	-	
L3	-	
L4	-	
L5	-	



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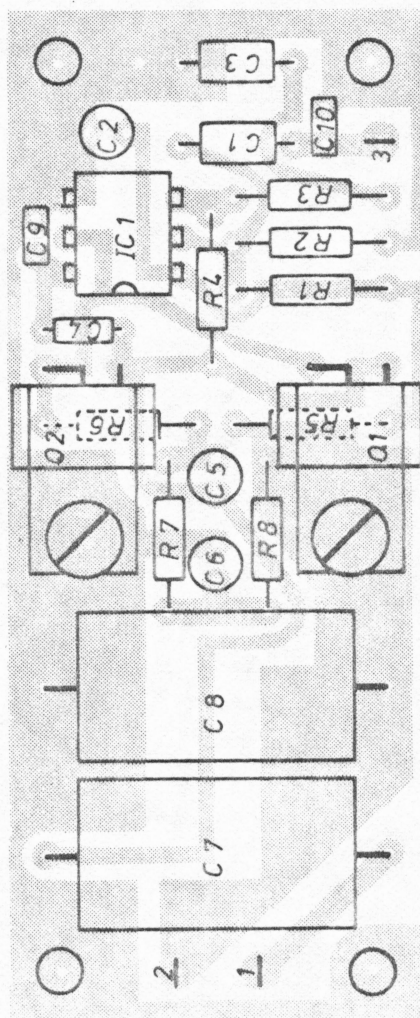


**ZODIAC-COMMUNICATIONS**

AF - amplifier  
AF - 7333  
Dwg. no. 7333-2

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**ZODIAC-COMMUNICATIONS**

AF - amplifier  
AF - 7333  
Dwg. no. 7333-2

# Component List

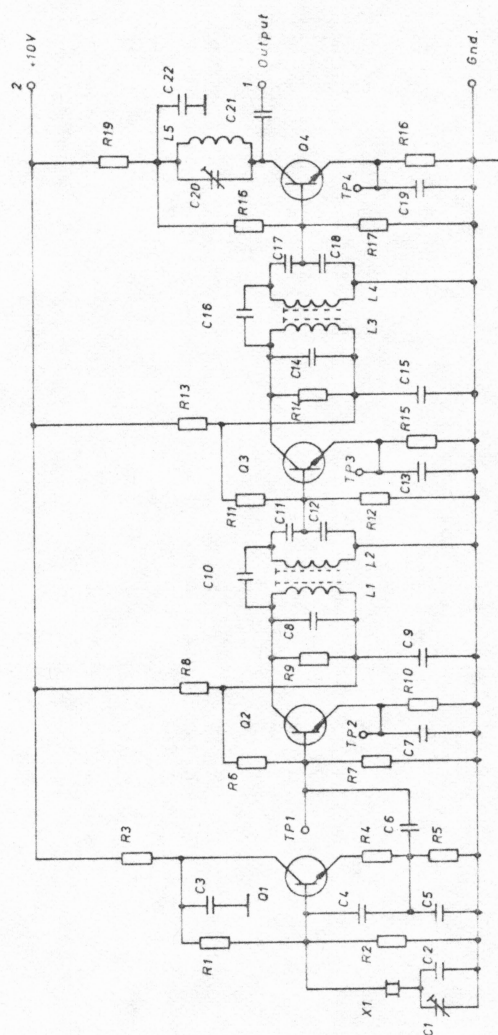
## AF-amplifier - AF-7333

Ckt. Symbol	Description	Value or type
IC1	IC	TAA865A (TAA765)
Q1	Transistor	MPS-U01 (BD 461 )
Q2	-	MPS-U51 (BD 462 )
R1	Resistor	150K/1/8W
R2	-	220K
R3	-	22K
R4	-	220K
R5	-	2,2K
R6	-	100 ohm
R7	-	100 -
R8	-	47 -
C1	Capacitor	100 nf
C2	-	22uF/16 V -tantal
C3	-	100 nf
C4	-	47 pf-ceramic
C5	-	22 uF/10V-tantal
C6	-	22 uF/16V-tantal
C7	-	220 uF/16V
C8	-	220 uF/16V



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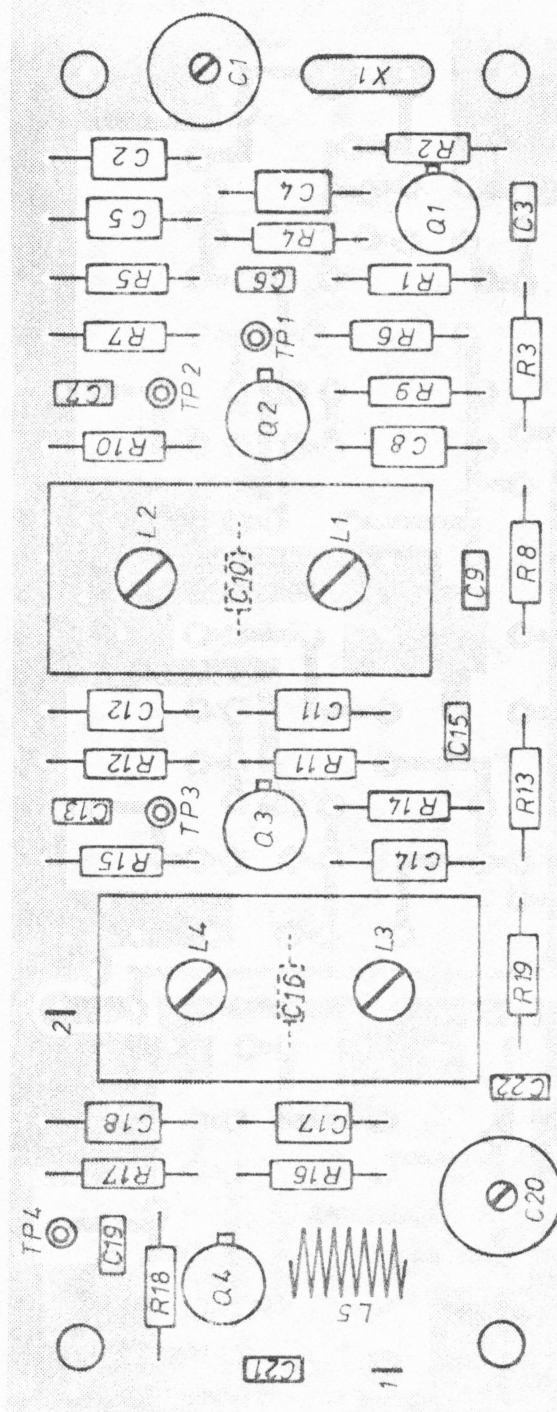
**ZODIAC-COMMUNICATIONS**

Receiver Osc./Multiplier  
XR - 7234  
Dwg. no. 7234-2



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**ZODIAC-COMMUNICATIONS**

Receiver Osc./Multiplier  
XR-7234  
Dwg. no. 7234-2

# Component List

## Receiver Osc. Multiplier - XR-7234

Ckt. Symbol	Description	Value or type
Q1	Transistor	BF 185
Q2	-	BF 185
Q3	-	BF 185
Q4	-	BSX 2o ( 2N2369A)
R1	Resistor	22K/1/8 W
R2	-	1oK
R3	-	27o ohm
R4	-	1o -
R5	-	1,5K
R6	-	1oK
R7	-	2,2K
R8	-	27o ohm
R9	-	1oK
R1o	-	47o ohm
R11	-	1oK
R12	-	1K
R13	-	27o ohm
R14	-	1oK
R15	-	47o ohm
R16	-	1oK
R17	-	1K
R18	-	22o ohm
R19	-	27o -
C1	Trimmer	27 pf
C2	Capacitor	33 pf-styroflex
C3	-	4,7 nf-ceramic
C4	-	22o pf-styroflex
C5	-	12o pf-styroflex
C6	-	2,2 nf-ceramic
C7	-	4,7 nf-ceramic
C8	-	51 pf-styroflex
C9	-	4,7 nf-ceramic
C1o	-	1 pf-ceramic
C11	-	68 pf-styroflex
C12	-	2oo pf-styroflex
C13	-	2,2 nf-ceramic
C14	-	22 pf-styroflex

# Component List

## Receiver Osc. Multiplier - XR-7234

Ckt. Symbol	Description	Value or type
C15	Capacitor	4,7 nf-ceramic
C16	-	0,5 pf-ceramic
C17	-	33 pf-styroflex
C18	-	68 pf-styroflex
C19	-	2,2 nf-ceramic
C20	Trimmer	15 pf
C21	Capacitor	0,5 pf-ceramic
C22	-	4,7 nf-ceramic
L1-2	Coil	
L3-4	-	
L5	-	



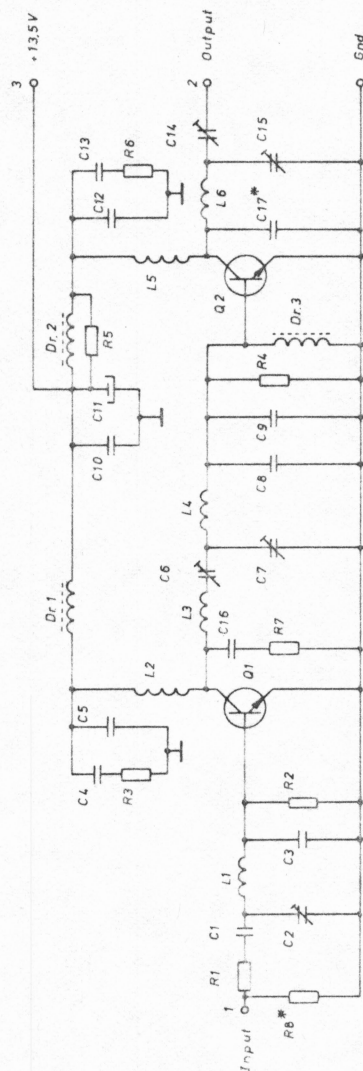
Receiver Osc. / Multiplier - XR - 7234/4

<u>Ckt. Symbol</u>	<u>Description</u>	<u>Value or Type</u>
Q1	Transistor	BF 495
Q2	-	BF 495
Q4	-	BSX 2o
R1	Resistor	22 K 1/8 W
R2	-	1o K -
R3	-	27o Ohm -
R4	-	1o Ohm -
R5	-	1,5 K -
R6	-	1o K -
R7	-	2,2 K -
R8	-	27o Ohm -
R9	-	1o K -
R1o	-	47o Ohm -
R16	-	1o K -
R17	-	1 K -
R18	-	22o Ohm -
R19	-	27o Ohm -
R2o	-	22o Ohm -
C1	Trimmer	27 pf
C2	Capacitor	33 pf - styroflex
C3	-	4,7 nf - ceramic
C4	-	22o pf - styroflex
C5	-	12o pf - styroflex
C6	-	2,2 nf - ceramic
C7	-	4,7 nf - ceramic
C8	-	51 pf - styroflex
C9	-	4,7 nf - ceramic
C1o	-	1,5 pf - ceramic
C11	-	68 pf - styroflex
C12	-	2oo pf - styroflex
C19	-	2,2 nf - ceramic
C2o	Trimmer	27 pf
C21	Capacitor	1 pf - ceramic
C22	-	4,7 nf - ceramic



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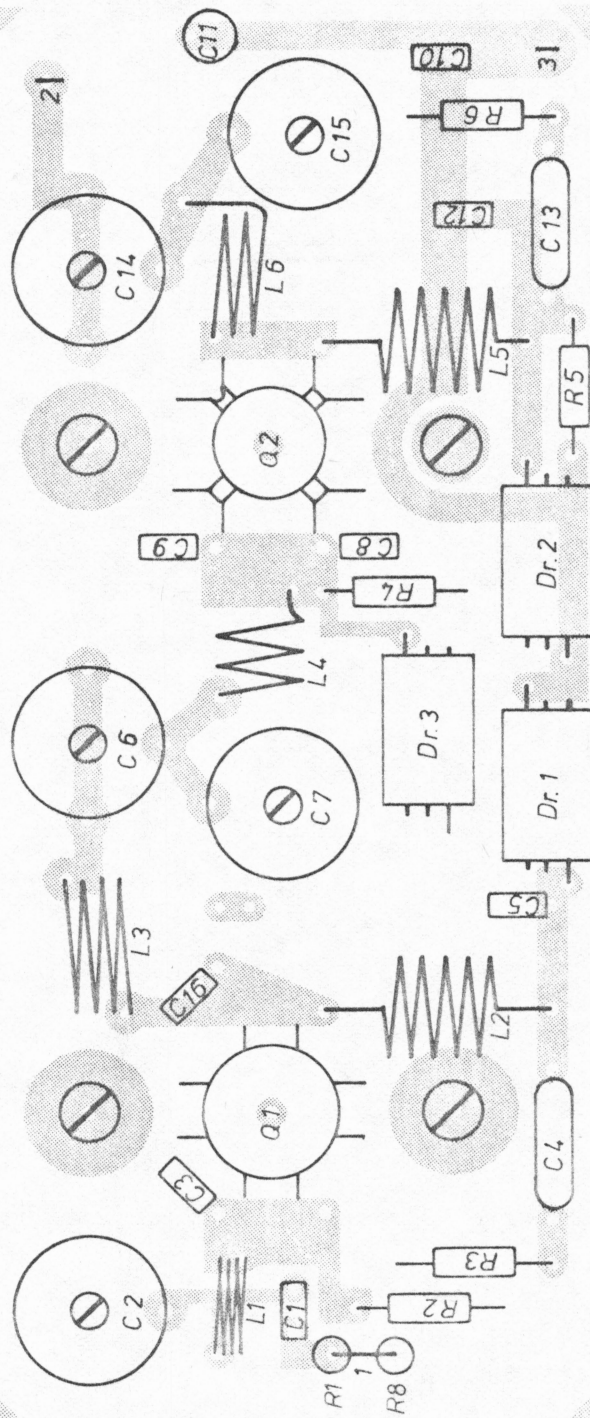
\* only used in 4-meter version

ZODIAC-COMMUNICATIONS

Power Amplifier  
PA-7235 (1/4)  
Dwg. no. 7235-3

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# ZODIAC-COMMUNICATIONS

Power Amplifier  
PA-7235 (1/4)  
Dwg. no. 7235-3

# Component List

## Power Amplifier - PA-7235

<u>Ckt. Symbol</u>	<u>Description</u>	<u>Value or type</u>
Q1	Transistor	BLY87A-Philips
Q2	-	B25-12-CTC
R1	Resistor	10 ohm/1/8 W
R2	-	10 -
R3	-	10 -
R4	-	47 -
R5	-	10 -
R6	-	10 -
C1	Capacitor	22 pf-ceramic
C2	Trimmer	60 pf
C3	Capacitor	47 pf-ceramic
C4	-	0,1 uF
C5	-	100 pf-ceramic
C6	Trimmer	60 pf
C7	-	60 pf
C8	Capacitor	100 pf-ceramic
C9	-	100 pf-ceramic
C10	-	4,7nf-ceramic
C11	-	22 uF/16V-tantal
C12	-	100 pf-ceramic
C13	-	0,1 uF
C14	Trimmer	60 pf
C15	-	60 pf
DR1	RF-choke	4,5 uH
DR2	-	4,5 uH
DR3	-	4,5 uH
R7	Resistor	10 ohm
C16	Capacitor	4,7pF



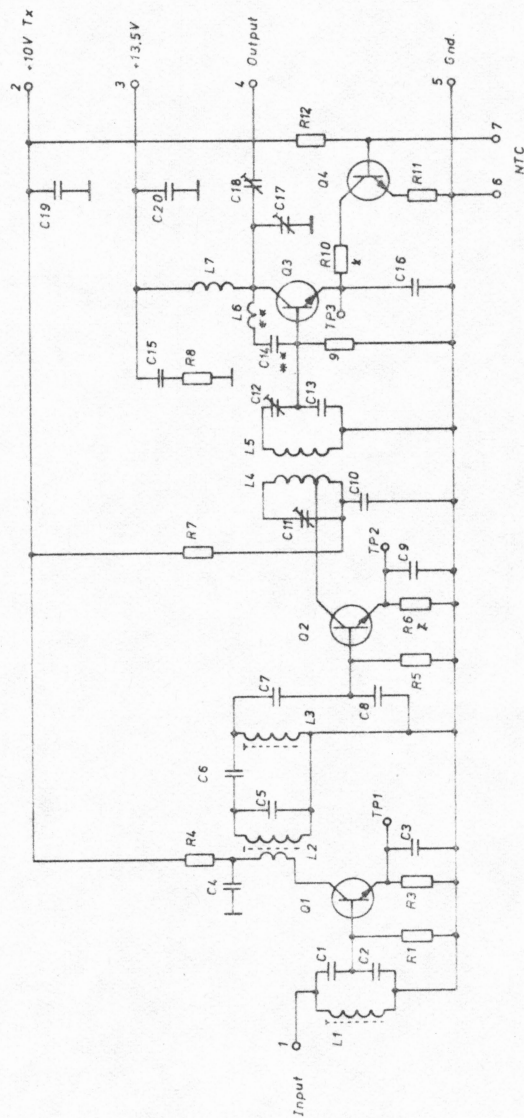
Power Amplifier - PA - 7235/4

<u>Ckt. Symbol</u>	<u>Description</u>	<u>Value or Type</u>
Q1	Transistor	BLY 87 A - Philips
Q2	-	B 25 - 12 - CTC
R1	Resistor	47 Ohm 1/8 W ( selected )
R2	-	10 Ohm -
R3	-	10 Ohm -
R4	-	47 Ohm -
R5	-	10 Ohm -
R6	-	10 Ohm -
R7	-	10 Ohm -
R8	-	100 Ohm -
C1	Capacitor	15 pf - ceramic
C2	Trimmer	60 pf
C3	Capacitor	47 pf - ceramic
C4	-	100 nf
C5	-	220 pf - ceramic
C6	Trimmer	60 pf
C7	-	60 pf
C8	Capacitor	47 pf - ceramic
C9	-	47 pf - céramic
C10	-	4,7 nf - ceramic
C11	-	22 µf/16 V - tantal
C12	-	220 pf - ceramic
C13	-	100 nf
C14	Trimmer	60 pf
C15	-	60 pf
C16	Capacitor	10 pf - ceramic
C17	-	47 pf - ceramic
DR1	RF-choke	4,5 µH
DR2	-	4,5 µH
DR3	-	4,5 µH



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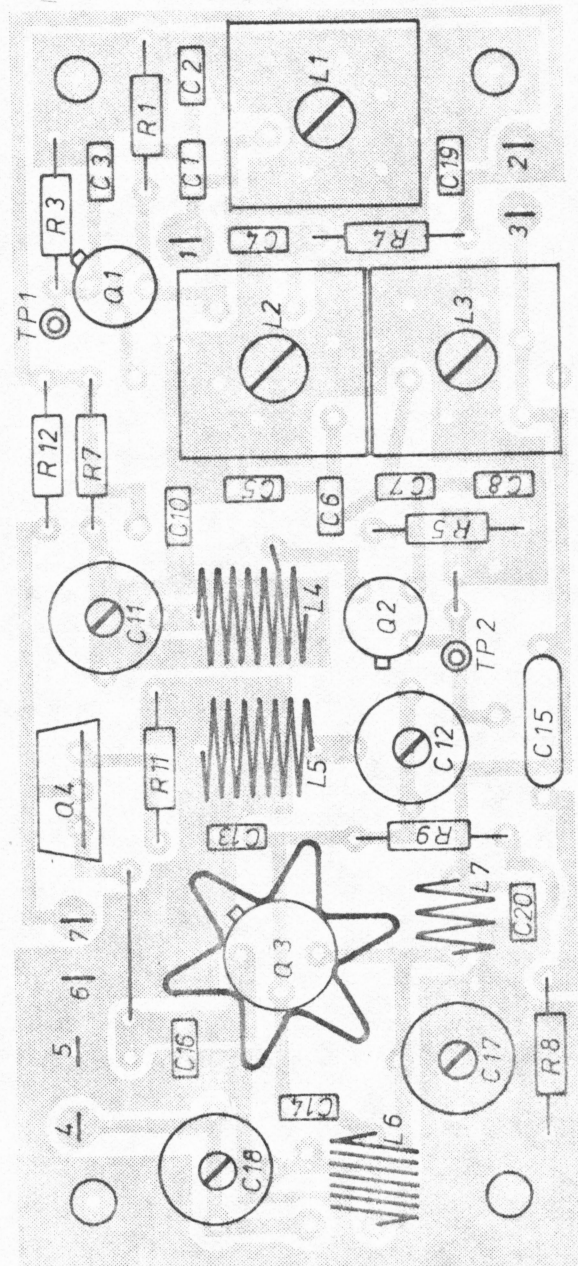
\* Value selected for  $P_o = 0.5 \text{ W} - 0.75 \text{ W}$   
 \*\* not used in 4-meter version

ZODIAC-COMMUNICATIONS

Driver  
 DR-7236 (/4)  
 Dwg.no. 7236-2

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ZODIAC-COMMUNICATIONS

Driver  
DR-7236(1/4)  
Dwg.no. 7236-2

# Component List

## Driver - DR-7236

<u>Ckt. Symbol</u>	<u>Description</u>	<u>Value or type</u>
Q1	Transistor	BSX 2o
Q2	-	BSX 2o
Q3	-	2N4427-TRW
Q4	-	MPS-U01 ( U05 )
R1	Resistor	1K/1/8 W
R3	-	100 ohm
R4	-	47 -
R5	-	33o -
R6	-	( 15 - ) selected for
R7	-	22 - Po=0,5 -0,75W
R8	-	1o -
R9	-	22 - 47 ohm
R1o	-	Selected for Po=0,5-0,
R11	-	1 ohm
R12	-	1,8 K
C1	Capacitor	27 pf-ceramic
C2	-	68 pf-ceramic
C3	-	2,2 nf-ceramic
C4	-	4,7 nf-ceramic
C5	-	8,2 pf-ceramic
C6	-	o,5 pf-ceramic
C7	-	12 pf-ceramic
C8	-	33 pf-ceramic
C9	-	2,2 nf-ceramic
C1o	-	4,7 nf-ceramic
C11	Trimmer	15 pf
C12	-	15 pf
C13	Capacitor	68 pf-ceramic
C14	-	4,7 nf-ceramic
C15	-	100 nf
C16	-	2,2 nf-ceramic
C17	Trimmer	27 pf
C18	-	27 pf
C19	Capacitor	4,7 nf-ceramic
C2o	-	2,2 nf-ceramic

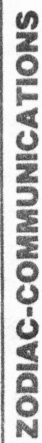


Driver - DR - 7236/4

<u>Ckt. Symbol</u>	<u>Description</u>	<u>Value or Type</u>
Q1	Transistor	BSX 2o
Q2	-	BSX 2o
Q3	-	2N4427 -
Q4	-	MPS-Uo1 ( Uo5 )
R1	Resistor	1 K 1/8 W
R3	-	100 Ohm -
R4	-	47 Ohm -
R5	-	330 Ohm -
R7	-	22 Ohm -
R8	-	10 Ohm -
R9	-	47 Ohm -
R10	-	( 5,6 Ohm + ) selected
R11	-	1 Ohm -
R12	-	1,8 K -
C1	Capacitor	47 pf - ceramic
C2	-	120 pf - ceramic
C3	-	2,2 nf - ceramic
C4	-	4,7 nf - ceramic
C5	-	18 pf - ceramic
C6	-	1 pf - ceramic
C7	-	27 pf - ceramic
C8	-	68 pf - ceramic
C10	-	4,7 nf - ceramic
C11	Trimmer	27 pf
C12	-	27 pf
C13	Capacitor	120 pf - ceramic
C15	-	100 nf
C16	-	2,2 nf - ceramic
C17	Trimmer / Capacitor	60 pf in par. with 22 pf - cer.
C18	- / -	27 pf in par. with 10 pf - cer.
C19	Capacitor	4,7 nf - ceramic
C20	-	2,2 nf - ceramic

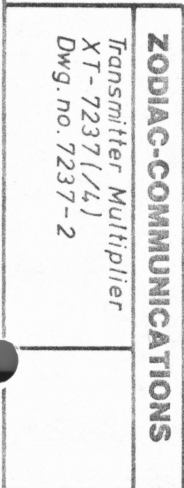


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Transmitter Multiplier  
XT-7237(1/4)  
Dwg. no. 7237-2

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# Component List

## Transmitter Multiplier - XT-7237

Ckt. Symbol	Description	Value or type
Q1	Transistor	BF 185
Q2	-	BF 185
Q3	-	BF 185
Q4	-	BF 185
Q5	-	BSX 20
D1	VV C-diode	MV 2115
D2	-	MV 2115
R1	Resistor	22 K/1/8 W
R2	-	10 K
R3	-	330 ohm
R4	-	10 -
R5	-	2,2K
R6	-	33K
R7	-	10K
R8	-	330 ohm
R9	-	4,7K
R10	-	2,2K
R11	-	100K
R12	-	2,2K
R13	-	10K
R14	-	2,2K
R15	-	100 ohm
R16	-	10K
R17	-	270 ohm
R18	-	<del>8,2K</del> 4,7 K
R19	-	680 ohm
R20	-	47 -
R21	-	5,6K
R22	-	150 ohm
R23	-	680 -
R24	-	100 -
R25	-	47 -
R26	-	220 -
C1	Trimmer	27 pf
C2	Capacitor	33 pf-styroflex
C3	-	220 pf-styroflex
C4	-	120 pf-styroflex



# Component List

## Transmitter Multiplier - XT-7237

<u>Ckt. Symbol</u>	<u>Description</u>	<u>Value or type</u>
C5	Capacitor	4,7 nf-ceramic
C6	-	47 pf-styroflex
C7	-	4,7 nf-ceramic
C8	-	4,7 nf-ceramic
C9	-	10 pf-styroflex
C10	-	3,3 pf-styroflex
C11	-	4,7 nf-ceramic
C12	-	470 pf-ceramic
C13	-	4,7 nf-ceramic
C14	-	56 pf-styroflex
C15	-	4,7 nf-ceramic
C16	-	1,8 pf-ceramic
C17	-	82 pf-styroflex
C18	-	220 pf-styroflex
C19	-	2,2 nf-ceramic
C20	-	39 pf-styroflex
C21	-	4,7 nf-ceramic
C22	-	1,5 pf-ceramic
C23	-	56 pf-styroflex
C24	-	150 pf-styroflex
C25	-	2,2 nf-ceramic
C26	-	18 pf-styroflex
C27	-	4,7 nf-ceramic
C28	-	1 pf- ceramic
L1-2	Coil	
L3-4	-	
L5-6	-	
L5	-	



Transmitter Multiplier - XT - 7237/4

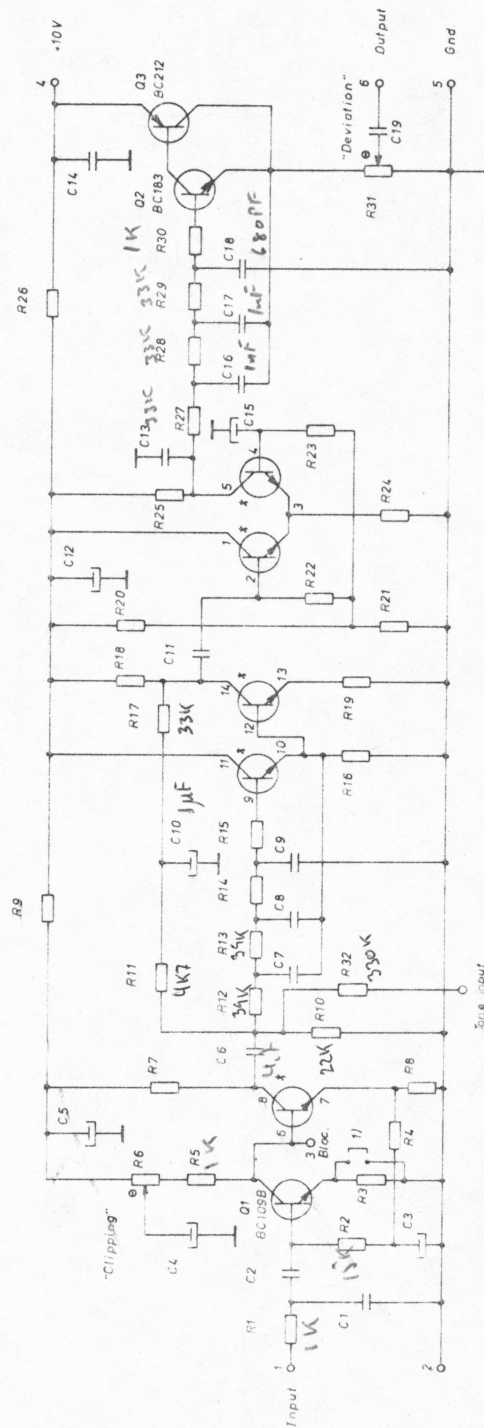
<u>Ckt. Symbol</u>	<u>Description</u>	<u>Value or Type</u>
Q1	Transistor	BF 495
Q2	-	BF 495
Q3	-	BF 495
Q4	-	BF 495
Q5	-	BSX 2o
D1	VVC-diode	MV 2115
D2	-	MV 2115
R1	Resistor	22 K 1/8 W
R2	-	1o K -
R3	-	33o Ohm -
R4	-	1o Ohm -
R5	-	2,2 K -
R6	-	33 K -
R7	-	1o K -
R8	-	33o Ohm -
R9	-	4,7 K -
R1o	-	2,2 K -
R11	-	1oo K -
R12	-	2,2 K -
R13	-	1o K -
R14	-	2,2 K -
R15	-	1oo Ohm -
R16	-	1o K -
R17	-	27o Ohm -
R18	-	4,7 K -
R19	-	68o Ohm -
R2o	-	47 Ohm -
R21	-	5,6 K -
R22	-	15o Ohm -
R23	-	68o Ohm -
R24	-	1oo Ohm -
R25	-	47 Ohm -
R26	-	22o Ohm -

Transmitter Multiplier - XT - 7237/4

<u>Ckt. Symbol</u>	<u>Description</u>	<u>Value or Type</u>
C1	Trimmer	27 pf
C2	Capacitor	33 pf - styroflex
C3	-	220 pf - styroflex
C4	-	120 pf - styroflex
C5	-	4,7 nf - ceramic
C6	-	120 pf - styroflex
C7	-	4,7 nf - ceramic
C8	-	4,7 nf - ceramic
C9	-	10 pf - styroflex or ceramic
C10	-	3,3 pf - styroflex or ceramic
C11	-	4,7 nf - ceramic
C12	-	470 pf - ceramic
C13	-	4,7 nf - ceramic
C14	-	100 pf - styroflex
C15	-	4,7 nf - ceramic
C16	-	3,3 pf - ceramic
C17	-	150 pf - styroflex
C18	-	470 pf - styroflex
C19	-	2,2 nf - ceramic
C20	-	68 pf - styroflex
C21	-	4,7 nf - ceramic
C22	-	2,7 pf - ceramic
C23	-	100 pf - styroflex
C24	-	330 pf - styroflex
C25	-	2,2 nf - ceramic
C26	-	33 pf - styroflex
C27	-	4,7 nf - ceramic
C28	-	1,8 pf - ceramic

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1) Shorting strap for gain set

\* Transistor array CA3046

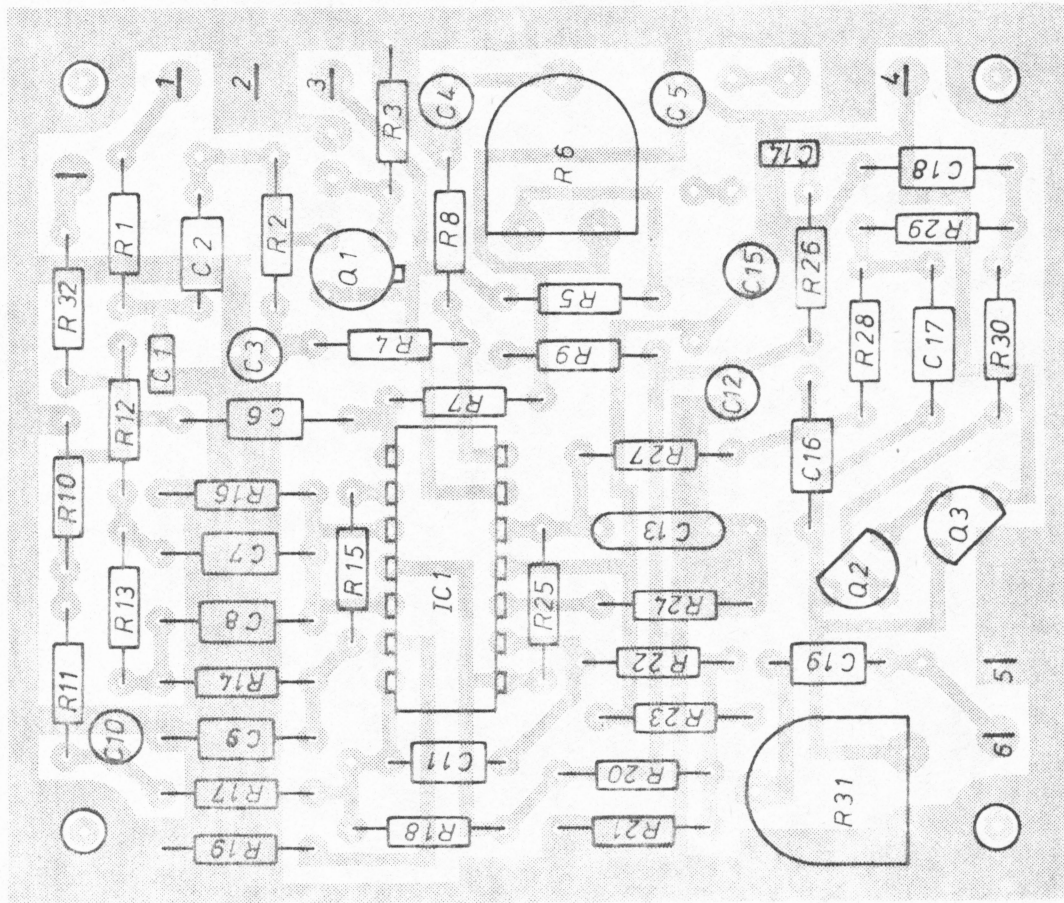
ZODIAC-COMMUNICATIONS

Microphone Amplifier  
MA-7238  
Dwg. no. 7238-2



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**ZODIAC-COMMUNICATIONS**

Microphone Amplifier  
MA-7238  
Dwg. no. 7238-2



# Component List

## Microphone Amplifier - MA-7238

<u>Ckt. Symbol</u>	<u>Description</u>	<u>Value or type</u>
IC1	IC	CA3046-RCA
Q1	Transistor	BC 109
Q2	-	BC 183 (BC 237)
Q3	-	BC 213 (BC 307)
R1	Resistor	1K/1/8 W
R2	-	15K
R3	-	1K
R4	-	15K
R5	-	1K
R6	Trimmerpotm.	22K
R7	Resistor	4,7K
R8	-	1K
R9	-	330 ohm
R10	-	22K
R11	-	4,7K
R12	-	39K
R13	-	39K
R14	-	39K
R15	-	1K
R16	-	39K
R17	-	33K
R18	-	10K
R19	-	330 ohm
R20	-	47K
R21	-	15K
R22	-	15K
R23	-	15K
R24	-	3,9K
R25	-	15K
R26	-	330 ohm
R27	-	33K
R28	-	33K
R29	-	33K
R30	-	1K
R31	Trimmerpotm.	4,7K
R32	Resistor	330K

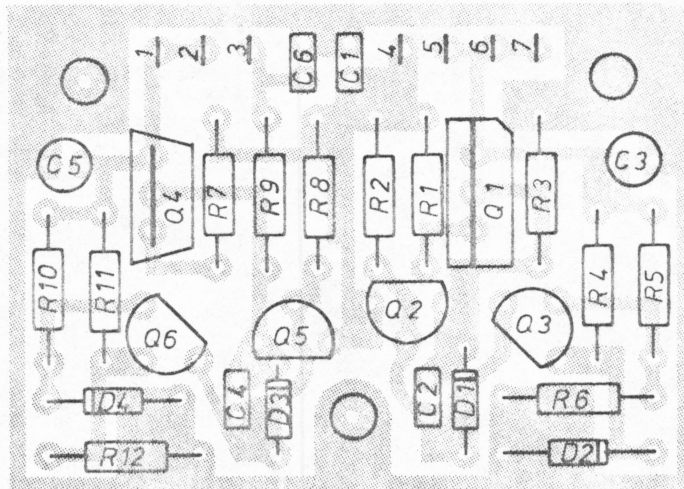
# Component List

## Microphone Amplifier - MA-7238

<u>Ckt. Symbol</u>	<u>Description</u>	<u>Value or type</u>
C1	Capacitor	2,2 nf-ceramic
C2	-	330 nf-polyester
C3	-	22 uf/16V-tantal
C4	-	4,7 uf/16V-tantal
C5	-	22 uf/16V-tantal
C6	-	4,7 nf-styroflex
C7	-	1 nf-styroflex
C8	-	1 nf-styroflex
C9	-	220 pf-styroflex
C10	-	1 uf/16V-tantal
C11	-	330 nf-polyester
C12	-	22 uf/16V-tantal
C13	-	47 nf-polyester
C14	-	4,7 nf-ceramic
C15	-	1 uf/16V-tantal
C16	-	1 nf-styroflex
C17	-	1 nf-styroflex
C18	-	680 pf-styroflex
C19	-	100 nf-polyester

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# **ZODIAC-COMMUNICATIONS**

Voltage Regulator  
PS-7239  
Dwg. no. 7239-2



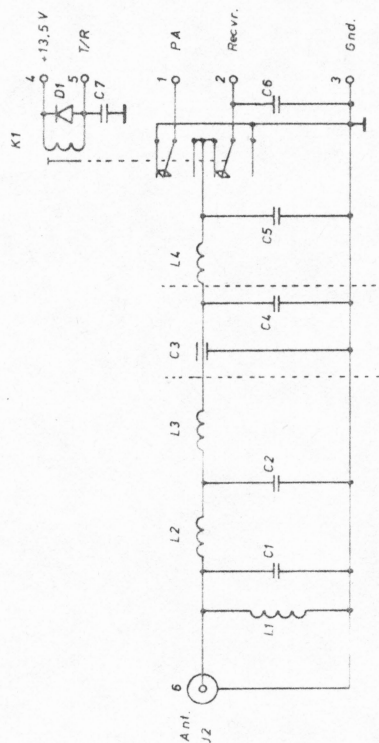
# Component List

## Voltage Regulator - PS-7239

<u>Ckt. Symbol</u>	<u>Description</u>	<u>Value or type</u>
Q1	Transistor	MPS-U51 (U 55 )
Q2	-	BC 213
Q3	-	BC 183
Q4	-	MPS-U51 (U 55 )
Q5	-	BC 213
Q6	-	BC 183
D1	Si-diode	1N 4148
D2	Zener-diode 6,2V	BZX79 C6V2
D3	Si-diode	1N 4148
D4	Zener-diode, 6,2V	BZX79 C6V2
R1	Resistor	5,6 ohm/1/8 W
R2	-	2,2K
R3	-	3,3K
R4	-	2,2K
R5	-	1,8K-selected value
R6	-	3,9K
R7	-	5,6K
R8	-	2,2K
R9	-	3,3K
R10	-	2,2K
R11	-	1,8K-selected value
R12	-	3,9K
C1	Capacitor	2,2 nf-ceramic
C2	-	2,2 nf-ceramic
C3	-	4,7 uF/16V-tantal
C4	-	2,2 nf-ceramic
C5	-	4,7 uF/16V-tantal
C6	-	2,2 nf-ceramic

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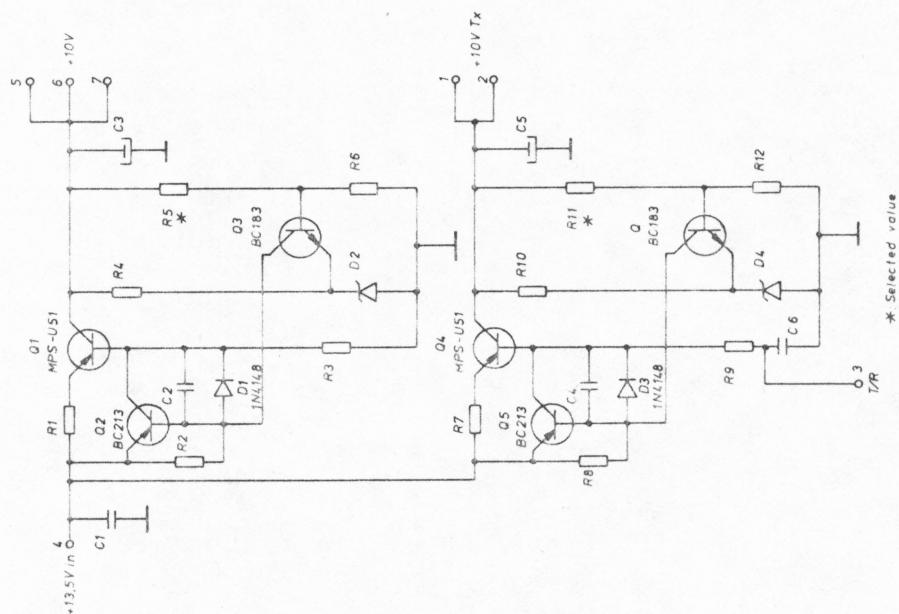


**ZODIAC-COMMUNICATIONS**

Lowpass Filter  
LPF-72310 (/4)  
Dwg. no. 72310

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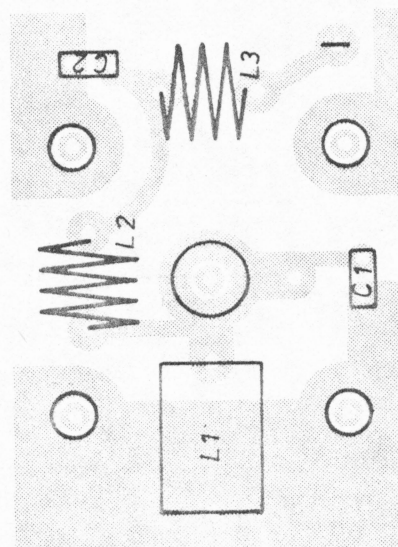


**ZODIAC-COMMUNICATIONS**

Voltage Regulator  
PS-7239  
Dwg. no. 7239-2



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## ZODIAC-COMMUNICATIONS

Lowpass Filter  
LPF-72310 (1/4)  
Dwg. no. 72310

# Component List

## Lowpass Filter - LPF-72310

<u>Ckt. Symbol</u>	<u>Description</u>	<u>Value or type</u>
D1 x)	Diode	LN4148
C1	Capacitor	22 pf-ceramic
C2	-	33 pf-ceramic
C3	Lead through	33 pf
C4	Capacitor	10 pf-ceramic
C5	-	22 pf-ceramic
C6 x)	-	4,7 pf-ceramic
C7 x)	-	2,2 nf-ceramic
K1 x)	Relay	

x) Not used in FA-81F/-161F

## Component List

-1-

Lowpass Filter - LPF - 7231o/4

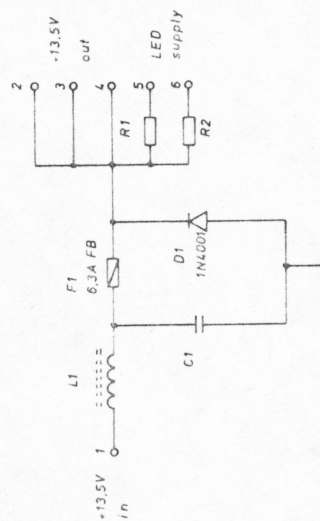
<u>Ckt. Symbol</u>	<u>Description</u>	<u>Value or Type</u>
D1    x)	Diode	1N4148
C1	Capacitor	47 pf - ceramic
C2	-	82 pf - ceramic
C3	Lead trough	33 pf
C4	Capacitor	47 pf - ceramic
C5	-	47 pf - ceramic
C6    x)	-	4,7 pf - ceramic
C7    x)	-	2,2 nf - ceramic
K1    x)	Relay	

x) Not used in BD-743o



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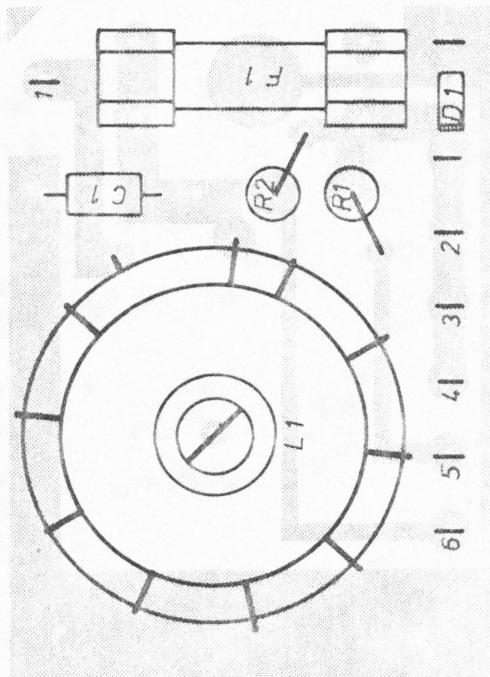


**ZODIAC-COMMUNICATIONS**

Filter Unit  
FU-72311  
Dwg. no. 72311-2

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**ZODIAC-COMMUNICATIONS**

Filter Unit

FU-72311

Dwg.no. 72311-2

## Component List

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### Filter Unit - FU-72311

<u>Ckt. Symbol</u>	<u>Description</u>	<u>Value or type</u>
D1	Diode	1N4001
R1	Resistor	680 ohm/1/4 W
R2	-	680 - -
C1	Capacitor	330 nf-polyester



CS-74313 Channel Switch

The 12 channel unit can be equipped with 12 transmitter crystals, 12 receiver crystals, and consists of a channel switch which is connected to XT 7237 and XR 7234 by coax cables.

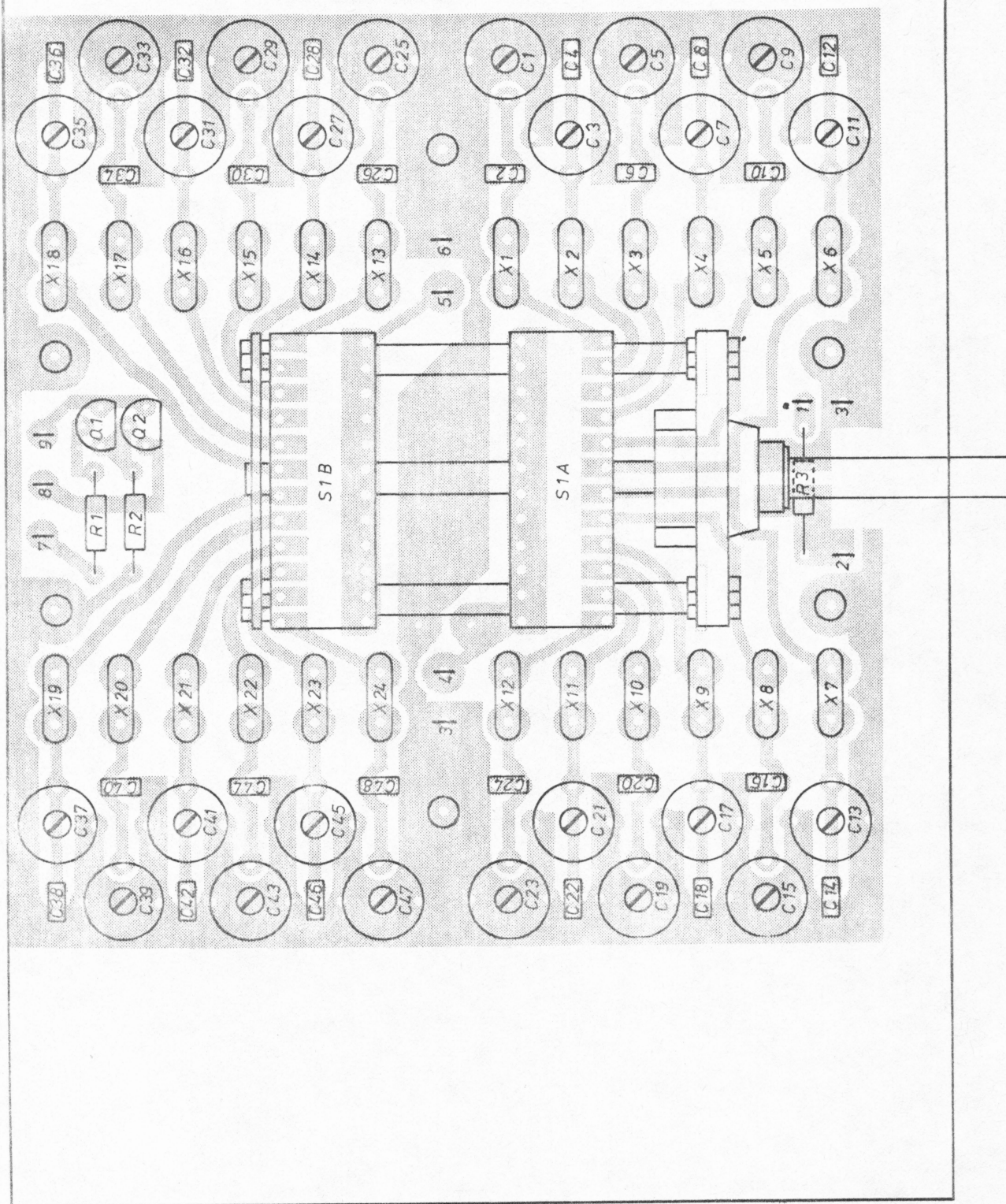
If T/R is grounded during transmission, the power supply to the XR-unit and RF-unit is cut off by the transistors Q1 and Q2 (BC 213).

The LED has the purpose to illuminate the channelselector dial.



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# ZODIAC-COMMUNICATIONS

Channel Switch  
CS-74313  
Dwg. no. 74313-2



## Alignment Procedure

The procedure given below is for a complete alignment. For channels located in the high end of the band, it will be necessary to shorten the iron core in the coils.

### 1. Transmitter

- 1.1 Adjust L1 and L2 in XT-7237 for max. DC-voltage on TP2.
- 1.2 Adjust L3 and L4 in XT-7237 for max. DC voltage on TP3.
- 1.3 Adjust L5 and L6 in XT-7237 for max. DC-voltage on TP4.
- 1.4 Adjust L7/XT-7237 and L1/DR-7236 for max. voltage on TP 1/DR-7236.
- 1.5 Unsolder the coaxial cable connecting DR-7236 and PA-7235 at R1 in PA-7235. Connect at this point a 50 ohm Wattmeter (1 Watt f.s.d.) to the output of DR-7236.  
Set supply voltage to 13.0 V.  
Adjust L2 - L3 - C11 - C12 - C17 - C18 for max. output on Wattmeter.  
If it is not possible to get an indication on the Wattmeter, it might be necessary to make a coarse adjustment of the tuned circuits using an RF-voltmeter, starting from L2, and proceeding towards the output until output is indicated on the Wattmeter.
- 1.6 Repeat 1.3 and 1.4.
- 1.7 Repeat adjustment as in 1.5.  
Output should now be 0.5 - 1 W, typical 0.75 W.
- 1.8 Remove Wattmeter and solder coaxial cable at R1. Set supply voltage to 13.8 V.  
Connect 50 ohm Wattmeter (more than 25 W f.s.d.) to antenna jack.  
Adjust the trimmers in PA-7235 for max. output.
- 1.9 The output should now be approximately 23 W.  
Reduce the supply voltage slowly, and watch the output.  
It has to increase proportionally to the supply voltage without sudden jumps, and there should still be output at a supply voltage of 9 volts.
- 1.10 Check the output for spurious and harmonics with a spectrum analyzer or equivalent. All products should be attenuated more than 70 dB.
- 1.11 Adjust transmitter frequency with C1/XT-7237.
- 1.12 Connect an audiogenerator to the microphone input, set frequency to 1 KHz, and output according to microphone sensitivity. For a close-talking microphone this is nominal 2mV RMS, when using a fixed microphone it is normally necessary to short R3 in MA-7238 to get sufficient sensitivity. Adjust R6/MA-7238 for a deviation of  $\pm 3$  KHz.

1.13 Increases signal level 20 dB. Adjust audiogenerator frequency for max. deviation (typically at 500 Hz).  
Adjust R31/MA-7238 for a deviation of  $\pm 5$  KHz.

1.14 Repeat 1.12 and 1.13 a couple of times.

## 2. Receiver

2.1 Adjust L1 and L2 in XR-7234 for max. DC-voltage on TP3.

2.2 Adjust L3 and L4 in XR-7234 for max. DC-voltage on TP4.

2.3 Adjust C20/XR-7234 and L6/RF-7231 for max. voltage on TP1/RF-7231 using an RF-voltmeter. Reading on TP1 should 0.5 - 0.9 volts RMS.

2.4 Connect a signal generator, set to receiver frequency, to the antenna jack.  
Make a coarse adjustment of all trimmers in RF-7231 for the best signal-to-noise-ratio.

2.5 Set the signal generator modulation with fm=1 KHz for a deviation of  $\pm 7,5$  KHz.  
Connect the RF-millivoltmeter in the range 30 mV f.s.d. to TP2/IF-7232.  
Set output level of the signal generator for a suitable meter deflection and adjust its frequency for max. deflection. Adjust all tuned circuits for maximum, that is:

In RF-7231: C1-C2-C6-C8-C9-C14.

In IF-7232: L1-L2-L3-L4.

Input from signal generator for 30 mV RMS on TP2:  
20  $\mu$ V across 50 ohm typical.

If an RF-millivoltmeter is not available, an oscilloscope with the required sensitivity can be used as the signal frequency at TP2 is only 455 KHz.

2.6 Remove signal generator modulation.  
Adjust receiver frequency with C1/XR-7234 using the 3 dB points of the passband.

2.7 Set the signal generator frequency exactly on the center frequency  $\pm$  of the channels.  
Set deviation to + 3 KHz with fm=1 KHz.  
Adjust L5/IF-7232 for max. on PCB pin 6 (AF output).  
Typically reading 500 mV RMS.

2.8 Remove output from signal generator.  
Adjust squelch potmeter R17/IF-7232.  
Final setting is 4 mm further CW as the squelch-threshold.  
Squelch should open at approx. 0,35  $\mu$ V EMK.

## INSTALLATION OF MOBILE STATION

### WARNING!

Before beginning installation work, remove the ground connection to the battery.

### Mechanical Installation

(See drawing next page)

### Antenna

Place the antenna as high as possible on the vehicle, and in a position where it has a good ground plane.

Ensure that the antenna has a good ground connection.

Install the antennacable so that sharp bends are avoided, and use rubber-bushings where the cable is led around sharp corners or through holes.

Cut the antenna by using the enclosed table or curve to the operating frequency.

Mount the plug on the cable and measure the standing wave ratio with an SWR-meter to control the antenna installation.

### Mobile Station

Place the mobile station to smallest inconvenience for the driver, and passengers, but so that the operating controls are readily accessible.

Arrangement possibilities: The mobile station can be placed under the dashboard, in the glovestore, above the transmissionbox or on the side of the transmissionbox. In motor-vans the mobile station often is placed on the backwall.

Place the mobile station so that the operating controls are easy accessible with the right hand.

When using handmicrophone, place it to be easy accessible with the right hand, if fixed microphone is used, the T/R-switch is placed in the same manner.

Place the loudspeaker so that the signal from it can be heard easily.



## Electrical Installation

(see drawing)

The supply-voltage should be taken directly from the battery, so that there should be drawn a wire for both + and - to avoid loops, lead + to the horn (alarm) via the same wire if selective call is used.

Insert a fuse (8 Amp rating) in the + wire from the battery.

Protect the wires which are led around sharp corners or through holes with rubber-bushings.

The length of all cables should be so long that it is possible to connect them in removal state.

Fix all the cables and connect the ground connection to the battery after the end of mounting the mobile station.

Use extreme caution when drilling holes in the vehicle to prevent damaging the vehicle wiring, brake lines, gas lines, transmission or gas tank.