# TP 3000
manual
400 – 470 MHz

TP RADIO

Technical decription TP 3000 Receiver.
400 - 470 MHz.

The RF signal goes through the antenna relay, and arrives to the RF amplifier
Q1, which is a low noise bipolar transistor. The necessary selectivity is
achieved by the use of high Q Helical coils.
The first mixer Q2 is a single gate junction FET. The input signal 400 -
470 MHz is converted down to 21,4 MHz which is the 1st. IF. The 1st. local
oscillator signal from 421,4 - 491,4 is injected into the source of the FET.
The IF signal 21,4 MHz is fed through the x-talfilter giving exellent adjacent
channel selectivity. From the x-talfilter the signal is fed to the 2nd. mixer
through a 20 db dual gate MOS FET amplifier Q1.
The 2nd mixer is an integrated balanced type with built in local oscillator.
The local oscillator is controlled by an external x-tal with nom. frequency
20.945 MHz.
The 2nd IF signal of 455 Khz is fed through a tuned circuit L3 to the detector
IC3, the coil L4 is the detector coil in the quadrature detector circuit.
The AF signal is supplied to the amplifier and squelch circuit by an emitter
follower Q2.
The AF signal goes through the electronic attenuator consisting of the diodes
D1 and D2 (TP139). When a DC-voltage is applied to the diodes, the diode
current will more or less short circuit the AF-signal. The applied DC-voltage
is the volume control.
The volume control circuit is followed by an amplifier Q1 (TP 139) which
compensates for the loss in signal from the following deemphasis R8, C12.
The AF signal is then led to the integrated audio power amplifier IC1
(TP 139).which delivers approx. 3-4 watt output power into the 4 ohm loudspeaker.
The squelch circuit consists of an 7-8 Khz tuned amplifier Q7 followed by
the noise detector D4 and D5. D6 is on when the base is negativ from the
rectified noise. This results in an attenuation of the audio signal by means
of Q2 and Q3.
The muting level is controlled by a DC voltage from the control box.
The transistor Q4 is used to drive the occupied indicator when squelch is
open or a carrier present.
Blocking of the AF amplifier is acomplished through the diodes D7, D10, and
D11.

From the Tx buffer, Q6 (TP 132) the VCO signal is led to the ballanced mixer
Q3 and Q4 (TP 138). The VCO signal is always differing 21,4 MHz. from the
Receiver frequency , therefore, in order to get the transmitter frequency,
a mixer is necessary.
The local oscillator is a combined crystal osc/doubler. For simplex operation
the crystal therefore has to be 10,7 MHz. The transmitter amplifier consists
of Q5, Q6, Q7, and Q8. (TP 138), and again in order to achieve sufficient
suppression of unwanted sidebands, the use of high Q helicoils is necessary.
The output power for the power amplifier is approx. 200 mV out of Q8.
The power amplifier consists of the stages Q1, Q2, and Q3, and a power sensing
and regulation circuit IC 1, and Q5. From the power sensing circuit a DC voltage
proportional to the forward output power, is led to the regulation amplifier
and compared to a reference voltage from IC 2. If the voltage from the sensing
circuit is greater than this reference voltage, the regulation transistor
Q5 will reduce the supply voltage to the driver Q1 and thereby the output
power.
The output power is adjustable with the potentiometer R10. Note that the last
2 transistors in the power amplifier, are supplied independent of the key.
The Tx indicator is controllled by the presense of high frequency power.
The power amplifier is followed by antenna filter which suppresses the
harmoinics from the transmitter.
The diode D3, C46, and R13 forms a switch, which short circuit the receiver
input, when the transmitter is keyed.

Modulation amplifier and limiter.

The modulation amplifier consists of Q11, IC1, and IC2. Q11 is the preamp-
lifier giving a sensitivity of max 1 mV, in ca. 600 ohm. It is followed by
the preemphasis condenser C43, and the sensitivity potentiometer R38.
IC1 acts as amplifier and clipper, and is followed by IC2, a 3 KHz active
low pass filter. The potentiometer, R54 adjusts the max. deviation. When the
tone input is used, the microphone amplifier Q11 is blocked via D7.

Power supply and controls.
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The supply voltage for most internal circuits, is 9 volt stabilized by means
of IC2 (TP 139). Q8 is the series pass element.
The unit is started by activating the relay A.
Once activated, relay A hold itself as long as voltage is supplied to the
set.
The transistors Q9 and Q10 act as 9 volt key switch.

The synthesizer logic in the TP 3000 is based upon the dual modulus prescaling.
The princible is shown in the blok diagram.

```
┌─────┐        ┌─────┐      ╭──────╮     ┌──────┐      ┌──────┐
│     │───────▶│     │─────▶│phase │────▶│ low  │─────▶│ vco  │──┐
└─────┘        └─────┘      ╰──────╯     │ pass │      └──────┘  │
 Ref.osc        div            ▲         └──────┘                │
                               │                ┌──────────────┐ │
                      ┌────────┘          ┌─────│  prescaler   │◀┤
                      │        ┌──────────┘     │  Pand P+1    │◀┤
         ┌────────────┴─┐    ┌─┴────────────┐   └──────────────┘ │
         │   program    │◀───│   program    │◀──────────────────┘
         │   divider    │    │   divider    │
         │     ÷ N      │    │     ÷ A      │
         └──────────────┘    └──────────────┘
```
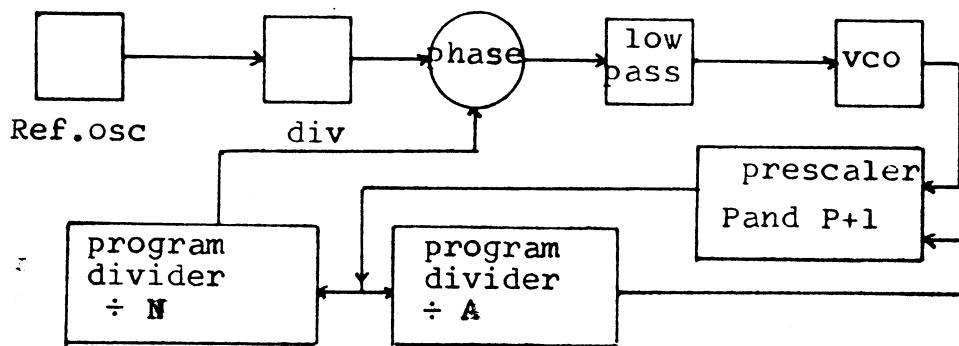
The operation is as follows:
First the prescaler divides by P+1, A times. Every time a P+1 pulse enters the
prescaler, both the ÷A counter and the ÷ N counter are decremented by 1.
This continues until the ÷ A counter reaches zero.
At the end of (P+1) A pulses, the state of the ÷ N counter is equal to (N-A).
Then the modulus of the prescaler is changed to P by the ÷ A counter. The dual
modulus prescaler continues to divide by P until the remaining count (N-A) in
the ÷ N counter is decremented to zero.
When this is completed, both counters are resetted and ready to start a new
cycle.

The dual modulus prescaler in TP 3000

The prescaler is set to 50/51 in the divider ratio and an extra divider of
÷ 2 is incorporated in order to get the input frequnecy for the dual modulus
below 250 MHz, which is max. input frequency.
The output frequency from the prescaler is between 5=4 MHz.

The PLL. synthesizer (TP 132).

From the prescaler IC 1, the LSI synthesizer IC 3 receives the input frequency.
IC 3 is a complete synthesizer with a 10 bit N-counter and a 6 bit A-counter,
a x-tal oscillator with divider for setting of the reference frequency, And
a phase-frequency detector, eith lock detection.

The reference frequency is 12,5 KHz, which is set by 3 input bits.
The reference oscillator frequency is 6,4 MHz at 25 KHz channel spacing.
The system frequency is adjustable with C 60.
The reference oscillator is temperature compensated, and in cold environments
the x-tal is heated up by means of the circuit Q10, R39, and R40.

The ÷ N counter is used to set a certain frequency band, and the ÷ A counter
to set the channel inside this frequency band.

The phase and frequency detector compares the reference signal and the down
divided vco signal, in frequency and phase, and delivers an output to the
low pass filter IC4/1 according to errors in phase and frequency.
IC 4/2 is another low pass filter which removes the 12,5 KHz ripple.
The remaining DC-errorvoltage is led to the vco frequency control D2.

The voltage control oscillator (TP132) consists of Q4, a single gate junction
FET, L8 a coaxial coil, and the necessary capacitors, C21, C22, and C 31.
The trimmer condenser C31, adjusts the vco from 400-500 MHz.
The frequency is controlled by the varicap D2.
The varicap D4, is for the modulation.
The output from the vco is led through the main buffer Q5, to the Rx-buffer,
Tx-buffer and the synthesizer buffers, Q7, Q6, Q8, and Q9, respectively.

Calculating the band code and channel code.

We have the total division ratio

Frx= Receiver frequency.

21,4 MHz= 1st. IF.

0,025 MHz= Channel spacing.

$$N_t = \frac{Frx + 21,4}{0,025} \qquad \underline{1}$$

Furthermore we have that

$$N_t = N \times P + A \qquad \underline{2}$$

N: is the number to be programmed into the ÷ N counter, in order to decide the frequency area. N must be an integer.

P: is an integer from the prescaler modolus, here P=50.

A: is the number to be programmed into the ÷ A counter in order to decide the wanted channel. A is an integer 0 A 113.

An example : A

We want to find the frequency area code and the channel code, for the receiver frequency : FRx = 468,125 MHz.
Step 1. Calculate the total division ratio NT according to $\underline{1}$

$$N_t = \frac{468,125 \text{ MHz} + 21,4 \text{ MHz}}{0,025} = 19581$$

step 2. Use formula $\underline{2}$ to find N and A

we have NT = N x P + A $\qquad \frac{A + N = NT}{P}$

NT = 19581
P = 50

We have: A + N = $\frac{19581}{50}$ = 391,62 select N to be the highest integer, that is N = 391.
The rest NT - (391 x 50) = 19581 - 19550 = 31 = A
We have the division retio for the ÷ N counter = 391
and for the ÷ A counter = 31.

From example A we have that N = 391 and A = 31 these numbers are coded as follows:
1. Enter the programming table and find the number 391.
2. Check that the frequency area is ok.
3. Connect the input of the N divider according to the table.
   The code for N = 391 is read A A A B O O O Free.
   and is coded as shown.
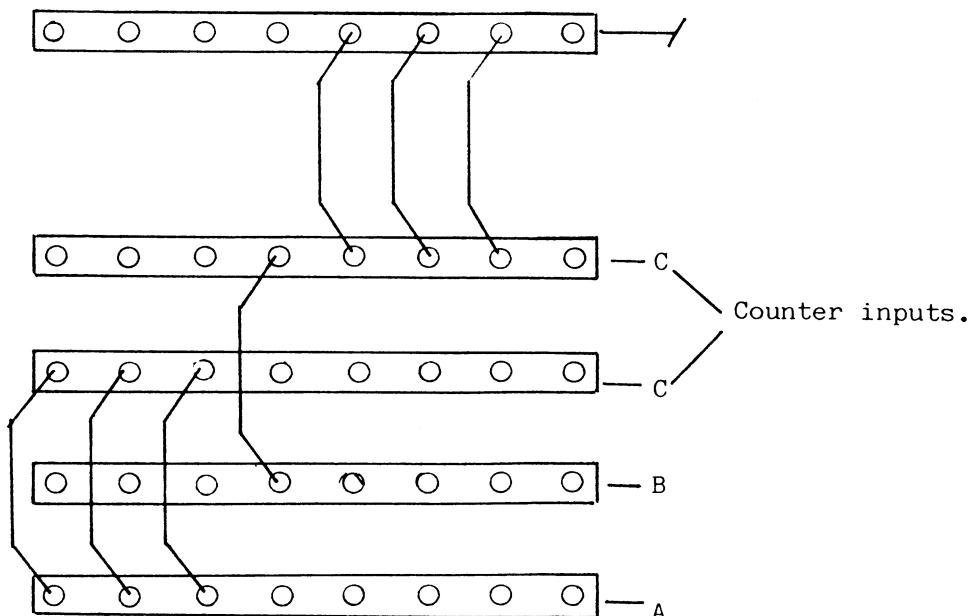
Bit nr. 1 2 3 4 8 16 32 64 128

4. The channel A = 31 is coded on ex. TP 105.

T.P. 105.

1   2   4   8   16 32 64
                    (50)
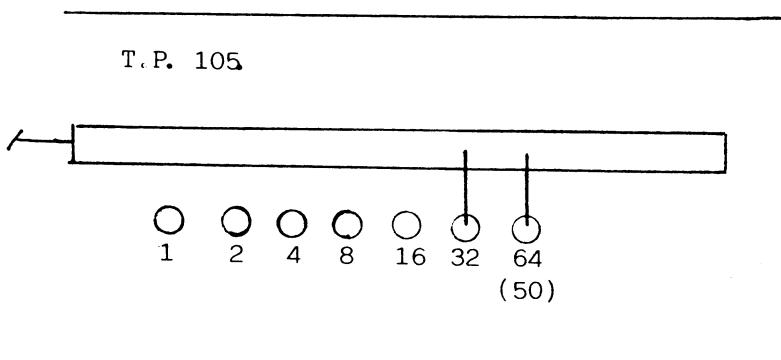
In some cases f.ex. in multichannel sets, the channel code A is greater than 64. In these cases, it must be noted, that the last bit in the channel code is calculated 50 and not 64.
So in order to avoid confusion, every time the calculated channel code is 64 add 14 to the number.
The reason for this lies in the $\div$ A divider, which only contains 6-bit, so in order to become sufficient channel coverage. The 7th. bit is borrowed from, the $\div$ N divider in which the first bit accounts for 50.

Example:
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2 channels must be programmed into the channel prom.

Channel 1.   Rx = 453,000 MHz.

Channel 2.   Rx = 454,000 MHz.

We have $N_T = \dfrac{453 + 21,4}{0,025} = 18976$ channel 1.

further A + N $= \dfrac{18976}{50} = 379,52$

$\qquad$ N = 379

$\qquad$ A = 18976 − (379 X 50) = 26

for channel 2. $N_T = \dfrac{454,000 + 21,4}{0,025} = 19016$

but N was = 379.

which gives A = 19016 − (379 X 50) = 66

In channel 2. A   64, so we have to add 14, which makes the channel code for channel 2 = <u>80.</u>

Number programmed into the N counter	Receiver frequencies MHz.	1	2	4	8	16	32	64	128
					connect to				
342	406,1 – 408,925	B			0		0		0
343	407,35 – 410,175	A	A	A	B		0		0
344	408,6 – 411,425	B	0	0			0		0
345	409,85 – 412,675	A	B	0			0		0
346	411,1 – 413,925	B		0			0		0
347	412,35 – 415,175	A	A	B			0		0
348	413,6 – 416,425	B	0				0		0
349	414,85 – 417,675	A	B				0		0
350	416,1 – 418,925	B					0		0
351	417,35 – 420,175	A	A	A	A	A	B		0
352	418,6 – 421,425	B	0	0	0	0			0
353	419,85 – 422,675	A	B	0	0	0			0
354	421,1 – 423,925	B		0	0	0			0
355	422,35 – 425,175	A	A	B	0	0			0
356	423,6 – 426,425	B	0		0	0			0
357	424,85 – 427,675	A	B		0	0			0
358	426,1 – 428,925	B			0	0			0
359	427,35 – 430,175	A	A	A	B	0			0
360	428,6 – 431,425	B	0	0		0			0
361	429,85 – 432,675	A	B	0		0			0
362	431,1 – 433,925	B		0		0			0
363	432,35 – 435,175	A	A	B		0			0
364	433,6 – 436,425	B	0			0			0
365	434,85 – 437,675	A	B			0			0
366	436,1 – 438,925	B				0			0
367	437,35 – 440,175	A	A	A	A	B			0
368	438,6 – 441,425	B	0	0	0				0
369	439,85 – 442,675	A	B	0	0				0
370	441,1 – 443,925	B		0	0				0
371	442,35 – 445,175	A	A	B	0				0
372	443,6 – 446,425	B	0		0				0
373	444,85 – 447,675	A	B		0				0
374	446,1 – 448,925	B			0				0
375	447,35 – 450,175	A	A	A	B				0
376	448,6 – 451,425	B	0	0					0
377	449,85 – 452,675	A	B	0					0
378	451,1 – 453,925	B		0					0
379	452,35 – 455,175	A	A	B					0
380	453,6 – 456,425	B	0						0
381	454,85 – 457,675	A	B						0
382	456,1 – 458,925	B							0
383	457,35 – 460,175	A	A	A	A	A	A	A	B
384	458,6 – 461,425	B	0	0	0	0	0	0	
385	459,85 – 462,625	A	B	0	0	0	0	0	
386	461,1 – 463,925	B		0	0	0	0	0	
387	462,35 – 465,175	A	A	B	0	0	0	0	
388	463,6 – 466,425	B	0		0	0	0	0	
389	464,85 – 467,675	A	B		0	0	0	0	
390	466,1 – 468,925	B			0	0	0	0	
391	467,35 – 470,175	A	A	A	B	0	0	0	
392	468,6 – 471,425	B	0	0		0	0	0	

PLL Synthesizer (print board TP 132)

The first is to code the set to the wgnted channel. This is done according
to the instructions contained in the technical description of the synthesizer
circuit. Check the channel code and if the set containes more than one channel,
select one in the middle of the band.
Check the reference frequency code.
Connect a high input impedance DC-voltmeter to MP 3 and turn the trimmercon-
denser C31 until a voltage movement is obtained. Then adjust C31 to a reading
of approx 4 volts.
Connect a high frequency counter to the Tx output buffer, and adjust the vco
frequency to FRx + 21,4 MHz by means of C60.
Check the lock range by turning C31 and read the value on MP3. The trimmer
C31 should be turned approx one full turn before the loop goes out of lock.
The voltage on MP3 varies correspondingly between 0,3 - 8 volts DC.
In multichannel sets, select the lowest and highest channel and check that
the loop still goes into lock.
The sensitivity of the vco is approx 1 MHz/volt.

21,4 MHz and 455 KHz IF.

Connect a 21,4 MHz sweep generator to the gate of Q2 on print board TP 132,

and the DC-probe to MP 1 (TP 135).

Adjust L7 (TP 132) and L1 (TP 135) to minimum ripple.

L2 and L3 (TP 135) to max. amplitude and best possible symmetry.

The input level from the sweep generator must be kept below the limiting level

of the second mixer. Connect the ac-probe to the discriminator output pin,

and adjust L4 to max. slope and best linearity.

RF-amplifier and mixer

Connect a DC-voltmeter to MP1 and adjust L5 and L6 to max. deflection approx

0,8 volt DC.

Connect a signal generator to the receiver input, and adjust L1, L2, L3 and

L4 to max. sensitivity, which should be ca. 0,6 µV. e.m.f. at 20db.SINAD.

AF-amplifier and squelch (T) 139).

Connect the signal generator to the receiver input, adjust the attenuator

to 1mV. and the deviation to +÷3 KHz at 1000 Hz. Connect an AF-millivoltmeter

to the "disc. out" and read. ca-120 mV. R.M.S.

Connect a 4 ohm 5w resistor to the loudspeaker output and an AC-volt accros

the resistor. Adjust the volume control to the last but one step and read

ca. 3 VAC.

Removed the signal generator and adjust the squelch 3 step up. Adjust the

potentiometer R26 (TP 139) so that the squelch opens.

Check that the closing level is 2 step below.

Transmitter mixer and amplifier (TP 138)

First the condensers Cx 1 and Cx 2 are mounted according to the table in the drawing no.
Connect a DC-voltmeter to MP 1 and adjust L1 and L2 to max. deflection ca. 0,4 v.
Connect the DC-voltmeter to MP2 and adjust C10 to max. ca. 0,5 v DC.
Move the probe to MP 3 and tune L3 and L4 to max. 1,2 V.
Tune L5 and L6 to max. 4,2 V on MP 4.
Now connect a wattmeter to the output of the amplifier and tune L7, L8, C32 and C34 to max. output power, approx 200 mW into 50 ohm.
Note that the condensers Cx 1 and Cx 2 accoros coil L1 and L2 must be changed

Transmitter Power stage (TP 140)

Connect a wattmeter (50 ohm, 25 w) to the transmitter output.
Set the supply voltage to 12,0 volt.
Turn the potentiometer R 10 counter-clockwise to get the output power stabilization out of function.
Key the transmitter and adjust C2, C11, C20, C32, and C33 to max. output power.
In crease the supply voltage to 13,2 V and turn.
The potentiometer R 10 clockwise until the desired output power is reached.
0012

Transmitter frequency

Connect a frequency counter to the attenuated wattmeter output and adjust
the transmitter frequency with the capacitor C 7 on TP 138.

Modulation amplifier (TP 138)

Connect a modulationmeter to the attenuated wattmeter output and a tone-
generator to the microphone input.
Turn the potentiometer R38 and R 54 to center position and set the tone-
generator frequency to 1000 Hz. With an input level of 20 mV. adjust R54 to
give max. deviation.
Decrease the input level 20 db (2 mV) adjust R38 to give nominal deviation
($\pm$ 3 KHz).
Repeat the procedure and readjust if necessary with an input level of 20 mV,
check the symmetry of the limited signal. The + and _ deviation should not
differ more than 0,5 KHz.

TP 101A + TP 102 A
Betjeningsbox 1-12 kanal
med - uden selektiv

TP RADIO

JS 13.03.79

DRAWING NO.

EA3 790310

MOBIL CONTROL BOX BB 3
PRINT BOARD
TP 136   TP 137

TP RADIO

TP 06.12.82

DRAWING NO.
EA3-821201
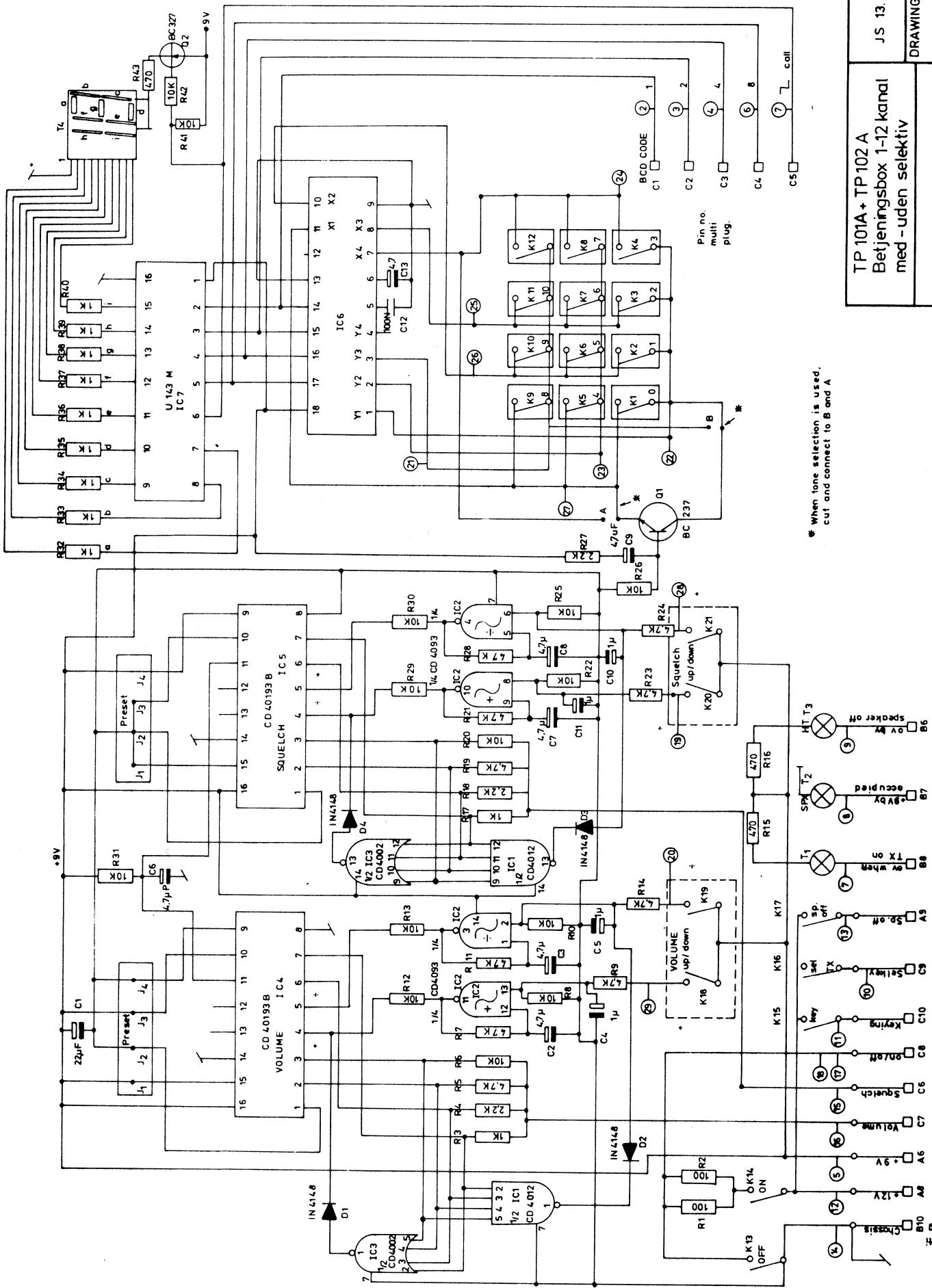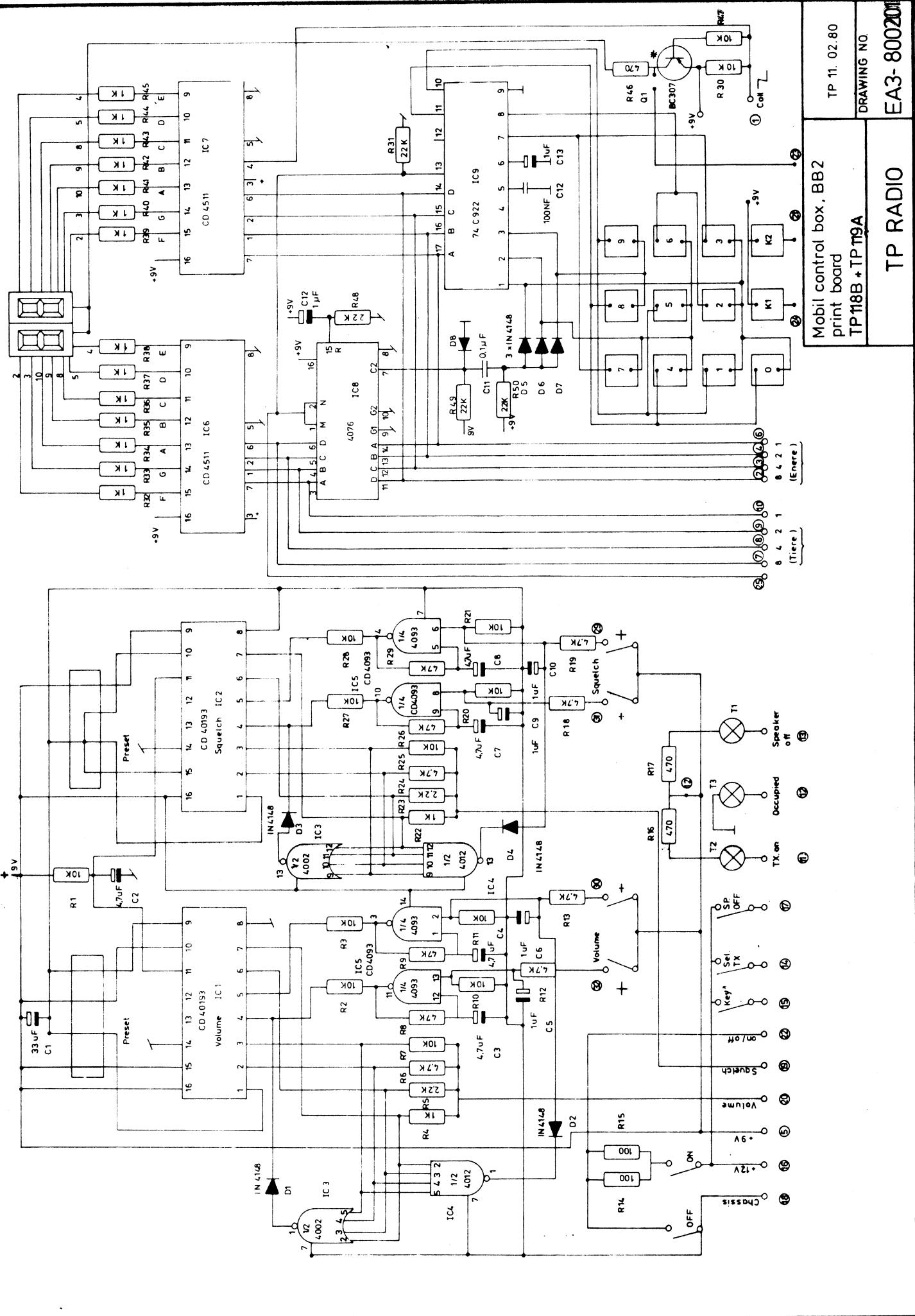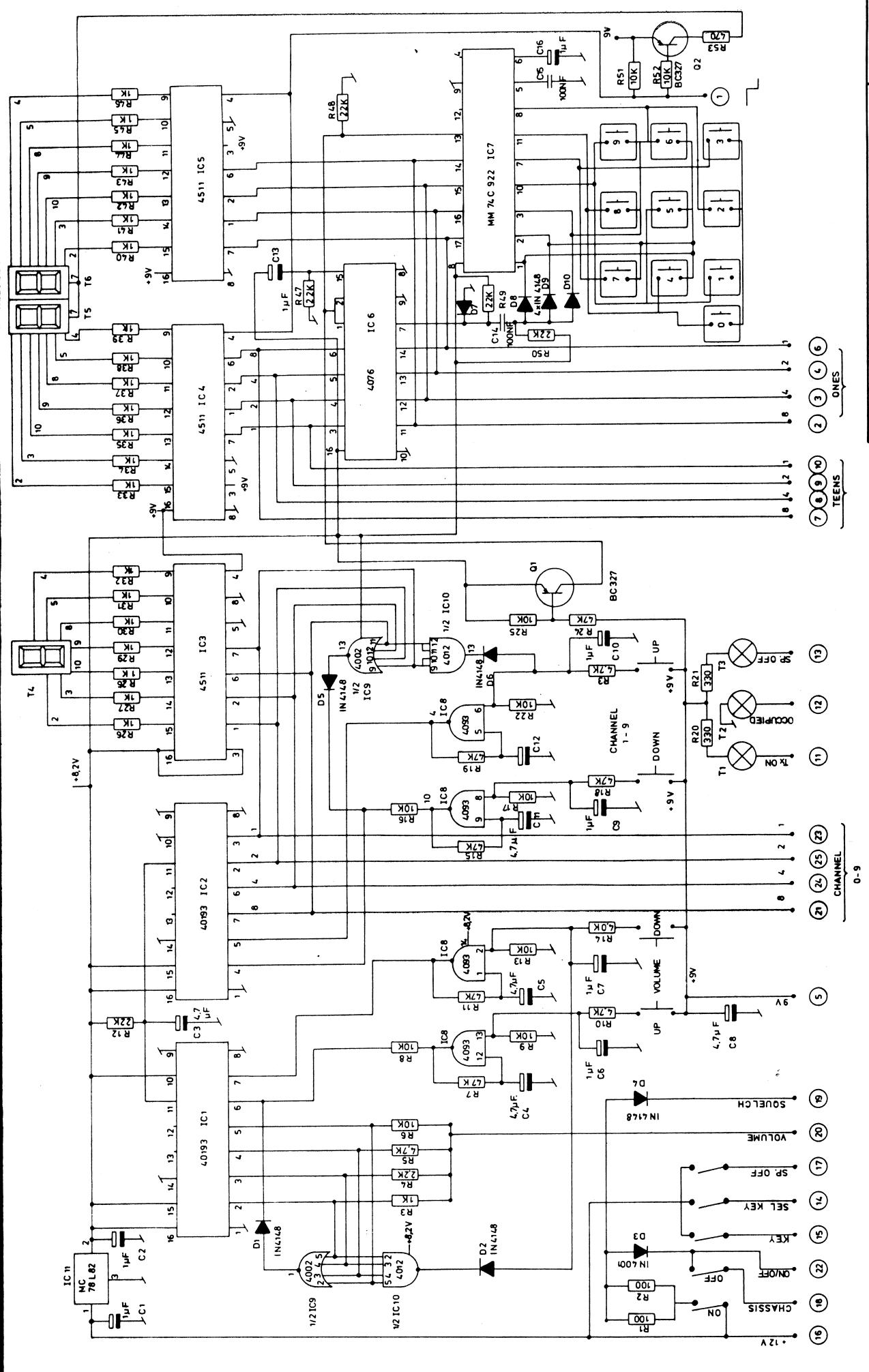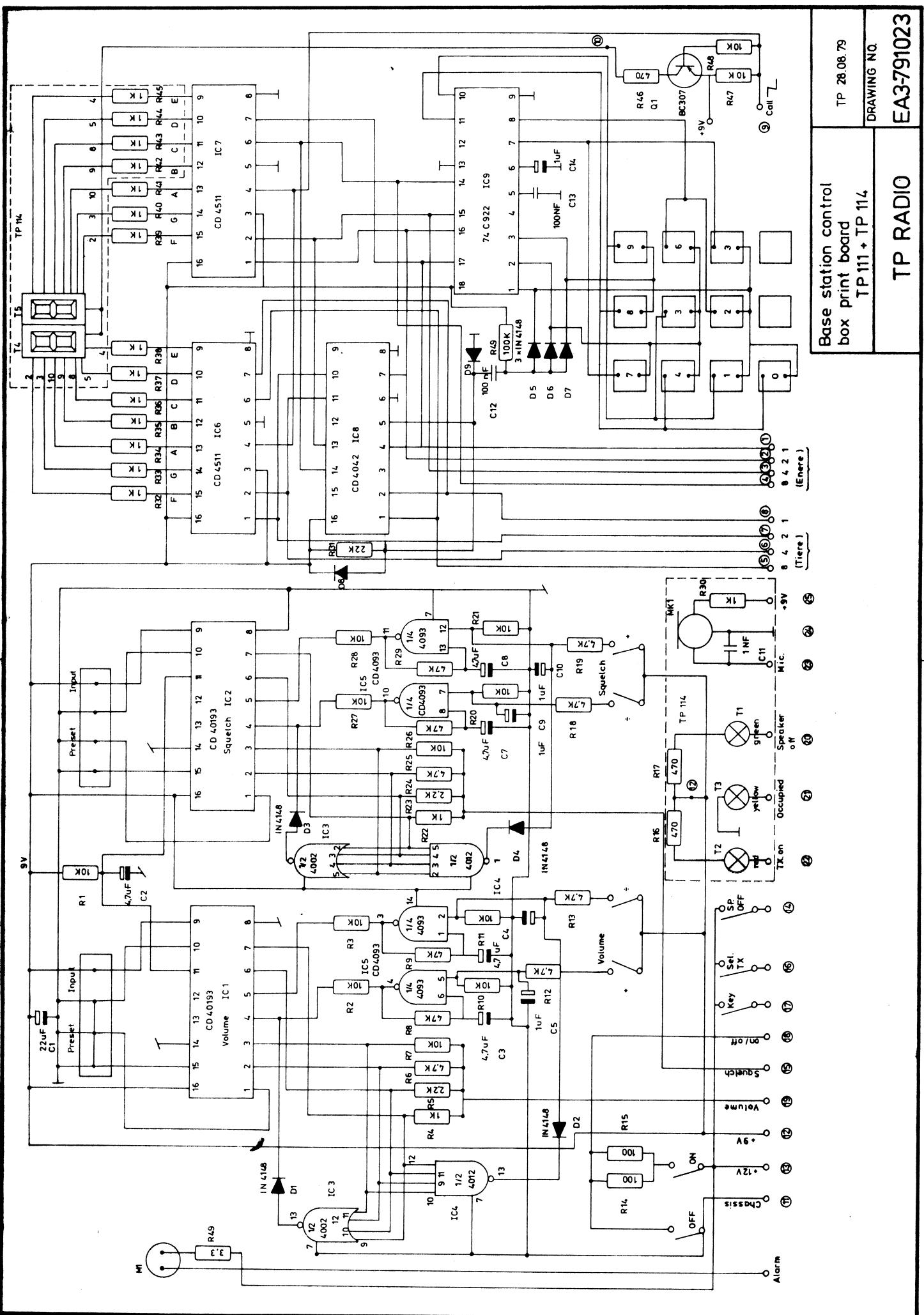
Base station control
box print board
TP 111 + TP 114

TP RADIO

TP 28.08.79

DRAWING NO

EA3-791023

UHF RECEIVER AND PLL
PRINT BOARDS TP132-135-139

TP RADIO

JS 29. 04. 83

DRAWING NO.
EA3-830302

UHF PA-STAGE TP 140
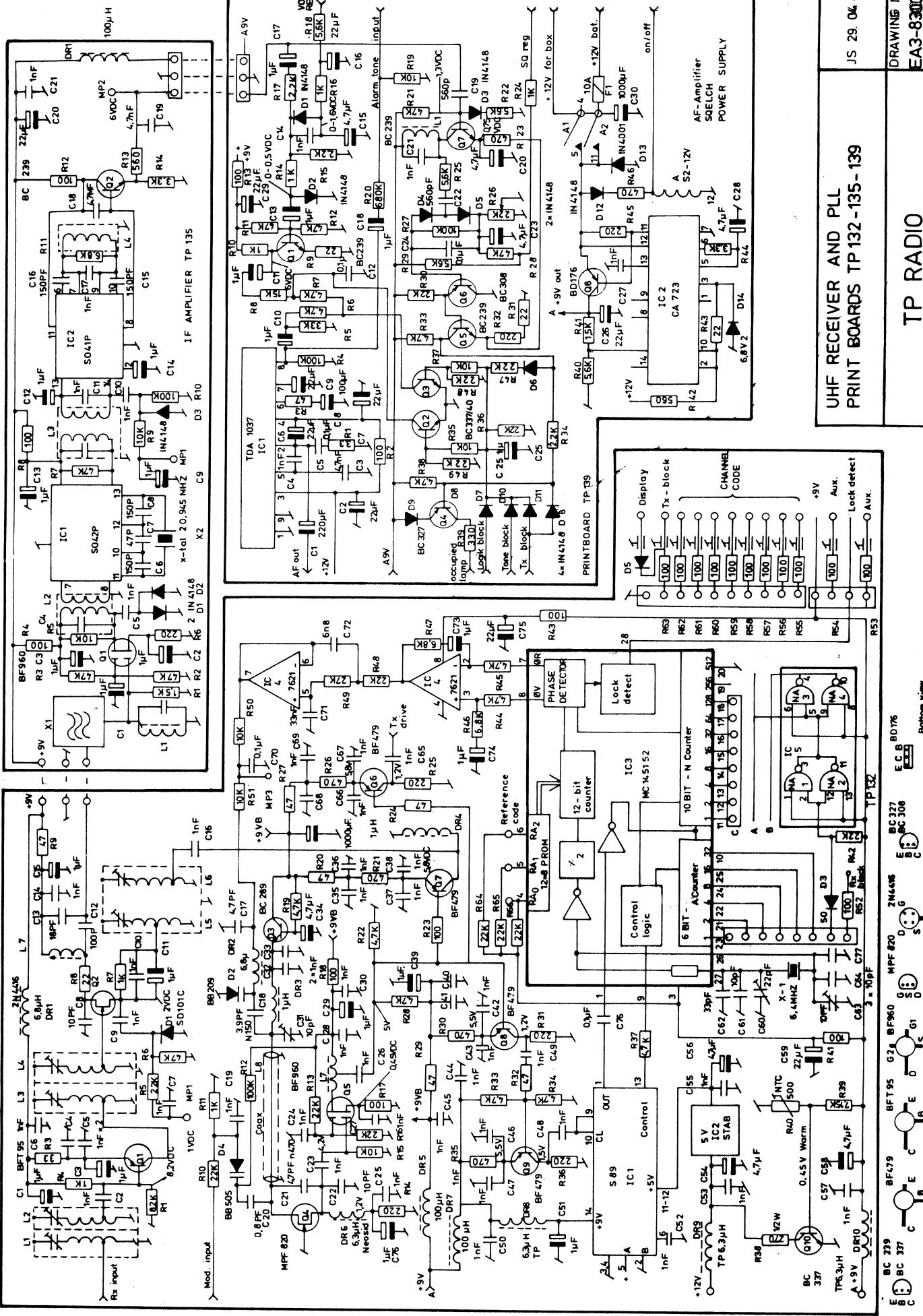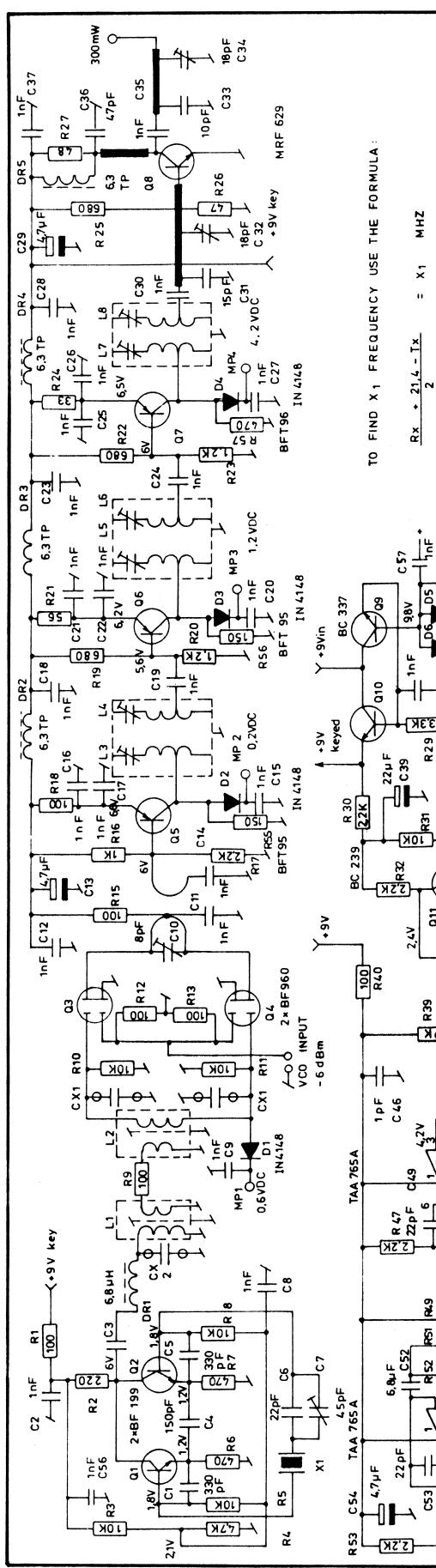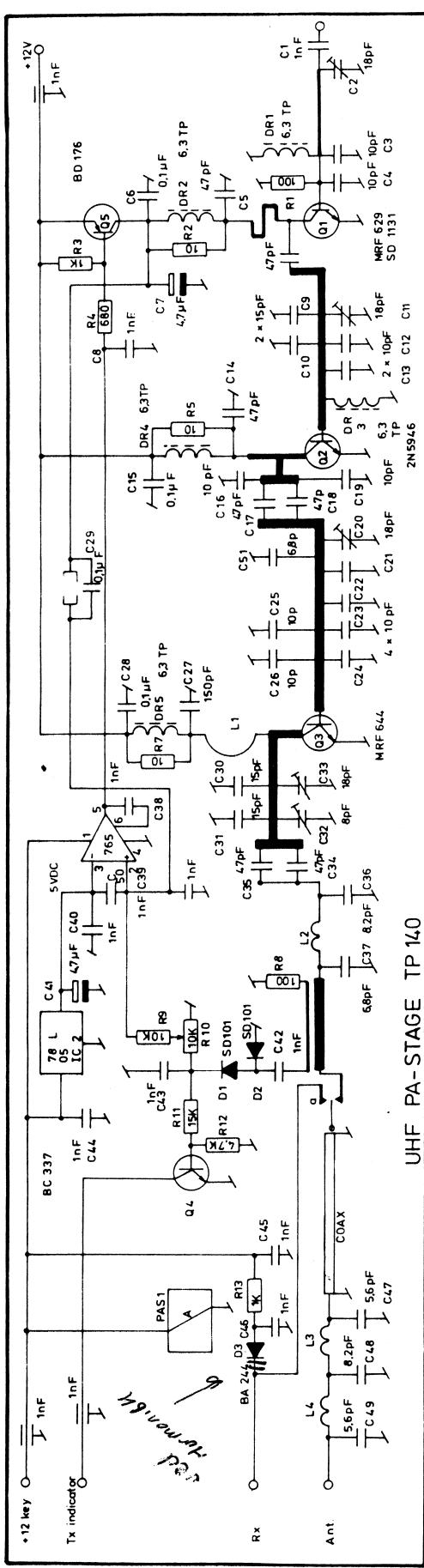
MOD. AMP-TX. OSC. MIXER AND AMPLIER FOR UHF.
PRINT BOARD TP 138

TO FIND X₁ FREQUENCY USE THE FORMULA:

$$\frac{Rx + 21.4 - Tx}{2} = X_1 \quad MHZ$$

CX1 = 47pF when X1 = 10.7 MHZ . CX₂ = 22 pF
CX1 = 22 pF when X1 > 10.7 MHZ . CX₂ = 10 pF
CX1 = 82 pF when X1 < 10.7 MHZ . CX₂ = 47 pF

UHF-TRANSMITTER
PRINTED BOARDS TP140 - TP138

TP RADIO

JS 10. 02. 83

DRAWING NO.
EA3 830301

BOTTOM VIEW

BC 337-239
BF 199
GZ BF 960
BFT 95 - 96
BD 176

+ 9V

MP 2

Mod input

+ 9V

+12V

MP 1

MP 3

TP 132

+ 12 V

Receiver input
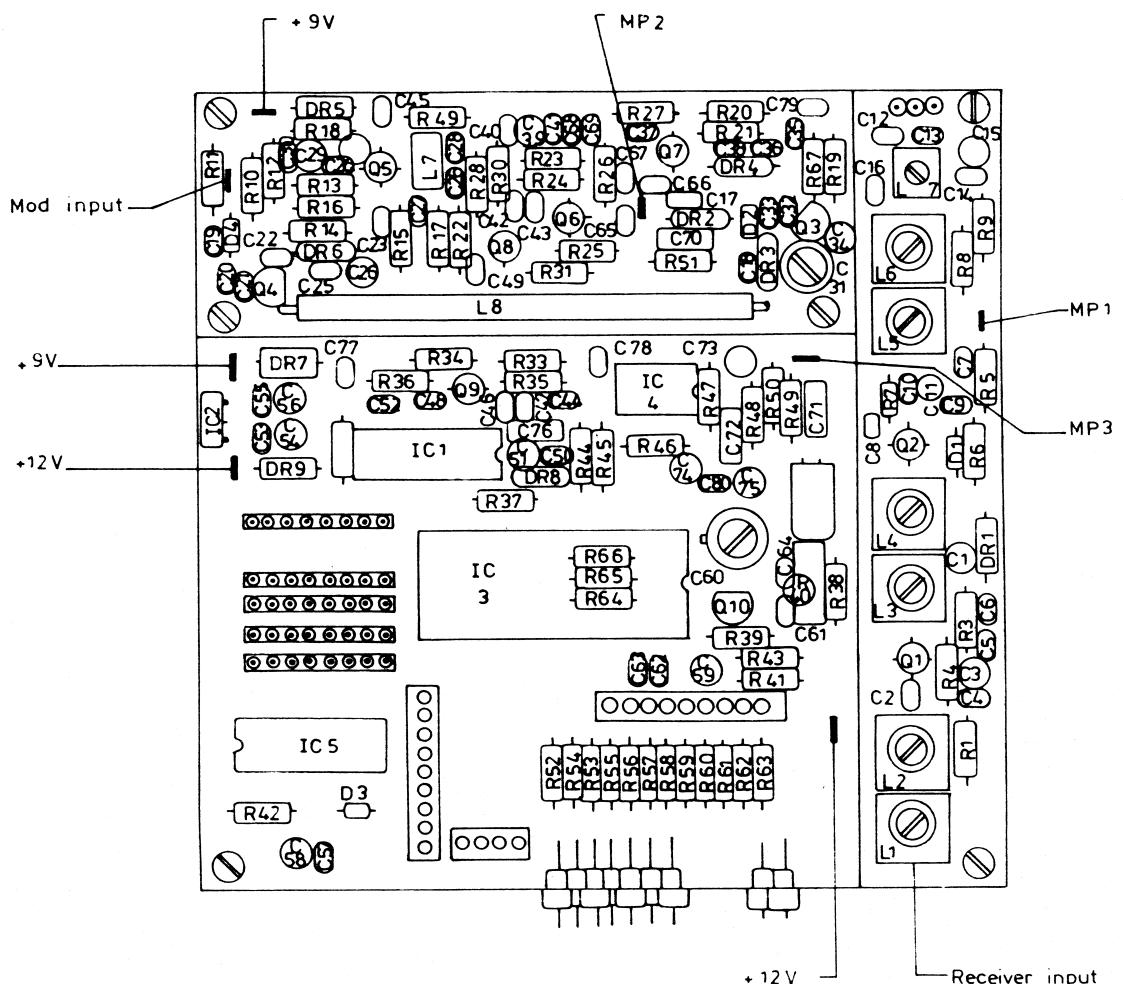
COMPONENT LAY OUT TP 132 RF MIXER VCO AND PLL	JS 06. 06. 84
TP RADIO	DRAWING NO. EA4-840805

MP2

MP1

TP 135

R14
R13
R11
C17
C19
C16

GND
DISC.
+9V

Q2
C20 C18
DR1
C21

C9 D3
C14
L4
R9
C10
R12
C15 C11
C12
L3

R10

X2
C7
C8 C6
IC1
R7
R8
C13

D2
D1 R6
C2
C5
D Q1
R5 R3 R2
C1
R4
C3

L1
R1
X1
L2

IC2

GND   INPUT   +9V
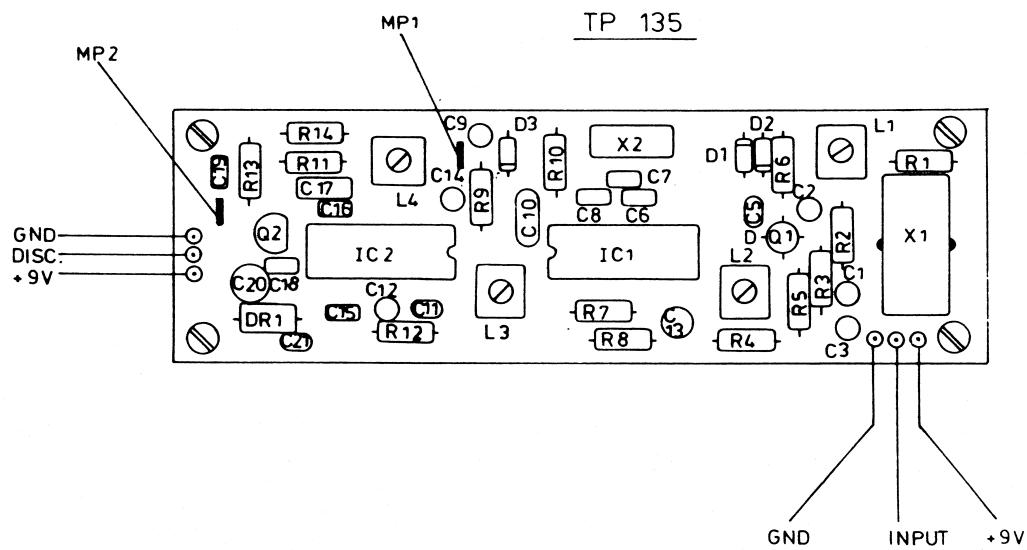
COMPONENT LAY OUT TP 135	
IF AND DISCRIMINATOR	JS 21. 05. 84
TP RADIO	DRAWING NO. EA4-840808
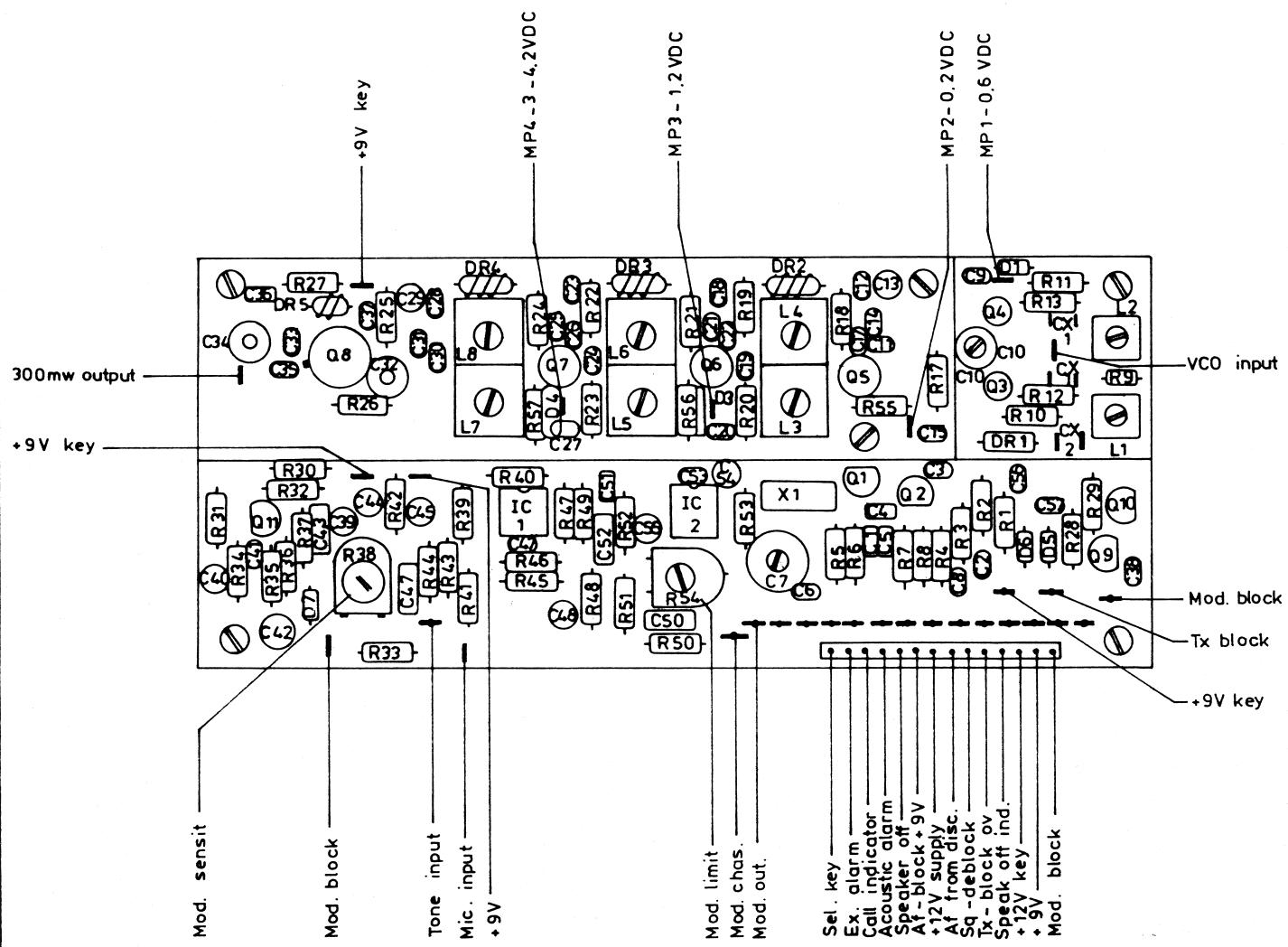
TP 138

COMPONENT LAY OUT TP 138 UHF MOD. AMP TX MIXER TX AMP	JS 11.10.84
TP RADIO	DRAWING NO. EA4 840812
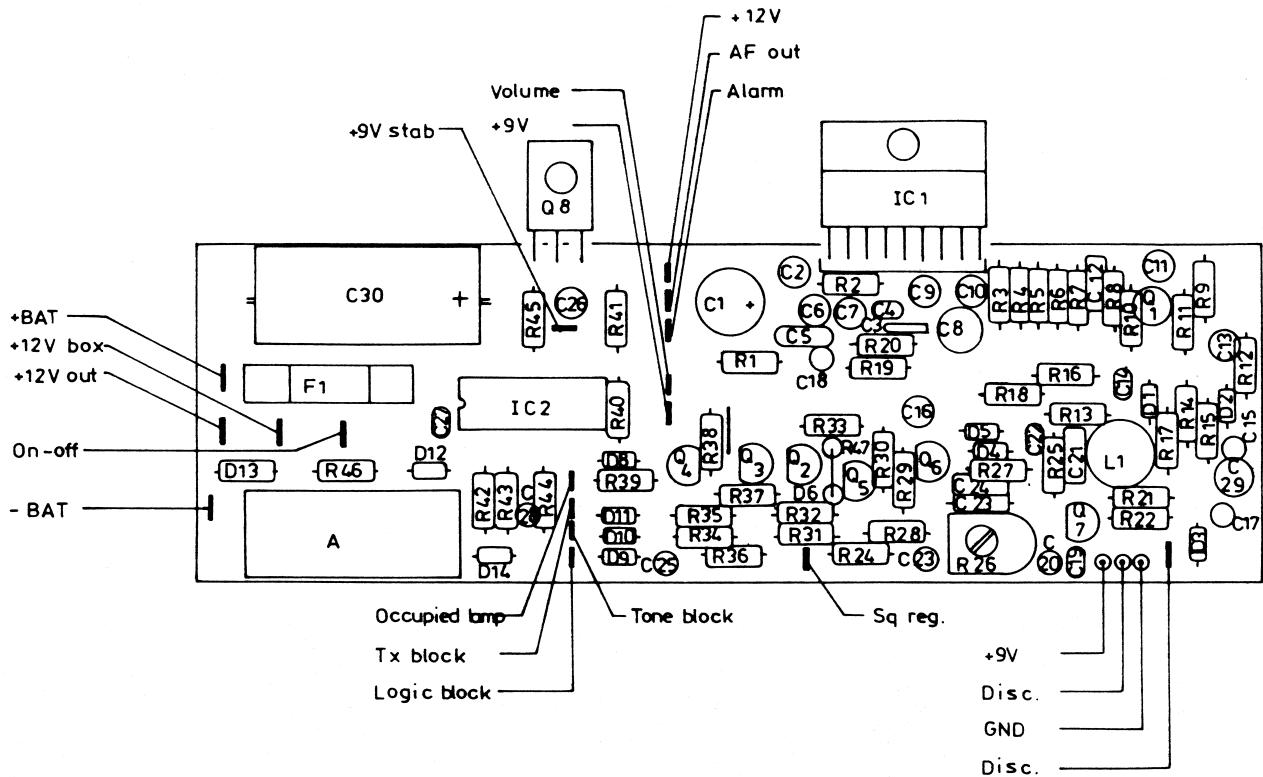
TP 139

TP 140

+12V key   Receiver input

Tx input

+12V

+12V key

Tx indicator

Antenna
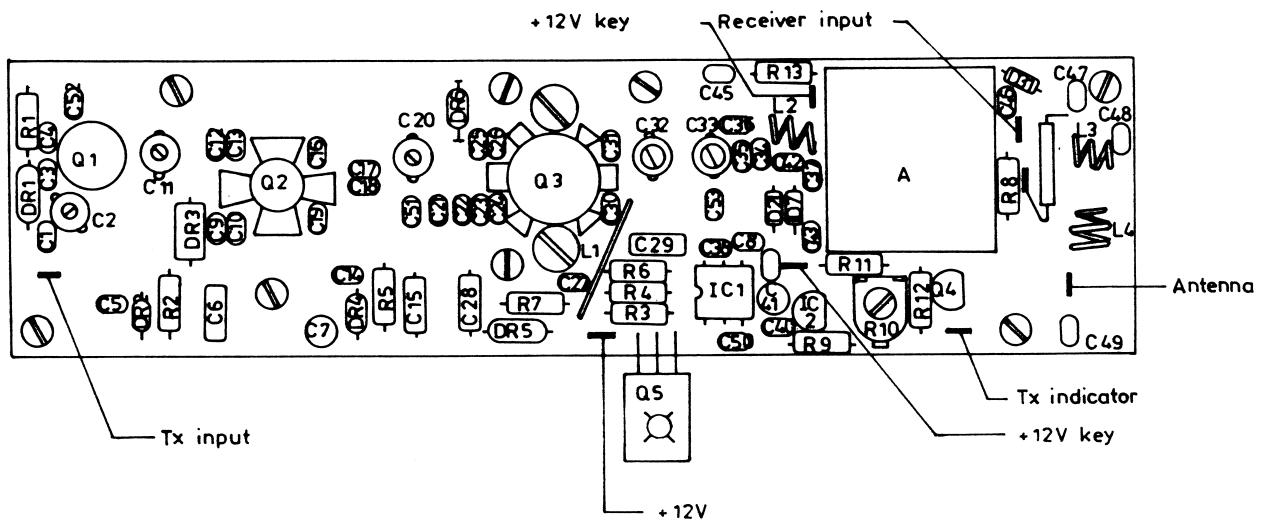
COMPONENT LAY OUT TP 140 PA - STAGE UHF	JS 23.05.84
TP RADIO	DRAWING NO. EA4-840807

Output code

1   2   4   8

1	1	16	R1	R2	R3	R4	R5	+ 5 V supply
2	2	15						Rx block +5V
4	3	14						Tx block 0V
8	4	13						Display block
16	5	12						
32	6	11						
34	7	10						
	8	9						

IC1

74 LS 188

10 K (R1–R5)

D2 D3 D4 D5 D6 D7

128

R6 22K

Q1 BC 239

R7 22K

C2 1µ

— Chassis

To phase detector

pin 12   R15 22K   R14 10 K   Q2 BF 199

C1 0,1 µF

D1 IN4148   R12 47K

R11 22 K   Q3 BC 239

R9 10 K

Q4 BC 337

R13 10 K   +9 V

R10 10 K   +9 V

R8 1K   +9 V
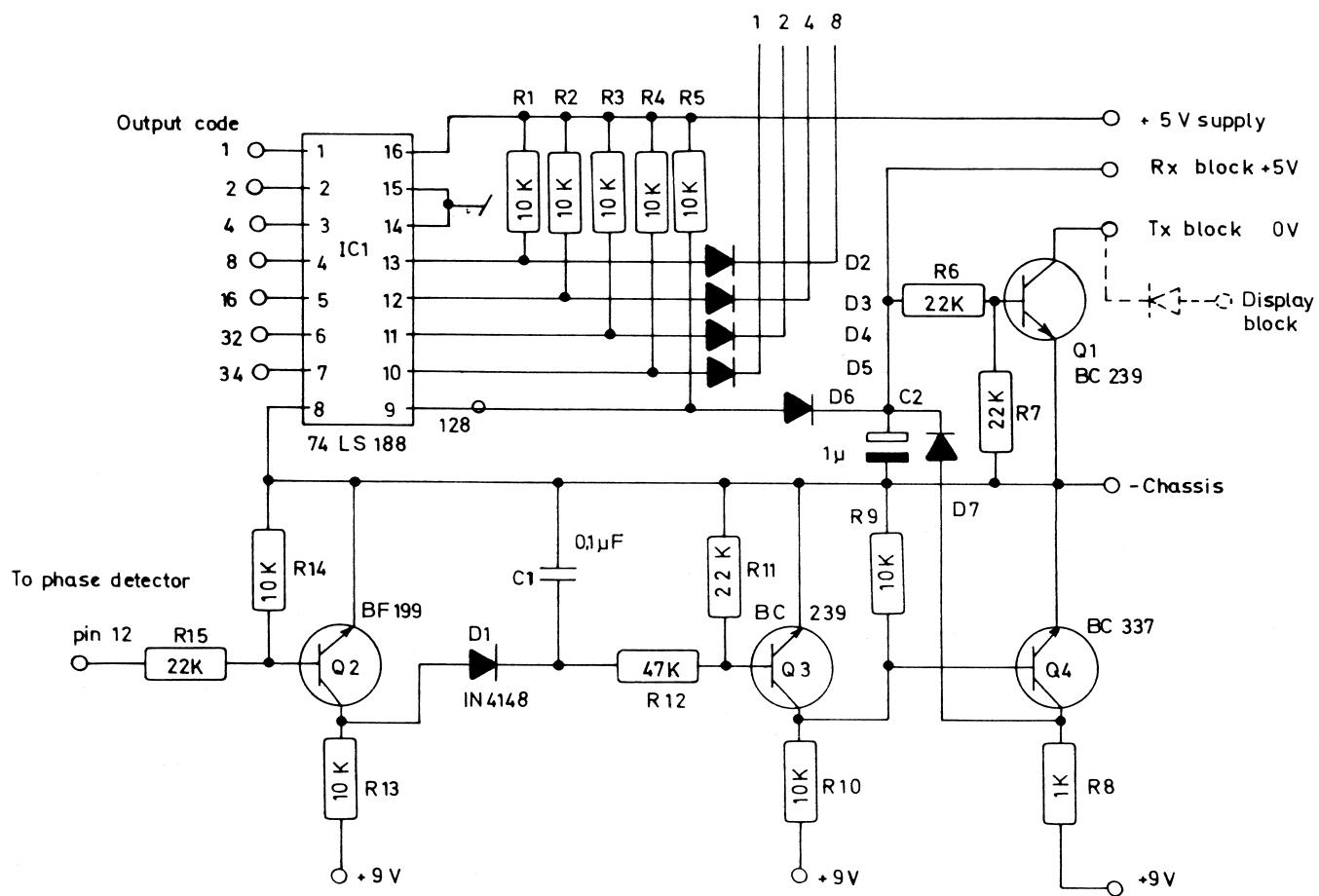
Print board TP 121	13. 05. 80
Code plug for max. 12 channels with lock control circuit	JS
	DRAWING NO.
TP RADIO	EA4-800503

+9V

Tx block 0V

Display block

BC 239

Q4

Chassis

R9 22K

R10 22K

1 µF C2

D2 IN4148

BC337

Q3

R8 1K

R6 10K

BC 239

Q2

R7 10K

R4 47K

R5 22K

10NF C1

R3 4.7K

D1 IN4148

BF199

Q1

R1 22K

R2 10K

To phasedetector

PIN 12

CHANNEL CODE

1
4
8
2
16
32
64

Rx block

+5V
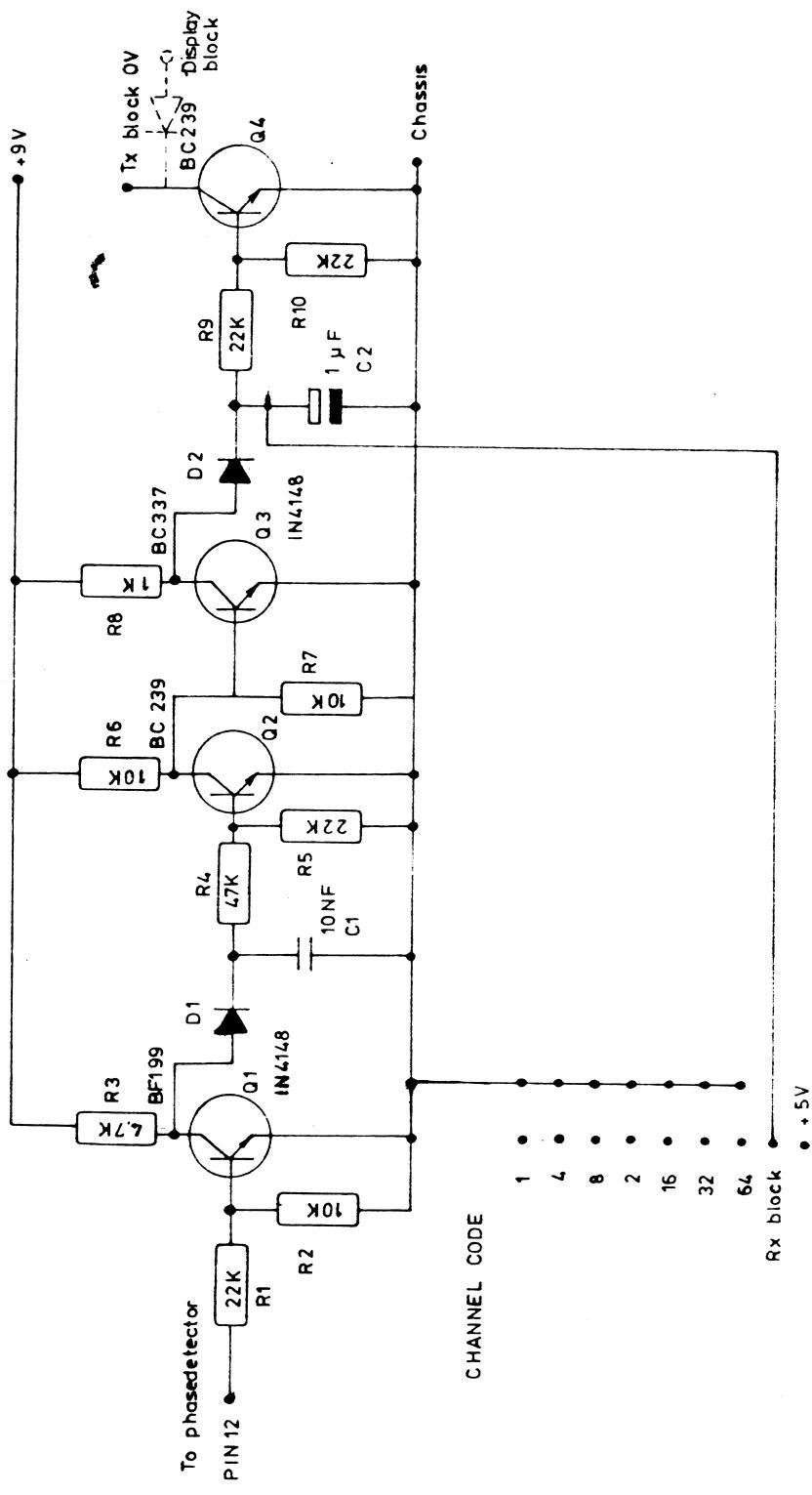
| Ptint board 123 | 29. 07. 80 |
| Code plug 1 channel with lock control | TP |

| TP RADIO | DRAWING NO. |
| | EA4- 800711 |
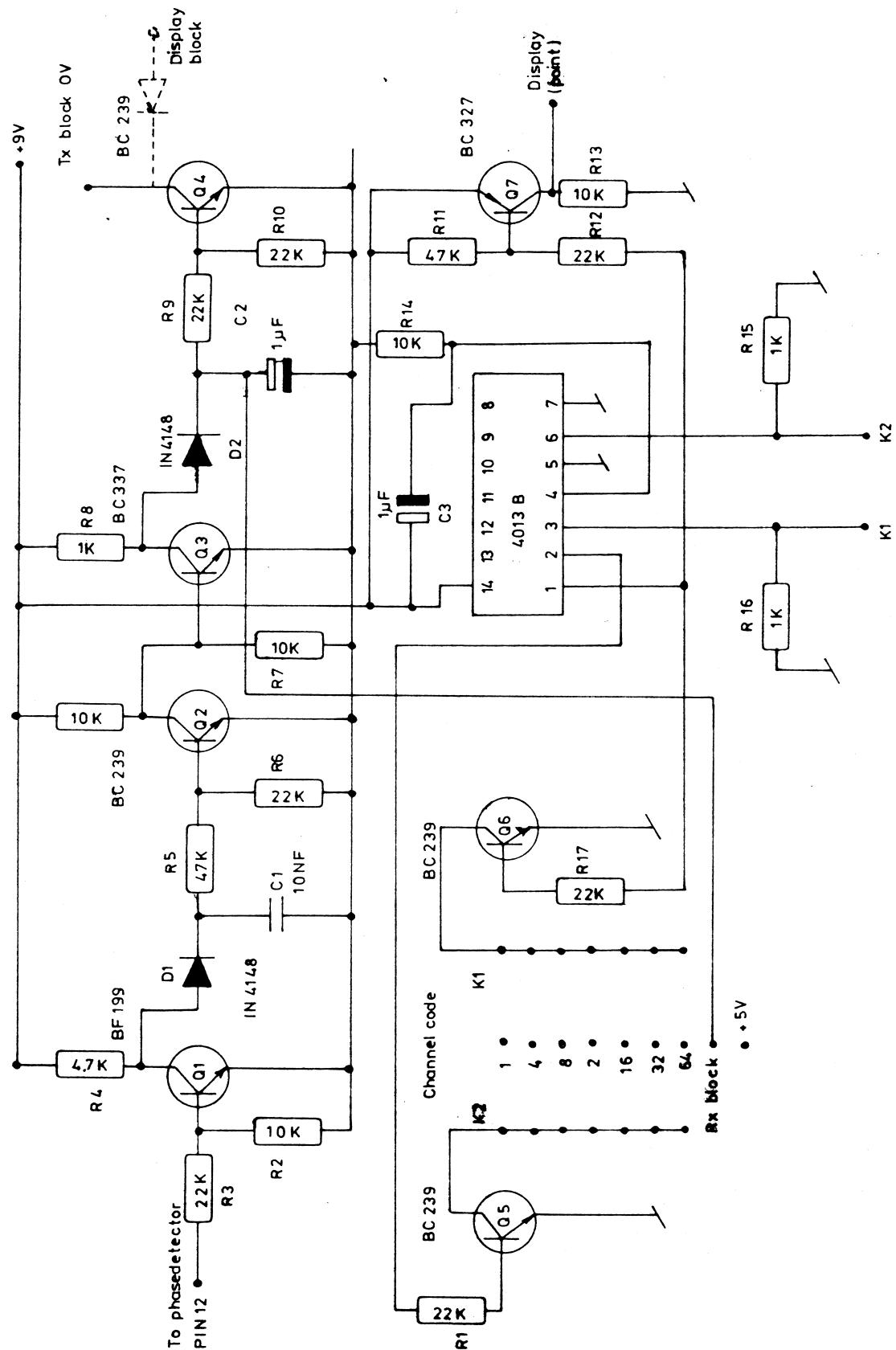
Print board TP 124 Code plug for max 2 channels with lock control circuit	25. 08. 80 TP
	DRAWING NO
TP RADIO	EA4-800815

Schematic diagram labels:

7602

1	1	16
2	2	15
4	3	14
8	4	13
16	5	12
32	6	11
64	7	10
	8	9

128

R1 R2 R3 R4 R5 R6
10K 10K 10K 10K 10K 10K

+ 5 V supply

Rx block 15V

Tx block 0V

R7 22K

BC 237

Display block

D5

9 × IN 4148

D6   D7 D8 D9

D1 D2 D3 D4

- chassis

8 4 2 1   1 2 4 8

Ones   teens
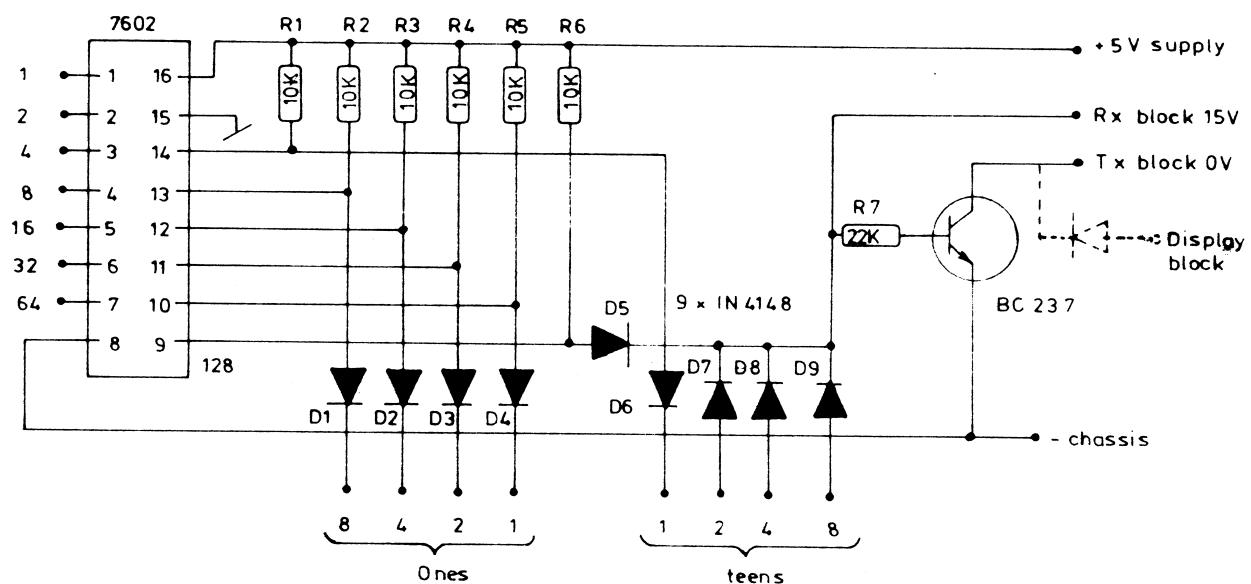
Print board Code plug for max 19 channels	25. 08. 80 TP
	DRAWING NO
TP RADIO	EA4 800814

Print board TP 117
Volume down control and AF-Buffer amplifier

JS 9. 11. 79

TP- RADIO

DRAWING NO
EA4-791124

Control logic for dual watch

TP 128

TP RADIO

JS 30. 03. 81

DRAWING NO.

EA3-810304

Multiconnector

A	1	Brown/Green
A	2	White / Grey
A	3	White / Rosa
A	4	White
A	5	Mic — Rosa
A	6	+9V stab. — Grey / Brown
A	7	Extern alarm — Blue
A	8	+12 V forbox — Violet
A	9	Speaker on/off — YELLOW
A	10	+Bat +12V — Red / Blue
B	1	Green
B	2	Red
B	3	White / Green
B	4	Black
B	5	Mic chassis — Yellow / Brown
B	6	Speaker off indicator — Brown
B	7	Occupied indicator — White / Yellow
B	8	Transmit indicator
B	9	Loudspeaker
B	10	÷Bat
C	1	BCD
C	2	BCD
C	3	Channel code or tone code
C	4	Channel code or tone code
C	5	Call indicator display
C	6	Squelch regulation
C	7	Volume regulation
C	8	On /Off
C	9	Tone key
C	10	Key

Solder points in concrol box: 1–29

ext. key
+Bat
+Bat
÷Bat

Installation of TP 3000 1-12 channels	JS 28. 08. 79
TP RADIO	DRAWING NO. EA4-790304

The „R" contacts may operate signal horn relay.

MULTICONNECTOR		1 FUNCTION	2 FUNCTION	3 FUNCTION
A1	RED-BROWN	POINTS	AF OUT	BCD 1
2	RED-GREY	3 STATE CONT.		CODES 2
3	BLUE-BLACK	SCANNING	K1	4
4	BLUE-BROWN	STORE	K2	8
5			MICROPHONE	
6	ORANGE		+ 9V	
7			EXT. ALARM	
8	RED		+ 12V FOR BOX	
9	ROSA		SPEAK ON/OFF	
10	RED 2,5□		+ 12V BAT	
B1	BLUE		1	BCD 1
2	YELLOW		2	2
3	BROWN		4	CODES 4 "ONES"
4	VIOLET		8	8
5			MICRO SCREEN	
6	GREEN DARK		SPEAK OFF LAMP	
7	WHITE		OCCUPIED LAMP	
8	GREY		TRANSMIT LAMP	
9	GREY HT		SPEAKER	
10	BLACK 2,5□		- BAT	
C1	RED-ORANGE		1	BCD 1
2	RED-WHITE		2	2
3	RED-BLACK		4	CODES 4 "TENS"
4	BLUE-WHITE		8	8
5	BLUE GREY		CALL INDICAT.	
6	RED-GREEN		SQ REGUL	
7	BLUE-GREEN		VOL. REGUL	
8	BLUE-YELLOW		ON-OFF	
9	GREEN LIGHT		TONE KEY	
10	RED-BLUE		KEY	

A7
R
+
A8
Ext. key
A5 C10
M1
A6 B5
HT
B10 B9
+BAT
A10
-BAT
B10

CONTROL BOX

23 25 24 21 5 16 17 10 9 8 7 13 12 11 18 6 4 3 2 1 19 20 22 14 15

A
B 10 9 8 7 6 5 4 3 2 1
C 10 9 8 7 6 5 4 3 2 1

Installation TP 3000
Control box BB2 + BB3

JS. 27. 08. 81

TP RADIO

DRAWING NO.
EA4-800710