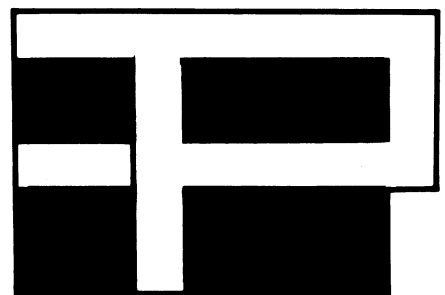


TP 3000

manual

146 - 174 MHz



TP RADIO

LINIESYSTEM LT1 OG LR1 BESKRIVELSE

GENERELT.

Liniesystemet LT1 og LR1 bruges til fjernkontrol af radioenheder over en telefonlinie.

LR1 monteres sammen med radioenheden ved hjælp af et multikabel, og tilsluttes den private eller lejede telefonlinie.

I den anden ende af telefonlinien er LT1 tilsluttet.

LT1 styres ved hjælp af kontrol pulten HB1.

På denne måde kan mikrofon signal, tast og squelch funktioner overføres til radioenheden.

LT1 og LR1 kan kun anvendes på linier med jævnstrømsgennemgang.

LINIESENDER LT1. Tgn. Nr. EA3-820305

Liniesenderen består af 3 strømforsyninger, 2 LF-forstærkere, styringskredsløb og en linietransformator.

Den ene spændingsforsyning på 9 Volt stab, bruges til forsyning af mikrofonforstærker og forforstærker samt DC-styring af tast og SQ.

LF-effektforstærkeren forsynes med 12V DC og de 20V DC anvendes til liniespænding.

Når kontrolpulten tages, sendes via Q10 og Q14 en spænding ind på den inv. indgang på IC6, hvorved optokobleren IC8 aktiveres og frembringer en spænding på R74. Denne spænding føres igennem forstærkerne IC5 til strømgeneratoren Q11 og ud på telefonlinien over relæet A1 som er aktivt ved tast. Q12 fungerer som elektronisk sikring.

Ved en kortslutning af telefonlinien er max. strøm ca. 30 mA.

Samme funktion gennemløbes ved sq.reg. blot er relæ A1 ikke aktiveret, således at sq. strømmen løber modsat af tast strømmen.

Hele dette kredsløb er galvanisk adskilt fra de andre kredsløb ved hjælp af særskilt strømforsyning, optoisolator, relæ og linietransformator med gennemslagsspændinger større end 2000 volt.

Ved tast føres mikrofonsignalet ind på Q1 og videre til begrænseren IC1, gennem lavpasfilteret IC2 til emitterfølgeren Q3 som leder signalet til linietransformatoren.

Mikrofonfølsomheden indstilles ved hjælp af R9. evt. tonesignal føres ind på R14.

Max. linieniveau indstilles ved hjælp af R24.

LF-signalet til højttaleren føres fra linietrafo til volumenkontrollen D11 og D10 og driver Q6 og videre til effektforstærkeren.

Transistorerne Q7 og Q8 fungerer som attenuatorer ved tast og andre blokeringsfunktioner. Transistorerne Q4 og Q5 indikerer ved hjælp af en lysdiode om linien er optaget.

LINIEMODTAGER LR1 Tgn.Nr.EA3-820504

LR1 modtager fra linien gennem optoisolatoren IC1 og Q1 spænding til tast af senderen.

Gennem optoisolatoren IC2 modtages spændingen til regulering af squelchniveauet. Tærskelværdien kan sættes med R6.

Hvis flere kontrolpulte er koblet parallel er det ikke muligt at have variabel squelch. Derfor forbindes strappingen "A". Herved aktiveres relæet A1 som indkobler potentiometeret R9 til indstilling af squelch.

Fra R5 tages LF-signalet til modulation af senderen.

LF-signalet fra radiomodtageren tages fra diskriminatoren pkt.8 og føres til forstærkeren IC3 som forstærker ca.10 gange. Signalet føres via R14 og Q3 til linietransformatoren.

Max.linieniveau indstilles ved hjælp af R14.

Forstærkeren squelch styres ved hjælp af Q4, Q5 og Q6.

JUSTERING OG AFPRØVNING LT1 OG LR1.

LT1 PRINT TP133
.....

STRØMGENERATOR: Et mA-meter forbindes over linieudgangen, pkt. 18 og 19. Anlægget tændes. Indstil potentiometeret R74 således at mA-metret viser 3,5 mA DC. Derefter tages kontrolboxen. Bemærk at strømmen vender og værdien er ca. 10 mA i modsat retning. Hermed er strømgeneratoren indstillet.

MODULATIONSFORSTÆRKER: tilslut mikrofonindgangen et LF -signal på 20 mV ved 1000 Hz. Potentiometer R24 og R9 sættes i midterstilling. Linieudgangen belastes med 600 ohm og et AC - voltmeter tilsluttes. Med potentiometer R 24 stilles niveauet ved tast til 0,7 Veff. Derefter sænkes indgangsniveauet til 1,5 mV og niveauet over linien stilles nu til 0,42 Veff. ved hjælp af potm. R9 Hermed er linieniveauet sat.

Derefter forbindes LT1 og LR1 sammen over linieudgang/indgang, og LR1 forbindes yderligere til en sende/modtager enhed.

Tilslut 12VDC.

LR1.PRINT TP134
.....

SQUELCH: Når kontrolboxen lige er blevet tændt, trykkes én gang på SQ+ og R6 justeres således at squelchen lige netop åbner.

Derefter forbindes strapningen "A" og potmeter R9 justeres så squelchen netop er lukket. Strapningen "A" fjernes.

LF - NIVEAU, LR1: Et AC - voltmeter tilsluttes linieudgangen.

Modtageren moduleres med 1000 Hz +-5 KHz sving. Herefter indstilles signalet på linieudgangen til 0,7 VACeff. ved hjælp af R14.

MODULATIONS NIVEAU LR1: Når systemet er forbundet sammen skal modulationsniveauet til radioenheden indstilles.

Mikrofonindgangen i LT1 påtrykkes et signal på 1,5 mV eff. ved 1000 Hz.

Et frekvenssvingmeter er tilsluttet senderen, og med potmeter R5 i LR1 indstilles svinget til +-3 KHz.

Systemet er herefter færdigjusteret, og diverse funktioner efterprøves.

RP1 Tgn. Nr. EA3 - 820504

RP1 anvendes til styring af en repeaters funktioner.

Til at starte repeaterfunktionen kan anvendes flere former for tonesystemer samt squelchstyring.

Når der er bærebølge på repeateren vil Q7 trække og RC-leddet R27,C9 lades op. Hvis repeateren kaldes op, vil Q8 begynde at lede og dermed aktivere gatesystemet NA2-NA3, som vil være selvholdende ved hjælp af D8.

Senderen taster gennem Q9 og Q10 som samtidig aktiverer relæ A2.

Transistor Q7 trækker Q12 on. Herved åbner switchen Q13.

LF-signalet føres gennem Q13 til relækontakten a2 og videre til senderens modulationsforstærker.

Repeater holde tiden er ca. 15 sek. Indenfor denne tid kan repeateren anvendes uden opkald med forlængelse ved hver optastning.

Repeateren kan tvangsnedbrydes ved hjælp af tælleren IC5.

Hvis repeateren kaldes 4 gange hurtigt i rækkefølge, vil Q11 aktiveres og annullere holde tiden.

REMOTE CONTROL SYSTEM

DESCRIPTION.

GENERAL

The remote control system LT1 and LR1 is used to control a Transceiver via a 2 wire Telephoneline.

LR1 and the Transceiver are located in the one end, and the LT1 and the Control Box at the other end of the wire.

In this way it is possible to transfer microphone signal, Key -and Squelch- functions to the transceiver Unit.

LT1 and LR1 may only be used in connection with DC-lines.

Linetransmitter LT1. DWG.No. EA3-820305

The linetransmitter consists of 3 powersupplies, a modulation amplifier, a power amplifier, a control circuit and a linetransformer.

The one powersupply, 9V supplies the microphone amplifier and the preamp. and the DC-control of the key and SQ.

The AF-power amplifier is supplied with 12VDC, and the 20 VDC is used as line voltage.

When the Controlbox is keyed, a voltage is placed via Q10 and Q14 at the inv. input of IC6, hereby activating the optoisolator, IC8, and producing a voltage on R74.

This voltage is led via the amplifiers IC5, to the current generator, Q11, and placed on the telephoneline via the relay A1.

Q12 act as a current limiter.

The current limit is appr. 30 mA at short circuited line.

The same function is achieved by SQ regulation, but in this situation the relay A1 is not active, thus the SQ current flows in the opposite direction of the key current.

The control circuit in its whole is galvanically separated from all other circuits. This is mainly achieved by its own powersupply, the optoisolator, the relay and linetransformer, which all withstand 2000VDC test voltage.

The microphone signal is placed at the base of Q1 and led to the limiter IC1 via the lowpass filter IC2. The emitter follower Q3 supplies the AF-signal to the linetransformer.

The sensitivity of the microphone amplifier is adjustable by means of R9.

The tone signal from the tone system, when used, is placed at R14.

Max. line level is adjustable by means of R24.

The AF-signal for the speaker is taken from the linetransformer and led to the volume control, D11 and D10 and driver Q6 and passed to the power amp. IC3

The transistors Q7 and Q8 are used as attenuators to block the AF-amp in the case of keying and for other blocking purposes.

The transistors Q4 and Q5 act as a modulation indicator.

The circuit indicates by means of a LED in the controlbox, if the line is busy.

Linereceiver LR1 DWG.No. EA3-820504

In the case of keying, LR1 receives a voltage from the linetransformer.

This voltage is led via IC1 and Q1 to the transmitter key relay.

The voltage for the regulation of the squelch level is obtained through the optoisolator IC2.

The threshold voltage is set by R6.

If more control boxes are connected in parallel, it is not possible to have adjustable squelch. Thus the points "A" are shorted, hereby activating the relay A1, which in turn switches the potentiometer R9 into the circuit for setting of the squelch level.

The AF-signal for the modulation of the transmitter is taken from R5.

The AF-signal from the receiver discriminator, is led to the amplifier IC3, which has appr. 10 times amplification.

This signal is supplied to the line transformer via R14 and Q3.
Max. line level is adjustable by means of R14.
The amplifier IC3 is squelch controlled by means of Q4, Q5 and Q6.

Repeater logic RP1, DWG No. EA3-820504

RP1 controls the functions of a repeater.

The repeater start may be controlled by either the squelch or any kind of tone system.

When a carrier is present, Q7 will go "on" and R27, C9 is charged.

If now the repeater receives a start information Q8 will turn on, thus activating the gate system NA-2, NA-3, which takes a locked position by means of D8.

The transmitter is keyed via Q9 and Q10, and relay A2 is activated.

Transistors Q7 and Q12 operate the switch Q13.

The AF-signal is led via Q13 to the relay contact a2 and passed on to the modulation amplifier.

The repeater hold time is approx. 15 sec. Within this time the repeater may be used without start information, and the hold time is renewed at every key-stroke.

In cases of disturbance or malfunctioning, the repeater may be forced to close down. This is accomplished by calling the repeater 4 times in a sequence, thus activating Q11 and hereby cancel the hold time.

ALIGNMENT PROCEDURE

LT1 and LR1

LT1. Print board TP133

Current generator: A DC mA-meter is connected across the line terminals 18 and 19.

The set is switched "ON".

Adjust potentiometer R74 until the meter reads 3,5 mA DC.

Then the controlbox is keyed.

Note that the current now flows in the opposite direction, and that the meter reads appr. 10 mADC.

Modulation amplifier

An Audio signal of 20mV at 1000 Hz is connected to the microphone input. R24 and R9 are set to mid position.

A 600 ohm resistor is connected across the line.

Connect an AC-Voltmeter across the 600 ohm resistor. Press the key button.

With potmeter R24 the max. linelevel is set to 0,7Veff.

Adjust the input level to 1,5 mV and set the linelevel to 0,42Veff by means of R9.

Then LT1 and LR1 are connected through the line, and the transceiver to LR1.

Supply 12V DC.

LR1 Print board TP134

Squelch:

Switch the controlbox "ON". Press the button SQ+ once, and turn R6 until the squelch just opens.

Short the points "A" and turn R9 until the squelch has just closed.

Remove the short from "A".

AF-level, LR1 An AC-voltmeter is connected across the line terminals.

The receiver is modulated with 1000 Hz \pm 5 KHz deviation.

Turn R17 until the max. linelevel of 0,7VACeff. is obtained.

Modulation level LR1

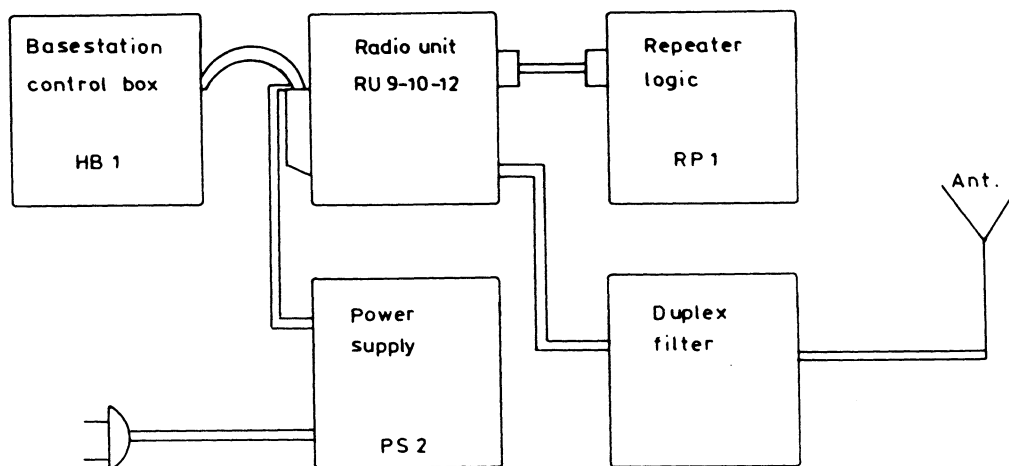
LT1 and LR1 are connected via the Line.

A signal of 1,5mVeff at 1000 Hz is placed on the microphone input in LT1.

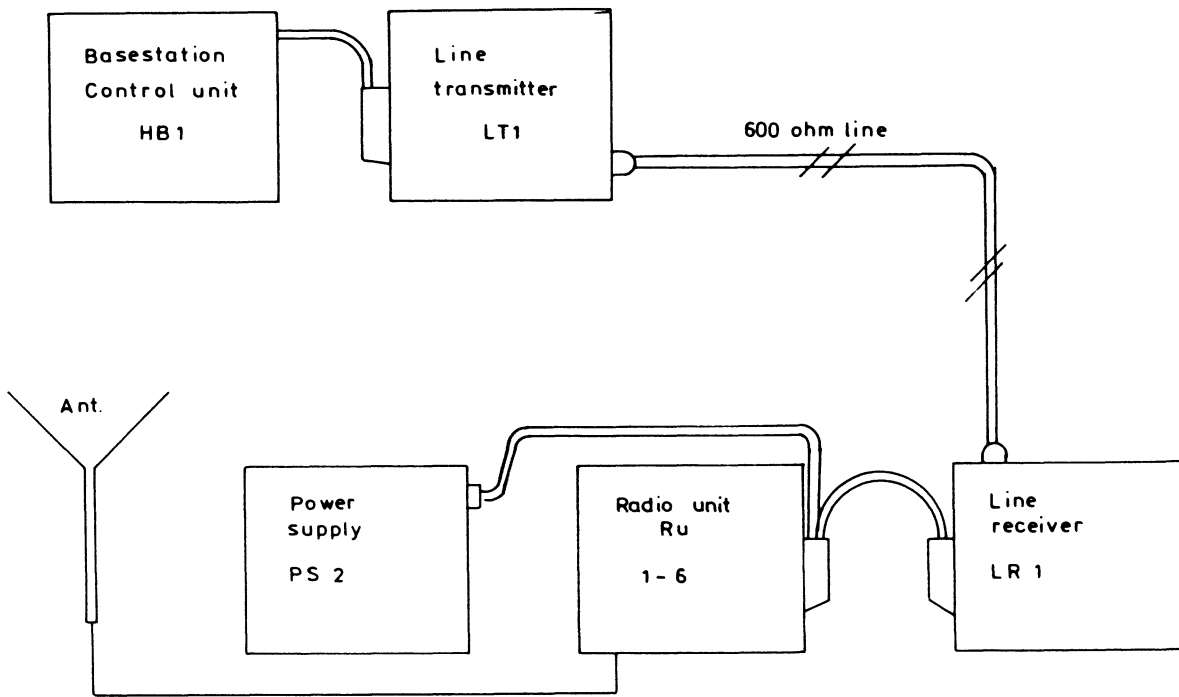
Connect a modulationmeter to the transmitter.

Key the transmitter and adjust the deviation to \pm 3KHz by means of R5 in the LR1.

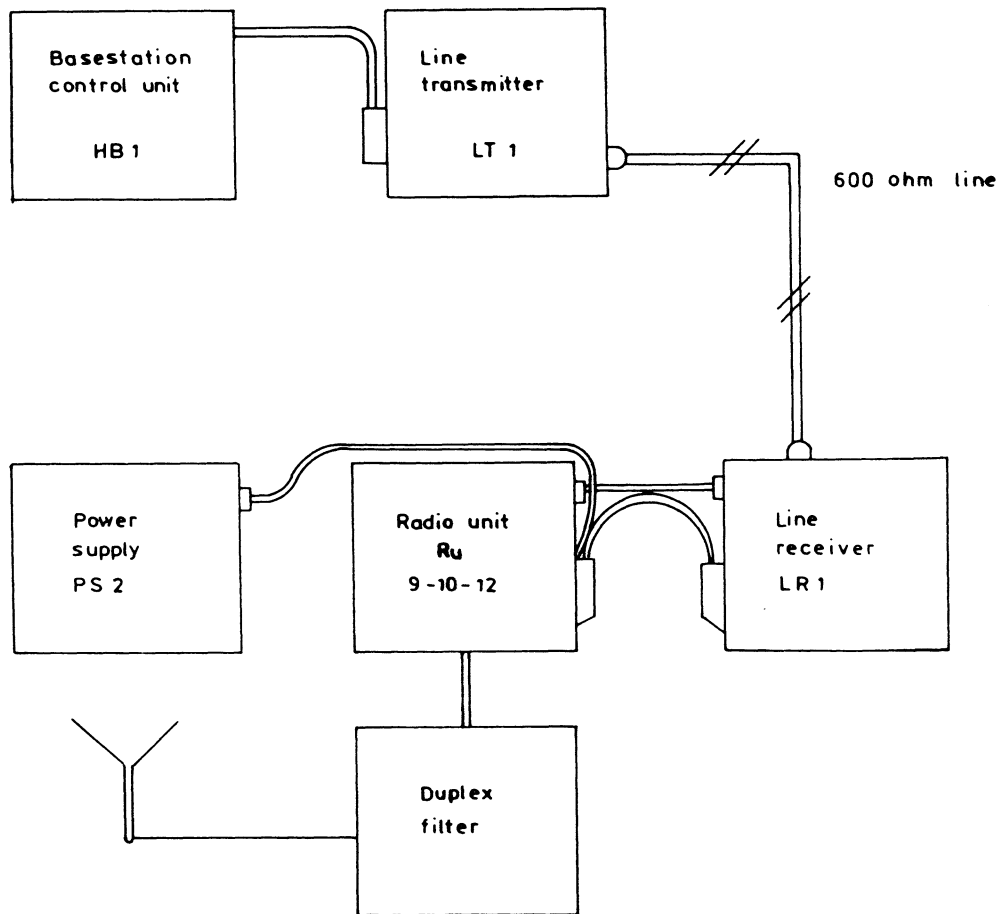
The system is now fully aligned and all functions are checked.



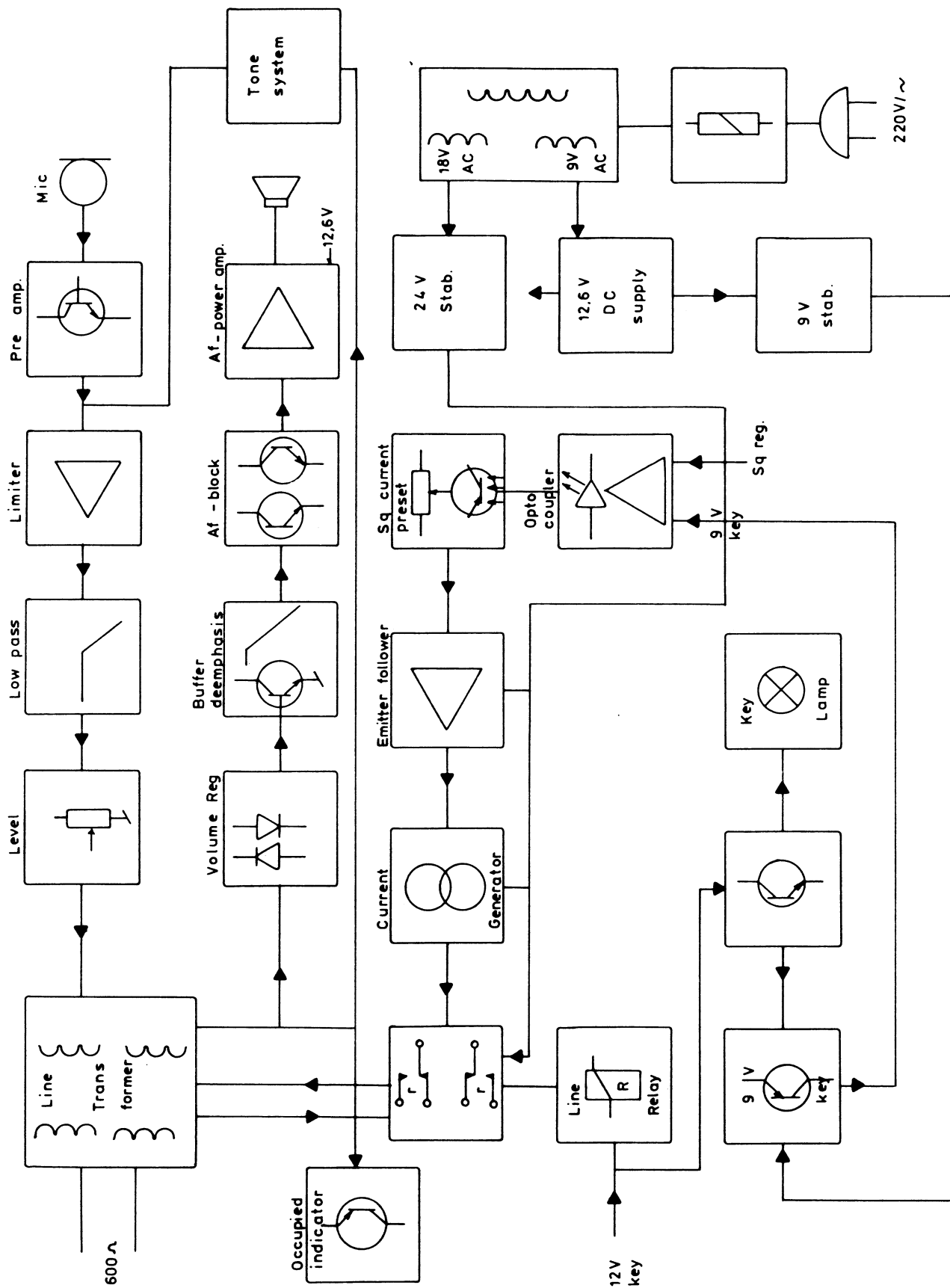
Base station system HS 6-7 Repeater	JS 04. 05. 82
TP RADIO	EA4-820809



Base station system HS 11 and 12 with remote control	JS 22. 04. 82
TP RADIO	EA4-820808



Base station system. HS 15, HS 14 with remote control, and repeater.	JS 28. 04. 82
TP RADIO	EA4 820810

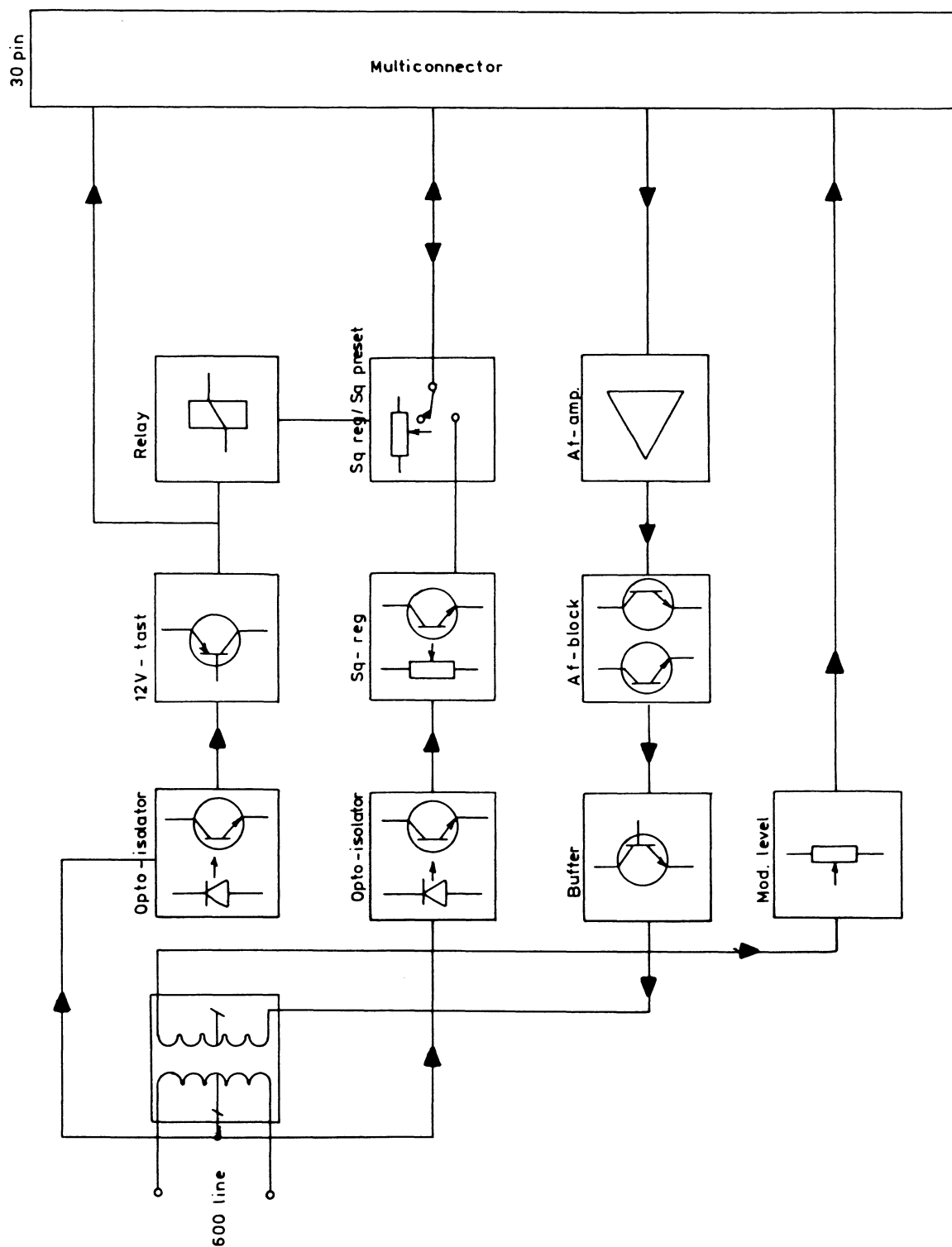


Line transmitter LT1.
for
600 ohm. telephone line

JS
28. 04. 82

TP RADIO

EA4-820807



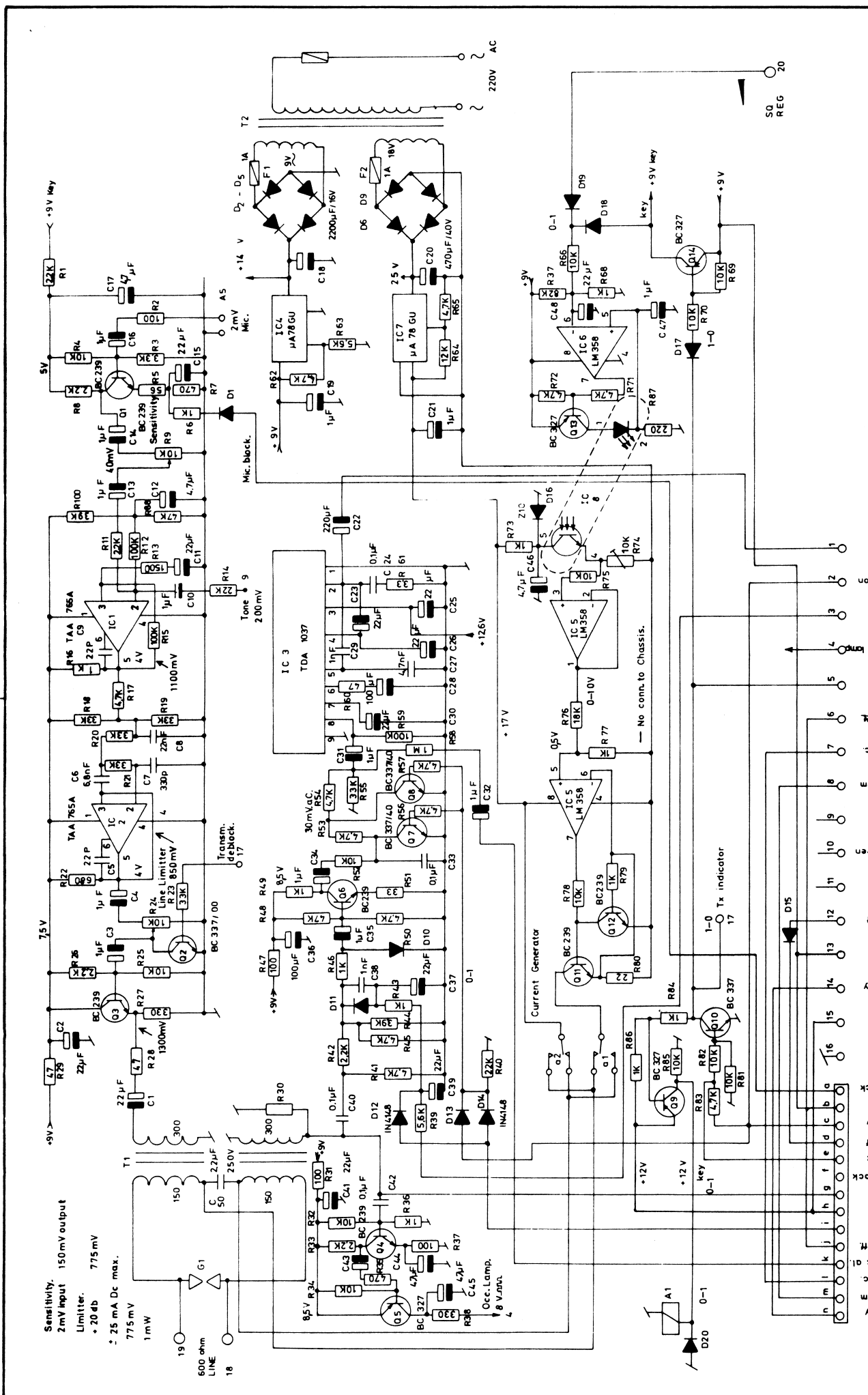
600 Ω line receiver . Block diagram LR 1
Telephone line

JS

24.08.82

TP RADIO

EA4-820806



Sensitivity. 2mV input
 Limiter. 20 db
 25 mA Dc max.
 775 mV
 1 mW

- 19 600 ohm LINE
- 20 220V AC
- 1 1.1.91. ajp JS
- 2 03 05. 82
- 3 1.1.91. ajp JS
- 4 03 05. 82
- 5 1.1.91. ajp JS
- 6 03 05. 82
- 7 1.1.91. ajp JS
- 8 03 05. 82
- 9 1.1.91. ajp JS
- 10 03 05. 82
- 11 1.1.91. ajp JS
- 12 03 05. 82
- 13 1.1.91. ajp JS
- 14 03 05. 82
- 15 1.1.91. ajp JS
- 16 03 05. 82
- 17 1.1.91. ajp JS

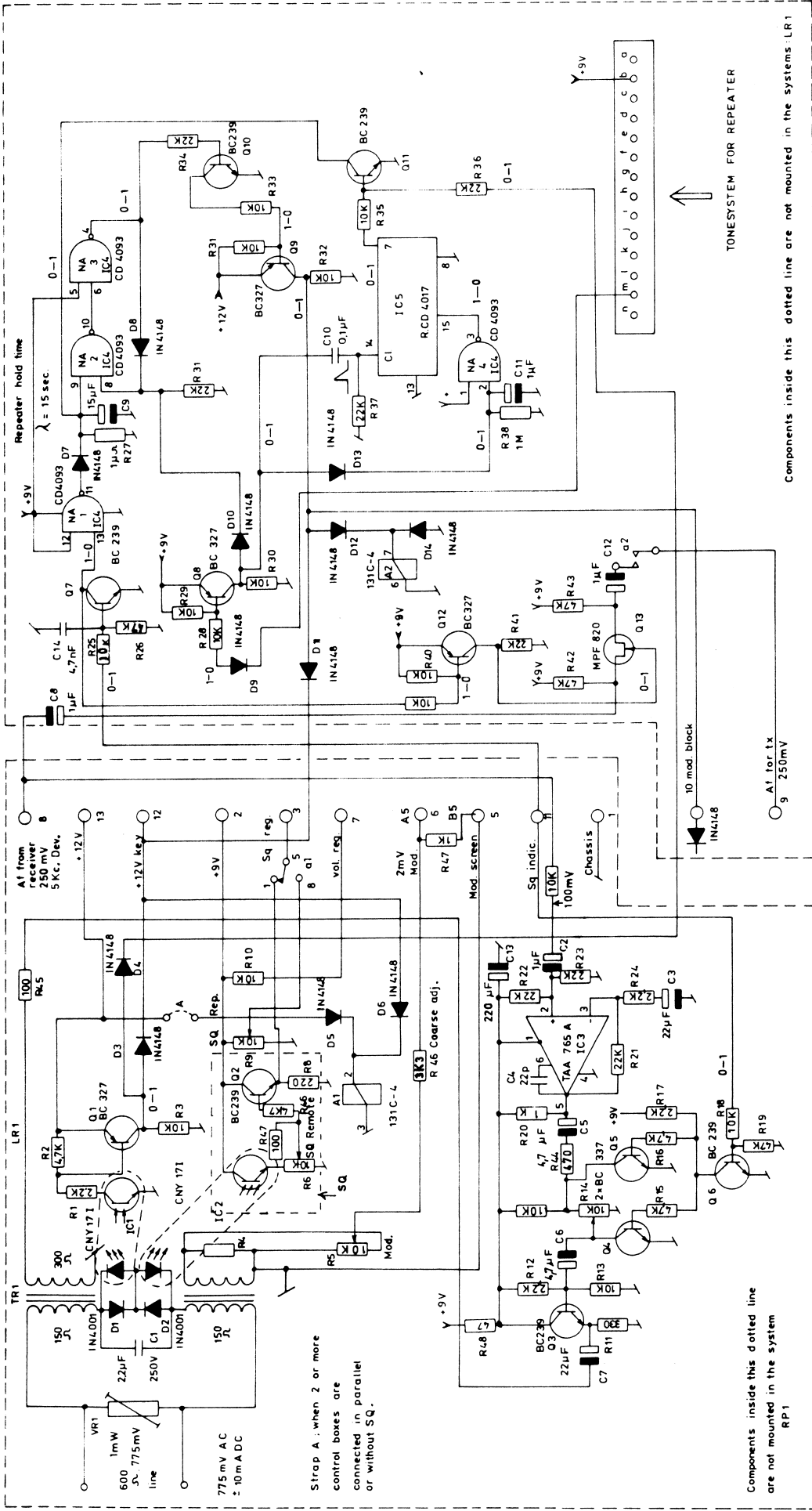
LINE TRANSMITTER
 LT 1
 PRINT BOARD TP 133

TP RADIO

EAS-820503

TONE SYSTEM

- 1 Tone key
- 2 Cell indic
- 3 Acoustic al
- 4 Speak off
- 5 A1 block
- 6 A1 input
- 7 Sq deblock
- 8 Tx block
- 9 Speak off
- 10 Speak off
- 11 12V key
- 12 9V
- 13 Lamp off
- 14 Mic. ip
- 15 Mic screen
- 16 Tone ip
- 17 Ext alarm
- 18 Call indic
- 19 Speak off
- 20 Occupied lamp
- 21 Vol. reg
- 22 Key button
- 23 At out.

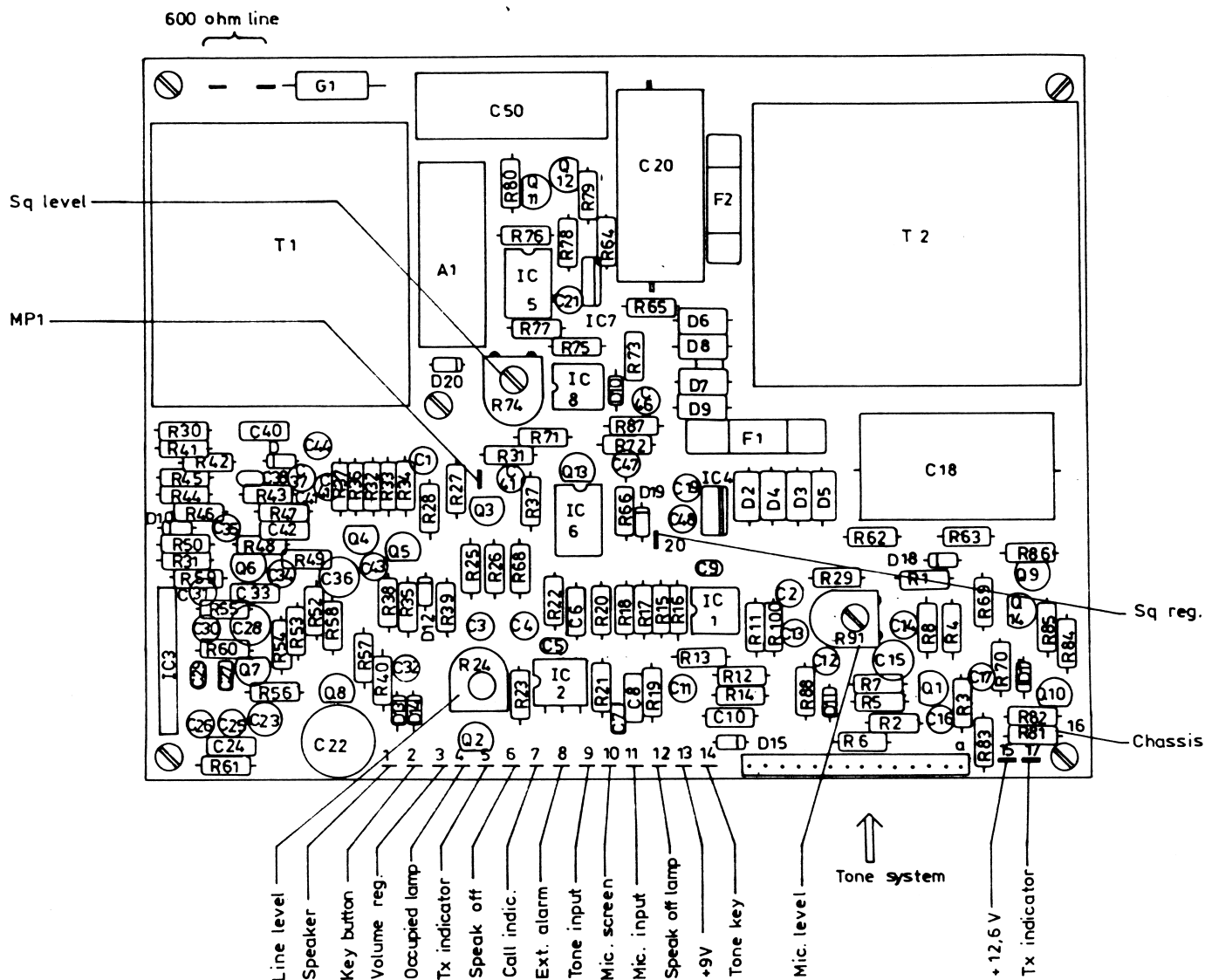


Line Receiver and Repeater Logic
 System nr. LR1-LRP1-RP1
 PRINT BOARD TP 134

J S
 04. 05. 82
 1-1-81 app.

TP RADIO

EA3-820504



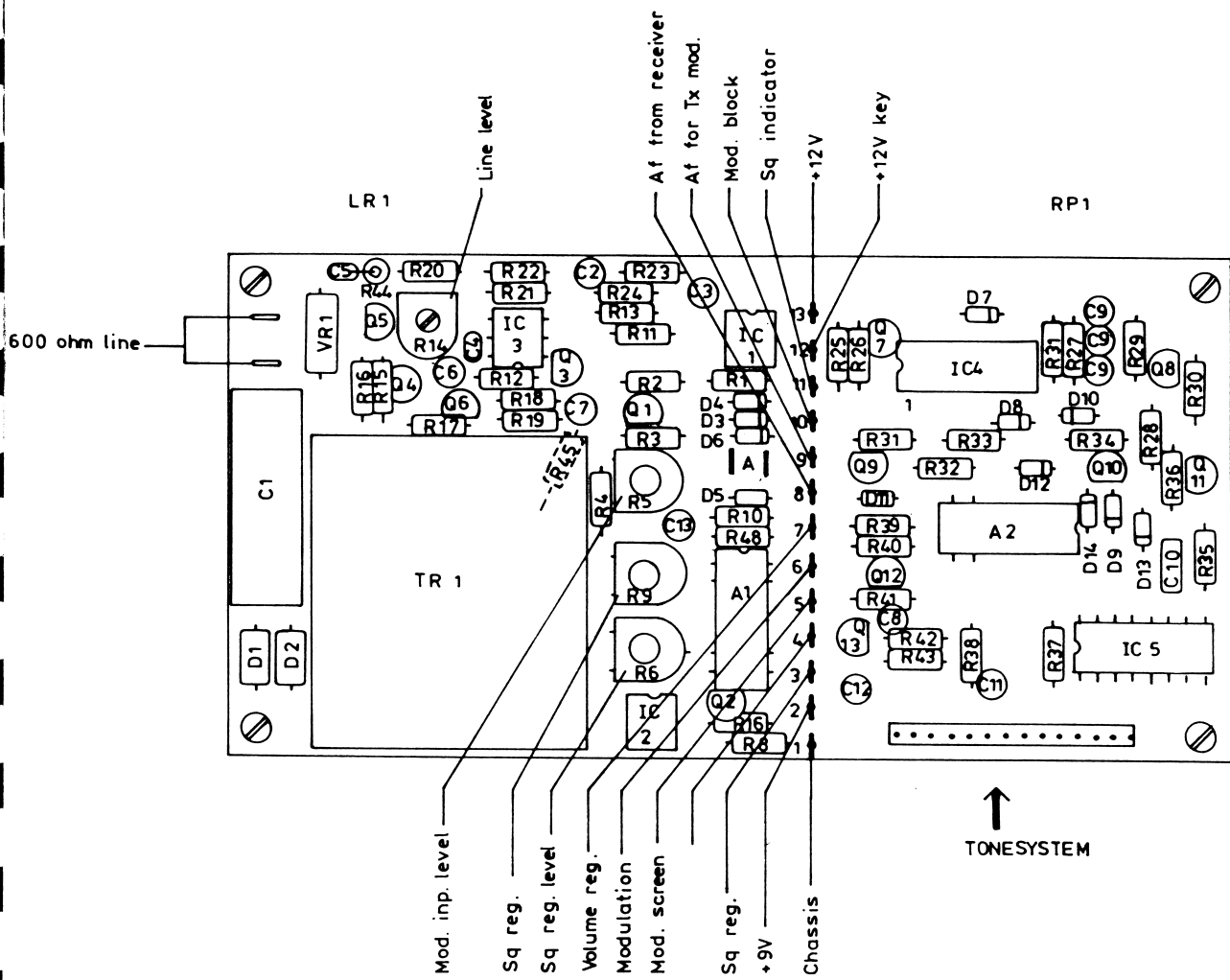
TP 133

LAY OUT PRINT BOARD TP 133
 LINETRANSMITTER - LT 1

JS 03.09.84

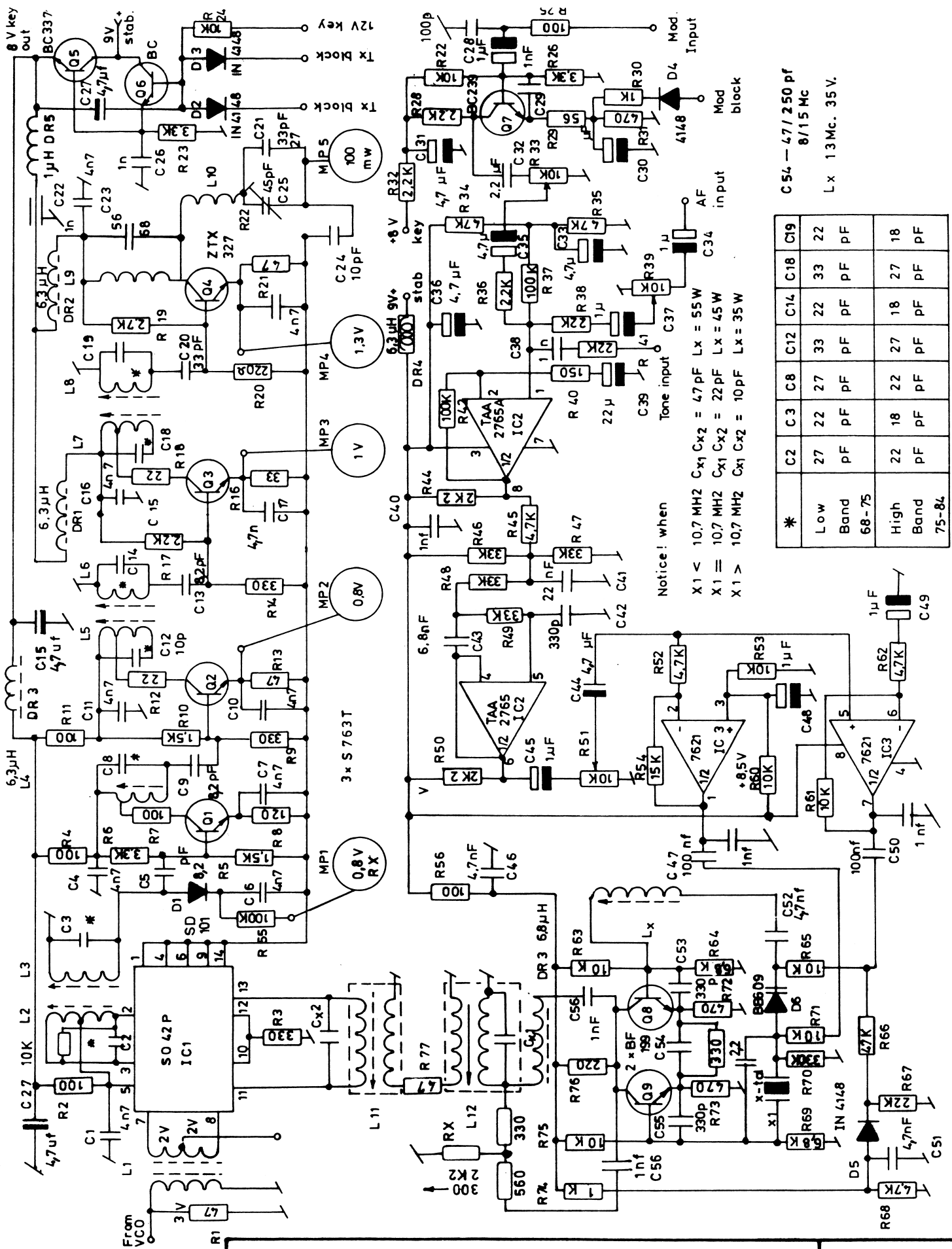
TP RADIO

DRAWING NO.
 EA4-840914



TP 134 LRP 1

LINERECIVER REPEATER CONTROL LOGIC LAY OUT PRINT BOARD TP 134	JS 31.08.84
TP RADIO	DRAWING NO. EA4-840813



*	C2	C3	C8	C12	C14	C18	C19
Low Band 68-75	27	22	27	33	22	33	22
High Band 75-84	22	18	22	27	18	27	18
	PF	PF	PF	PF	PF	PF	PF

Notice! when
 X1 < 10.7 MHz Cx1 Cx2 = 47 pF Lx = 55W
 X1 = 10.7 MHz Cx1 Cx2 = 22 pF Lx = 45W
 X1 > 10.7 MHz Cx1 Cx2 = 10 pF Lx = 35W

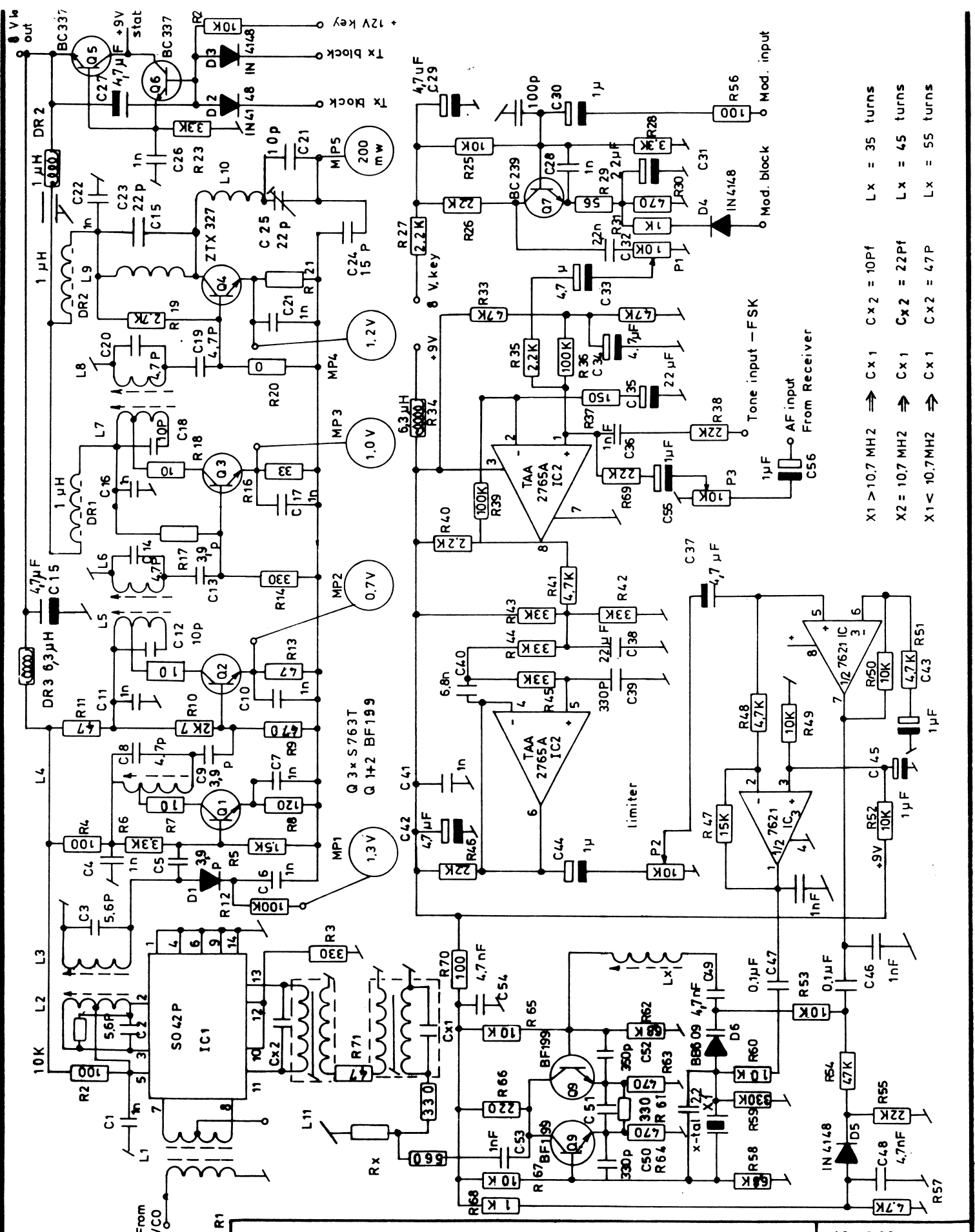
C54 — 47 / 250 pF
 8 / 15 Mc
 Lx 13 Mc. 35 V.

Print board TP 131
 VCX oscillator - Mixer - Amplifier - Modulator
 Amplifier and limiter 4m

10.10.90.
 JS
 03.11.81

TP RADIO

EA4-811112



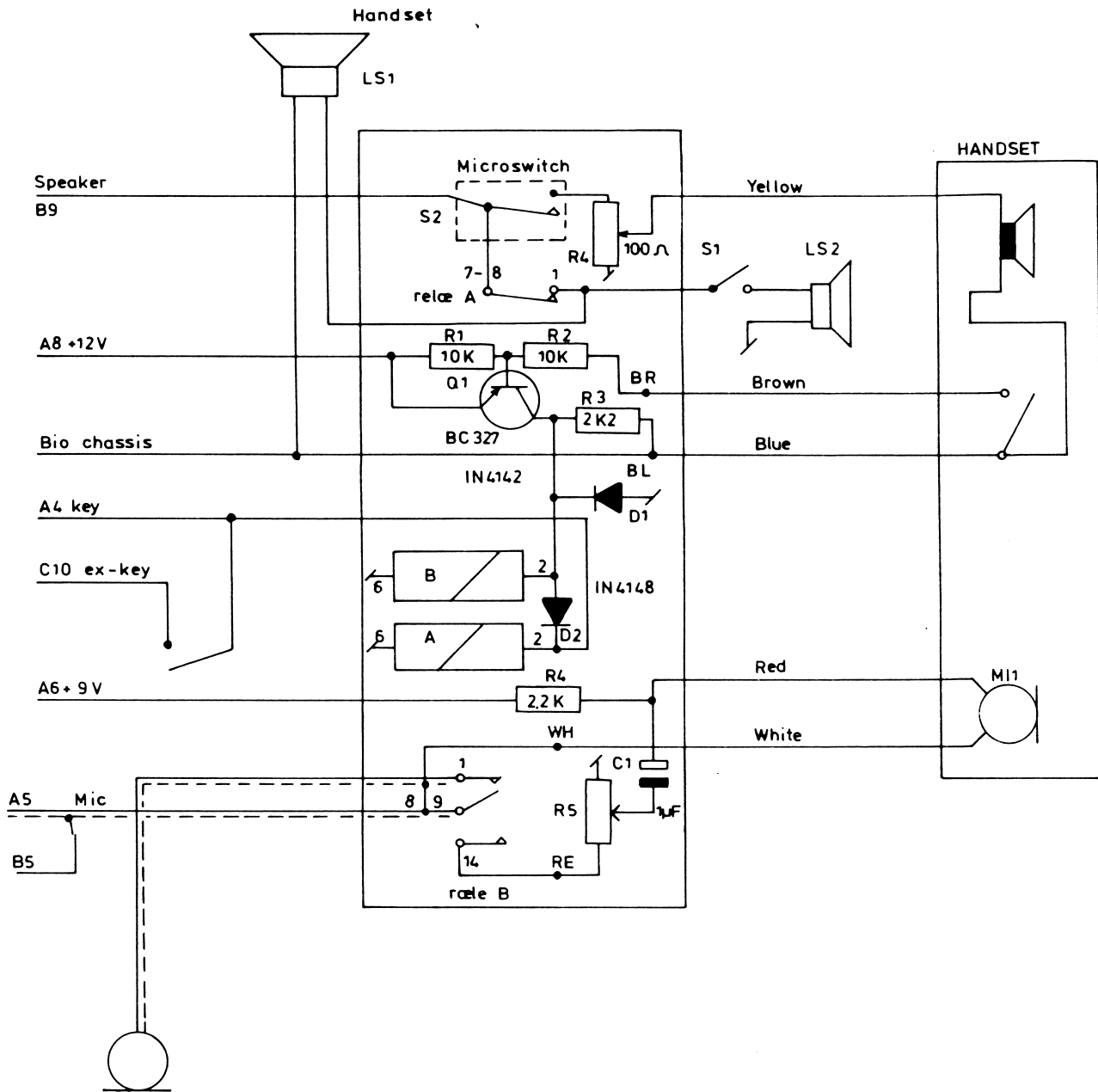
Print board TP 131
 VCX oscillator - Mixer - Amplifier - Modulation
 Amplifier and limiter 2m

10.10.90.
 JS
 03. 11. 81

TP RADIO

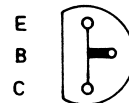
EA4-820805

- X1 > 10.7 MHz ⇒ Cx1 Cx2 = 10Pf Lx = 35 turns
- X2 = 10.7 MHz ⇒ Cx1 Cx2 = 22Pf Lx = 45 turns
- X1 < 10.7 MHz ⇒ Cx1 Cx2 = 4.7P Lx = 55 turns



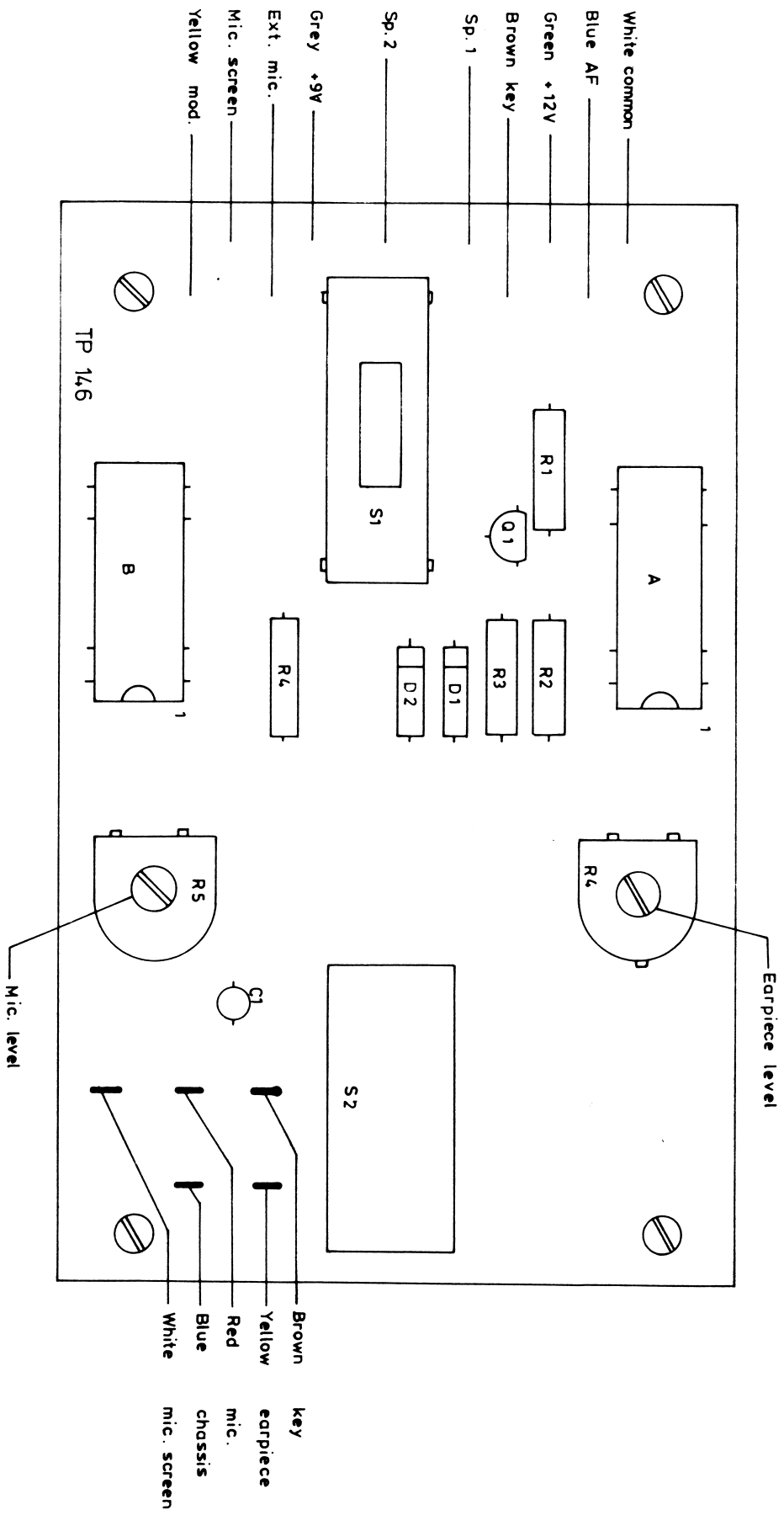
PREPARING TP3000 FOR DUPLEX OPERATION

1. Disconnect green cable on TP103 solder terminal
2. Insert a diode in green cable from multiconnector terminal c10. Anode against C10

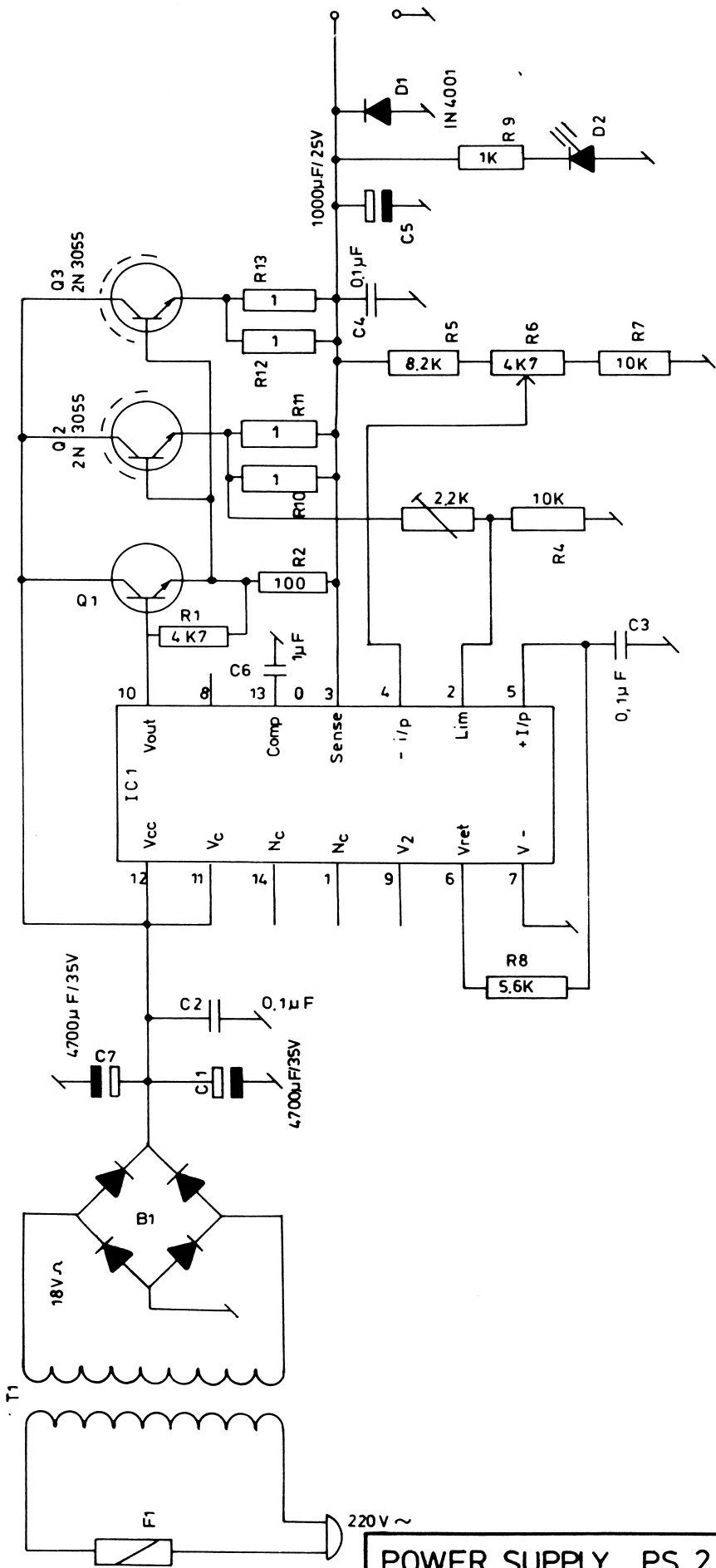


BC 327

<p>INSTALLATION OF HANDSET FOR DUPLEX OPERATION TP 3000</p>	<p>JS 10.02 84</p>
<p>TP RADIO</p>	<p>DRAWING NO. EA4-840811</p>



COMPONENT LAY OUT TP 146 HANDSET CONTROL	JS 02.03.84
TP RADIO	DRAWING NO. EA4-840809

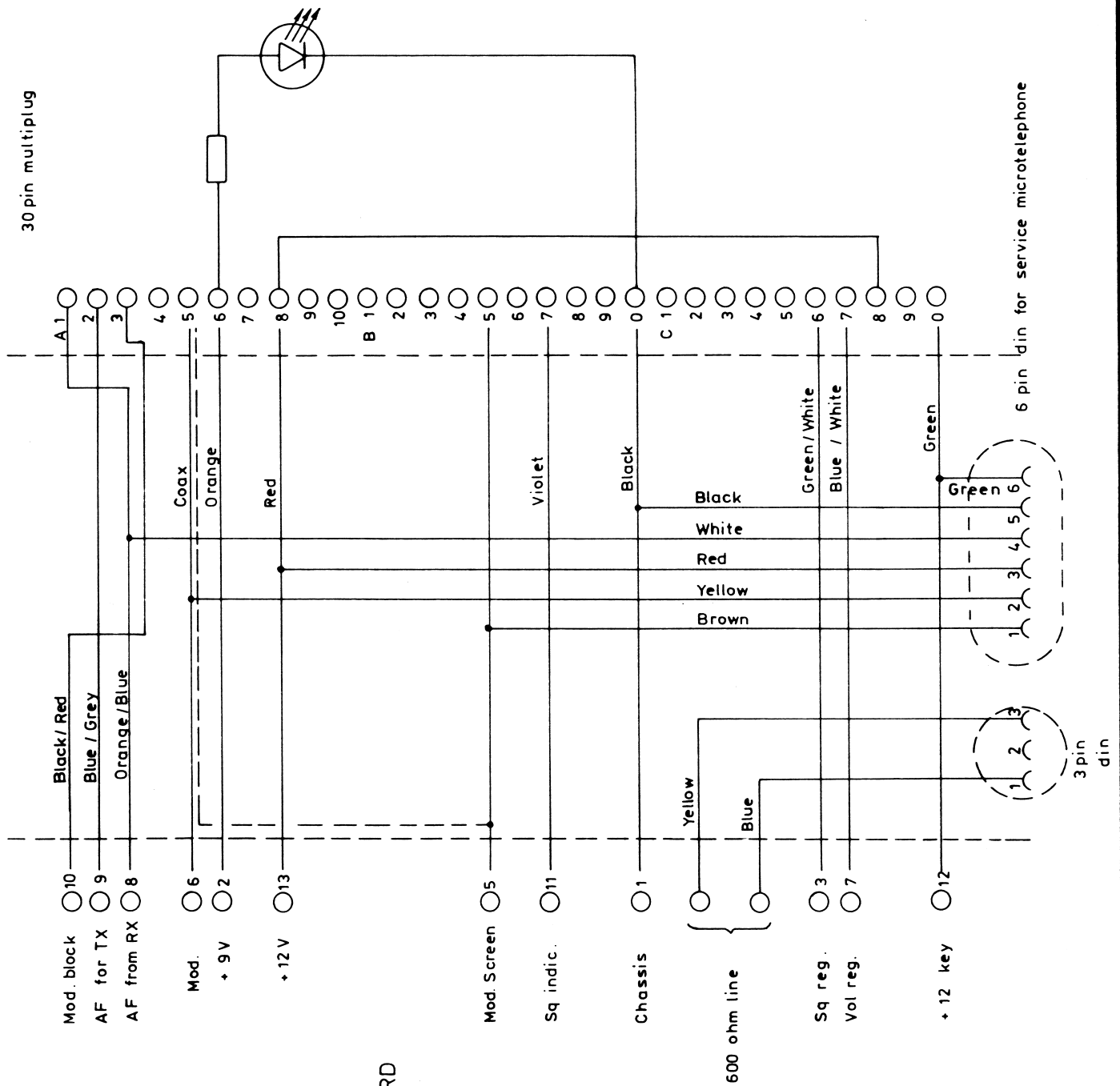


POWER SUPPLY PS 2
13,5 V - 10 Amp.

JS 09. 01. 84

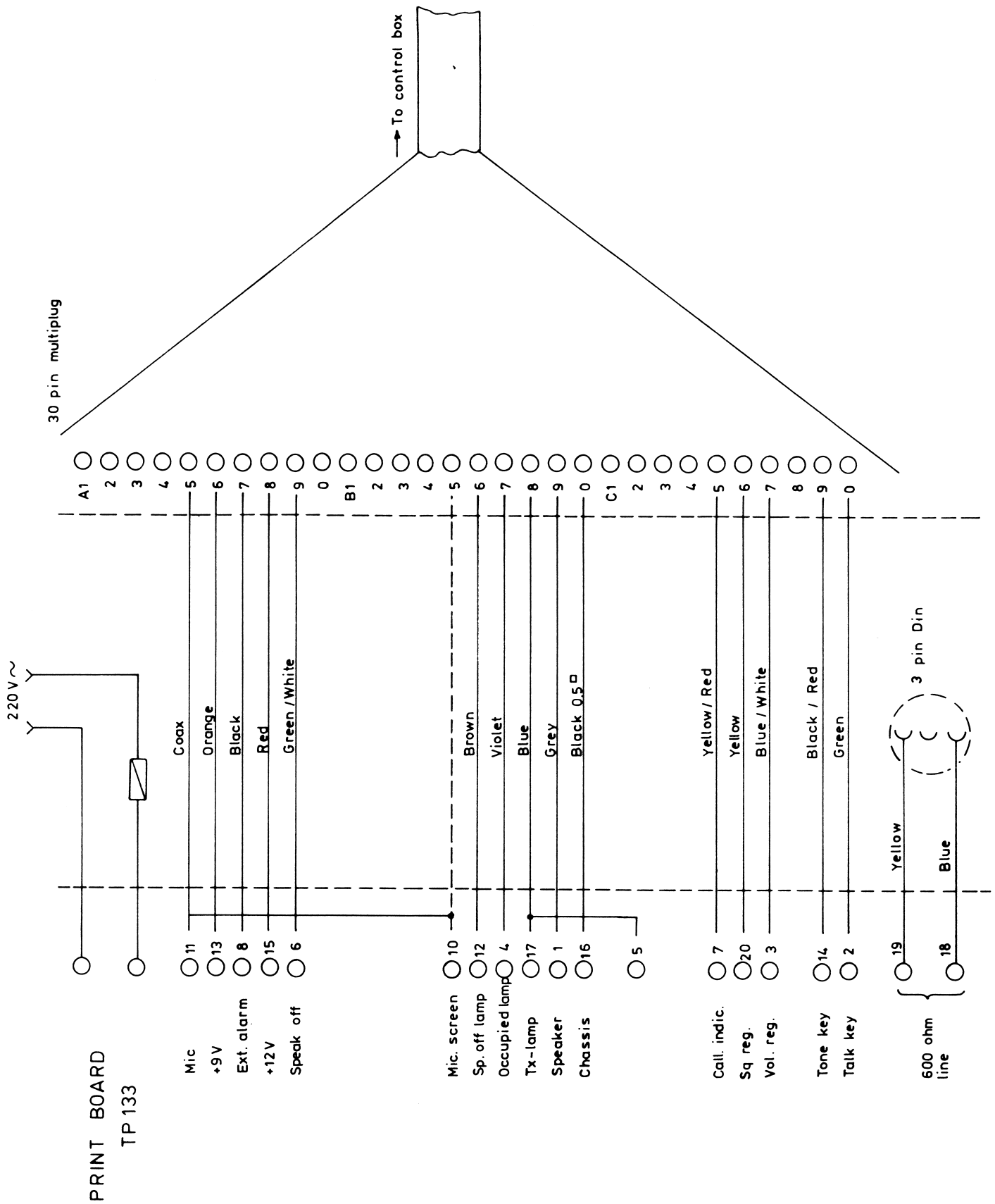
TP RADIO

DRAWING NO.
EA4-840810



PRINT BOARD
TP 134

Wiring diagram for linereceiver - repeaterlogic. LR1 , LRP1 and RP 1	JS
TP RADIO	EA4-820812



Wiring diagram for line transmitter
LT 1

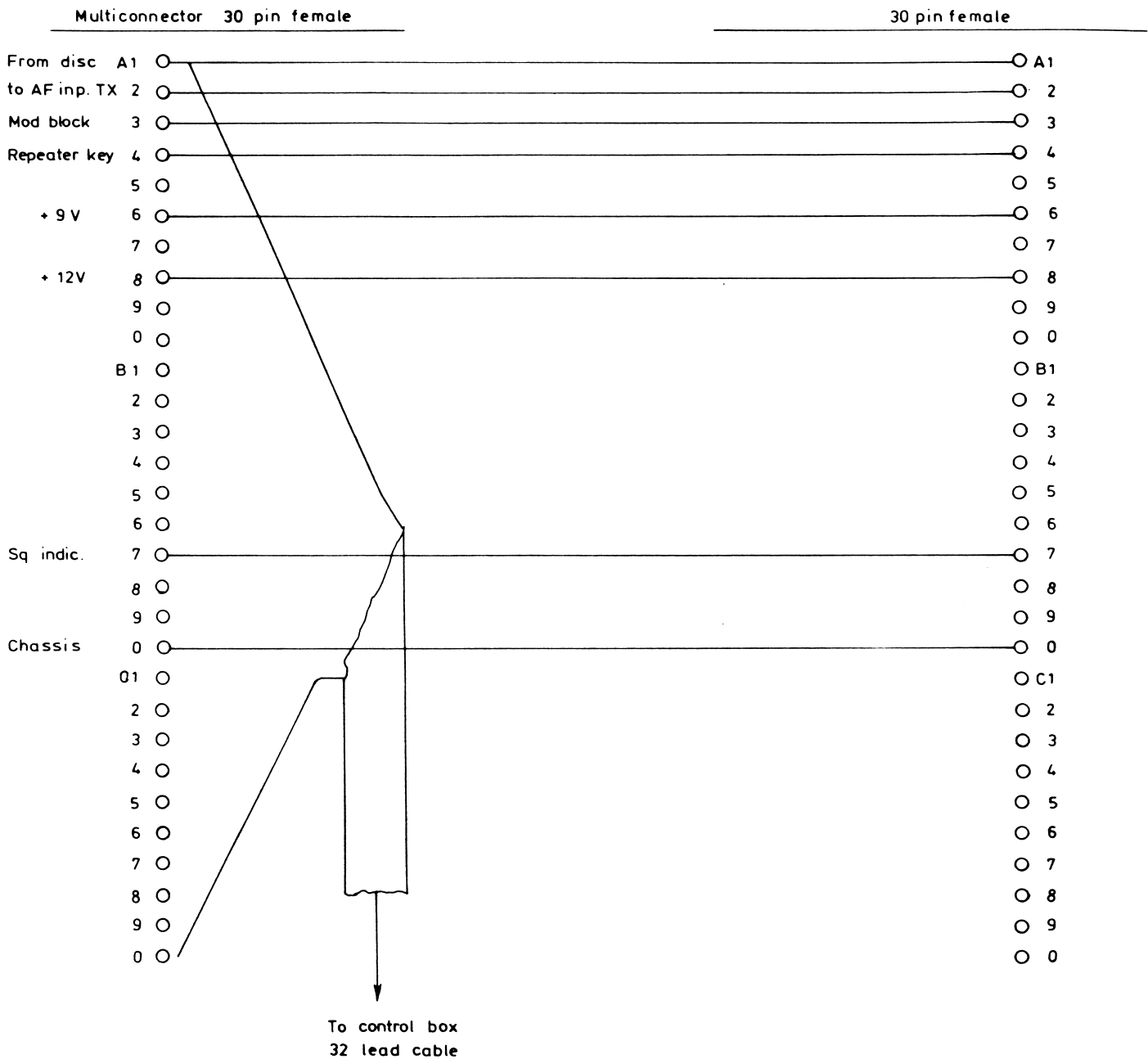
JS
01. 07. 82

TP RADIO

EA4-820811

TRANCEIVER

REPEATER LOGIC

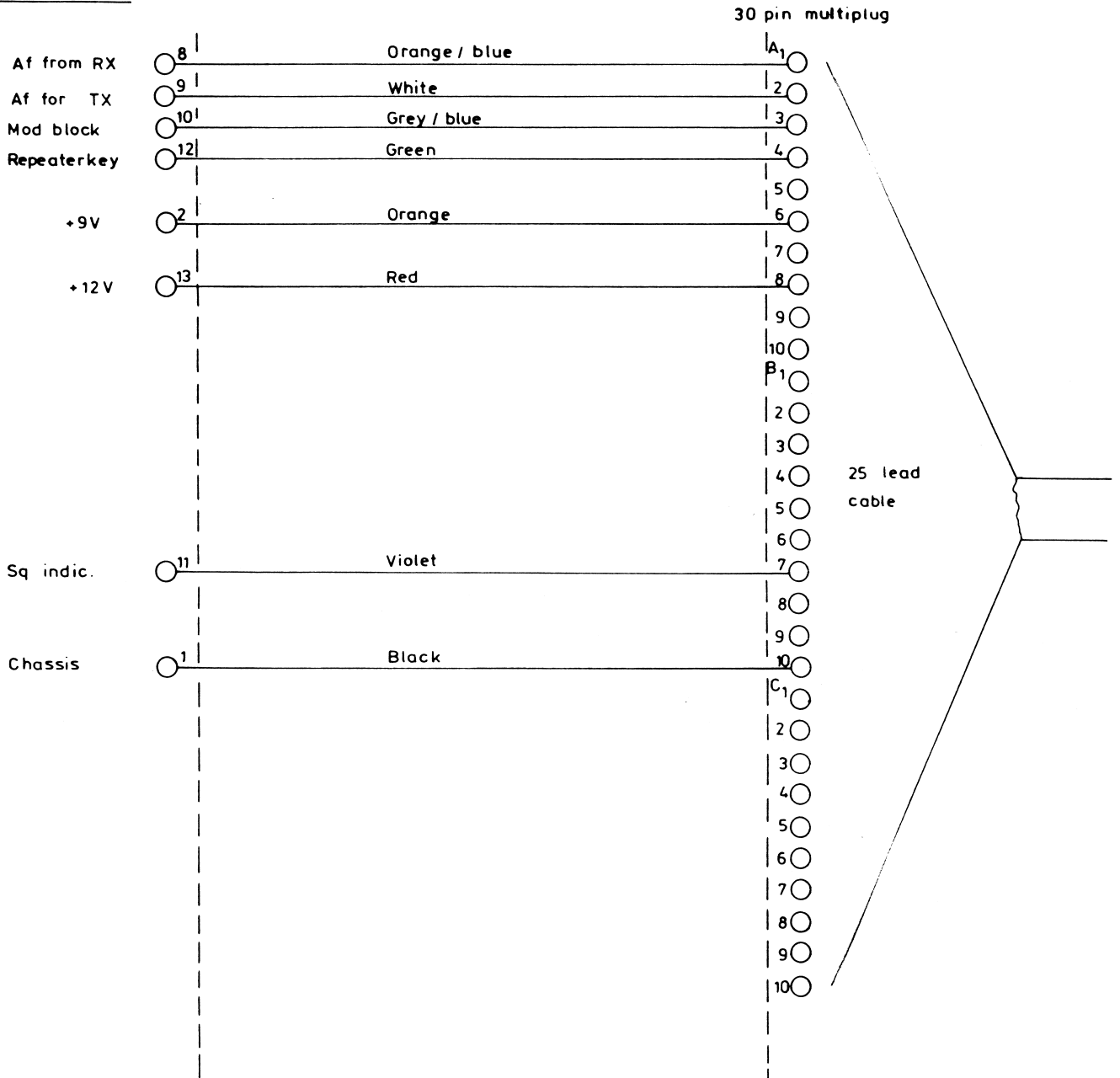


Interconnections for repeater operation

JS
19. 04. 83

TP RADIO

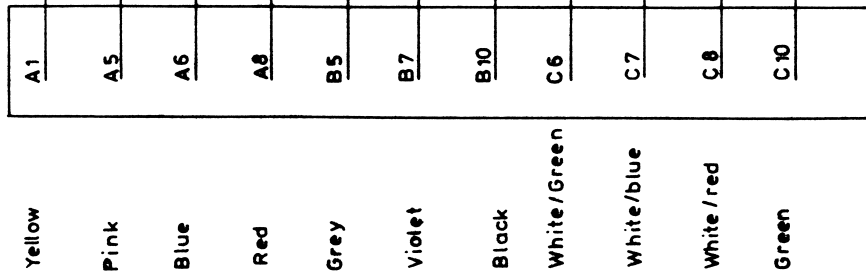
EA4-840601



Repeater logic wiring System HS 6-7	JS 18.04.83
TP RADIO	EA4-840602

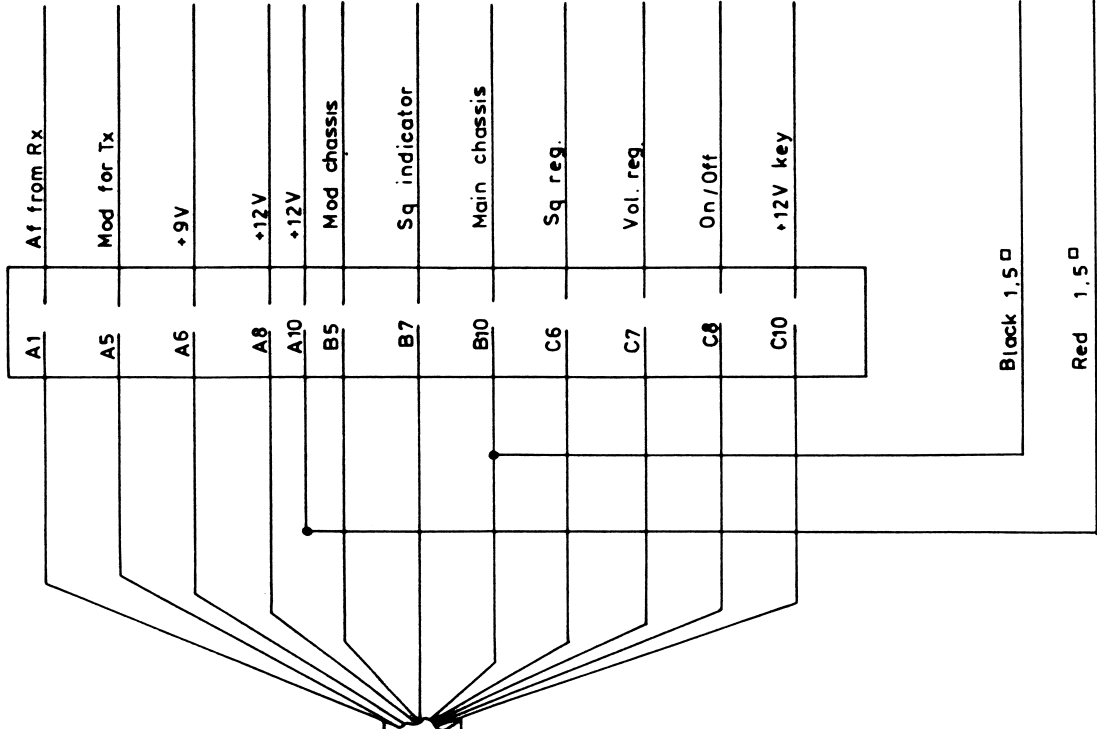
FEMALE

30 pin connector to LR



FEMALE

30 pin connector to radio unit



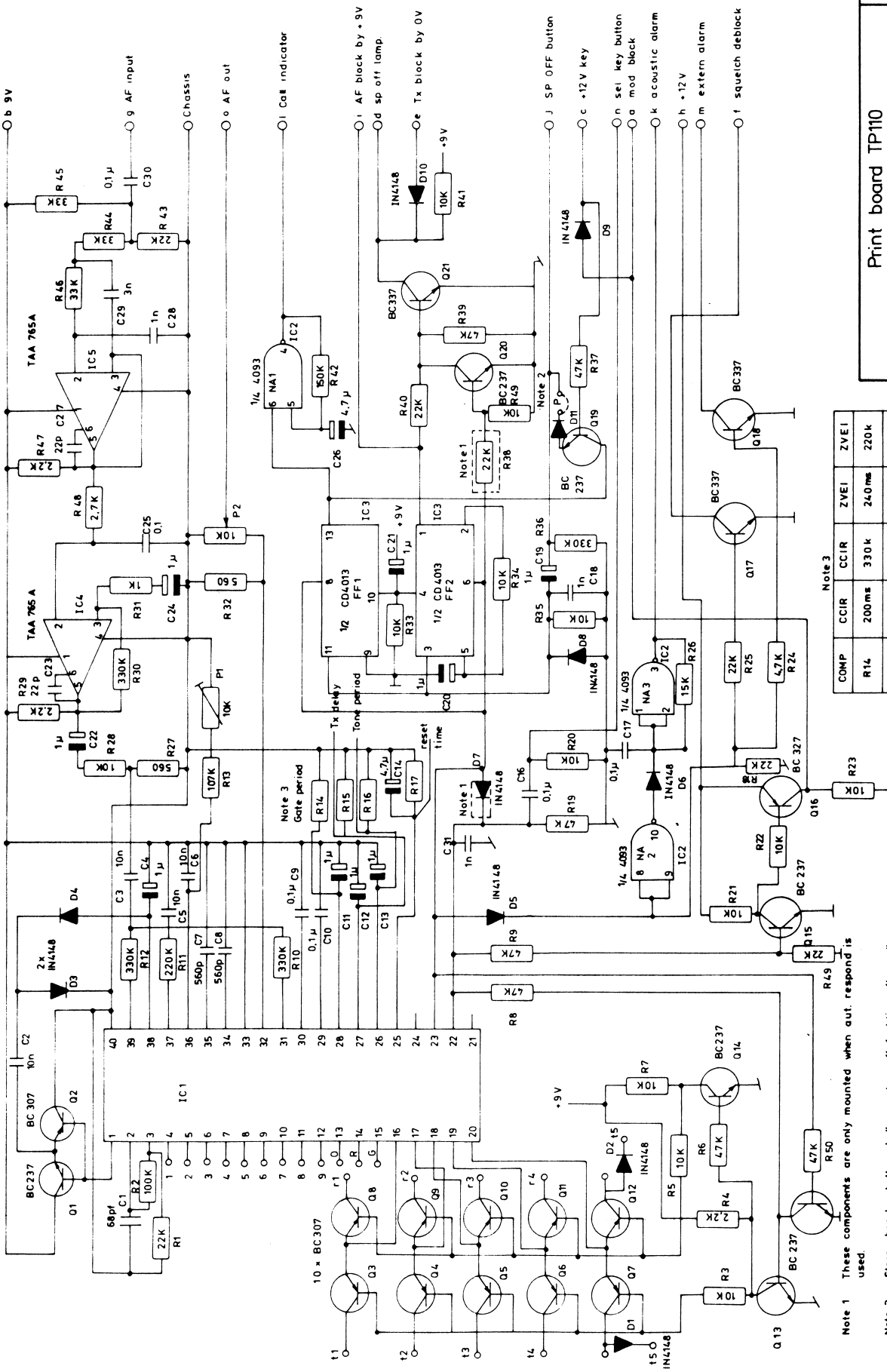
Multicable
25 conductors

Connection cable for LR 1 and
radio unit

JS
09. 09. 82

TP RADIO

DRAWING NO.
EA4-840603



Note 3

COMP	CCIR	CCIR	ZVEI	ZVEI
R14	200ms	330k	24.0ms	220k
R15	200ms	330k	14.0ms	220k
R16	100ms	180k	70ms	120k
R17	1s	330k	700ms	220k

Note 1 These components are only mounted when aut. respond is used.
Note 2 Strap when key button shall cancel sp off function after call.

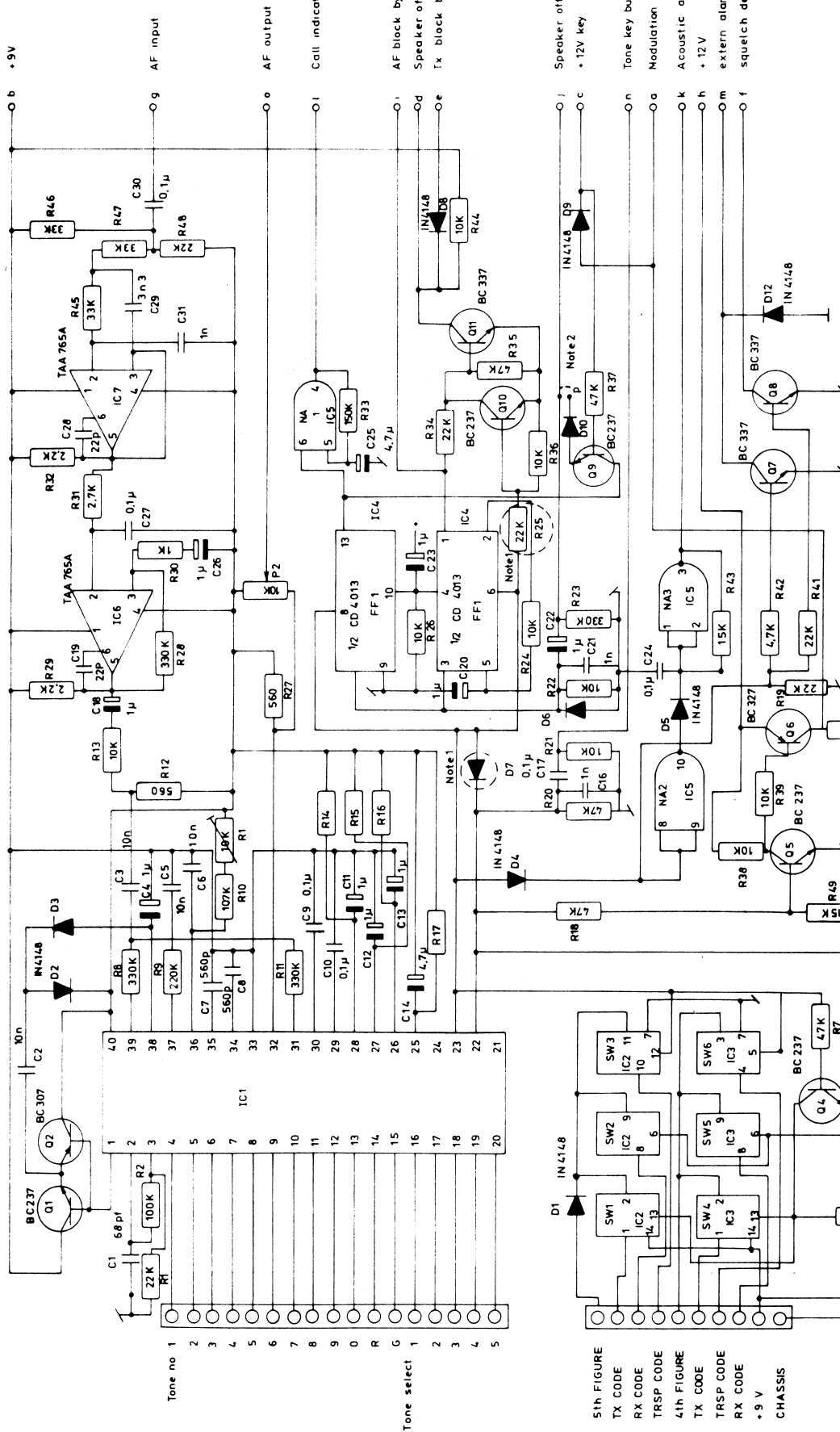
Print board TP110
 2-5 Tone encoder - decoder for
 CCIR and ZVEI tone system with
 automatic Transpond Facility

TP RADIO

DRAWING NO.

EA3-790514

JS 28 08 79



COMP	CCIR	CCIR	ZVEI	ZVEI
R14	200ms	300K	140ms	220K
R15	200ms	300K	140ms	220K
R16	100ms	150K	70ms	120K
R17	IS	330K	700ms	220K

Note 1 These components are only mounted when out. Transpanding is used

Note 2 Strip when key button shall cancel sp. off. function after received call

PRINT BOARD TP 112
5 Tone encoder-decoder for CCIR and ZVEI and possibility of selecting two figures in TX code

TP RADIO

EA3-790617

JS 28 08 79

- 5th FIGURE
- TX CODE
- RX CODE
- TRSP CODE
- 4th FIGURE
- TX CODE
- TRSP CODE
- RX CODE
- + 9 V
- CHASSIS

Tone no 1

Tone select

+9V

AF input

AF output

Call indicator

AF block by +9V

Speaker off lamp

Tx block by OV

Speaker off button +12V key

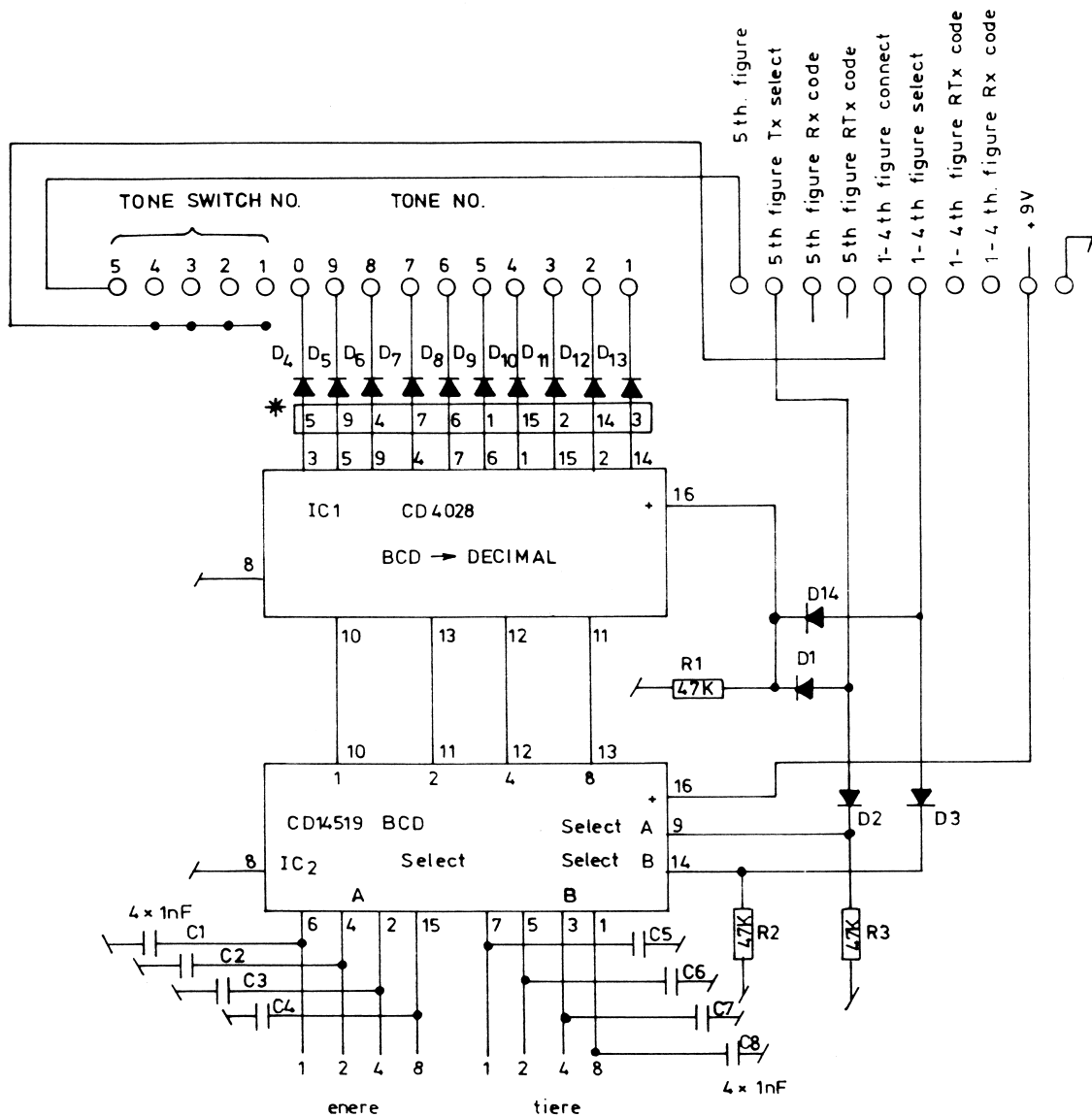
Tone key button

Modulation block +12V

Acoustic alarm +12V

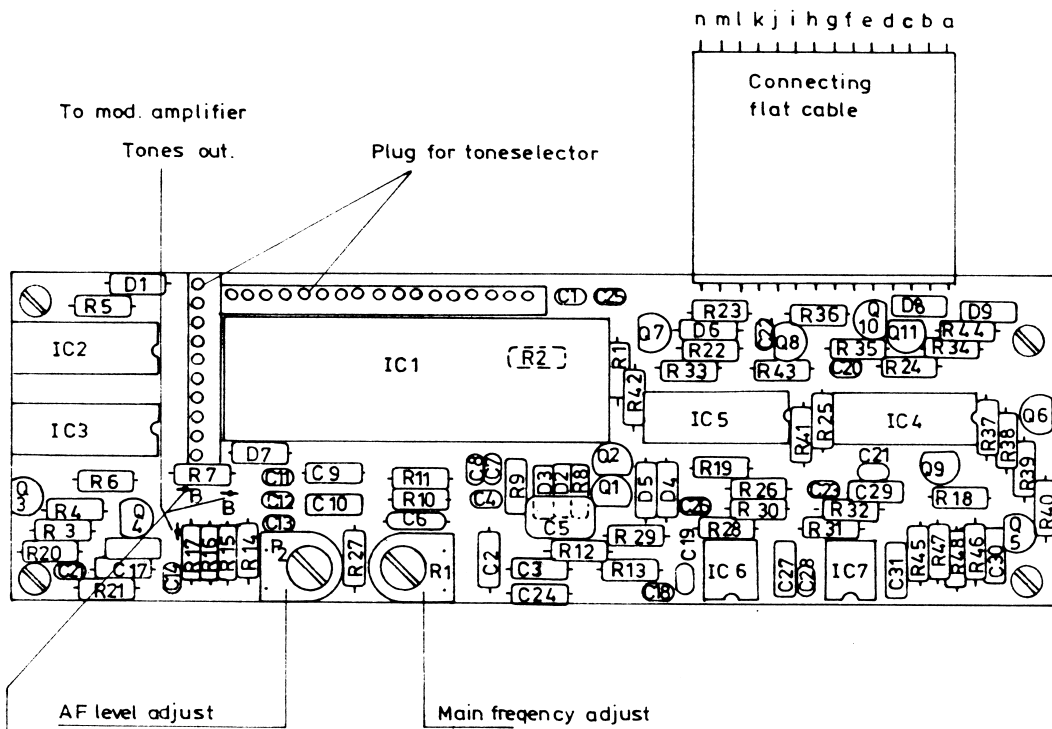
extern alarm by OV

squelch deblock



* Diodes D₄ - D₁₃ are connected to these pin numbers, when the print board is used for 1 tone select

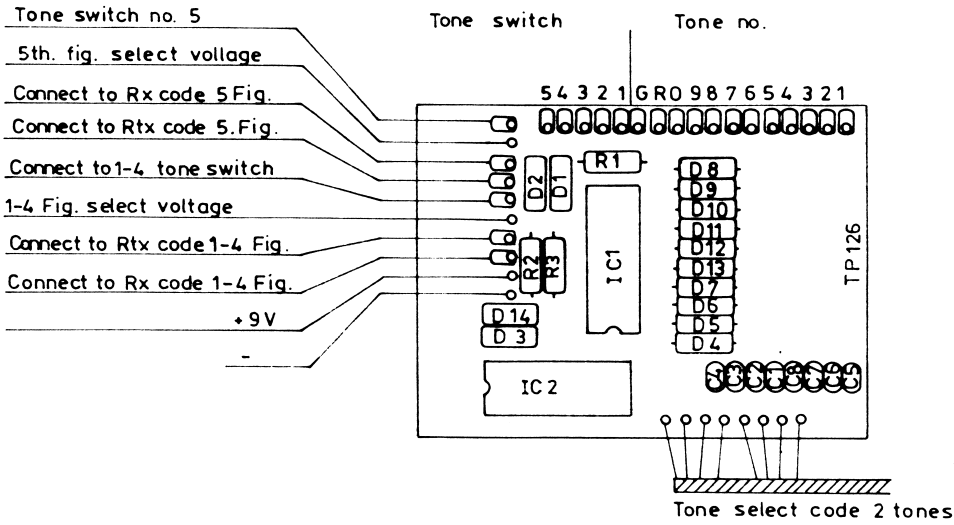
Print board TP 126 code plug 1 or 2 tones Tx code selectable (Tone system TP 112)	JS 25.02.81
TP RADIO	DRAWING NO. EA4 810202



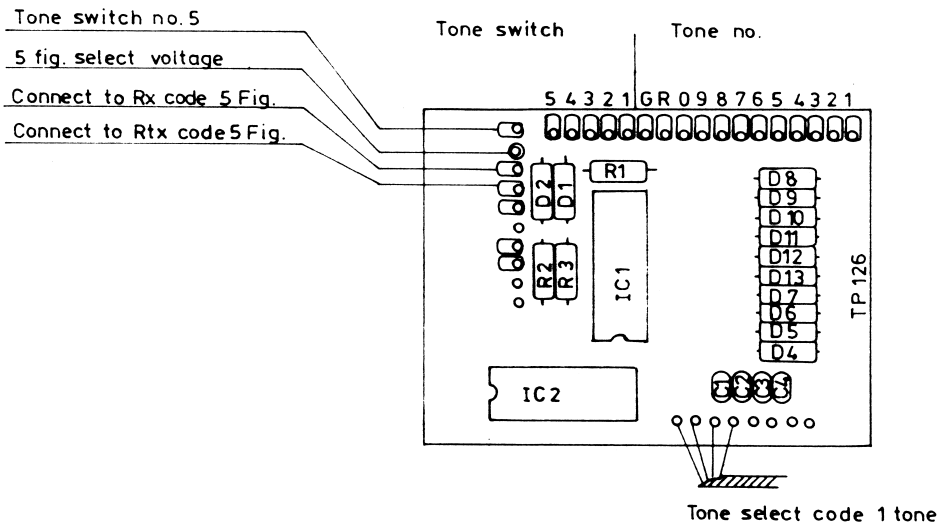
Connect A-B for continuous 1st. tone

TP 112
see drawing no.
EA3-790617

<p>Component Lay Out TP112 5-tone sequence system</p>	<p>JS 18.08.81</p>
<p>TP RADIO</p>	<p>DRAWING NO. EA4-810809</p>

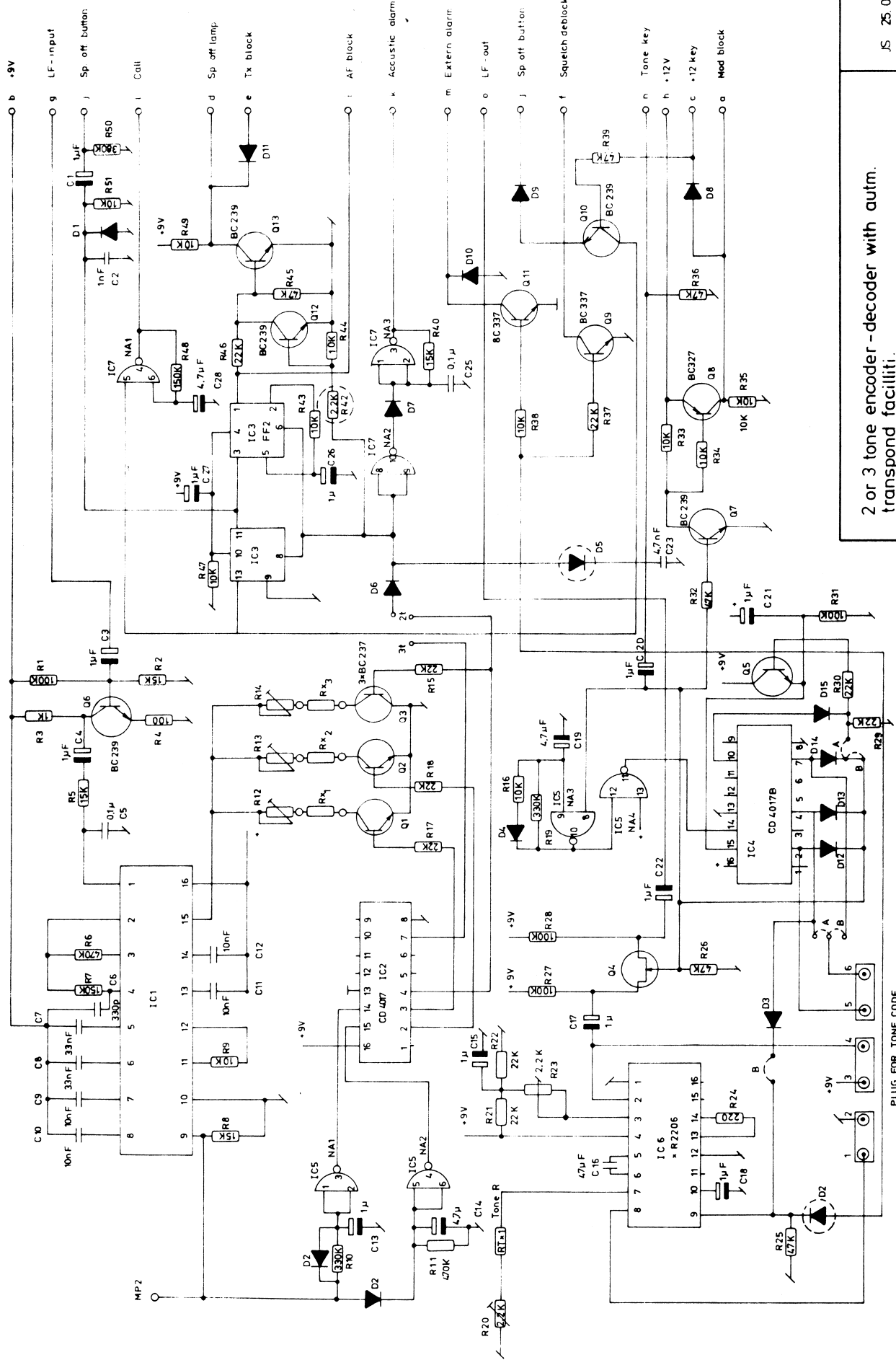


TP 126/2
see drawing no.
EA4 - 810202



TP 126/1
see drawing no.
EA4-810202

<p>Component Lay Out TP126/1- TP126/2 Tone select boards for TP112. 5 tonesystem</p>	<p>JS 18. 08. 81</p>
<p>TP RADIO</p>	<p>DRAWING NO. EA4-810808</p>



STRAP A FOR 2 TONES AND B FOR 3 TONES

PLUG FOR TONE CODE

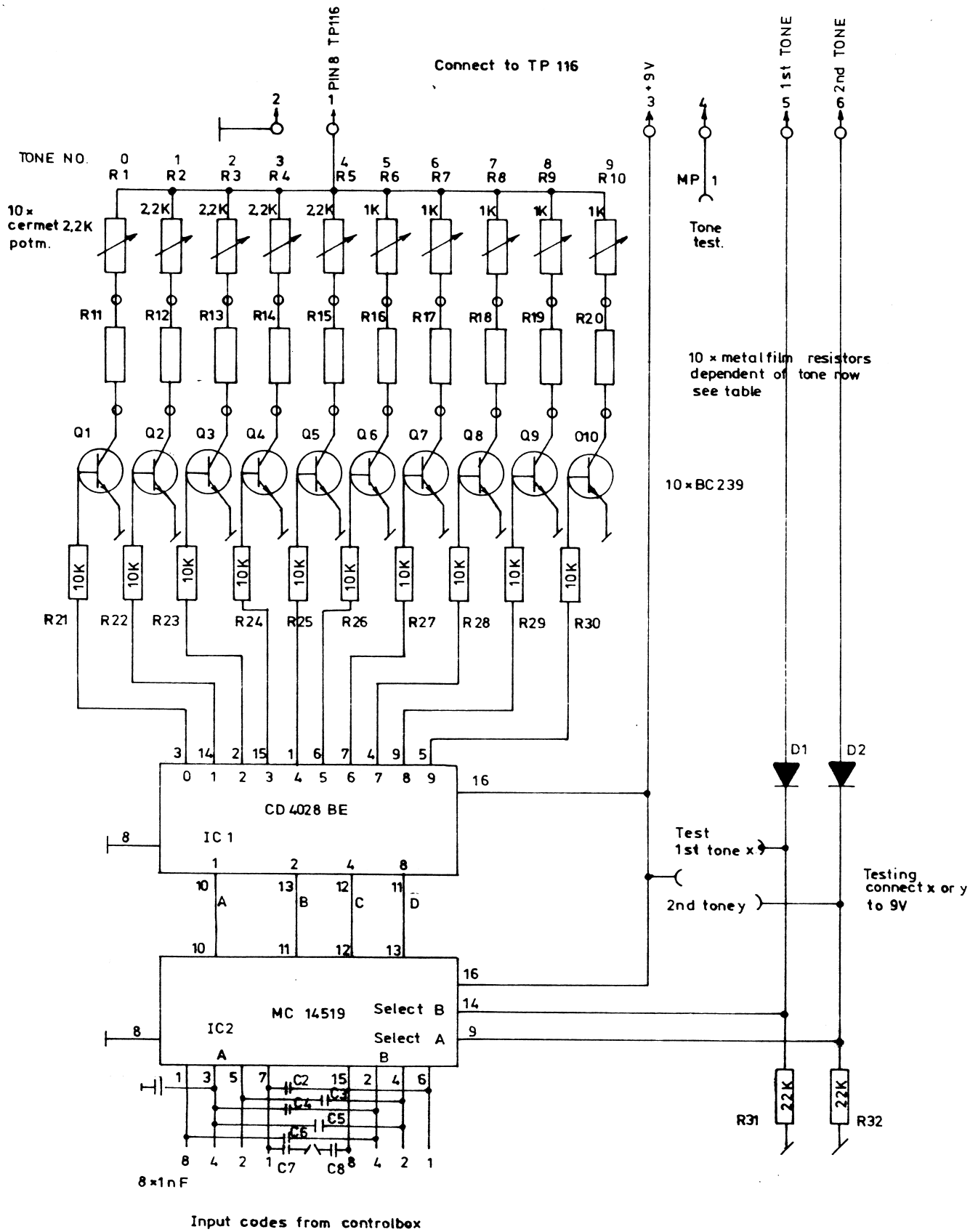
2 or 3 tone encoder-decoder with autm. transpond faciliti. Print board 116

JS 25.02.81

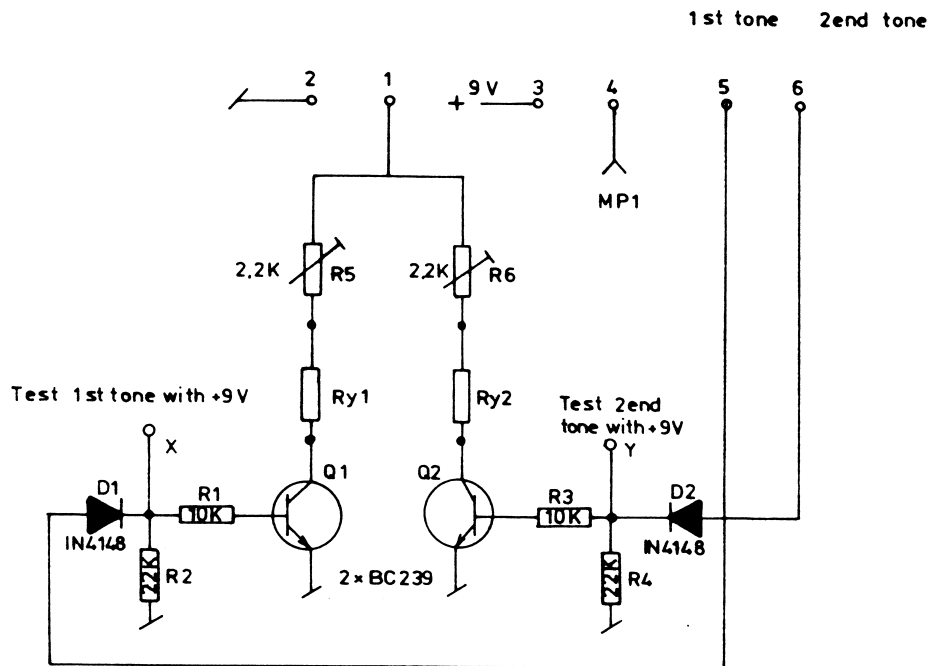
DRAWING NO

TP RADIO

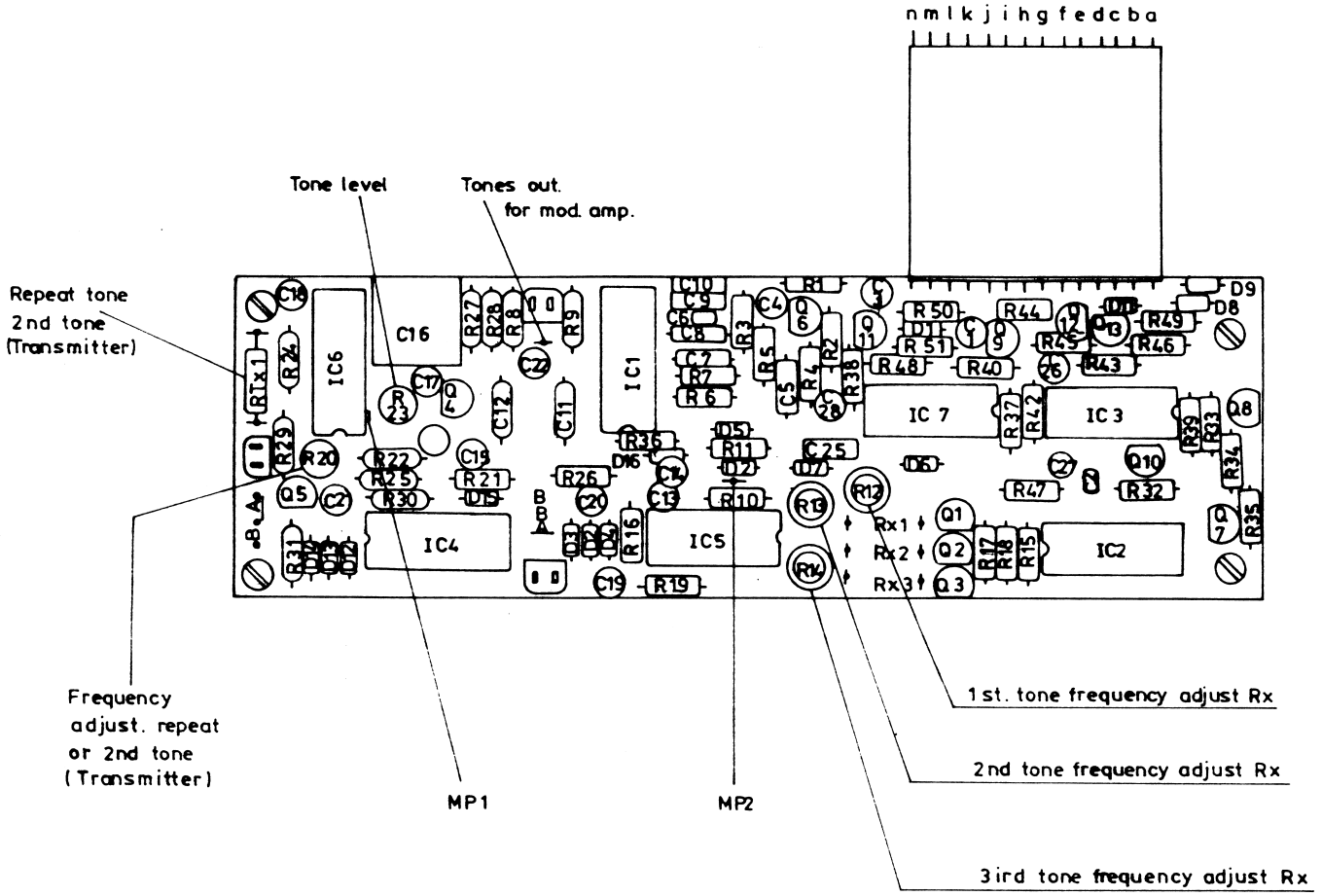
EA3-791125



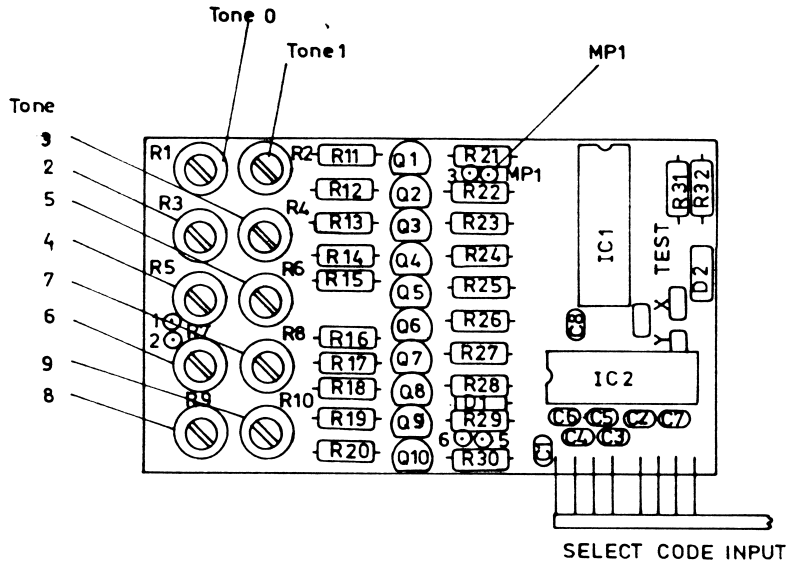
<p>Tone row 2-3 tone System 2 tones selectable Print board TP125</p>	<p>JS 25. 02. 81</p>
<p style="text-align: center;">TP RADIO</p>	<p>DRAWING NO. EA4-801116</p>



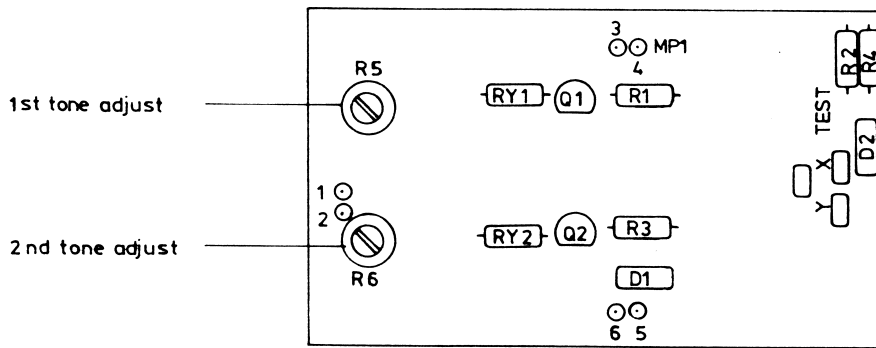
Print board TP 125 Code board for 2 tones (Tone system TP 116)	JS. 25. 02. 81
TP RADIO	DRAWING NO. EA4 810101



Component Lay Out Print board TP116 2-3 tone system	JS 17.08.81
TP RADIO	DRAWING NO. EA4-810806

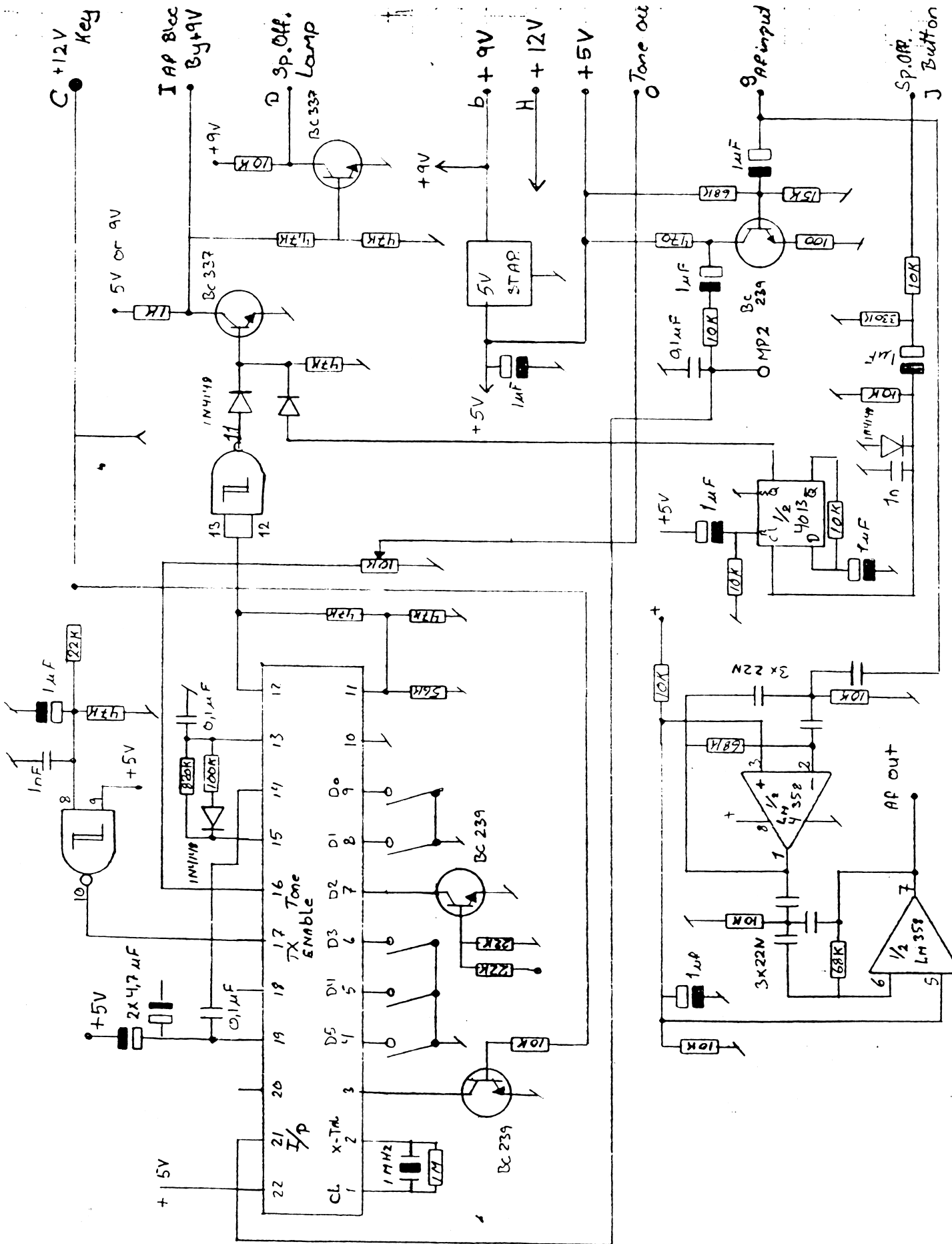


TP 125/1
See drawing no.
EA4-801116



TP 125/2
See drawing no.
EA4-810101

Component lay out Print board TP 126/1 - TP 126/2	JS 17.08.81
TP RADIO	DRAWING NO. EA4-810807



TP 143

Pilottone
(Tone Switch)

1/2-88 coc.

Tone Frequencies : ZVEI.

Frequency determining resistors for 2-3 TONE SYSTEM

TP 116 - 125.

Resistors 1 % Metalfilm.

TONE NO	TONE FREQ Hz	FREQUENCY DEVIATION \pm KHZ	Tx Resistor Kohm	Rx Resistor Kohm
0	2400	3,1	8,06	8,45
1	1057	1,3	18,7	20,0
2	1163	1,4	16,9	17,8
3	1229	1,55	16,5	16,5
4	1402	1,7	14,0	14,7
5	1530	1,85	12,7	12,7
6	1665	1,95	11,5	11,5
7	1828	2,25	10,5	10,5
8	2000	2,5	9,09	10,0
9	2200	2,8	8,45	8,45
R	2600	3,3	7,5	7,5
"S	2900	3,7	6,81	6,81

TONEROW AP- SYSTEM

Frequency determining resistors for 2-3 tone system,
TP 116-125, and Pilot tonesystem TP 120.

TABLE 1.

Tone No.	Tone Freq. Hz	Freq. Devi. +/- KHz.	Resistor Tx	Resistor Rx
0	980	1.2	20 Kohm	22 Kohm
1	1190	1.4	16.5 Kohm	17.8Kohm
2	1380	1.65	14 Kohm	15.4Kohm
3	1600	1.9	12.4 Kohm	12.7Kohm
4	1800	2.2	10.5 Kohm	11.5Kohm
5	2010	2.5	10 Kohm	10 Kohm
6	2220	2.8	9.09Kohm	9.09Kohm
7	2410	3.1	8.06Kohm	8.45Kohm
8	2590	3.3	7.15Kohm	7.50Kohm
9	2820	3.5	6.81Kohm	6.81Kohm
R	2960	3.7	6.81Kohm	6.81Kohm

TONE FREQUENCIES/ AGA SYSTEM

Frequency determining resistors for 2-3 TONE SYSTEM
TP 116-125

Resistors: 1 % Metalfilm

TONE NO	TONE FREQ Hz	FREQUENCY DEVIATION + - KHz	Tx RESISTOR Kohm	Rx RESISTOR Kohm
0	2580	3,3	7,15	7,50
1	2367	3,0	8,45	8,45
2	2172	2,7	9,09	9,09
3	1993	2,4	10,0	10,0
4	1828	2,2	10,5	10,5
5	1677	2,0	11,5	11,5
6	1539	1,8	12,7	12,4
7	1412	1,65	14,0	15,4
8	1295	1,5	14,7	16,5
9	1188	1,4	16,5	17,81