

MANUAL 140

AP 2000 MOBILE

UHF BAND

This manual covers the typenumbers:

AP 2115, AP 2125

AP 2155, AP 2156, AP 2157, AP 2158

AP 2160, AP 2161, AP 2162, AP 2163

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Technical Data AP 2000 Series UHF

General:

The equipment is homologated in several countries where the technical requirements are based on the CEPT Recommendation T/R 17.

Frequency range:	406-432 MHz and 450-470 MHz
Principle:	Digital frequency synthesizer
Number of channels:	Max. 80
Channel spacing:	25 kHz or 20 kHz
RF-Bandwidth:	typ. 2 MHz at 1 dB reduction
Mode of operation:	Simplex, semi-duplex
Supply voltage:	12 V DC chassis negative- nom. 13,2 V. DC-DC converter available for 6 V, 24 V and 12 V chassis positive operation. A 220 V AC supply is available too.
Supply voltage variations:	10,8 V to 15,6 V
Operation Temperature:	% 25°C to + 60°C
Frequency stability:	typ. \pm 3 ppm for the above specified temperature and supply voltage variations
Loudspeaker:	External 4 Ω
Microphone:	1 k Ω condenser microphone or 200 Ω dynamic close talk micro- phone with push-button
Antenna impedance:	50 Ω
Power consumption:	At 13,2 V reception approx. 0,4 A transmission { 25 W approx. 7,5 A 6 W " 2,0 A

Receiver:

Sensitivity: typ. 0,4 μ V ($\frac{1}{2}$ E.M.F.) for 20 dB SINAD.

Adjacent channel sensitivity: typ. 72 dB (CEPT Method)

Spurious and image rejection: typ. 82 dB (CEPT Method)

Intermodulation attenuation: typ. 72 dB (CEPT Method)

Undesired conducted power: typ. 0,5 nW

Deemphasis: Following 6 dB per octave curve from 0,3 to 3 KHz within + 1-3 dB relative level at 1000 Hz

Audio output power: 3 watts into 4 Ω at 10 per cent distortion, 13,2 V supply voltage.

Output for microtelephone: 1 mW in 300 Ω

Hum and noise: typ. 45 dB (CEPT Method)

Function of limiter: Less than 1 dB variation in output voltage for RF-input levels between 1 μ V and 100 mV EMF.

Transmitter:

6 W \pm 0,5 dB, 10 W - 1 + 0,5 dB from \pm 25°C to + 60°C and supply voltages between 10,8 V and 15,6 V with external PA: 10-25 W + 0 dB \pm 2 dB from \pm 25°C to 60°C and supply voltages between 10,8 V and 15,6 V

Spurious outputs and harmonics: typ. each less than 200 nW into 50 Ω

Adjacent channel power: typ. 82 dB below the output power.

Frequency deviation: Max. \pm 5 kHz.

Preemphasis: Following 6 dB per octave curve from 0,3 to 3 kHz within + 1 - 3 dB relative level at 1000 Hz.

Harmonic distortion: typ. 1 per cent at \pm 3 kHz deviation and 1000 Hz modulation frequency.

Hum and noise: typ. 45 dB relative \pm 3 kHz deviation and 1000 Hz modulation frequency (CEPT Method).

Technical description for AP 2000 UHF

RECEIVER (FIG. 1)

Aerial Switch dwg. no. 75624-4E2

(for sets with ext. PA see dwg. no. 75627-4E2)

The aerial switch is made by a relay, while TR 1 D 1 and D 2 makes a forward power sensing circuit for the transmitter. This circuit is used for power regulation.

RF-amplifier and 1st mixer (75476-4E2)

The RF-amplifier consists of a bipolar transistor with several tuned circuits, of this 4 helicoils, to give the necessary selectivity. This first mixer converts the RF-signal 406-432 MHz or 450-470 MHz to 21,4 MHz with an oscillator injection of 427,4-453,4 MHz respective 471,4-491,4 MHz on the gate. Matching of the mixer output impedance to the crystal filter is made by the tuned circuit L 6.

21,4 MHz and 455 kHz IF (75076-3E2)

The 21,4 MHz crystal filter is followed by a dual-gate Mos-amplifier which gives approximately 20 dB gain. This stage is followed by the second mixer which converts 21,4 MHz to the low IF 455 kHz. The second mixer consists of an integrated doublebalanced transistor mixer, in which one section is used as the crystal oscillator. An emitter follower with some RC low-pass sections feeds the signal to IC 2, which is an integrated high gain amplifier/limiter and quadrature detector. The coil L 4 is the detector phase shift network. AF output is supplied by the emitter follower Q 3.

AF-amplifier, squelch and key circuit (75017-3E2)

The AF-signal goes through an amplifier stage Q 6 to the volume control circuit. Here, the diodes D 1, D 2 and D 3 act as an electronic attenuator regulated by the diode current. This circuit is also used for external AF-blocking and squelch. An integrated AF output amplifier is used for the 3 W loudspeaker output and here the feedback-capacitors C 6 and C 7 produce the deemphasis.

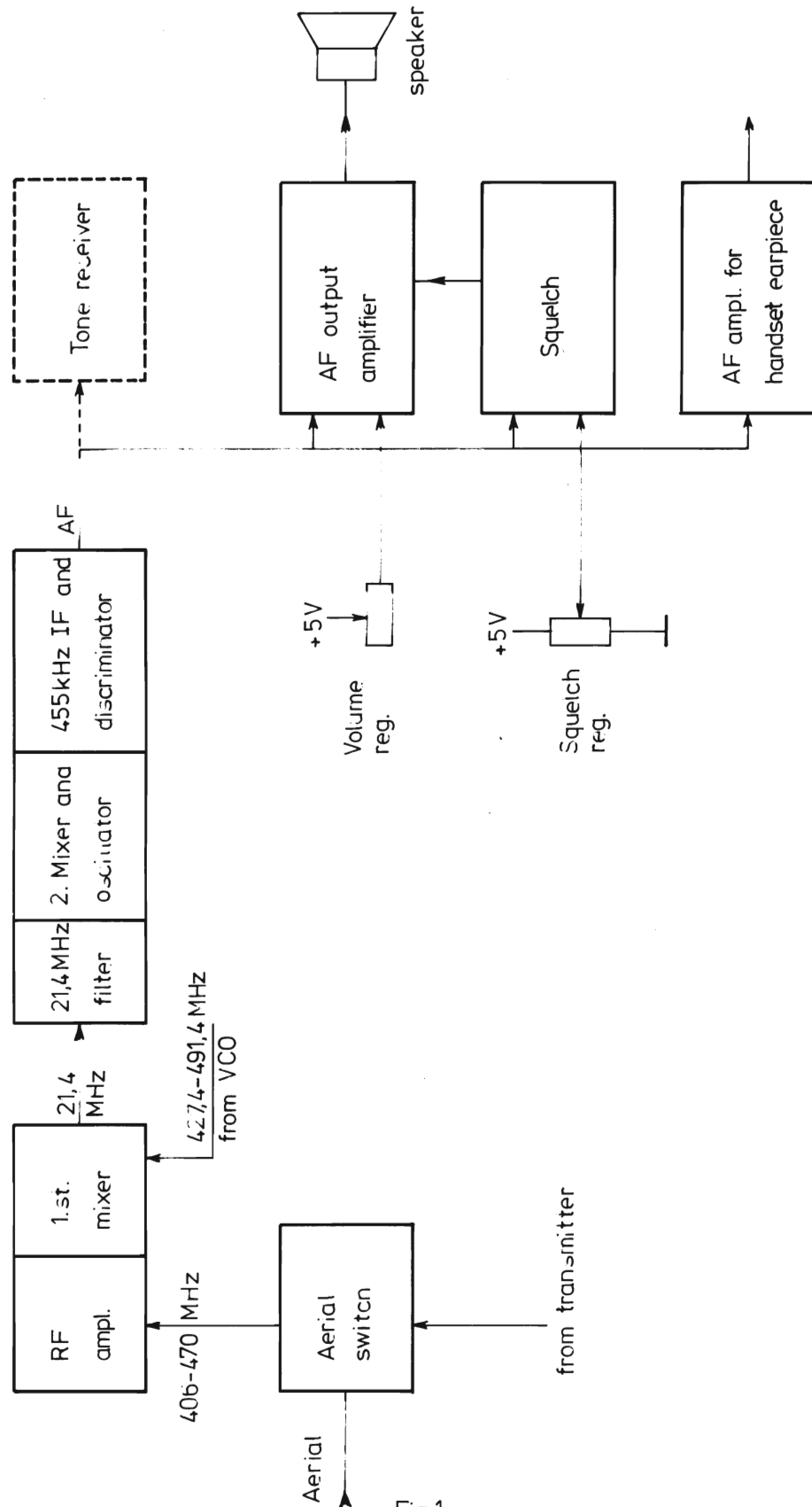


Fig.1

Rettet:	Technical description for AP 2000 UHF Receiver		Tegn.: 26-3-76 AC	Kontr.: 1-4-76 CHB
			Page: 2	
	AP-RADIOTELEFON 1/5		Tegn. nr.: 76085-4E2	

For the handset earpiece Q 4 and Q 5 gives the amplification. The squelch circuit consists of an 8 kHz tuned amplifier Q 3 followed by a detector D 11 and D 12. With increasing noise level on the AF-input the voltage on the negative side on C 19 will decrease from + 5 V. Getting lower than the squelch reg. voltage on point 7, the amplifier IC 2 switches over to an output voltage of + 5 V and thus blocking the AF-output through the volume control circuit. In the key control circuit Q 1 and Q 2 goes ON when the button in the handset connects point 11 to chassis, thus producing + 12 V on point 14. A positive voltage applied on point 10 will inhibit this function.

TRANSMITTER (FIG. 2)

Transmitter mixer and amplifier (75511-4E2)

Because the VCO has a frequency 21,4 MHz higher than the operating Rx-frequency this is fed to the transmitter mixer and converted to the desired transmitting frequency. For simplex operation the necessary 21,4 MHz signal comes from a combined crystal oscillator/doubler (75628-3E2). Thus the crystal will be 10,7 MHz. For good suppression of VCO - and 21,4 MHz injection the Tx-mixer is a balanced transistor type. The two amplifier stages Q 3 and Q 4 give further suppression of unwanted sidebands and necessary amplification to reach an output of approx. 30 mW.

6-10 W power amplifier (75510-4E2)

This power amplifier consists of three stages Q 1, Q 2 and Q 3, where the output level can be regulated by varying the supply voltage for Q 1 and Q 2. The regulation voltage is taken, from the forward power sensing circuit. Situated on print board B 58 C 1.

10-25 W PA-stage (75627-4E2)

This amplifier consists of one stage Q 1, and is driven from the 6-10 W amplifier. The output of Q 1 goes through a forward power-sensing circuit to the aerial switch. The output is adjustable with R 2.

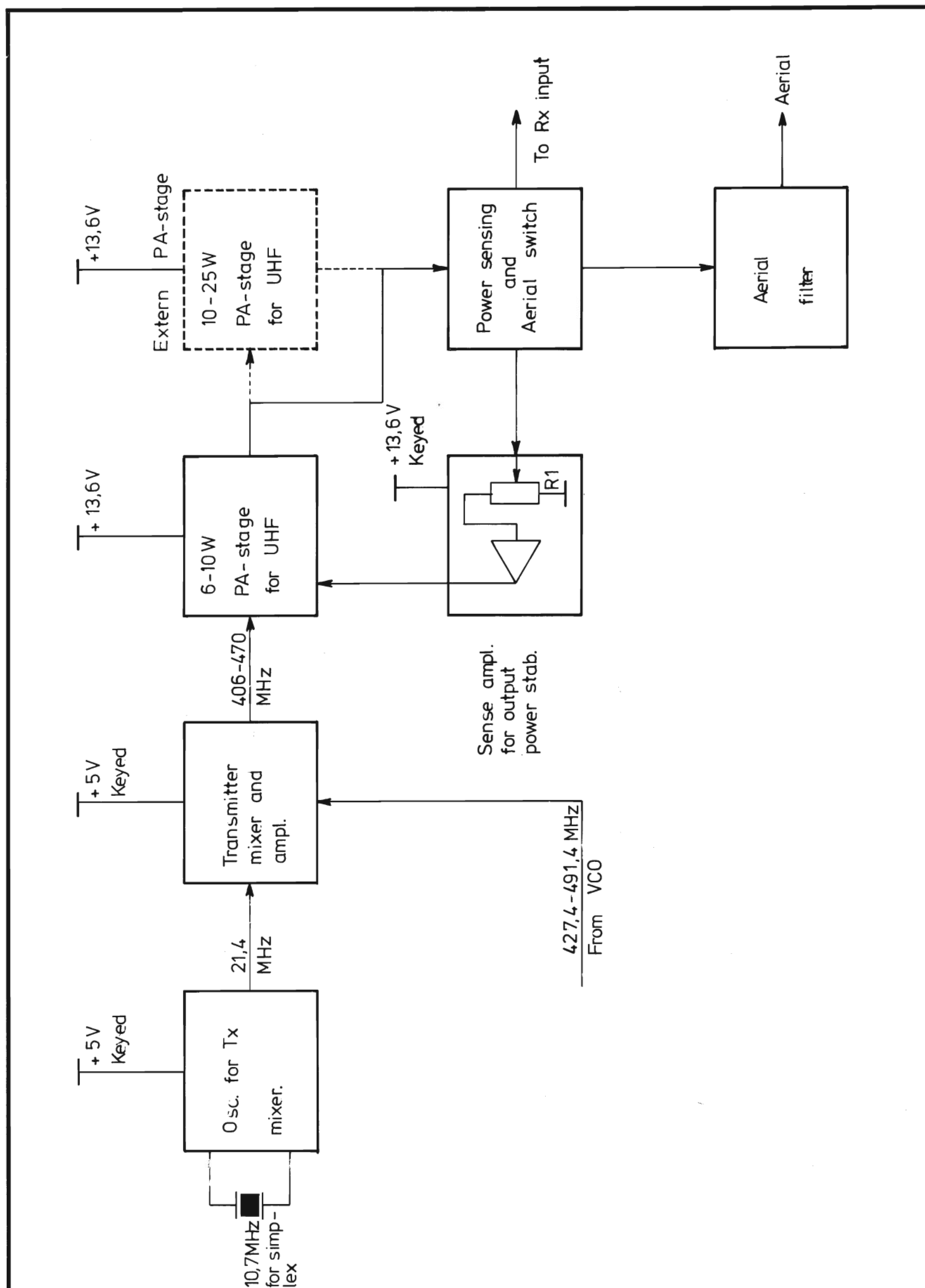


Fig. 2

Rettet:	Technical decription for AP 2000 UHF		Tegn.: 26- 3- 75	Kontr.: 1-4-76
	Transmitter		AC	CHB
	Page: 4			
	AP-RADIOTELEFON ¼		Tegn. nr.:	76085- 4E 2

Output power stabilizing (76325-4E2) and (75622-4E2)

From the power-sensing a DC voltage proportional to the forward power is led to an amplifier. Here it is compared to a zener-voltage, and if it is greater than this threshold level, the amplifier IC 1 will give a lower output voltage for the supply of Q 1 and Q 2 (75510-4E2), thus reducing the drive level. This will act in the following manner:

For low supply voltage (~11 V) the output power will increase with increasing supply voltage, and when the output reaches the desired value it will be constant for further increase in the supply voltage. The output level for supply voltages greater than approx. 13 V is adjustable with R 2 on print board B 59 for power outputs between 10-25 W and R 1 on print board B 57 for power outputs between 6-10 W. Note that the oscillator for Tx-mixer, the transmitter mixer and amplifier, and sense amplifier have keyed supply lines, while the final transistor in the 6-10 W stage and the 10-25 W stage are supplied independent of the key.

Aerial filter (75623-4E2)

The aerial filter is a low-pass filter for suppression of the harmonics from the transmitter.

Modulation amplifier (75018-3E2)

The modulation amplifier has a preamplifier Q 1 for the most sensitive input (input 1). Using the less sensitive input 2, the Mic. switch terminal shall have + 5 V so that Q 1 will be blocked via D 3. D 4 will be conducting and feed the AF-signal to IC 1. For selective tone transmission the tone Tx input is used while Q 1 is blocked via D 2. D 5 is used for blocking of the modulation amplifier while receiving in simplex mode. IC 1 and the first part of IC 2 work as a compressor/amplifier to limit the maximum output AF-voltage. When using a variable gain type amplifier as IC1 it is possible to avoid the distortion for high AF-levels, which occurs in a conventional clipper-circuit. The other amplifier in IC 2 is used as a 3 kHz active low-pass filter. A tuning diode in the VCO is used for modulation.

FREQUENCY SYNTHESIZER CIRCUIT

Basic phase lock loop operation

A simple phase locked loop consists of 3 elements, a phase comparator, a filter and the VCO (Fig. 1).

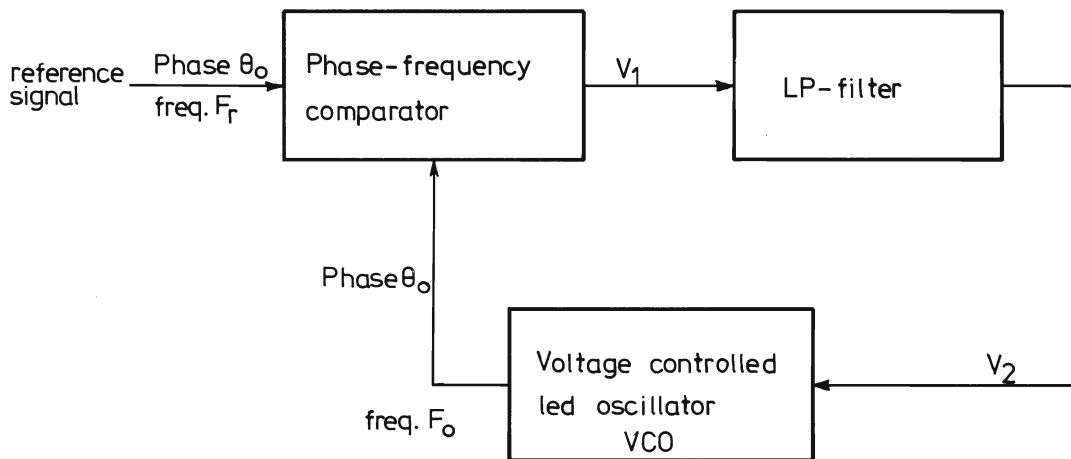


Fig.1 Basic phase locked loop.

Phase-frequency comparator

If the VCO-frequency $F_o = F_r$, the comparator gives out a DC-level proportional to the phase difference between F_o and F_r (Fig. 2). We have $V_1 = K_1 \times (\theta_r - \theta_o)$ where K_1 is a constant. When there is a frequency difference between F_o and F_r , V_1 will be low for F_o greater than F_r and high for F_o less than F_r .

Voltage controlled oscillator

This can be a LC-oscillator whose frequency is controlled with a varicap. $F_o = K_2 \times V_1$ where K_2 is a constant.

LP-filter

This filter removes the ripple on V_1 (Fig. 2) and determines the dynamic behaviour (stability, step response) of the loop.

Let us consider a situation where the loop is out of lock and



Rettet:	Figure for synthesizer description	Tegn.: 2 - 6-77	Kontr.: 1-4-76
		AC	CHB
	Page: 2		
	AP-RADIOTELEFON 1/2	Tegn. nr.: 77229 - 4E2	

F_o is greater than F_r . The comparator output voltage V_1 will contain the normal ripple with frequency F_r and a beat note, but the mean DC level ($= V_2$ after the filter) will be low (Fig. 2). Thus the VCO frequency will decrease and at the time F_o reaches F_r the loop will go in lock. Now $F_o = F_r$ and the phase difference will assume a level for V_2 sufficient to hold the VCO frequency in lock with F_r . If the tuning of the VCO is changed (such as by varying the value of the tuning capacitor) the frequency F_o from the VCO will attempt to change. This will result in a change in phase angle between F_o and F_r , resulting in a change in DC-level of V_1 which will act to maintain frequency lock. In this way tuning of the VCO will change the ripple and the DC-level on V_1 but as long as lock is maintained F_o will be equal F_r .

A multichannel synthesizer (Fig. 3)

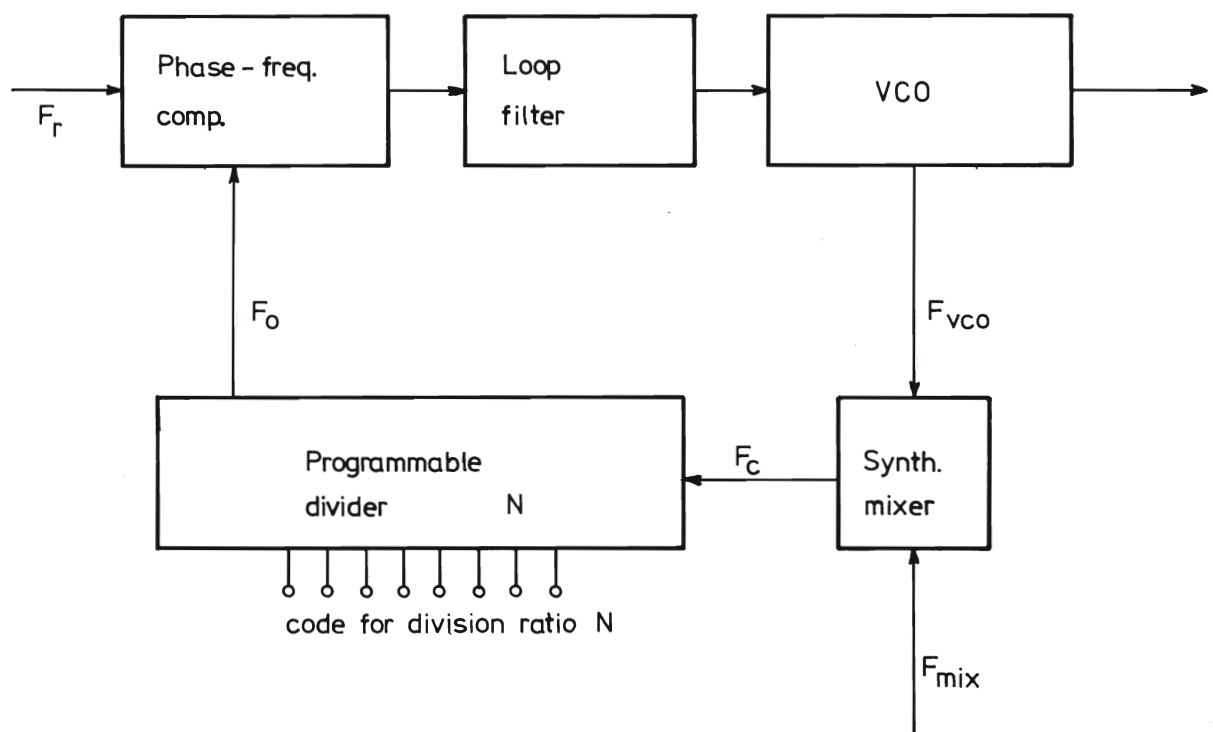


Fig. 3 Synthesizer loop

To build a multichannel synthesizer we have to add some more components (Fig. 3) but the basic function is the same. Here the VCO frequency is converted to a lower frequency F_c suitable

for the digital divider. $F_c = F_{vco} - F_{mix}$ (1). When the loop is in lock the incoming frequencies F_r and F_o are equal, but they can have a phase difference. $F_o = F_r$ (2). The programmable divider divides frequency F_c with a number N , which can be selected by a binary code. $F_c = N \times F_o$ (3).

Combining equations (1), (2) and (3) give

$$F_{vco} = F_{mix} + N \times F_r \quad (4).$$

By changing the division ratio N we can get lot of VCO-frequencies with the spacing F_r , and the stability depends only on F_{mix} and F_r which can be crystal oscillators.

The synthesizer circuit in AP 2000 (Fig. 4)

Synthesizer logic (75062-3E2 25 kHz and 77201-3E2 20 kHz)

The 25 (20) kHz reference frequency is produced by dividing a 400 (320) kHz crystal oscillator (X 1 and Q 4) by 16 in the counter IC6. The output signal to the programmable divider is amplified in Q 1 and Q 2, while the two gates from IC 1 shape the waveform to narrow pulses. IC 2 and IC 3 form the programmable divider, where the division ratio N is the binary number on the eight channel code lines. The numbers on the codes lines correspond to the binary value of each line. In this way a division ratio $N = 168$ will have a channel code:

Number on code line	128	64	32	16	8	4	2	1
Binary value	128	64	32	16	8	4	2	1
Code for $N = 168$	1	0	1	0	1	0	0	0

where 0 means 0 V and 1 means + 5 V.

The two cascaded counters IC 2 and IC 3 count down from 168. When the counters reach zero a borrow pulse is generated and used to preset the number 168, thus starting a new count cycle. The very narrow borrow pulses with a repetition rate of 25 (20) kHz are used as input to the frequency-phase comparator IC 4. The comparator output voltage V_1 (Fig.2) can be seen on a test point TP 1. To suppress the 25 (20) kHz ripple on the comparator output voltage Q 3 is connected as an active lowpass filter IC 5 is for DC-amplification.

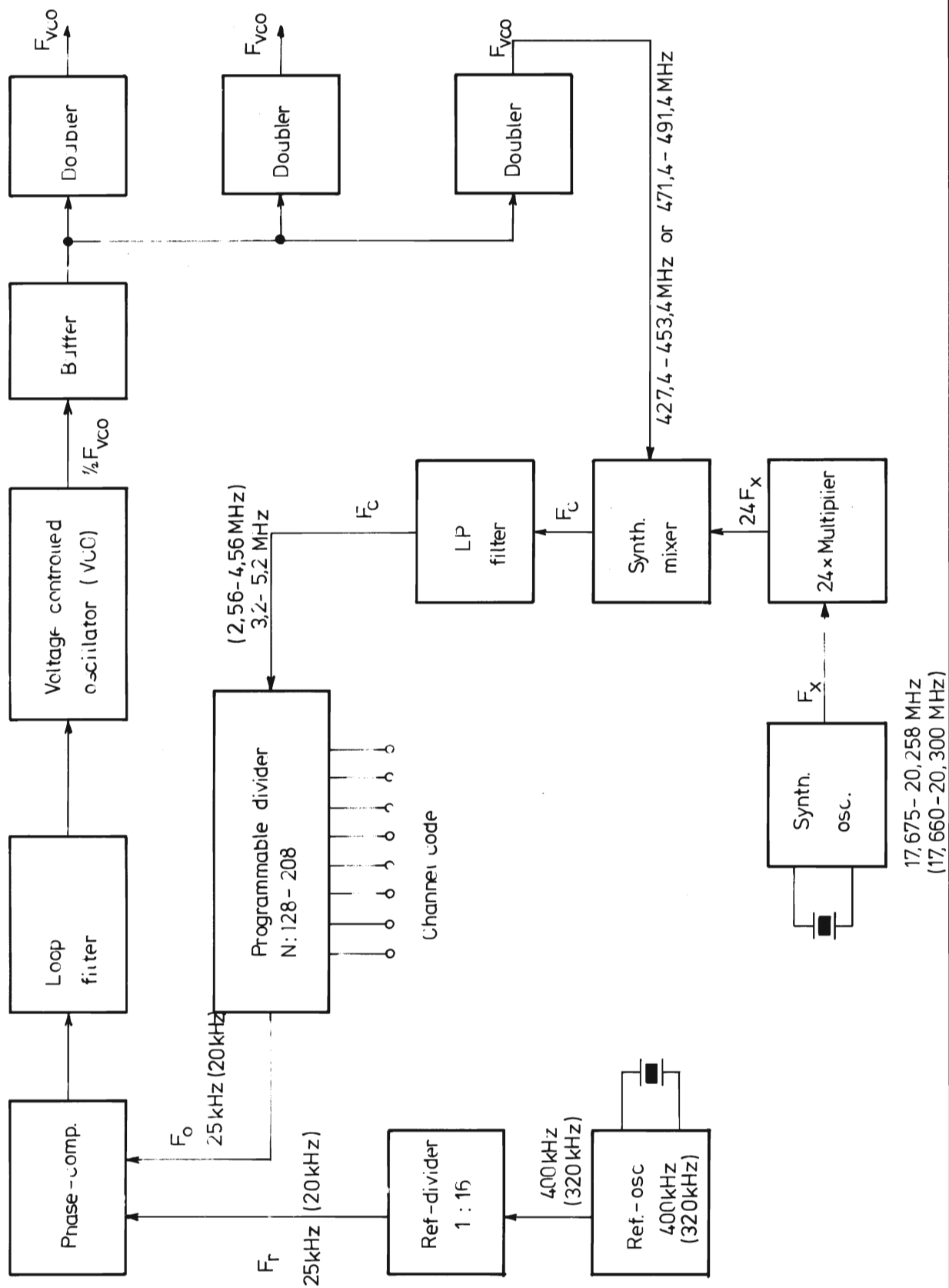


Fig. 4

Rettet:

Figure for synthesizer description, UHF
25 (20) kHz

AP-RADIOTELEFON $\frac{1}{2}$

Tegn.: 2 - 6 - 77
AC

Kontr.:

Page: 5

Tegn. nr.:

77229 - 4E2

Voltage controlled oscillator (76024-3E2)

The transistor Q 2 is used to switch between two loop filters. When Q 2 is 'ON' the slow filter R 1, R 3 and C 15 are in function while R 1, R 2 and C 16 give the loop a fast step response for Q 2 'OFF'. The fast loop filter is only used in connection with automatic channel scanning. Diode D 2 is used to clamp the control voltage thus preventing too great VCO frequency excursions when the loop is out of lock. The frequency of oscillator Q 1 is controlled by tuning diode D 3 while diode D 4 is for modulation. To avoid excessive loading of the oscillator it is followed by a wideband bufferstage Q 3. Transistors Q 4 to Q 6 make the three output multipliers with tuned collector circuits.

Synthesizer mixer (75628-3E2)

In the synthesizer mixer Q 1 and Q 3 act as a combined crystal oscillator/doubler. Since the crystal frequency is about 20 MHz and the tuned circuits L 1 and L 2 are tuned to the second harmonic of the 40 MHz collector frequency, the input frequency to the mixer Q 4 is about 80 MHz. The VCO-signal goes through the dual gate Mos-transistor buffer Q 2 which gives high backward isolation but no amplification. Reaching the base of Q 4 the VCO-signal is mixed with the sixth harmonic of the 80 MHz to give an output signal of 3,2 - 5,2 (2,56 - 4,56) MHz. L 5 and L 6 are part of a 10 MHz low-pass filter connected to the amplifier stage Q 7.

Channel code

From the blockschematic of the synthesizer circuit (Fig. 4) we have:

$$F_{VCO} = 24 F_x + N \times 0,025 (0,020) \text{ MHz where } 128 \leq N \leq 208.$$

The VCO frequency lies 21,4 MHz above the receiver frequency leading to:

$$\text{Receiver frequency } F_m = 24 F_x + N \times 0,025 (0,020) - 21,4 \text{ MHz (5)}$$

Here N is the division ratio and F_x is the synthesizer mixer crystal. F_x is found from the drawings 75499-4E2, 75500-4E2 and 76132-4E2. For a single channel set you can choose between two standard crystals being equally good. Considering a multi-channel set, in most cases only one standard crystal will fit the desired frequency range.

1. Computation example of the receiver frequency for 25 kHz set:

Known is: Crystal frequency F_x and channel code.

Example: $F_x = 19,675 \text{ MHz}$

Code: 1 0 0 1 0 0 1 1

Division ratio $N = 128 + 16 + 2 + 1 = 147$

Using equation (5):

$$\underline{F_{Rx}} = 24 \times 19,675 + (147 \times 0,025) - 21,4 = \underline{454,475 \text{ MHz}}$$

2. Computation of the channel code:

Known is: Crystal frequency F_x and desired receiver frequency F_{Rx} .

Rearranging equation (5) gives

$$N = \frac{F_{Rx} - 24 F_x + 21,4}{0,025}$$

Example:

$F_x = 19,675 \text{ MHz}$, $F_{Rx} = 455,625 \text{ MHz}$

$N = (455,625 - 24 \times 19,675 + 21,4) / 0,025 = 193$

$N = 128 + 64 + 0 + 0 + 0 + 0 + 0 + 1$

Channel code 1 1 0 0 0 0 0 1

NOTE: Because of the special synthesizer oscillator circuit, it has been necessary to specify the crystal X1 with a parallel capacity of 15pF. If you use a crystal specified with 30pF parallel capacity, the frequency should be about 250 ppm lower than the standard frequency given on the drawings 75499-4E2, 75500-4E2, and 76312-4E2.

Exactly the same procedure is used when the set is intended for 20 kHz channel spacing.

The synthesizer mixer x-tal for 20 kHz spacing is found on the dwg.: 77105-4E2, 77106-4E2, 77107-4E2, 77194-4E2, 77195-4E2 and 77196-4E2.

DIVISION RATIO AND CHANNEL CODE

The division ratio N corresponds to the 8 - bit channel code in this way.

Bit number	8	7	6	5	4	3	2	1
------------	---	---	---	---	---	---	---	---

Value of each bit	128	64	32	16	8	4	2	1
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Example: channel code = 1 1 0 0 0 0 0 1

$$N = 193 = 128 + 64 + 0 + 0 + 0 + 0 + 0 + 1$$

Logic 1 = +5 Volts. Logic 0 = 0 Volts

Div. ratio	Channel code								
N	128	64	32	16	8	4	2	1	
128	1	0	0	0	0	0	0	0	
129	1	0	0	0	0	0	0	1	
130	1	0	0	0	0	0	1	0	
131	1	0	0	0	0	0	1	1	
132	1	0	0	0	0	1	0	0	
133	1	0	0	0	0	1	0	1	
134	1	0	0	0	0	1	1	0	
135	1	0	0	0	0	1	1	1	
136	1	0	0	0	1	0	0	0	
137	1	0	0	0	1	0	0	1	
138	1	0	0	0	1	0	1	0	
139	1	0	0	0	1	0	1	1	
140	1	0	0	0	1	1	0	0	
141	1	0	0	0	1	1	0	1	
142	1	0	0	0	1	1	1	0	
143	1	0	0	0	1	1	1	1	
144	1	0	0	1	0	0	0	0	
145	1	0	0	1	0	0	0	1	
146	1	0	0	1	0	0	1	0	
147	1	0	0	1	0	0	1	1	
148	1	0	0	1	0	1	0	0	
149	1	0	0	1	0	1	0	1	
150	1	0	0	1	0	1	1	0	
151	1	0	0	1	0	1	1	1	
152	1	0	0	1	1	0	0	0	
153	1	0	0	1	1	0	0	1	
154	1	0	0	1	1	0	1	0	
155	1	0	0	1	1	0	1	1	
156	1	0	0	1	1	1	0	0	
157	1	0	0	1	1	1	0	1	
158	1	0	0	1	1	1	1	0	
159	1	0	0	1	1	1	1	1	
160	1	0	1	0	0	0	0	0	
161	1	0	1	0	0	0	0	1	
162	1	0	1	0	0	0	1	0	
163	1	0	1	0	0	0	1	1	
164	1	0	1	0	0	1	0	0	
165	1	0	1	0	0	1	0	1	
166	1	0	1	0	0	1	1	0	
167	1	0	1	0	0	1	1	1	

Div. ratio	Channel code								
N	128	64	32	16	8	4	2	1	
168	1	0	1	0	1	0	0	0	
169	1	0	1	0	1	0	0	1	
170	1	0	1	0	1	0	1	0	
171	1	0	1	0	1	0	1	1	
172	1	0	1	0	1	1	0	0	
173	1	0	1	0	1	1	0	1	
174	1	0	1	0	1	1	1	0	
175	1	0	1	0	1	1	1	1	
176	1	0	1	1	0	0	0	0	
177	1	0	1	1	0	0	0	1	
178	1	0	1	1	0	0	1	0	
179	1	0	1	1	0	0	1	1	
180	1	0	1	1	0	1	0	0	
181	1	0	1	1	0	1	0	1	
182	1	0	1	1	0	1	1	0	
183	1	0	1	1	0	1	1	1	
184	1	0	1	1	1	0	0	0	
185	1	0	1	1	1	0	0	1	
186	1	0	1	1	1	0	1	0	
187	1	0	1	1	1	0	1	1	
188	1	0	1	1	1	1	0	0	
189	1	0	1	1	1	1	0	1	
190	1	0	1	1	1	1	1	0	
191	1	0	1	1	1	1	1	1	
192	1	1	0	0	0	0	0	0	
193	1	1	0	0	0	0	0	1	
194	1	1	0	0	0	0	1	0	
195	1	1	0	0	0	0	1	1	
196	1	1	0	0	0	1	0	0	
197	1	1	0	0	0	1	0	1	
198	1	1	0	0	0	1	1	0	
199	1	1	0	0	0	1	1	1	
200	1	1	0	0	1	0	0	0	
201	1	1	0	0	1	0	0	1	
202	1	1	0	0	1	0	1	0	
203	1	1	0	0	1	0	1	1	
204	1	1	0	0	1	1	0	0	
205	1	1	0	0	1	1	0	1	
206	1	1	0	0	1	1	1	0	
207	1	1	0	0	1	1	1	1	
208	1	1	0	1	0	0	0	0	

Tuning instructions for AP 2000 UHF

1. Tuning of the synthesizer circuit

A. Synthesizer oscillator

Connect a high input resistance DC-voltmeter to TP 1 on print board B 56. By tuning coils L1 and L2 to max., a reading of approx. 1,7 V should be obtained. The coil L3 is later used for frequency adjustment.

B. Phase locked loop

If the set contains more than one channel, turn the channel selector to a channel with frequency in the middle of the used band. Check the channel code with a voltmeter on points 1, 2,64, 128 on print board B 17. Computation of the channel code is contained in the technical description of the synthesizer circuit. Note that there are three types of VCO's corresponding to the following Rx-frequencies 406-432 MHz, 432-450 MHz, 450-470 MHz check that the right type is used for the desired frequency range. The marking is noted on the VCO-diagram. Set the trimmers C24, C30 and C35 to the center position and then connect a counter to point 5 (coaxcable). The VCO should now be set to about the right frequency (with C4). Connect a DC-voltmeter to TP 1 and tune C 24 to maximum reading (about 1 VDC). Move the voltmeter to point 2 on the VCO print board and an oscilloscope (sensitivity 1 V/div.) to test point TP 1 on the logic print (print board B 17). Adjust the VCO trimmer until the loop goes in lock. The loop is in lock when a stable 25 kHz ripple sawtooth is appearing on the scope, and the voltage on the voltmeter increases while turning the VCO trimmer clockwise. Adjust the VCO so that the loop voltage is 3 V. This loop voltage corresponds to min. 25 (20) kHz ripple on TP 1. Now when the loop is in lock a slight tuning of C 24 should be done to control that the voltage on TP 1 still is maximum.

For multichannel sets, turn the channel selector to the lowest and highest frequency and check that the loop still goes in lock. Considering a set with the max. possible bandwidth 2 MHz, the loop voltage shall lie between 2 and 4 V going from the lowest channel to the highest in such a manner that increasing voltage corresponds to increasing frequency.

C. Rx-frequency.

Select the mid-frequency channel and connect a 500 MHz counter to the VCO-output point 5. The reading will be Rx-frequency + 21,4 MHz and for fine tuning of the Rx-frequency, use C 39 on synthesizer mixer print board B 56.

2. Tuning of the receiver.

A. 21,4 MHz and 455 kHz IF (print board B01).

Connect a 21,4 MHz sweep generator (a 10,7 MHz sweep generator normally contains sufficient second harmonics to be used on 21,4 MHz to point TP 2 on the RF and mixer print board B 48 and the (DC) probe on point TP 1 on the IF print board B 01. Adjust L 6 (print B 48) and L 1 (print B 01) for minimum ripple. L 2 is tuned to max. amplitude while L 3 is tuned to best possible symmetry. Use the lowest possible input level to prevent limiting in the mixer. Connect the probe to the AF output from the detector (a suitable point is pin 1 on the ampl. print B 09) and adjust L 4 in the IF to max. discriminator slope and the best linearity.

B. RF amplifier and mixer (print board B 48)

With the voltmeter on TP 1 (print board B 48) the capacitors B 43 - C 35, B 48 - C 10 and C 11 are adjusted to max. deflection (approx. 2 V DC). With the signal generator connected to the receiver input, C 20, L 1, L 2, L 3 and L 4 are now tuned to give optimum sensitivity.

C. AF-amplifier, squelch and key circuit (print board B 09).

Adjust the output level for the handset earpiece to 60 mV with potmeter R 31. (3,5 kHz dev., 1 kHz modulation).

Alternative method for tuning of Rx front and IF
without a sweep generator

Adjust C 10 and C 18 as described under 'B'. Tune the RF-signal generator either to 21,4 MHz or to the receiving frequency and connect it to TP 2 in the RF-amplifier. The horizontal deflection voltage from an oscilloscope should be used to modulate (FM) the signal generator. Now the IF can be tuned as previously described. By connecting the signal generator (tuned to the receiving frequency) to the aerial input, all the capacitors in the RF-amplifier and mixer can be tuned to max. deflection with the probe on TP 1 in the IF amplifier.

3. Tuning of the transmitter

A. Transmitter mixer and amplifier (print board B 46)

Turn the capacitors C 9 and C 17 to max. capacitance and tune the helicoils L 4, L 5, L 7 and L 8 to max. frequency (screw up the four alignment screws). Remove the VCO signal and connect a wattmeter (50 Ω , 1 W range) to pin 4, then key the transmitter. The 21,4 MHz* injection to the transmitter mixer is tuned with L 1 (print B 46) to max. DC-voltage on TP 1 - approx. 0,4 V. If the Tx-mixer crystal is higher than 10,7 MHz, the capacitor C 21 is removed. Reconnect the VCO signal and tune the capacitor C 30 on print B 43 to max. DC-voltage on TP 1 print B 46 approx. 0,5 V. Decrease the capacitance of C 9 slowly until the first time a max. of about 0,4 V_{DC} is indicated on TP 2. Now tune L 4 until the voltage on TP 2 decreases. Move the voltmeter to TP 3 and tune L 5 and L 4 to max. reading approx. 0,55 V_{DC}. Tune L 7 until a decrease in the reading on TP 3 is seen. L 8 and L 7 should now be tuned to max. DC-voltage on TP 4 approx. 0,75 V. C 17 can now be tuned to max. output on the wattmeter. Finally a slight tuning of C 9, L 4, L 5, L 7, L 8 and C 17 should be done in order to get max. output power approx. 30 mW.

* When $F_{Tx} = F_{Rx}$ (x-tal < 10,7 MHz) C 2 or C 21 have to be removed.

B. 6-10 W PA-stage (print board B 45)

Turn the power regulation potmeter R 1 counterclockwise to get the output power stabilization out of function. Connect a wattmeter (50 Ω , 10 W) to the test installation output and set the supply voltage to 12,0 V. Now tune C 2, C 5, C 6, C 10, C 11, C 15 and C 16 to max. output power. Then a fine adjustment of C 17 on the transmitter amplifier print B 07 should be done. Finally the tuning should be repeated once or twice in order to get the max. possible output power approx. 12 W. The potmeter R 1 on print board B 57 will adjust the output power for any desired value between 6-10 W.

C. Transmitter frequency

Connect a counter to the wattmeter and adjust the transmitter frequency with the capacitor C 31 in the Tx-oscillator print board B 56.

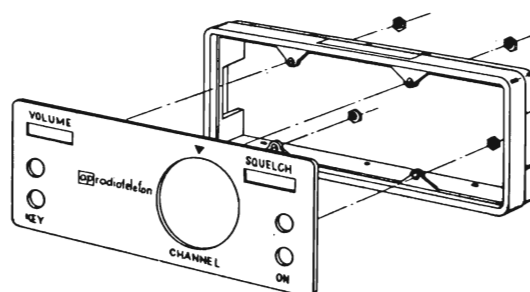
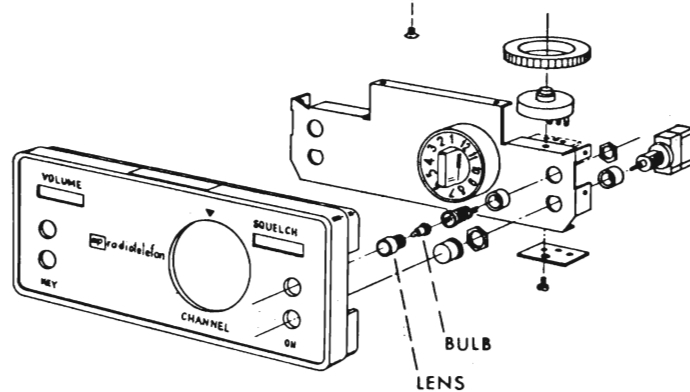
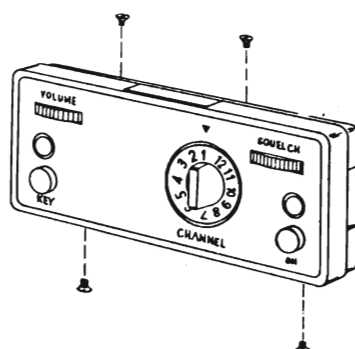
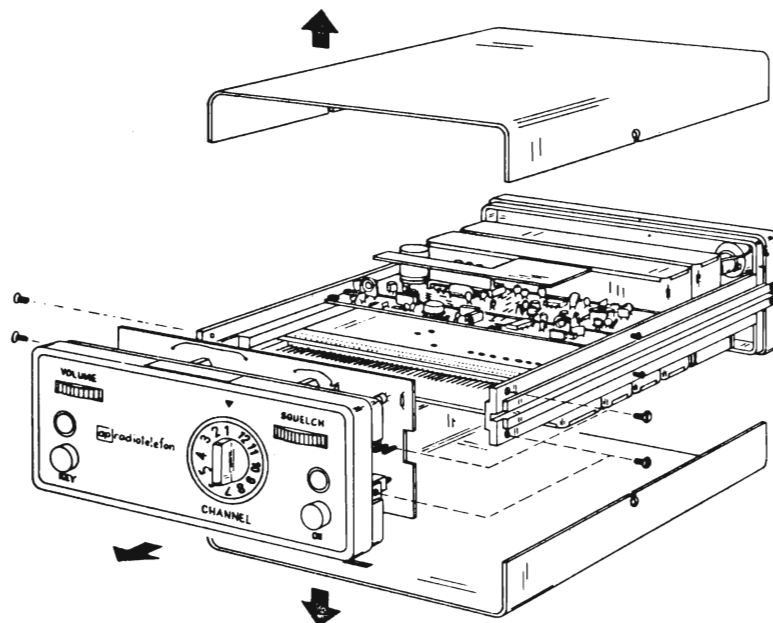
D. 10-25 W PA-stage (print board B 59 extern PA-stage)

Push the radio into the power cassette, connect the wattmeter (50 Ω , 25 W) and adjust C 1, C 2, C 8 and C 9 to max. output power with a supply voltages of 12,0 V. Increase the supply voltage to 13,6 V and turn the potmeter R 2 on print B 59 clockwise until the power decreases to the desired value. Check the power regulation by varying the supply voltage from 10,8 V to 16,0 V. In the case of 25 W set the output power may be a little less than 25 W at supply voltages below 13,2 V, but for voltages from 13,2 V and up the output power shall be held constantly on 25 W.

E. Modulation amplifier (print board B 10)

Connect a modulation meter to the transmitter and a tone generator to the microphone input 1. The generator must have a low output impedance.

Turn the 3 potentiometers to centre position and set the generator to 1000 Hz. With an input level of 20 mV, potmeter R 27 is adjusted to give ± 5 kHz deviation on the modulation meter. Decrease the input level to 2 mV and adjust potmeter R 3 to a deviation of ± 3 kHz. Repeat the procedure to check and fine adjust R 27 and R 3 if necessary. If the station is equipped with a handset, R 27 is adjusted to ± 5 kHz with an input level (1000 Hz) of 4 V. When the level is decreased to 400 mV R 28 is set to give a deviation of ± 3 kHz.



Rettet: 29-11-76 H.J.

Disassembling of AP 2000

AP-RADIOTELEFON ½

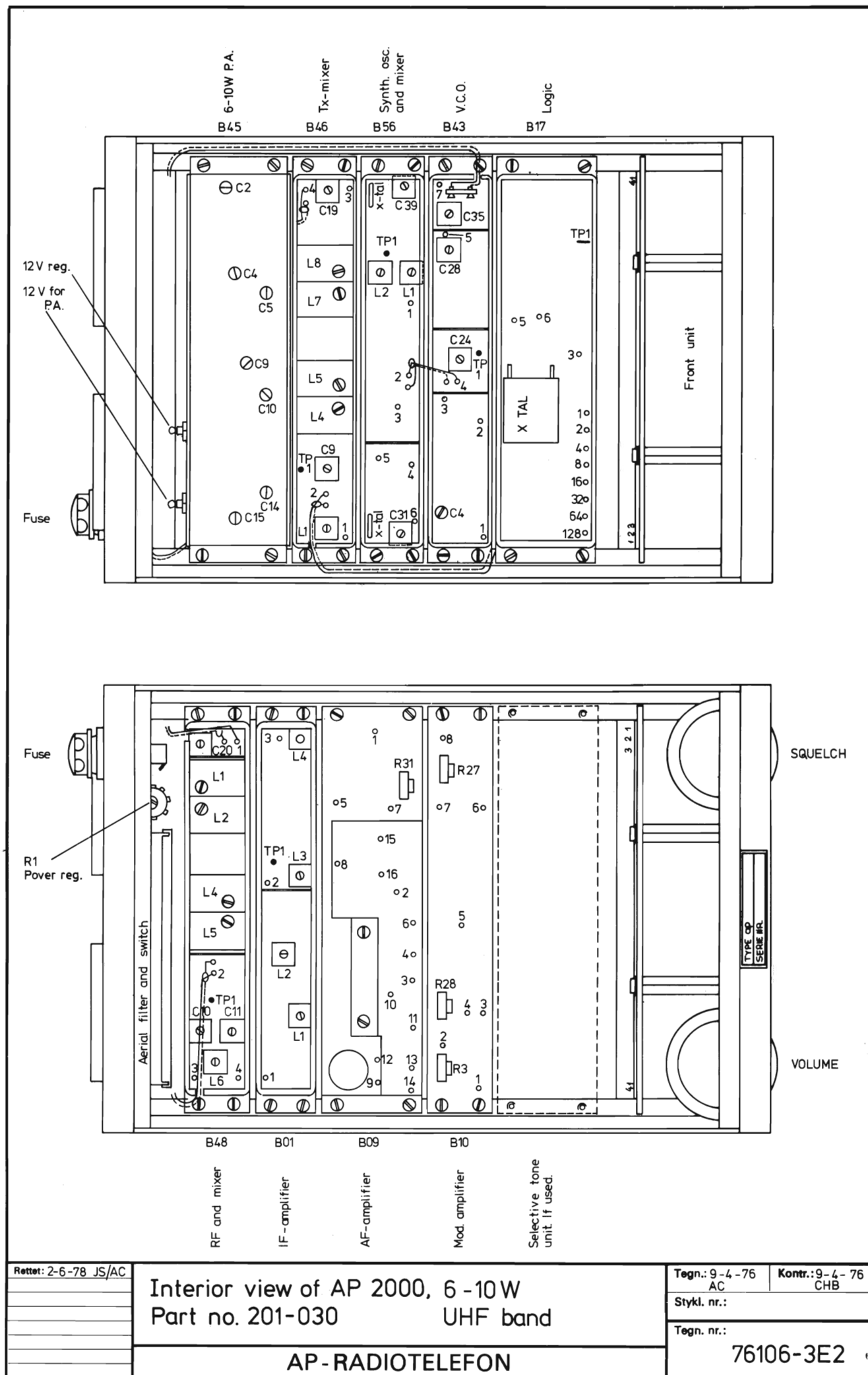
Tegn.: 10-8-76
AC

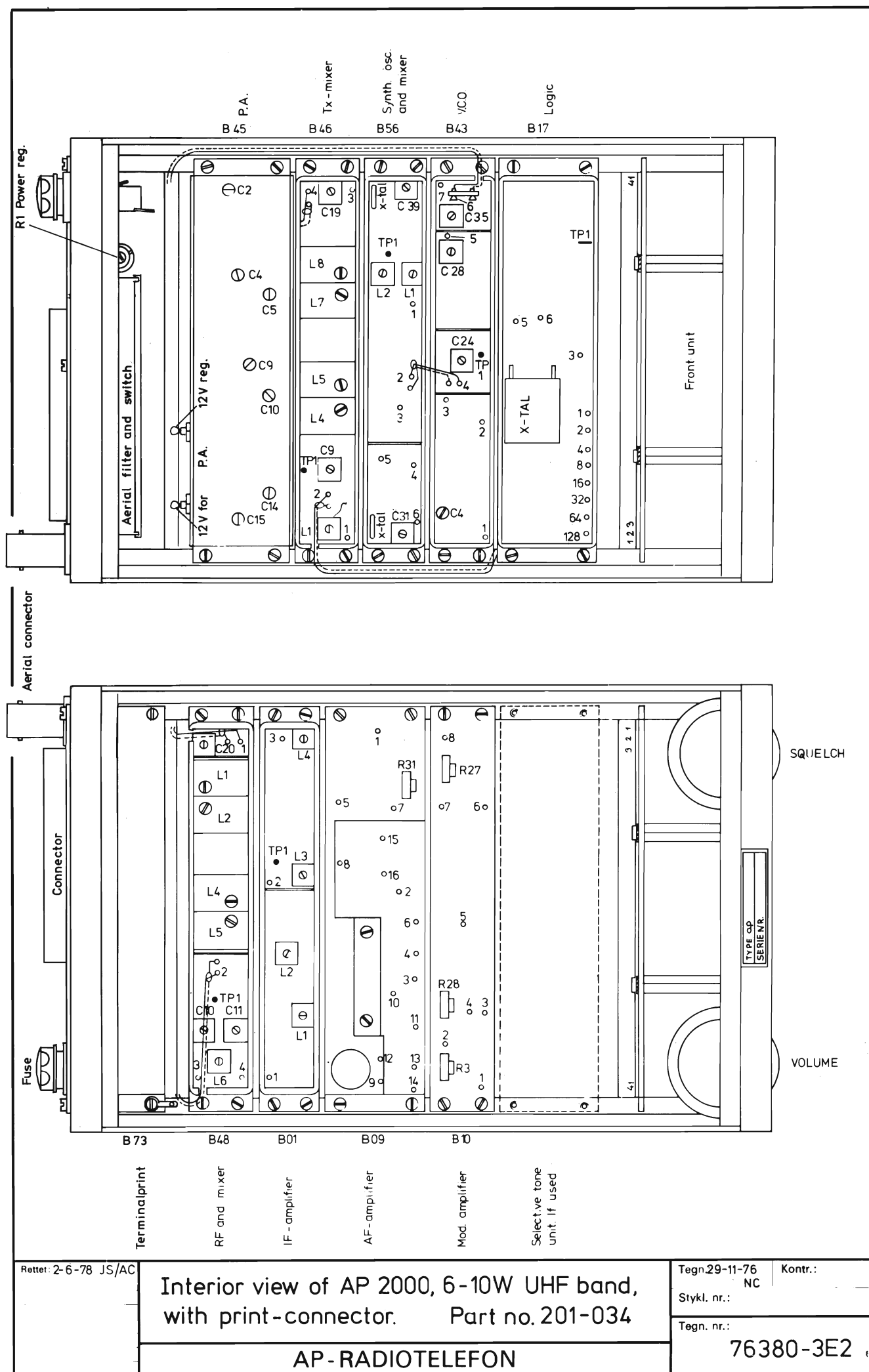
Kontr.:

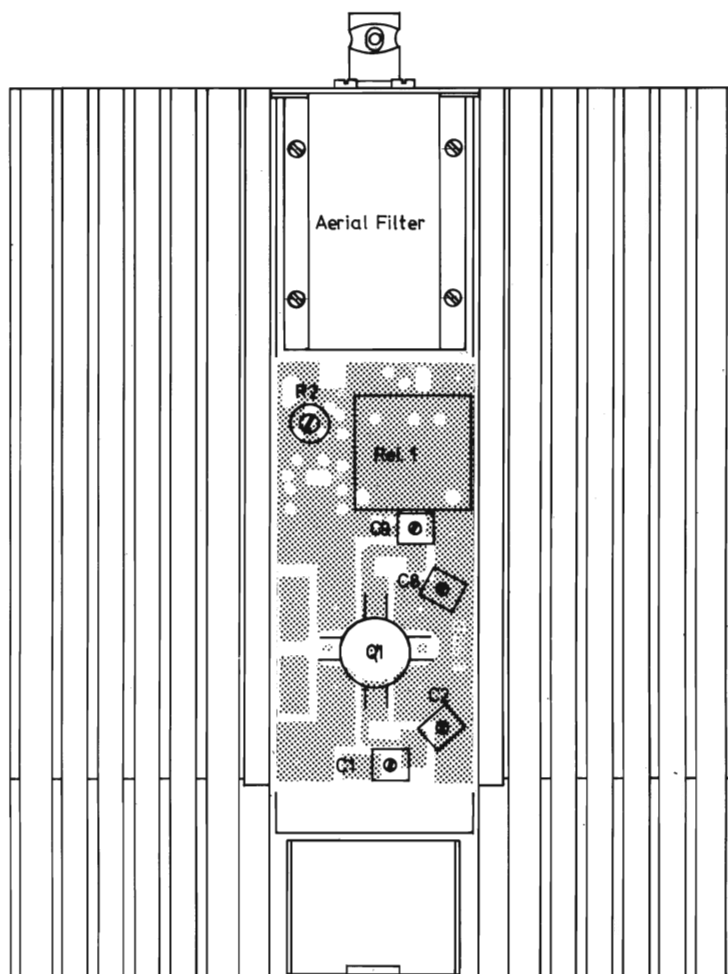
Stykl. nr.:

Tegn. nr.:

76218 - 4M2







Rettet: 2-6-78 JS/AC

Interior view of UHF
Ext. PA-stage

AP-RADIOTELEFON

Tegn.: 12-4-76
NC

Kontr.: 12-4-76
CHB

Stykl. nr.:

Tegn. nr.:

76108-3E 2

SPECIFICATION

for Quartz Crystal Unit

AP 25

Mode of operation: F_{Rx} higher than or equal to F_{Tx}

1. Mode of operation : AT-Fundamental
2. Holder : HC-42/U
3. Frequency range : 10-22 MHz
4. Resonance : Parallel (15 pF)
5. Calibration tolerance : ± 10 ppm at 25°C
6. Temperature tolerance : ± 5 ppm % 20°C to + 70°C
7. Drive level : 1 mW
8. Equivalent series resistance : Max. 40 Ω
9. Marking : AP 25 frequency in MHz

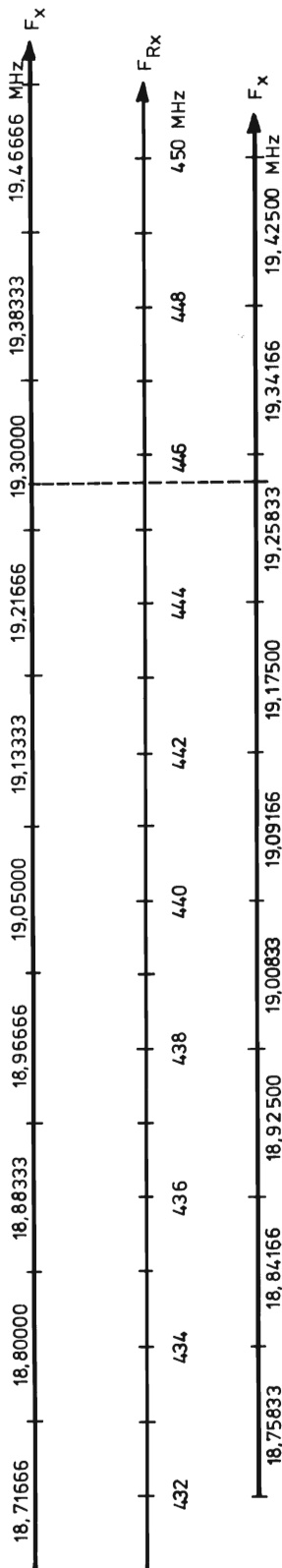
$$\text{Division ratio } N = \frac{F_{Rx} + 21,4 - 24 F_x}{0,025}$$

Example:

Known receiver freq. = 445,650 MHz

Found from the table $F_x = 19,25833$ MHz

Calculated $N = 194,0032$ as N is an integer the decimal places are deleted so $N = 194$.



25kHz Channel spacing

Transmitter mixer oscillator

SPECIFICATION

for Quartz Crystal Unit

AP 22

1. Mode of operation : AT-Fundamental
2. Holder : HC-42/U
3. Frequency range : 10-22 MHz
4. Resonance : Parallel (30 pF)
5. Calibration tolerance : ± 15 ppm at 25°C
6. Temperature tolerance : ± 10 ppm % 20°C to + 70°C
7. Drive level : 1 mW
8. Equivalent serie resistance : Max. 40 Ω
9. Marking : AP 22 frequency in MHz

Calculation of the crystal frequency for the transmitter mixer oscillator
 $F_{Tx \text{ mix.}} = 10,7 + \frac{F_{Rx} - F_{Tx}}{2}$ Spec. AP 22

Rettet:

15-2-77 NC

Standard crystals for AP 2000

UHF band, medium range: 2. For channels ending with 00, 25, 50, 75 khz

AP-RADIOTELEFON ½

Tegn.: 27-10-76
AC

Kontr.: 27-10-76
CHB

Stykl. nr.:

Tegn. nr.:

76312-4E2

Rettet: 27-2-76 AC
15-2-77 NC

Standard crystals for AP2000
UHF band, high range: 3. For channels ending with 00, 25, 50, 75 kHz
AP-RADIOTELEFON $\frac{\lambda}{2}$

Tegn.: 30-10-75 EH	Kontr.: 30-10-75 CHB
Stykl. nr.:	
Tegn. nr.:	75500-4E2

SPECIFICATION
for Quartz Crystal Unit
AP 25

- Mode of operation : AT-Fundamental
- Holder : HC-42/U
- Frequency range : 10-22 MHz
- Resonance : Parallel (15 pF)
- Calibration tolerance : ± 10 ppm at 25°C
- Temperature tolerance : ± 5 ppm $\%$ 20°C to + 70°C
- Drive level : 1 mW
- Equivalent series resistance : Max. 40 Ω
- Marking : AP 25 frequency in MHz

Mode of operation: F_{Rx} higher than or equal to F_{Tx}

$$\text{Division ratio } N = \frac{F_{Rx} + 21,4 - 24 F_x}{0,025}$$

Example:
Known receiver freq. = 461,325 MHz
Found from the table $F_x = 19,96666$ MHz
Calculated $N = 141,0064$ as N is an integer the decimal places are deleted so $N = 141$.

SPECIFICATION
for Quartz Crystal Unit
AP 22

- Mode of operation : AT-Fundamental
- Holder : HC-42/U
- Frequency range : 10-22 MHz
- Resonance : Parallel (30 pF)
- Calibration tolerance : ± 15 ppm at 25°C
- Temperature tolerance : ± 10 ppm $\%$ 20°C to + 70°C
- Drive level : 1 mW
- Equivalent series resistance : Max. 40 Ω
- Marking : AP 22 frequency in MHz

25kHz Channel spacing

SPECIFICATION
for Quartz Crystal Unit
AP 22

- Mode of operation : AT-Fundamental
- Holder : HC-42/U
- Frequency range : 10-22 MHz
- Resonance : Parallel (30 pF)
- Calibration tolerance : ± 15 ppm at 25°C
- Temperature tolerance : ± 10 ppm $\%$ 20°C to + 70°C
- Drive level : 1 mW
- Equivalent series resistance : Max. 40 Ω
- Marking : AP 22 frequency in MHz

Transmitter mixer oscillator

$$\text{Calculation of the crystal frequency for the transmitter mixer oscillator}$$

$$F_{Tx \text{ mix.}} = 10,7 + \frac{F_{Rx} - F_{Tx}}{2} \text{ Spec. AP 22}$$

SPECIFICATION
for Quartz Crystal Unit
AP 22

- Mode of operation : AT-Fundamental
- Holder : HC-42/U
- Frequency range : 10-22 MHz
- Resonance : Parallel (30 pF)
- Calibration tolerance : ± 15 ppm at 25°C
- Temperature tolerance : ± 10 ppm $\%$ 20°C to + 70°C
- Drive level : 1 mW
- Equivalent series resistance : Max. 40 Ω
- Marking : AP 22 frequency in MHz

Rettet:

Standard crystals for AP2000 UHF band low range: 1 for channels ending with 10,30,50,70,90, kHz
AP-RADIOTELEFON ½

Tegn.: 13-5-77 H.J.	Kontr.:
Stykl. nr.:	
Tegn. nr.:	77196-4E2

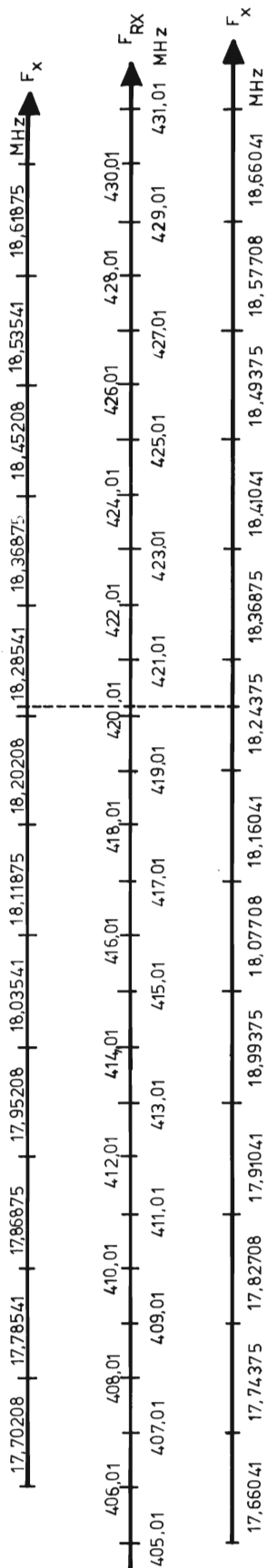
Mode of operation: F_{RX} higher than or equal to F_{TX}

SPECIFICATION
for Quartz Crystal Unit
AP 25

1. Mode of operation : AT-Fundamental
2. Holder : HC-42/U
3. Frequency range : 10-22 MHz
4. Resonance : Parallel (15 pF)
5. Calibration tolerance : ± 10 ppm at 25°C
6. Temperature tolerance : ± 5 ppm % 20°C to + 70°C
7. Drive level : 1 mW
8. Equivalent series resistance : Max. 40 Ω
9. Marking : AP 25 frequency in MHz

Division ratio $N = \frac{F_{RX} + 21,4 - 24 F_x}{0,020}$

Example:
Known receiver freq. = 420,460 MHz
Found from the table $F_x = 18,25833$ MHz
Calculated $N = 183,004$ as N is an integer
the decimal places are deleted so $N = 183$.



Transmitter mixer oscillator

SPECIFICATION
for Quartz Crystal Unit
AP 22

1. Mode of operation : AT-Fundamental
2. Holder : HC-42/U
3. Frequency range : 10-22 MHz
4. Resonance : Parallel (30 pF)
5. Calibration tolerance : ± 15 ppm at 25°C
6. Temperature tolerance : ± 10 ppm % 20°C to + 70°C
7. Drive level : 1 mW
8. Equivalent series resistance : Max. 40 Ω
9. Marking : AP 22 frequency in MHz

Calculation of the crystal frequency for the transmitter mixer oscillator
 $F_{Tx \text{ mix.}} = 10,7 + \frac{F_{RX} - F_{Tx}}{2}$ Spec. AP 22

SPECIFICATION

for Quartz Crystal Unit

AP 25

Mode of operation: F_{Rx} higher than or equal to F_{Tx}

1. Mode of operation : AT-Fundamental
2. Holder : HC-42/U
3. Frequency range : 10-22 MHz
4. Resonance : Parallel (15 pF)
5. Calibration tolerance : ± 10 ppm at 25°C
6. Temperature tolerance : ± 5 ppm % 20°C to + 70°C
7. Drive level : 1 mW
8. Equivalent series resistance : Max. 40 Ω
9. Marking : AP 25 frequency in MHz

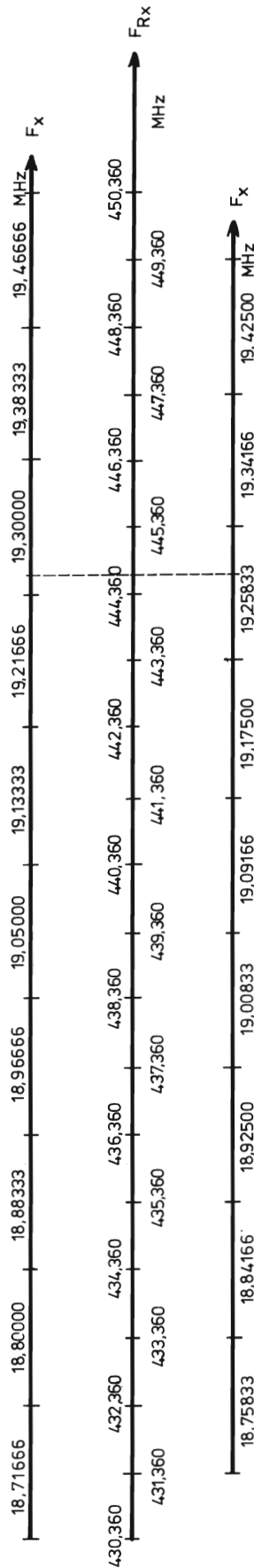
$$\text{Division ratio } N = \frac{F_{Rx} + 21,4 - 24 F_x}{0,020}$$

Example:

Known receiver freq. = 444,680 MHz

Found from the table $F_x = 19,25833$ MHz

Calculated $N = 194,004$ as N is an integer the decimal places are deleted so $N = 194$.



Transmitter mixer oscillator

SPECIFICATION

for Quartz Crystal Unit

AP 22

1. Mode of operation : AT-Fundamental
2. Holder : HC-42/U
3. Frequency range : 10-22 MHz
4. Resonance : Parallel (30 pF)
5. Calibration tolerance : ± 15 ppm at 25°C
6. Temperature tolerance : ± 10 ppm % 20°C to + 70°C
7. Drive level : 1 mW
8. Equivalent series resistance : Max. 40 Ω
9. Marking : AP 22 frequency in MHz

Calculation of the crystal frequency for the transmitter mixer oscillator

$$F_{Tx \text{ mix.}} = 10,7 + F_{Rx} - \frac{F_{Tx}}{2}$$

Rettet:

15-2-77 NC

Standard crystals for AP2000 UHF band
 medium range: 2 for channels ending with
 00,20,40,60,80 kHz

AP-RADIOTELEFON ¼

Tegn.: 7-2-77
 AC

Kontr.:
 CHB

Stykl. nr.:

Tegn. nr.:

77106 - 4E2

Rettet:

Standard crystals for AP2000 UHF band
medium range: 2 for channels ending with
10,30,50,70,90 kHz

AP-RADIOTELEFON ¼

Tegn.: 13-5-77 HJ	Kontr.:
Stykl. nr.:	
Tegn. nr.: 77195-4E2	

SPECIFICATION
for Quartz Crystal Unit
AP 25

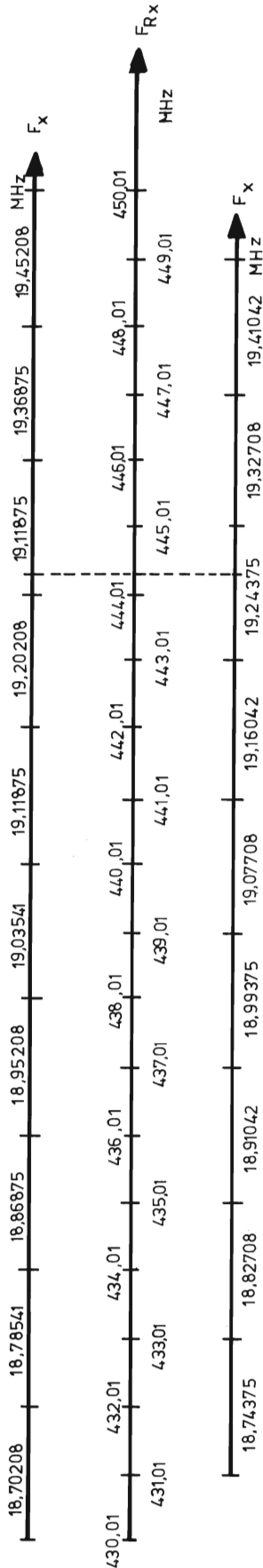
Mode of operation: F_{Rx} higher than or equal to F_{Tx}

1. Mode of operation : AT-Fundamental
2. Holder : HC-42/U
3. Frequency range : 10-22 MHz
4. Resonance : Parallel (15 pF)
5. Calibration tolerance : ± 10 ppm at 25°C
6. Temperature tolerance : ± 5 ppm % 20°C to + 70°C
7. Drive level : 1 mW
8. Equivalent series resistance : Max. 40 Ω
9. Marking : AP 25 frequency in MHz

$$\text{Division ratio } N = \frac{F_{Rx} + 21,4 - 24 \times}{0,020}$$

Example:

Known receiver freq. = 444,680 MHz
Found from the table $F_x = 19,25833$ MHz
Calculated $N = 194,004$ as N is an integer
the decimal places are deleted so $N = 194$.



Transmitter mixer oscillator

SPECIFICATION
for Quartz Crystal Unit
AP 22

1. Mode of operation : AT-Fundamental
2. Holder : HC-42/U
3. Frequency range : 10-22 MHz
4. Resonance : Parallel (30 pF)
5. Calibration tolerance : ± 15 ppm at 25°C
6. Temperature tolerance : ± 10 ppm % 20°C to + 70°C
7. Drive level : 1 mW
8. Equivalent series resistance : Max. 40 Ω
9. Marking : AP 22 frequency in MHz

Calculation of the crystal frequency for
the transmitter mixer oscillator
 $F_{Tx \text{ mix.}} = 10,7 + \frac{F_{Rx} - F_{Tx}}{2}$ Spec. AP 22

Mode of operation: F_{Rx} higher than or equal to F_{Tx}

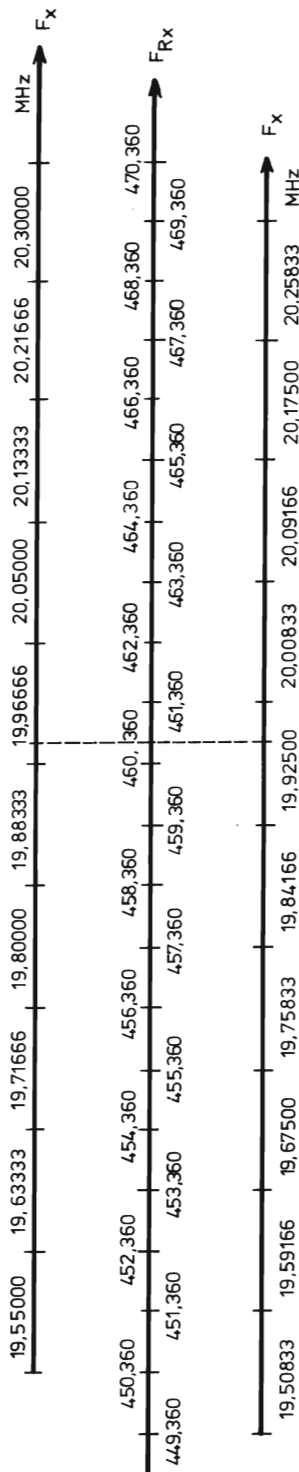
SPECIFICATION for Quartz Crystal Unit AP 25

1. Mode of operation : AT-Fundamental
2. Holder : HC-42/U
3. Frequency range : 10-22 MHz
4. Resonance : Parallel (15 pF)
5. Calibration tolerance : ± 10 ppm at 25°C
6. Temperature tolerance : ± 5 ppm % 20°C to + 70°C
7. Drive level : 1 mW
8. Equivalent series resistance : Max. 40Ω
9. Marking : AP 25 frequency in MHz

$$\text{Division ratio } N = \frac{F_{Rx} + 21,4 - 24 F_x}{0,020}$$

Example:

Known receiver freq. = 460,620 MHz
Found from the table $F_x = 19,96666$ MHz
Calculated $N = 141,008$ as N is an integer
the decimal places are deleted so $N = 141$.



Transmitter mixer oscillator

SPECIFICATION for Quartz Crystal Unit AP 22

1. Mode of operation : AT-Fundamental
2. Holder : HC-42/U
3. Frequency range : 10-22 MHz
4. Resonance : Parallel (30 pF)
5. Calibration tolerance : ± 15 ppm at 25°C
6. Temperature tolerance : ± 10 ppm % 20°C to + 70°C
7. Drive level : 1 mW
8. Equivalent serie resistance : Max. 40 Ω
9. Marking : AP 22 frequency in MHz

Calculation of the crystal frequency for the transmitter mixer oscillator
 $F_{Tx \text{ mix.}} = 10,7 + \frac{F_{Rx} - F_{Tx}}{2}$ Spec. AP 22

20kHz Channel spacing

Rettet:
15-2-77 NC

Standard crystals for AP2000 UHF-band
high range: 3 for channels ending with
00,20,40,60,80 kHz

AP-RADIOTELEFON ¼

Tegn.: 7-2-77
AC

Kontr.:
CHB

Stykl. nr.:

Tegn. nr.: 77107-4E2

Rettet:

Standard crystals for AP 2000 UHF-band high range: 3 for channels ending with 10,30,50,70,90 kHz	
AP-RADIOTELEFON $\frac{A}{S}$	

Tegn.: 13-5-77 HJ	Kontr.:
Stykl. nr.:	
Tegn. nr.: 77194-4E 2	

Mode of operation: F_{Rx} higher than or equal to F_{Tx}

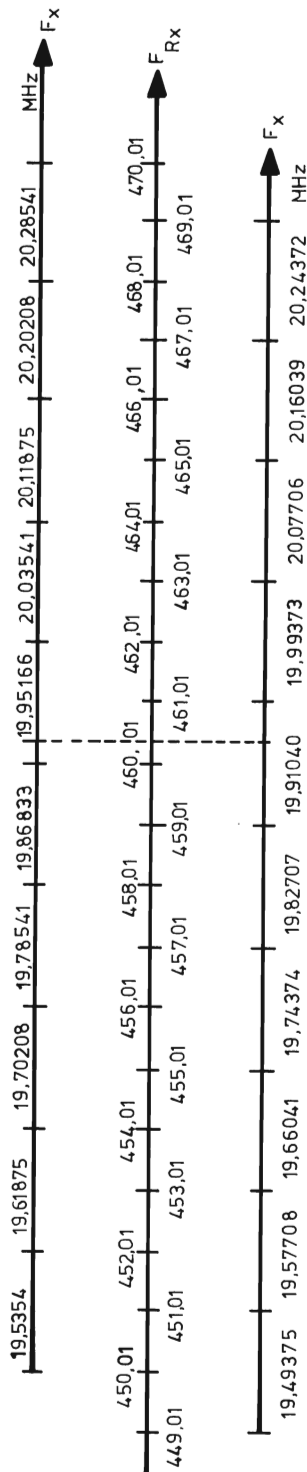
SPECIFICATION for Quartz Crystal Unit AP 25

1. Mode of operation : AT-Fundamental
2. Holder : HC-42/U
3. Frequency range : 10-22 MHz
4. Resonance : Parallel (15 pF)
5. Calibration tolerance : ± 10 ppm at 25°C
6. Temperature tolerance : ± 5 ppm % 20°C to + 70°C
7. Drive level : 1 mW
8. Equivalent series resistance : Max. 40 Ω
9. Marking : AP 25 frequency in MHz

$$\text{Division ratio } N = \frac{F_{Rx} + 21,4 - 24 F_x}{0,020}$$

Example:

Known receiver freq. = 460,620 MHz
Found from the table $F_x = 19,96666$ MHz
Calculated $N = 141,008$ as N is an integer
the decimal places are deleted so $N = 141$.

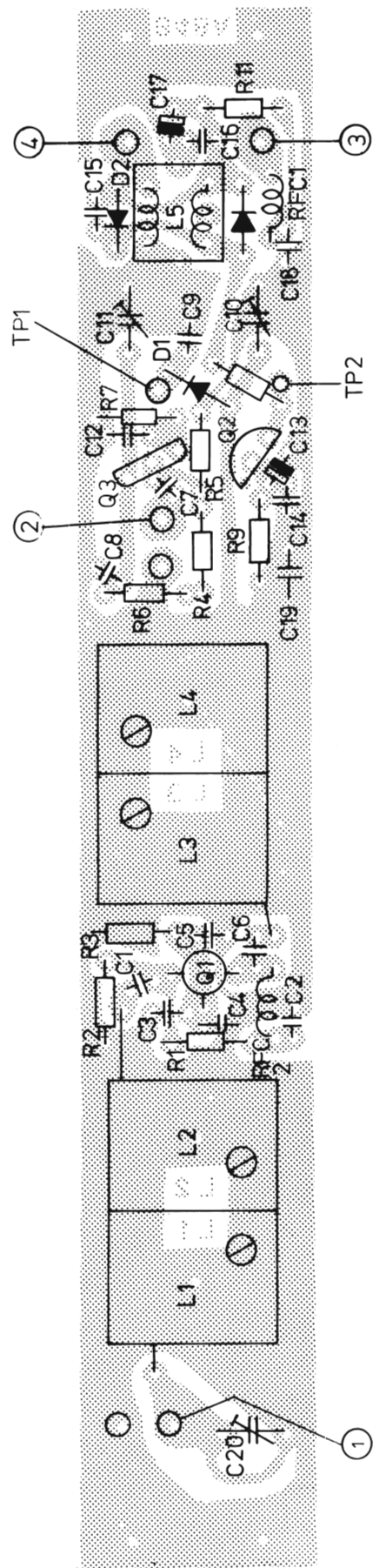
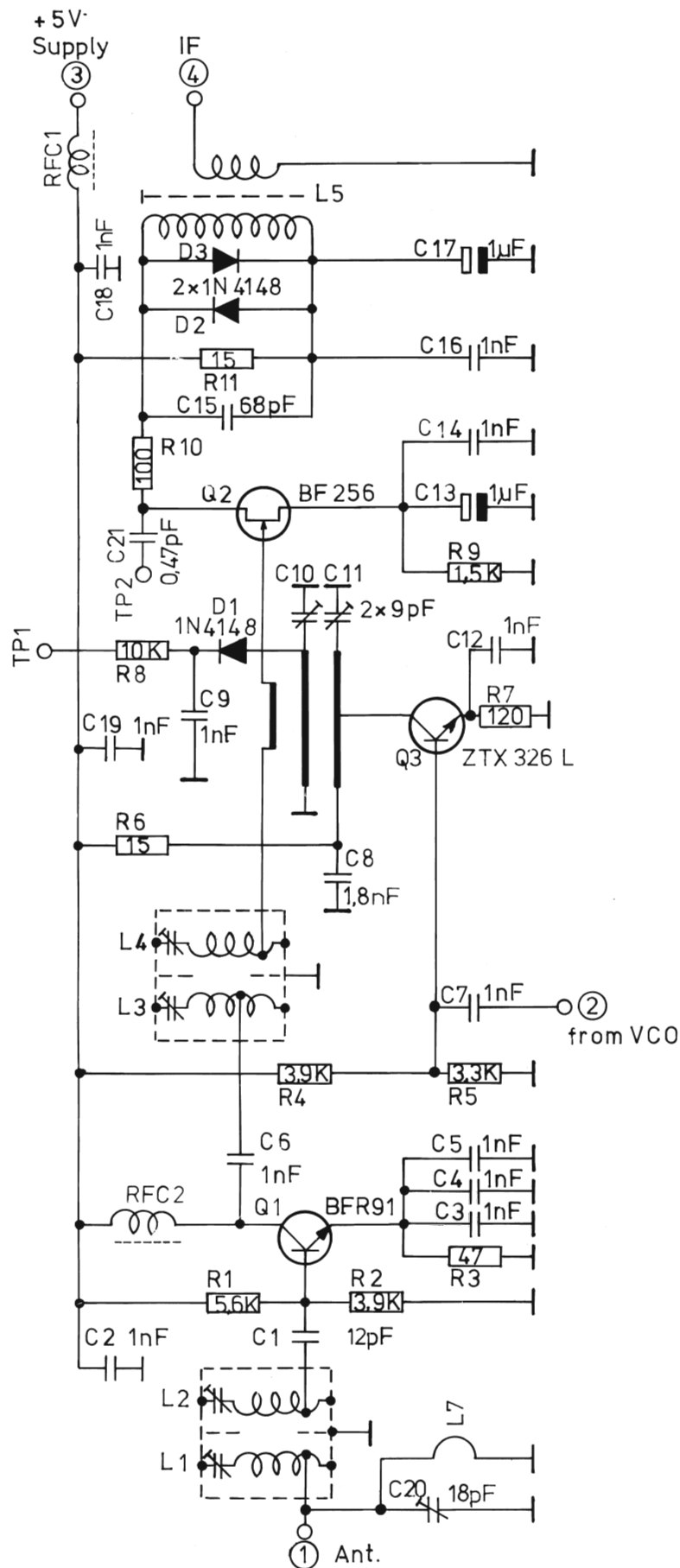


Transmitter mixer oscillator

SPECIFICATION for Quartz Crystal Unit AP 22

1. Mode of operation : AT-Fundamental
2. Holder : HC-42/U
3. Frequency range : 10-22 MHz
4. Resonance : Parallel (30 pF)
5. Calibration tolerance : ± 15 ppm at 25°C
6. Temperature tolerance : ± 10 ppm % 20°C to + 70°C
7. Drive level : 1 mW
8. Equivalent serie resistance : Max. 40 Ω
9. Marking : AP 22 frequency in MHz

Calculation of the crystal frequency for
the transmitter mixer oscillator
 $F_{Tx \text{ mix.}} = 10,7 + F_{Rx} - \frac{F_{Tx}}{2}$ Spec. AP 22



Rettet: 21-4-77 BJ/ac
 31-5-77 LT/AC
 26-8-77 POR/AC

RF AMPLIFIER AND MIXER F. UHF
 PRINT BOARD B48A 1

AP-RADIOTELEFON 1/2

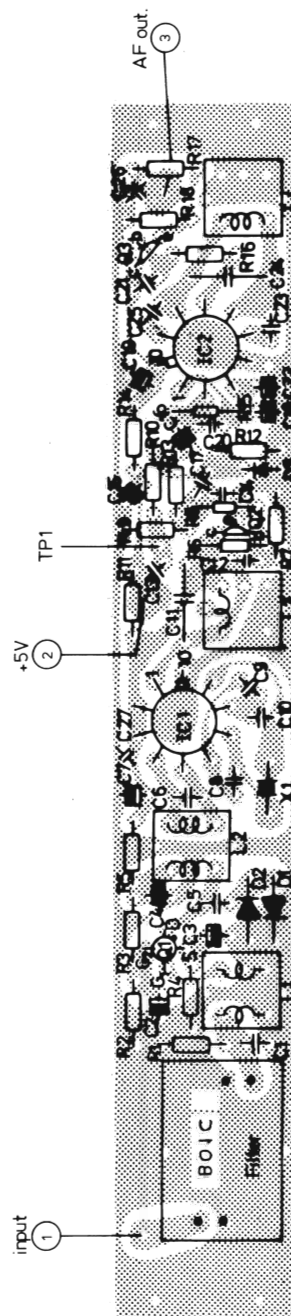
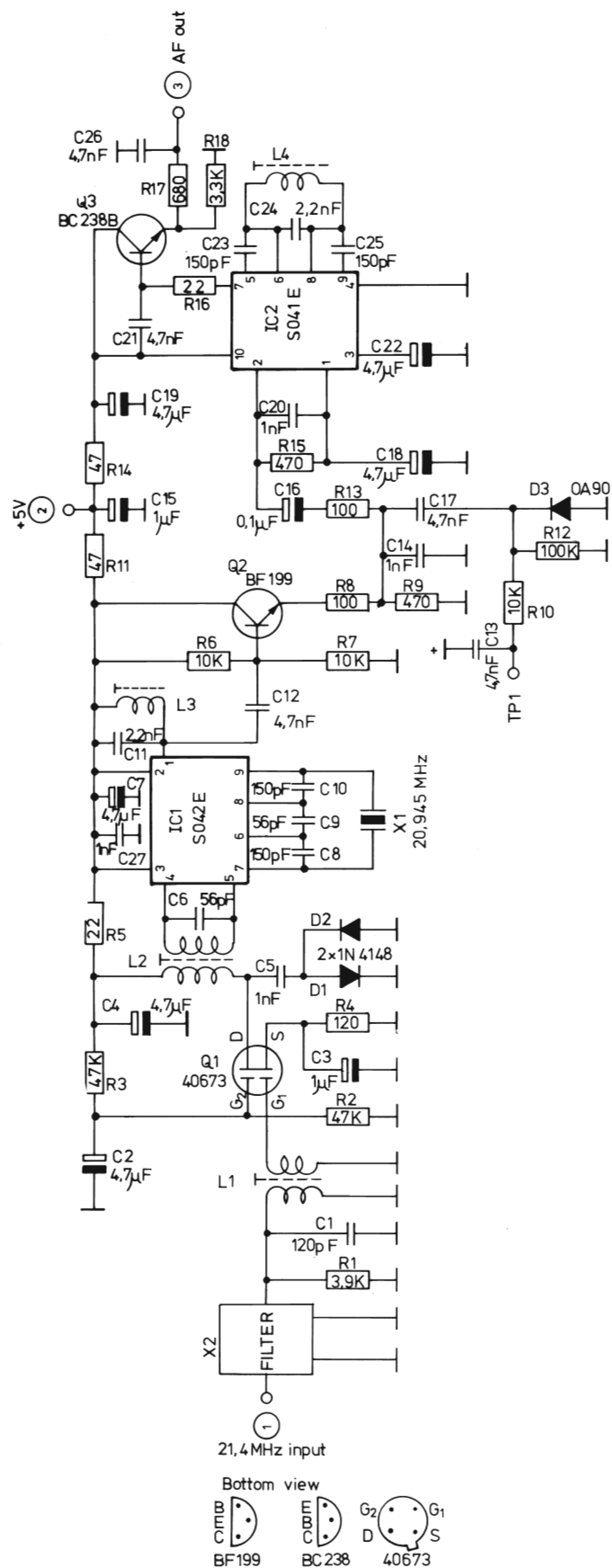
Tegn.: 29-10-75 NC
 Kontr.: 29-10-75 BJ

Stykl. nr.: 75476-4S2

Tegn. nr.: 75476-4E2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-292	5,6 kΩ 1/8 w	D1	04-062	1N 4148
R2	13-290	3,9 kΩ "	D2	04-062	1N 4148
R3	13-267	47 Ω "	D3	04-062	1N 4148
R4	13-290	3,9 kΩ "			
R5	13-289	3,3 kΩ "			
R6	13-261	15 Ω "	Q1	19-116	BFR 91
R7	13-272	120 Ω "	Q2	19-113	BF 256 A Philips
R8	13-295	10 kΩ "	Q3	19-115	ZTX 326 L
R9	13-285	1,5 kΩ "			
R10	13-271	100 Ω "			
R11	13-261	15 Ω "	L1		75472-4E2
			L2		75474-4E2
			L3		75473-4E2
			L4		75472-4E2
			L5		75285-4E2
C1	11-379	12 pF ker.			
C2	11-409	1 nF "			
C3	11-409	1 nF "			
C4	11-409	1 nF "	RFC-1		75290-4E2
C5	11-409	1 nF "			
C6	11-409	1 nF "	RFC-2		77155-4E2
C7	11-409	1 nF "			
C8	11-441	1,8 nF chip			
C9	11-409	1 nF "			
C10	19-329	9 pF Trim.			
C11	19-329	9 pF "			
C12	11-409	1 nF Ker.			
C13	11-502	1 μF/35V Tant.			
C14	11-409	1 nF Ker.			
C15	11-397	68 pF "			
C16	11-409	1 nF "			
C17	11-502	1 μF/35V Tant.			
C18	11-409	1 nF Ker.			
C19	11-409	1 nF "			
C20	19-330	18 pF Trim.			
C21	11-360	0,47 pF ker.			
RF-mixer UHF Print board B 48 A 1 Tilhører tegn. nr.: 75476-4E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 75476-4S2



Rettet: 8-5-78 JH/AC

21,4 MHz IF

Print B01C1

AP-RADIOTELEFON

Tegn.: 28-2-75

AC

Kontr.:

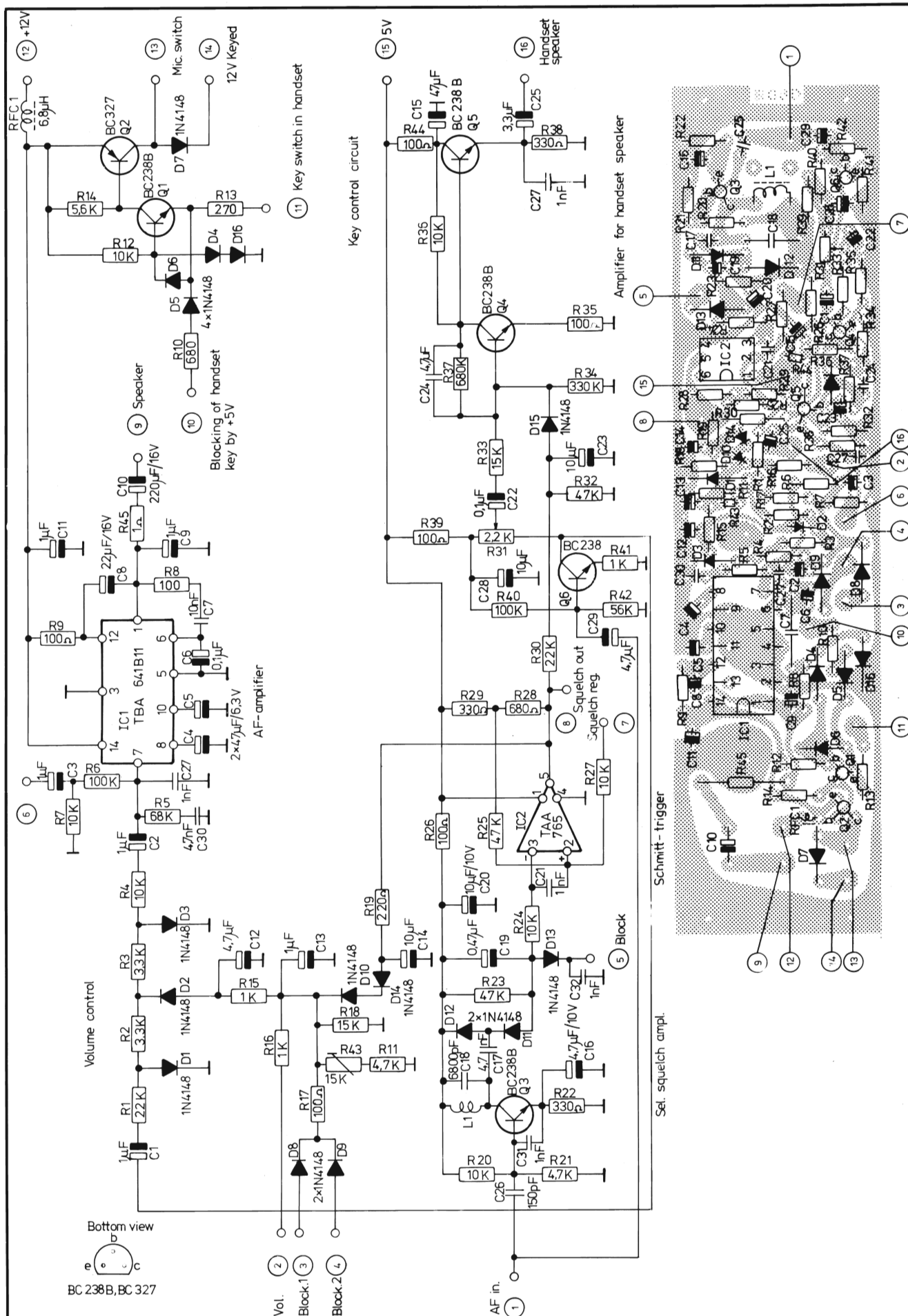
Stykl. nr.:

Tegn. nr.:

75076 - 3E2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-290	3,9 KΩ 1/8W CR 16	C19	11-504	4,7 μF/10V Tant.
R2	13-302	47 KΩ " "	C20	11-409	1 nF Ker.
R3	13-302	47 KΩ " "	C21	11-416	4,7 nF "
R4	13-272	120 Ω " "	C22	11-504	4,7 μF/10V Tant.
R5	13-263	22 Ω " "	C23	11-404	150 pF Ker.
R6	13-295	10 KΩ " "	C24	11-461	2,2 nF MKM
R7	13-295	10 KΩ " "	C25	11-404	150 pF Ker.
R8	13-271	100 Ω " "	C26	11-416	4,7 nF "
R9	13-279	470 Ω " "	C27	11-409	1 nF "
R10	13-295	10 KΩ " "	D1	04-062	1N4148
R11	13-267	47 Ω " "	D2	04-062	1N4148
R12	13-306	100 KΩ " "	D3	04-036	0A90
R13	13-271	100 Ω " "			
R14	13-267	47 Ω " "	Q1	19-128	40673
R15	13-279	470 Ω " "	Q2	19-104	BF199
R16	13-263	22 Ω " "	Q3	19-093	BC238B
R17	13-281	680 Ω " "			
R18	13-289	3,3 KΩ " "	IC1	09-007	SO42E
			IC2	09-006	SO41E
C1	11-403	120 pF Ker.			
C2	11-504	4,7 μF/10V Tant.	L1		75282-4E2
C3	11-502	1 μF/35V "	L2		75281-4E2
C4	11-504	4,7 μF/10V "	L3		75280-4E2
C5	11-409	1 nF Ker.	L4		75279-4E2
C6	11-396	56 pF "			
C7	11-504	4,7 μF/10V Tant.	X1	11-815	AP 22 20,945 Mhz
C8	11-404	150 pF Ker.	X2	11-854	21,4 Mhz
C9	11-396	56 pF "			
C10	11-404	150 pF "			
C11	11-461	2,2 nF MKM			
C12	11-416	4,7 nF Ker.			
C13	11-416	4,7 nF "			
C14	11-409	1 nF "			
C15	11-502	1 μF/35V Tant.			
C16	11-500	0,1 μF/35V "			
C17	11-416	4,7 nF Ker.			
C18	11-504	4,7 μF/10V Tant.			
21,4 MHz IF Print B 01 C Tilhører tegn. nr.: 75076-3E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 75076-4S2



Rettet: 12-4-77 JH/AC
7-6-77 JH/AC
13-4-78 POR/AMC

AF-amplifier, squelch and key circuit
Print board B09 D1

AP-RADIOTELEFON

Tegn.: 15-1-75

AC

Stykl. nr.:

Tegn. nr.:

Kontr.:

75017-3E2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-299	22 KΩ 1/8W CR 16	R38	13-277	330 Ω 1/8W CR 16
R2	13-289	3,3 KΩ " "	R39	13-271	100 Ω " "
R3	13-289	3,3 KΩ " "	R40	13-306	100 KΩ " "
R4	13-295	10 KΩ " "	R41	13-283	1 KΩ " "
R5	13-304	68 KΩ " "	R42	13-303	56 KΩ " "
R6	13-306	100 KΩ " "	R43	13-663	15 KΩ NTC
R7	13-295	10 KΩ " "	R44	13-271	100 Ω 1/8W CR 16
R8	13-271	100 Ω " "	R45	13-409	1 Ω 1/2W CR 37
R9	13-271	100 Ω " "	C1	11-502	1 µF/35V Tant.
R10	13-281	680 Ω " "	C2	11-502	1 µF/35V "
R11	13-291	4,7 KΩ " "	C3	11-502	1 µF/35V "
R12	13-295	10 KΩ " "	C4	11-509	47 µF/6,3V "
R13	13-276	270 Ω " "	C5	11-509	47 µF/6,3V "
R14	13-292	5,6 KΩ " "	C6	11-500	0,1 µF/35V "
R15	13-283	1 KΩ " "	C7	11-350	10 nF Laco
R16	13-283	1 KΩ " "	C8	11-507	22 µF/16V Tant.
R17	13-271	100 Ω " "	C9	11-502	1 µF/35V "
R18	13-297	15 KΩ " "	C10	05-024	220 µF/16V Elko
R19	13-275	220 Ω " "	C11	11-502	1 µF/35V Tant.
R20	13-295	10 KΩ " "	C12	11-504	4,7 µF/10V "
R21	13-291	4,7 KΩ " "	C13	11-502	1 µF/35V "
R22	13-277	330 Ω " "	C14	11-506	10 µF/25V "
R23	13-302	47 KΩ " "	C15	11-509	47 µF/6,3V "
R24	13-295	10 KΩ " "	C16	11-504	4,7 µF/10V "
R25	13-302	47 KΩ " "	C17	11-416	4,7 nF Ker.
R26	13-271	100 Ω " "	C18	11-465	6,8 nF MKH
R27	13-295	10 KΩ " "	C19	11-501	0,47 µF/35V Tant.
R28	13-281	680 Ω " "	C20	11-506	10 µF/25V "
R29	13-277	330 Ω " "	C21	11-409	1 nF Ker.
R30	13-299	22 KΩ " "	C22	11-500	0,1 µF/35V Tant.
R31	19-255	2,2 KΩ Trim.	C23	11-506	10 µF/25V "
R32	13-302	47 KΩ 1/8W CR 16	C24	11-416	4,7 nF Ker.
R33	13-297	15 KΩ " "	C25	11-519	3,3 µF/16V Tant.
R34	13-310	330 KΩ " "	C26	11-404	150 pF Ker.
R35	13-271	100 Ω " "	C27	11-409	1 nF "
R36	13-295	10 KΩ " "	C28	11-506	10 µF/25V Tant.
R37	13-311	680 KΩ " "	C29	11-504	4,7 µF/10V "

AF-amplifier, squelch and key circuit
 Print board B 09 D 1
 Tilhører tegn. nr.: 75017-3E2

Tegn.:

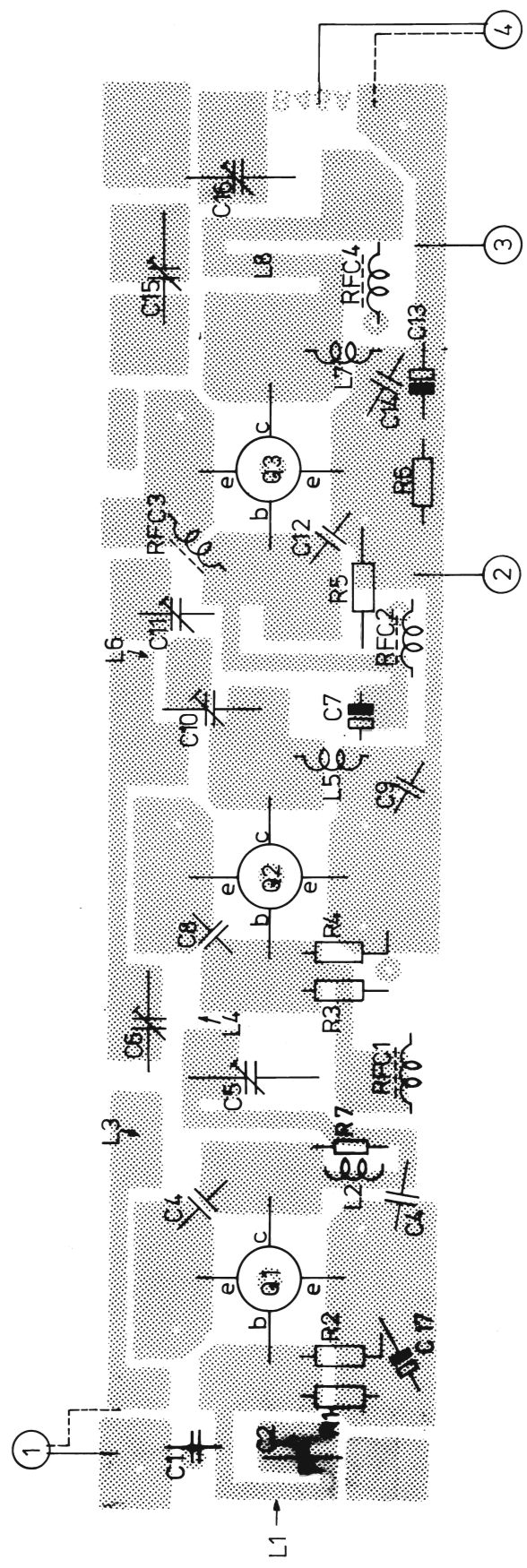
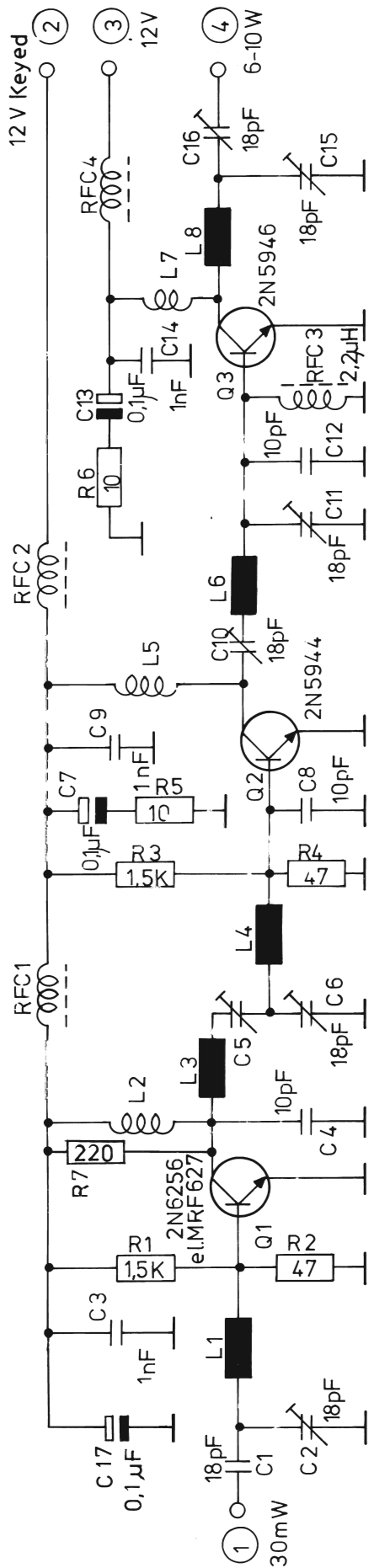
Stykl. nr.:

Kontr.:

75017-4S2

AP-RADIOTELEFON

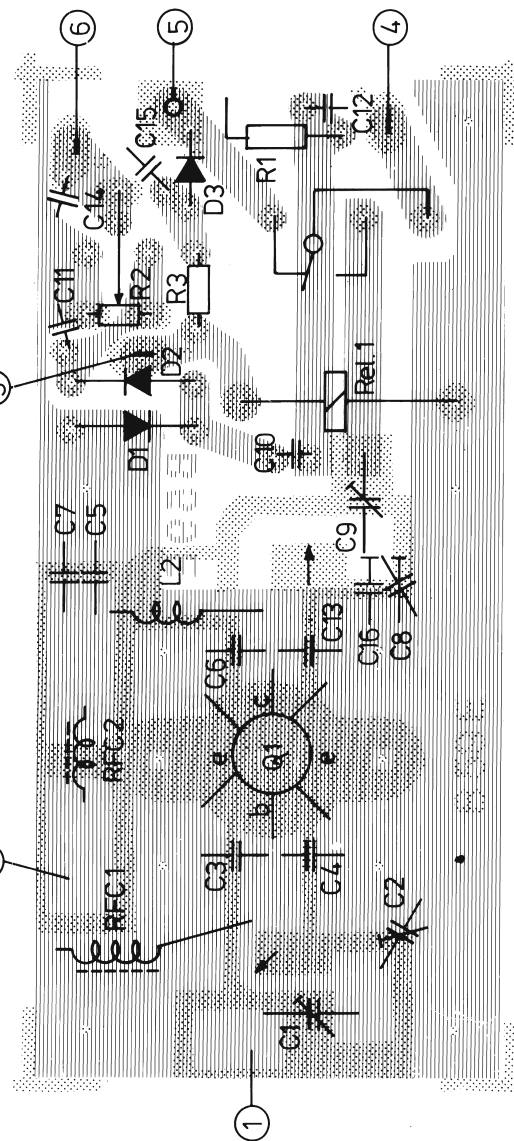
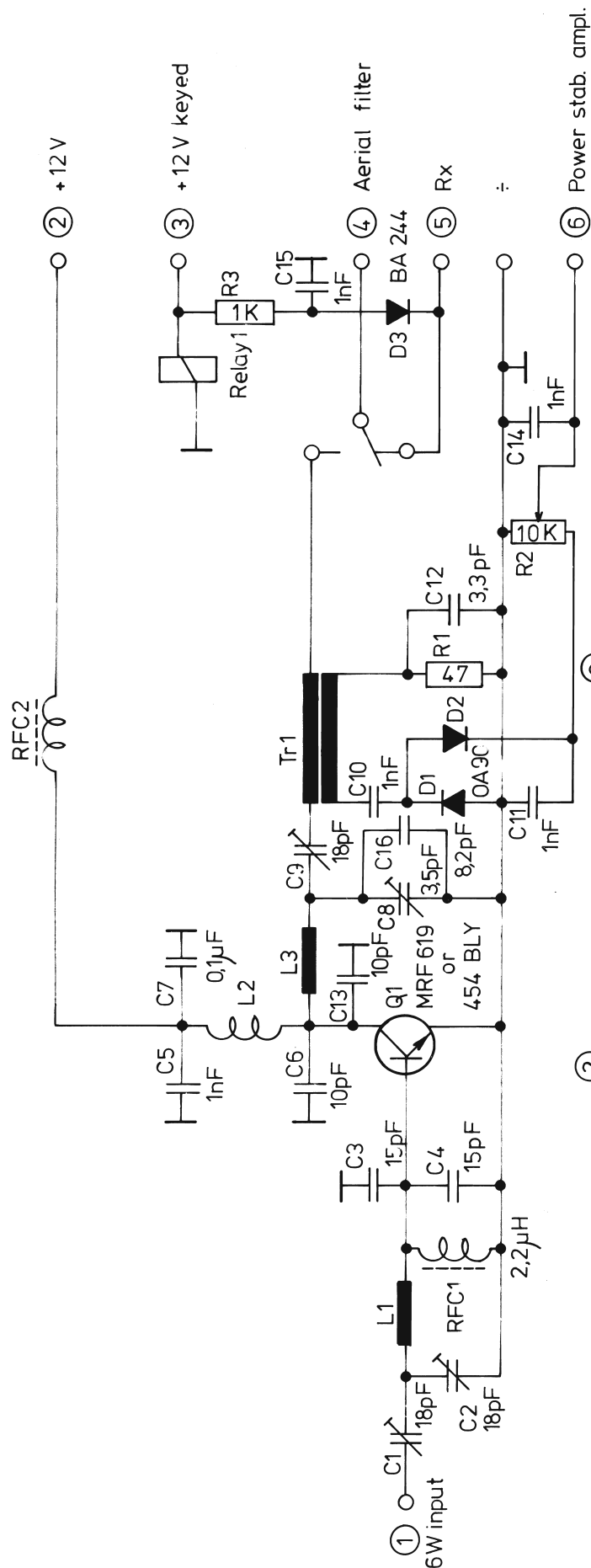
Nr.	Kode	Data	Nr.	Kode	Data
C30	11-416	4,7 nF ker.			
C31	11-409	1 nF "			
C32	11-409	1 nF "			
D1	04-062	1N4148			
D2	04-062	1N4148			
D3	04-062	1N4148			
D4	04-062	1N4148			
D5	04-062	1N4148			
D6	04-062	1N4148			
D7	04-062	1N4148			
D8	04-062	1N4148			
D9	04-062	1N4148			
D10	04-062	1N4148			
D11	04-062	1N4148			
D12	04-062	1N4148			
D13	04-062	1N4148			
D14	04-062	1N4148			
D15	04-062	1N4148			
D16	04-062	1N4148			
Q1	19-093	BC 238B			
Q2	19-095	BC 327			
Q3	19-093	BC 238B			
Q4	19-093	BC 238B			
Q5	19-093	BC 238B			
Q6	19-093	BC 238B			
IC1	09-004	TBA 641B11			
IC2	09-003	TAA 765A			
RFC 1	04-114	74016-4E2 drossel			
L1		75295-4E2			
AF-amplifier, squelch and key circuit. Print board B 09 D1 Tilhører tegn. nr.: 75017-3E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 75017-4S2



<div>Rettet: 2-6-78 JS/AC</div> <div></div> <div></div> <div></div> <div></div> <div></div>	<div>6-10W PA UHF B 45 A 1</div> <div>AP-RADIOTELEFON ¼</div>	<div> <div>Tegn.: 31-10-75 EH</div> <div>Kontr.:</div> </div> <div>Stykl. nr.:</div> <div> <div>Tegn. nr.:</div> <div>75510-4E2</div> </div>
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AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-285	1,5 K Ω 1/8W CR 16	RFC		75290-4E2
R2	13-267	47 Ω " "	1		
R3	13-285	1,5 K Ω " "	RFC		75290-4E2
R4	13-267	47 Ω " "	2		
R5	13-259	10 Ω " "	RFC		75290-4E2
R6	13-259	10 Ω " "	3		
R7	13-362	220 Ω 1/4W CR 25	RFC		75290-4E2
			4		
C1	11-434	18 pF Ker.			
C2	19-330	18 pF Trim.			
C3	11-409	1 nF Ker.			
C4	11-376	10 pF "			
C5	19-330	18 pF Trim.			
C6	19-330	18 pF "			
C7	11-500	0,1 μ F Tant.			
C8	11-376	10 pF Ker.			
C9	11-409	1 nF "			
C10	19-330	18 pF Trim.			
C11	19-330	18 pF "			
C12	11-376	10 pF Ker.			
C13	11-500	0,1 μ F Tant.			
C14	11-409	1 nF Ker.			
C15	19-330	18 pF Trim.			
C16	19-330	18 pF "			
C17	11-500	0,1 μ F Tant.			
Q1	19-123	MRF627			
Q2	19-162	2N5944			
Q3	19-163	2N5946			
L2		75615-4E2			
L5		75619-4E2			
L7		75619-4E2			
6-10 W, PA-stage UHF Print board B 45 A 1 Tilhører tegn. nr.: 75510-4E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div> <div>Stykl. nr.: 75510-4S2</div>



B59E1 relay W-7K 570 Ω

B59E2 without relay

B59E3 relay M/DK-14

Rettet: 9-1-78 AC/RB
23-2-78 AMC/IM
2-6-78 JS/AC

10-25 WPA UHF, aerial switch and
power detector. Print board B59E1,2 and 3

AP-RADIOTELEFON $\frac{1}{5}$

Tegn.: 17-11-76
AC

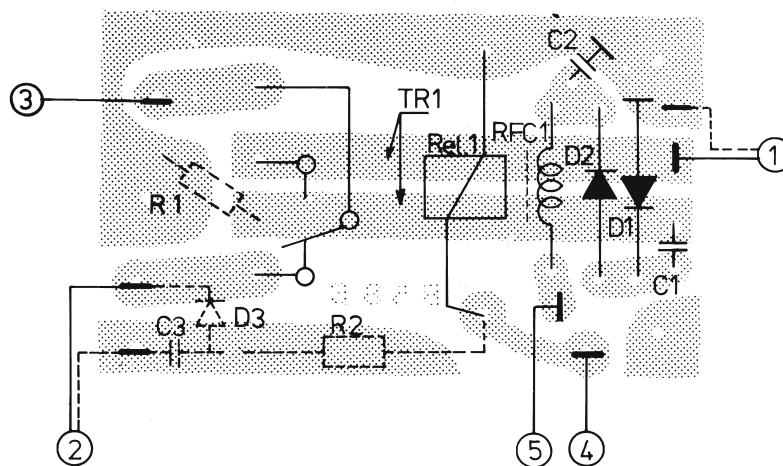
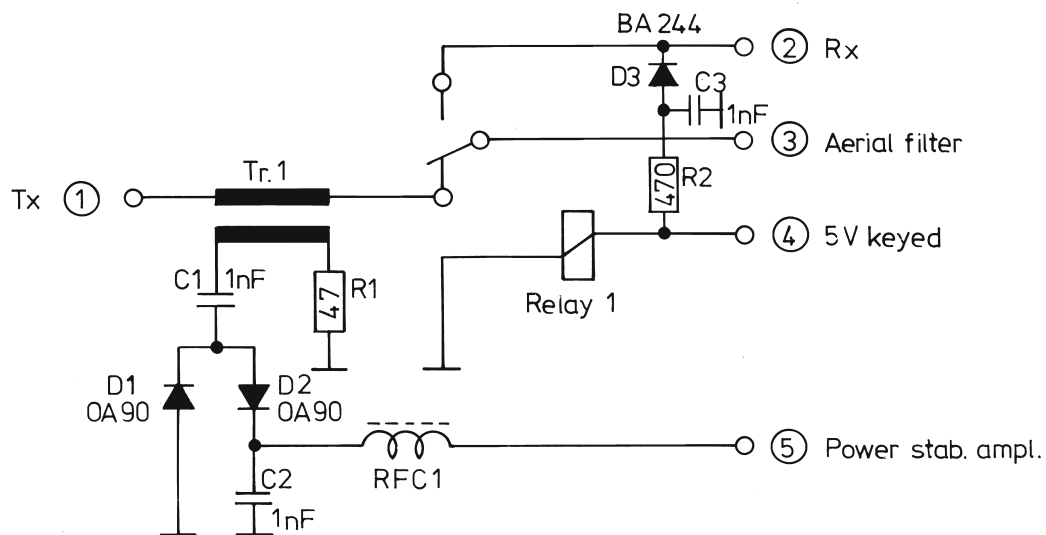
Kontr.:

Stykl. nr.: 75627-4E2

Tegn. nr.: 75627-4E2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-356	47 Ω $\frac{1}{4}$ W CR 25			
R2	19-258	10 K Ω Trim.			
R3	13-283	1 K Ω 1/8 CR 16			
C1	19-330	18 pF Trim.			
C2	19-330	18 pF "			
C3	11-381	15 pF ker.			
C4	11-381	15 pF "			
C5	11-409	1 nF "			
C6	11-376	10 pF "			
C7	11-353	0,1 μ F Laco			
C8	19-346	3,5 pF Trim.			
C9	19-330	18 pF "			
C10	11-409	1 nF ker.			
C11	11-409	1 nF "			
C12	11-366	3,3 pF "			
C13	11-376	10 pF "			
C14	11-409	1 nF "			
C15	11-409	1 nF "			
C16	11-423	8,2 pF NPO "			
D1	04-036	OA 90			
D2	04-036	OA 90			
D3	04-008	BA 244			
Q1	19-177	MRF 619 or 454BLY			
RFC- 1	04-111	2,2 μ H			
RFC- 2		75290-4E2			
L2		75619-4E2			
Rel. 1	17-057	W-7K 570 Ω			
Rel.	17-058	MD/K - 14 PASI			
10-25 W PA-stage UHF, aerial switch and power detector. Print board B 59E1, 2 and 3 Tilhører tegn. nr.: 75627-4E2			Tegn.:		Stykl. nr.:
			Kontr.:		75627-4S2



Rettet: 8-2-77 JH/AC
2-6-78 JS/AC

6-10 W aerial switch and power detector
for UHF. Print board B58C 1

AP-RADIOTELEFON $\frac{1}{2}$

Tegn.: 29-12-75
AC

Kontr.:

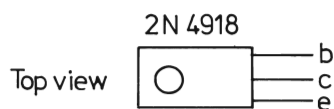
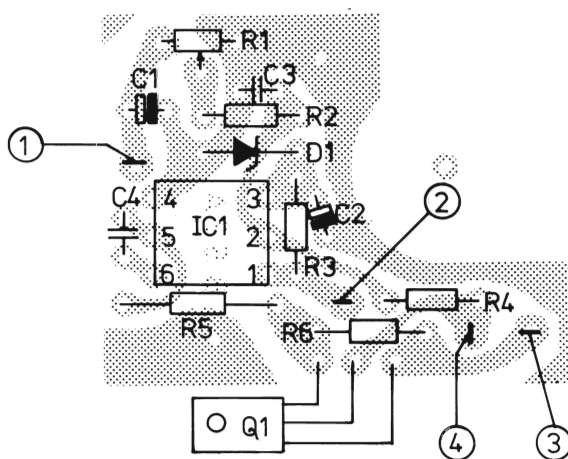
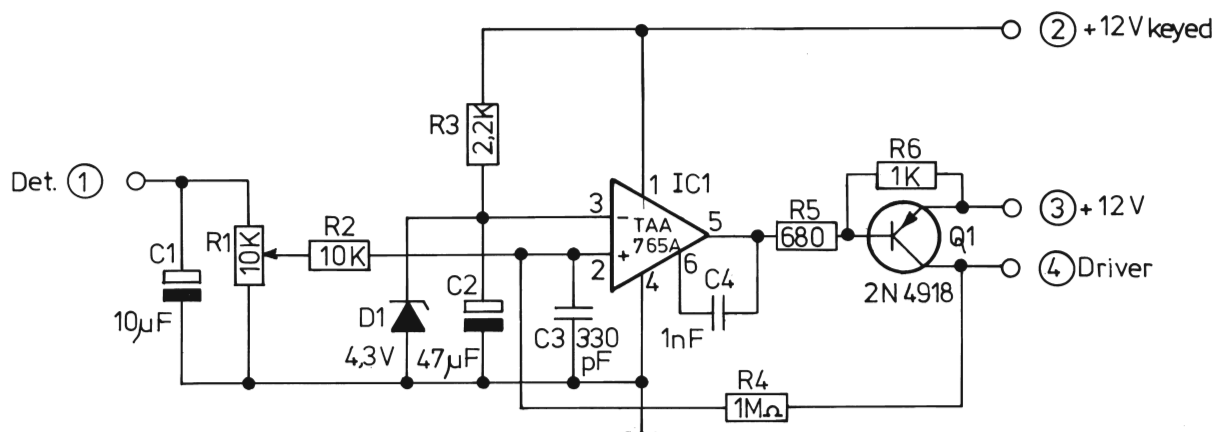
Stykl. nr.:

Tegn. nr.:

75624 - 4E2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-356	47 Ω $\frac{1}{4}$ W CR 25			
R2	13-366	470 Ω " " " "			
C1	11-409	1 nF Ker.			
C2	11-409	1 nF "			
C3	11-409	1 nF "			
D1	04-036	0A90			
D2	04-036	0A90			
D3	04-008	BA244			
RFC 1		75290-4E2			
Rel. 1	17-058	W-4K 115 Ω			
10-25 W aerial switch and power detector Print board B 58. C 1 Tilhører tegn. nr.: 75624-4E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 75624-4S2



Rettet: 21-4-77 JH/pc

Sense amplifier for output power stabilizing of
internal PA. Print board B 57 B 1

AP-RADIOTELEFON $\frac{1}{2}$

Tegn.: 29-12-75

Kontr.:

AC

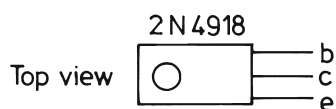
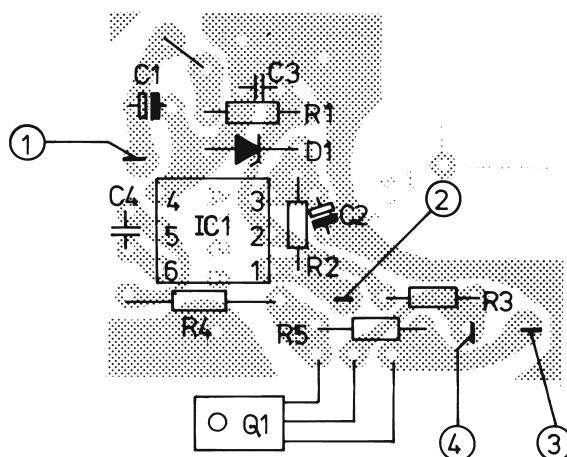
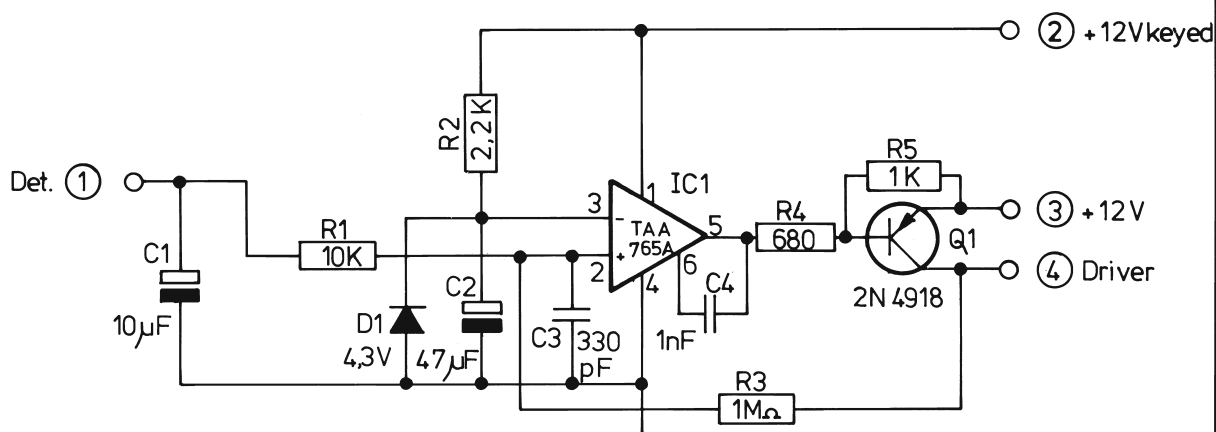
Stykl. nr.:

Tegn. nr.:

75622 - 4E2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	19-258	10 K Ω Trim.			
R2	13-295	10 K Ω 1/8W CR 16			
R3	13-287	2,2 K Ω " "			
R4	13-312	1 M Ω " "			
R5	13-368	680 Ω $\frac{1}{4}$ W CR 25			
R6	13-283	1 K Ω 1/8W CR 16			
C1	11-506	10 μ F/25V Tant.			
C2	11-509	47 μ F/6,3V "			
C3	11-406	330 pF Ker.			
C4	11-409	1 nF "			
D1	04-045	4,3 V Zener			
Q1	19-176	2N4918			
IC1	09-003	TAA765A			
Sense amplifier for output power stabilizing of internal PA Print board B 57B 1 Tilhører tegn. nr.: 75622-4E2			<div>Tegn.:</div> <div>Kontr.:</div> <div>Stykl. nr.: 75622-4S2</div>		



Rettet: 21-4-77 B/pc

Sense amplifier for output power stabilizing
of external PA
Print board B57B 2

AP-RADIOTELEFON $\frac{1}{2}$

Tegn.: 3-11-76
AC

Kontr.:

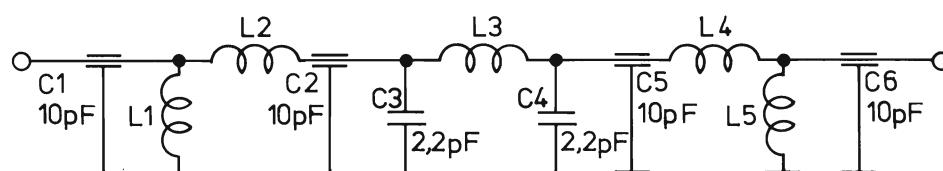
Stykl. nr.:

Tegn. nr.:

76325-4E2

AP-RADIOTELEFON

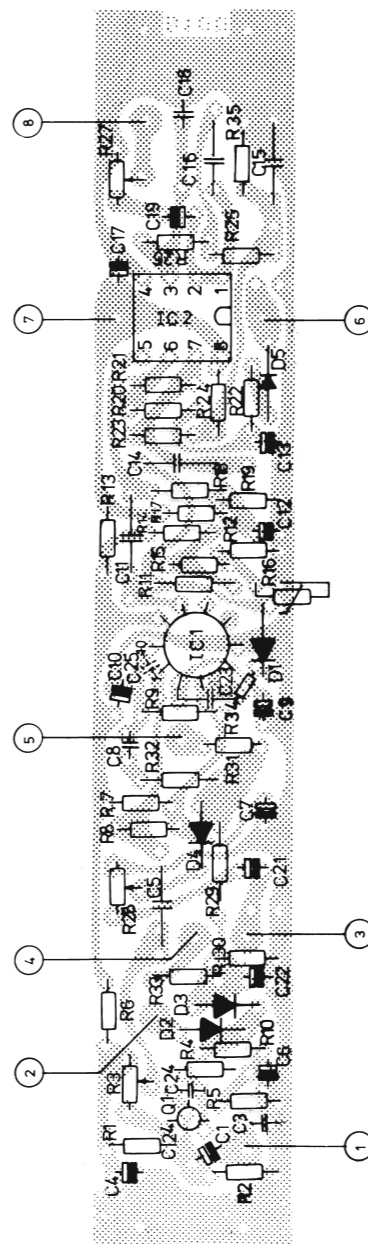
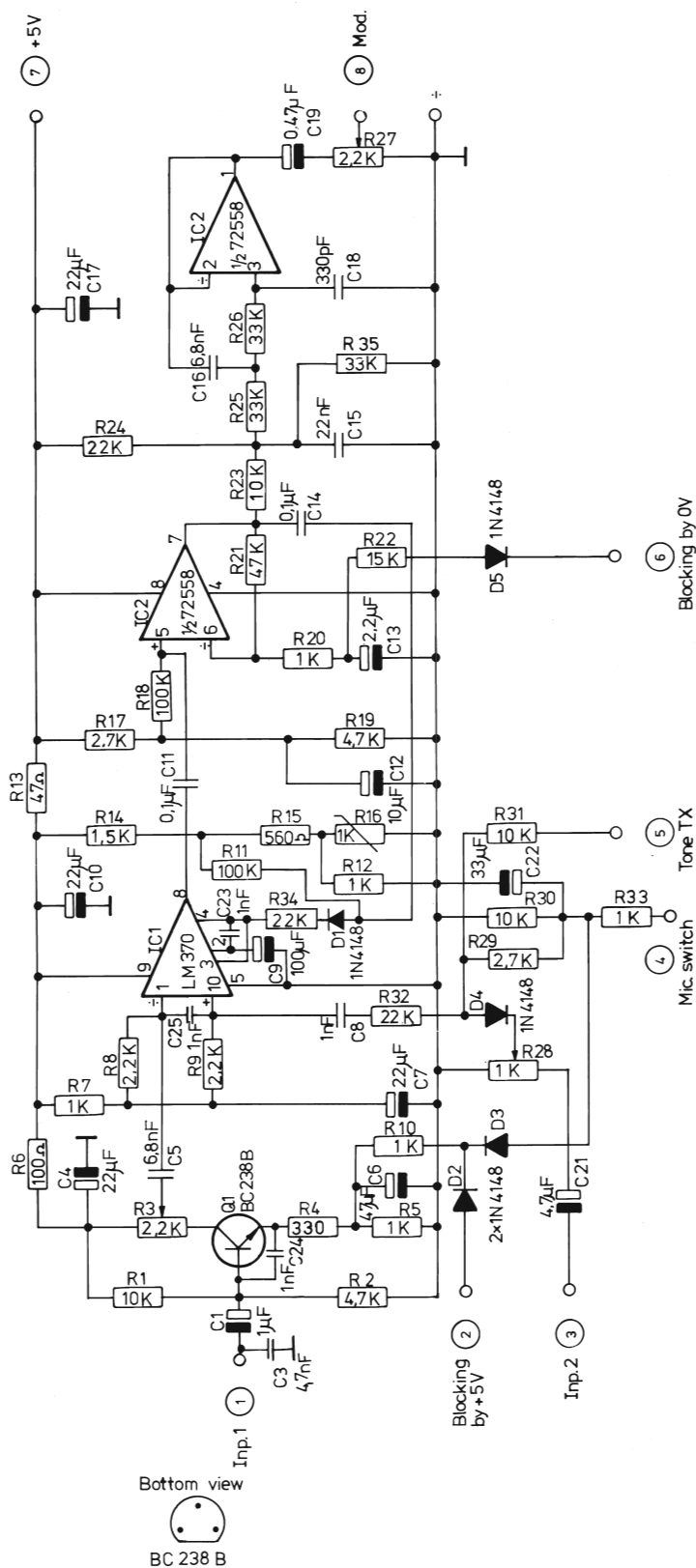
Nr.	Kode	Data	Nr.	Kode	Data
R1	13-295	10 K Ω 1/8W CR 16			
R2	13-287	2,2 K Ω " "			
R3	13-312	1 M Ω " "			
R4	13-368	680 Ω $\frac{1}{4}$ W CR 25			
R5	13-283	1 K Ω 1/8W CR 16			
C1	11-506	10 μ F/25V Tant.			
C2	11-509	47 μ F/6,3V "			
C3	11-406	330 pF Ker.			
C4	11-409	1 nF "			
D1	04-045	4,3 V Zener			
Q1	19-176	2N4918			
IC1	09-003	TAA765A			
Sense amplifier for output power stabilizing of external PA. Print board B 57 B 2 Tilhører tegn. nr.: 76325-4E2			<div>Tegn.:</div> <div>Stykl. nr.:</div> <div>Kontr.:</div> <div>76325-4S2</div>		



Rettet:	Aerialfilter UHF	Tegn.: 29-12-75	Kontr.:
		NC-AC	
		Stykl. nr.:	
		Tegn. nr.:	
	AP-RADIOTELEFON 1/2	75623 - 4E2	

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
C1	11-447	10 pF Ker.			
C2	11-447	10 pF "			
C3	11-363	2,2 pF "			
C4	11-363	2,2 pF "			
C5	11-447	10 pF "			
C6	11-447	10 pF "			
L1		75618-4E2			
L2		75613-4E2			
L3		75612-4E2			
L4		75613-4E2			
L5		75618-4E2			
6 W aerial filter UHF			Rettet:		Tegn.:
Tilhører tegn. nr.: 75623-4E2					Kontr.:
					Stykl. nr.: 75623-4S2



Rettet:
7-9-76 JH/NC
1-2-77 HJ
27-5-77 LT/AC
9-6-77 LT/AC
22-6-77 JH/AC
9-2-78 HJ.

Modulation amplifier
Print board B10D1

AP-RADIOTELEFON

Tegn.: 8-1-75
AC

Kontr.:

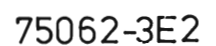
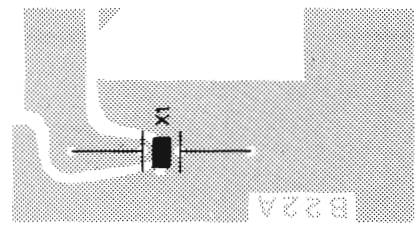
Stykl. nr.:

Tegn. nr.:

75018-3E2

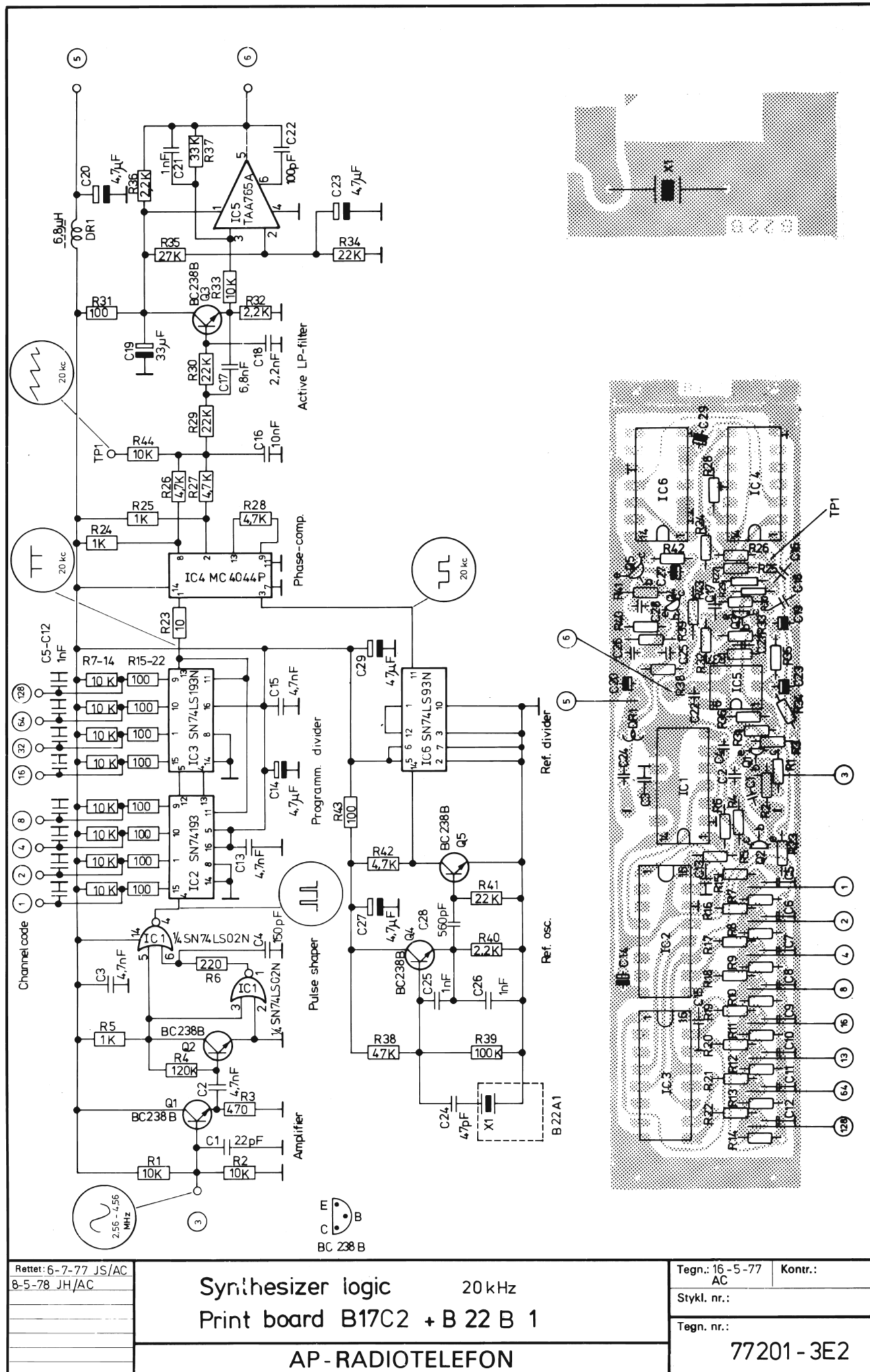
AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-295	10 KΩ 1/8W CR 16	C4	11-507	22 μF/16V Tant.
R2	13-291	4,7 KΩ " "	C5	11-466	6,8 nF Ker.
R3	19-255	2,2 KΩ Trim.	C6	11-509	47 μF/6,3V Tant.
R4	13-277	330 Ω 1/8W CR 16	C7	11-507	22 μF/16V "
R5	13-283	1 KΩ " "	C8	11-409	1 nF Ker.
R6	13-271	100 Ω " "	C9	11-510	100 μF/3V Tant.
R7	13-283	1 KΩ " "	C10	11-507	22 μF/16V "
R8	13-287	2,2 KΩ " "	C11	11-470	0,1 μF MKH
R9	13-287	2,2 KΩ " "	C12	11-506	10 μF/25V Tant.
R10	13-283	1 KΩ " "	C13	11-503	2,2 μF/25V "
R11	13-306	100 KΩ " "	C14	11-470	0,1 μF MKH
R12	13-283	1 KΩ " "	C15	11-489	22 nF "
R13	13-267	47 Ω " "	C16	11-465	6,8 nF MKH
R14	13-285	1,5 KΩ " "	C17	11-507	22 μF/16V Tant.
R15	13-280	560 Ω " "	C18	11-430	330 pF N750 Ker.
R16	13-664	1 KΩ NTC	C19	11-501	0,47 μF/35V Tant.
R17	13-288	2,7 KΩ 1/8 W "	C20		
R18	13-306	100 KΩ " "	C21	11-504	4,7 μF/10V Tant.
R19	13-291	4,7 KΩ " "	C22	11-508	33 μF/10V Tant.
R20	13-283	1 KΩ " "	C23	11-409	1 nF Ker.
R21	13-307	47 KΩ " "	C24	11-409	1 nF "
R22	13-297	15 KΩ " "	C25	11-409	1 nF "
R23	13-295	10 KΩ " "			
R24	13-299	22 KΩ " "	D1	04-062	1N4148
R25	13-300	33 KΩ " "	D2	04-062	1N4148
R26	13-300	33 KΩ " "	D3	04-062	1N4148
R27	19-255	2,2 KΩ Trim.	D4	04-062	1N4148
R28	19-252	1 KΩ " "	D5	04-062	1N4148
R29	13-288	2,7 KΩ 1/8W CR 16			
R30	13-295	10 KΩ " "	Q1	19-093	BC 238B
R31	13-295	10 KΩ " "			
R32	13-299	22 KΩ " "	IC1	09-005	LM 370
R33	13-283	1 KΩ " "	IC2	09-075	SN 72558 p
R34	13-299	22 KΩ " "			
R35	13-300	33 KΩ " "			
C1	11-502	1 μF/35V Tant.			
C3	11-416	4,7 nF Ker.			
Modulation amplifier Print board B 10 D1 Tilhører tegn. nr.: 75018-3E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 75018-4S2



AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
Q1	19-093	BC 238B			
Q2	19-093	BC 238B			
Q3	19-093	BC 238B			
Q4	19-093	BC 238B			
Q5	19-093	BC 238B			
IC1	09-077	SN74LS02N			
IC2	09-052	SN74193N			
IC3	09-076	SN74LS193N			
IC4	09-008	MC4044P			
IC5	09-003	TAA765A			
IC6	09-078	SN74LS93N			
RFC1	04-114	74016-4E			
X1	11-816	AP 21 400 Khz			
Synthesizer logic			Tegn.:		
Print board B 17C 1+B 22 B 1			Stykl. nr.:		
Tilhører tegn. nr.: 75062-3E 2			Kontr.:		
			75062-4S 2		

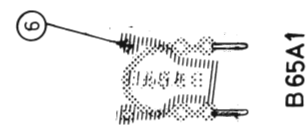


AP-RADIOTELEFON

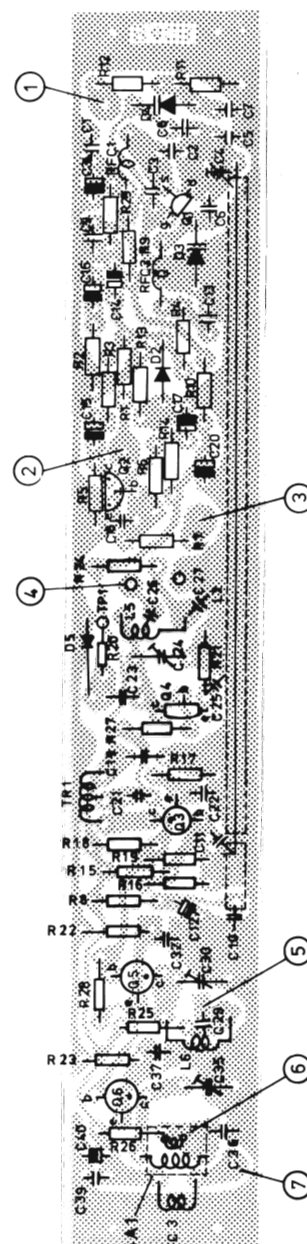
Nr.	Kode	Data	Nr.	Kode	Data
R1	13-295	10 KΩ 1/8WCR16	R38	13-302	47 KΩ 1/8WCR16
R2	13-295	10 KΩ " "	R39	13-306	100 KΩ " "
R3	13-279	470 Ω " "	R40	13-287	2,2 KΩ " "
R4	13-307	120 KΩ " "	R41	13-299	22 KΩ " "
R5	13-283	1 KΩ " "	R42	13-291	4,7 kΩ " "
R6	13-275	220 Ω " "	R43	13-271	100 Ω " "
R7	13-295	10 KΩ " "	R44	13-382	10 KΩ 1/4 W CR25
R8	13-295	10 KΩ " "	C1	11-385	22 pF Ker
R9	13-295	10 KΩ " "	C2	11-416	4,7 nF "
R10	13-295	10 KΩ " "	C3	11-416	4,7 nF "
R11	13-295	10 KΩ " "	C4	11-404	150 pF "
R12	13-295	10 KΩ " "	C5	11-409	1 nF "
R13	13-295	10 KΩ " "	C6	11-409	1 nF "
R14	13-295	10 KΩ " "	C7	11-409	1 nF "
R15	13-271	100 Ω " "	C8	11-409	1 nF "
R16	13-271	100 Ω " "	C9	11-409	1 nF "
R17	13-271	100 Ω " "	C10	11-409	1 nF "
R18	13-271	100 Ω " "	C11	11-409	1 nF "
R19	13-271	100 Ω " "	C12	11-409	1 nF "
R20	13-271	100 Ω " "	C13	11-416	4,7 nF "
R21	13-271	100 Ω " "	C14	11-504	4,7 μF/10V Tant
R22	13-271	100' Ω " "	C15	11-416	4,7 nF Ker
R23	13-259	10 Ω " "	C16	11-481	10 nF Pol.
R24	13-283	1 KΩ " "	C17	11-478	6,8 nF "
R25	13-283	1 KΩ " "	C18	11-476	2,2 nF "
R26	13-291	4,7 KΩ " "	C19	11-508	33 μF/10V Tant
R27	13-291	4,7 KΩ " "	C20	11-504	4,7 μF/10V "
R28	13-291	4,7 KΩ " "	C21	11-409	1 nF Ker
R29	13-299	22 KΩ " "	C22	11-401	100 pF "
R30	13-299	22 KΩ " "	C23	11-504	4,7 μF/10V Tant
R31	13-271	100 Ω " "	C24	11-394	47 pF Ker
R32	13-287	2,2 KΩ " "	C25	11-409	1 nF "
R33	13-295	10 KΩ " "	C26	11-409	1 nF "
R34	13-299	22 KΩ " "	C27	11-504	4,7 μF/10V Tant
R35	13-313	27 KΩ " "	C28	11-444	560 pF Ker.
R36	13-287	2,2 KΩ " "	C29	11-509	47 μF/6,3V Tant
R37	13-300	33 KΩ " "			
Synthesizer logic				Tegn.:	Stykl. nr.:
Print board B 17 C2 and B 22 C1				Kontr.:	77201-4S2
Tilhører tegn. nr.: 77201-3E2					

AP - RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
Q1	19-093	BC 238B			
Q2	19-093	BC 238B			
Q3	19-093	BC 238B			
Q4	19-093	BC 238B			
Q5	19-093	BC 238B			
IC1	09-077	SN74LS02N			
IC2	09-052	SN74193N			
IC3	09-076	SN74LS193N			
IC4	09-008	MC4044P			
IC5	09-003	TAA765A			
IC6	09-078	SN74LS93N			
RFC1	04-114	74016-4E			
X1	11-816	AP 21 320 Khz			
Synthesizer logic Print board B 17 C2 and B 22 C1 Tilhører tegn. nr.: 77201-3E2			Tegn.:		Stykl. nr.:
			Kontr.:		77201-4S2



Version	Marking dot	Rx freq. range	VCO freq. range	C5	C6
B43B1	1 brown	406-432 MHz	427.4-453.4 MHz	5.6pF	6.8pF
B43B2	2 red	432-450 MHz	453.4-471.4 MHz	3.9pF	5.6pF
B43B3	3 orange	450-470 MHz	471.4-491.4 MHz	2.2pF	5.6pF



B 65A1

ZTX 326
Bottom view

76024-3E2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-300	33 KΩ 1/8W CR 16	C6/3	11-370	5,6 pF Ker.
R2	13-281	680 Ω " "	C7	11-409	1 nF "
R3	13-273	150 Ω " "	C8	11-361	1 pF "
R4	13-295	10 KΩ " "	C9	11-409	1 nF "
R5	13-306	100 KΩ " "	C10	11-441	1,8 nF chip "
R6	13-295	10 KΩ " "	C11	11-409	1 nF "
R7	13-295	10 KΩ " "	C12	11-509	47 μF/6,3V Tant.
R8	13-267	47 Ω " "	C13	11-416	4,7 nF Ker.
R9	13-302	47 KΩ " "	C14	11-515	0,1 μF/35 V Tant.
R10	13-267	47 Ω " "	C15	11-508	33 μF/10 V "
R11	13-291	4,7 KΩ " "	C16	11-503	2,2 μF/25 V "
R12	13-295	10 KΩ " "	C17	11-507	22 μF/25 V "
R13	13-287	2,2 KΩ " "	C18	11-409	1 nF Ker.
R14	13-289	3,3 KΩ " "	C19	11-409	1 nF Ker.
R15	13-285	1,5 KΩ " "	C20	11-509	47 μF/6,3V Tant
R16	13-283	1 KΩ " "	C21	11-409	1 nF Ker.
R17	13-276	270 Ω " "	C22	11-409	1 nF "
R18	13-285	1,5 KΩ " "	C23	11-409	1 nF "
R19	13-283	1 KΩ " "	C24	19-329	9 pF Trim.
R20	13-382	10 KΩ 1/4 W CR 25	C25	11-409	1 nF Ker.
R21	13-278	390 Ω 1/8W CR 16	C26	11-376	10 pF "
R22	13-278	390 Ω " "	C27	11-409	1 nF "
R23	13-278	390 Ω " "	C28		
R24	13-271	100 Ω " "	C29	11-406	330 pF "
R25	13-271	100 Ω " "	C30	19-329	9 pF Trim.
R26	13-271	100 Ω " "	C31	11-409	1 nF Ker.
R27	13-263	22 Ω " "	C32	11-409	1 nF "
R28	13-263	22 Ω " "	C33		
R29	13-275	220 Ω " "	C34	11-517	1 μF/25 V Tant.
C1	11-406	330 pF Ker.	C35	19-329	9 pF Trim.
C2	11-374	8,2 pF "	C36	11-409	1 nF Ker.
C3	11-385	22 pF "	C37	11-409	1 nF "
C4	19-319	4,5 pF Trim.	C38		
C5/1	11-370	5,6 pF Ker.	C39	11-409	1 nF "
C5/2	11-433	3,9 pF "	C40	11-509	47 μF/6,3V Tant.
C5/3	11-439	2,2 pF NPO Ker.			
C6/1	11-373	6,8 pF "			
C6/2	11-370	5,6 pF "			

Voltage controlled oscillator for UHF
 Print board B43B 1,2,3, and Print board
 Tilhører tegn. nr.: 76024-3E2 B65A 1

Tegn.:

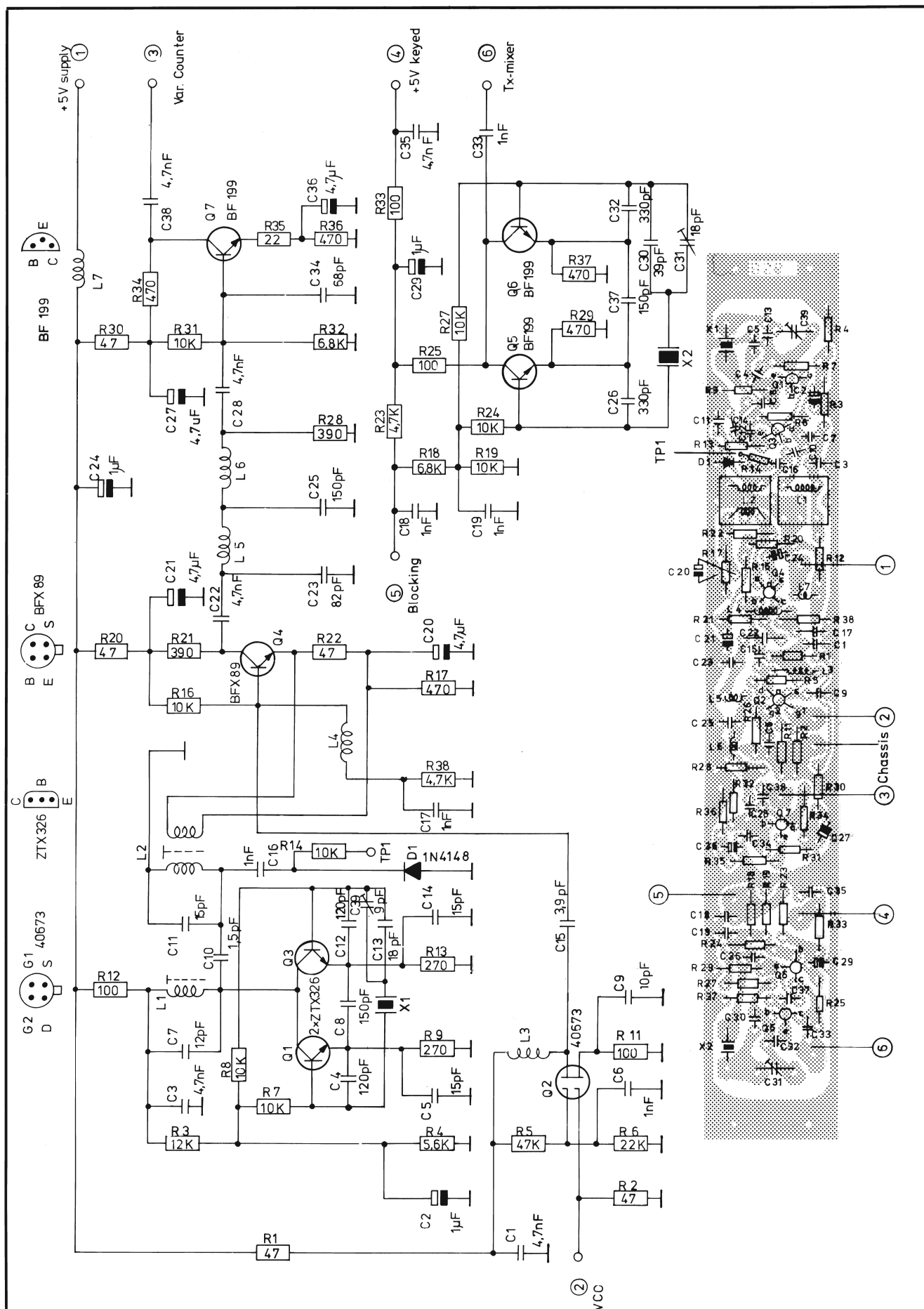
Stykl. nr.:

Kontr.:

76024-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
D2	04-062	1N4148			
D3	04-009	BB105G			
D4	04-009	BB105G			
D5	04-062	1N4148			
Q1	19-113	BF256A Philips			
Q2	19-093	BC238B			
Q3	19-114	BFR90			
Q4	19-115	ZTX326L			
Q5	19-114	BFR90			
Q6	19-114	BFR90			
L2		75523-4E2			
L5		76082-4E2			
L6		76082-4E2			
TR1		75288-4E2			
RFC 1	04-114	6,8 μ H			
RFC 2	04-114	6,8 μ H			
RFC 3	04-117	100 μ H			
Voltage controlled oscillator for UHF Print board B43B 1,2,3 and Print board Tilhører tegn. nr.:76024-3E2			<div>Tegn.:</div> <div>Kontr.:</div>		
B65A 1			Stykl. nr.: 76024-4S2		



Rettet: 30-8-77 JH/AC
10-2-78 HJ LT
8-5-78 JH/AC

Synthesizer mixer and Tx-oscillator UHF
Print board B56 C 1

AP-RADIOTELEFON

Tegn.: 19-12-75 E H Kontr.: 23-1-76 CHB

Stykl. nr.:

Tegn. nr.:

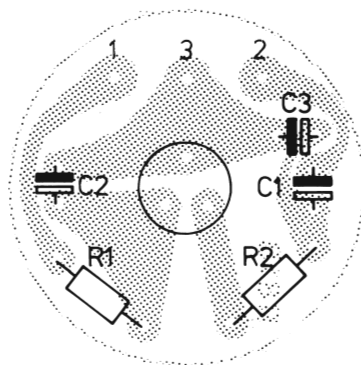
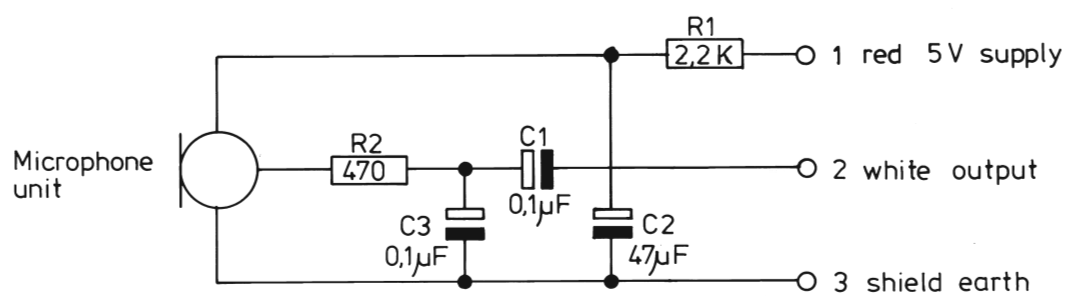
75628-3E2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-267	47 Ω 1/8W CR 16	C1	11-416	4,7 nF Ker.
R2	13-267	47 Ω " "	C2	11-502	1 μ F/35V Tant.
R3	13-296	12 K Ω " "	C3	11-416	4,7 nF Ker.
R4	13-292	5,6 K Ω " "	C4	11-403	120 pF "
R5	13-302	47 K Ω " "	C5	11-381	15 pF "
R6	13-299	22 K Ω " "	C6	11-409	1 nF "
R7	13-295	10 K Ω " "	C7	11-379	12 pF "
R8	13-295	10 K Ω " "	C8	11-404	150 pF "
R9	13-276	270 Ω " "	C9	11-376	10 pF "
			C10	11-362	1,5 pF "
R11	13-271	100 Ω " "	C11	11-381	15 pF "
R12	13-271	100 Ω " "	C12	11-403	120 pF "
R13	13-276	270 Ω " "	C13	11-434	18 pF "
R14	13-382	10 K Ω $\frac{1}{4}$ W CR 25	C14	11-381	15 pF "
R16	13-295	10 K Ω 1/8W CR 16	C15	11-433	3,9 pF "
R17	13-279	470 Ω " "	C16	11-409	1 nF "
R18	13-293	6,8 K Ω " "	C17	11-409	1 nF "
R19	13-295	10 K Ω " "	C18	11-409	1 nF "
R20	13-267	47 Ω " "	C19	11-409	1 nF "
R21	13-278	390 Ω " "	C20	11-504	4,7 μ F/10V Tant.
R22	13-267	47 Ω " "	C21	11-504	4,7 μ F/10V "
R23	13-291	4,7 K Ω " "	C22	11-416	4,7 nF Ker.
R24	13-295	10 K Ω " "	C23	11-399	82 pF "
R25	13-271	100 Ω " "	C24	11-502	1 μ F/35V Tant.
R27	13-295	10 K Ω " "	C25	11-404	150 pF Ker.
R28	13-278	390 Ω " "	C26	11-430	330 pF N750 "
R29	13-279	470 Ω " "	C27	11-504	4,7 μ F/10V Tant.
R30	13-267	47 Ω " "	C28	11-416	4,7 nF Ker.
R31	13-295	10 K Ω " "	C29	11-502	1 μ F/35V Tant.
R32	13-293	6,8 K Ω " "	C30	11-393	39 pF Ker.
R33	13-271	100 Ω " "	C31	19-330	18 pF Trim.
R34	13-279	470 Ω " "	C32	11-430	330 pF N750 Ker.
R35	13-263	22 Ω " "	C33	11-409	1 nF "
R36	13-279	470 Ω " "	C34	11-397	68 pF "
R37	13-279	470 Ω " "	C35	11-416	4,7 nF "
R38	13-291	4,7 K Ω " "	C36	11-504	4,7 μ F/10V Tant.
			C37	11-404	150 pF Ker.
Synthesizer mixer and Tx-oscillator UHF				Tegn..	Stykl. nr.:
Print board B 56 C 1				Kontr.:	75628-4S2
Tilhører tegn. nr.: 75628-3E2					

AP-RADIOTELEFON

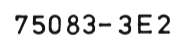
Nr.	Kode	Data	Nr.	Kode	Data
C38	11-416	4,7 nF Ker.			
C39	19-329	9 pF Trim.			
D1	04-062	1N4148			
Q1	19-115	ZTX 326			
Q2	19-128	40673			
Q3	19-115	ZTX 326			
Q4	19-102	BFX89			
Q5	19-104	BF199			
Q6	19-104	BF199			
Q7	19-104	BF199			
L1		75594-4E2			
L2		75595-4E2			
L3		76079-4E2			
L4		76079-4E2			
L5	04-114	6,8 μ H			
L6	04-114	6,8 μ H			
L7	04-114	6,8 μ H			
X1		Frequency dependent on desired band spec. AP 25			
X2		Frequency dependent on mode of operation (simplex) duplex etc.) spec. AP 22			
Synthesizer mixer and Tx-oscillator UHF			Tegn.:		
Print board B 56 C 1			Kontr.:		
Tilhører tegn. nr.: 75628-3E2			Stykl. nr.: 75628-4S2		



Rettet:	Microphone 213-020 Print board B 81 B1	Tegn.: 4-3-77	Kontr.:
25-5-77 LT/AC		AC	
		Stykl. nr.:	
		Tegn. nr.:	
			77127-4E2
		AP-RADIOTELEFON 1/5	

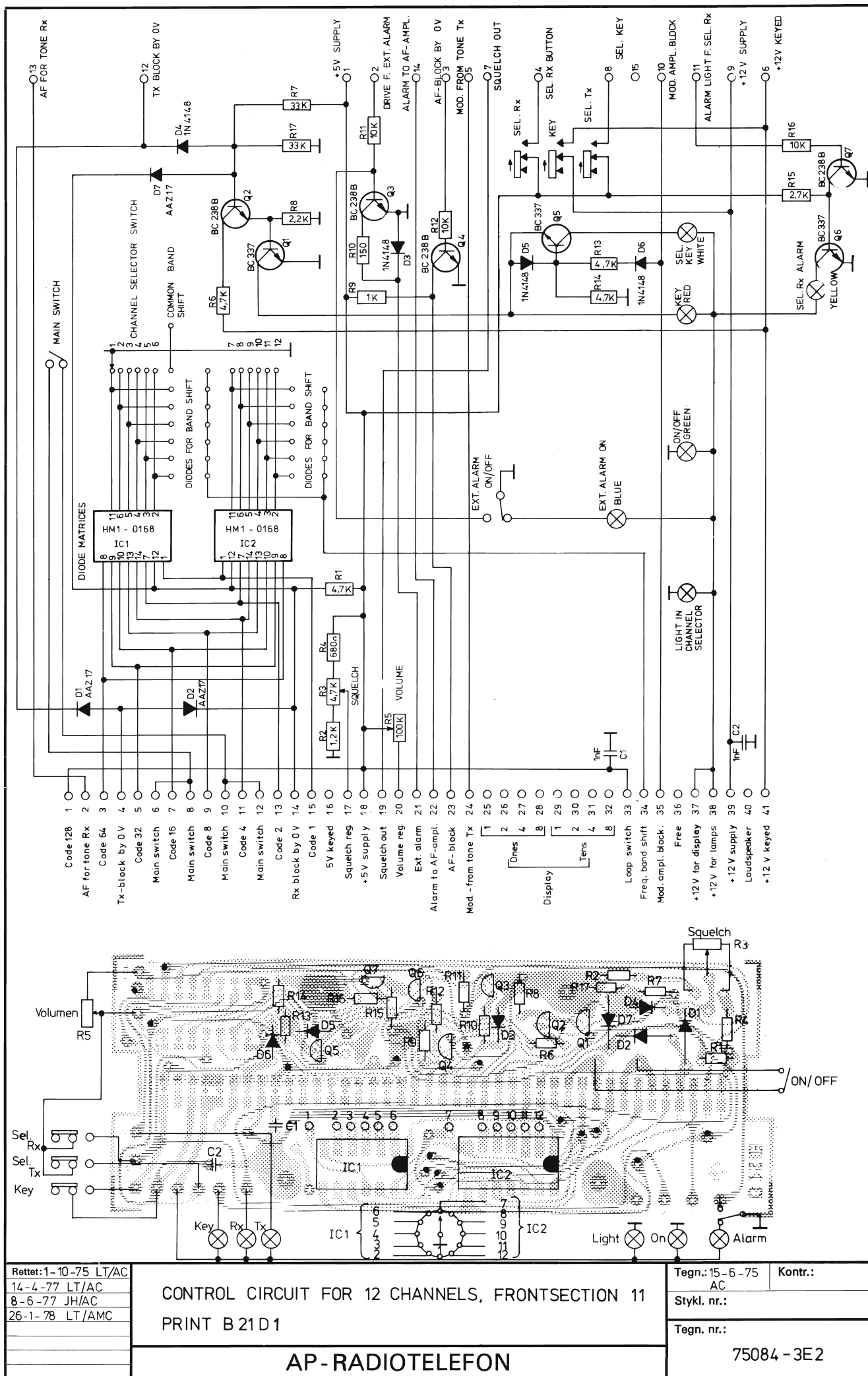
AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-287	2,2 K Ω 1/8W CR 16			
R2	13-279	470 Ω " "			
C1	11-500	0,1 μ F/35 V tant.			
C2	11-509	47 μ F/6,3 V "			
C3	11-500	0,1 μ F/35 V "			
	13-062	Mic. EM-10LB			
Microphone 213-020 Print board B 81 B1 Tilhører tegn. nr.: 77127-4E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 77127-4S2



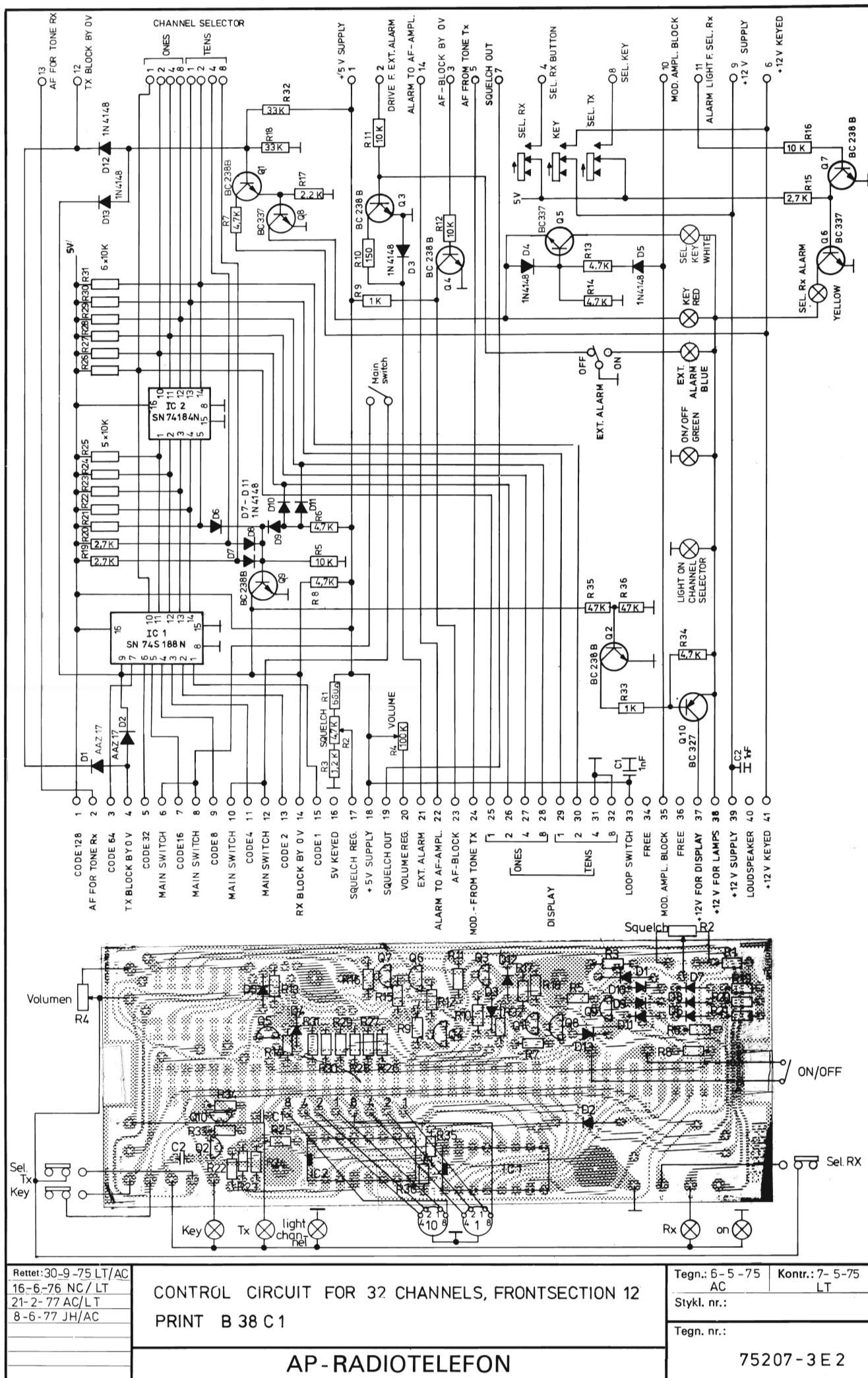
AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-291	4,7 KΩ 1/8 W CR16			
R2	13-281	680 Ω " "			
R3	16-022	4,7 KΩ Potm.			
R4	13-284	1,2 KΩ 1/8 W "			
R5	16-023	100 KΩ Lin.Potm.			
R6	13-291	4,7 KΩ 1/8 W CR16			
R7	13-300	33 KΩ " "			
R8	13-287	2,2 KΩ " "			
R9	13-283	1 KΩ " "			
R10	13-273	150 Ω " "			
R11	13-295	10 KΩ " "			
R12	13-295	10 KΩ " "			
R13	13-291	4,7 KΩ " "			
R14	13-291	4,7 KΩ " "			
R15	13-288	2,7 KΩ " "			
R16	13-295	10 KΩ " "			
R17	13-300	33 KΩ " "			
C1	11-409	1 nF Ker.			
C2	11-409	1 nF Ker.			
D1	04-062	1N4148			
D2	04-062	1N4148			
D3	04-062	1N4148			
D4	04-062	1N4148			
D5	04-002	AAZ17			
Q1	19-093	BC238B			
Q2	19-096	BC337			
Q3	19-093	BC238B			
Q4	19-093	BC238B			
Q5	19-096	BC337			
Q6	19-096	BC337			
Q7	19-093	BC238B			
Control Circuit for 1 channel, frontsection 04. Print B 20 D1 Tilhører tegn. nr.: 75083-3E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 75083-4S2



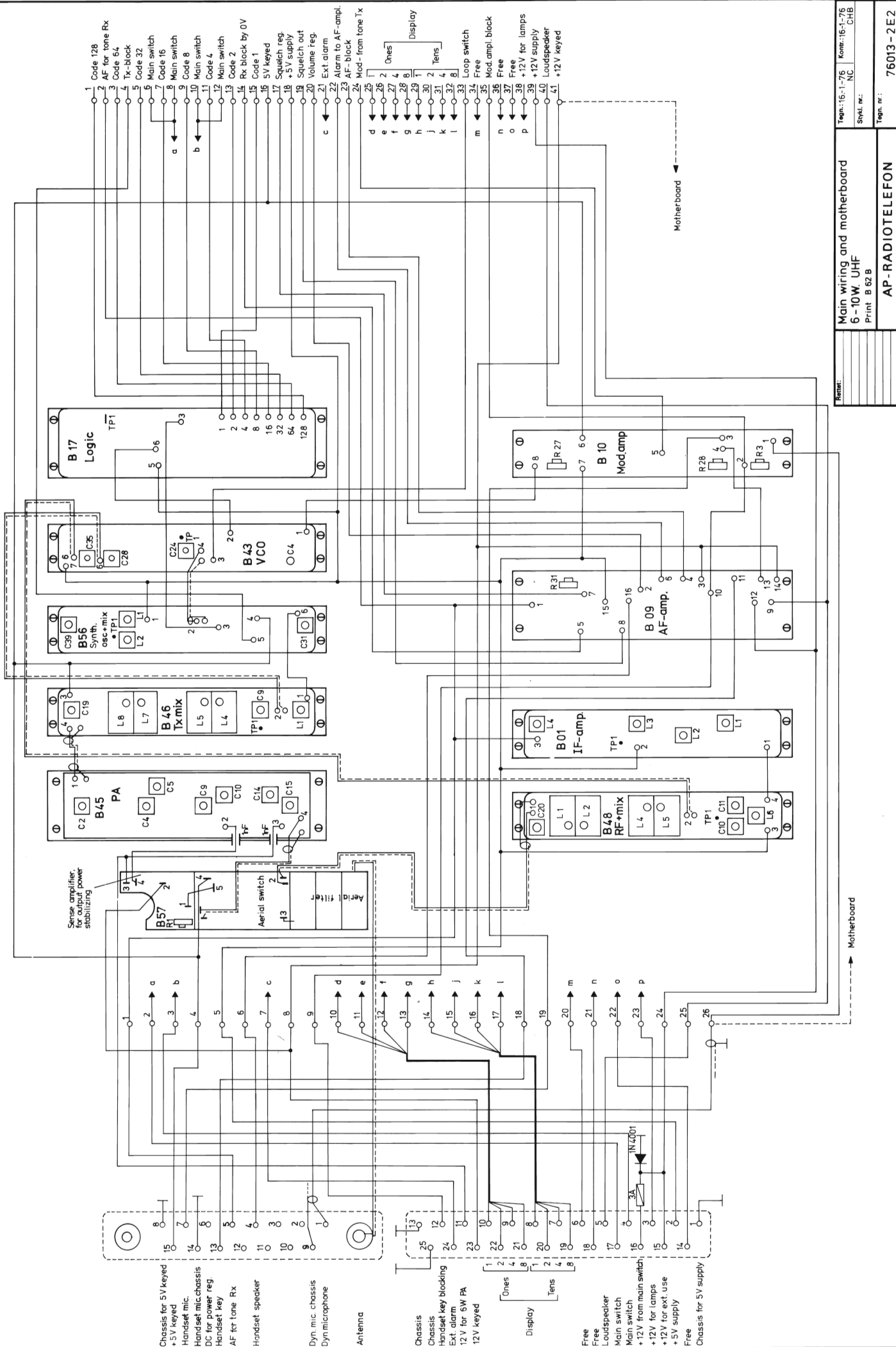
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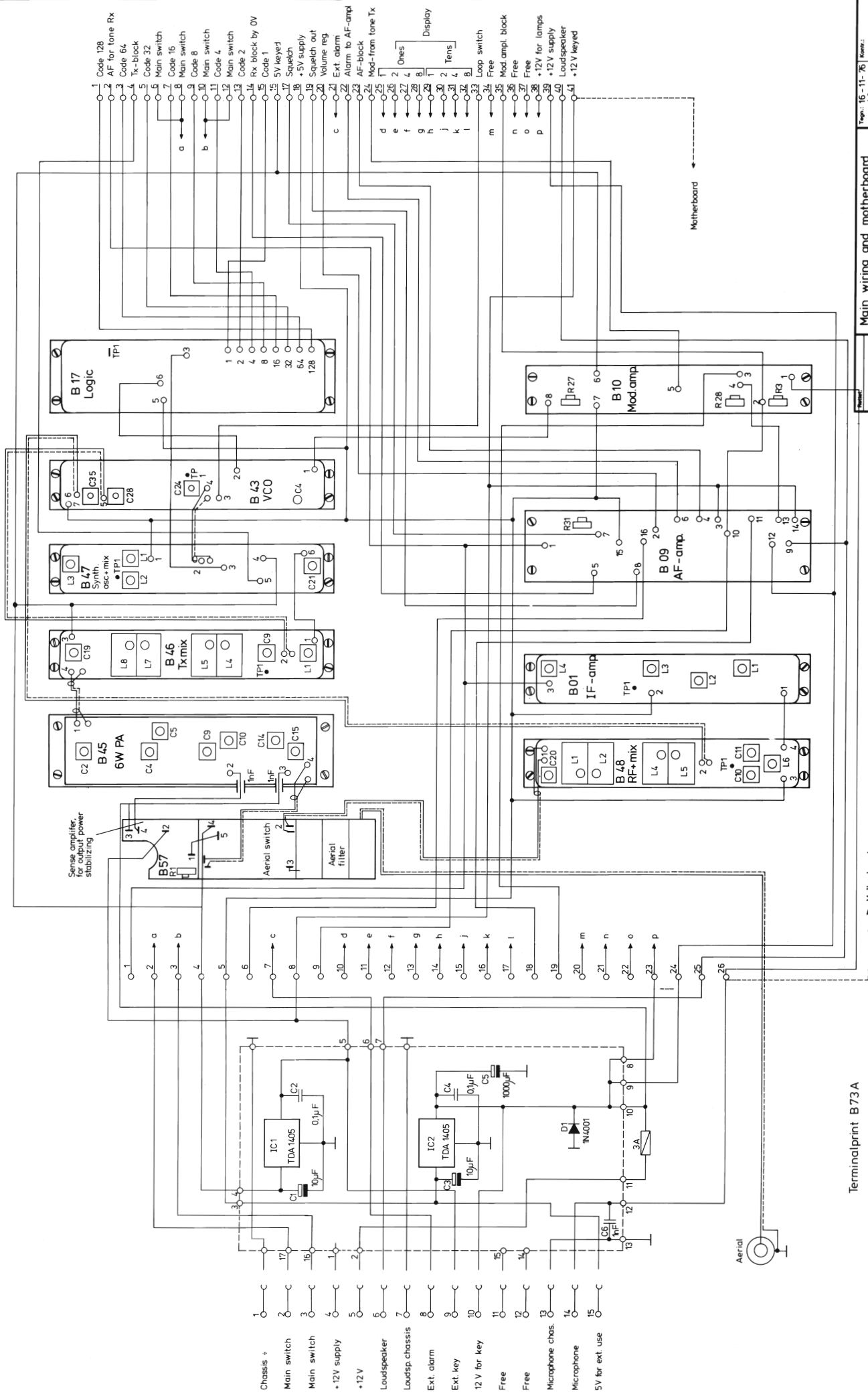
Nr.	Kode	Data	Nr.	Kode	Data
R1	13-291	4,7 KΩ 1/8 W CR16	IC1	09-067	HM1-0168
R2	13-284	1,2 KΩ " "	IC2	09-067	HM1-0168
R3	16-022	4,7 KΩ Potm.			
R4	13-281	680 Ω 1/8 W "			
R5	16-023	100 KΩ Lin.Potm.			
R6	13-291	4,7 KΩ 1/8 W CR16			
R7	13-300	33 KΩ " "			
R8	13-287	2,2 KΩ " "			
R9	13-283	1 KΩ " "			
R10	13-273	150 Ω " "			
R11	13-295	10 KΩ " "			
R12	13-295	10 KΩ " "			
R13	13-291	4,7 KΩ " "			
R14	13-291	4,7 KΩ " "			
R15	13-288	2,7 KΩ " "			
R16	13-295	10 KΩ " "			
C1	11-409	1 nF Ker.			
C2	11-409	1 nF Ker.			
D1	04-002	AAZ17			
D2	04-002	AAZ17			
D3	04-062	1N4148			
D4	04-062	1N4148			
D5	04-062	1N4148			
D6	04-062	1N4148			
D7	04-002	AAZ17			
Q1	19-096	BC337			
Q2	19-093	BC238B			
Q3	19-093	BC238B			
Q4	19-093	BC238B			
Q5	19-096	BC337			
Q6	19-096	BC337			
Q7	19-093	BC238B			
Control circuit for 12 channel frontsection 11. Print B 21 D1 Tilhører tegn. nr.: 75084-3E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div> <div>Stykl. nr.: 75084-4S2</div>



AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-281	680 Ω 1/8 W CR16	C1	11-409	1nF Ker.
R2	16-022	4,7 K Ω Potm.	C2	11-409	1nF Ker.
R3	13-284	1,2 K Ω 1/8 W CR16			
R4	16-023	100 K Ω Lin.Potm.	D1	04-002	AAZ17
R5	13-295	10 K Ω 1/8 W CR16	D2	04-002	AAZ17
R6	13-291	4,7 K Ω " "	D3	04-062	1N4148
R7	13-291	4,7 K Ω " "	D4	04-062	1N4148
R8	13-291	4,7 K Ω " "	D5	04-062	1N4148
R9	13-283	1 K Ω " "	D6	04-062	1N4148
R10	13-273	150 Ω " "	D7	04-062	1N4148
R11	13-295	10 K Ω " "	D8	04-062	1N4148
R12	13-295	10 K Ω " "	D9	04-062	1N4148
R13	13-291	4,7 K Ω " "	D10	04-062	1N4148
R14	13-291	4,7 K Ω " "	D11	04-062	1N4148
R15	13-288	2,7 K Ω " "	D12	04-062	1N4148
R16	13-295	10 K Ω " "	D13	04-062	1N4148
R17	13-287	2,2 K Ω " "			
R18	13-300	33 K Ω " "	Q1	19-093	BC238B
R19	13-288	2,7 K Ω " "	Q2	19-093	BC238B
R20	13-288	2,7 K Ω " "	Q3	19-093	BC238B
R21	13-295	10 K Ω " "	Q4	19-093	BC238B
R22	13-295	10 K Ω " "	Q5	19-096	BC337
R23	13-295	10 K Ω " "	Q6	19-096	BC337
R24	13-295	10 K Ω " "	Q7	19-093	BC238B
R25	13-295	10 K Ω " "	Q8	19-096	BC337
R26	13-295	10 K Ω " "	Q9	19-093	BC238B
R27	13-295	10 K Ω " "	Q10	19-095	BC327
R28	13-295	10 K Ω " "			
R29	13-295	10 K Ω " "	IC1	09-066	SN74S188N
R30	13-295	10 K Ω " "	IC2	09-051	SN74184N
R31	13-295	10 K Ω " "			
R32	13-300	33 K Ω " "			
R33	13-283	1 K Ω " "			
R34	13-291	4,7 K Ω " "			
R35	13-302	47 K Ω " "			
R36	13-302	47 K Ω " "			
Control Circuit for 32 channel frontsection 12. Print B38C1 Tilhører tegn. nr.: 75207-3E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 75207-4S2



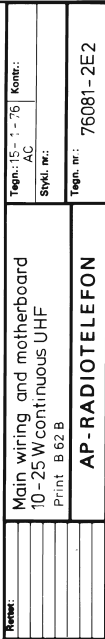


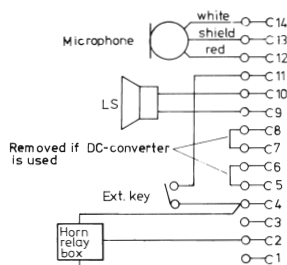
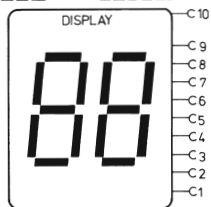
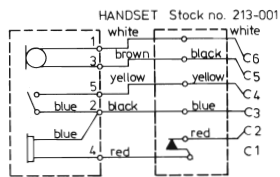
Terminalprint B73A

Main wiring and motherboard
6-10W UHF
With Print-connector, Print B628 / B73A

AP-RADIOTELEFON ¼

Page: 16-11-76
AC
Sheet no.:
Page: 76344-2E2

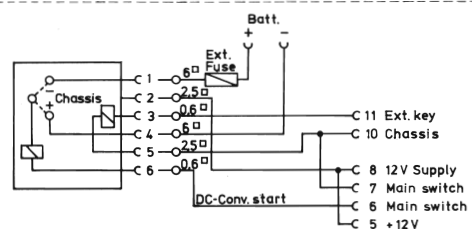




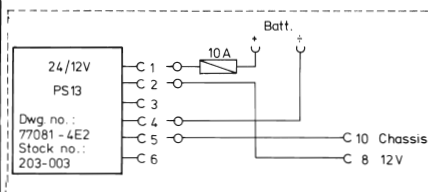
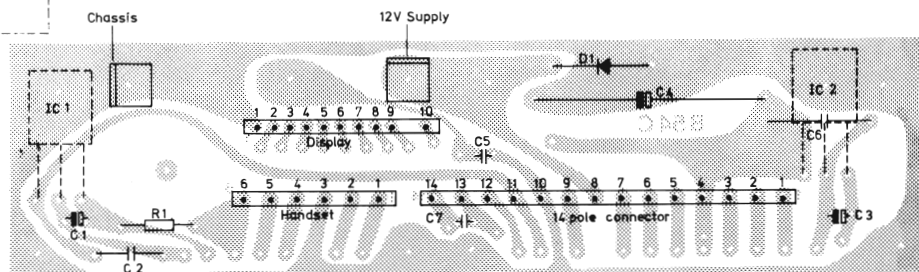
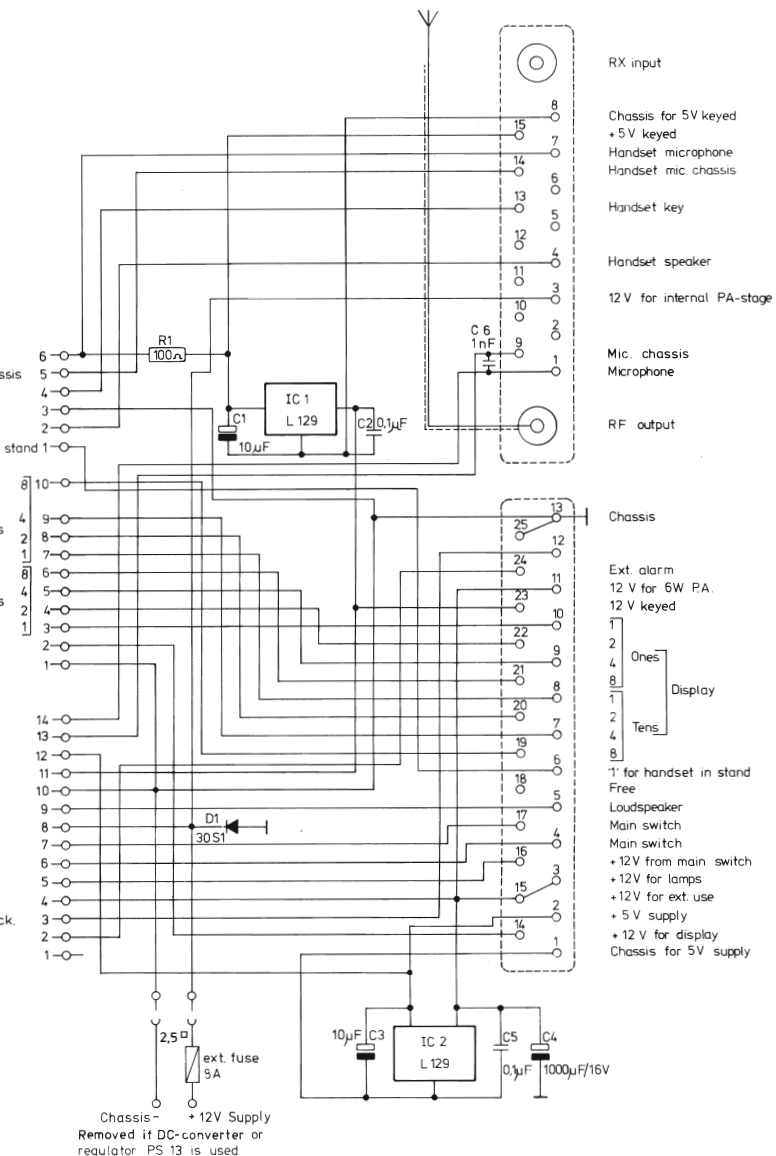
Handset mic.
Handset mic. chassis
Handset key
Chassis
Handset speaker
'1' for handset in stand

BCD-code tens
BCD-code ones
12 V Supply
Display chassis

Microphone
Mic. chassis
+5V
Ext. key
Chassis
Loudspeaker
12 V supply
Main switch
Main switch
+12V
+12V for key
Handset key block.
External alarm



Connections for AP DC-Converter
6V or 12V: Dwg. no 68171/4 Stock no. 203-001
24V: Dwg. no. 68194/4 Stock no. 203-002
(Can not be used at 25W UHF)



Rettet:
6-9-76 LT/NC
16-3-77 TP/AC
4-5-77 TP/AC
7-6-77 BJ/AC

Installation for AP 2000
with internal PA-stage
Print board B54C2

AP-RADIOTELEFON

Tegn.: 14-2-75

AC

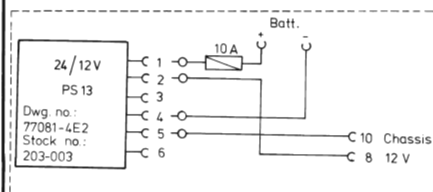
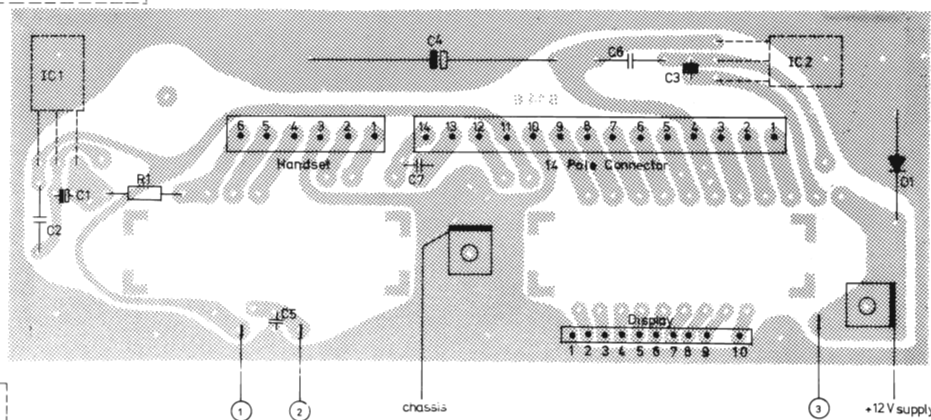
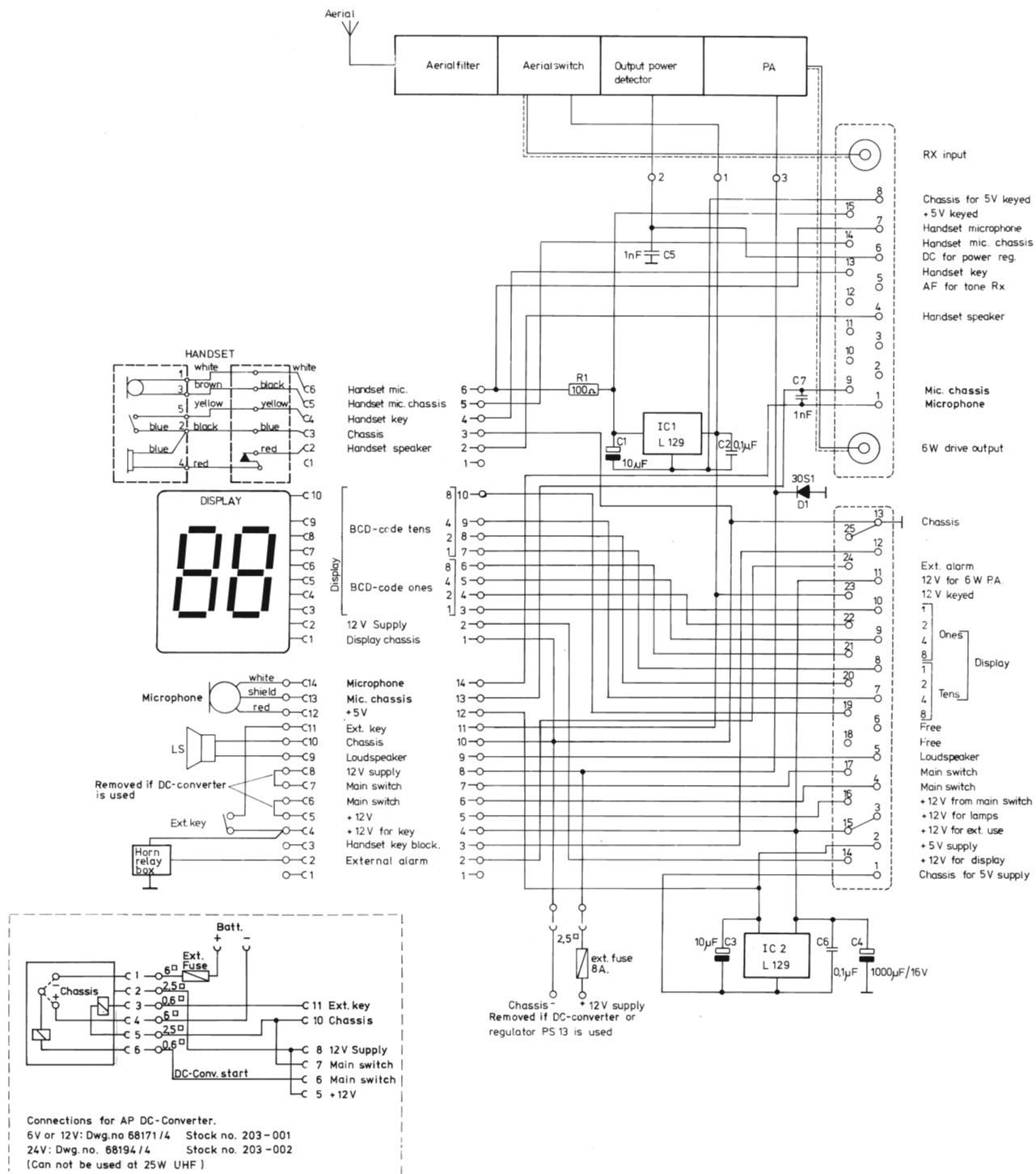
Stykt. nr.:

Tegn. nr.:

75061-2E2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-359	100 Ω $\frac{1}{4}$ W CR 25			
C1	11-506	10 μ F/25V Tant.			
C2	11-353	0,1 μ F Laco			
C3	11-506	10 μ F/25V Tant.			
C4	05-030	1000 μ F/16V Elko			
C5	11-353	0,1 μ F Laco			
C6	11-409	1 nF ker.			
D1	04-040	30S1			
IC1	09-081	TDA 1405			
IC2	09-081	TDA 1405			
Installation for AP 2000 int. Print board B 54 C 2 PA Tilhører tegn. nr.: 75061-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 75061-4S2



Notat:
 S-5-76 LT/NC
 1-1-76 LT/NC
 16-3-77 TP/AC
 5-5-77 TP/AC

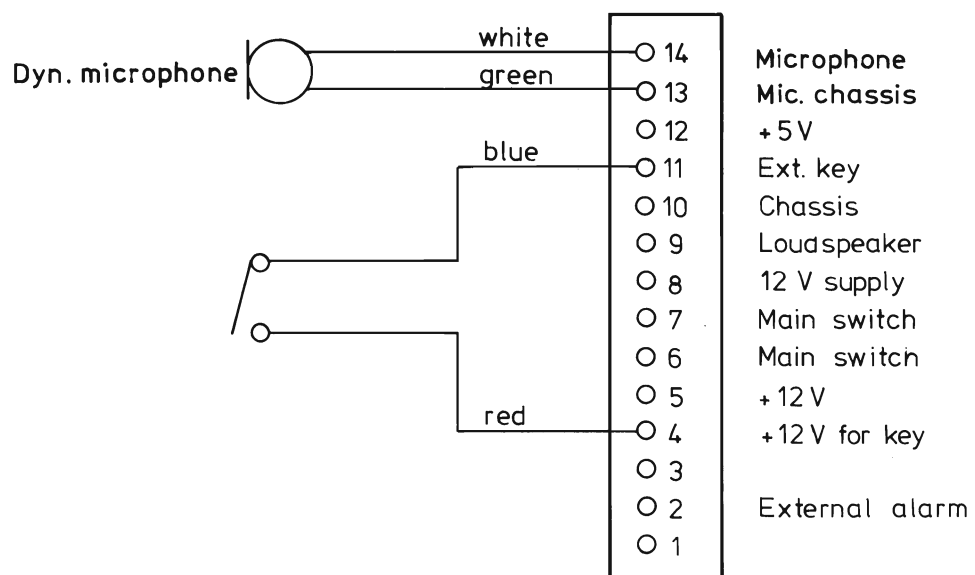
Installation for AP 2000 with
 external PA-stage
 Print board B14B1

AP-RADIOTELEFON ½

Tegn.: 12-2-75
 AC
 Stykl. nr.:
 Tegn. nr.: 75058-2E2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-359	100 Ω $\frac{1}{4}$ W CR 16			
C1	11-506	10 μ F/25V Tant.			
C2	11-353	0,1 μ F Laco			
C3	11-506	10 μ F/25V Tant.			
C4	05-030	1000 μ F/16V Elko			
C5	11-409	1 nF Ker.			
C6	11-353	0,1 μ F Laco.			
C7	11-409	1 nF Ker.			
D1	04-040	30S1			
IC1	09-081	TDA 1405			
IC2	09-081	TDA 1405			
Installation for AP 2000,ext PA			Tegn..		
Print board B 14 B 1			Stykl. nr.:		
Tilhører tegn. nr.: 75058-2E2			Kontr.: 75058-4S2		



Rettet:	Installation for close talk microphone, AP 2000	Tegn.: 4 - 11 - 76	Kontr.:
		AC	
		Stykl. nr.:	
		Tegn. nr.:	
		76327 - 4E2	
AP-RADIOTELEFON $\frac{A}{S}$			