

MICROPROCESSOR CONTROLLED TONESYSTEM.

GENERAL DISCRIPTION

(TP3000)

MICROPROCESSOR CONTROLLED TONESYSTEM.

GENERAL DESCRIPTION

The TP 3001 µp tonesystem is developed in accordance to the well known European selective call system standards "CCIR" and "ZVEI". These two standards and one local are included in the basic software.

Normally the tonesystems are used to receive and transmit a 5 or 4 tone call.

But a tendency of a more sophisticated use is apparent.

In systems using a repeater, a 5 tone call is often used to activate the repeater.

This means that two 5-tone codes must be transmitted. 1 for repeat and 1 for the call.

It is often very time saving to know the identity of the calling station. In order to achieve that an identity code must be transmitted and displayed at the called station.

This means, that a modern tonesystem must be able to transmit at least 3 times 5 tone sequencies.

The TP 3001 µp tonesystem is capable af transmitting and receiving 3 times 8 tones plus 1 intermidiate tone (B). The B tone is located between the call sequence and "ID" sequence.

Further more TP 3001 µp is capable of receiving any "group call" and "all call" code.

If the driver is not at his car, it is useful to have a memory for calls, so when returning he can go through the "stack" of incoming calls and call back in turn.

The TP 3001 µp is capable of memorizing up till 25 incoming calls.

If the network uses pagers, it is possible in the TP 3001 µp to program the number of the pager into a memory. When the mobile is called, the no. in the memory is transmitted and the pager will respond. This is a very usefull feature.

TP 3001 µp is capable of surveilling an arbitrary ID code. If a certain mobile is not responding to your call, the number is put under surveillance. As soon as the number appears in the air, positioned as an ID that is, you will be alerted.

The facility to recall the last transmitted no. is included in the TP 3001 µp.

8 Short number calls are programmable, and several other features are included.

Typical for all these features and functions are, that all are programmable from the Control panel.

In some networks it is often the driver who carries the call number.

In these cases it is very useful to have an easy change of call number, when the driver goes from one car to another.

In the TP 3001 µp, you may simply change your ID code directly from the control panel. This abillity is normally secured by an access code.

MICROPROCESSOR TONESYSTEM.

TECHNICAL DESCRIPTION

TONERECEIVER.

The LF-signal (60-250 mV) is led through IC 9, where it is cleaned for noise, amplified and multiplied by 4. Hereafter the signal is divided by 4 in IC 8, so that again $f_{out} = f_{in}$. It is further inverted by transistor T 7, because the NMI input of the pp, IC 1 must be "1" when the divider IC 8, is reset at pin 15. This reset is generated by the NMI routine, after each check of input frequency.

The input frequency, LF in, is constantly measured by the NMI routine. These measurements are delivered to the TRX routine in the main program. The NMI is stopped during programming of Registers and Shortnumbers. When the TRX routine in the pp is activated, this routine starts to receive a call. At this state, it is not decided whether the call is valid or not, merely if it includes the correct number of tones.

"ID" is not necessary for this routine, even if it is used, but it well be accepted if present.

Hereafter it is checked if the received call is identical with the programmed numbers. If that is the case, the tone system will react, by audio and visual indications.

TONE TRANSMITTER

When the tone key is activated, the pp "TTX" routine is called. This routine starts by investigating whether the correct numbers of tones are tipped in, either direct or via the short number keys. Then the routine checks if a "repeatercall" will precede and an "ID" succeed the call. Then the complexed call is transmitted, by means of timer 1, IC 5, and according to the actual tonetabel.

SERIAL INTERFACE

Volume, channelregister and display are all controlled via a serial bus.

This "bus" has common "clock" and "data" and a seperate "select" control for each unit.

For further control af the display a "comdat" and "busy" command is used.

PARALLEL INTERFACE.

The parallel interface is used to input keyboard data.

It consists of four "data" input and a "strobe", when "strobe" receives a positiv edge, the CA1 input stops all other functions in order to collect the data input.

These data are immediately delivered to the display.

MICROPROCESSOR CONTROLLED
TONESYSTEM

PROGRAMMING INSTRUCTIONS.

Install the special 30 pin multiplug with the built in programming switch, between the station and the controlpanel.

Get into the programming mode by pressing the programming switch while the station is switched "ON".

The display now writes "CODE" asking for a 4 figure accesscode.

Write the code and the display indicates by "___" that you have access to the programming registers.

The list below will view the amount of registers and explain the functions.

WHEN PROGRAMMING: Always start by programming register 30. If, for any reason, reg. 30 has been programmed, registers 31-37 and 40 MUST be reprogrammed.

After programming register 30, the station always returns to normal mode and the programming procedure must be started again.

Every keystroke is followed by a short acoustic "BEEP".

False inputs are indicated by a longer "BEEP".

When during programming, a keystroke is regretted, push  and  , or wait for the automatic resetting.

System fault is indicated by a continuos "BEEP", this means that the circuit must be repaired or the EE-prom reprogrammed.

Clearing a register is done by selecting the wanted register number. Then press  and  . A long "BEEP" indicates that the register has been cleared.

REGISTER NO.	REGISTER NAME.	CODING AND FUNCTIONING
00	Rx channel code	Two-8 bit codes pr. channel write "0" and "1" for band code and channel code
01	Tx channel code	
02	Max. number of channel	Max. no. are 90, always write two figures.
03	Speaker on - off	"1" not open when called "0" open when called
04	Horn alert length	Input 2 digits from 00-99. 99 means 9,9 sec.
05	Memory size	Input 2 digits from 00-25 setting the amount of calls to be memorized.
06	Number of ringings	Input 2 digits, max. is 10 times "00" means no ringing.
07	Pure ID system	"1" means ID is sent when keying and displayd when received. "0" means not in use.
08	Autovolume	"1" volume reduced to min. when 2nd tone received. "0" not in use.
09	Tonesystem choice	"0" AP tonesystem. "1" CCIR tonesystem. "2" ZVEI tonesystem.
10	Access code	Input any 4 digits after "pass ----". "0000" means no code.
30	Call construction	Max. 8 digits. Selectable figures are "#". Sp. off is repeat tone "E" end is "TTX".
31	Tonelength	"0" is normal length. "#" is extended.
32	"Basestation call" code	Input only selectable digits.
33	"Repeater call" code	Input only selectable digits.
34	"Horn alert" code	Input only selectable digits.
35	"All call" code	Input only selectable digits.
36	"Group call" code	Input only selectable digits.
37	"ID" code	Your own call number, input selectable digits only.

CHANNEL PROGRAMMING OF TP 3000 Up.

In order to programme channels into the TP 3000 Up a code board TP 164 must be installed and connected according to the instructions.

Channelprogramming are carried out via the control panel by authorized personnel.

PROGRAMMING PROCEDURE:

Programming steps.

1. Get into the programming mode.
2. Enter the 4 figure accesscode.
3. Enter the register 00 for Rx channel code.
4. Enter the channel no. you wish to programme.
5. Enter the 7-bit Rx channel code and the 8-bit band code.
6. Enter the register 01 for Tx channel code.
7. Enter the same channel no. as before.
8. Enter the 7-bit Tx channel code and the 8 bit band code.
9. Enter 99 to get back into the user mode.

PROGRAMMING EXAMPLE.

We want to programme channel 1 Rx 160,150, Tx 160,750 MHz.
Calculate the channel and band codes:

For the Rx frequency we have:

$$\frac{160,150 + 21,4}{0,025 \times 32} = 226,9375 \text{ we choose 226 as band code.}$$

and $0,9375 \times 32 = 30$ as channel code.

For the Tx frequency we select the same band code: 226 that gives us a channel code figure of 54.

We have Rx: channel code

64 32 16 8 4 2 1
0 0 1 1 1 1 0

band code

128 64 32 16 8 4 2 1
1 1 1 0 0 0 1 0

And Tx channel or

0 1 1 0 1 1 0

1 1 1 0 0 0 1 0

Then we start the programming.

DISPLAY

Step 1 : Get into the programming mode

C O D E - - - -

2 : Our access code is „2000”

- -

3 : Enter „00” for Rx

0 0 0 0

4 : Enter channel no. 01

- - - - - ' -

5 : Enter the 7-bit channel code starting with the least significant bit

1 2 4 8 16 32 64 x

0 1 1 1 1 0 0 -

enter either „0” or „1”

And the 8-bit band code starting with the LSB.

0 1 0 0 0 1 1 1

6 : Enter „01” for Tx

0 1 0 2

7 : Enter channel no. 01

- - - - - - -

8 : Enter 7-bit channel code for Tx.

0 1 1 0 1 1 0 -

REGISTER NO.	REGISTER NAME	CODING AND FUNCTIONING
39	"Mobile alert" code	Input selectable digits only.
40	"ID code" transm/not transm.	"1" transmitted. "0" not transmitted. (not displayd)
41-49	"Short numbers"	Input selectable digits (may also be progr. in user mode).
50	"Base alert" code	Special alert code for base- station Rx. Input selectable digits.
88	Version no.	A 2 figure no.
89	Dealers code	A 2 figure no.
99	Return to user mode	No input.

Enter the 8-bit band code

0 1 0 0 0 1 1 1

Step 9 : Enter "99" and you will return to user mode.

Check that the frequencies of the programmed channels are correct.

MICROPROCESSOR CONTROLLED

TONESYSTEM

In order to illustrate the easyness in programming the system, an example is used.

A costumer wants a tonesignalling system in the following manor.

Tonesystem : CCIR 5 tones.
Call construction : 6RXRX, that is 2 selectable digits.
Tone length : All tones 100 ms.
ID (own no.) : 25
Repeater call : 05
ID transmit yes/no : Yes.
Horn alert code : 30
Max. no. af channels : 1
Speaker open yes/no : yes.
Horn alert length : 2 sec.
Memory size : 10 (no af memorized calls)
Group call : 50
All call : 00
Auto volume yes/no : Yes.
No. of rings : 2
Access code : 2010

Start by getting the station into the programming mode as described.
If the factory access code is 1060 following procedure is carried out.

REG. NAME	INPUT	DISPLAY	INPUT	DISPLAY
Access code	10	>CODE---<	1060	>CODE 1060<
Call construct	30	>PASS----<	2010	>-- <
		>-----<	6 # #	>01 EE<

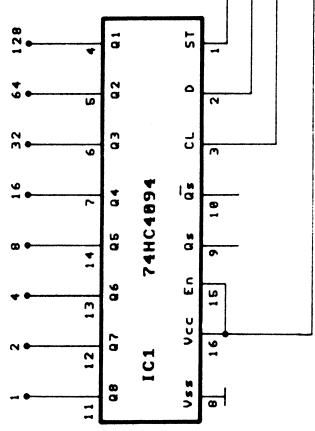
The station returns to normal mode and the programming procedure must be started again.

Tone length	31	>-----<	00000	>-- <
ID (own no.)	37	>37 EE<	25	>-- <
Repeater call	33	>33 EE<	05	>-- <
ID transmit	40	>40 --<	1	>-- <
Horn alert	34	>34 EE<	30	>-- <
Max. channels	02	>02 09<	01	>-- <
Speaker open	03	>03 1-<	0	>-- <
Horn length	04	>04 25<	20	>-- <
Memory size	05	>05 25<	10	>-- <
Group call	36	>36 EE<	50	>-- <
All call	35	>35 EE<	00	>-- <
Autovolume	08	>08 0-<	1	>-- <
No. of rings	06	>06 05<	02	>-- <

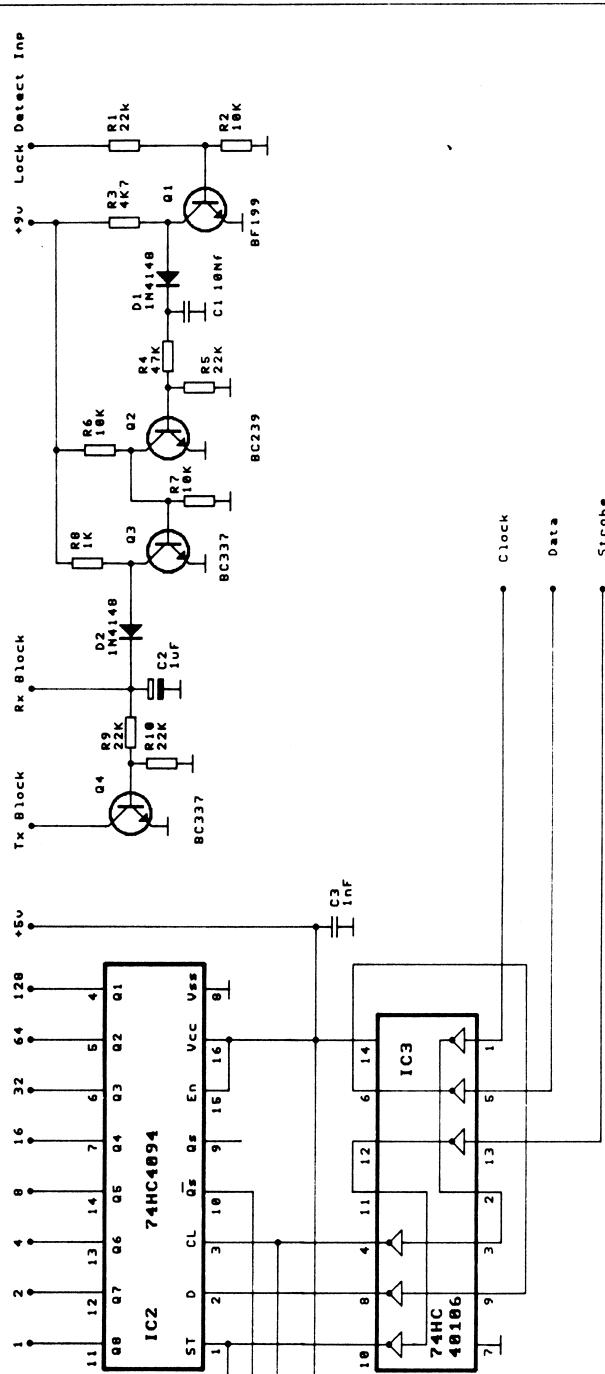
This completes the programming.

Press 99 to get back into the user mode or wait for the automatic return.

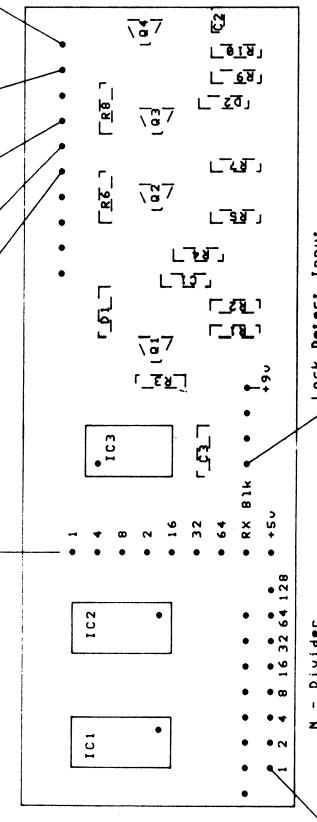
N - DIVIDER



A - DIVIDER

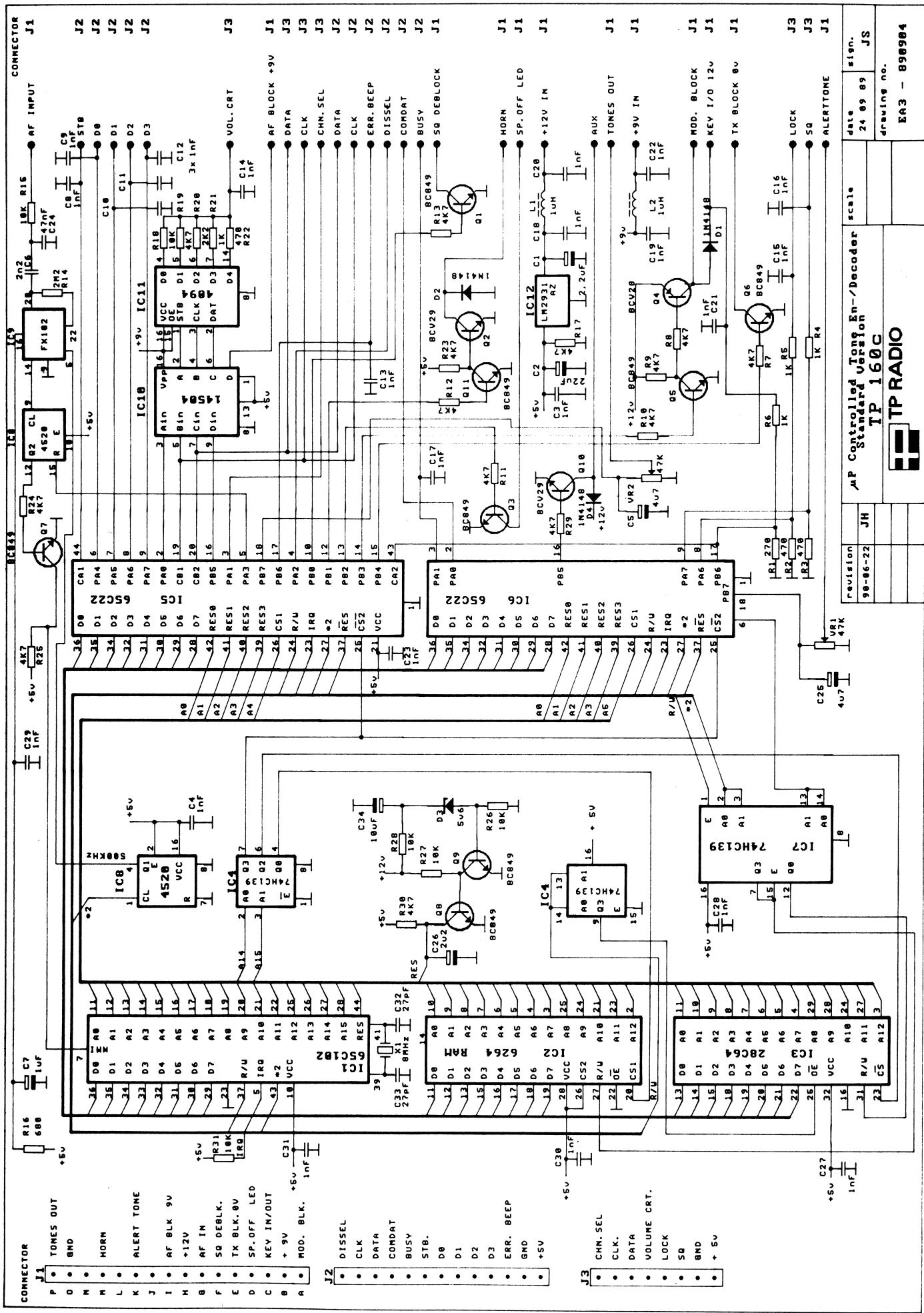


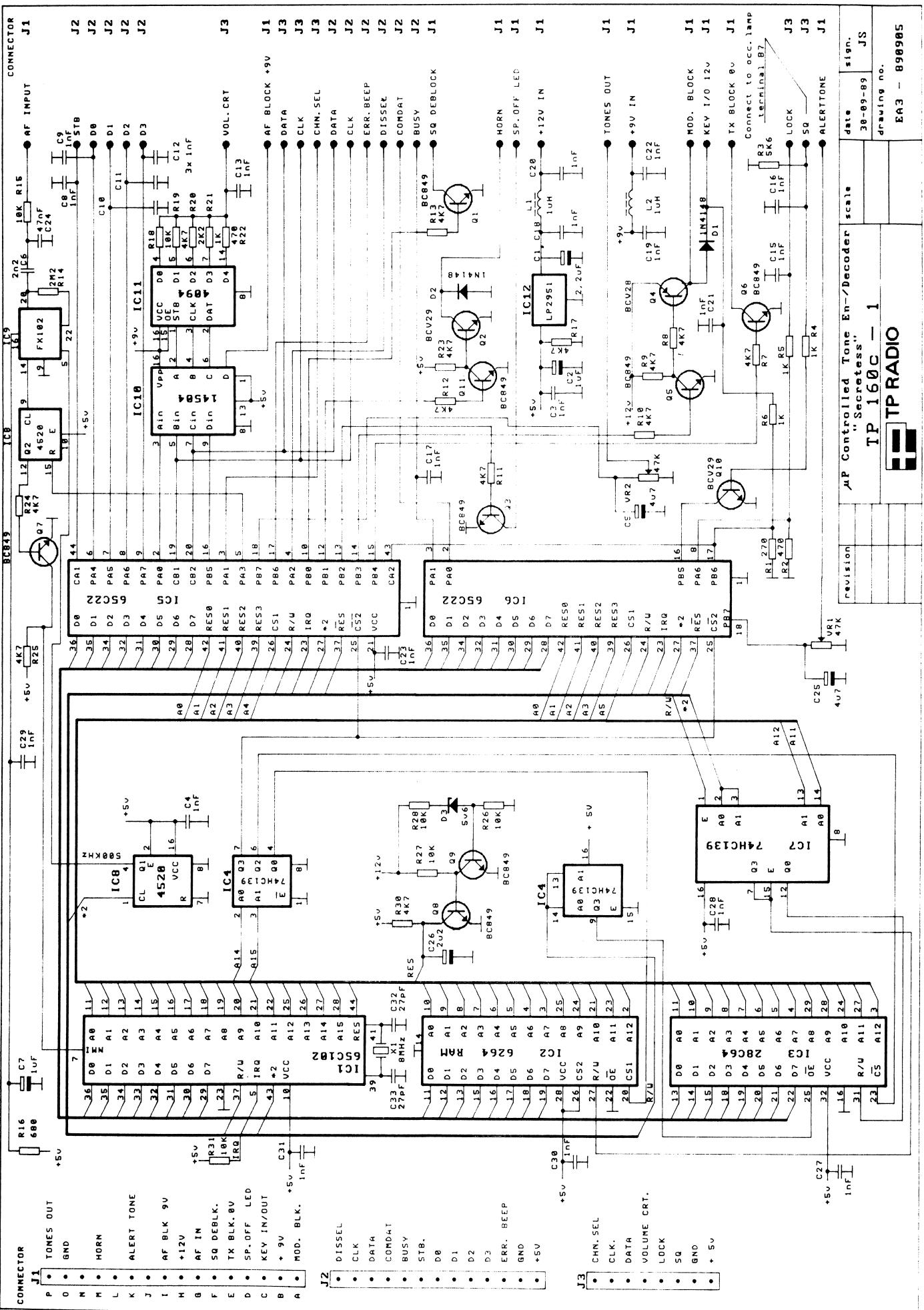
- Divider

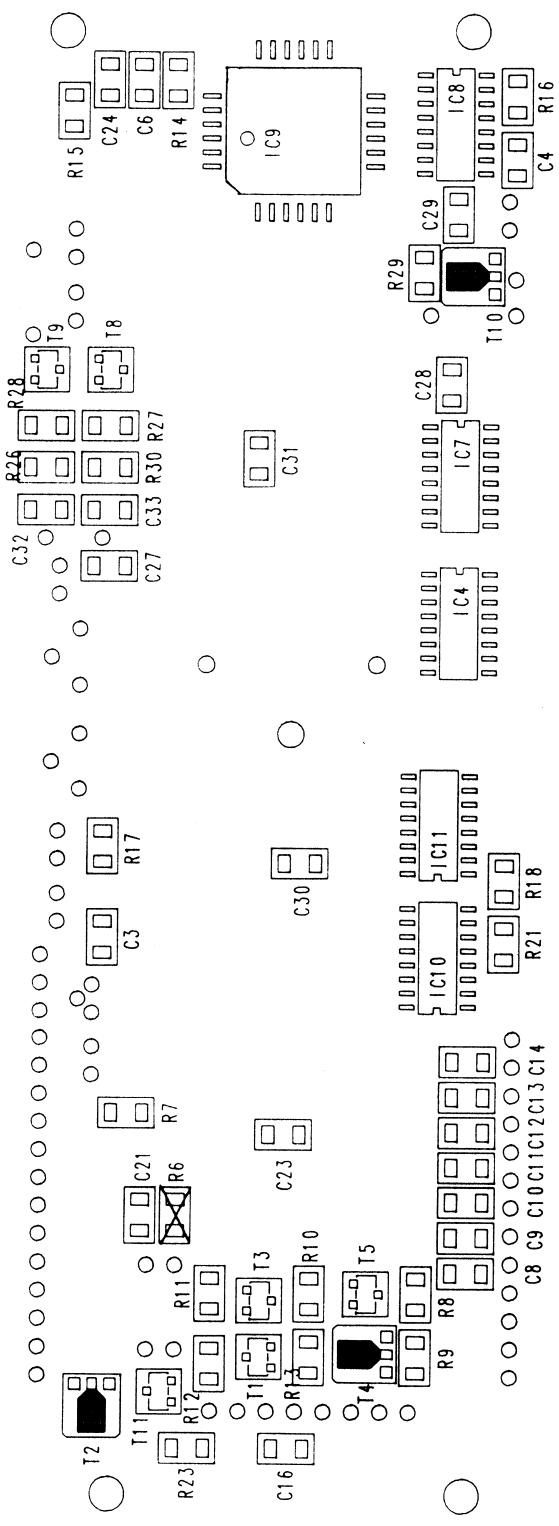
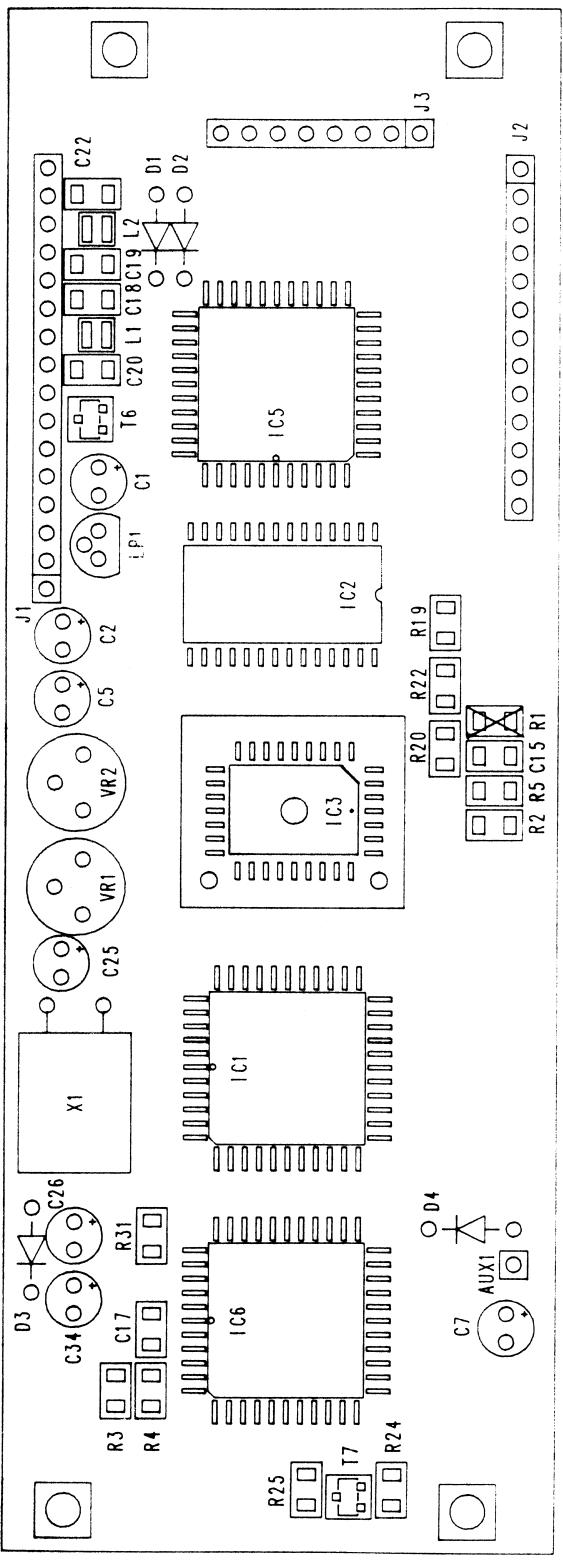


הרבן הצעיר י"ג

revision	CHANNEL DECODING AND LOCK DETECTOR BOARD TP 164	scale	date 12-01-98	sign. JS
				drawing no.
				EA3 - 881107
	TPRADIO			







STYKLISTE

side 1 af 2

EMNE: TP160c SMD montage

<u>pos.nr</u>	<u>lagernr.</u>	<u>beskrivelse</u>	<u>antal</u>
R1	print	TP160c	1
R2	modstand	270 ohm 1206	1
R3	modstand	470 ohm 1206	3
R4	modstand	470 ohm 1206	
R5	modstand	1 Kohm 1206	4
R6	modstand	1 Kohm 1206	
R7	modstand	1 Kohm 1206	
R8	modstand	4,7 Kohm 1206	14
R9	modstand	4,7 Kohm 1206	
R10	modstand	4,7 kohm 1206	
R11	modstand	4,7 kohm 1206	
R12	modstand	4,7 kohm 1206	
R13	modstand	4,7 Kohm 1206	
R14	modstand	2,2 Mohm 1206	1
R15	modstand	10 Kohm 1206	6
R16	modstand	680 ohm 1206	1
R17	modstand	4,7 Kohm 1206	
R18	modstand	10 Kohm 1206	
R19	modstand	4,7 Kohm 1206	
R20	modstand	2,2 kohm 1206	1
R21	modstand	1 Kohm 1206	
R22	modstand	470 ohm 1206	
R23	modstand	4,7 Kohm 1206	
R24	modstand	4,7 Kohm 1206	
R25	modstand	4,7 kohm 1206	
R26	modstand	10 Kohm 1206	
R27	modstand	10 kohm 1206	
R28	modstand	10 kohm 1206	
R29	modstand	4,7 kohm 1206	
R30	modstand	4,7 kohm 1206	
R31	modstand	10 Kohm 1206	
C3	kondensator	1 nF NPO 1206	23
C4	kondensator	1 nF NPO 1206	
C6	kondensator	2,2 nF X7R 1206	1
C8	kondensator	1 nF NPO 1206	
C9	kondensator	1 nF NPO 1206	
C10	kondensator	1 nF NPO 1206	
C11	kondensator	1 nF NPO 1206	
C12	kondensator	1 nF NPO 1206	
C13	kondensator	1 nF NPO 1206	
C14	kondensator	1 nF NPO 1206	
C15	kondensator	1 nF NPO 1206	
C16	kondensator	1 nF NPO 1206	
C17	kondensator	1 nF NPO 1206	
C18	kondensator	1 nF NPO 1206	
C19	kondensator	1 nF NPO 1206	
C20	kondensator	1 nF NPO 1206	
C21	kondensator	1 nF NPO 1206	
C22	kondensator	1 nF NPO 1206	
C23	kondensator	1 nF NPO 1206	
C24	kondensator	47 nF X7R 1206	1
C27	kondensator	1 nF NPO 1206	

STYKLISTE

side 2 af 2

EMNE: TP160c SMD montage

<u>pos.nr</u>	<u>lagsnr.</u>	<u>beskrivelse</u>	<u>antal</u>
C28		kondensator 1 nF NPO 1206	
C29		kondensator 1 nF NPO 1206	
C30		kondensator 1 nF NPO 1206	
C31		kondensator 1 nF NPO 1206	
C32		kondensator 27 pF NPO 1206	2
C33		kondensator 27 pF NPO 1206	
L1		spole 6,8 µH SMD	2
L2		spole 6,8 µH SMD	
T1		transistor BC849 NPN	8
T2		transistor BCV29 NPN darlington	2
T3		transistor BC849 NPN	
T4		transistor BCV28 PNP darlington	1
T5		transistor BC849 NPN	
T6		transistor BC849 NPN	
T7		transistor BC849 NPN	
T8		transistor BC849 NPN	
T9		transistor BC849 NPN	
T10		transistor BCV29 NPN darlington	
T11		transistor BC849 NPN	
IC1	65C102	µP PLCC-44	1
IC2	H6264	8K RAM SO-24	1
IC4	74HC139	SO-16	2
IC5	65C022	I/O PLCC-44	2
IC6	65C022	I/O PLCC-44	
IC7	74HC139	SO-16	
IC8	74HC4520	SO-16	1
IC9	FX102LG		1
IC10	MC14504	SO-16	1
IC11	74HC4094	SO-16	1

STYKLISTE

side 1 af 1

EMNE: TP160c håndmontage

<u>pos.nr</u>	<u>lagernr.</u>	<u>beskrivelse</u>	<u>antal</u>
VR1		modstand 47 Kohm variabel	2
VR2		modstand 47 Kohm variabel	2
C1		kondensator 2,2 μ F/25V tantal	2
C2		kondensator 22 μ F/16V tantal	1
C5		kondensator 4,7 μ F/16V tantal	2
C7		kondensator 1 μ F/35V tantal	1
C25		kondensator 4,7 μ F/16V tantal	1
C26		kondensator 2,2 μ F/25V tantal	1
C34		kondensator 10 μ F/16V tantal	1
D1		diode 1N4148	3
D2		diode 1N4148	
D3		zenerdiode BZX 83 5,6V	1
D4		diode 1N4148	
IC3		28C64 PROM	UDLEVERES IKKE
IC12		LM2931AZ	1
X1		Krystal 8 MHz	1
J2		tulipansokkel 11-polet	1
J3		tulipansokkel 8-polet	1
		fladkabel 14-polet	1
		IC-sokkel 32-pin	1
		skrue UHJ 2x9	1
		møtrik 2mm	1
		fiberskive	1

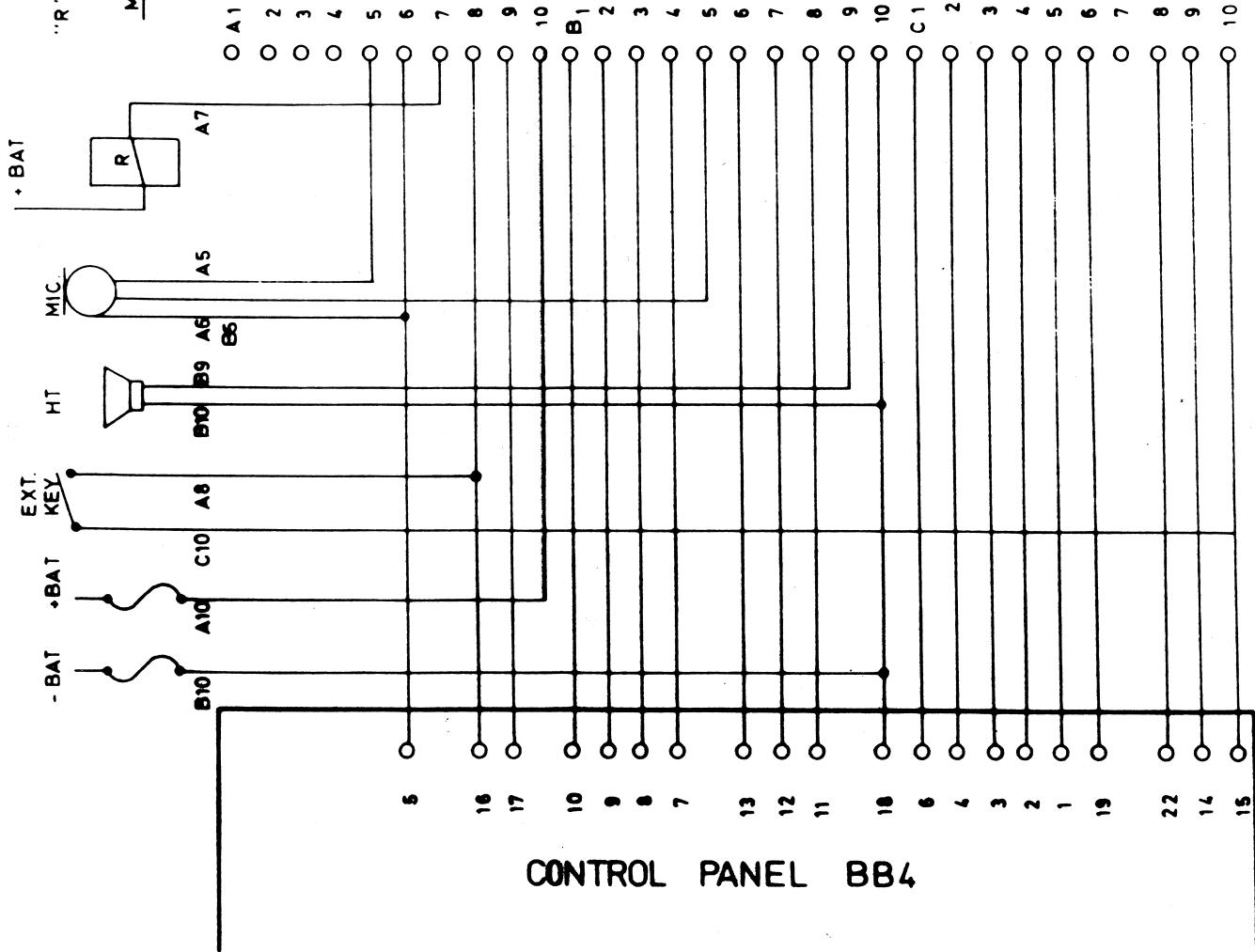
TP 158

DISPLAY PCID 20770

Pinout of PCID 20770:
 1. GND
 2. S₁
 3. S₂
 4. S₃
 5. S₄
 6. S₅
 7. S₆
 8. S₇
 9. S₈
 10. S₉
 11. S₁₀
 12. S₁₁
 13. S₁₂
 14. S₁₃
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 138. S₁₃₇
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 153. S₁₅₂
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 159. S₁₅₈
 160. S₁₅₉
 161. S₁₆₀
 162. S₁₆₁
 163. S₁₆₂
 164. S₁₆₃
 165. S₁₆₄
 166. S₁₆₅
 167. S₁₆₆
 168. S₁₆₇
 169. S₁₆₈
 170. S₁₆₉
 171. S₁₇₀
 172. S₁₇₁
 173. S₁₇₂
 174. S₁₇₃
 175. S₁₇₄
 176. S₁₇₅
 177. S₁₇₆
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 180. S₁₇₉
 181. S₁₈₀
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 202. S₂₀₁
 203. S₂₀₂
 204. S₂₀₃
 205. S₂₀₄
 206. S₂₀₅
 207. S₂₀₆
 208. S₂₀₇
 209. S₂₀₈
 210. S₂₀₉
 211. S₂₁₀
 212. S₂₁₁
 213. S₂₁₂
 214. S₂₁₃
 215. S₂₁₄
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"R" CONTACTS MAY OPERATE SIGNAL HORN RELAY

MULTICONNECTOR - FUNCTION



INSTALLATION TP 3000 μ P CONTROL PANEL BB4	10. 08. 88 JS
TP RADIO	EA4-880804

TP 3000

MICROPROCESSOR CONTROLLED TONESYSTEM.

BETJENINGSVEJLEDNING.

Lyser grønt når HT er udkoblet
Blinker hurtigt ved opkald
Slukkes med HT ud/ind

Viser aktuel højttalerstyrke

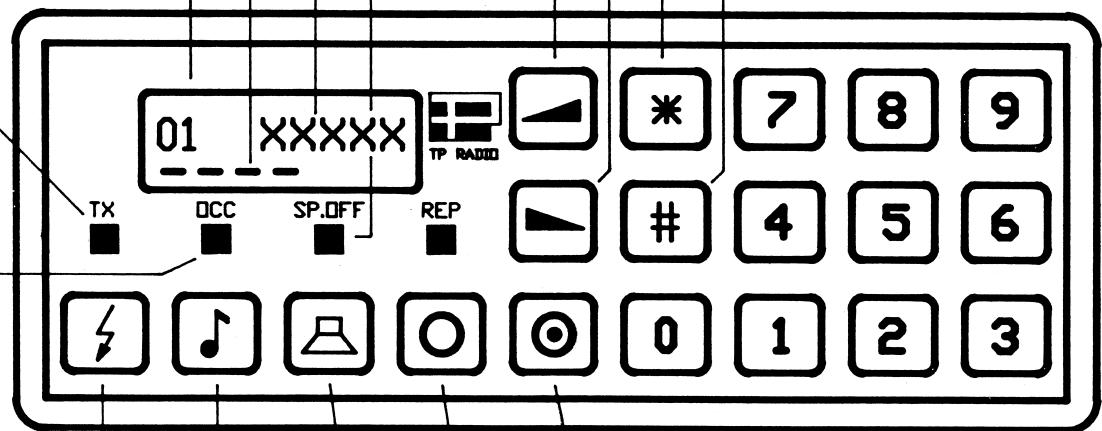
Højttalerstyrke op - ned

Viser valgt kanal

Funktionstast

Lyser rødt ved sending

Funktionstast



Taletast

Sluk

Ciffertastatur
kanal volges med
* og 2 ciffre

Lyser gult
når kanal
er optaget

Normal
opkald

Højttaler
ind/ud

Tand
SQ. åben

TP3000 mobil

TP RADIO type 709925

BETJENINGSVEJLEDNING.

- Tænd : Tryk
- Sluk : Tryk
- Tale_tast : Tryk ☀ rød lampe lyser.
- Nummer_valg : Tryk tasterne **0** til **9** for der ønskede nr., max. 5 cifre.
- Kanal_valg : Tryk og **0 1 - 9 0** for ønsket kanal nr.
- Kort_nr._valg : Tryk og **1** til **9**. Kun et ciffer. Nr. ses i display.
- Sidst_kaldte_nr. : Tryk **0** sidste nr. ses i display.
- Sende_kalde_nr. : Tryk ☀ rød lampe lyser kort. Nr. i display afsendes.
- Højttaler_blokering : Tryk ☀ Grøn lampe lyser konstant. Opkald kan modtages.
- Tilslut_hornalarm : Tryk ☀ Grøn lampe blinker 50/50 ved frakobling gentages betjeningen.
- Overvågning_af_ID. : Tryk det ønskede nr. med **0 - 9** samt
☞ Grøn lampe blinker 20/80. Hvis hornalarm er tilsluttet har denne prioritet og hvis HT blokering er aktiv har denne prioritet, overvågning fjernes ved tryk på
- Volume_op : Tryk volumen forøges for hvert step.
- Volume_ned : Tryk Volumen formindskes for hvert step.
Hvert 4 step indikeres på display, ved vedvarende tryk kører volumen automatisk op hhv. ned.
- Opkalds_kø_op : Tryk " bladrer" op gennem modtagne opkald, stopper ved sidste nr.
- Opkalds_kø_ned : Tryk " bladrer" ned gennem modtagne opkald, stopper ved første nr.

Viderestilling

: Tryk **0 - 9** for det ønskede nr. samt **#** og **9** tryk dernæst *** 9 0** og **1**. Display viser " H er ". Slet ved tryk på ***** og vent ca. 10 sek.

Kort_nr._program

: Tryk **0 - 9** for der ønskede nr. Derefter **#** og kort nr. **1** til **9**.

Hornalarm_længde

: Tryk *** # * 4** Display viser den nuværende længde.

Tryk **0 0 - 9 9** for ønsket længde max.
99 (9,9 sek.).

Kø_størrelse

: Tryk *** # * 5**
Status kan læses og ændres, max. er 25.
tryk **0 0** til **2 5** for ønsket
størrelse.

Antal_ring_ved_opkald

: Tryk *** # * 6** læs status og programmer-
ændring. Tryk **0 0** til **1 0** max. er 10.

00 er ingen ringning.

Squelch

: Tryk **○** vedvarende. Der høres støj i højttaler.