

RS9044

70cm transceiver



ATF-2

Base-unit Modification

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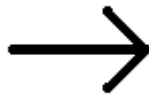
1 The receiver

Lets start with the receiver, this is the most difficult part. Those filters can only be used for 450-460 and are hard to modify for a lower frequency.

The two filters below are the filters which should be removed. Heat the filter with a small gas-burner or soldering iron and try to remove the metal cap with a flat screw-driver.



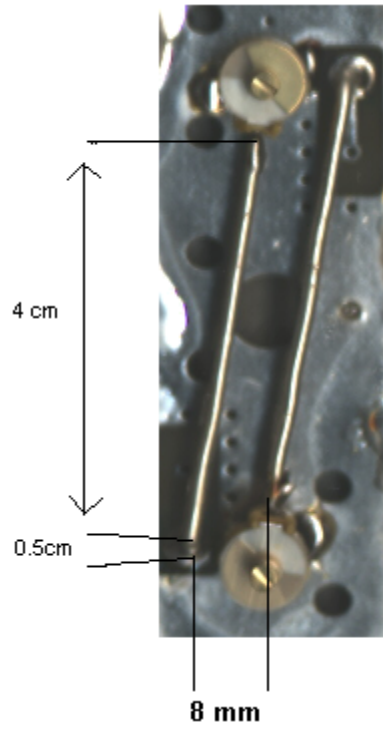
Afb.1 Original receiver



Afb.2 Modified receiver

When the caps are removed, the two inductors in the middle can be removed. The wire of the two other inductors must be bend straight and cut off at 4.5 cm. Bend the wire $\frac{1}{2}$ cm from the PCB with an angle of 90 degrees in the direction of the other inductor. Place the trimmer exactly above the hole of the opposite inductor.

It is better to solder a piece of PCB with all copper still on it between those two filters to isolate the filters. Without any isolation, the amplifier will be oscillating.

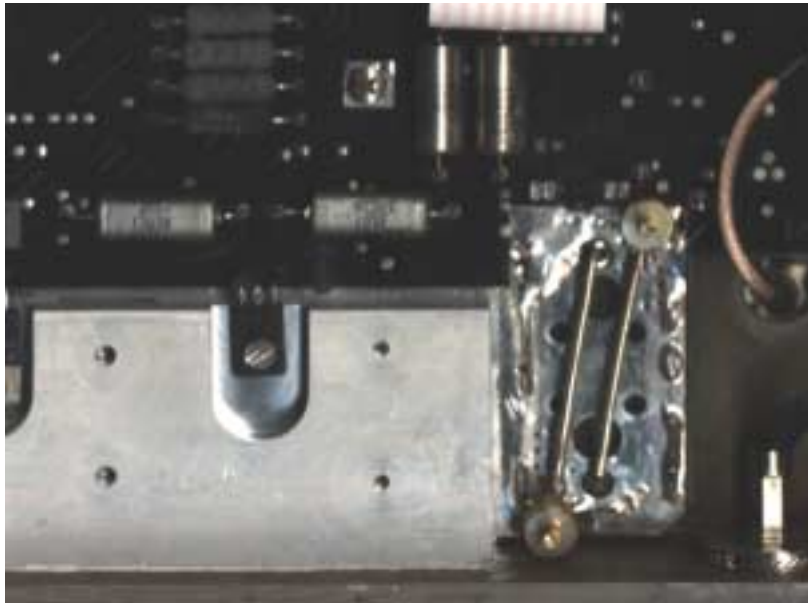


Afb.3 The lecherline

The signal strength of the local oscillator can be improved by soldering a piece of metal of $\frac{1}{2}$ cm under the two screws on the top of the third filter.

2 The transmitter

The filter on the driver of the transmitter must be replaced by a lecherline the same way.



Afb.4 The modified transmitter

3 The VCO's

The VCO PCB's are located at the bottom, the VCO of the transmitter on the right and the VCO of the receiver in the 3th room on the left. At both sides of the resonators of both VCO's must be soldered a capacitor of 1pF to ground.

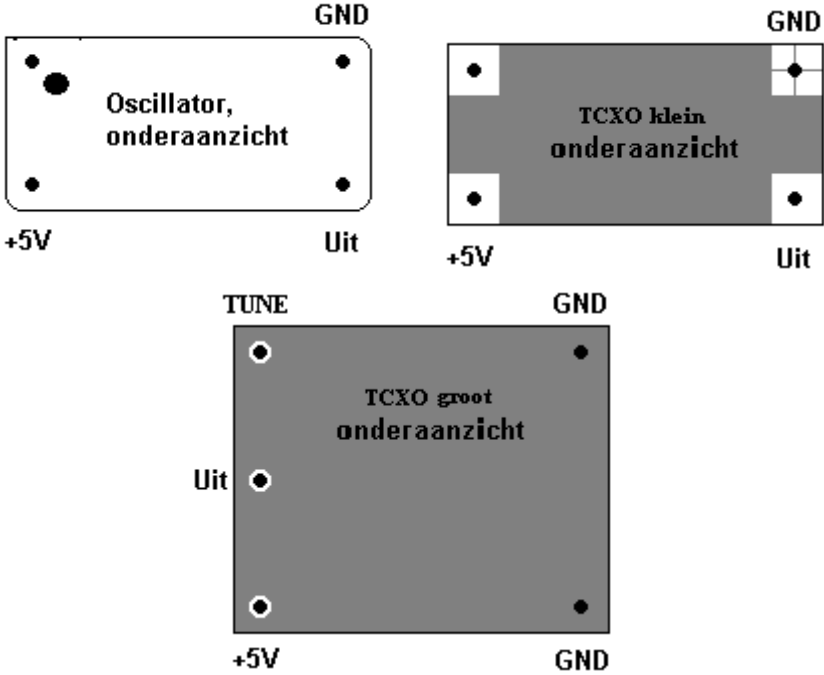
Afb.6 RX VCO:



Afb.7 TX VCO:



The reference frequency for the PLL is normally connected to the SUB-D connector, but in the radio is enough room to build in a 5V reference oscillator. Behind the SUB-D connector next to the big capacitor is J1. Cut the coaxial cable and put the ground of this cable to the ground of the oscillator and the other to the output of the oscillator. Connect the 5V supply of the oscillator to the most right pin of the 5V regulator on the small metal block, this is the chip with 5 connection pins. An TCXO should be used because of the required precision. The frequency may be between 25kHz en 81MHz, but the frequency must be a multiply of 25kHz. The frequency of the oscillator can be entered in the menu of the software.



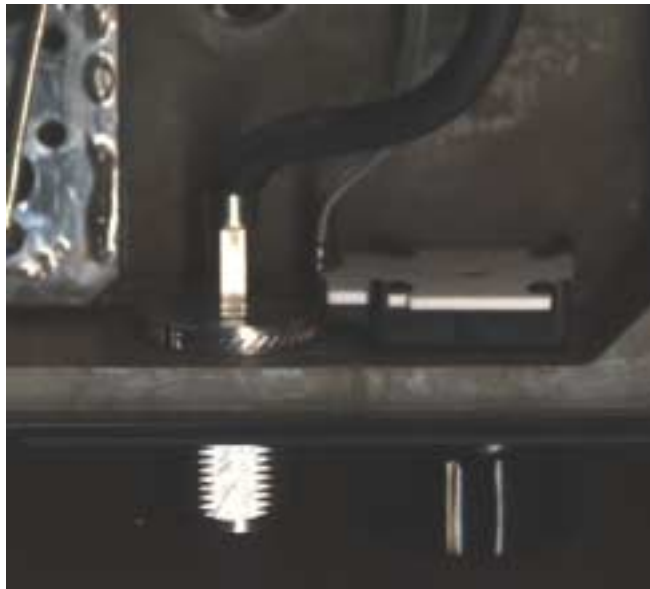
Afb.8 Connections of the oscillators



1 CPU board

In the RS9044 series are two different CPU boards, one is completely in SMD components and the other mainly DIL IC's. Both boards are almost identical, only the CPU is another version.

It is very easy to place a rotary encoder on the front of the radio. A possibility is the location of the transmitter test-output.



Afb.9 Rotary encoder, next to the transmitter output.

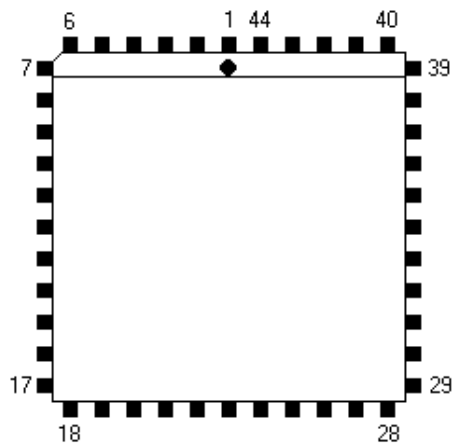
Connect three wires to the rotary encoder, the connection in the middle of the encoder to ground. When the encoder is frontal viewed, connections down, the right wire must be connected to pin 10 of the TMS7001 from the DIL CPU board. The left wire to pin 15 of this IC. To the same pins must be connected a pull-up resistor of 4k7 to 5V, for example pin 25 of the TMS7001.

For the SMD board the most right wire must be connected to pin 11 if the TMS70C02, and the left wire to pin 16 of this chip. At this board the 5V supply for the pull-up resistors can be found at pin 28 of the TMS70C02.

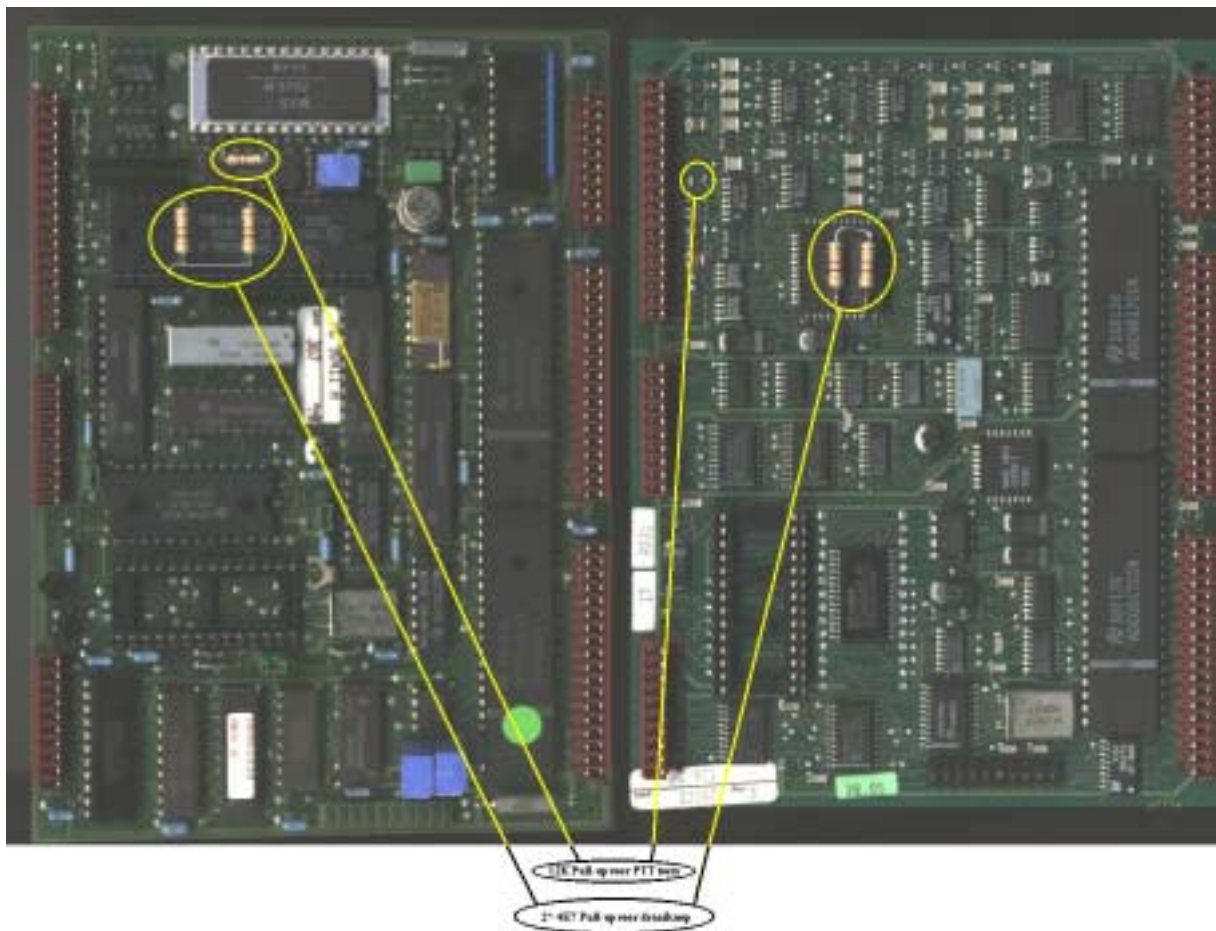
With this SMD version are some hardware troubles. Some of these radios are switching on the transmitter at full power when the radio is starting up. This is happening at the power-on reset. The latch which controls the power amplifier should be reset at this point, this is okay but at the SMD version is behind this latch another IC with open-collector outputs (ULN2803). The power supply of this IC is the 10V of the analogue part. The problem is, this supply disappears while the power on reset occurs, so the ULN2803 can't disable the transmitter. This all happens before the CPU can run the first instruction, so the SWR isn't controlled! The most easy and effective solution is to connect TP1 to TP3. TP1 is located near the SUB-D connector and TP3 on the other side of the large capacitor. This connection prevents the 10V to disappear at start up.

The radios with the DIL CPU board don't have this problem, here TP1 and TP3 may not be connected to each other.

The pinning of the SMD CPU:



A resistor of 12K must be placed as a pull-up resistor for the PTT switched. For the DIL CPU board this resistor can be placed between pin 3 and 6 of the LM239 next to the CPU. At the SMD board is left an empty place for it.



Afb.10 Resistors on the CPU boards.

The original EPROM has to be replaced by the new softwareblock. In this block are two IC's, an EEPROM and an extra memory mapping chip. For updateing are no new components required.

LF print

This modification is not strictly necessary, this extra PCB gives the possibility of selective call, DTMF and CTCSS transmitting, tone suppress and morse tutor. On this PCB is space left for an internal TCXO.

This PCB must be placed between Q17 and Q18 and their sockets. The connection 'Toon 1' of this PCB points to the direction of TP4.

Connection:

'CTCSS van main CPU'

'Toon1 van CPU bord'

'TCXO uit'

'CPU interrupt'

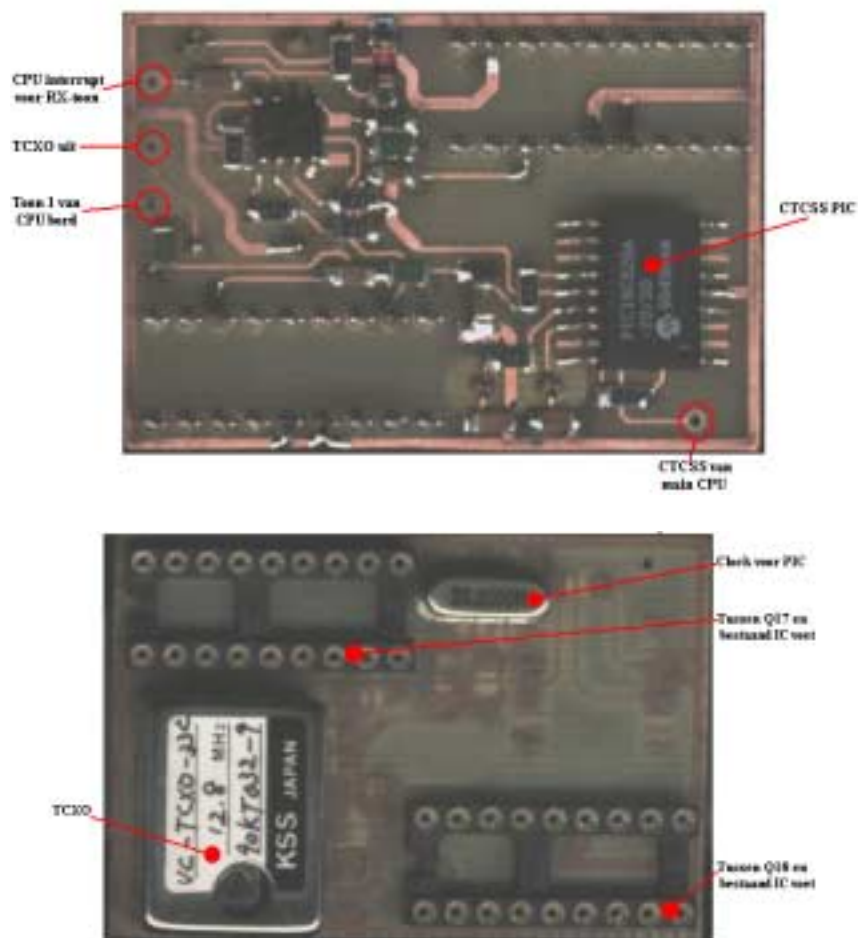
To:

Pin 8 of P4

TP 4

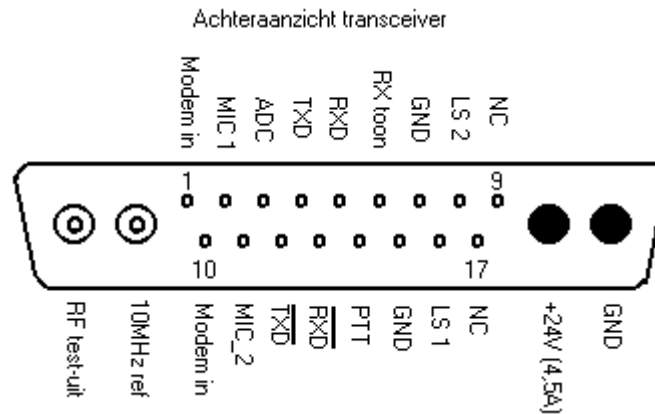
Coaxial cable

Pin 11 of P2



Afb.11 LF-PCB

Sub-D Connections



Pin:	Funktion:	Comment:
1 & 10	Modem	Identification, not used
2 & 11	MIC 1	Microphone
3	ADC	Analogue in, 0-5V. In status menu.
4 & 12	TXD & !TXD	RS232 data output
5 & 13	RXD & !RXD	RS232 data input
6	RX-tone	Tone recognition (after modification)
7 & 15	GND	
8 & 16	LS 2	Speaker output
9 & 17	NC	Not connected
14	PTT	PTT (after modification)

Tuning the receiver

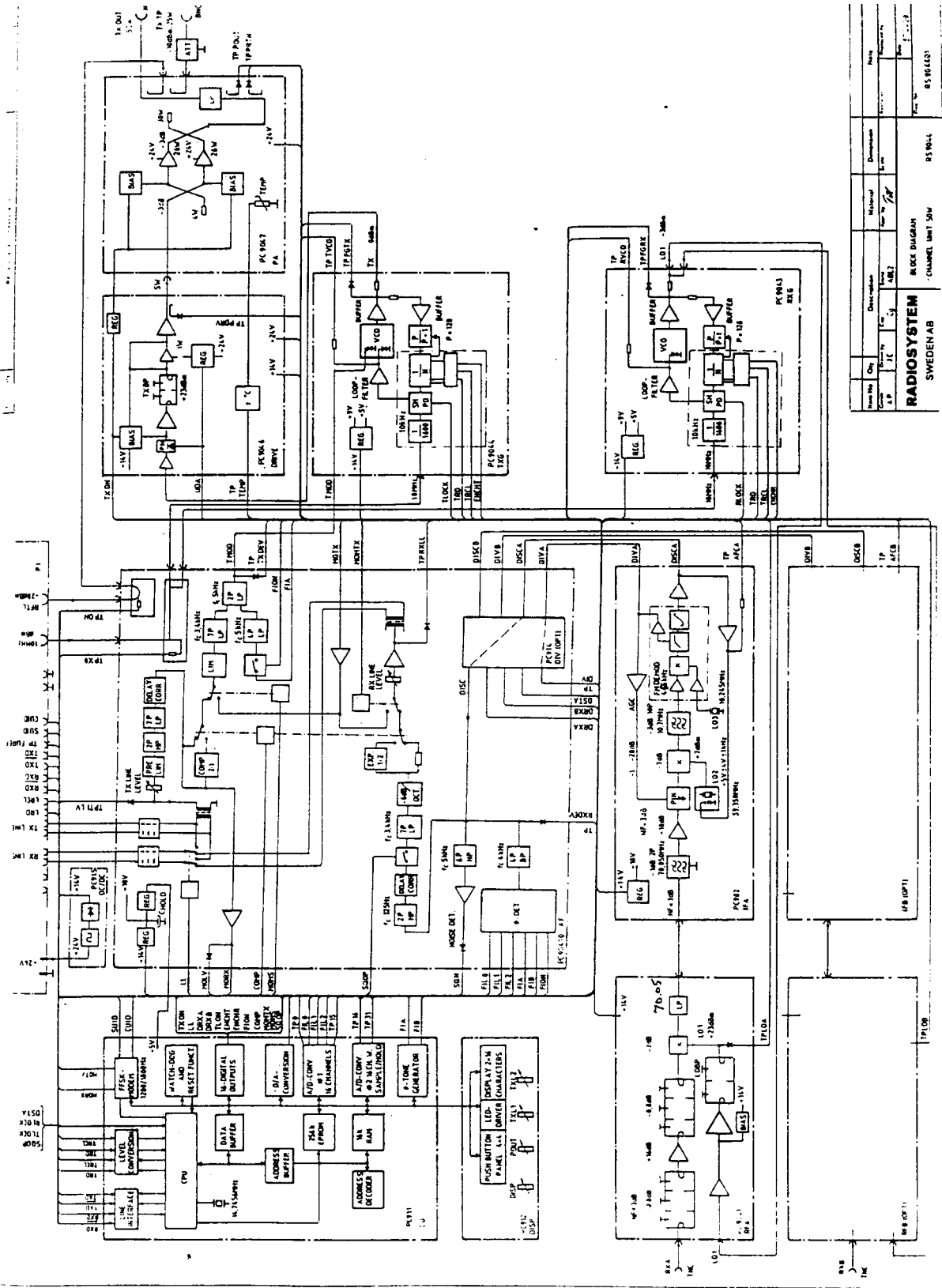
Go to the status menu item '**RX lokcal**'. On the right of the display the voltage of the local oscillator. This voltage must be tuned to maximum with the small filter on the receiver board. Now the sensitivity can be optimized with the other two filters. In normal situation a RF meter is displayed on the second line of the display together with the frequency.

Tuning the transmitter

Go to the status menu item '**TX driver**'. On the right of the display the power from the transmitter driver. First tune the driver to maximum output power using the software indication. After this, return the power amplifier.

The power indication of the final amplifier must be calibrated to give an exact value, this must be done by bending the metal tab next to the low-pass filter. By bending this tab over the wire next to it, the indicator gives a higher value. The original setting could not be used because the ADC is clipping just above the 50Watt.

Totaal blokschema



Item No.	Qty	Description	Material	Dimension	Notes
1	1	PC101			
2	1	PC102			
3	1	PC103			
4	1	PC104			
5	1	PC105			
6	1	PC106			
7	1	PC107			
8	1	PC108			
9	1	PC109			

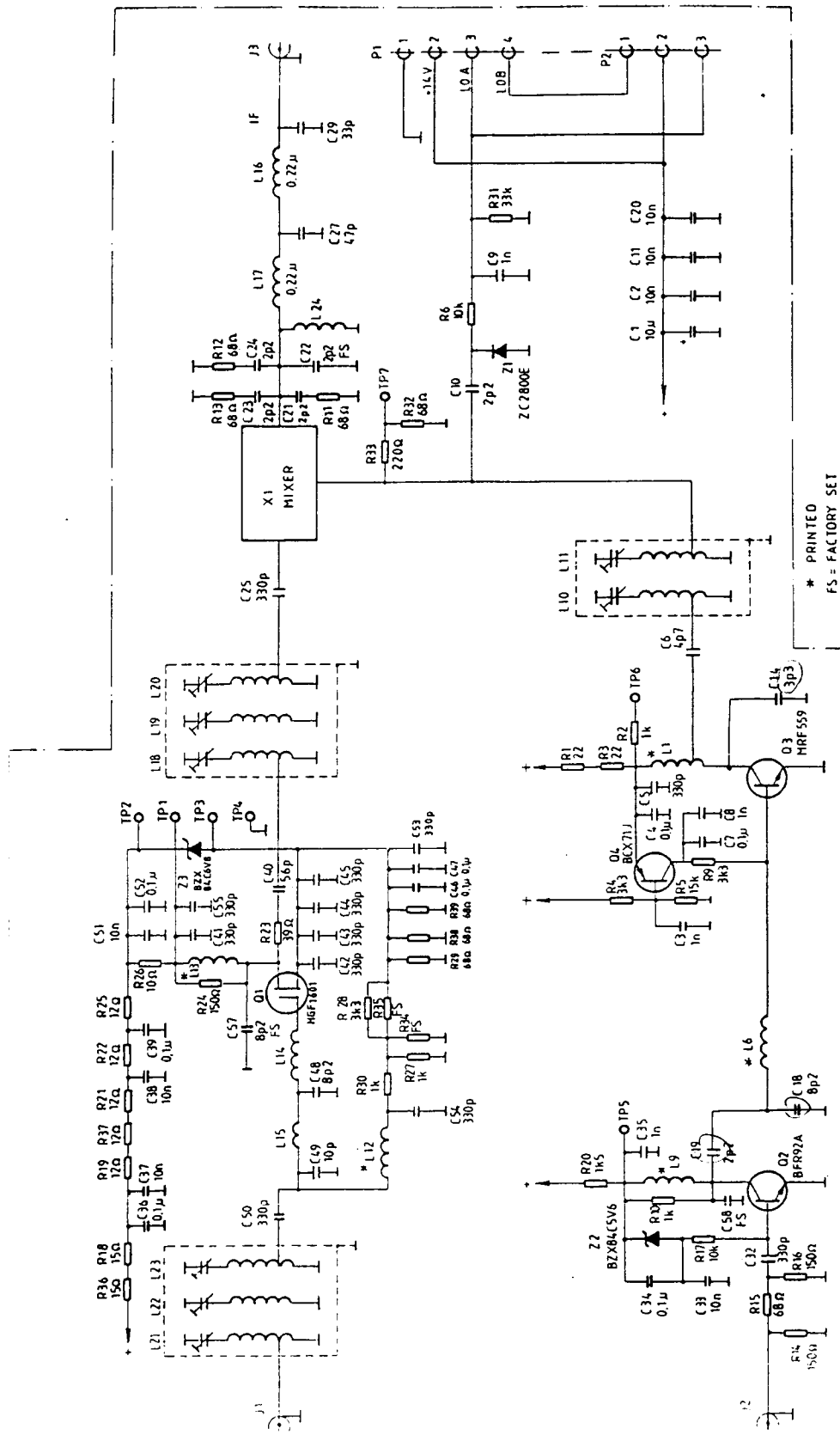
RADIOSYSTEM
SWEDEN AB

R. OCE DUGDAH
CHANNEL UNIT 50W

851041

851043

Ontvanger front-end

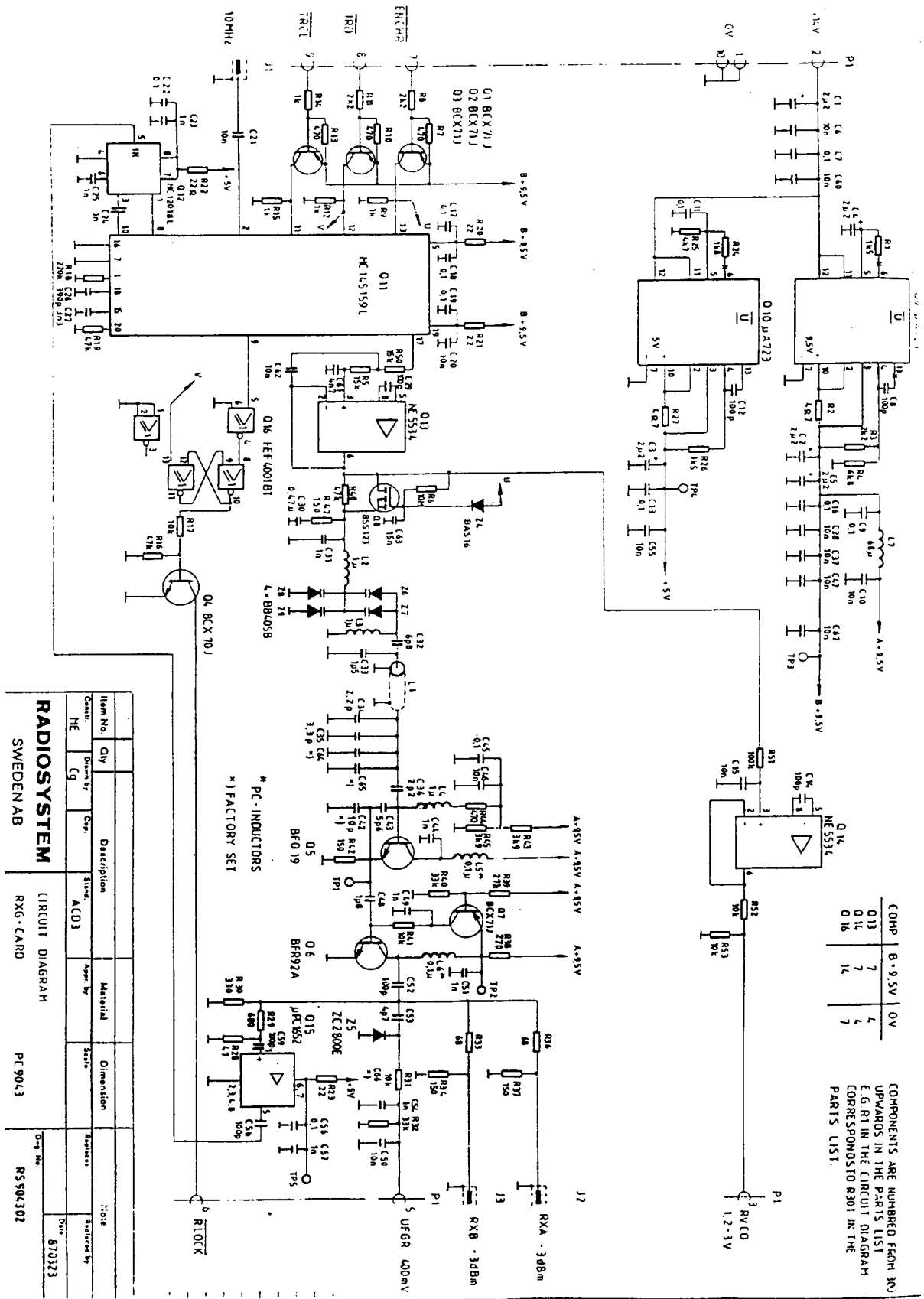


Item No.	Qty	Description	Material	Dimension	Note
AP	1	Stand, ALD3			Replaces
		Cap.			Replaced by
		Cg			870:09
RADIO SYSTEM					Doc. No.
SWEDEN AB					RS904 102
CIRCUIT DIAGRAM					PC 904.1
RF. CARD 450-455 MHz					

* PRINTED
FS = FACTORY SET

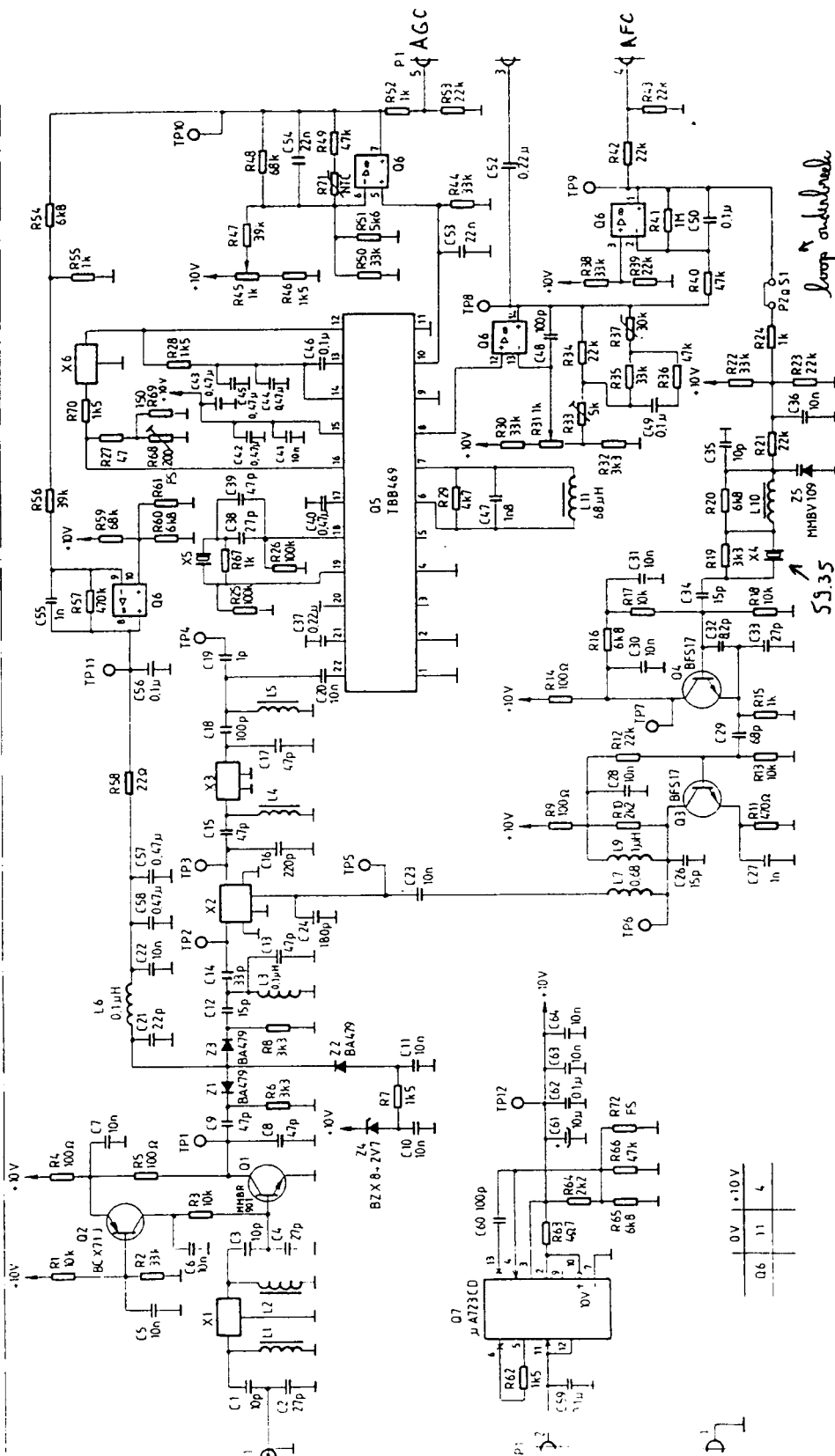
COMPONENTS ARE NUMBERED FROM 101 UPWARDS IN THE PARTS LIST. E.G. R1 IN THE CIRCUIT DIAGRAM CORRESPONDS TO R101 IN THE PARTS LIST

Ontvanger PLL



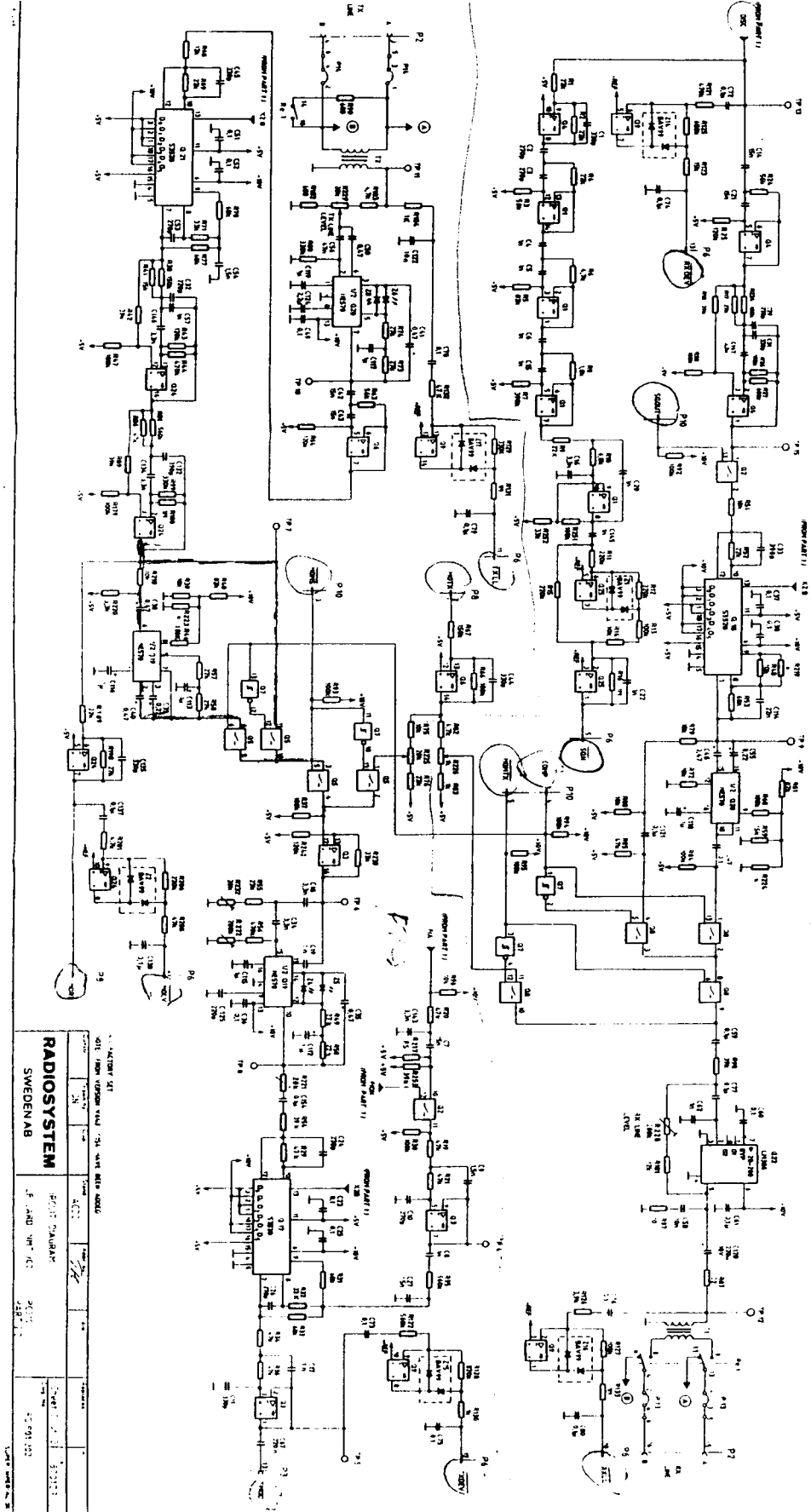
Item No.	Qty	Description	Material	Dimension	Note
HE	1	SWEDEN AB			
HE	1	RADIO SYSTEM			
HE	1	CIRCUIT DIAGRAM			
HE	1	PC CARD			
HE	1	PC 9043			
HE	1	RS 904302			

Middenfrequent



Item No.	Qty	Description	Material	Dimension	Note
05 1BB469	1	Tube	ACD.3	Scale	Replaces
06 1BB469	1	Tube	ACD.3	Scale	Replaces
CIRCUIT DIAGRAM					Dimension
IF - CARD 70.050MHz					Scale
SWEDEN AB					PC 902
RADIO SYSTEM					Replaces
SWEDEN AB					Div
FS - FACTORY SET					Div
COMPONENTS ARE NUMBERED FROM 201 UPWARDS IN THE PARTS LIST E.G. R1 IN THE CIRCUIT DIAGRAM CORRESPONDS TO R201 IN THE PARTS LIST					Div
59.35					Div
Loop outdrubbed					Div
AGC					Div
AFC					Div
PC 902					Div
RS 901122					Div
Boc807					Div

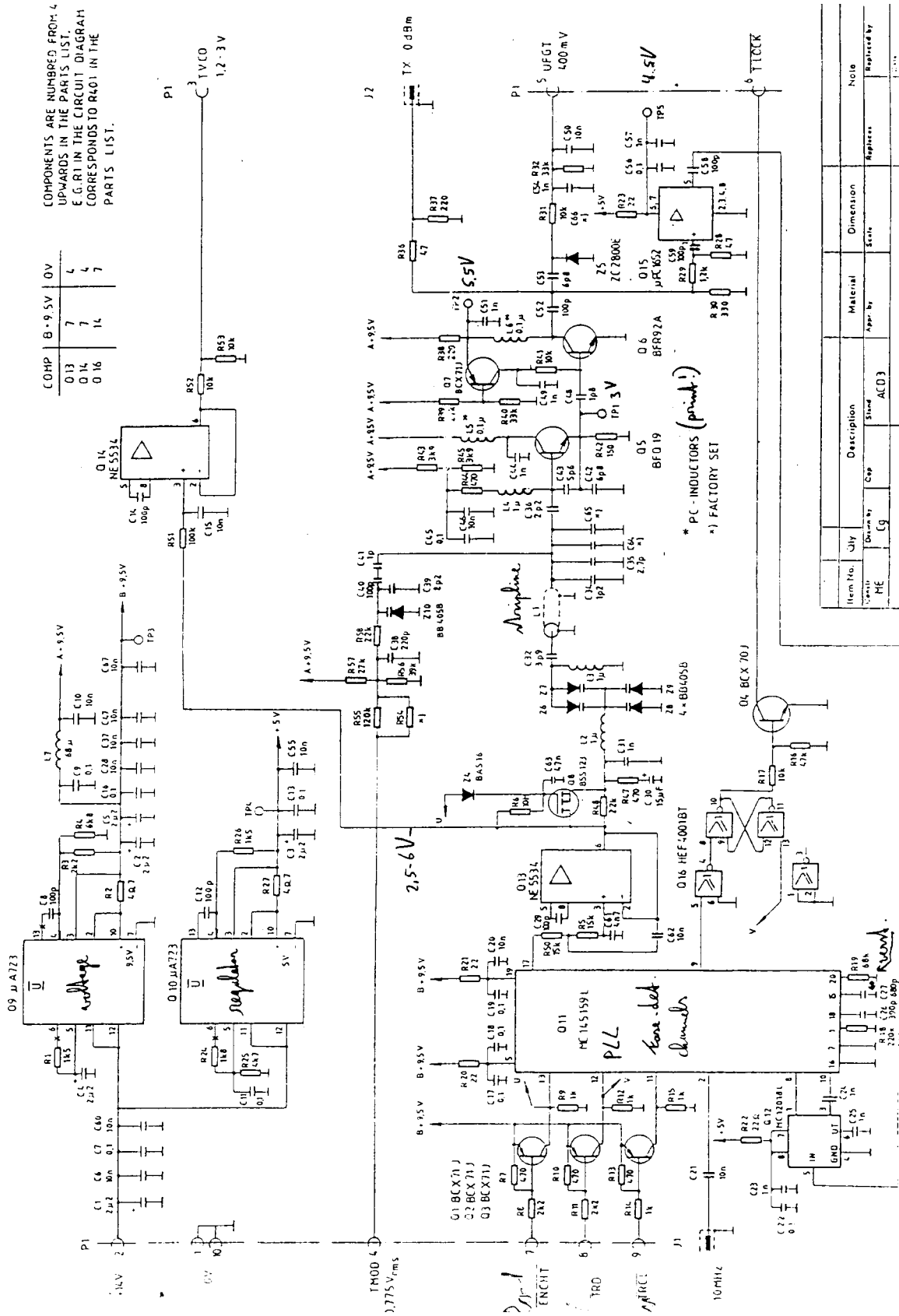
LF-deel Filters



RADIO SYSTEM		SWEDEN AB	
Model	6X4	Power	100 W
Frequency	400 KHz	Bandwidth	10 KHz
Gain	20 dB	Distortion	0.1%
Input Impedance	50 Ohms	Output Impedance	50 Ohms
Supply Voltage	100 V	Current	1 A
Weight	10 kg	Dimensions	100 x 100 x 100 mm
Manufacturer	Radio System Sweden AB	Year	1950

Zender PLL

COMPONENTS ARE NUMBERED FROM 4 UPWARDS IN THE PARTS LIST. E.G. R1 IN THE CIRCUIT DIAGRAM CORRESPONDS TO R401 IN THE PARTS LIST.

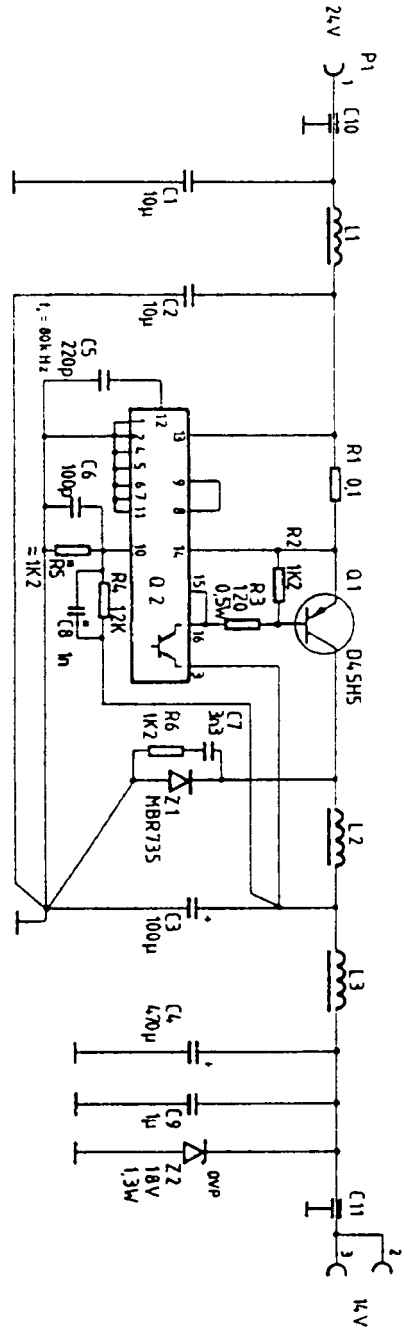


* PC - INDUCTORS (print!)

*1 FACTORY SET

Item No.	Qty	Description	Material	Dimension	Scale	Revised By	Revised Date
ME	1	PCB	ACD3				
RADIOSYSTEM							
CIRCUIT DIAGRAM							
TXG - CARD							
SWEDEN AB							
PC9044							
PS9044-32							

14V SMPS Voeding



* SET AT FACTORY

Output current limit 1.6 A
 voltage ripple < 1mV
 Conversion efficiency 85%

COMPONENTS ARE NUMBERED FROM X00
 UPWARDS IN THE PARTS LIST.
 E.G. R1 IN THE CIRCUIT DIAGRAM
 CORRESPONDS TO RX01 IN THE PARTS LIST

Item No.	Qty	Description	Material	Dimension	Note
OS/EK	Drawn by KH/EK	Cap. AC03	Appr by TH	Scale	Replaces
Circuit		CIRCUIT DIAGRAM			Registered by
SWEDEN AB		DC/DC-CARD -24V, 14V 1A			Date 851017
PL 915					
RS901 302					