

MANUAL 146

FRONTSECTIONS AND

TONESYSTEMS

Contents for Manual 146.

Frontsection no.		Drawing number
206 - <u>001</u>	} Tone units	77134-4E2
	} Control circuit	77095-3E2
206 - <u>002</u>	} Tone units	77135-4E2
	} Control circuit	77096-3E2
206 - <u>003</u>	} Tone units	77136-4E2
	} Control circuit	77010-3E2
206 - <u>004</u>	} Tone units	77137-4E2
	} Control circuit	75083-3E2
206 - <u>005</u>	} Tone units	77138-4E2
	} Control circuit	77097-3E2
206 - <u>007</u>	} Tone units	77139-4E2
	} Control circuit	77098-3E2
206 - <u>008</u>	} Tone units	77140-4E2
	} Control circuit	77007-3E2
206 - <u>009</u>	} Tone units	77141-4E2
	} Control circuit	77099-3E2
206 - <u>010</u>	} Tone units	77142-4E2
	} Control circuit	77100-3E2
206 - <u>011</u>	} Tone units	77143-4E2
	} Control circuit	75084-3E2
206 - <u>012</u>	} Tone units	77144-4E2
	} Control circuit	75207-3E2
206 - <u>013</u>	} Tone units	77145-4E2
	} Control circuit	77101-3E2
206 - <u>014</u>	} Tone units	77146-4E2
	} Control circuit	77102-3E2

77319-4E2

Frontsection no.

Drawing number

206 - <u>016</u>	}	Tone units
		Control circuit
206 - <u>017</u>	}	Tone units
		Control circuit
206 - <u>020</u>	}	Tone units
		Control circuit
206 - <u>021</u>	}	Tone units
		Control circuit

77147-4E2

77103-3E2

77148-4E2

77104-3E2

Tone unit

Stock no.	Tones	Aut. resp.	Function	Drawing number
219 - 001	AP		1-tone Rx 1-tone Tx Spec. pilot tone unit Technical description Diagram (print board B 68)	78042-4E2 78002-2E2
(219 - 005)	AP	x	2-tone Rx/Tx	76235-4E2
(219 - 007)	AP		Technical description	76223-2E2
(219 - 032)	AGA		Diagram (print board B 74 +	
(219 - 033)			B 67	
219 - 042	AP		Technical description	78100-4E2
219 - 054	AP			
219 - 046	AGA		Diagram (print board C 14 +	78161-2E2
219 - 055	AGA		C 16)	
(219 - 006)	AP	x	2-tone Rx+tone Tx	76352-4E2
(219 - 008)	AP		Technical description	76231-2E2
			Diagram (print board B 66	
			B 67	
219 - 057	AP	x	Technical description	
219 - 058	AP		Diagram (print board B 86 +	77337-2E2
			B 67)	
219 - 009	AP		2-tone Rx	
219 - 011	AP		3-tone Rx	
219 - 010	CCIR		5-tone Rx	
219 - 014	ZVEI		5-tone Rx	
			Technical description	76314-4E2
			Diagram (print board B 69)	76236-2E2
219 - 024	Storno 1+1		2-tone parallel Rx/Tx	
219 - 026	Storno 1+2		General description	77116-4E2
219 - 038	Storno 2+2		Technical description	77117-4E2
			Diagram (print board B 84)	77405-2E2

() old types

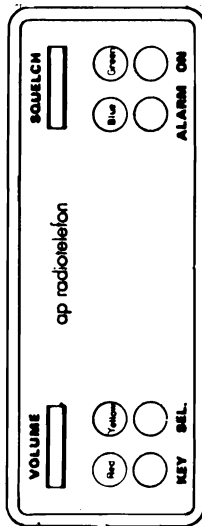
77319-4E2

Stock no.	Tones	Aut. resp.	Function	Drawing number
219 - <u>015</u> 219 - <u>016</u> 219 - <u>034</u> 219 - <u>035</u>	AP AP AGA AGA	x	3-tone Rx + tone Tx Technical description Diagram (print board B 86 + B 67)	77337-2E2
(219 - <u>018</u>) (219 - <u>019</u>) (219 - <u>020</u>) (219 - <u>021</u>) (219 - <u>022</u>) (219 - <u>023</u>) 219 - <u>051</u> 219 - <u>050</u> 219 - <u>044</u> 219 - <u>045</u> 219 - <u>048</u> 219 - <u>049</u> 219 - <u>052</u> 219 - <u>053</u>	ZVEI CCIR CCIR ZVEI CCIR ZVEI ZVEI CCIR CCIR ZVEI CCIR ZVEI CCIR ZVEI	x x x x x x x x x x x x x x	5-tone Rx/Tx Technical description Adjustment procedure Diagram (print board B 76 + B 77) Technical description Diagram (print board C 16 + C 14) Remarque: 219- <u>052</u> and <u>053</u> on- ly for controlbox 202-020	76315-4E2 76316-4E2 76294-2E2 78101-4E2 78132-2E2
219 - <u>031</u> 219 - <u>030</u> 219 - <u>028</u> 219 - <u>029</u> 219 - <u>025</u> 219 - <u>027</u>			2-tone Tx Diagram 3-tone Tx Diagram 5-tone Tx Diagram 1-tone Rx+5-tone Tx Diagram Technical description Print board for all units B 85	77358-2E2 77357-2E2 77348-2E2 77352-2E2
219 - <u>043</u> 219 - <u>047</u>			3-tone Rx/Tx Technical description Print boards C 16/C 14	78162-2E2 78100-4E2

77319-4E2

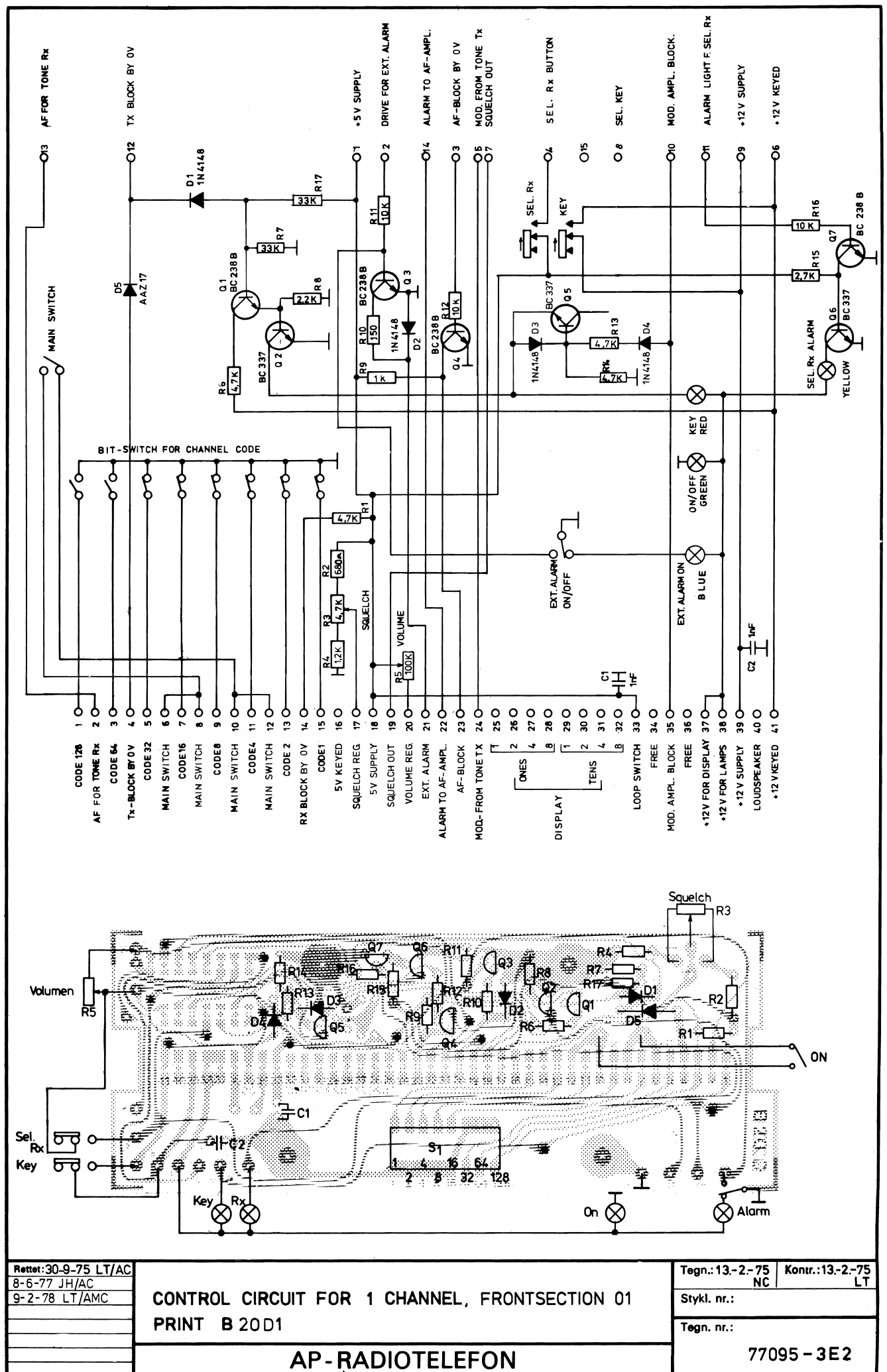
Stock no.	Tones	Aut. resp.	Function	Drawing number
219 - 040			5-tone encoder/decoder with automatic transponding and group call	78049-2E2
219 - 041			C 07A1/C 08A1 ZVEI C 07A2/C 08A2 CCIR Technical description	78053-2E2 78076-4E2
Relay with timing for ext. alarm				75169-4E2

FRONTSECTION 01



Toneunits belonging to this frontsection

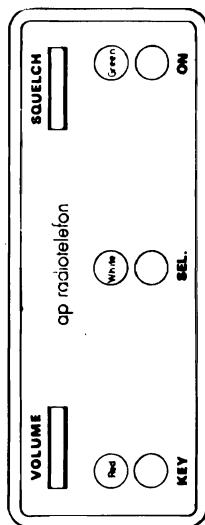
Function	Unit no.	Print board no.	Diagram no.
2-tone Rx. Tones: AP	219-009	B 69 A1	76236-2E2
3-tone Rx. Tones: AP	219-011	B 69 A2	76236-2E2
5-tone Rx. Tones: CCIR	219-010	B 69 A3	76236-2E2
5-tone Rx. Tones: ZVEI	219-014	B 69 A4	76236-2E2



AP-RADIOTELEFON

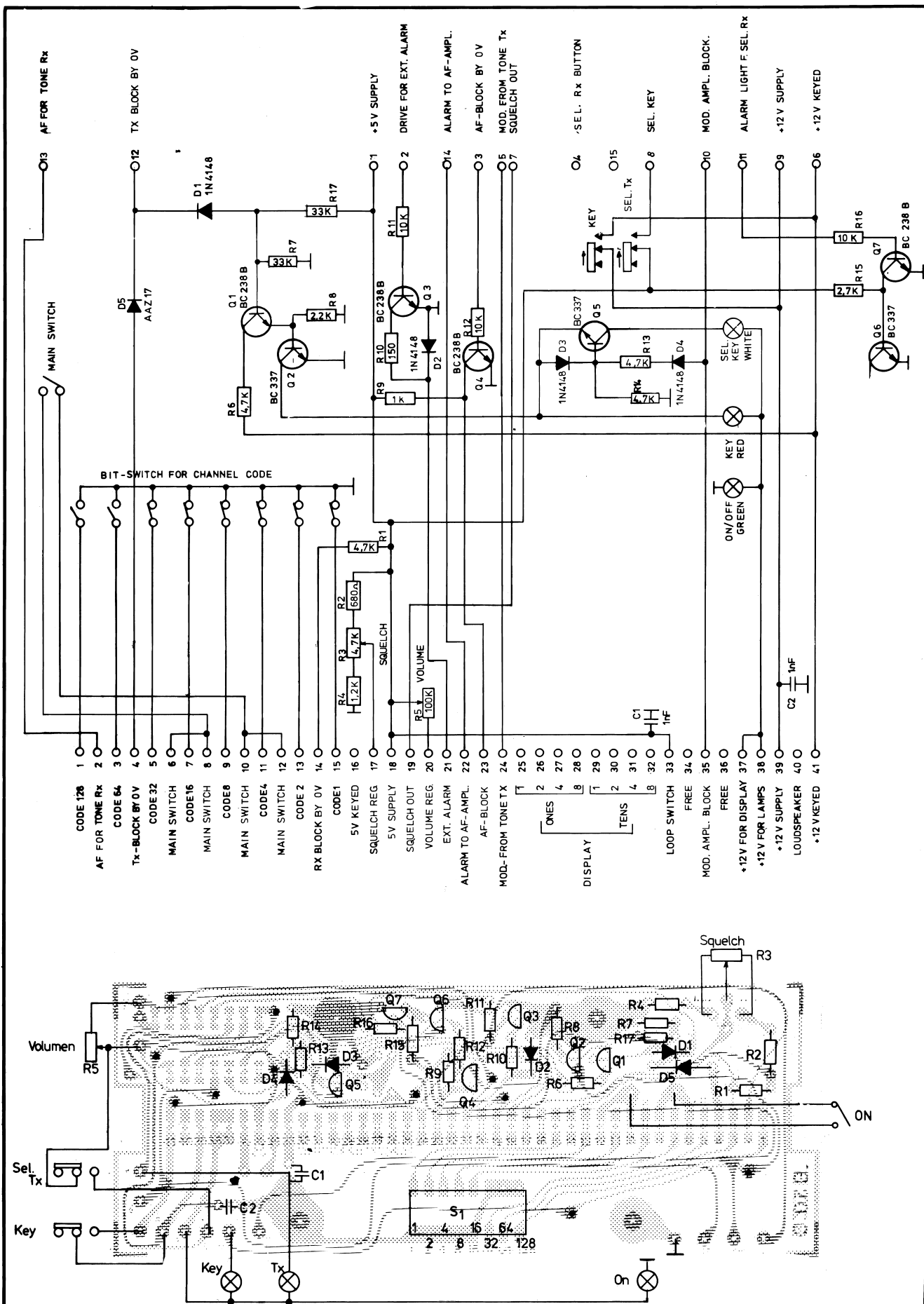
Nr.	Kode	Data	Nr.	Kode	Data
R1	13-291	4,7 KΩ 1/8 W CR16			
R2	13-281	680 Ω " "			
R3	16-022	4,7 KΩ Potm.			
R4	13-284	1,2 KΩ 1/8 W "			
R5	16-023	100 KΩ Lin.Potm.			
R6	13-291	4,7 KΩ 1/8 W CR16			
R7	13-300	33 KΩ " "			
R8	13-287	2,2 KΩ " "			
R9	13-283	1 KΩ " "			
R10	13-273	150 Ω " "			
R11	13-295	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 01. PrintB 20 D1 Tilhører tegn. nr.: 77095-3E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 77095-4S2

FRONTSECTION 02



Toneunits belonging to this frontsection

Function	Unit no.	Print board no.	Diagram no.
2-tone Tx Tones: AP	219-031	B85A6	
3-tone Tx Tones: AP	219-030	B85A5	
5-tone Tx Tones: ZVEI	219-028	B85A3	
5-tone Tx Tones: CCIR	219-029	B85A4	



Rettet: 30-9-75 LT/AC
 8-6-77 JH/AC
 9-2-78 LT/AMC

CONTROL CIRCUIT FOR 1 CHANNEL, FRONTSECTION 02
 PRINT B 20D1

AP-RADIOTELEFON

Tegn.: 13-2-75 NC Kontr.: 13-2-75 LT

Stykl. nr.:

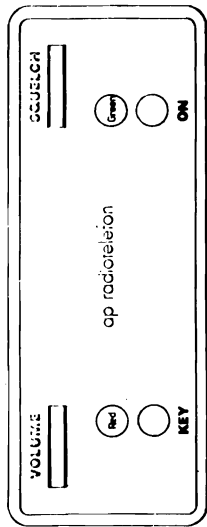
Tegn. nr.:

77096-3E2

AP-RADIOTELEFON

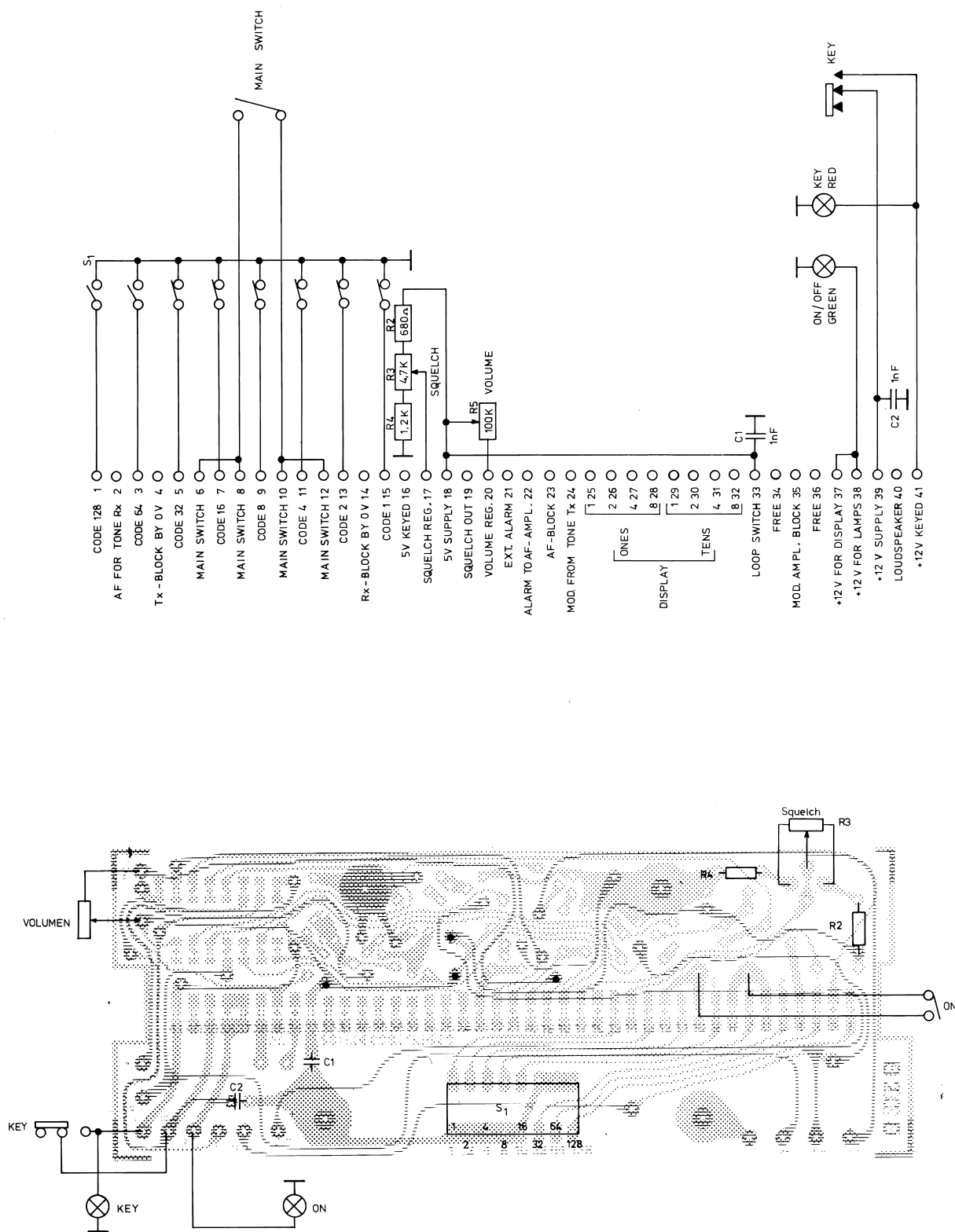
Nr.	Kode	Data	Nr.	Kode	Data
R1	13-291	4,7 K Ω 1/8 W CR16			
R2	13-281	680 Ω " "			
R3	16-022	4,7 K Ω Potm.			
R4	13-284	1,2 K Ω 1/8 W "			
R5	16-023	100 K Ω Lin.Potm.			
R6	13-291	4,7 K Ω 1/8 W CR16			
R7	13-300	33 K Ω " "			
R8	13-287	2,2 K Ω " "			
R9	13-283	1 K Ω " "			
R10	13-273	150 Ω " "			
R11	13-295	10 K Ω " "			
R12	13-295	10 K Ω " "			
R13	13-291	4,7 K Ω " "			
R14	13-291	4,7 K Ω " "			
R15	13-288	2,7 K Ω " "			
R16	13-295	10 K Ω " "			
R17	13-300	33 K Ω " "			
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 02. Print B 20 D1 Tilhører tegn. nr.: 77096-3E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div> <div>Stykl. nr.: 77096-4S2</div>

FRONTSECTION 03



Toneunits belonging to this frontsection

Function	Unit no.	Print board no.	Diagram no.
Without tone unit.			



Rettet: 8-6-77 JH/AC
10-2-78 LT/AMC

CONTROL CIRCUIT FOR 1 CHANNEL, FRONTSECTION 03
PRINT BOARD B20 D2

AP-RADIOTELEFON

Tegn.: 21-1-77

Kontr.:

Stykl. nr.:

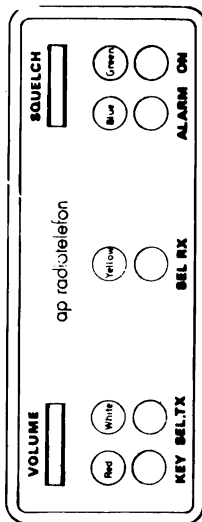
Tegn. nr.:

77010-3E2

AP-RADIOTELEFON

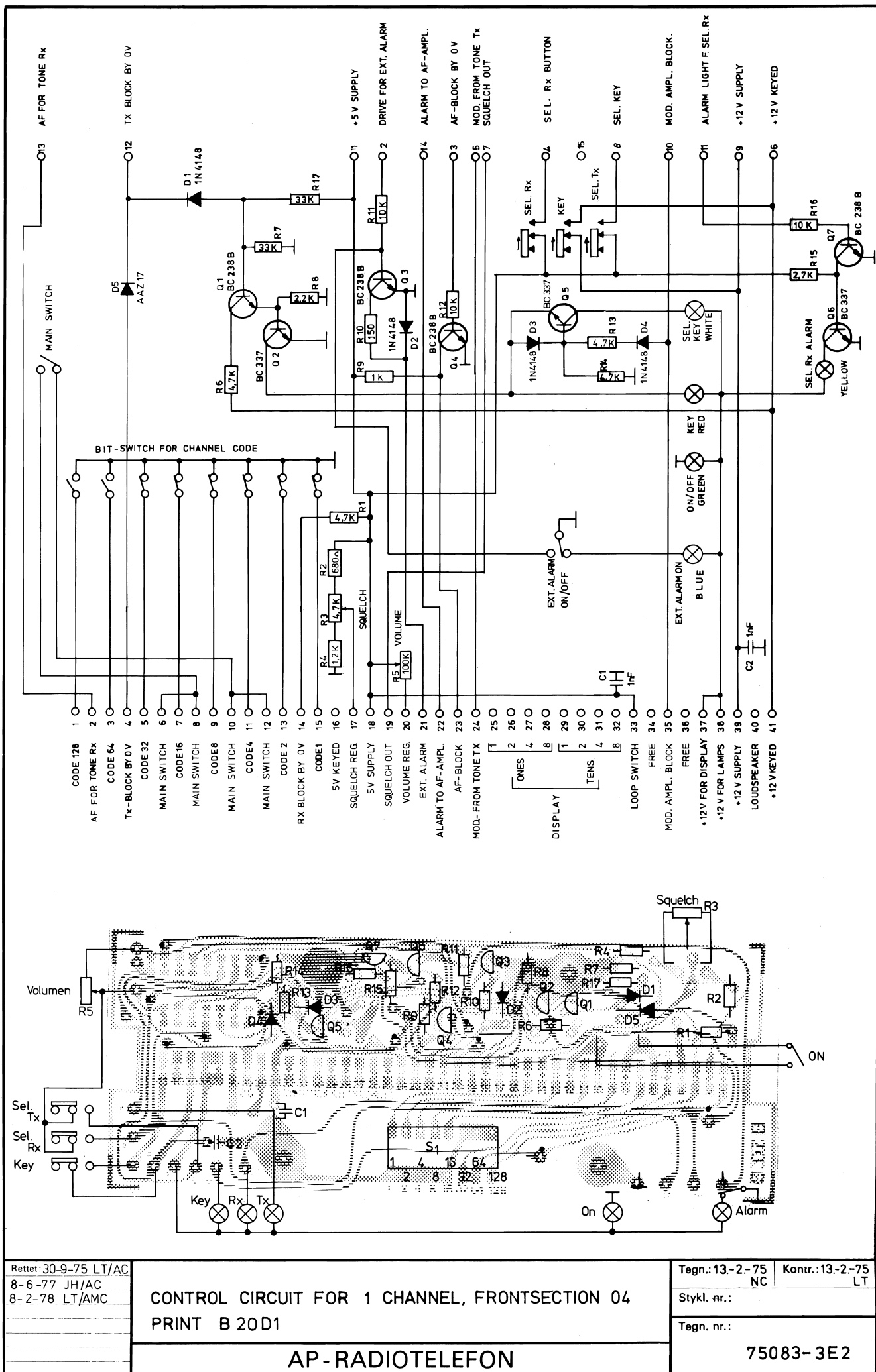
Nr.	Kode	Data	Nr.	Kode	Data
R2	13-281	680 Ω 1/8 W CR16			
R3	16-022	4,7 K Ω Potm.			
R4	13-284	1,2 K Ω 1/8 W CR16			
R5	16-023	100 K Ω Lin.Potm.			
C1	11-409	1 nF Ker.			
C2	11-409	1 nF Ker.			
S1	15-069	Switch 0-69			
Control Circuit for 1 channel, frontsection 03. Print B 20 D2 Tilhører tegn. nr.: 77010-3E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 77010-4S2

FRONTSECTION 04



Toneunits belonging to this frontsection

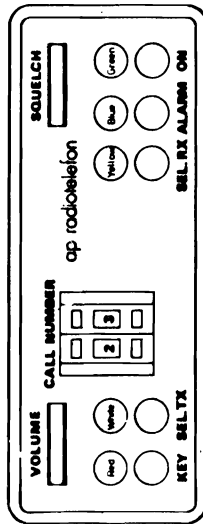
Function	Unit no.	Print board no.	Diagram no.
2-tone Tx + 2-tone Rx.	219-005	B74B1 - B67A1	76223-2E2
2-tone Tx + 2-tone Rx, aut. response.	219-007	B74B2 - B67A1	76223-2E2
5-tone Tx + 5-tone Rx, aut. response.	219-020	B76B1 - B77A1	76294-2E2
5-tone Tx + 5-tone Rx, aut. response.	219-021	B76B2 - B77A1	76294-2E2
2-tone Tx/Rx parallel	219-024	B84A1	77125-2E2
2-tone Tx/Rx parallel	219-026	B84A2	77125-2E2
2-tone Tx/Rx	219-032	B74B3 - B67A1	76223-2E2
2-tone Tx/Rx aut. response	219-033	B74B4 - B67A1	76223-2E2



AP-RADIOTELEFON

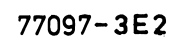
Nr.	Kode	Data	Nr.	Kode	Data
R1	13-291	4,7 KΩ 1/8 W CR16			
R2	13-281	680 Ω " "			
R3	16-022	4,7 KΩ Potm.			
R4	13-284	1,2 KΩ 1/8 W "			
R5	16-023	100 KΩ Lin.Potm.			
R6	13-291	4,7 KΩ 1/8 W CR16			
R7	13-300	33 KΩ " "			
R8	13-287	2,2 KΩ " "			
R9	13-283	1 KΩ " "			
R10	13-273	150 Ω " "			
R11	13-295	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

FRONTSECTION 05



Toneunits belonging to this frontsection

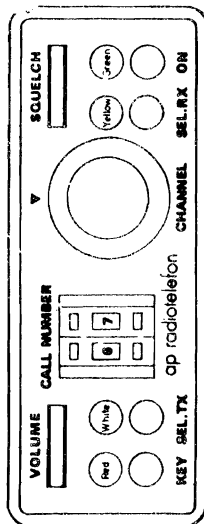
Function	Unit no.	Print board no.	Diagram no.
5-tone Rx + 5-tone Tx, choice of figure 4 and 5. Tones:CCIR	219-022	B76B3 - B77A1	76294-2E2
5-tone Rx + 5-tone Tx, choice of figure 4 and 5. Tones:ZVEI	219-023	B76B4 - B77A1	76294-2E2
5-tone Rx + 5-tone Tx, choice of figure 3 and 5. Tones:CCIR	219-019	B76B5 - B77A1	76294-2E2
5-tone Rx + 5-tone Tx, choice of figure 3 and 5. Tones:ZVEI	219-018	B76B6 - B77A1	76294-2E2
All units have automatic response.			



AP-RADIOTELEFON

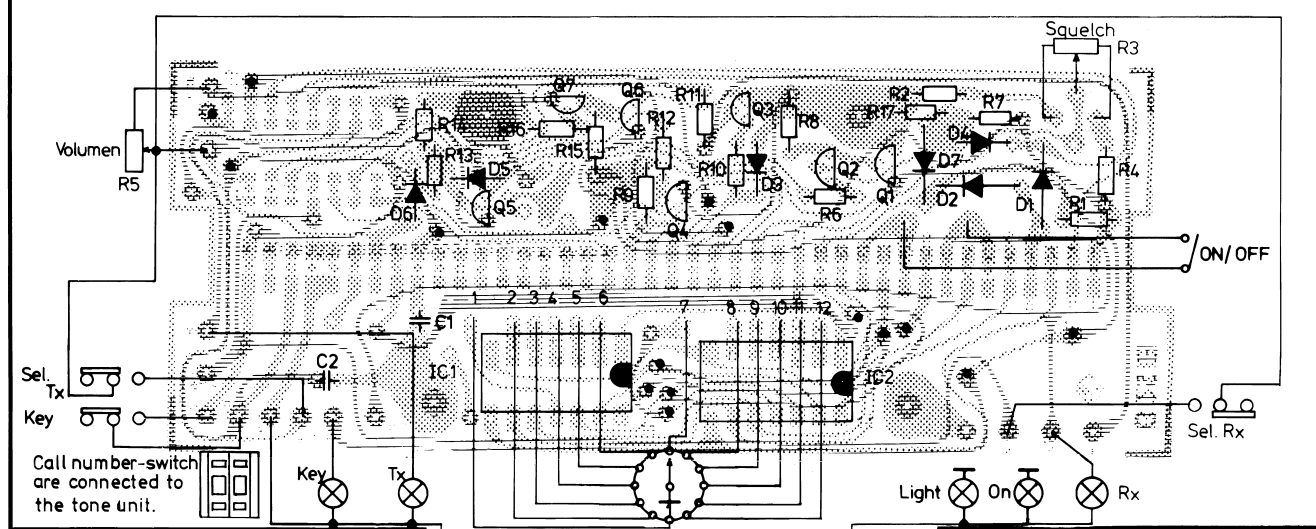
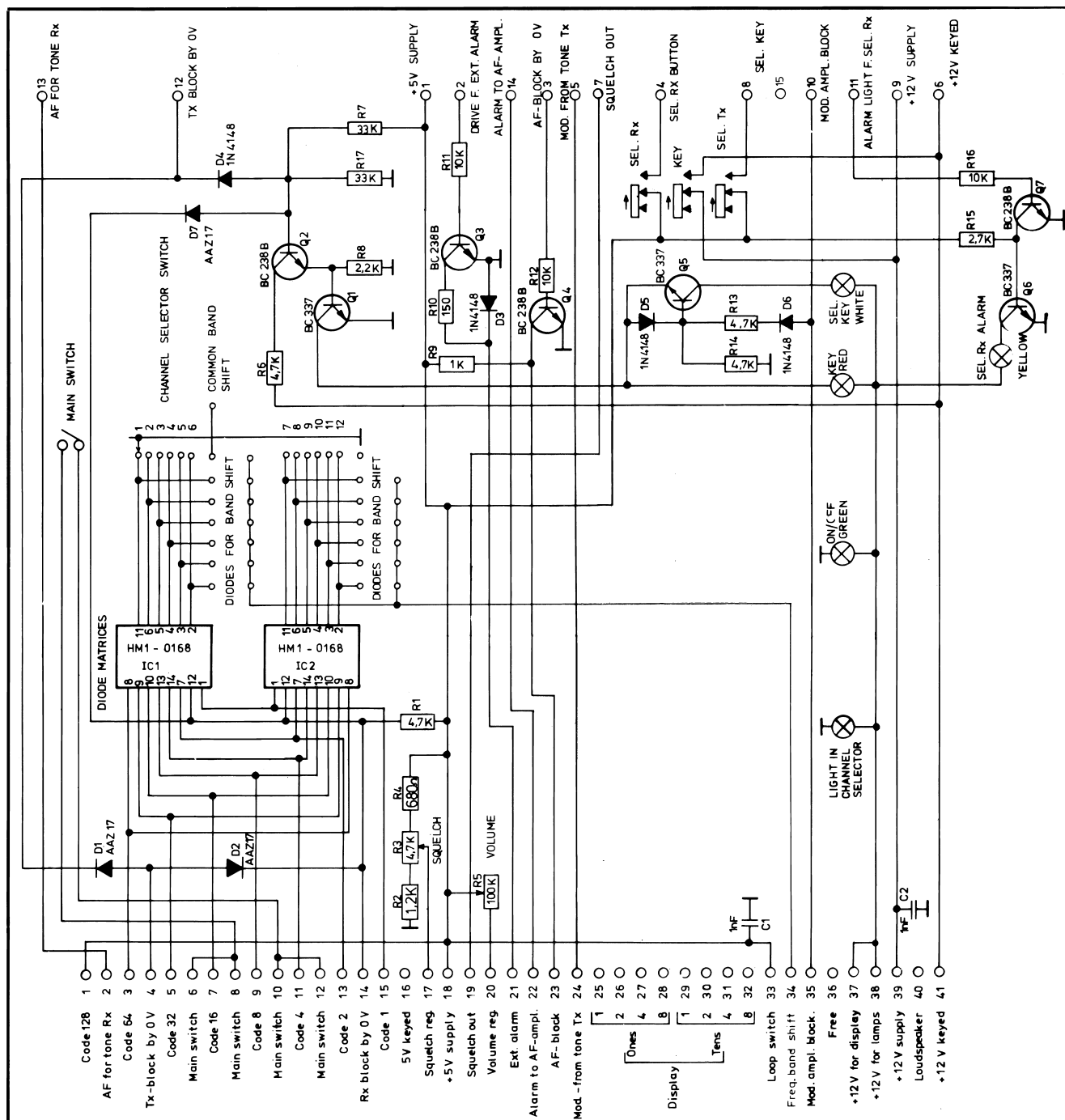
Nr.	Kode	Data	Nr.	Kode	Data
R1	13-291	4,7 K Ω 1/8 W CR16			
R2	13-281	680 Ω " "			
R3	16-022	4,7 K Ω Potm.			
R4	13-284	1,2 K Ω 1/8 W "			
R5	16-023	100 K Ω Lin.Potm.			
R6	13-291	4,7 K Ω 1/8 W CR16			
R7	13-300	33 K Ω " "			
R8	13-287	2,2 K Ω " "			
R9	13-283	1 K Ω " "			
R10	13-273	150 Ω " "			
R11	13-295	10 K Ω " "			
R12	13-295	10 K Ω " "			
R13	13-291	4,7 K Ω " "			
R14	13-291	4,7 K Ω " "			
R15	13-288	2,7 K Ω " "			
R16	13-295	10 K Ω " "			
R17	13-300	33 K Ω " "			
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 05. Print B 20 D1 Tilhører tegn. nr.: 77097-3E2			Rettet:		<div>Tegn.:</div> <div>Stykl. nr.:</div> <div>Kontr.:</div> <div>77097-4S2</div>

FRONTSECTION 07



Toneunits belonging to this frontsection

Function	Unit no.	Print board no.	Diagram no.
5-tone Rx + 5-tone Tx, choice of figure 4 and 5. Tones:CCIR	219-022	B76B3 - B77A1	76294-2E2
5-tone Rx + 5-tone Tx, choice of figure 4 and 5. Tones:ZVEI	219-023	B76B4 - B77A1	76294-2E2
5-tone Rx + 5-tone Tx, choice of figure 3 and 5. Tones:CCIR	219-019	B76B5 - B77A1	76294-2E2
5-tone Rx + 5-tone Tx, choice of figure 3 and 5. Tones:ZVEI	219-018	B76B6 - B77A1	76294-2E2
All units have automatic response			



Retort: 1-10-75 LT/AC
 13-4-77 LT/AC
 23-6-77 JH/AC
 25-1-78 LT/AMC

CONTROL CIRCUIT FOR 12 CHANNELS, FRONTSECTION 07
 PRINT B 21 D 1

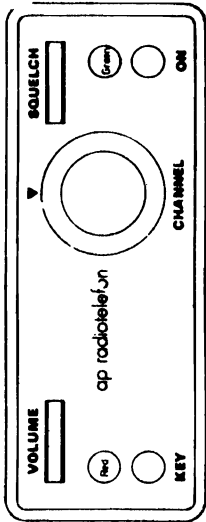
AP-RADIOTELEFON

Tegn.: 15-6-75
 AC
 Strykl. nr.:
 Tegn. nr.:
 77098-3E2

AP-RADIOTELEFON

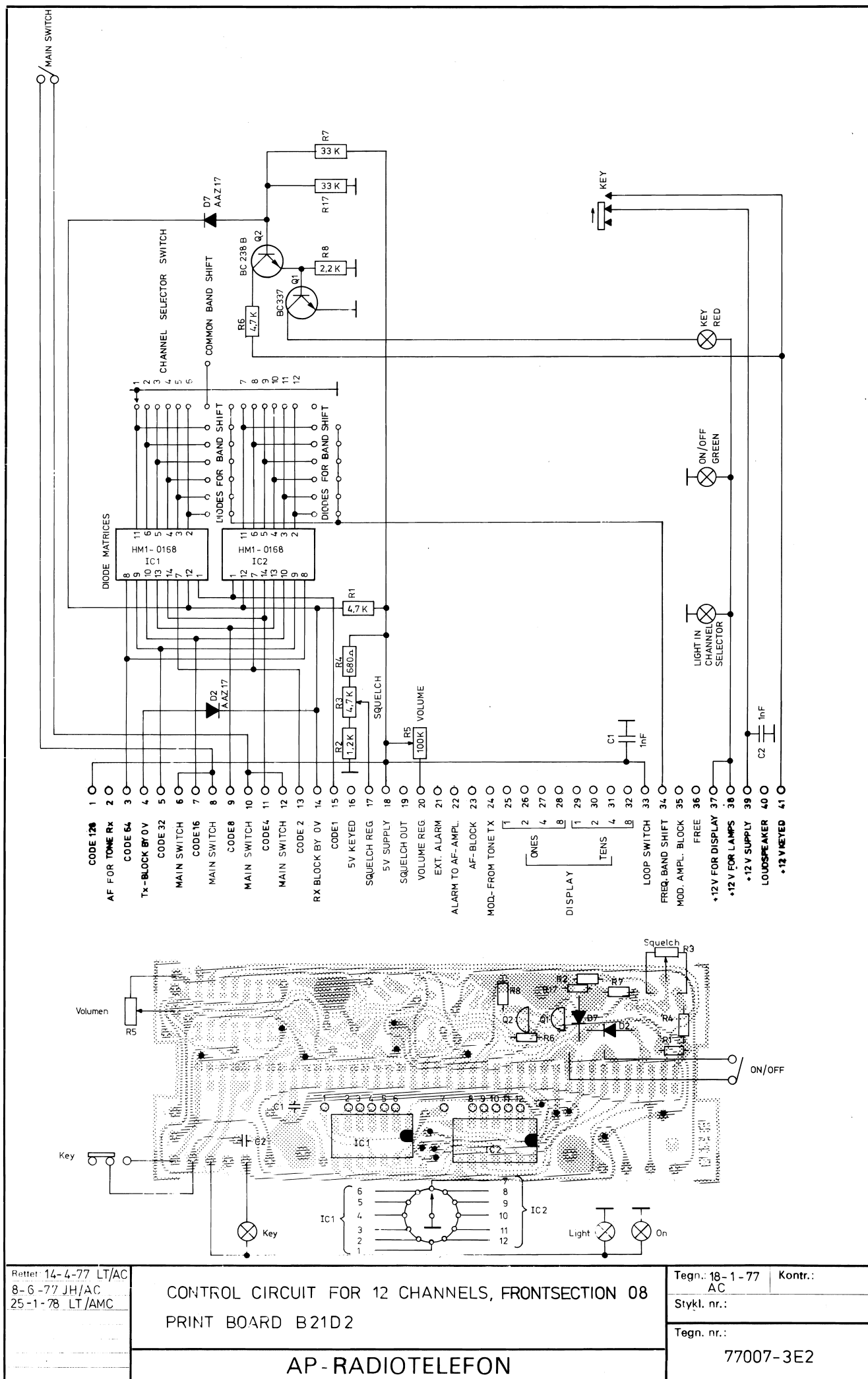
Nr.	Kode	Data	Nr.	Kode	Data
R1	13-291	4,7 KΩ 1/8 W CR16	IC1	09-067	HM1-0168
R2	13-284	1,2 KΩ " "	IC2	09-067	HM1-0168
R3	16-022	4,7 KΩ Potm.			
R4	13-281	680 Ω 1/8 W "			
R5	16-023	100 KΩ Lin.Potm.			
R6	13-291	4,7 KΩ 1/8 W CR16			
R7	13-300	33 KΩ " "			
R8	13-287	2,2 KΩ " "			
R9	13-283	1 KΩ " "			
R10	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 07. Print B 21 D1 Tilhører tegn. nr.: 77098-3E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div> <div>Stykl. nr.: 77098-4S2</div>

FRONTSECTION 08



Toneunits belonging to this frontsection

Function	Unit no.	Print board no.	Diagram no.
Without tone unit			



Retter 14-4-77 LT/AC
8-6-77 JH/AC
25-1-78 LT/AMC

CONTROL CIRCUIT FOR 12 CHANNELS, FRONTSECTION 08
PRINT BOARD B21D2

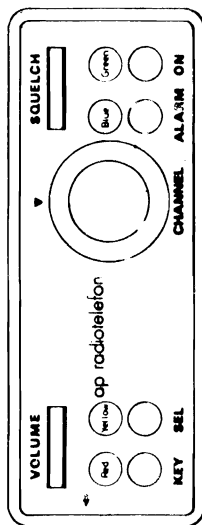
AP-RADIOTELEFON

Tegn.: 18-1-77
AC
Stykl. nr.:
Tegn. nr.:
77007-3E2

AP-RADIOTELEFON

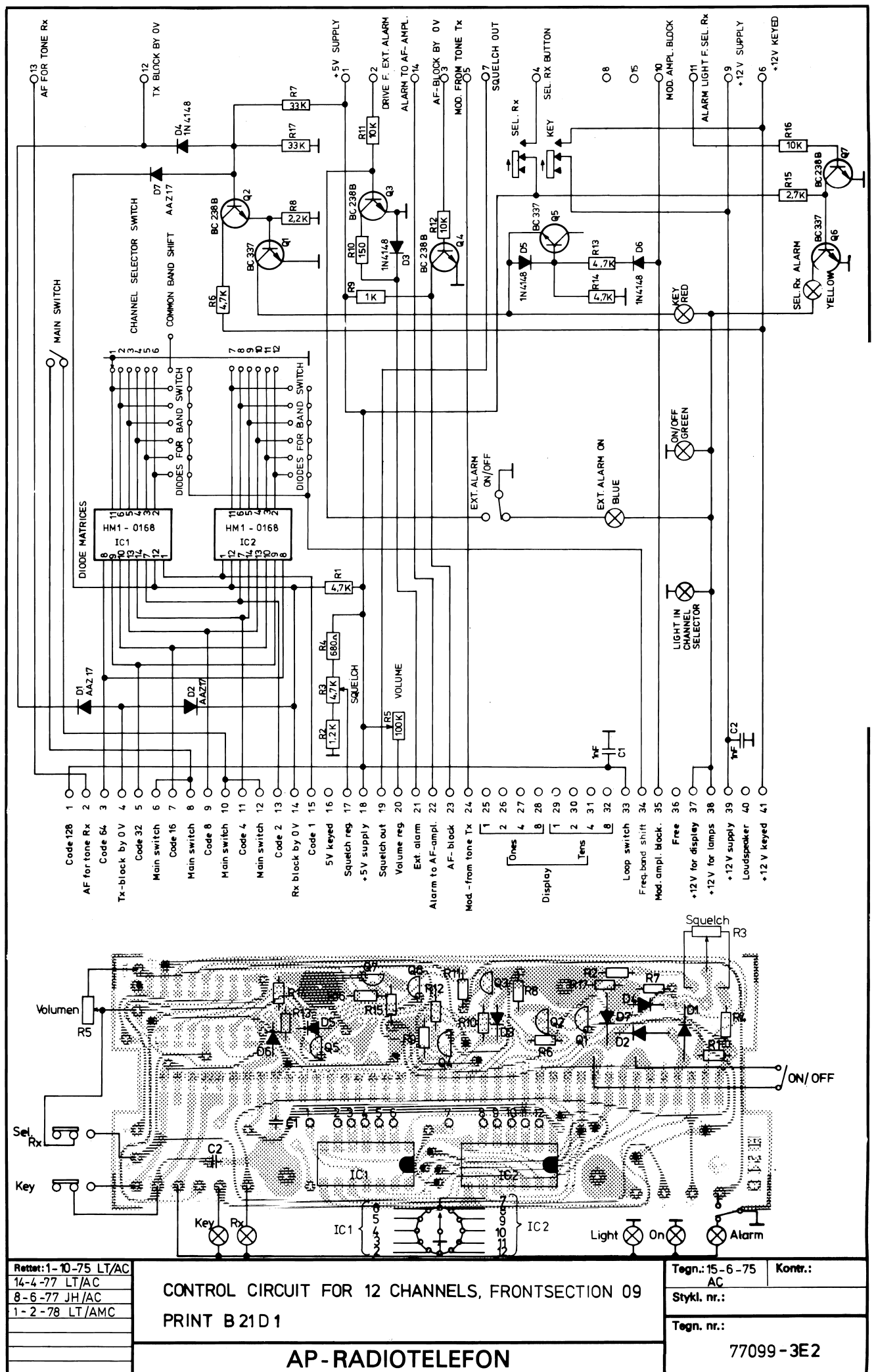
Nr.	Kode	Data	Nr.	Kode	Data
R1	13-291	4,7 K Ω 1/8 W CR16			
R2	13-284	1,2 K Ω " "			
R3	16-022	4,7 K Ω Potm.			
R4	13-281	680 Ω 1/8 W "			
R5	16-023	100 K Ω Lin.Potm.			
R6	13-291	4,7 K Ω 1/8 W CR16			
R7	13-300	33 K Ω " "			
R8	13-287	2,2 K Ω " "			
R17	13-300	33 K Ω " "			
C1	11-409	1 nF Ker.			
C2	11-409	1 nF Ker.			
IC1	09-067	HM1-0168			
IC2	09-067	HM1-0168			
Control circuit for 12 channel frontsection 08. Print B 21 D1			, Rettet:		Tegn.:
Tilhører tegn. nr.: 77007-3E2					Kontr.:
					Stykl. nr.:
					77007-4S2

FRONTSECTION 09



Toneunits belonging to this frontsection

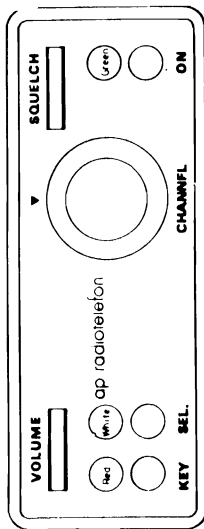
Function	Unit no.	Print board no.	Diagram no.
2-tone Rx. Tones: AP	219-009	B69A1	76236-2E2
3-tone Rx. Tones: AP	219-011	B69A2	76236-2E2
5-tone Rx. Tones: CCIR	219-010	B69A3	76236-2E2
5-tone Rx. Tones: ZVEI	219-014	B69A4	76236-2E2



AP-RADIOTELEFON

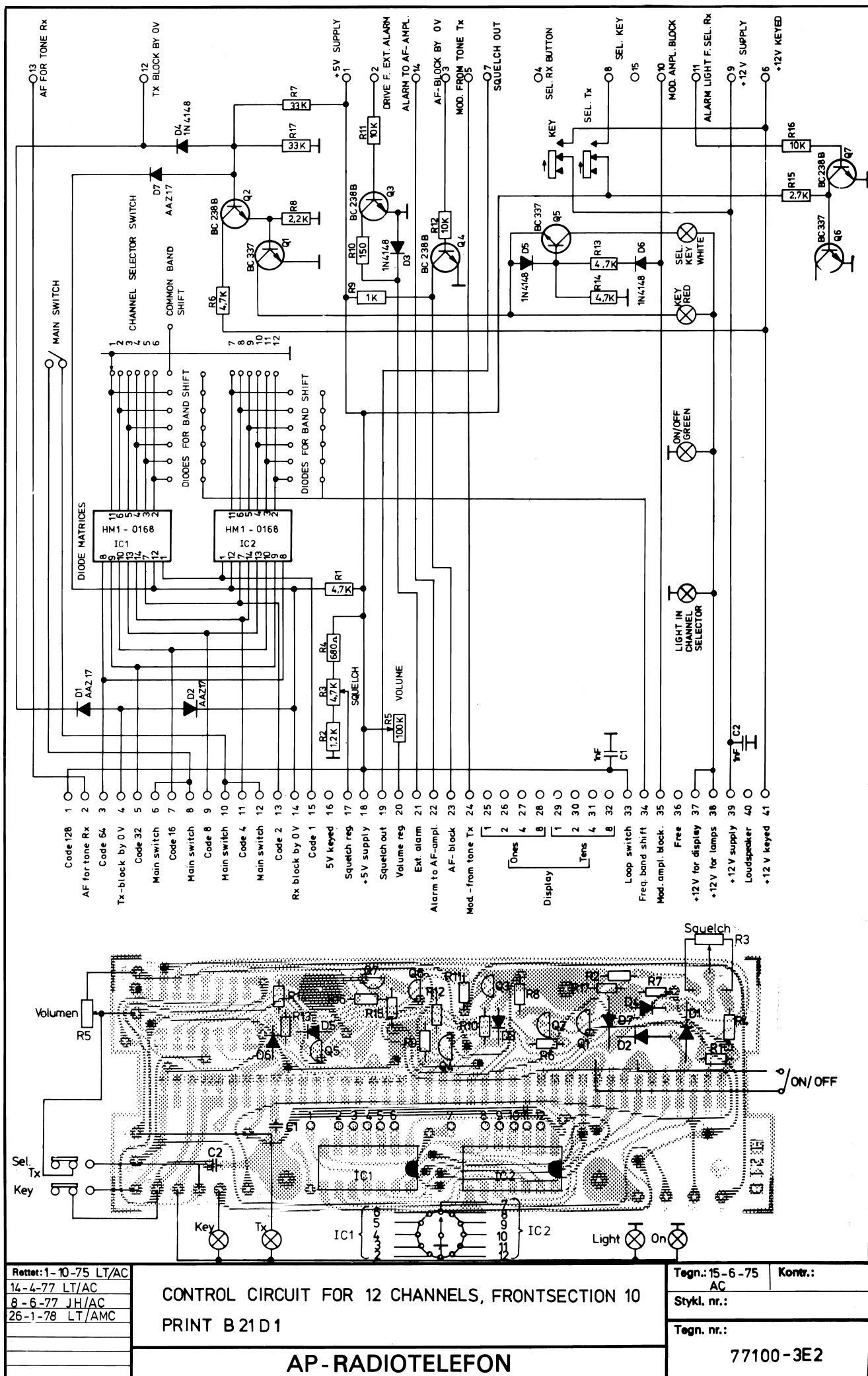
Nr.	Kode	Data	Nr.	Kode	Data
R1	13-291	4,7 KΩ 1/8 W CR16	IC1	09-067	HM1-0168
R2	13-284	680 Ω " "	IC2	09-067	HM1-0168
R3	16-022	4,7 KΩ Potm.			
R4	13-281	1,2 KΩ 1/8 W "			
R5	16-023	100 KΩ Lin.Potm.			
R6	13-291	4,7 KΩ 1/8 W CR16			
R7	13-300	33 KΩ " "			
R8	13-287	2,2 KΩ " "			
R9	13-283	1 KΩ " "			
R10	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 " "			
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 09. Print B 21 D1 Tilhører tegn. nr.: 77099-3E2			Rettet:		<div>Tegn.: Stykl. nr:</div> <div>Kontr.: 77099-4S2</div>

FRONTSECTION 10



Toneunits belonging to this frontsection

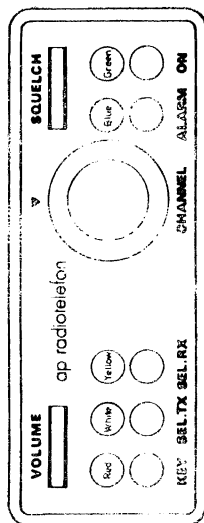
Function	Unit no.	Print board no.	Diagram no.
2-tone Tx. Tones: AP	219-031	B85A6	ikke tegn. 3/3-1977.
3-tone Tx. Tones: AP	219-030	B85A5	
5-tone Tx. Tones: ZVEI	219-028	B85A3	
5-tone Tx. Tones: CCIR	219-029	B85A4	



AP-RADIOTELEFON

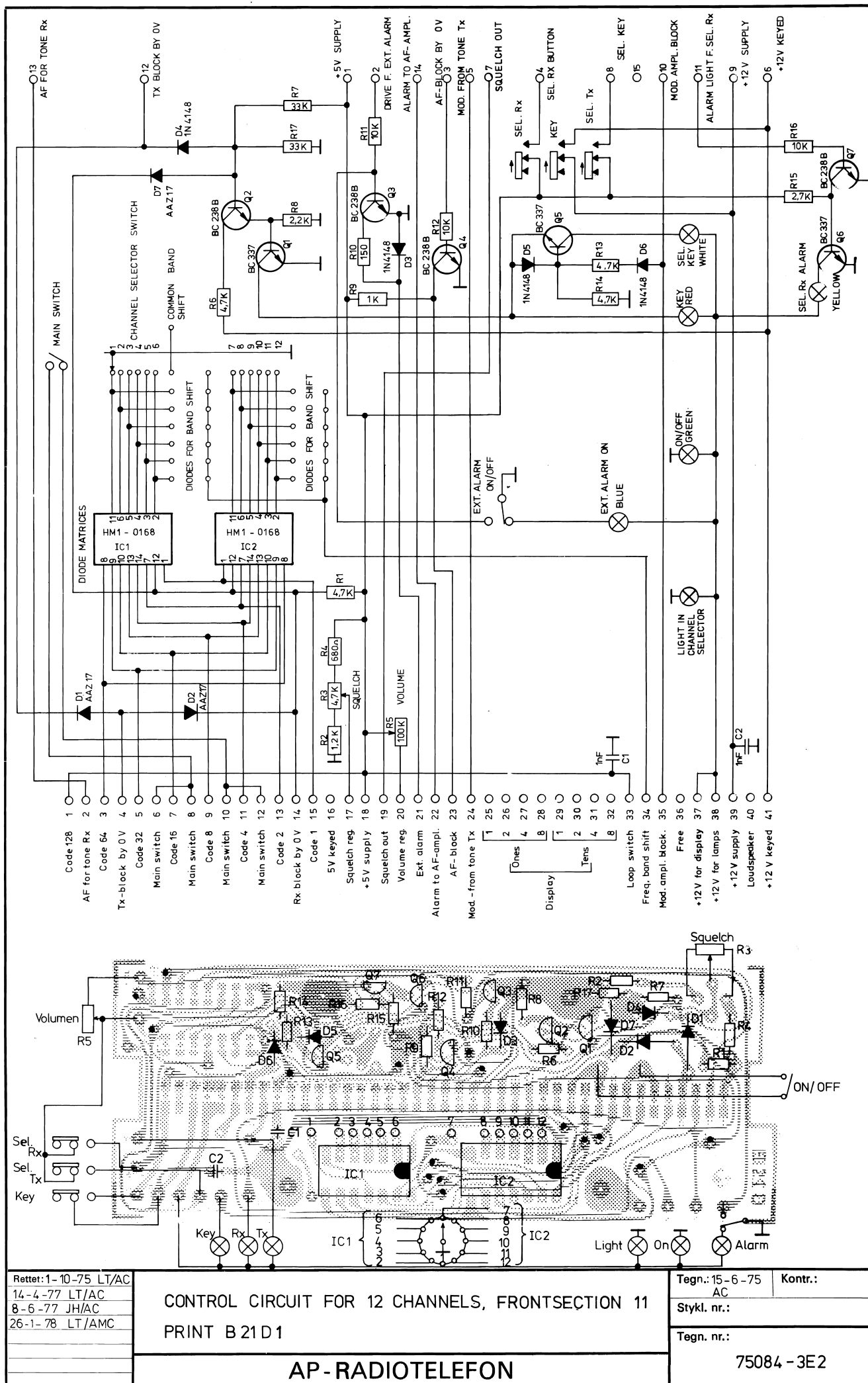
Nr.	Kode	Data	Nr.	Kode	Data
R1	13-291	4,7 K Ω 1/8 W CR16	IC1	09-067	HM1-0168
R2	13-284	1,2 K Ω " "	IC2	09-067	HM1-0168
R3	16-022	4,7 K Ω Potm.			
R4	13-281	680 Ω 1/8 W "			
R5	16-023	100 K Ω Lin.Potm.			
R6	13-291	4,7 K Ω 1/8 W CR16			
R7	13-300	33 K Ω " "			
R8	13-287	2,2 K Ω " "			
R9	13-283	1 K Ω " "			
R10	13-273	150 Ω " "			
R11	13-295	10 K Ω " "			
R12	13-295	10 K Ω " "			
R13	13-291	4,7 K Ω " "			
R14	13-291	4,7 K Ω " "			
R15	13-288	2,7 K Ω " "			
R16	13-295	10 K Ω " "			
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 10. Print B 21 D1 Tilhører tegn. nr.: 77100-3E2			,Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 77100-4S2

FRONTSECTION 11



Toneunits belonging to this frontsection

Function	Unit no.	Print board no.	Diagram no.
2-tone Tx + 2-tone Rx.	219-005	B74B1 - B67A1	76223-2E2
2-tone Tx + 2-tone Rx, aut. response.	219-007	B74B2 - B67A1	76223-2E2
5-tone Tx + 5-tone Rx, aut. response.	219-020	B76B1 - B77A1	76294-2E2
5-tone Tx + 5-tone Rx, aut. response.	219-021	B76B2 - B77A1	76294-2E2
2-tone Tx/Rx parallel	219-024	B84A1	77125-2E2
2-tone Tx/Rx parallel	219-026	B84A2	77125-2E2
2-tone Tx/Rx	219-032	B74B3 - B67A1	76223-2E2
2-tone Tx/Rx aut. response	219-033	B74B4 - B67A1	76223-2E2



Rettet: 1-10-75 LT/AC
 14-4-77 LT/AC
 8-6-77 JH/AC
 26-1-78 LT/AMC

CONTROL CIRCUIT FOR 12 CHANNELS, FRONTSECTION 11
 PRINT B 21 D 1

AP-RADIOTELEFON

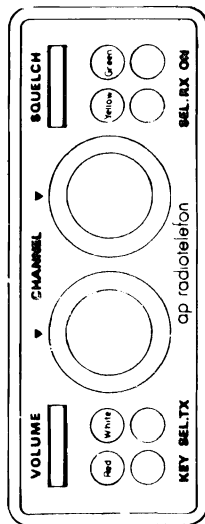
Tegn.: 15-6-75
 AC
 Stykl. nr.:
 Tegn. nr.:

75084-3E2

AP-RADIOTELEFON

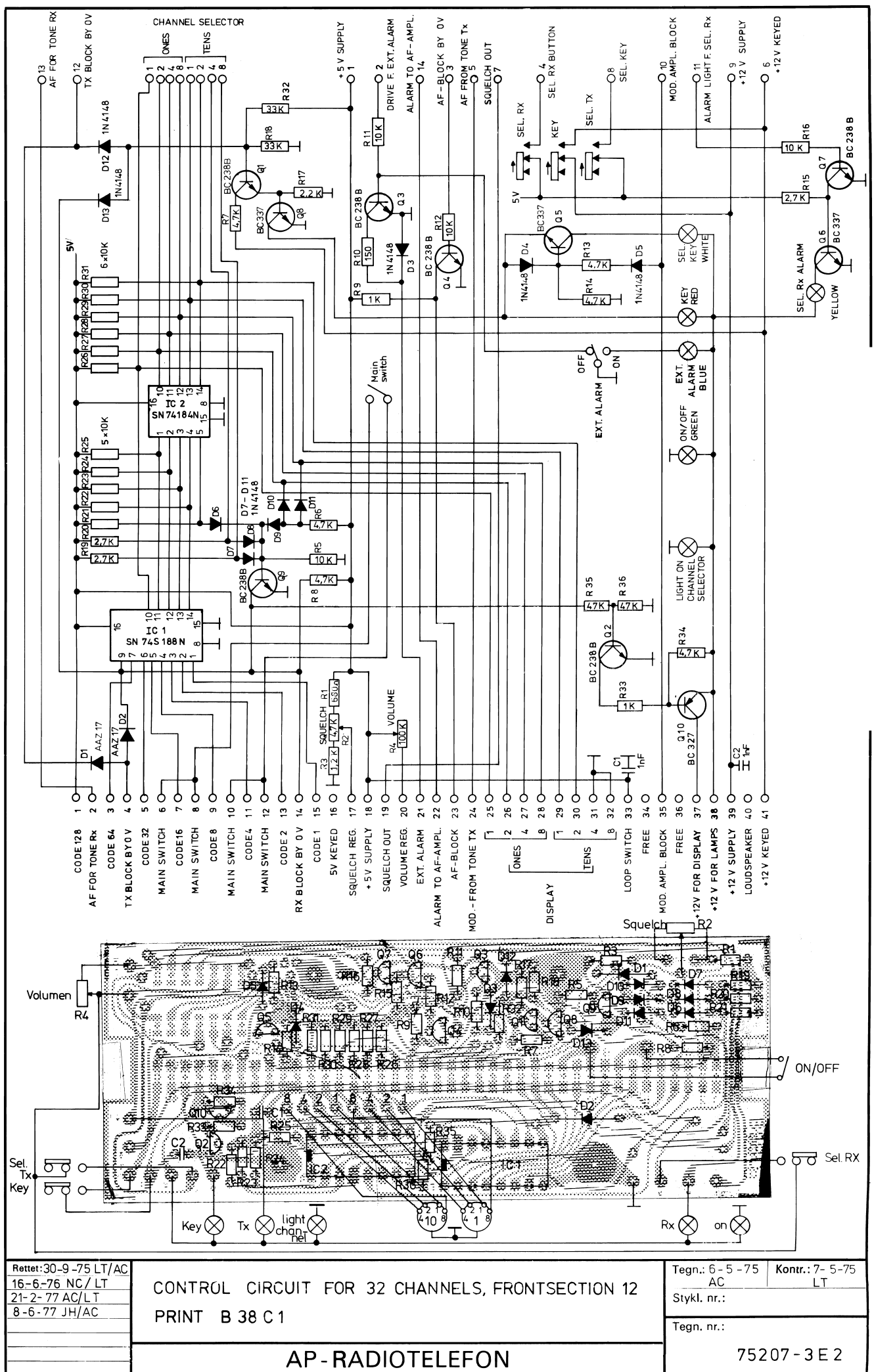
Nr.	Kode	Data	Nr.	Kode	Data
R1	13-291	4,7 K Ω 1/8 W CR16	IC1	09-067	HM1-0168
R2	13-284	1,2 K Ω " "	IC2	09-067	HM1-0168
R3	16-022	4,7 K Ω Potm.			
R4	13-281	680 Ω 1/8 W "			
R5	16-023	100 K Ω Lin.Potm.			
R6	13-291	4,7 K Ω 1/8 W CR16			
R7	13-300	33 K Ω " "			
R8	13-287	2,2 K Ω " "			
R9	13-283	1 K Ω " "			
R10	13-273	150 Ω " "			
R11	13-295	10 K Ω " "			
R12	13-295	10 K Ω " "			
R13	13-291	4,7 K Ω " "			
R14	13-291	4,7 K Ω " "			
R15	13-288	2,7 K Ω " "			
R16	13-295	10 K Ω " "			
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>

FRONTSECTION 12



Toneunits belonging to this frontsection

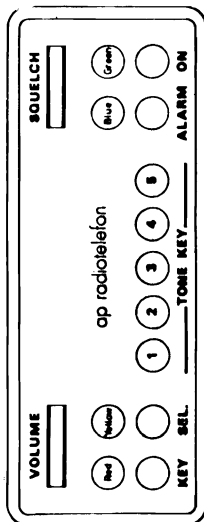
Function	Unit no.	Print board no.	Diagram no.
2-tone Tx + 2-tone Rx.	219-005	B74B1 -- B67A1	76223-2E2
2-tone Tx + 2-tone Rx, aut. response.	219-007	B74B2 -- B67A1	76223-2E2
5-tone Tx + 5-tone Rx, aut. response.	219-020	B76B1 -- B77A1	76294-2E2
5-tone Tx + 5-tone Rx, aut. response.	219-021	B76B2 -- B77A1	76294-2E2
2-tone Tx/Rx parallel	219-024	B84A1	77125-2E2
2-tone Tx/Rx parallel	219-026	B84A2	77125-2E2
2-tone Tx/Rx	219-032	B74B3 -- B67A1	76223-2E2
2-tone Tx/Rx aut. response	219-033	B74B4 -- B67A1	76223-2E2



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

FRONTSECTION 13



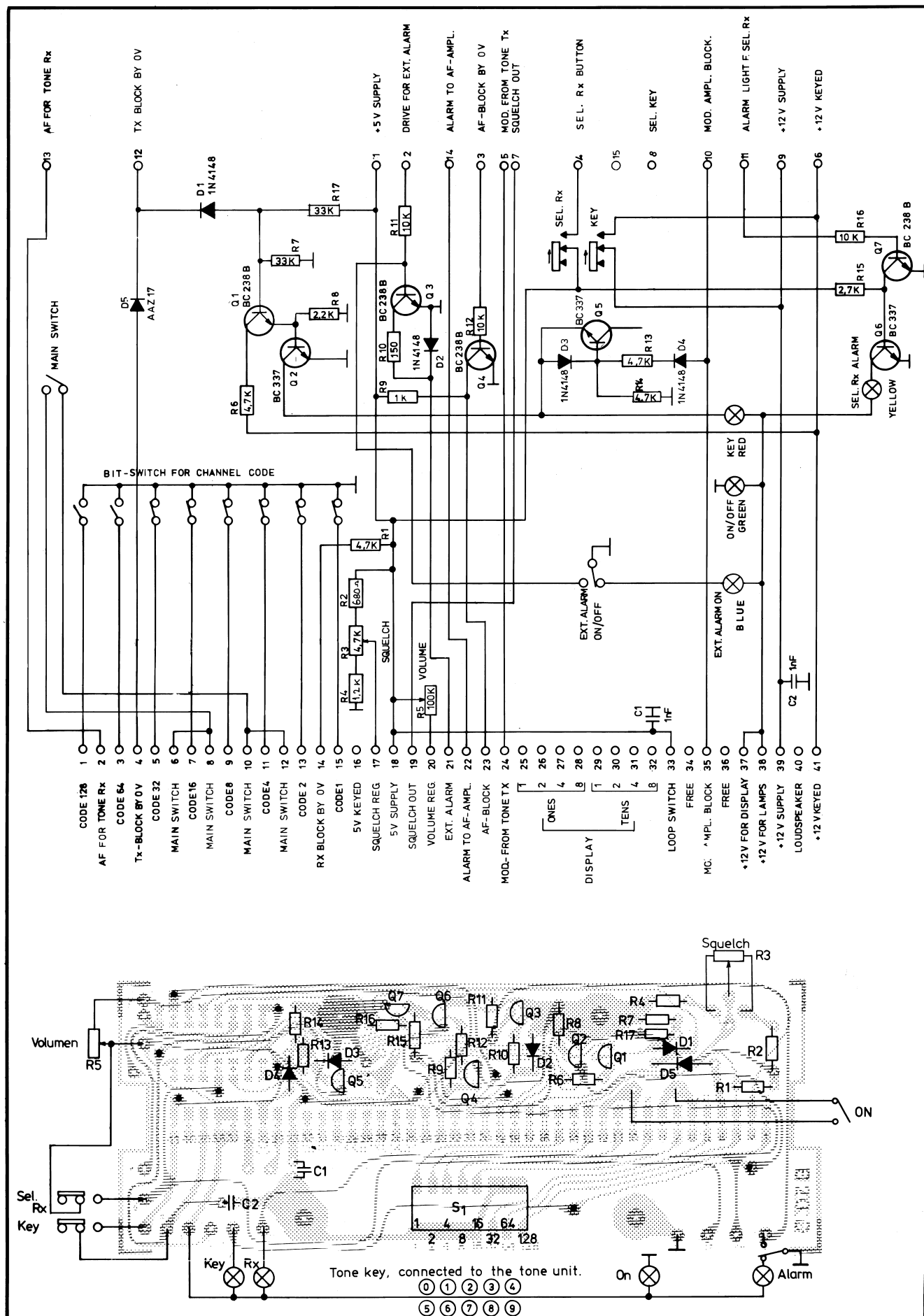
Toneunits belonging to this frontsection

Function	Unit no.	Print board no.	Diagram no.
Tone Tx + 2-tone Rx. Tones : AP	219-006	B66B1 - B67A1	76231-2E2
Tone Tx + 2-tone Rx aut. response. Tones : AP	219-008	B66B2 - B67A1	76231-2E2
Tone Tx + 3-tone Rx. Tones : AP	219-015	B86A1 - B67A1	
Tone Tx + 3-tone Rx aut. response. Tones : AP	219-016	B86A2 - B67A1	
Tone Tx + 3-tone Rx. Tones : AGA	219-034	B86A3 - B67A1	
Tone Tx + 3-tone Rx aut. response. Tones : AGA	219-035	B86A4 - B67A1	

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-291	4,7 K Ω 1/8 W CR16			
R2	13-281	680 Ω " "			
R3	16-022	4,7 K Ω Potm.			
R4	13-284	1,2 K Ω 1/8 W "			
R5	16-023	100 K Ω Lin.Potm.			
R6	13-291	4,7 K Ω 1/8 W CR16			
R7	13-300	33 K Ω " "			
R8	13-287	2,2 K Ω " "			
R9	13-283	1 K Ω " "			
R10	13-273	150 Ω " "			
R11	13-295	10 K Ω " "			
R12	13-295	10 K Ω " "			
R13	13-291	4,7 K Ω " "			
R14	13-291	4,7 K Ω " "			
R15	13-288	2,7 K Ω " "			
R16	13-295	10 K Ω " "			
R17	13-300	33 K Ω " "			
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 13. Print B 20D1			Rettet:		Tegn.:
Tilhører tegn. nr.: 77101-3E2					Kontr.:
					Stykl. nr.: 77101-4S2

Function	Unit no.	Print board no.	Diagram no.
Tone Tx + 2-tone Rx.	219-006	B66B1 - B67A1	76231-2E2
Tone Tx + 2-tone Rx aut. response.	219-008	B66B2 - B67A1	76231-2E2
Tone Tx + 3-tone Rx.	219-015	B86A1 - B67A1	
Tone Tx + 3-tone Rx aut. response.	219-016	B86A2 - B67A1	
Tone Tx + 3-tone Rx.	219-034	B86A3 - B67A1	
Tone Tx + 3-tone Rx aut. response.	219-035	B86A4 - B67A1	



Rettet: 30-9-75 LT/AC
 9-6-77 JH/AC
 9-2-78 LT/AMC

CONTROL CIRCUIT FOR 1 CHANNEL, FRONTSECTION 14
 PRINT B 20D1

AP-RADIOTELEFON

Tegn.: 13-2-75 NC Kontr.: 13-2-75 LT

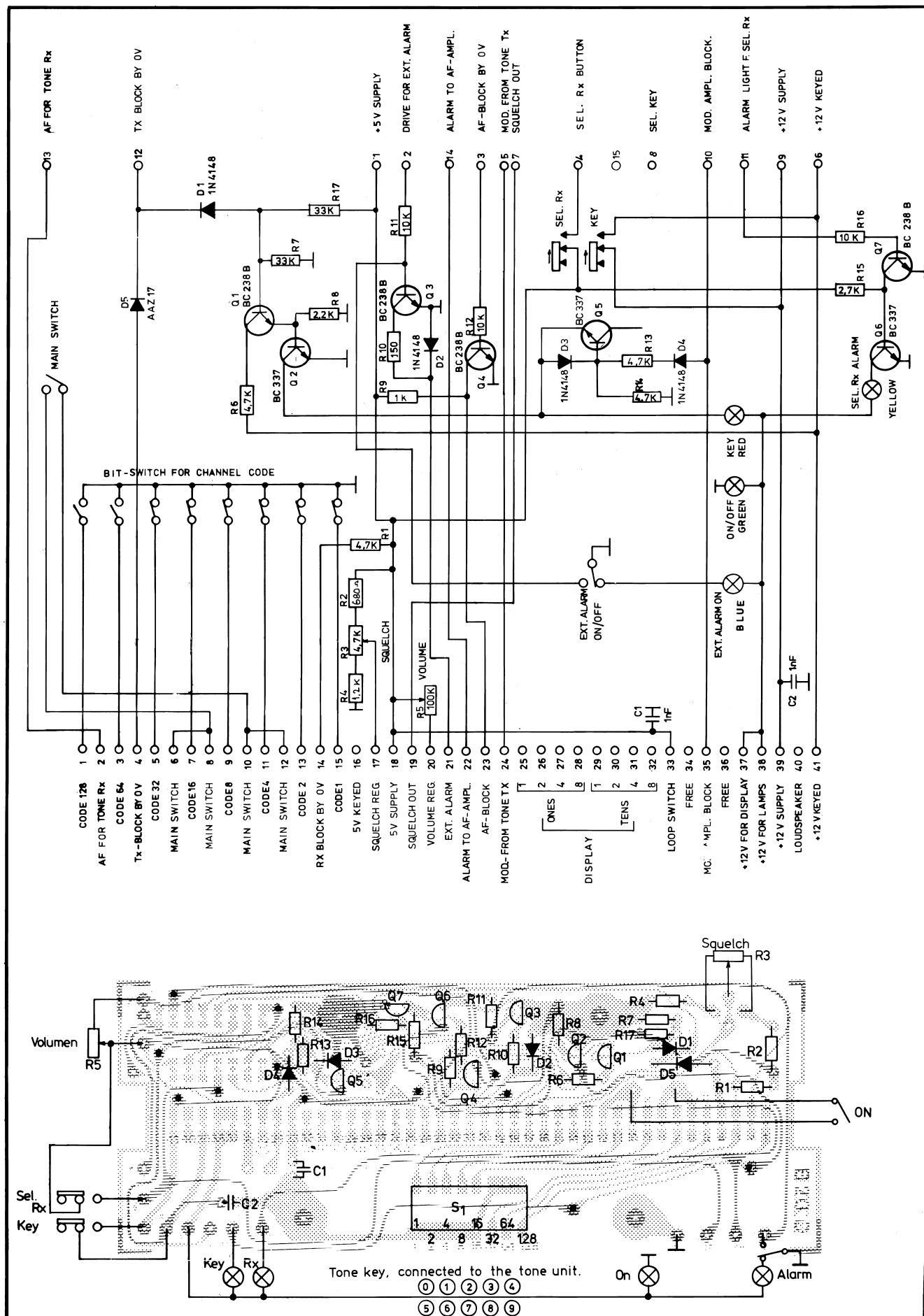
Stykl. nr.:

Tegn. nr.:

77102 - 3E2

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 14. Print B 20 D1 Tilhører tegn. nr.: 77102-3E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div> <div>Stykl. nr.: 77102-4S2</div>



Rettet: 30-9-75 LT/AC
 9-6-77 JH/AC
 9-2-78 LT/AMC

CONTROL CIRCUIT FOR 1 CHANNEL, FRONTSECTION 14
 PRINT B 20D1

AP-RADIOTELEFON

Tegn.: 13-2-75 NC Kontr.: 13-2-75 LT

Stykl. nr.:

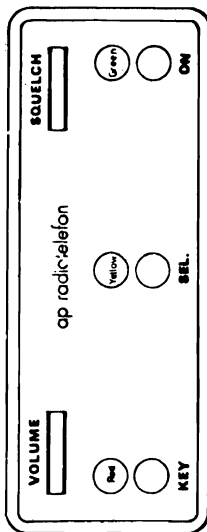
Tegn. nr.:

77102 - 3E2

AP-RADIOTELEFON

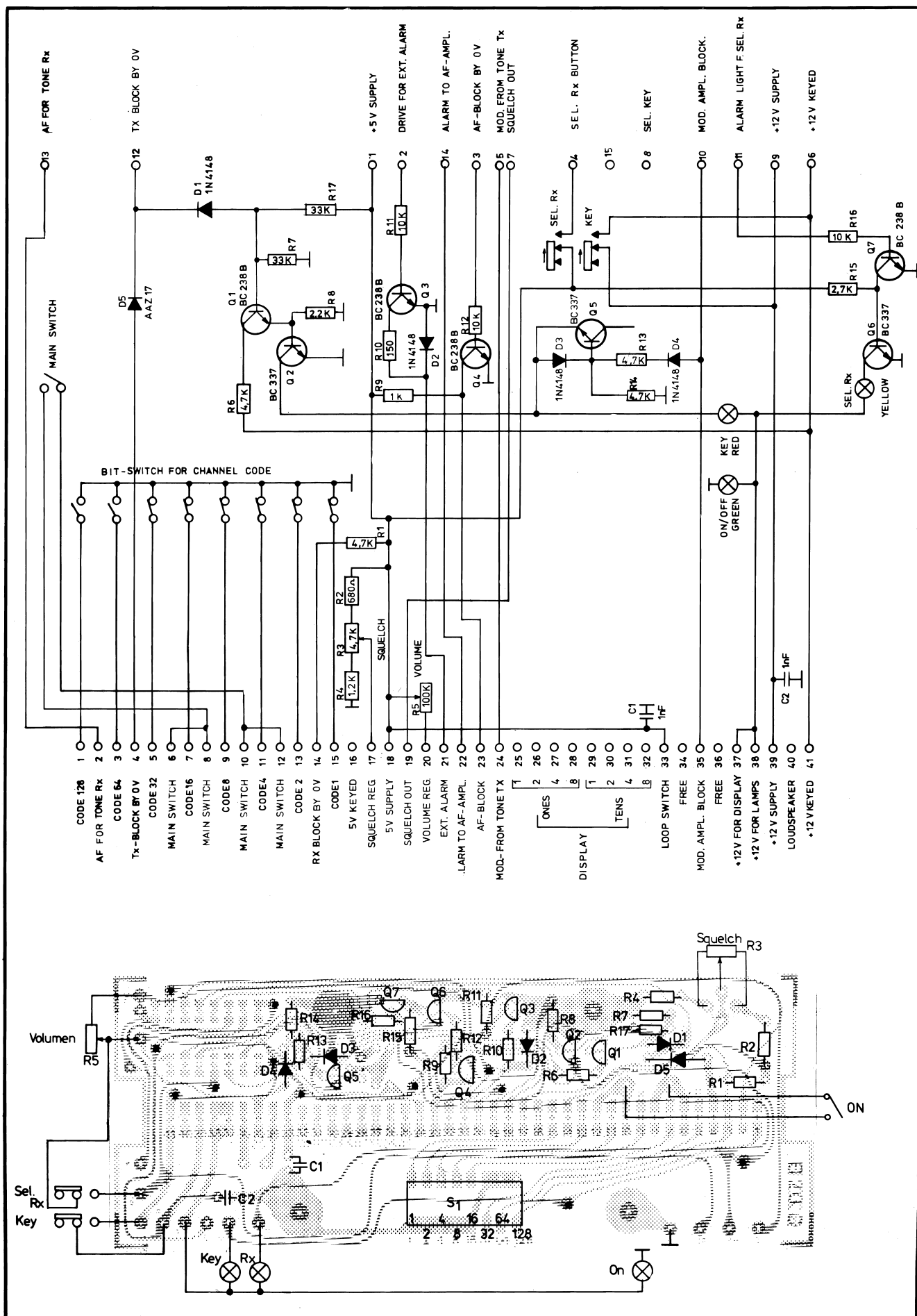
Nr.	Kode	Data	Nr.	Kode	Data
R1	13-291	4,7 K Ω 1/8 W CR16			
R2	13-281	680 Ω " "			
R3	16-022	4,7 K Ω Potm.			
R4	13-284	1,2 K Ω 1/8 W "			
R5	16-023	100 K Ω Lin.Potm.			
R6	13-291	4,7 K Ω 1/8 W CR16			
R7	13-300	33 K Ω " "			
R8	13-287	2,2 K Ω " "			
R9	13-283	1 K Ω " "			
R10	13-273	150 Ω " "			
R11	13-295	10 K Ω " "			
R12	13-295	10 K Ω " "			
R13	13-291	4,7 K Ω " "			
R14	13-291	4,7 K Ω " "			
R15	13-288	2,7 K Ω " "			
R16	13-295	10 K Ω " "			
R17	13-300	33 K Ω " "			
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 14. Print B 20 D1 Tilhører tegn. nr.: 77102-3E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div> <div>Stykl. nr.: 77102-4S2</div>

FRONTSECTION 16



Toneunits belonging to this frontsection

Function	Unit no.	Print board no.	Diagram no.
Pilottone unit 1-tone Rx + 1-tone Tx	219-001	B 68 A1	76242-2E2



Retter: 30-9-75 LT/AC
 14-4-77 LT/AC
 9-6-77 JH/AC
 9-2-78 LT/AMC

CONTROL CIRCUIT FOR 1 CHANNEL, FRONTSECTION 16
 PRINT B 20D1

AP-RADIOTELEFON

Tegn.: 13-2-75 NC
 Kontr.: 13-2-75 LT

Stykl. nr.:

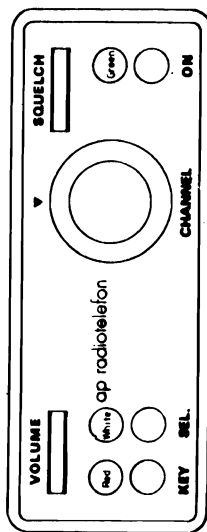
Tegn. nr.:

77103-3E2

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 16. PrintB 20 D1 Tilhører tegn. nr.: 77103-3E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 77103-4S2

FRONTSECTION 17



Toneunits belonging to this frontsection

Function	Unit no.	Print board no.	Diagram no.
Pilottone unit 1-tone Rx + 1-tone Tx	219-001	B 68 A1	76242-2E2

AP-RADIOTELEFON

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 17. Print B 21 D1 Tilhører tegn. nr.: 77104-3E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 77104-4S2

PILOTTONE Rx/Tx B68

B68 er en kombineret 1-tone sender/modtager, med hvilken det er muligt at udelukke fremmed kommunikation på frekvensen.

VIRKEMÅDE AF B68 MONTERET I MOBILSTATION

Tonemodtageren vil altid være indkoblet, når stationen tændes, hvilket indikeres med en tændt gul lampe. Modtages et opkald vil den gule lampe slukke, og højttaleren åbne. Højttaleren vil forblive åben, så længe squelchen er åben, og lukkes ca. $\frac{1}{2}$ sec. efter squelchen er lukket.

I områder med meget flutter kan tonemodtageren udkobles ved tryk på selektivknappen. Al trafik på kanalen vil kunne høres. Tonemodtageren indkobles atter ved et nyt tryk på selektivknappen.

Ved hver transmissons begyndelse udsendes en tone i ca. 400 ms, som åbner basisstationens højttaler. I dette tidsrum er mikrofonen blokeret. Selektivknappen har i dette udstyr ingen indflydelse på senderen.

TEKNISK BESKRIVELSE AF B68

Tonemodtageren

Tidskonstanten R33, C18 vil når apparatet tændes bevirke, at Q på IC3 FF1 vil være på logisk 0 og Q på IC3 FF2 vil være på logisk 1. Herved vil sel.lampen lyse og højttaleren være lukket.

Det indkomne tonesignal filtreres af det aktive lavpas-filter, bestående af operationsforstærkeren IC1 og R4, R5, C2 og C3. Afskæringsfrekvensen for filteret er ca. 3 kHz. Efter lavpas-filteret efterbetones signalet med R9, C6, inden det tilføres ben 5 på klipperforstærkeren IC1.

L1 og C9 udgør en resonanskreds, hvis resonansfrekvens bestemmes af hvilket udtag Q2 er tilsluttet. Resonansfrekvensen forstærkes af Q5 og Q7 inden signalet tilføres halvbølgedetektoren Q8. Det detekterede signal bevirker, at der kommer et DC-niveau på TP1, der med ca. 150 ms forsinkelse tilføres reset indgangen på IC3 FF2. \bar{Q} på FF2 går på logisk 1 og åbner for højttaleren.

Under opkald er squelch-indgangen ben 7 på logisk 0. Forsvinder bærebølgen vil clock-indgangen ben 11 på IC3 FF2, efter ca. $\frac{1}{2}$ sec. få en impuls, der atter sætter \bar{Q} på logisk 0, og dermed lukkes højttaleren og den gule lampe lyser.

Med sel.knappen kan højttaleren henholdsvis den gule lampe åbne/lyse og lukke/slukke.

TONESENDEREN

Tastes stationen oplades tidskonstanten C4, R6 og aktiverer udgangen af IC 2 ben 5 i ca. 400 ms. Et logisk 1 på denne udgang vil aktivere transistorerne Q3 og Q4. Q3 bestemmer resonansfrekvensen medens Q4 aktiverer oscillatorens tilbagekoblingsvikling, og starter toneosillatoren. Dioden D6 hindrer, at toneudstyret kalder sig selv op under tonetransmission.

JUSTERING AF TONEMODTAGER

En målesender moduleret med tone 6 og 3 kHz div. tilsluttes mobilapparatet. Rx strapningen tilsluttes udtog nr. 6 på L1. Et Dc-votmeter tilsluttes TP1. L1 justeres til max. udslag på TP1. Tone 6 varieres $\pm 3\%$ og L1 justeres til symmetri.

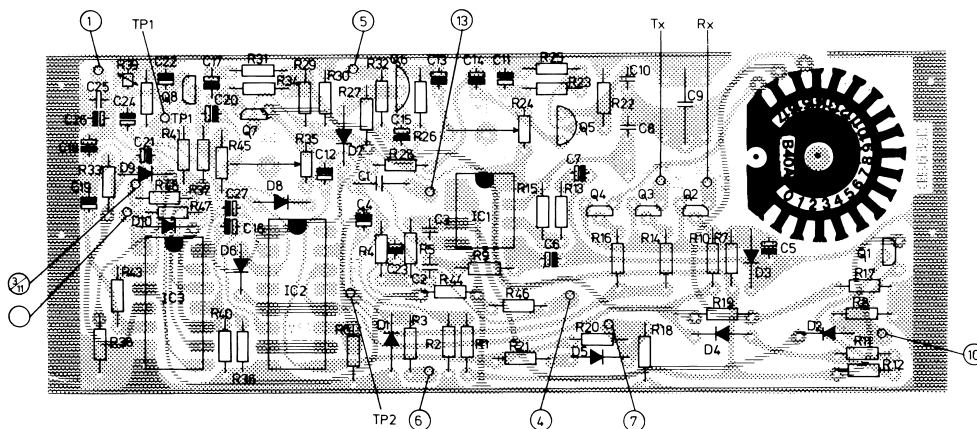
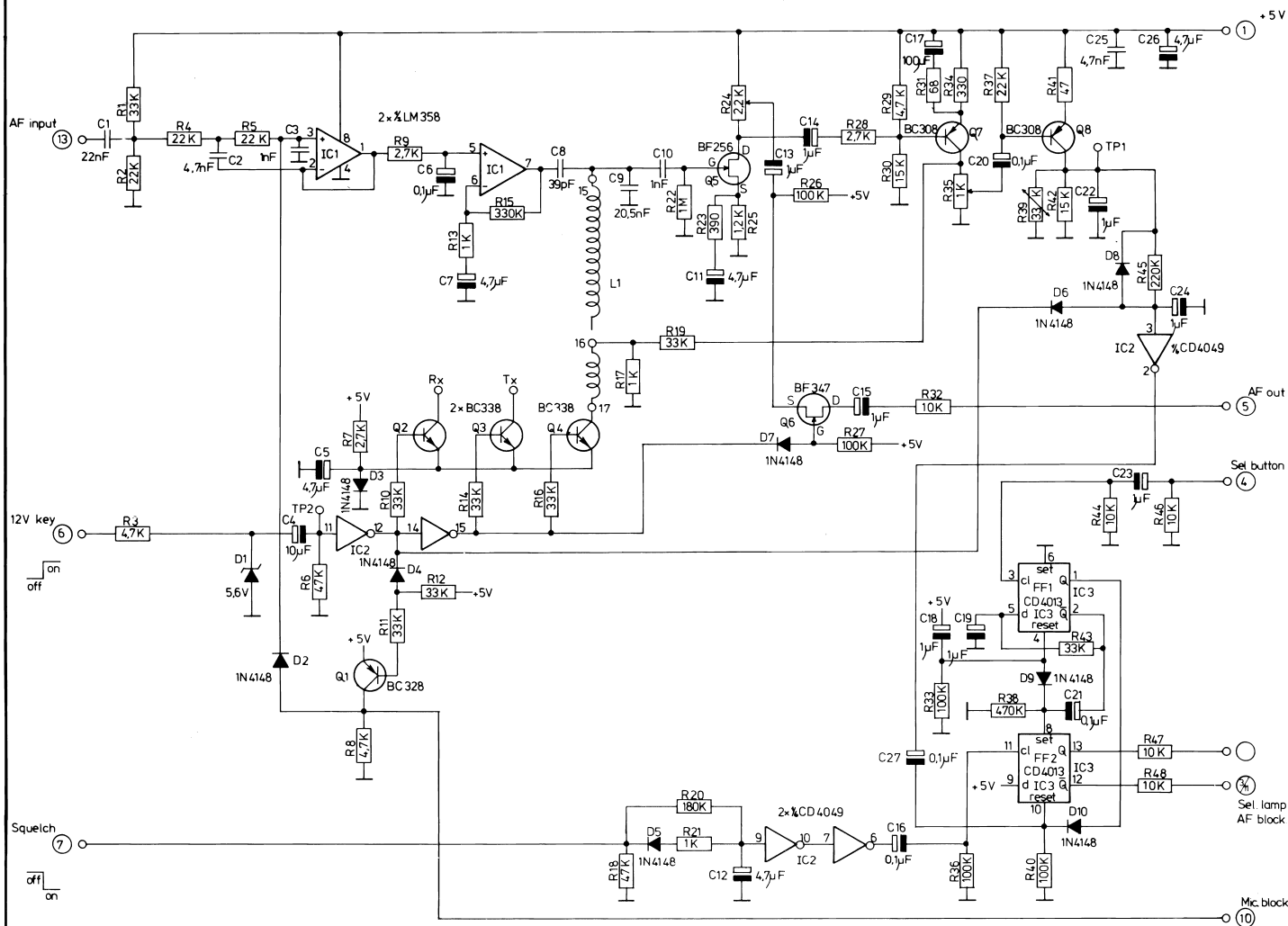
R35 justeres til 1V $\pm 0,1V$ på TP1 ved tone 6 + 3% eller tone 6 - 3%.

L1 kontrolleres for symmetri ved dette DC niveau. Rx strapningen flyttes til det ønskede udtag.

JUSTERING AF TONESENDEREN

Tx strapningen påloddet det ønskede udtag. TP2 strappes til 5V. R24 justeres til 2,4 kHz div. på et modulationsmeter.

Det kontrolleres, at tonesenderen ligger inden for ± 10 Hz af den ønskede frekvens.



AP TONES

Tone no.	76136-4E2
0	980 Hz
1	1190 Hz
2	1380 Hz
3	1600 Hz
4	1800 Hz
5	2010 Hz
6	2220 Hz
7	2410 Hz
8	2590 Hz
9	2820 Hz
11	2960 Hz

Rettest: 1-3-78 IM/AMC
17-4-78 TJ/AMC

Pilottone Rx/Tx
Print B68D1

AP-RADIOTELEFON ½

Tegn.: 5-1-78
AMC
Stykt. nr.:
Tegn. nr.: 78002-2E2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-300	33 KΩ 1/8W CR 16	R38	13-315	470 KΩ 1/8W CR 16
R2	13-299	22 KΩ " "	R39	13-671	33 KΩ NTC
R3	13-291	4,7 KΩ " "	R40	13-306	100 KΩ 1/8W CR 16
R4	13-299	22 KΩ " "	R41	13-267	47 Ω " "
R5	13-299	22 KΩ " "	R42	13-297	15 KΩ " "
R6	13-302	47 KΩ " "	R43	13-300	33 KΩ " "
R7	13-288	2,7 KΩ " "	R44	13-295	10 KΩ " "
R8	13-291	4,7 KΩ " "	R45	13-309	220 KΩ " "
R9	13-288	2,7 KΩ " "	R46	13-295	10 KΩ " "
R10	13-300	33 KΩ " "	R47	13-295	10 KΩ " "
R11	13-300	33 KΩ " "	R48	13-295	10 KΩ " "
R12	13-300	33 KΩ " "			
R13	13-283	1 KΩ " "	C1	11-489	22 nF MKH
R14	13-300	33 KΩ " "	C2	11-416	4,7 nF ker.
R15	13-310	330 KΩ " "	C3	11-409	1 nF "
R16	13-300	33 KΩ " "	C4	11-506	10 µF/25V tant.
R17	13-283	1 KΩ " "	C5	11-504	4,7 µF/10V "
R18	13-302	47 KΩ " "	C6	11-500	0,1 µF/35V "
R19	13-300	33 KΩ " "	C7	11-504	4,7 µF/10V "
R20	13-314	180 KΩ " "	C8	11-393	39 pF ker.
R21	13-283	1 KΩ " "	C9	11-651	20,5 nF styr.
R22	13-312	1 MΩ " "	C10	11-409	1 nF ker.
R23	13-278	390 Ω " "	C11	11-504	4,7 µF/10V tant.
R24	19-254	2,2 KΩ Trim. ligg.	C12	11-504	4,7 µF/10V "
R25	13-284	1,2 KΩ 1/8W CR 16	C13	11-502	1 µF/35V "
R26	13-306	100 KΩ " "	C14	11-502	1 µF/35V "
R27	13-306	100 KΩ " "	C15	11-502	1 µF/35V "
R28	13-288	2,7 KΩ " "	C16	11-500	0,1 µF/35V "
R29	13-291	4,7 KΩ " "	C17	11-510	100 µF/3V "
R30	13-297	15 KΩ " "	C18	11-502	1 µF/35V "
R31	13-269	68 Ω " "	C19	11-502	1 µF/35V "
R32	13-295	10 KΩ " "	C20	11-500	0,1 µF/35V "
R33	13-306	100 KΩ " "	C21	11-500	0,1 µF/35V "
R34	13-277	330 Ω " "	C22	11-502	1 µF/35V "
R35	19-253	1 KΩ Trim ligg.	C23	11-502	1 µF/35V "
R36	13-306	100 KΩ 1/8W CR 16	C24	11-502	1 µF/35V "
R37	13-299	22 KΩ " "	C25	11-416	4,7 nF ker.
Pilottone Rx/Tx Print B 68 D1 Tilhører tegn. nr.: 78002-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 78002-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
C26	11-504	4,7 μ F/10V tant.			
C27	11-500	0,1 μ F/35V "			
D1	04-028	ZF 5,6V			
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			
Q1	19-082	BC 328B			
Q2	19-085	BC 338B			
Q3	19-085	BC 338B			
Q4	19-085	BC 338B			
Q5	19-113	BF 256A			
Q6	19-106	BF 347			
Q7	19-084	BC 308B			
Q8	19-084	BC 308B			
IC1	09-080	LM 358			
IC2	09-071	CD 4049AE			
IC3	09-074	CD 4013AE			
L1	76-136	76136-4E2			
Pilottone Rx/Tx Print B68 D1 Tilhører tegn. nr.: 78002-2E2			Rettet:		Tegn.: Kontr.:
					Stykl. nr.: 78002-4S2

FUNCTION DESCRIPTION OF 2-TONE RX/TX
WITH FIXED TX-TONE CODE
B74B and B67A

Tone RX

At reception the transistors B74B-Q1, Q2, Q5, Q8, Q10 and Q11 will be OFF and B74B-Q3, B67A-Q1 and Q2 will be ON.

Input Signal:

The decoder can receive a signal consisting of two tone pulses. A call will be received correctly if the duration of each tone pulse is bigger than 300 mS and the time interval between the two pulses is less than 2,5 sec.

Function at reception of a correct call:

Having passed the active filter A1 the first tone pulse will be amplified by A2. The tone pulse is amplified so that the voltage impressed on the selective circuit L1 - C7 is a square wave (4 Vpp) even at minimum input level (50 mVrms). The two flip-flops FF1 and FF2 are reset i.e. the reset inputs are logical 1, Q14 and Q12 are ON and the coil tap according to the first tone is maintained. The voltage across the coil is detected of transistor Q7 and the outputs of NA7 and NA8 are going to logical 0. When the tone pulse ceases the voltage on the collector of Q7 will be 0 and the output of NA7 is going to logical 1. The modulo 4 counter, consisting of FF1 and FF2, is going one step forward so that Q15 and Q13 will go ON. By this the tone coil again will be in resonance, the voltage on the collector of Q7 increases and the output of NA7 is going to logical 0. When this 2nd tone pulse ceases pin 13 on FF1 is becoming logical 1. Schmitttrigger NA8 will reset the counter (FF1 + FF2) so that the decoder is ready to receive a new call about 2,5 sec. after the end of the last correct tone.

Indication of call:

An accepted call is indicated by an alarm tone in the loudspeaker. NA5 together with R42 and C28 determine the duration of this tone

(about 1 sec.) while NA4 together with R44 and C29 are working as an oscillator (about 1000 Hz). Furthermore FF4 will be set so that pin 13 is logical 1 irrespective of the position before the call. FF3 will be set so that pin 1 is logical 1 and pin 2 logical 0. This effects the flash oscillator NA9 to start and the output of NA11 will be logical 1 so that an external alarm will start, if any. The gate NA10 attends to the selective lamp flashes and NA12 and Q6 block the loudspeaker and the key. When pressing the Sel. button a positive pulse will be fed to pin 4 on the 14 pin multiplug print board B37A. This has the effect that FF3 and FF4 shift state. All the blockings are now cancelled and the selective lamp will be switched off. The next press on the sel. button will set FF3 to logical 0 at pin 1 and FF4 will shift the state. The selective lamp will be switched on and the AF part as well as the transmitter are blocked.

Function at reception of a wrong/incomplete call:

If the second tone pulse in the call has a wrong frequency the counter FF1 + FF2 will remain with a logical 1 on pin 1. As the voltage across the tone coil is continuously zero the schmitttrigger NA8 will reset FF1 + FF2 after about 2,5 sec.

Tone TX

When transmitting the transistors B74B-Q1, Q2, Q5, Q8 and B67A-Q3, Q4, Q5 are ON on the contrary B74B-Q3, Q12, Q13, Q14, Q15, and B67A-Q1, Q2 are OFF.

Normal call:

By pressing the selective key the monostable multivibrator, consisting of NA1 and NA2, is triggered. The output of NA2, i.e. pin 11 is going from logical 1 to 0 for a time (about 1 sec.), determined by C22 and R33. By this Q10 goes ON and via the diode D1 the transmitter is keyed. Simultaneously Q1 will block the amplifiers A1 and A2 and furthermore Q2, Q3 and Q8 will switch Q6 to the oscillator mode. Finally the switch transistor Q5 will open in order to feed the tone pulse to the modulation amplifier. When the output of NA2 is returning to logical 1 the tone transmitter stops for a short while. Now a charging of C21 is started,

and the output of NA3 goes from logical 1 to 0 for a while (about 1 sec.). This output pulse from NA3 switches Q11 ON and as described above, the necessary change over will be carried out and via diode D2 the transmitter will be keyed.

Automatic response:

The tone code for the automatic response will always be the same as that for the normal call. As mentioned above, an accepted call will have the effect that pin 13 on FF1 goes to logical 1 for about 2,5 sec. This means that the output of NA6 is going from logical 1 to 0 for a time (about 2,5 sec.) which is determined by C31 and R47. If the jumper, indicated on the diagram (note 1), is mounted the monostable multivibrator NA1 - NA2 will be triggered by means of diode D5. Now the normal key sequence, as described above, is run through. Furthermore the blocking of the transmitter is cancelled, i.e. the transistor B67A-Q6 is going OFF for a certain time which is determined by C31 and R47.

Adjustment of the tone transmitter

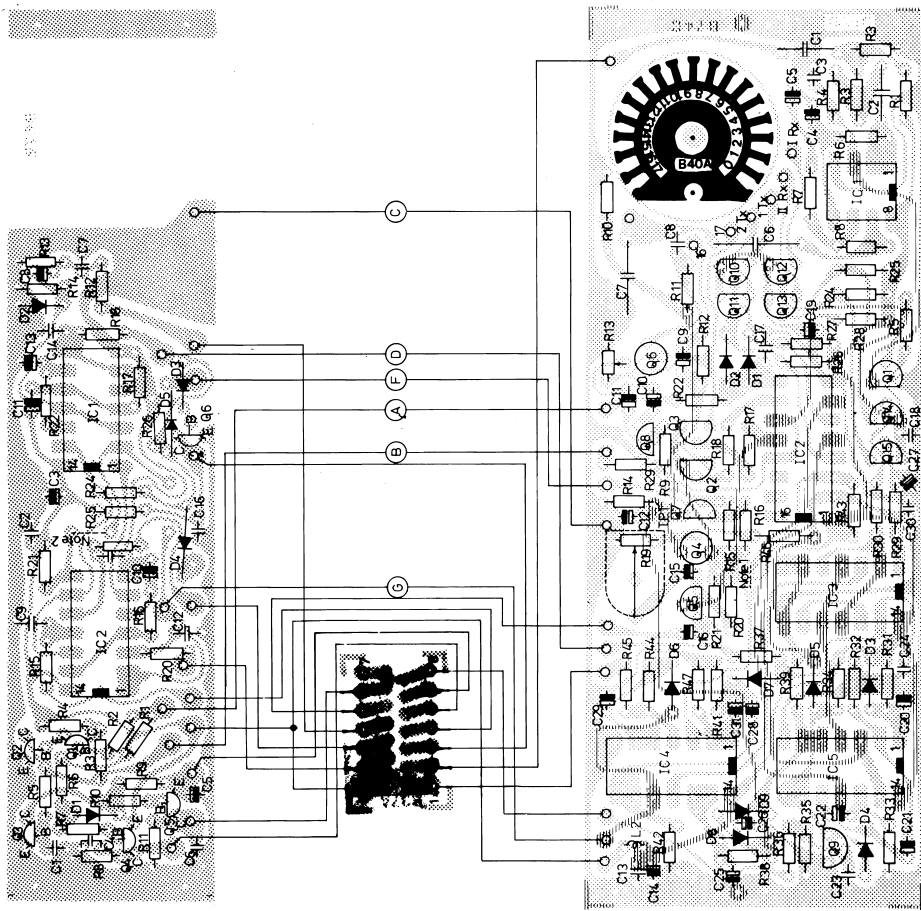
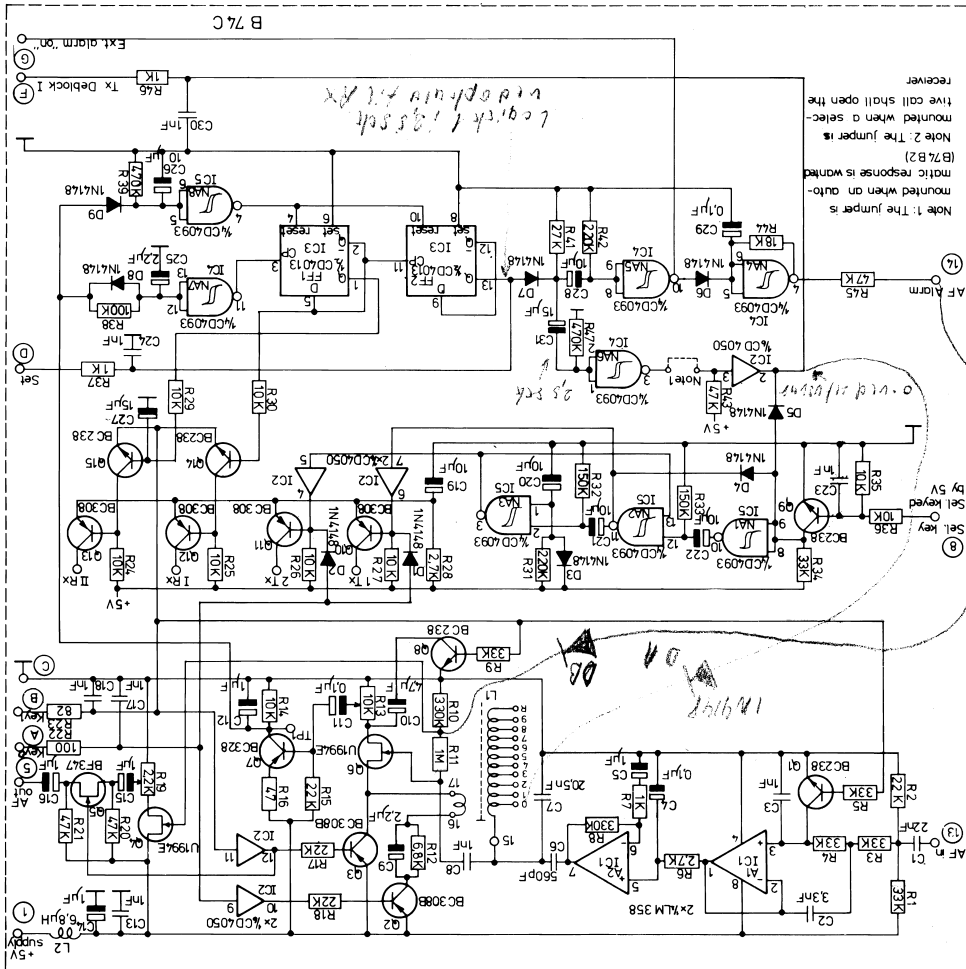
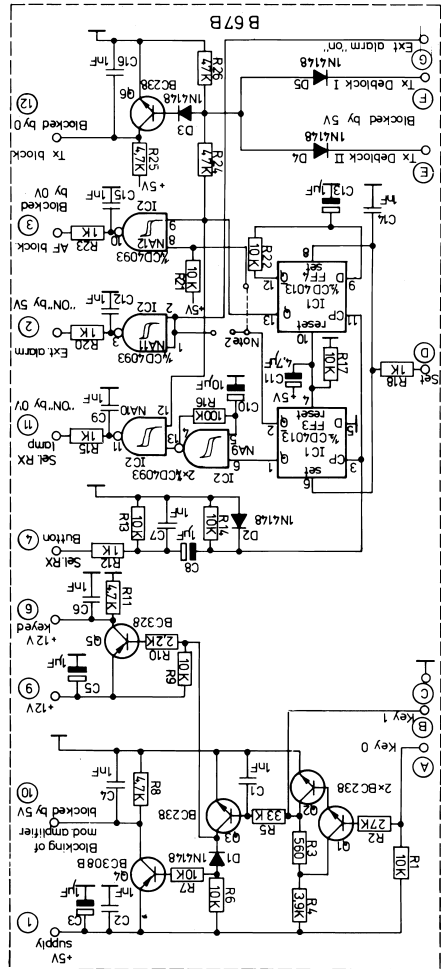
The four wires are soldered to the coil taps according to the Rx- and Tx- tone codes. The transmitter is keyed and the first Tx tone is set "on" continuously by connecting pin 7 and pin 8 on IC2. With a counter connected to the deviationmeter L1 is adjusted to give the proper output frequency. Now R19 can be adjusted to the right deviation.

Tone	0	1	2	3	4	5	6	7	8	9	R
Frequency in Hz	980	1190	1380	1600	1800	2010	2220	2410	2590	2820	2960
Deviation in kHz	1,2	1,4	1,65	1,9	2,2	2,5	2,8	3,1	3,3	3,5	3,7

Adjustment of the tone receiver

The above mentioned shortcircuit is cancelled. The first tone, F1, in the call is fed to the tone receiver (tone generator to pin (13) or a FM-modulated generator to the antenna input).

A DC-voltmeter is connected to TP1 and R13 is adjusted to + 1V at F1 \pm 3%. A proper working tone receiver will now accept a call at 5 dB SINAD.



*Detto jonczyk 2200 normal cyf. 74C10
semireprow. Detto kan anslut vid 44 typ OA
(cyf. 74C10 normal) cy OB (modulær TX
med AF utgång)*

Form: 14-27/17/0	Page: 1/2	2-tone Rx/Tx, fixed Tx tonecode -
14-27/17/0	Page: 2/2	Alarm and key circuit -
14-27/17/0	Page: 3/2	Print boards B74C and B67B1
14-27/17/0	Page: 4/2	AP-RADIOTELEFON 4
14-27/17/0	Page: 5/2	76223-2E2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-300	33 KΩ 1/8W CR16	R38	13-306	100 KΩ 1/8W CR16
R2	13-299	22 KΩ " "	R39	13-315	470 KΩ " "
R3	13-300	33 KΩ " "	R40		
R4	13-300	33 KΩ " "	R41	13-313	27 KΩ " "
R5	13-300	33 KΩ " "	R42	13-314	180 KΩ " "
R6	13-288	2,7 KΩ " "	R43	13-302	47 KΩ " "
R7	13-283	1 KΩ " "	R44	13-298	18 KΩ " "
R8	13-310	330 KΩ " "	R45	13-302	47 KΩ " "
R9	13-300	47 KΩ " "	R46	13-283	1 KΩ " "
R10	13-310	330 KΩ " "	R47	13-315	470 KΩ " "
R11	13-312	1 MΩ " "			
R12	13-293	6,8 KΩ " "	C1	11-489	22 nF MKH
R13	13-295	10 KΩ Trimpot.	C2	11-484	3,3 nF MKH
R14	13-295	10 KΩ " "	C3	11-485	1 nF ker.
R15	13-299	22 KΩ " "	C4	11-515	0,1 µF/35V mini
R16	13-267	47 Ω " "	C5	11-502	1 µF/35V tant
R17	13-299	22 KΩ " "	C6	11-407	560 pF ker.
R18	13-299	22 KΩ " "	C7	11-651	20,5 nF styr
R19	19-254	2,2 KΩ Trimpot.	C8	11-409	1 nF ker.
R20	13-302	47 KΩ 1/8W CR16	C9	11-503	2,2 µF/25V tant
R21	13-302	47 KΩ " "	C10	11-504	4,7 µF/10V tant
R22	13-271	100 Ω " "	C11	11-515	0,1 µF/35V mini
R23	13-270	82 Ω " "	C12	11-502	1 µF/35V tant
R24	13-295	10 KΩ " "	C13	11-409	1 nF ker.
R25	13-295	10 KΩ " "	C14	11-502	1 µF/35V tant
R26	13-295	10 KΩ " "	C15	11-517	1 µF/35V mini
R27	13-295	10 KΩ " "	C16	11-502	1 µF/35V tant
R28	13-288	2,7 KΩ " "	C17	11-409	1 nF ker.
R29	13-295	10 KΩ " "	C18	11-409	1 nF "
R30	13-295	10 KΩ " "	C19	11-506	10 µF/25V tant
R31	13-309	220 KΩ " "	C20	11-506	10 µF/25V "
R32	13-308	150 KΩ " "	C21	11-521	10 µF/10V mini
R33	13-308	150 KΩ " "	C22	11-521	10 µF/10V "
R34	13-300	33 KΩ " "	C23	11-409	1 nF ker.
R35	13-295	10 KΩ " "	C24	11-409	1 nF "
R36	13-295	10 KΩ " "	C25	11-503	2,2 µF/25V tant
R37	13-283	1 KΩ " "	C26	11-521	10 µF/10V "
2-tone Rx/Tx, fixed Tx tonecode Print board B 74 C 1 and 2 Tilhører tegn. nr.: 76223-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 76223-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-295	10 KΩ 1/8W CR16	C11	11-504	4,7 μF/10V tant
R2	13-313	27 KΩ " "	C12	11-409	1 nF ker.
R3	13-280	560 Ω " "	C13	11-502	1 μF/35V tant
R4	13-290	3,9 KΩ " "	C14	11-409	1 nF ker.
R5	13-300	33 KΩ " "	C15	11-409	1 nF "
R6	13-295	10 KΩ " "	C16	11-409	1 nF "
R7	13-295	10 KΩ " "			
R8	13-291	4,7 KΩ " "	D1	04-062	1N4140
R9	13-295	10 KΩ " "	D2	04-062	1N4148
R10	13-287	2,2 KΩ " "	D3	04-062	1N4148
R11	13-291	4,7 KΩ " "	D4	04-062	1N4138
R12	13-283	1 KΩ " "	D5	04-062	1N4148
R13	13-295	10 KΩ " "			
R14	13-295	10 KΩ " "	Q1	19-117	BC238B
R15	13-283	1 KΩ " "	Q2	19-117	BC238B
R16	13-306	100 KΩ " "	Q3	19-117	BC238B
R17	13-295	10 KΩ " "	Q4	19-084	BC308B
R18	13-283	1 KΩ " "	Q5	19-082	BC328B
R19					
R20	13-283	1 KΩ " "	IC1	09-074	CD4013
R21	13-295	10 KΩ " "	IC2	09-072	CD4093
R22	13-295	10 KΩ " "			
R23	13-283	1 KΩ " "			
R24	13-302	47 KΩ " "			
R25	13-291	4,7 KΩ " "			
R26	13-302	47 KΩ " "			
C1	11-409	1 nF ker.			
C2	11-409	1 nF "			
C3	11-517	1 μF/35V tant			
C4	11-409	1 nF ker.			
C5	11-517	1 μF/35V tant			
C6	11-409	1 nF ker.			
C7	11-409	1 nF "			
C8	11-517	1 μF/35V tant			
C9	11-409	1 nF ker.			
C10	11-521	10 μF/10V tant			
Alarm and key circuit Print board B 67 B1 Tilhører tegn. nr.: 76223-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 76223-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
C27	11-523	15 μ F/6,3V mini	IC1	09-080	LM358N
C28	11-506	10 μ F/25V tant	IC2	09-090	CD4050AE
C29	11-515	0,1 μ F/35V mini	IC3	09-074	CD4013AE
C30	11-409	1 nF ker.	IC4	09-072	CD4093BE
C31	11-523	15 μ F/6,3V mini	IC5	09-072	CD4093BE
D1	04-062	1N4148	L1	18-678	76136-4E2 AP-to.
D2	04-062	1N4148	L2	04-114	L235 6,8 μ H
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			
Q1	19-117	BC238B			
Q2	19-084	BC308B			
Q3	19-084	BC308B			
Q4	19-127	U1994E			
Q5	19-106	BF347N			
Q6	19-127	U1994E			
Q7	19-082	BC328B			
Q8	19-117	BC238B			
Q9	19-117	BC238B			
Q10	19-084	BC308B			
Q11	19-084	BC308B			
Q12	19-084	BC308B			
Q13	19-084	BC308B			
Q14	19-117	BC238B			
Q15	19-117	BC238B			
2-tone Rx/Tx, fixed Tx tonecode Print board B 74 B.1 and 2 Tilhører tegn. nr.: 76223-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 76223-4S2

2 TONE AND 3 TONE ENCODER/DECODER WITH AUTOMATIC TRANSPONDING

219-042, C16A2/C14A1, 2 tone encoder/decoder, AP tones

219-054, C16A13/C14A1, 2 tone encoder/decoder, AP tones

219-046, C16A5/C14A1, 2 tone encoder/decoder, AGA tones

219-055, C16A14/C14A1, 2 tone encoder/decoder, AGA tones

219-043, C16A3/C14A1, 3 tone encoder/decoder, AP tones

219-047, C16A6/C14A1, 3 tone encoder/decoder, AGA tones

GENERAL OPERATION

In the Rx mode a fixed ID-call is received. A correct ID-call is indicated by the flashing selective lamp and the acoustic alarm in the loudspeaker. For 219-042,-043,-046 and 047, the ID-call includes automatic transponding, normally consisting of the ID-code, but the tone unit can also be strapped for the Tx-code.

The flashing of the selective lamp is cancelled by pushing the sel Rx button and the loudspeaker is opened. In stand-by position the loudspeaker and the key functions are blocked by pushing the sel Rx button once, indicated by the lightening of the sel Rx lamp.

In the Tx mode a fixed code is transmitted. The Tx code is transmitted by pushing the sel key button, indicated by the lightening of the key and the sel key lamp.

CIRCUIT DESCRIPTION .

THE ENCODER.

The tone input signal at terminal 13 (C14) passes through an active low pass filter (A1) and the network R3, C5 for deemphasis, before the signal is amplified to a square wave (about 4Vpp) at pin 7-A2.

The encoder is programmed to the ID code, by connecting the collectors of Q7 and Q9 (042-046-054-055) to the tapcoil L 1 on print board C16. For 219-043 and 219-047 the collectors

of Q7, Q9 and Q11 are connected. The signal at the top of the coil (200 mVpp in receiving mode) is amplified by Q1 and Q2 and rectified by Q3. A DC-voltage about 4,8V will appear at TP1 for a proper tone. The counter IC1 is clocked one step forward by NA1, when the first tone in the call has ended. This will continue until the last tone has been accepted.

R18 and C13 delay the accept of the tones about 0,3 sec. and NA2 together with R19 and C14 resets the counter 3 sec. after a call is received or if the tone input code is wrong.

A high level at pin 4 (042-046-054-055) respectively pin 7 (219-043 and 219-047) appears when a correct call has been received. Pin 10, IN3 switch to low for about 2 sec. determined by C17/R25 and activates the acoustic alarm oscillator IN4. Furthermore FF1 and FF2 (C14) is set, the transmitter is blocked by the low level at the collector of Q2, the AF-amplifier is blocked by NA 3 and by means of NA1/NA2 the sel Rx-lamp is flashing.

These functions are cancelled by the high going level at the clock-inputs (pin 3 and 11), when pushing the sel. Rx button once.

THE ENCODER

Activating the sel key (8), the set-input of FF1, FF2 and FF4 (C16) receive a 5V impuls, setting FF1 and FF2 for programming the two or the three digits in the Tx code.

Pin 1-FF4 switch to a high level, activating the tone oscillator by Q5 and the transmitter through Q4 and Q5 (C14). Furthermore the AF-input is blocked by Q1 (C14) and charging the time constant C16/R28 (C16) the output gating of the tones (Q4) and the clock oscillator NA3/NA4 are delayed about 200 m sec. by IN2.

When the gating has ended, Q4 is switched on, and the clock oscillator takes action with a cycle about 1 Hz.

In the end of the sequence pin 7 (042-046-054-055) respective-

ly pin 10(219-043 and 219-047) of the counter IC1 switch to high , resetting FF1, FF2, FF3 and FF4.

C22/R34 and D 13 reset the flip-flops, when the decoder/encoder is turned on.

AUTOMATIC TRANSPONDING.

Having received a correct ID code, pin 4 (219-042 and 219-046) or pin 7 (219-043 and 219-047) of the counter IC1 (C16) will switch high. When the time constant R19/C14 after 3 sec. resets the counter, the negative going level at pin 4 respectively pin 7, will clock FF1, FF2, FF3 and FF4 for the automatic transponding mode through IN1.

The outputs of FF1 and FF2 program the transponding code according to the jumpers J1 and J2. The transmitter is keyed by FF4 as described in the section "THE ENCODER" and FF3 disables the Tx blocking through Q3 (C14) during automatic transponding.

USING THE JUMPERS ON C16.

219-042, 219-046, 219-054 and 219-055.

Transpond	:	No jumpers	- ID code
		J1	- The first digit changed (Tx code)
		J2	- The second digit changed (Tx code)
		J1 and J2	- Tx code

The encoder	:	No jumper	- Second digit changed
		J3	- Tx code

219-043 and 219-047.

Transpond	:	No jumpers	- ID code
		J1	- The first digit changed (Tx code)
		J2	- The two last digits changed (Tx code)
		J1 og J2	- Tx code

The encoder : No jumpers - The two last digits changed
J3 - Tx code

USING THE JUMPERS ON C14.

No jumpers : AF blocking and no external alarm.

- J1 : The loudspeaker opens, when a call is received.
- J2 : The external alarm activates only once, when several calls are received without resetting IC2.
- J3 : The external alarm activates every time a call is received.
- J4 : Resets IC2 whenever the transmitter is keyed. Except during transponding.

ADJUSTMENT OF THE DECODER.

1. The collector of Q7 (C16) is connected to tone no. 6 of the tapcoil.
2. A tone generator is connected to the AF input or a FM-modulated generator is connected to the antenna input.
3. L1 is adjusted to max. DC-level at TP1 (C16).
4. R10 (C16) is adjusted to 1V DC at tone no. 6 $\pm 3\%$.
5. L1 is readjusted to symmetry at 1V $\pm 0,1$ V DC-level.
6. The adjustment screw is fixed.

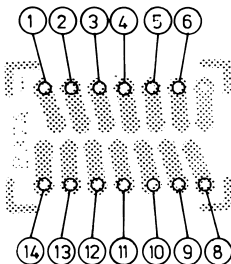
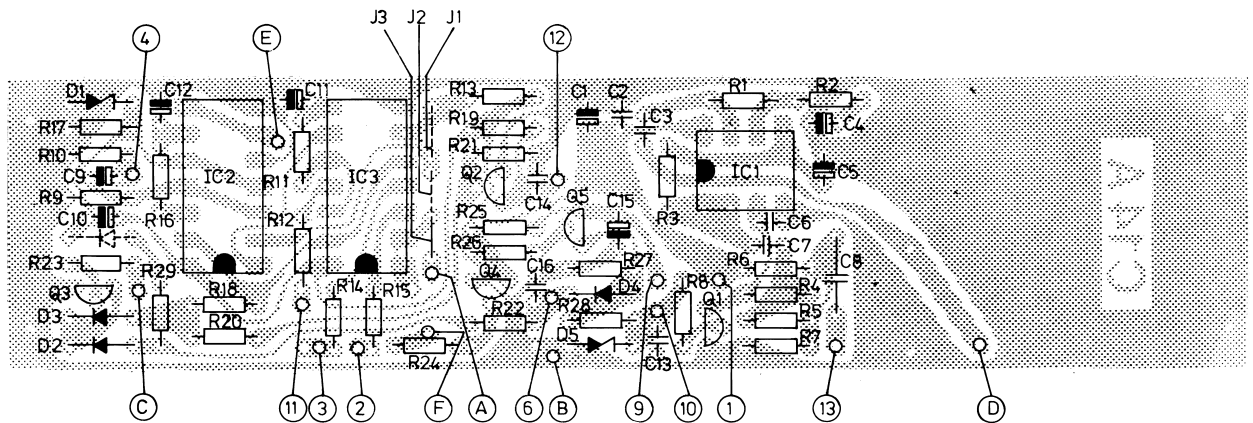
ADJUSTMENT OF THE ENCODER.

1. TP3 (C16) is connected to the 5V supply.
2. R4 (C16) is adjusted to 2,4 Khz div. at tone no. 6.
3. An oscilloscope or a counter is connected to TP2 (C16). The clock frequency must be 1Hz $\pm 0,3$ Hz. If the clock frequency is too fast, R31 must be removed.
4. Remove the 5V supply from TP3. The collectors of Q7 - Q10 (042-046-054-055) respectively Q7 - Q12 (219-043 and 219-047) can now be connected to the wanted Rx code and Tx code.

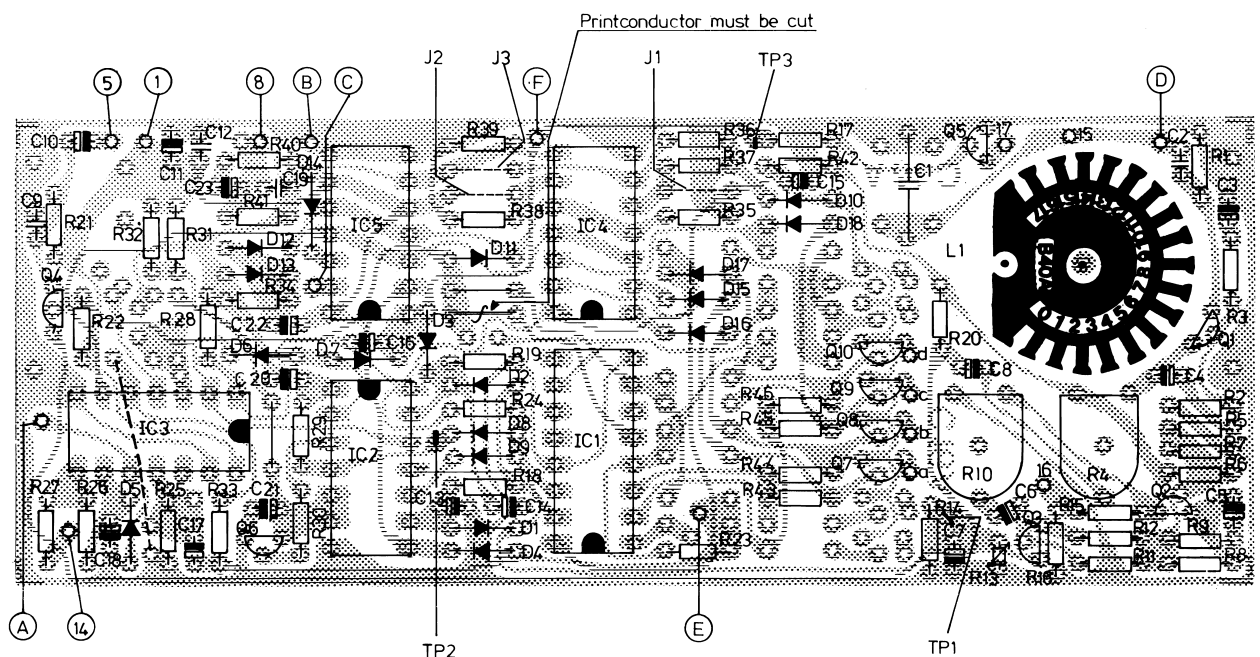
AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-310	330 K Ω 1/8W CR 16	C8	11-489	22 nF MHH
R2	13-283	1 K Ω " "	C9	11-502	1 μ F/35V tant.
R3	13-288	2,7 K Ω " "	C10	11-504	4,7 μ F/10V "
R4	13-300	33 K Ω " "	C11	11-504	4,7 μ F/10V "
R5	13-300	33 K Ω " "	C12	11-502	1 μ F/35V "
R6	13-300	33 K Ω " "	C13	11-409	1 nF ker.
R7	13-299	22 K Ω " "	C14	11-409	1 nF "
R8	13-300	33 K Ω " "	C15	11-505	4,7 μ F/25V tant.
R9	13-295	10 K Ω " "	C16	11-409	1 nF ker.
R10	13-295	10 K Ω " "			
R11	13-308	150 K Ω " "	D1	04-045	BZX 83-C4V3
R12	13-295	10 K Ω " "	D2	04-062	1N4148
R13	13-300	33 K Ω " "	D3	04-062	1N4148
R14	13-295	10 K Ω " "	D4	04-062	1N4148
R15	13-295	10 K Ω " "	D5	04-045	BZX 83-C4V3
R16	13-300	33 K Ω " "			
R17	13-306	100 K Ω " "			
R18	13-299	22 K Ω " "	IC1	09-080	LM 358
R19	13-291	4,7 K Ω " "	IC2	09-074	CD 4013AE
R20	13-299	22 K Ω " "	IC3	09-072	CD 4093BE
R21	13-299	22 K Ω " "			
R22	13-291	22 K Ω " "	Q1	19-117	BC 238 BPL
R23	13-300	33 K Ω " "	Q2	19-085	BC 338 BPL
R24	13-300	33 K Ω " "	Q3	19-085	BC 338 BPL
R25	13-295	10 K Ω " "	Q4	19-085	BC 338 BPL
R26	13-287	2,2 K Ω " "	Q5	19-082	BC 328 BPL
R27	13-291	4,7 K Ω " "			
R28	13-281	680 Ω " "			
R29	13-291	4,7 K Ω " "			
C1	11-504	4,7 μ F/10V tant.			
C2	11-416	4,7 nF ker.			
C3	11-393	39 pF "			
C4	11-502	1 μ F/35V tant.			
C5	11-500	0,1 μ F/35V "			
C6	11-409	1 nF ker.			
C7	11-414	3,3 nF "			
Control circuit for C 16 A Print board C 14 A1 Tilhører tegn nr. 78161-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr: 78161-4S2

C14 A1



B 37A



C16A

Retter: 	2-tone encoder/decoder with automatic transponding 219-042/046/054/055 AP - RADIOTELEFON	Tegn.: 8-11-78 AMC Stykl. nr.: Tegn. nr.: 78161-3E2 Kontr.:
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AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-312	1 MΩ 1/8W CR 16	R38	13-306	100 KΩ 1/8W CR 16
R2	13-284	1,2 KΩ " "	R39	13-315	470 KΩ " "
R3	13-278	390 Ω " "	R40	13-299	22 KΩ " "
R4	19-524	2,2 KΩ trim. ligg.	R41	13-299	22 KΩ " "
R5	13-287	2,2 KΩ 1/8W CR 16	R42	13-288	2,7 KΩ " "
R6	13-291	4,7 KΩ " "	R43	13-313	27 KΩ " "
R7	13-296	12 KΩ " "	R44	13-313	27 KΩ " "
R8	13-277	330 Ω " "	R45	13-313	27 KΩ " "
R9	13-269	68 Ω " "	R46	13-313	27 KΩ " "
R10	19-253	1 KΩ trim. ligg.			
R11	13-299	22 KΩ 1/8W CR 16	C1	11-651	20,5 nF styr.
R12	13-267	47 Ω " "	C2	11-409	1 nF ker.
R13	13-671	33 KΩ NTC	C3	11-504	4,7 μF/10V tant.
R14	13-297	15 KΩ 1/8W CR 16	C4	11-504	4,7 μF/10V "
R15	13-300	33 KΩ " "	C5	11-509	47 μF/6,3V "
R16	13-283	1 KΩ " "	C6	11-500	0,1 μF/35V "
R17	13-300	33 KΩ " "	C7	11-502	1 μF/35V "
R18	13-306	100 KΩ " "	C8	11-502	1 μF/35V "
R19	13-315	470 KΩ " "	C9	11-409	1 nF ker.
R20	13-306	100 KΩ " "	C10	11-502	1 μF/35V tant.
R21	13-306	100 KΩ " "	C11	11-504	4,7 μF/10V "
R22	13-306	100 KΩ " "	C12	11-416	4,7 nF ker.
R23	13-297	15 KΩ " "	C13	11-503	2,2 μF/25V tant.
R24	13-306	100 KΩ " "	C14	11-506	10 μF/25V "
R25	13-315	470 KΩ " "	C15	11-504	4,7 μF/10V "
R26	13-298	18 KΩ " "	C16	11-503	2,2 μF/25V "
R27	13-302	47 KΩ " "	C17	11-504	4,7 μF/10V "
R28	13-306	100 KΩ " "	C18	11-500	0,1 μF/35V "
R29	13-306	100 KΩ " "	C19	11-409	1 nF ker.
R30	13-300	33 KΩ " "	C20	11-500	0,1 μF/35V tant.
R31	13-316	560 KΩ " "	C21	11-504	4,7 μF/10V "
R32	13-309	220 KΩ " "	C22	11-504	4,7 μF/10V "
R33	13-306	100 KΩ " "	C23	11-502	1 μF/35V "
R34	13-306	100 KΩ " "			
R35	13-315	470 KΩ " "			
R36	13-315	470 KΩ " "			
R37	13-306	100 KΩ " "			
2-tone encoder/decoder with aut. transp. C16A2/A5/A13/A14 Tilhører tegn. nr.			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 78161-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
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			
D17	04-062	1N4148			
D18	04-062	1N4148			
Q1	19-113	BF 256 A			
Q2	19-084	BC 308 BPL			
Q3	19-084	BC 308 BPL			
Q4	19-106	BF 244			
Q5	19-085	BC 338 BPL			
Q6	19-117	BC 238 BPL			
Q7	19-085	BC 338 BPL			
Q8	19-085	BC 338 BPL			
Q9	19-085	BC 338 BPL			
Q10	19-085	BC 338 BPL			
IC1	09-086	MC 14017 BE			
IC2	09-072	CD 4093 BE			
IC3	09-037	CD 40106 BE			
IC4	09-074	CD 4013 BE			
IC5	09-074	CD 4013 BE			
L1	18-678	76136-4E2			
	18-680	77119-4E2			
2-tone encoder/decoder with aut. transp. C16A2/A5/A13/A14 Iinhører tegn. nr.: 78161-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 78161-4S2

Function Description of 2-tone RX/TX
With selectable TX-tone code
B66B and B67A

Tone RX

At reception the transistors B66B-Q1, Q2, Q5, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15, Q16, Q17, Q18, and Q19 will be OFF and B66B-Q3, B67A-Q1 and Q2 will be ON.

Input Signal:

The decoder can receive a signal consisting of two tone pulses. A call will be received correctly if the duration of each tone pulse is longer than 300 ms and the time interval between the two pulses is less than 2,5 sec.

Function at Reception of a Correct Call:

Having passed the active filter A1 the first tone pulse will be amplified by A2. The tone pulse is amplified so that the voltage impressed on the selective circuit L1-C7 is a square wave (4Vpp) even at a minimum input level (50 mVrms). The two flip-flops FF1 and FF2 are reset i.e. the reset inputs are logical 1, Q20 and Q22 are ON and the coil tap according to the first tone is maintained. The voltage across the coil is detected of transistor Q7 and the output of NA3 and NA4 are going to logical 0. The voltage on the collector of Q7 will be 0 when the tone pulse ceases and the output of NA3 is going to logical 1. The modulo 4 counter, consisting of FF1 and FF2, is going one step forward so that Q21 and Q23 will go ON. By this the tone coil again will be in resonance, the collector voltage of Q7 increases and the output of NA3 is going to logical 0. When this second tone pulse ceases pin 13 on FF1 is becoming logical 1. Schmitttrigger NA4 will reset the counter (FF1 + FF2) so that the decoder is ready for receiving a new call about 2,5 sec. after the end of the last correct tone.

Indication of Call:

An accepted call is indicated by an alarm tone in the loudspeaker. NA2 together with R44 and C21 determine the duration of this tone (approx. 1 sec.) while NA1 together with R42 and C20 are working as an oscillator (approx. 1000 Hz). Furthermore FF4 will be set so that pin 13 is logical 1 irrespective of the position before the call. FF3 will be set so that pin 1 is logical 1 and pin 2 logical 0. This effects the flash oscillator NA9 to start and the output of NA11 will be logical 1 so that an external alarm will start, if any. The gate NA10 attends to the selective lamp flashes and NA12 and Q6 block the loudspeaker and the key. When pressing the sel. button a positive pulse will be fed to pin 4 on the 14 pin multi-plug print board B37A. This has the effect that FF3 and FF4 shift state. Now all the blockings are cancelled and the selective lamp will be switched off. The next press on the sel. button will set FF3 to logical 0 at pin 1 and FF4 will shift state. By this the selective lamp is switched on and the AF part as well as the transmitter are blocked.

Function at Reception of a Wrong/Incorrect Call:

If the second tone pulse in the call has a wrong frequency the counter FF1 + FF2 will remain with a logical 1 on pin 1. As the voltage across the tone coil is continuously zero the schmitttrigger NA4 will reset FF1 + FF2 after approx. 2,5 sec.

Tone TX

When transmitting the transistors B66B-Q1, Q2, Q5, Q8, and B67A-Q3, Q4, Q5 are ON and on the contrary B66B-Q3, Q20, Q21, Q22, Q23 and B67A-Q1, Q2 are OFF.

Normal Call:

By pressing one of the tone keys the corresponding switch transistor Q9-Q18 goes ON. Moreover Q24 goes ON too and via the diode D7 the transmitter is keyed. Simultaneously Q1 will block the amplifiers A1 and A2, and Q2, Q3 and Q8 will switch Q6 to the oscillator mode. Finally the FET switch

Q5 will open in order to feed the tone to the modulation amplifier. When the pressing of the tone key ceases the transmitter stops transmitting which will cause a positive going edge to appear on point (A). This edge will, via Q25, trigger the monostable multivibrator, consisting of NA5 and NA6. The output of NA6, i.e. pin 10, is going from logical 1 to 0 for a time (approx. 1 sec.) determined by R 55 and C28. By this Q19 goes ON and as described above, the necessary change over will be carried out and via diode D1 the transmitter will be keyed. This second tone pulse is always the repetition tone. If a tone key is pressed before the repetition tone has finished the transmitted tone will always correspond to the tone key in question.

Automatic Response:

The first tone in the automatic response is coded by connecting a wire between point (AR) and one of the switch points SW 0 - SW 9. The second tone will always be the repetition tone. As mentioned above, an accepted call will have the effect that pin 13 on FF1 goes to logical 1 for about 2,5 sec. This means that the output of NA2 is going from logical 1 to 0 for a time (approx. 1 sec.) which is determined by C21 and R44. If the jumper, indicated on the diagram (note 1), is mounted, one of the switch transistors Q9 - Q18 will go ON and via diode D2 the transmitter will be keyed. The duration of the first tone is determined by C21 and R44. When this tone ceases the monostable multivibrator NA5 - NA6 is triggered and the repetition tone is transmitted as described above. When transmitting an automatic response the blocking must be temporarily cancelled, i.e. B67A-Q6 must go OFF. During the first tone this will be done by the wire (F) and NA7 will cancel the transmitter blocking during the second tone.

Adjustment of the tone transmitter

Press tone key 5, and with a counter connected to the deviation-meter L1 is adjusted to give an output frequency of 2010 Hz. Now R 19 can be adjusted to the right deviation, 2,5 kHz for tone 5.

Tone	0.	1	2	3	4	5	6	7	8	9	R
Frequency in Hz	980	1190	1380	1600	1800	2010	2220	2410	2590	2820	2960
Deviation in kHz	1,2	1,4	1,65	1,9	2,2	2,5	2,8	3,1	3,3	3,5	3,7

Adjustment of the tone receiver

The two wires RxI and RxII must be soldered to the coil taps according to the wanted tone code. The first tone, F1, in the call is fed to the tone receiver (tone generator to pin 13 or a FM-modulated generator to the antenna input). A DC-voltmeter is connected to TP1 and R13 is adjusted to + 1V at F1 \pm 3%. A proper working tone receiver will now accept a call at 5 dB SINAD.

2 tone Rx/Tx selectable tx tonecode - Alarm and key circuit Print boards B66C1 and 2, B67B1		Top: 23 - 8 - 76 AC	Kont.: 15 - 9 - 7 CHB
AP-RADIOTELEFON 4		Syfte: nr.:	Top: nr.:
23157 AC1D		76231-2E2	

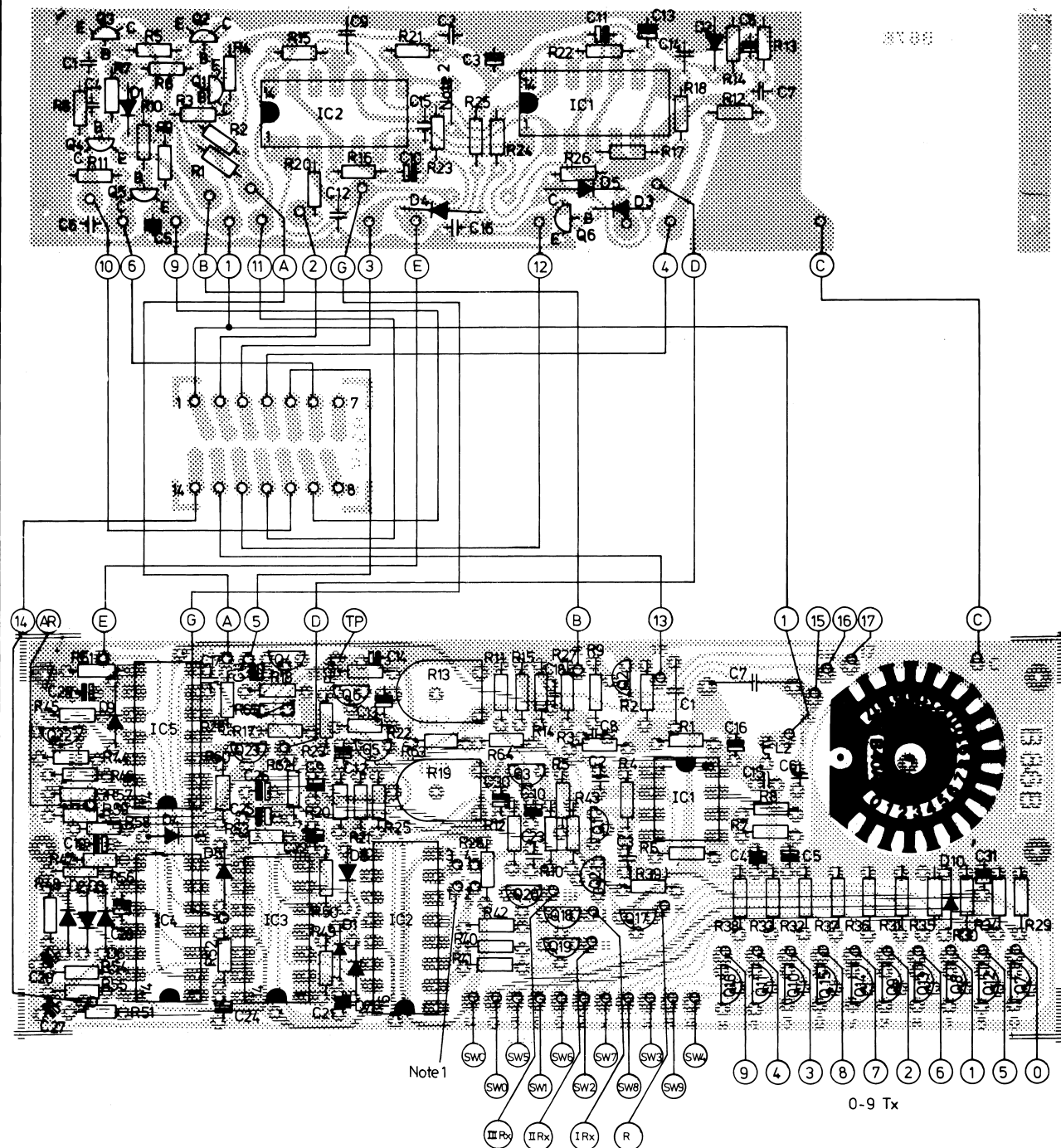


AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-300	33 KΩ 1/8W CR16	R38	13-295	10 KΩ 1/8W CR16
R2	13-299	22 KΩ " "	R39	13-295	10 KΩ " "
R3	13-300	33 KΩ " "	R40	13-283	1 KΩ " "
R4	13-300	33 KΩ " "	R41	13-302	47 KΩ " "
R5	13-300	33 KΩ " "	R42	13-298	18 KΩ " "
R6	13-288	2,7 KΩ " "	R43	13-302	47 KΩ " "
R7	13-283	1 KΩ " "	R44	13-309	220 KΩ " "
R8	13-310	330 KΩ " "	R45	13-313	27 KΩ " "
R9	13-300	33 KΩ " "	R46	13-306	100 KΩ " "
R10	13-310	330 KΩ " "	R47	13-315	470 KΩ " "
R11	13-312	1 MΩ " "	R48		
R12	13-293	6,8 KΩ " "	R49		
R13	19-258	10 KΩ potm.	R50	13-295	10 KΩ " "
R14	13-295	10 KΩ 1/8W CR16	R51	13-295	10 KΩ " "
R15	13-299	22 KΩ " "	R52	13-302	47 KΩ " "
R16	13-267	47 Ω " "	R53	13-302	47 KΩ " "
R17	13-299	22 KΩ " "	R54	13-300	33 KΩ " "
R18	13-299	22 KΩ " "	R55	13-308	150 KΩ " "
R19	19-255	2,2 KΩ potm.	R56	13-315	470 KΩ " "
R20	13-302	47 KΩ 1/8W CR16	R57	13-315	470 KΩ " "
R21	13-302	47 KΩ " "			
R22	13-271	100 Ω " "	C1	11-489	22 nF MKH
R23	13-270	82 Ω " "	C2	11-484	3,3 nF MKH
R24	13-295	10 KΩ " "	C3	11-485	1 nF MKH
R25	13-295	10 KΩ " "	C4	11-500	0,1 μF/35V tant
R26	13-295	10 KΩ " "	C5	11-502	1 μF/35V "
R27	13-295	10 KΩ " "	C6	11-407	560 pF ker.
R28	13-295	10 KΩ " "	C7	11-651	20,5 nF styr
R29	13-295	10 KΩ " "	C8	11-409	1 nF ker.
R30	13-295	10 KΩ " "	C9	11-503	2,2 μF/25V tant
R31	13-295	10 KΩ " "	C10	11-504	4,7 μF/10V "
R32	13-295	10 KΩ " "	C11	11-500	0,1 μF/35V "
R33	13-295	10 KΩ " "	C12	11-502	1 μF/35V "
R34	13-295	10 KΩ " "	C13	11-409	1 nF ker.
R35	13-295	10 KΩ " "	C14	11-502	1 μF/35V tant
R36	13-295	10 KΩ " "	C15	11-502	1 μF/35V "
R37	13-288	2,7 KΩ " "	C16	11-502	1 μF/35V "
2-tone Rx,Tx,selectable Tx tonecode. Print board B 66 Cl,2 Tilhører tegn. nr.: 76231-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 76231-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
C17	11-409	1 nF ker.	Q11	19-084	BC308B
C18	11-409	1 nF "	Q12	19-084	BC308B
C19	11-506	10 µF/25V tant	Q13	19-084	BC308B
C20	11-515	0,1 µF/35V "	Q14	19-084	BC308B
C21	11-521	10 µF/10V mini	Q15	19-084	BC308B
C22	11-409	1 nF ker.	Q16	19-084	BC308B
C23	11-503	2,2 µF/25V tant	Q17	19-084	BC308B
C24			Q18	19-084	BC308B
C25	11-521	10 µF/10V mini	Q19	19-084	BC308B
C26	11-409	1 nF ker.	Q20	19-084	BC308B
C27	11-502	1 µF/35V tant	Q21	19-084	BC308B
C28	11-521	10 µF/10V "	Q22	19-117	BC238B
C29	11-521	10 µF/10V "	Q23	19-117	BC238B
			Q24	19-117	BC238B
			Q25	19-117	BC238B
D1	04-062	1N4148	IC1	09-080	LM358N
D2	04-062	1N4148	IC2	09-090	CD4050AE
D3	04-062	1N4148	IC3	09-074	CD4013AE
D4	04-062	1N4148	IC4	09-072	CD4093BE
D5	04-062	1N4148	IC5	09-072	CD4093AE
D6	04-062	1N4148			
D7	04-062	1N4148			
D8	04-062	1N4148			
D9	04-062	1N4148	L1	18-678	76136-4E2
D10	04-062	1N4148	L2	04-114	L235 6,8µH
D11	04-062	1N4148			
D12	04-062	1N4148			
Q1	19-117	BC238B			
Q2	19-084	BC308B			
Q3	19-084	BC308B			
Q4	19-127	U1994E			
Q5	19-106	BF347			
Q6	19-127	U1994E			
Q7	19-082	BC328B			
Q8	19-117	BC238B			
Q9	19-084	BC308B			
Q10	19-084	BC308B			
2-tone Rx, Tx, selectable Tx tonecode. Print board B66 C 1,2 Tilhører tegn. nr.: 76231-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 76231-4S2



Rettet: 19-10-77 LD/AC
14-2-80 LT/AMC

2-3 tone Rx, 2-tone Tx, selectable Tx tonecode,
Alarm and key circuit.

Print boards B86B1,2,3,4,5,6 and B67B1

AP-RADIOTELEFON

Tegn.: 16-8-77
AC

Kontr.:

Stykl. nr.:

Tegn. nr.:

77337-3E2

Technical description of tonereceiver with 2 - 5 tones.

The tonereceiver consists of two separated parts:

- I: The real tonereceiver, with an active filter a resonance coil and a countercircuit.
- II: Some logical control circuits with alarm and blocking functions.

Part I description.

From pin 13 the input signal passes through an active filter consisting of IC 1 - A 1. Frequencies above 3 kc will be attenuated in this filter.

R5 and C4 make the deemphases in order to maintain a suitable S/N ratio.

Passing through the amplifier IC 1 - A 2 the resonancecircuit L1/C7 is reached. L1 is grounded through Q3 in stand-by position ready for the first tone. When receiving the proper tone, amplifier Q1 takes action.

Q2 works as a detector making a DC-voltage on TP 1.

Even at minimum input signal. 50 m V, a square wave signal of 4Vpp is reached at the coil. R9 must be adjusted until a logic '1' appears at TP 1.

IC 4 will clock the counter IC 3 resulting Q3 to go off and Q4 to go on. Now the coil gives resonance on another frequency. This sequence will continue untill the last tone is received (2, 3, 4 and 5 set by the strapping S1). When the last tone is accepted the control circuit IC6 is set.

The counter will be reset by IC4-NA1 after a delay decided by R19 and C15, and the tonereceiver is ready for a new call.

A call will be accepted if the length of each tone is more than 40 ms and an eventual pause between two tones is not longer than 250 ms.

Part II description.

The acoustic alarm which consists of the oscillator IC 4 - NA 4 is normally blocked by IC 4 - NA 3. Receiving a call C14 will be charged and the oscillator takes action. The oscillator is connected to the AF amplifier independent of the AF blocking circuit and will always be heard. The alarm time is set by R21 and C14. The two flip-flops IC6 - FF1 and FF2 control the sel. indicator lamp, the ext. alarm and the blocking functions.

Because of C19/R26 IC 6 will always be reset when starting.

The sel. button clocks the flip-flops, which in stand-by position means nothing for IC 6 - FF 1, but sets the FF2 at the first push. Q8 goes on and blocks the transmitter.

The output of IC5-NA4 is 0 which by help of the driver transistor in the front section blocks the AF-amplifier.

The output of IC5-NA2 is 0 too and by help of two driver transistors in the front section the sel. lamp is lightening, which indicates: sel. on.

A second push resets IC 6 - FF2 and the radio is normal.

Receiving a call IC 6 - FF2 will be set, if not set previously by sel. button.

IC 6 - FF1 is set too, which starts the oscillator IC 5 - NA 1. The oscillator output goes through NA 2 and makes the sel. lamp flashing. In stand-by position the output of NA 1 was 1.

NA 3 receives a 0 from IC 6 - FF 1 at the call and gives a 1 to the driver transistor in the front section, which activates the external alarm if connected.

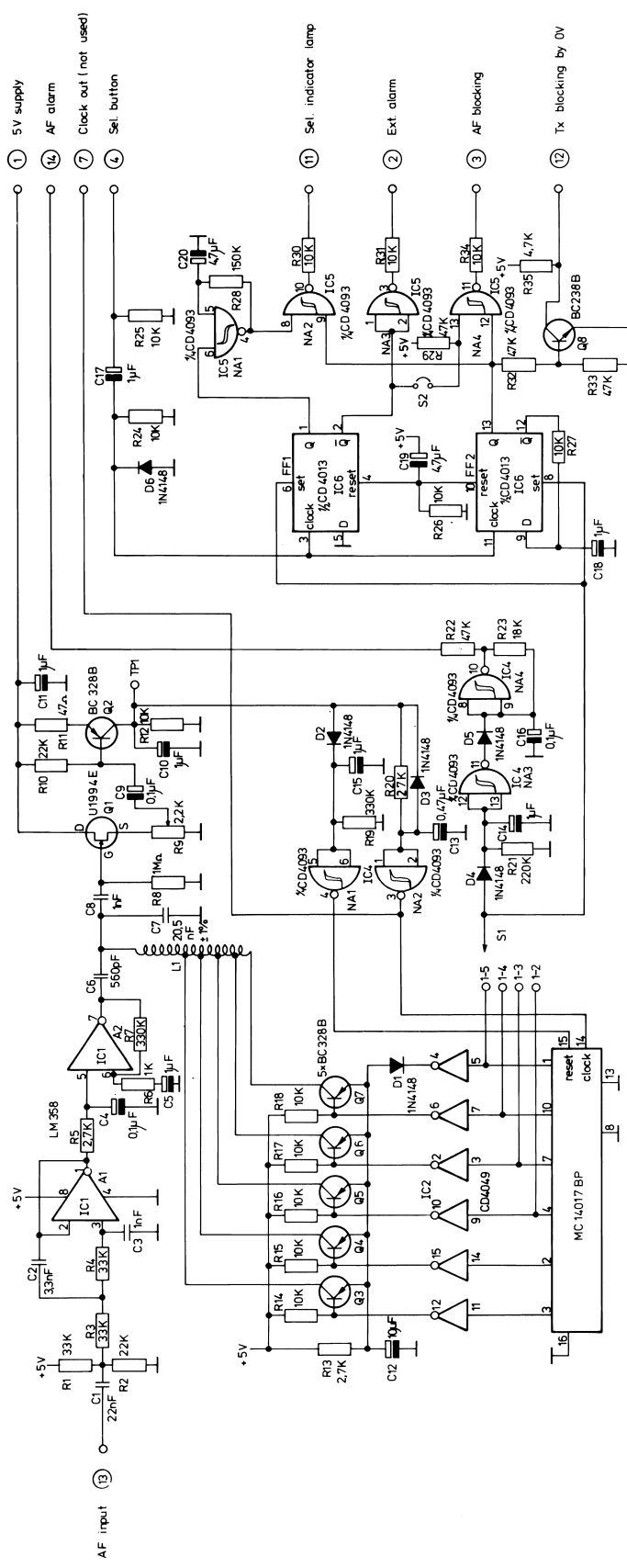
If IC5 - NA3 and NA4 are strapped the AF-blocking is cancelled, and a message can be received. In order to stop the sel. lamp from flashing and open the transmitter it is necessary to push the sel. button once.

Adjustments of the tonereceiver.

The first tone, F_0 , in the sequence is fed to the tonereceiver (tonegenerator to pin 13 or an FM-modulated generator to the ant. input).

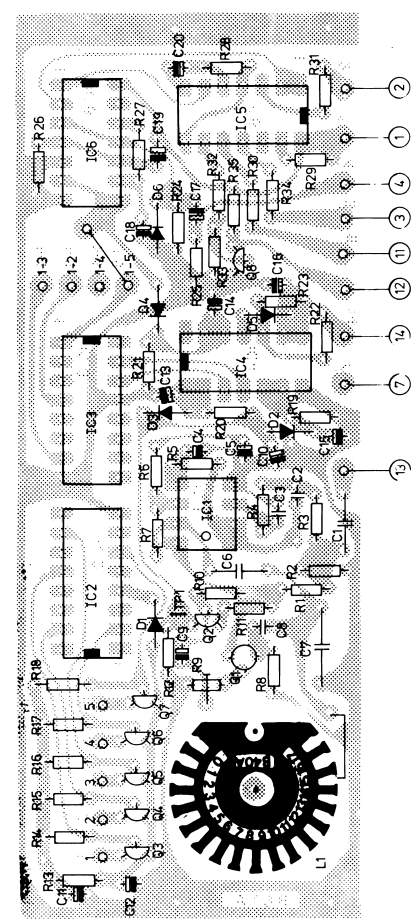
A DC-voltmeter is connected to TP 1 and R 36 is adjusted to + 1V at $F_0 \pm 3\%$. The coil is adjusted for the correct F_0 on the first tone too. For this adjustment a tone frequency in the middle of the used frequency band must be used. For 5-tone CCIR this will be tone number 6.

After correct adjustment it must be controlled that the tone-receiver works at a S/N ratio of 5 dB Sinad.



Strap S1 decides the number of tones.
 2-tone AP B69A1
 3-tone AP B69A2
 5-tone CCIR B69A3
 5-tone ZVEI B69A4

Strap S2 is mounted when a selective call shall open the receiver.



Revizija: 01-78 AC/11	Typ: 2-3-76	Norma: 2-3-76	EU
	Signal: AC		
	Typ: 76236-2E2		
2-5-tone receiver Print board B 69 A.1,2,3 and 4 AP-RADIOTELEFON 76236-2E2			

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-300	33 K Ω 1/8W CR16	C1	11-489	22 nF MKH
R2	13-299	22 K Ω " "	C2	11-414	3,3 nF ker.
R3	13-300	33 K Ω " "	C3	11-409	1 nF ker.
R4	13-300	33 K Ω " "	C4	11-500	0,1 μ F/35V tant
R5	13-288	2,7 K Ω " "	C5	11-502	1 μ F/35V tant
R6	13-283	1 K Ω " "	C6	11-407	560 pF N1500
R7	13-310	330 K Ω " "	C7	11-651	20,5 nF styr.
R8	13-312	1 M Ω " "	C8	11-409	1 nF ker.
R9	19-255	2,2 K Ω potm.stå.	C9	11-500	0,1 μ F/35V tant
R10	13-299	22 K Ω 1/8W CR16	C10	11-502	1 μ F/35V "
R11	13-267	47 Ω " "	C11	11-502	1 μ F/35V "
R12	13-295	10 K Ω " "	C12	11-506	10 μ F/25V "
R13	13-288	2,7 K Ω " "	C13	11-501	0,47 μ F/35V "
R14	13-295	10 K Ω " "	C14	11-502	1 μ F/35V "
R15	13-295	10 K Ω " "	C15	11-502	1 μ F/35V "
R16	13-295	10 K Ω " "	C16	11-500	0,1 μ F/35V "
R17	13-295	10 K Ω " "	C17	11-502	1 μ F/35V "
R18	13-295	10 K Ω " "	C18	11-502	1 μ F/35V "
R19	13-310	330 K Ω " "	C19	11-504	4,7 μ F/10V "
R20	13-313	27 K Ω " "	C20	11-504	4,7 μ F/10V "
R21	13-309	220 K Ω " "			
R22	13-302	47 K Ω " "	D1	04-062	1N4148
R23	13-298	18 K Ω " "	D2	04-062	1N4148
R24	13-295	10 K Ω " "	D3	04-062	1N4148
R25	13-295	10 K Ω " "	D4	04-062	1N4148
R26	13-295	10 K Ω " "	D5	04-062	1N4148
R27	13-295	10 K Ω " "	D6	04-062	1N4148
R28	13-308	150 K Ω " "			
R29	13-302	47 K Ω " "	Q1	19-127	U1994E
R30	13-295	10 K Ω " "	Q2	19-082	BC328B
R31	13-295	10 K Ω " "	Q3	19-082	BC328B
R32	13-302	47 K Ω " "	Q4	19-082	BC328B
R33	13-302	47 K Ω " "	Q5	19-082	BC328B
R34	13-295	10 K Ω " "	Q6	19-082	BC328B
R35	13-291	4,7 K Ω " "	Q7	19-082	BC328B
			Q8	19-117	BC238B
2-5-tone receiver Print board B 69 A1,2,3 and 4 tilhører tegn. nr.: 76236-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div> <div>Stykl. nr.: 76236-4S2</div>

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
IC1	09-080	LM358N			
IC2	09-071	CD4049AE			
IC3	09-070	CD4017AE			
IC4	09-072	CD4093BE			
IC5	09-072	CD4093BE			
IC6	09-074	CD4013AE			
L1	18-677	75425-4E2 udtagsspole.			
2-5-tone receiver Print board B 69 A1,2,3 and 4 Tilhører tegn. nr.: 76236-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div> <div>Stykl. nr.: 76236-4S2</div>

DESCRIPTION OF 2-TONE PARALLEL TX/RX

The tone receiver/transmitter is to be used in system 4, 11 and 12 with Storno tones or in system with E.V.U. tones and repeater-call (Behörde Funkanlage).

The tone receiver will always be in stand-by position, independent of the sel. Rx. button (Löschen in Behörde Funkanlage), but the loudspeaker can be blocked by pushing the button. The key function will normally be blocked too but not if the printboard is strapped for use in Behörde Funkanlage where the keyfunction resets the tone receiver. When receiving a call the yellow lamp always flashes and the two tones will be heard in 400 mS with a certain minimum level. The extern alarm (if used) is activated. These alarm functions are cancelled by pushing the sel. button.

It is possible to strap the printboard in order to cancel the AF-blocking function which means that a message can be received just after a call before the alarmfunctions are turned off.

The tone transmitter consists of two oscillators which can be strapped to work on the same sel. Tx button. The tone lengths are 700 mS. All straps are shown and explained on the diagram.

Technical description of 2-tone parallel Rx/Tx print board B84B1, 2 and 3

Tone receiver

In position of receiving will Q1, Q10, Q11 and Q21 be "on" and Q2, Q3, Q12 and Q13 be "off".

The received tone signal on pin 13 will pass A1 which is an active LP-filter giving an attenuation of 12dB/octave with $f_0 = 3$ kHz.

A2-ICI amplifies the signal about twice, and through C6 and C18 the signal are passing to the LC-circuits. Through Q1 and Q11 the tone coils corresponding to the wanted tone combination are grounded.

The signal is amplified by Q4 and Q5 and is detected by Q6. The right tone will give a DC-voltage of 4,8V in TP1. Correspondingly for the second tone where amplifier and detector consist of Q7, Q8 and Q9.

By a tone call pin 3, NA4 will change to logic "1" after 300 ms, (controlled by R25 and C16).

and sets FF1 and FF2. The alarm oscillator NA8 is started, and a 1 kHz tone can be heard in the loudspeaker as long as the tone call is present. At the same time NA5 is started the sel. lamp is flashing.

The alarm functions are cancelled by resetting the system with the sel. Rx button. Furthermore it is possible to reset by keying if J3 and J4 is strapped.

The sel. Rx lamp function can be inverted by strapping J6 and J7. Then the sel. Rx lamp is lighted when the system is reset.

If J5 and J6 are strapped the key will be blocked when the flip flop's are reset. C37 and R69 will reset the alarm functions when the unit is turned on.

Function of tone transmitter

The tone transmitter can work as 1-tone transmitter or as a double tone transmitter by strapping terminal 8 and (8). The tone transmitter will stay keyed for 800 ms after the tone key button has been released.

By keying, NA1 and NA2 change to logic "0", Q1, Q10, Q11 and Q21 is turned off and Q2, Q3, Q12 and Q13 is turned on and connect the tone coil to transmitter position. Furthermore D1 and D2 will block the entrance to the tone receiver. The transmitter is keyed through Q19 and Q20 and the amplifier stage Q14 admit the tone modulation.

D20, R49 and C29 secure that the transmitter is blocked in the moment the unit is turned on.

Automatic response

As earlier mentioned the output of NA4 shift to logic "1" receiving a call. When the call disappears NA4 shifts to logic "0" and Q17 is triggered for 800 ms controlled by R77/R78 and C39, and keyes the tone transmitter through D6 and D7. At the same time the Tx blocking is cancelled by Q18 and D15. The response can be cancelled by removing D6 and D7. If only one of the diodes is removed.

Adjustments of the tone equipment

To get a correct adjustment, the wires from RxI and TxI have to be soldered to the coil tap no. 6 (on L1). Correspondingly the Rx II and TxII are soldered to the coil tap 6 or L2.

Adjustment of the tone receiver.

A test oscillator modulated with tone 6 (1,5 kHz deviation $\pm 0,1$ kHz), is connected to the antenna input. A DC-voltmeter is connected to TP1. L1 is adjusted to max. DC on TP1. L1 is re-adjusted to symmetry and it is controlled that TP1 shows 1V at fo $\pm 3\%$. After correct adjustment there will be 4,8 VDC at fo. The DC-voltmeter is connected to TP2, and the above procedure is repeated with L2 and R41.

After correct adjustment check up that the tone receiver can accept a correct call at 5 dB S/N-ratio. Furthermore the tone receiver shall be able to accept a call with a length of min. 200 ms.

Finally the wires from RxI and RxII have to be soldered to the coil taps corresponding to the wanted receiver tone combination.

Adjustment of the tone transmitter

A modulation meter is connected through a Watt meter to the antenna output. Pin 13-NA1 is strapped to + 5V and with R11 is adjusted to 1,8 kHz deviation. The 5V strap is removed from pin 13 and connected to pin 9-NA2, and R33 has to be adjusted to give 1,8 kHz deviation.

Finally remove the straps and connect the wires from Tx1 and TxII to the coil taps corresponding to the wanted tx-tone combination.

Further adjustments of the tone coil is not necessary. The frequency is adjusted as described in the part of "adjustment of the tone receiver".

TECHNICAL DESCRIPTION OF 2-TONE PARALLEL TX/RX

Tone Receiver

From pin 13 the input signal passes through an active filter consisting of Q1. Frequencies above 3 KHz will be attenuated in this filter. L1 - C5 and L2 - C20 make the resonance circuits. L1 and L2 are grounded through Q6 and Q13 in stand-by position. When receiving the proper tones, the amplifiers Q2 - Q3 and Q9 - Q10 take action. Q4 and Q11 work as detectors making DC-voltages on TP1 and TP2. R22 and R53 must be adjusted until +5V is reached. The alarm signal is taken from the top of R22 and R53 and is connected to the AF-amplifier through pin 14 independent of the AF-blocking circuit. Q8 normally blocks the signal but will go off when a call is accepted. The two flip flops IC2 which control the sel. indicator lamp, the ext. alarm and the blocking functions are set by the two detectors after 300 mS tone length. The flip flops are always reset at start because of R29 and C16. The sel. Rx-button clocks the flip flop, which in stand-by means nothing for IC2 - FF1 but sets FF2 at the first push. If S3a is mounted Q16 goes on and blocks the transmitter. The output of IC3 - NA4 is 0, which by help of the driver transistor in the front section blocks the AF-amplifier. The output of IC3 - NA3 is 0, too and by help of two driver transistors in the front section the sel. Rx-lamp is lightening, which indicates: sel. Rx on. In Behörde Funkanlage the sel. Rx lamp is connected to pin 12 and S3b is mounted which make the lamp turn off when FF2 is set. The transmitter is not blocked and can be used. The first key will reset the flip flops because of S2.

When the flip flops are set by a call, the oscillator IC3 - NA2 takes action and makes the sel. Rx lamp flashing. The ext. alarm is activated too by help of a driver transistor in the front section.

If S1 is mounted the AF-blocking is cancelled by a call and a message can be received before the flip flops are reset.

Tone Transmitter

The monostable multivibrators IC1 are triggered by the sel. key button(s). The transistors Q5, Q7 go on and start oscillator 1

which consists of Q2 and Q3. The transistors Q12, Q14 start oscillator 2 consisting of Q9 and Q10. The transmitter is keyed by Q18 and the microphone is blocked by Q19.

The monostable multivibrators keep the transmitter keyed in 800 mS. Q15 starts the tone modulation after 100 mS decided by R64 and C31.

Adjustments of the tone transmitter

The four wires for the Tx and Rx codes must be soldered to the coils,

The transmitter is connected to a deviation meter. A counter is connected to the deviation meter or to pin 5 of the tone transmitter.

Pin 6 and 7 on IC1 must be shorted and the sel. Tx button activated. The transmitter will stay keyed and modulated with the first tone. The modulation can now be adjusted with R13 (marked Tx 1). Deviation 1,8 KHz. L1 is adjusted for the correct frequency. Remove the short circuit.

Pin 14 and 15 on IC1 must now be shorted and Tx2, L2 adjusted. Remove the short circuit.

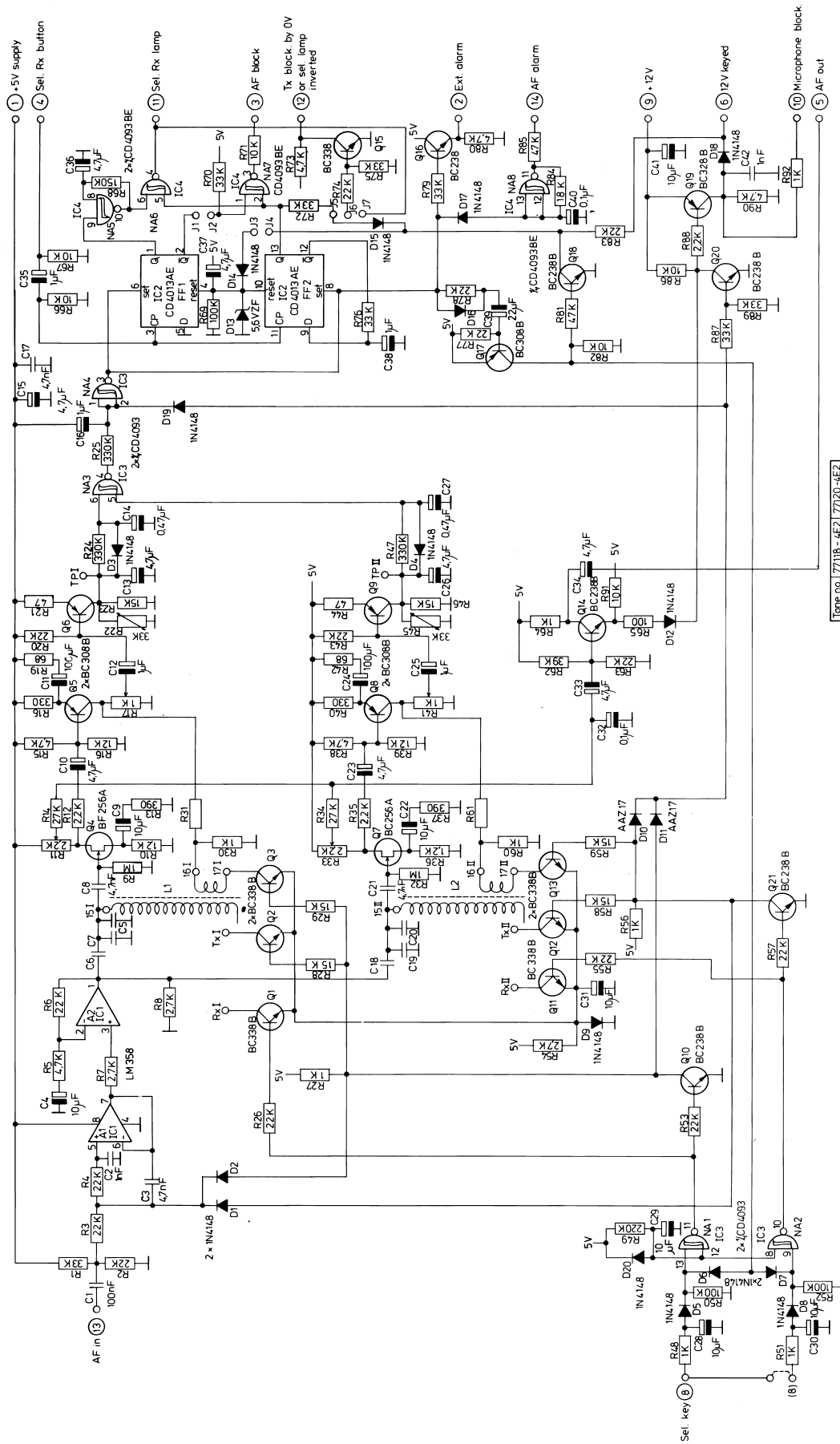
Now make a call and see if the transmitter is modulated with both tones in 700 mS.

Adjustments of the tone receiver

A FM-generator modulated with the first Rx-tone to 1,8 KHz dev. is connected to the receiver. A DC-voltmeter is connected to TP1. With a good S/N-ratio R22 (marked Rx1) is adjusted to + 1V on TP1 at $f_0 \pm 3\%$.

The modulation is changed to the second Rx-tone but still with 1,8 KHz dev. The voltmeter is moved to TP2 and Rx2 can be adjusted.

After correct adjustment the tone receiver must accept a two-tone call at 5 dB S/N-ratio. Normal tone length is 700 mS. The receiver opens after about 300 mS and the last 400 mS the two tones are heard as alarm.

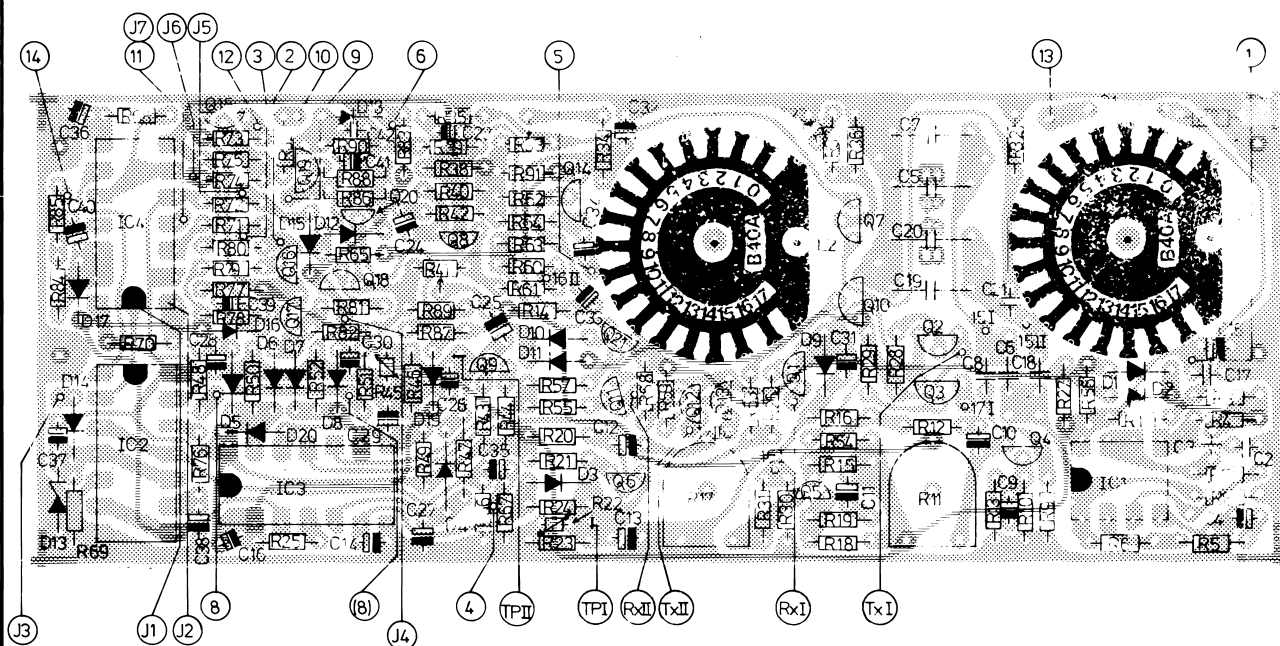
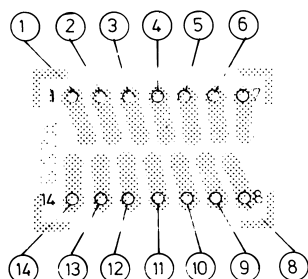


Tone no.	77118-4E2	77120-4E2
0	970	695
1	1060	675
2	1160	735
3	1270	855
4	1400	885
5	1530	970
6	1670	1060
7	1830	1160
8	2000	1270
9	2200	1400
10	2400	1530
11	2600	1670
12	2900	1830
13	2000	2000
14	2200	2200

Print board	L1	L2	C5	C6	C7	C18	C19	C20	R31	R61
B84B1	77118-4E2	77118-4E2	120 pF	20.5 nF	120 pF	205 nF	33K	33K	33K	33K
B84B2	77118-4E2	77120-4E2	120 pF	20.5 nF	1 nF	100 nF	68 nF	33K	10K	10K
B84B3	77120-4E2	77120-4E2	1 nF	100 nF	1 nF	100 nF	68 nF	10K	10K	10K

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R75	13-300	33 KΩ 1/8W CR 16	C19	11-491	100 nF MKM
R76	13-300	33 KΩ " "	C20	11-492	6,8 nF MKM
R77	13-299	22 KΩ " "	C21	11-416	4,7 nF ker.
R78	13-299	22 KΩ " "	C22	11-506	10 µF/25V tant.
R79	13-300	33 KΩ " "	C23	11-504	4,7 µF/10V "
R80	13-291	4,7 KΩ " "	C24	11-510	100 µF/3V "
R81	13-302	47 KΩ " "	C25	11-502	1 µF/35V "
R82	13-295	10 KΩ " "	C26	11-504	4,7 µF/10V "
R83	13-299	22 KΩ " "	C27	11-501	0,47 µF/35V "
R84	13-298	18 KΩ " "	C28	11-506	10 µF/25V "
R85	13-302	47 KΩ " "	C29	11-506	10 µF/25V "
R86	13-295	10 KΩ " "	C30	11-506	10 µF/25V "
R87	13-300	33 KΩ " "	C31	11-506	10 µF/25V "
R88	13-287	2,2 KΩ " "	C32	11-500	0,1 µF/35V "
R89	13-300	33 KΩ " "	C33	11-504	4,7 µF/10V "
R90	13-291	4,7 KΩ " "	C34	11-504	4,7 µF/10V "
R91	13-295	10 KΩ " "	C35	11-502	1 µF/35V "
R92	13-283	1 KΩ " "	C36	11-504	4,7 µF/35V "
			C37	11-504	4,7 µF/35V "
C1	11-490	100 nF MKH	C38	11-502	1 µF/35V "
C2	11-409	1 nF ker.	C39	11-507	22 µF/16V "
C3	11-416	4,7 nF "	C40	11-500	0,1 µF/35V "
C4	11-506	10 µF/25V tant.	C41	11-506	10 µF/25V "
C5	11-492	6,8 nF MKM	C42	11-409	1 nF ker.
C6	11-485	1 nF MKH			
C7	11-491	100 nF MKM	D1	04-062	1N4148
C8	11-416	4,7 nF ker.	D2	04-062	1N4148
C9	11-506	10 µF/25V "	D3	04-062	1N4148
C10	11-504	4,7 µF/10V tant.	D4	04-062	1N4148
C11	11-510	100 µF/3V "	D5	04-062	1N4148
C12	11-502	1 µF/35V "	D6	04-062	1N4148
C13	11-504	4,7 µF/10V "	D7	04-062	1N4148
C14	11-501	0,47 µF/35V "	D8	04-062	1N4148
C15	11-504	4,7 µF/10V "	D9	04-062	1N4148
C16	11-502	1 µF/35V "	D10	04-002	AAZ 17
C17	11-416	4,7 nF ker.	D11	04-002	AAZ 17
C18	11-485	1 nF MKH	D12	04-062	1N4148
2-tone parallel Tx/Rx Print board B 84B3 Tilhører tegn. nr.: 77405-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 77405-4S2



Rettet: 4 - 1 - 78 AMC
14-2-80 BJ/AMC

2-tone parallel Tx/Rx
Print board B 84 B 1,2 and 3

AP - RADIOTELEFON

Tegn.: 8-12-77 AC	Kontr.:
Stykl. nr.:	
Tegn. nr.:	77405-3E2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-300	33 KΩ 1/8W CR 16	R38	13-291	4,7 KΩ 1/8W CR 16
R2	13-299	22 KΩ " "	R39	13-296	12 KΩ " "
R3	13-299	22 KΩ " "	R40	13-277	330 Ω " "
R4	13-299	22 KΩ " "	R41	19-252	1 KΩ Trim. stå.
R5	13-291	4,7 KΩ " "	R42	13-269	68 Ω 1/8W CR 16
R6	13-299	22 KΩ " "	R43	13-299	22 KΩ " "
R7	13-288	2,7 KΩ " "	R44	13-267	47 Ω " "
R8	13-288	2,7 KΩ " "	R45	13-671	33 KΩ NTC
R9	13-312	1 MΩ " "	R46	13-297	15 KΩ 1/8W CR 16
R10	13-284	1,2 KΩ " "	R47	13-310	330 KΩ " "
R11	19-254	2,2 KΩ Trim. ligg.	R48	13-283	1 KΩ " "
R12	13-287	2,2 KΩ 1/8W CR 16	R49	13-309	220 KΩ " "
R13	13-278	390 Ω " "	R50	13-306	100 KΩ " "
R14	13-313	27 KΩ " "	R51	13-283	1 KΩ " "
R15	13-291	4,7 KΩ " "	R52	13-306	100 KΩ " "
R16	13-296	12 KΩ " "	R53	13-299	22 KΩ " "
R17	19-253	1 KΩ Trim. ligg.	R54	13-288	2,7 KΩ " "
R18	13-277	330 Ω 1/8W CR 16	R55	13-299	22 KΩ " "
R19	13-269	68 Ω " "	R56	13-283	1 KΩ " "
R20	13-299	22 KΩ " "	R57	13-299	22 KΩ " "
R21	13-267	47 Ω " "	R58	13-297	15 KΩ " "
R22	13-271	33 KΩ NTC	R59	13-297	15 KΩ " "
R23	13-297	15 KΩ 1/8W CR 16	R60	13-283	1 KΩ " "
R24	13-310	330 KΩ " "	R61	13-295	10 KΩ " "
R25	13-310	330 KΩ " "	R62	13-301	39 KΩ " "
R26	13-299	22 KΩ " "	R63	13-299	22 KΩ " "
R27	13-283	1 KΩ " "	R64	13-283	1 KΩ " "
R28	13-297	15 KΩ " "	R65	13-306	100 KΩ " "
R29	13-297	15 KΩ " "	R66	13-295	10 KΩ " "
R30	13-283	1 KΩ " "	R67	13-295	10 KΩ " "
R31	13-295	10 KΩ " "	R68	13-308	150 KΩ " "
R32	13-312	1 MΩ " "	R69	13-306	100 KΩ " "
R33	19-255	2,2 KΩ Trim. stå.	R70	13-300	33 KΩ " "
R34	13-313	27 KΩ " "	R71	13-295	10 KΩ " "
R35	13-287	2,2 KΩ 1/8W CR 16	R72	13-300	33 KΩ " "
R36	13-284	1,2 KΩ " "	R73	13-291	4,7 KΩ " "
R37	13-278	390 Ω " "	R74	13-299	22 KΩ " "
2-tone parallel Tx/Rx Print board B 84 B3 Tilhører tegn. nr.: 77405-2E2			Rettet:		Tegn.: Kontr.:
					Stykl. nr.: 77405-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
D13	04-028	ZF 5,6 V	L1	77-120	77120-4E2
D14	04-062	1N4148	L2	77-120	77120-4E2
D15	04-062	1N4148			
D16	04-062	1N4148			
D17	04-062	1N3138			
D18	04-062	1N4148			
D19	04-062	1N4148			
D20	04-062	1N4148			
Q1	19-085	BC 338B			
Q2	19-085	BC 338B			
Q3	19-085	BC 338B			
Q4	19-113	BF 256A			
Q5	19-084	BC 308B			
Q6	19-084	BC 308B			
Q7	19-113	BC 256A			
Q8	19-084	BC 308B			
Q9	19-084	BC 308B			
Q10	19-117	BC 238B			
Q11	19-085	BC 338B			
Q12	19-085	BC 338B			
Q13	19-085	BC 338B			
Q14	19-117	BC 238B			
Q15	19-085	BC 338B			
Q16	19-117	BC 238B			
Q17	19-084	BC 308B			
Q18	19-117	BC 238B			
Q19	19-082	BC 328B			
Q20	19-117	BC 238B			
Q21	19-117	BC 238B			
IC1	09-080	LM 358			
IC2	09-074	CD 4013 AE			
IC3	09-072	CD 4093 BE			
IC4	09-072	CD 4093 BE			
2-tone parallel Tx/Rx Print board B 84B3 Tilhører tegn. nr.: 77405-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 77405-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R75	13-300	33 KΩ 1/8W CR 16	C19	11-491	100 nF MKM
R76	13-300	33 KΩ " "	C20	11-492	6,8 nF "
R77	13-299	22 KΩ " "	C21	11-416	4,7 nF ker.
R78	13-299	22 KΩ " "	C22	11-506	10 µF/25V tant.
R79	13-300	33 KΩ " "	C23	11-504	4,7 µF/10V "
R80	13-291	4,7 KΩ " "	C24	11-510	100 µF/3V "
R81	13-302	47 KΩ " "	C25	11-502	1 µF/35V "
R82	13-295	10 KΩ " "	C26	11-504	4,7 µF/10V "
R83	13-299	22 KΩ " "	C27	11-501	0,47 µF/35V "
R84	13-298	18 KΩ " "	C28	11-506	10 µF/25V "
R85	13-302	47 KΩ " "	C29	11-506	10 µF/25V "
R86	13-295	10 KΩ " "	C30	11-506	10 µF/25V "
R87	13-300	33 KΩ " "	C31	11-506	10 µF/25V "
R88	13-287	2,2 KΩ " "	C32	11-500	0,1 µF/35V "
R89	13-300	33 KΩ " "	C33	11-504	4,7 µF/10V "
R90	13-291	4,7 KΩ " "	C34	11-504	4,7 µF/10V "
R91	13-295	10 KΩ " "	C35	11-502	1 µF/35V "
R92	13-283	1 KΩ " "	C36	11-504	4,7 µF/35V "
			C37	11-504	4,7 µF/35V "
C1	11-490	100 nF MKH	C38	11-502	1 µF/35V "
C2	11-409	1 nF ker.	C39	11-507	22 µF/16V "
C3	11-416	4,7 nF "	C40	11-500	0,1 µF/35V "
C4	11-506	10 µF/25V tant.	C41	11-506	10 µF/25V "
C5			C42	11-409	1 nF ker.
C6	11-403	120 pF ker.			
C7	11-651	20,5 nF styr.	D1	04-062	1N4148
C8	11-416	4,7 nF ker.	D2	04-062	1N4148
C9	11-506	10 µF/25V "	D3	04-062	1N4148
C10	11-504	4,7 µF/10V tant.	D4	04-062	1N4148
C11	11-510	100 µF/3V "	D5	04-062	1N4148
C12	11-502	1 µF/35V "	D6	04-062	1N4148
C13	11-504	4,7 µF/10V "	D7	04-062	1N4148
C14	11-501	0,47 µF/35V "	D8	04-062	1N4148
C15	11-504	4,7 µF/10V "	D9	04-062	1N4148
C16	11-502	1 µF/35V "	D10	04-002	AAZ 17
C17	11-416	4,7 nF ker.	D11	04-002	AAZ 17
C18	11-485	1 nF MKH	D12	04-062	1N4148
2-tone parallel Tx/Rx Print board B 84B2 Tilhører tegn. nr.: 77405-2E2			Rettet:		<div>Tegn.:</div> <div>Stykl. nr.: 77405-4S2</div> <div>Kontr.:</div>

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-300	33 KΩ 1/8W CR 16	R38	13-291	4,7 KΩ 1/8W CR 16
R2	13-299	22 KΩ " "	R39	13-296	12 KΩ " "
R3	13-299	22 KΩ " "	R40	13-277	330 Ω " "
R4	13-299	22 KΩ " "	R41	19-252	1 KΩ Trim. stå.
R5	13-291	4,7 KΩ " "	R42	13-269	68 Ω 1/8W CR 16
R6	13-299	22 KΩ " "	R43	13-299	22 KΩ " "
R7	13-288	2,7 KΩ " "	R44	13-267	47 Ω " "
R8	13-288	2,7 KΩ " "	R45	13-671	33 KΩ NTC
R9	13-312	1 MΩ " "	R46	13-297	15 KΩ 1/8W CR 16
R10	13-284	1,2 KΩ " "	R47	13-310	330 KΩ " "
R11	19-254	2,2 KΩ Trim. ligg.	R48	13-283	1 KΩ " "
R12	13-287	2,2 KΩ 1/8W CR 16	R49	13-309	220 KΩ " "
R13	13-278	390 Ω " "	R50	13-306	100 KΩ " "
R14	13-313	27 KΩ " "	R51	13-283	1 KΩ " "
R15	13-291	4,7 KΩ " "	R52	13-306	100 KΩ " "
R16	13-296	12 KΩ " "	R53	13-299	22 KΩ " "
R17	19-253	1 KΩ Trim. ligg.	R54	13-288	2,7 KΩ " "
R18	13-277	330 Ω 1/8W CR 16	R55	13-299	22 KΩ " "
R19	13-269	68 Ω " "	R56	13-283	1 KΩ " "
R20	13-299	22 KΩ " "	R57	13-299	22 KΩ " "
R21	13-267	47 Ω " "	R58	13-297	15 KΩ " "
R22	13-271	33 KΩ NTC	R59	13-297	15 KΩ " "
R23	13-297	15 KΩ 1/8W CR 16	R60	13-283	1 KΩ " "
R24	13-310	330 KΩ " "	R61	13-295	10 KΩ " "
R25	13-310	330 KΩ " "	R62	13-301	39 KΩ " "
R26	13-299	22 KΩ " "	R63	13-299	22 KΩ " "
R27	13-283	1 KΩ " "	R64	13-283	1 KΩ " "
R28	13-297	15 KΩ " "	R65	13-306	100 KΩ " "
R29	13-297	15 KΩ " "	R66	13-295	10 KΩ " "
R30	13-283	1 KΩ " "	R67	13-295	10 KΩ " "
R31	13-300	33 KΩ " "	R68	13-308	150 KΩ " "
R32	13-312	1 MΩ " "	R69	13-306	100 KΩ " "
R33	19-255	2,2 KΩ Trim. stå.	R70	13-300	33 KΩ " "
R34	13-313	27 KΩ " "	R71	13-295	10 KΩ " "
R35	13-287	2,2 KΩ 1/8W CR 16	R72	13-300	33 KΩ " "
R36	13-284	1,2 KΩ " "	R73	13-291	4,7 KΩ " "
R37	13-278	390 Ω " "	R74	13-299	22 KΩ " "
2-tone parallel Tx/Rx Print board B 84B2 Tilhører tegn. nr.: 77405-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 77405-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
D13	04-028	ZF 5,6 V	L1	77-118	77118-4E2
D14	04-062	1N4148	L2	77-120	77120-4E2
D15	04-062	1N4148			
D16	04-062	1N4148			
D17	04-062	1N3138			
D18	04-062	1N4148			
D19	04-062	1N4148			
D20	04-062	1N4148			
Q1	19-085	BC 338B			
Q2	19-085	BC 338B			
Q3	19-085	BC 338B			
Q4	19-113	BF 256A			
Q5	19-084	BC 308B			
Q6	19-084	BC 308B			
Q7	19-113	BC 256A			
Q8	19-084	BC 308B			
Q9	19-084	BC 308B			
Q10	19-117	BC 238B			
Q11	19-085	BC 338B			
Q12	19-085	BC 338B			
Q13	19-085	BC 338B			
Q14	19-117	BC 238B			
Q15	19-085	BC 338B			
Q16	19-117	BC 238B			
Q17	19-084	BC 308B			
Q18	19-117	BC 238B			
Q19	19-082	BC 328B			
Q20	19-117	BC 238B			
Q21	19-117	BC 238B			
IC1	09-080	LM 358			
IC2	09-074	CD 4013 AE			
IC3	09-072	CD 4093 BE			
IC4	09-072	CD 4093 BE			
2-tone parallel Tx/Rx Print board B 84 B2 Tilhører tegn. nr.: 77405-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 77405-4S2

AP-RADIOTELEFON

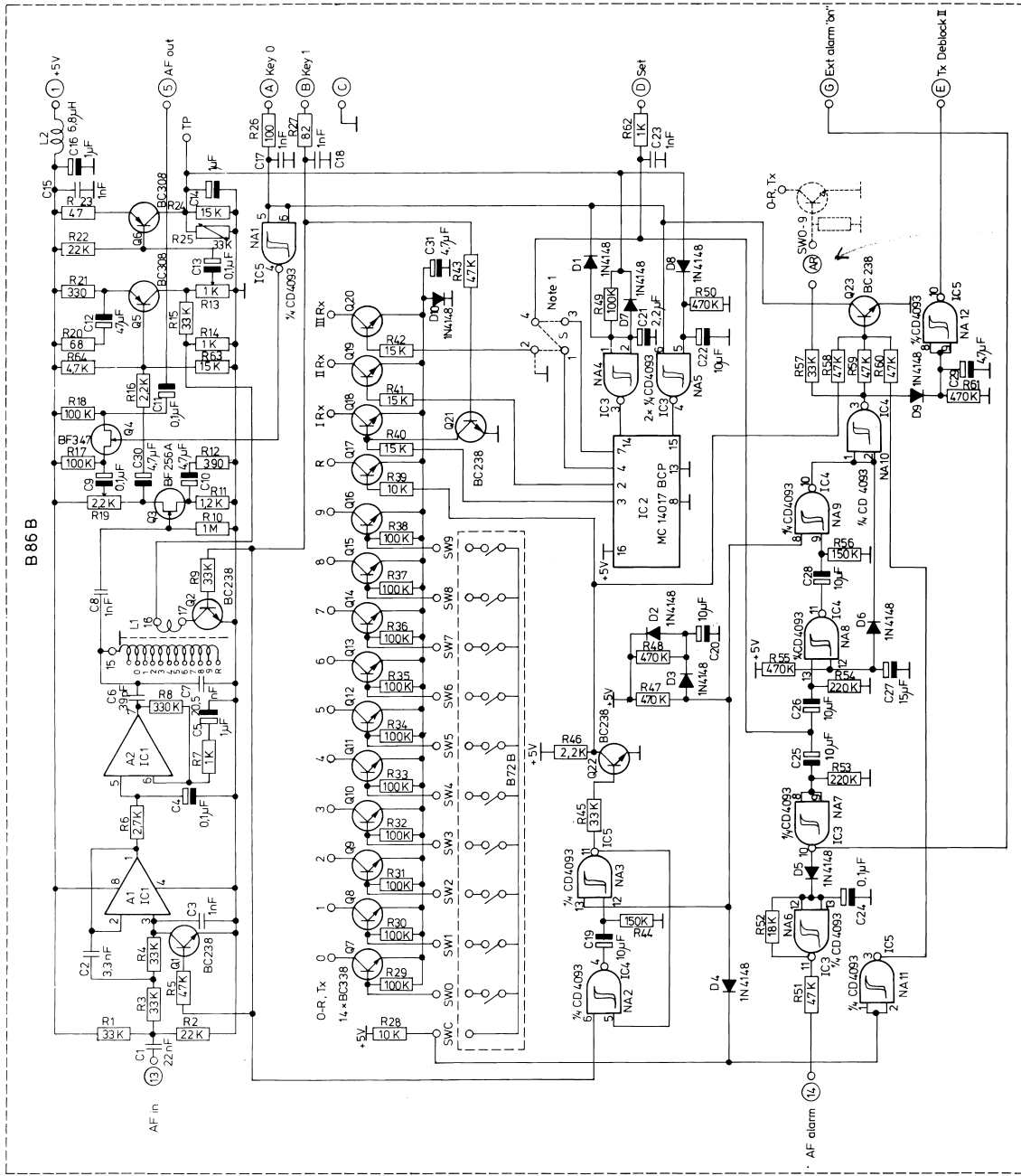
Nr.	Kode	Data	Nr.	Kode	Data
R1	13-300	33 KΩ 1/8W CR 16	R38	13-291	4,7 KΩ 1/8W CR 16
R2	13-299	22 KΩ " "	R39	13-296	12 KΩ " "
R3	13-299	22 KΩ " "	R40	13-277	330 Ω " "
R4	13-299	22 KΩ " "	R41	19-252	1 KΩ Trim. stå.
R5	13-291	4,7 KΩ " "	R42	13-269	68 Ω 1/8W CR 16
R6	13-299	22 KΩ " "	R43	13-299	22 KΩ " "
R7	13-288	2,7 KΩ " "	R44	13-267	47 Ω " "
R8	13-288	2,7 KΩ " "	R45	13-671	33 KΩ NTC
R9	13-312	1 MΩ " "	R46	13-297	15 KΩ 1/8W CR 16
R10	13-284	1,2 KΩ " "	R47	13-310	330 KΩ " "
R11	19-254	2,2 KΩ Trim. ligg.	R48	13-283	1 KΩ " "
R12	13-287	2,2 KΩ 1/8W CR 16	R49	13-309	220 KΩ " "
R13	13-278	390 Ω " "	R50	13-306	100 KΩ " "
R14	13-313	27 KΩ " "	R51	13-283	1 KΩ " "
R15	13-291	4,7 KΩ " "	R52	13-306	100 KΩ " "
R16	13-296	12 KΩ " "	R53	13-299	22 KΩ " "
R17	19-253	1 KΩ Trim. ligg.	R54	13-288	2,7 KΩ " "
R18	13-277	330 Ω 1/8W CR 16	R55	13-299	22 KΩ " "
R19	13-269	68 Ω " "	R56	13-283	1 KΩ " "
R20	13-299	22 KΩ " "	R57	13-299	22 KΩ " "
R21	13-267	47 Ω " "	R58	13-297	15 KΩ " "
R22	13-271	33 KΩ NTC	R59	13-297	15 KΩ " "
R23	13-297	15 KΩ 1/8W CR 16	R60	13-283	1 KΩ " "
R24	13-310	330 KΩ " "	R61	13-300	33 KΩ " "
R25	13-310	330 KΩ " "	R62	13-301	39 KΩ " "
R26	13-299	22 KΩ " "	R63	13-299	22 KΩ " "
R27	13-283	1 KΩ " "	R64	13-283	1 KΩ " "
R28	13-297	15 KΩ " "	R65	13-306	100 KΩ " "
R29	13-297	15 KΩ " "	R66	13-295	10 KΩ " "
R30	13-283	1 KΩ " "	R67	13-295	10 KΩ " "
R31	13-300	33 KΩ " "	R68	13-308	150 KΩ " "
R32	13-312	1 MΩ " "	R69	13-306	100 KΩ " "
R33	19-255	2,2 KΩ Trim. stå.	R70	13-300	33 KΩ " "
R34	13-313	27 KΩ " "	R71	13-295	10 KΩ " "
R35	13-287	2,2 KΩ 1/8W CR 16	R72	13-300	33 KΩ " "
R36	13-284	1,2 KΩ " "	R73	13-291	4,7 KΩ " "
R37	13-278	390 Ω " "	R74	13-299	22 KΩ " "
2-tone parallel Tx/Rx Print board B 84 B1 Tilhører tegn. nr.: 77405-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 77405-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R75	13-300	33 KΩ 1/8W CR 16	C19	11-651	20,5 nF styr.
R76	13-300	33 KΩ " "	C20		
R77	13-299	22 KΩ " "	C21	11-416	4,7 nF ker.
R78	13-299	22 KΩ " "	C22	11-506	10 µF/25V tant.
R79	13-300	33 KΩ " "	C23	11-504	4,7 µF/10V "
R80	13-291	4,7 KΩ " "	C24	11-510	100 µF/3V "
R81	13-302	47 KΩ " "	C25	11-502	1 µF/35V "
R82	13-295	10 KΩ " "	C26	11-504	4,7 µF/10V "
R83	13-299	22 KΩ " "	C27	11-501	0,47 µF/35V "
R84	13-298	18 KΩ " "	C28	11-506	10 µF/25V "
R85	13-302	47 KΩ " "	C29	11-506	10 µF/25V "
R86	13-295	10 KΩ " "	C30	11-506	10 µF/25V "
R87	13-300	33 KΩ " "	C31	11-506	10 µF/25V "
R88	13-287	2,2 KΩ " "	C32	11-500	0,1 µF/35V "
R89	13-300	33 KΩ " "	C33	11-504	4,7 µF/10V "
R90	13-291	4,7 KΩ " "	C34	11-504	4,7 µF/10V "
R91	13-295	10 KΩ " "	C35	11-502	1 µF/35V "
R92	13-283	1 KΩ " "	C36	11-504	4,7 µF/35V "
			C37	11-504	4,7 µF/35V "
C1	11-490	100 nF MKH	C38	11-502	1 µF/35V "
C2	11-409	1 nF ker.	C39	11-507	22 µF/16V "
C3	11-416	4,7 nF "	C40	11-500	0,1 µF/35V "
C4	11-506	10 µF/25V tant.	C41	11-506	10 µF/25V "
C5			C42	11-409	1 nF ker.
C6	11-403	120 pF ker.			
C7	11-651	20,5 nF styr.	D1	04-062	1N4148
C8	11-416	4,7 nF ker.	D2	04-062	1N4148
C9	11-506	10 µF/25V "	D3	04-062	1N4148
C10	11-504	4,7 µF/10V tant.	D4	04-062	1N4148
C11	11-510	100 µF/3V "	D5	04-062	1N4148
C12	11-502	1 µF/35V "	D6	04-062	1N4148
C13	11-504	4,7 µF/10V "	D7	04-062	1N4148
C14	11-501	0,47 µF/35V "	D8	04-062	1N4148
C15	11-504	4,7 µF/10V "	D9	04-062	1N4148
C16	11-502	1 µF/35V "	D10	04-002	AAZ 17
C17	11-416	4,7 nF ker.	D11	04-002	AAZ 17
C18	11-403	120 pF ker.	D12	04-062	1N4148
2-tone parallel Tx/Rx Print board B 84B1 Tilhører tegn. nr.: 77405-2E2			Rettet:		Tegn.: Kontr.:
					Stykl. nr.: 77405-4S2

AP-RADIOTELEFON

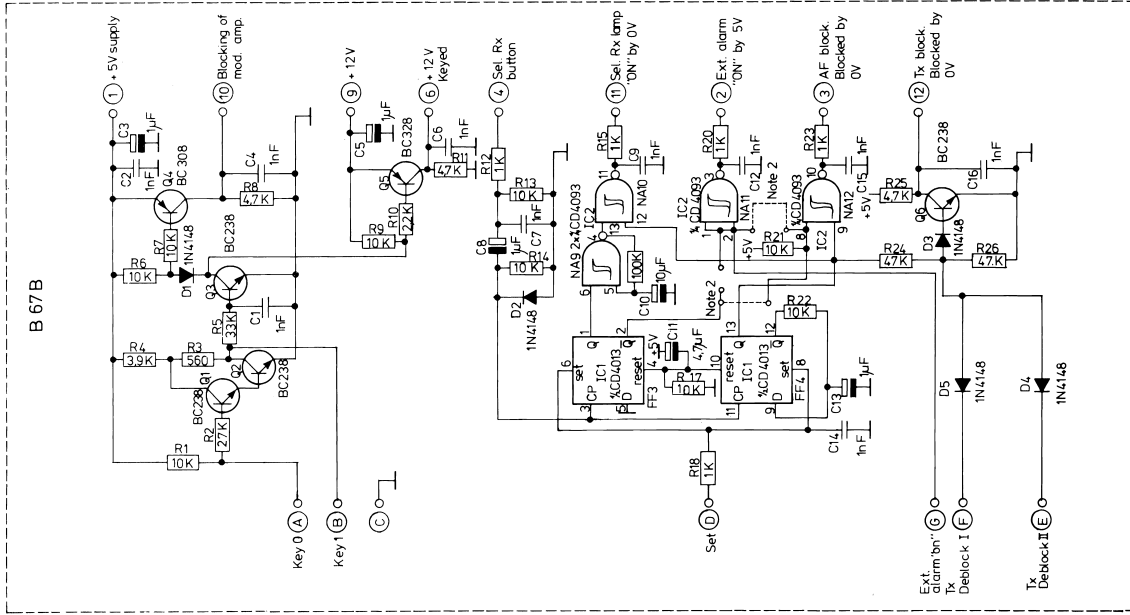
Nr.	Kode	Data	Nr.	Kode	Data
D13	04-028	ZF 5,6 V	L1	77-118	77118-4E2
D14	04-062	1N4148	L2	77-118	77118-4E2
D15	04-062	1N4148			
D16	04-062	1N4148			
D17	04-062	1N3138			
D18	04-062	1N4148			
D19	04-062	1N4148			
D20	04-062	1N4148			
Q1	19-085	BC 338B			
Q2	19-085	BC 338B			
Q3	19-085	BC 338B			
Q4	19-113	BF 256A			
Q5	19-084	BC 308B			
Q6	19-084	BC 308B			
Q7	19-113	BC 256A			
Q8	19-084	BC 308B			
Q9	19-084	BC 308B			
Q10	19-117	BC 238B			
Q11	19-085	BC 338B			
Q12	19-085	BC 338B			
Q13	19-085	BC 338B			
Q14	19-117	BC 238B			
Q15	19-085	BC 338B			
Q16	19-117	BC 238B			
Q17	19-084	BC 308B			
Q18	19-117	BC 238B			
Q19	19-082	BC 328B			
Q20	19-117	BC 238B			
Q21	19-117	BC 238B			
IC1	09-080	LM 358			
IC2	09-074	CD 4013 AE			
IC3	09-072	CD 4093 BE			
IC4	09-072	CD 4093 BE			
2-tone parallel Tx/Rx Print board B 84 B1 Tilhører tegn. nr.: 77405-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 77405-4S2



Tones	
B86B1	3-tone Rx, 2-tone Tx, without automatic response. C26 is not mounted.
B86B2	3-tone Rx, 2-tone Tx, with automatic response.
B86B3	3-tone Rx, 1-tone Tx, without automatic response. C19 and C26 are not mounted.
B86B4	3-tone Rx, 1-tone Tx, with automatic response. C19 and C26 are not mounted.

Note: When a 3-tone selective call is wanted a strap is mounted between point 1-2 and 3-4. When a 2-tone selective call is wanted a strap is mounted between point 1-4. Point 2 is not connected to ground (B86B1).
 Note 2: The strap is mounted, when a selective call shall open the receiver. (B87B)

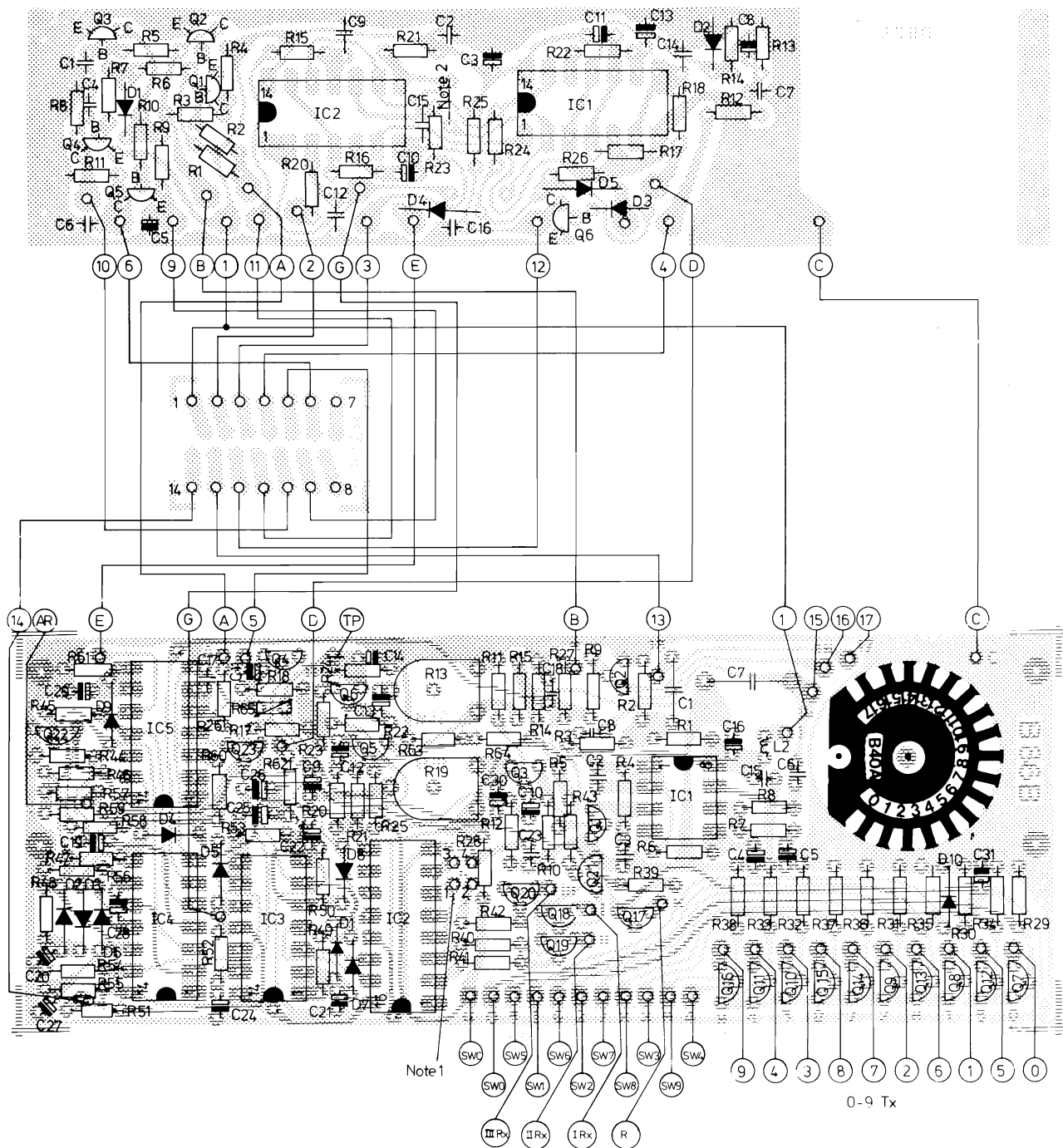
*fork TX tone: 1400 Hz variorol vid at flytt
 ledning fra @ til 07-016 SWO - SW9
 (give same number variorol vid at flytt)
 ledning fra @ til 07-016 SWO - SW9
 (give same number variorol vid at flytt)
 ledning fra @ til 07-016 SWO - SW9*



Part: 19-10-77 104	Page: 11-8-77	Mont:
9-1-78 AC	AC	
	Byt: nr:	
	Page: nr:	77337-2E2

2-3 tone Rx 2-tone Tx, selectable
 Tx tonecode - Alarm and key circuit
 Print boards B86B1,2,3,4 and B67B1

AP-RADIOTELEFON %



Retter: 19-10-77 LD/AC

2-3 tone Rx, 2-tone Tx, selectable Tx tonecode,
Alarm and key circuit.

Print boards B86B1,2,3,4 and B67B1

AP-RADIOTELEFON

Tegn.: 16-8-77
AC

Stykl. nr.:

Kontr.:

Tegn. nr.:

77337-3E2

Description of 5-tone transmitter-receiver, ID

The tone receiver/transmitter is to be used with frontsection 5 and 7.

The tone receiver will always be in stand-by position, independent of the sel. Rx. button but the loudspeaker and the key function can be blocked by pushing the button. When receiving a call the yellow lamp always flashes and the built-in accoustic alarm will always be heard. The extern alarm (if used) is activated. These alarm functions are cancelled by pushing the sel. button. Having received a call the tone transmitter starts and gives an identity response, which consists of the same tone sequence as just received or of the Tx-code.

While transmitting automatic ID-response the red and white lamps are lightening.

It is possible to strap the print board B77 in order to cancel the AF-blocking function, which means that a message can be received just after a call before the flashing yellow lamp is turned off by pushing the sel. Rx. button.

The tone transmitter is activated by pushing the sel. Tx. button and the red and the white lamps are lightening. In order to transmit the yellow lamp must be turned off.

It is possible to select different figures in the Tx-tone sequence: call number. The print board B76 might be strapped in two ways, dependent on which figures shall be selectable in the code:

- 1) Tone 3 and 5
- 2) Tone 4 and 5.

Technical description of 5-tone transmitter-receiver, ID

The tone system is separated in two print boards, B76 and B77. B77 includes the amplifier and the active filter for the tone receiver. The blocking and alarm functions are located on this printboard together with some logical control circuits. B76 includes the tone coil with receiver and oscillator circuit, counter, AF-alarm, switch circuit for the tone output, timing circuits and clock generator.

Tone receiver

From pin 13 the input signal passes through an active filter consisting of IC1-A1 on printboard B77. Frequencies above 3 kc will be attenuated in this filter. R1 and C3 makes the deemphasis in order to maintain a suitable S/N ratio.

Passing through the amplifier IC1-A2 the resonance circuit L1 on B76 and C1 on B77 is reached. L1 is grounded through Q6 in stand-by position ready for the first tone. When receiving the proper tone, amplifier Q4 takes action. The drain of Q4 is shorted to the 5V supply through Q2 because the Q output, pin 13 of IC3 is "ON". Q3 works as a detector making a DC-voltage on TP1. Even at minimum input signal, 50mV, a square wave voltage of 4 Vpp is reached at the coil. R36 must be adjusted until a logic "1" appears at TP1. IC6-NA2 will clock the counter IC1 resulting that Q6 go off and Q7 go on. Now the coil gives resonance on another frequency. This sequence will continue until the last tone is received. When the last tone is accepted, the counter will be reset by IC6-NA1, 3, 4 after a delay decided by R37 and C7.

A call will be accepted if the length of each tone is more than 40 mS, and an eventual pause between two tones is not larger than 250 mS.

A call accepted:

When the last tone is accepted, pin 1 on the counter IC1 goes high and stays high until the counter is reset after 250 ms. When the counter output goes high, the accoustic alarm, which consists of the oscillator IC5, NA4, takes action. It is normally blocked by NA3. The alarm time is set by R39 and C11. The oscillator is connected to the AF-amplifier through pin 14 independent of the AF blocking circuit and will always be heard.

The two flip flops IC2-FF1, 2 on B77 which control the sel. indicator lamp, the ext. alarm and the blocking functions, are set by the counter, too. They are always reset at start because of R14 and C12. The sel. Rx-button clocks the flip flop, which in stand-by means nothing for IC2-FF1, but sets the FF2 at the first push. Q2 goes on and blocks the transmitter. The output of IC3-NA4 is "0" which, by help of the driver transistor in the front section, blocks the AF-amplifier. The output of IC3-NA2 is "0", too and by help of two driver transistors in the front section the sel. Rx. lamp is lightening, which indicates: sel. Rx. on. A second push resets IC2-FF2 and the radio is normal. When the flip flops are set by the counter after accepting a call, the oscillator IC3-NA1 takes action. The oscillator output goes through NA2 and makes the sel. Rx. lamp flashing. In stand-by position the output of NA1 was "1". NA3 receives an "0" from NA1 at the call and gives a "1" to the driver transistors in the front section which activates the external alarm, if connected.

If NA3 and 4 are strapped the AF-blocking is cancelled and a message can be received, but in order to stop the sel. Rx. lamp from flashing and opening the transmitter, it is necessary to push the sel. Rx. button once.

Automatic ID-response - Tone Transmitter

Having accepted a call the counter sets IC3-FF2 and resets IC3-FF1 through IC5-NA1 on B76. IC3-FF1 cancels the Tx. blocking.

FF2 blocks the microphone by help of Q4 and Q5 on B77 and blocks the tone receiver through A1 on B77. The transmitter is keyed by Q3 and starts up without modulation at once. The clock generator IC7-NA4 on B76 goes on but the monostable multivibrator IC4-FF1 is fired too, which means that IC7-NA3 prohibits the counter to be clocked the first 200 ms while the tone oscillator starts up.

The tone oscillator consists of the same coil and transistor Q4 which made the selective receiver. When IC3-FF2 is set Q1 and Q5 goes on while Q2 goes off and the circuits starts to oscillate. The oscillator signal goes through Q23 to the switch Q24. When IC4-FF1 has reset after 200 ms IC7-NA3 opens the clock pulses, but the clock input of the counter is still blocked by IC7-NA1, 2 which is connected to the disable input making it high. The first clock pulse clocks IC2-FF2 and resets it (normally set at start by D7/C13).

The \bar{Q} output opens the switch Q24 immediately and the transmitter is modulated. After a few ms, C14 is charged and the disable goes "0". The following clock pulses now clock the counter ($f_c = 10$ or $14,3$ cycles adjusted by R24 and the tone transmitter starts. If pin 6 on IC2-FF1 is strapped to ground the receiver code is obtained, ID. If the strap goes to the flip-flop IC3 at pin 4 the FF1 will be set and the transmitter code is obtained. When \bar{Q} of IC3-FF2 is "0" there will be no alarm when pin 1 of the counter goes high just after tone 5 has stopped. When pin 5 goes high IC2-FF2 and IC3-FF1 are set again and IC3-FF2 resets as well. That means stand-by as before except for one detail: the monostable IC4-FF2 is set with the result that IC5-NA1 is blocked about 5 sec. - a new ID-response is impossible for a while.

Selective Call

The selective call works like an ID-response with a few exceptions. The sel. key clocks IC3-FF2 on B76 but not the FF1 which means that the Tx. blocking cannot be cancelled by FF1. Therefore the Sel. Rx. must not be on. The sel. key clocks IC2-FF1 which means Q21 goes off and Q22 on. Now the switch transistors Q9, Q10, Q17, Q18 go out of function and Q11, Q12, Q19, Q20 work instead. Q19

and Q20 might be connected arbitrary to all the sections of the coil through the contacts on the front panel. That means two figures in the tone sequence can be selected arbitrary from the contacts. The first selectable figure might be tone 3 or 4 depending on two straps on B76:

Tone 3 variable: upside terminal 4 strapped to free terminal
downside " 3 " " I-V "

Tone 4 variable: upside terminal 4 strapped to I-V terminal
downside " 3 " " free "

The second variable figure is always number five in the sequence.

Adjustment of the Tone Transmitter

The five wires on B76 must be soldered to the coil sections following the wanted tone sequence. For adjustment the first tone has to be tone 6. After correct adjustment the first tone is changed to the correct one.

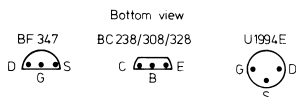
The modulation is to be adjusted by R43 as follows: the arm of R24 and TP3 are shortened to the 5V supply, so the clock generator is stopped and the switch is opened. Push the sel. Tx button. The transmitter now goes on modulated constantly with the first tone in the sequence. R43 now can be adjusted to the desired deviation depending on the tone frequency. The coil is adjusted to the correct frequency. Remove the short circuits.

In order to adjust the clock frequency terminal E must be shorted to the 5 V supply. Connect a counter to TP2 and adjust R24 until 10 cycles are reached for CCIR tones or 14,3 cycles for ZVEI tones.

Adjustments of the Tone Receiver

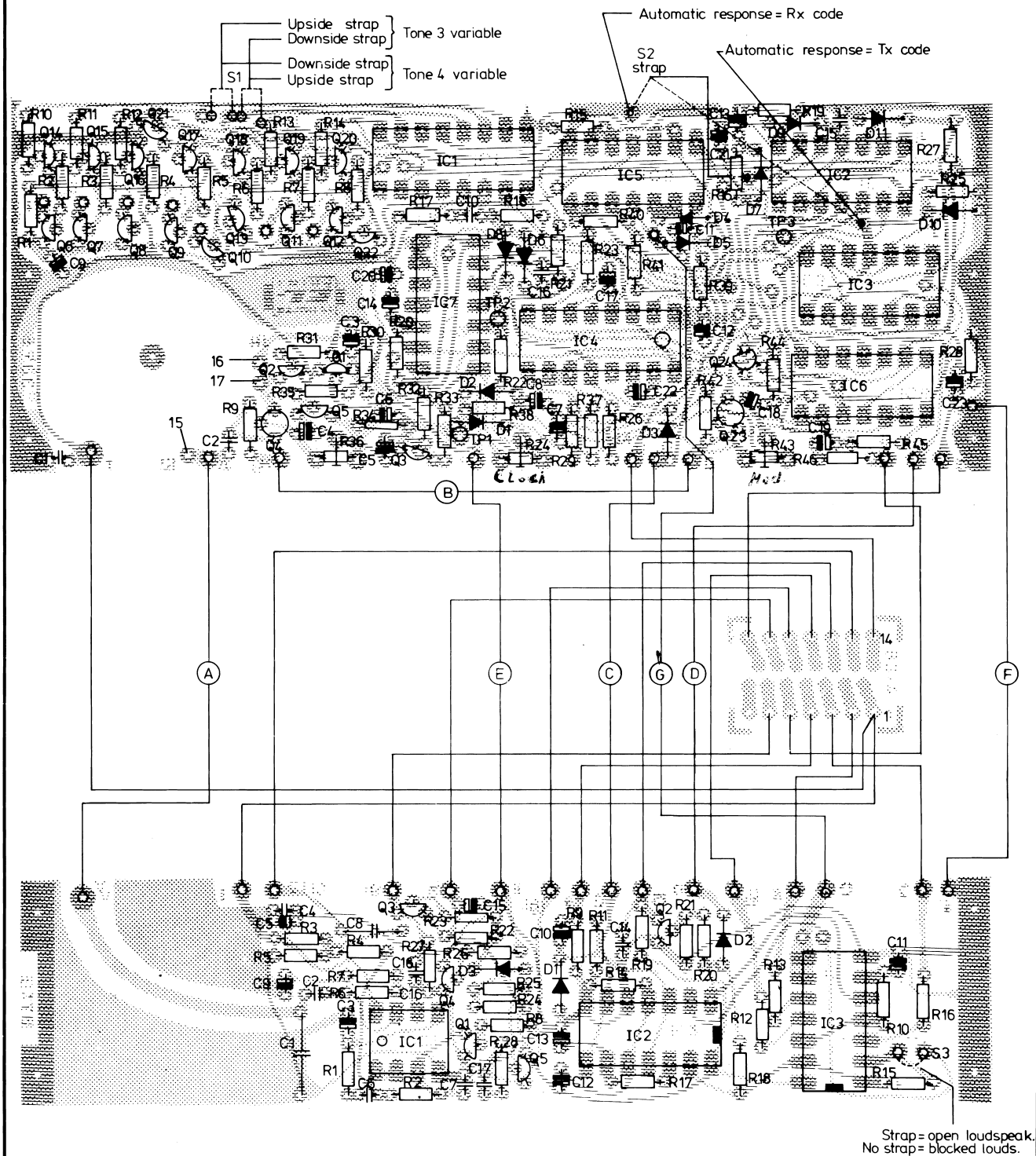
The first tone, F_0 , in the sequence is fed to the tone receiver (tone generator to pin 13 or an FM-modulated generator to the ant. input). A DC-volt meter is connected to TP1 and R36 is adjusted to + 1 V at $F_0 \pm 3\%$. After correct adjustment it must be controlled that the tone receiver accepts a correct call at a S/N ratio of 5 dB sinad.

Tone coil	Frequency tone 6	Deviation tone 6
CCIR	1540 Hz	3,0 kHz
ZVEI	1670 Hz	3,0 kHz



AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-284	1,2 K Ω 1/8W CR16	R38	13-313	27 K Ω 1/8W CR16
R2	13-295	10 K Ω " "	R39	13-315	470 K Ω " "
R3	13-295	10 K Ω " "	R40	13-298	18 K Ω " "
R4	13-295	10 K Ω " "	R41	13-302	47 K Ω " "
R5	13-295	10 K Ω " "	R42	13-310	330 K Ω " "
R6	13-295	10 K Ω " "	R43	19-260	22 K Ω " potm.
R7	13-295	10 K Ω " "	R44	13-302	47 K Ω " CR16
R8	13-295	10 K Ω " "	R45	13-302	47 K Ω " "
R9	13-312	1 M Ω " "	R46	13-299	22 K Ω " "
R10	13-295	10 K Ω " "			
R11	13-295	10 K Ω " "	C1	11-409	1 nF ker.
R12	13-295	10 K Ω " "	C2	11-409	1 nF "
R13	13-295	10 K Ω " "	C3	11-503	2,2 μ F/35V tant
R14	13-295	10 K Ω " "	C4	11-518	4,7 μ F/6,3V mini
R15	13-297	15 K Ω " "	C5	11-515	0,1 μ F/35V mini
R16	13-310	330 K Ω " "	C6	11-502	1 μ F/35V tant
R17	13-315	470 K Ω " "	C7	11-502	1 μ F/35V "
R18	13-300	33 K Ω " "	C8	11-501	0,47 μ F/35V "
R19	13-306	100 K Ω " "	C9	11-504	4,7 μ F/10V "
R20	13-306	100 K Ω " "	C10	11-409	1 nF ker.
R21	13-315	470 K Ω " "	C11	11-502	1 μ F/35V tant
R22	13-299	22 K Ω " "	C12	11-500	0,1 μ F/35V "
R23	13-308	150 K Ω " "	C13	11-501	0,47 μ F/35V "
R24	19-264	47 K Ω " potm.	C14	11-500	0,1 μ F/35V "
R25	13-295	10 K Ω " "	C15	11-409	1 nF ker.
R26	13-306	100 K Ω " "	C16	11-409	1 nF "
R27	13-295	10 K Ω " "	C17	11-502	1 μ F/35V tant
R28	13-295	10 K Ω " "	C18	11-500	0,1 μ F/35V "
R29	13-299	22 K Ω " "	C19	11-500	0,1 μ F/35V "
R30	13-293	6,8 K Ω " "	C20	11-504	4,7 μ F/10V "
R31	13-299	22 K Ω " "	C21	11-500	0,1 μ F/35V "
R32	13-299	22 K Ω " "	C22	11-509	47 μ F/6,3V "
R33	13-267	47 Ω " "	C23	11-502	1 μ F/35V "
R34	13-295	10 K Ω " "			
R35	13-300	33 K Ω " "			
R36	19-258	10 K Ω " potm.			
R37	13-310	330 K Ω " CR16			
5-tone Tx, Rx, ID Print board B 76 B 1,2,3,4,5,6 Tilhører tegn. nr.: 76294-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 76294-4S2



Retter: 23-3-77 BJ/AC
18-8-77 LD/AC

5-tone transmitter - receiver ID
Print board B76C 1-6, B77B1

AP-RADIOTELEFON

Tegn.: 27-10-76
AC

Kontr.:

Stykl. nr.:

Tegn. nr.:

Side: 2

76294 - 3E2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-288	2,7 K Ω 1/8W CR16	C9	11-502	1 μ F/35V tant
R2	13-300	33 K Ω " "	C10	11-502	1 μ F/35V "
R3	13-300	33 K Ω " "	C11	11-504	4,7 μ F/10V "
R4	13-300	33 K Ω " "	C12	11-504	4,7 μ F/10V "
R5	13-299	22 K Ω " "	C13	11-504	4,7 μ F/10V "
R6	13-310	330 K Ω " "	C14	11-409	1 nF ker.
R7	13-283	1 K Ω " "	C15	11-502	1 μ F/35V tant
R8	13-300	33 K Ω " "	C16	11-409	1 nF ker.
R9	13-295	10 K Ω " "	C17	11-409	1 nF "
R10	13-308	150 K Ω " "			
R11	13-295	10 K Ω " "	D1	04-062	1N4148
R12	13-295	10 K Ω " "	D2	04-062	1N4148
R13	13-295	10 K Ω " "	D3	04-062	1N4148
R14	13-295	10 K Ω " "			
R15	13-302	47 K Ω " "	Q1	19-117	BC238B
R16	13-295	10 K Ω " "	Q2	19-117	BC238B
R17	13-295	10 K Ω " "	Q3	19-082	BC328B
R18	13-299	22 K Ω " "	Q4	19-117	BC238B
R19	13-291	4,7 K Ω " "	Q5	19-084	BC308B
R20	13-300	33 K Ω " "			
R21	13-300	33 K Ω " "	IC1	09-080	LM358N
R22	13-295	10 K Ω " "	IC2	09-074	CD4013AE
R23	13-287	2,2 K Ω " "	IC3	09-072	CD4093BE
R24	13-295	10 K Ω " "			
R25	13-295	10 K Ω " "			
R26	13-300	33 K Ω " "			
R27	13-291	4,7 K Ω " "			
R28	13-287	2,2 K Ω " "			
C1	11-651	20,5 nF styr			
C2	11-407	560 pFN1500 ker.			
C3	11-500	0,1 μ F/35V tant			
C4	11-409	1 nF ker.			
C5	11-504	4,7 μ F/10V tant			
C6	11-414	3,3 nF ker.			
C7	11-409	1 nF "			
C8	11-489	22 nF MKH			
5-tone transmitter - receiver ID. Print board B 77 A1 Tilhører tegn. nr.: 76294-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 76294-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
D1	04-062	1N4148	IC1	09-070	CD4017AE
D2	04-062	1N4148	IC2	09-074	CD4013AE
D3	04-062	1N4148	IC3	09-074	CD4013AE
D4	04-062	1N4148	IC4	09-088	MM74C221
D5	04-062	1N4148	IC5	09-072	CD4093BE
D6	04-062	1N4148	IC6	09-072	CD4093BE
D7	04-062	1N4148	IC7	09-072	CD4093BE
D8	04-062	1N4148			
D9	04-062	1N4148	L1	18-677	75425-4E2 for
D10	04-062	1N4148			CCIR,
D11	04-062	1N4148		18-679	or 76243-4E2 for
					ZVEI
Q1	19-084	BC308			
Q2	19-084	BC308			
Q3	19-082	BC328			
Q4	19-127	U1994E			
Q5	19-117	BC238			
Q6	19-084	BC308			
Q7	19-084	BC308			
Q8	19-084	BC308			
Q9	19-084	BC308			
Q10	19-084	BC308			
Q11	19-084	BC308			
Q12	19-084	BC308			
Q13	19-084	BC308			
Q14	19-117	BC238			
Q15	19-117	BC238			
Q16	19-117	BC238			
Q17	19-117	BC238			
Q18	19-117	BC238			
Q19	19-117	BC238			
Q20	19-117	BC238			
Q21	19-084	BC308			
Q22	19-084	BC308			
Q23	19-127	U1994E			
Q24	19-106	BF347			
5-tone Tx,Rx,ID Print board B 76 B 1,2,3,4,5,6 Tilhører tegn. nr.: 76294-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 76294-4S2

5 TONE ENCODER/DECODER WITH AUTOMATIC TRANSPONDING

219-044, 219-048, 219-050, 219-052, CCIR-TONES

219-045, 219-049, 219-051, 219-053, ZVEI-TONES

GENERAL OPERATION

The tone unit can either be operated by a standard front section or by remote controlbox 202-020 and 202-021.

In the Rx mode a fixed ID-call is received. A correct ID-call is indicated by the flashing selective lamp and the acoustic alarm in the loudspeaker. The ID-call includes automatic transponding, normally consisting of the ID-code, but with the possibility of strapping the tone unit for the Tx-code or a special code for a paging receiver by only changing the third digit of the ID-code.

The flashing of the selective lamp is cancelled by pushing the sel Rx button and the loudspeaker is opened. For ZVEI-tone units the blocking functions are cancelled too by activating the key. In standby position the loudspeaker and the key functions are blocked by pushing the sel Rx button once, indicated by the lightning of the sel Rx lamp.

In the Tx-mode a fixed code is transmitted, or the last two or three digits can be programmed by thumbwheel switches or by remote control box 202-020 and 202-021. The Tx-code is transmitted by pushing the sel key button, indicated by the lightning of the key and the sel key lamp.

CIRCUIT DESCRIPTION

THE DECODER

The tone input signal at terminal (13) (C14), passes through an active low pass filter (A1) and the network R3, C5 for deemphasis, before the signal is amplified to a square wave (about 4Vpp) at pin 7-A2.

The decoder is programmed to the ID code, by connecting the collectors of Q6,Q7,Q8,Q10 and Q12 to the tapcoil L1 on print board C16. The signal at the top of the coil (200mVpp in receiving mode) is amplified by Q1 and Q2 and rectified by Q3. A DC-voltage about 4,8V will appear at TP1 for a proper tone.

The counter IC1 is clocked one step forward by NA1, when the first tone in the call has ended. This will continue until the last tone has been accepted.

R51 and C13 delay the accept of the tones about 40ms, and NA2 together with R50 and C14 resets the counter 0,3 sec. after a call is received, or if the tone input code is wrong.

A high level at pin 1 - IC1 appears, when a correct call has been received. Pin 10-IN4 switch to low for about 1 sec.,determined by C20 and R47, and activates the acoustic alarm oscillator IN 5. Furthermore FF1 and FF2 (C14) is set, the transmitter is blocked by the low level at the collector of Q2, the AF-amplifier is blocked by NA3, and by means of NA1/NA2 the sel Rx lamp is flashing.

The functions are cancelled by pushing the sel Rx button (4) once.

THE ENCODER

Activating the sel key (8), the set-input of FF1, FF2 and FF4 (C16) receive a 5V impuls, setting FF1 and FF2 for programming the two or the three last digits of the Tx code.

Pin 1-FF4 switches to a high level,activating the tone oscillator by Q5 (C16) and the transmitter through Q4 and Q5 (C14). Further more the AF input is blocked by Q1 (C14) and charging the time constant C19/R45 (C16) the output gating of the tones (Q4) and the clock oscillator NA3/NA4 are delayed about 200 m sec. by IN3.

When the gating has ended, Q4 is switch on, and the clock oscillator takes action.

In the end of the 5 tone sequence, pin 5 of the counter IC1 switch to high, resetting FF1, FF2, FF3 and FF4, and charging the time constant C16/R31, the encoder is prevent from transmitting for about 3 sec., if the decoder receives a transpond from the main station.

C22, R33 and D14 reset the flip-flops when the decoder/encoder is turned on.

AUTOMATIC TRANSPONDING

Having received a correct ID code, pin 1 of the counter IC1 (C16) will switch high. When the time constant R50/C14 resets the counter, the negative going level at pin 1 will clock FF1, FF2, FF3 and FF4 for the automatic transponding mode through IN2.

The outputs of FF1 and FF2 program the transponding code according to the jumpers J1 and J2. The transmitter is keyed by FF4 as described in the section "THE ENCODER", and FF3 disables the Tx blocking through Q3 (C14) during automatic transponding.

If automatic transponding is not required, it can be cancelled by removing D11, R32 and short - circuit D12 (C16).

USING THE JUMPERS ON C16.

Trandpond: No jumpers - ID code

J1 - Paging code by ^{changing} third digit of ID code.

~~Return~~ J2 - Tx code (two digits).

J1 and J2 - Tx code changing the three last digits.

The encoder: No jumper - Tx code changing two digits

J3 - Tx code changing three digits.

USING THE JUMPERS ON C14

No jumpers: AF blocking and no external alarm.

J1 : The loudspeaker opens, when a call is received.

J2 : The external alarm activates only once, when several calls are received without resetting IC2.

J3 : The external alarm activates every time a call is received.

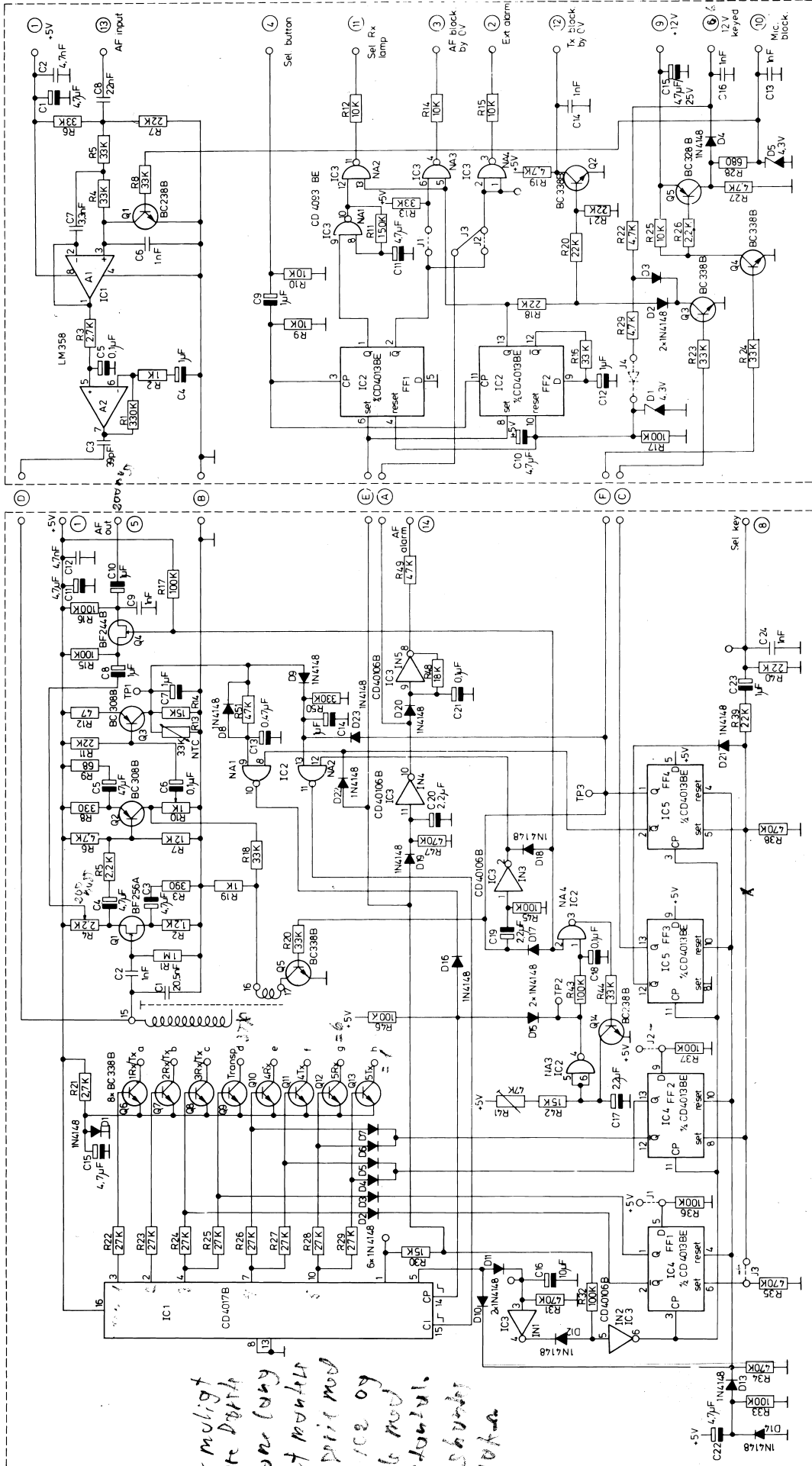
J4 : Reset IC2 whenever the transmitter is keyed. Except during transponding.

ADJUSTMENT OF THE DECODER

1. The collector of Q6 (C16) is connected to tone no. 6 of the tapcoil.
2. A tone generator is connected to the AF input, or a FM-modulated generator is connected to the antenna input.
3. L1 is adjusted to max DC-level at TP1 (C16).
4. R10 (C16) is adjusted to 1V DC at tone no. 6 $\pm 3\%$.
5. L1 is readjusted to symmetry at 1V $\pm 0,1$ V DC-level.
6. The adjustment screw is fixed.

ADJUSTMENT OF THE ENCODER

1. TP3 (C16) is connected to the 5V supply.
2. R4 (C16) is adjusted to 2,4 Khz div. at tone no. 6.
3. An oscilloscope or a counter is connected to TP2 (C16), and R41 is adjusted to T=100 ms. for CCIR and T=70 ms. for ZVEI.
4. Remove the 5V supply from TP3. The collectors of Q6-Q13 can now be connected to the wanted Rx code and Tx code.



Stock no	Printboards	Tones	J1-C14A	Transponding	Transponding	Function
219-044	C16A/C1A1	CCIR	75425-4E2	77118-4E2	J2/C16A	Fixed code
219-045	C16A/C1A2	ZVEI	75425-4E2	77118-4E2	J2/C16A	70 msec
219-046	C16A/C1A1	CCIR	75425-4E2	77118-4E2	J2/C16A	100 msec
219-047	C16A/C1A2	ZVEI	75425-4E2	77118-4E2	J2/C16A	70 msec
219-048	C16A/C1A1	CCIR	75425-4E2	77118-4E2	J2/C16A	100 msec
219-049	C16A/C1A2	ZVEI	75425-4E2	77118-4E2	J2/C16A	70 msec
219-050	C16A/C1A1	CCIR	75425-4E2	77118-4E2	J2/C16A	100 msec
219-051	C16A/C1A2	ZVEI	75425-4E2	77118-4E2	J2/C16A	70 msec
219-052	C16A/C1A1	CCIR	75425-4E2	77118-4E2	J2/C16A	100 msec
219-053	C16A/C1A2	ZVEI	75425-4E2	77118-4E2	J2/C16A	70 msec

The tone units are delivered as standard, with automatic transponding, including the ID-code. If automatic transponding is not required, it can be cancelled by removing D11 and R32.

Tone no	75425-4E2	77118-4E2
0	970	970
1	1124	1060
2	1197	1160
3	1276	1270
4	1398	1400
5	1446	1500
6	1540	1670
7	1640	1830
8	1747	2000
9	1860	2200
10	1981	2400
11	2110	2600
12	2400	2900

Tone 3

Tone 4 and 5

Key

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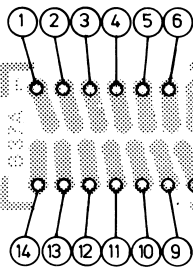
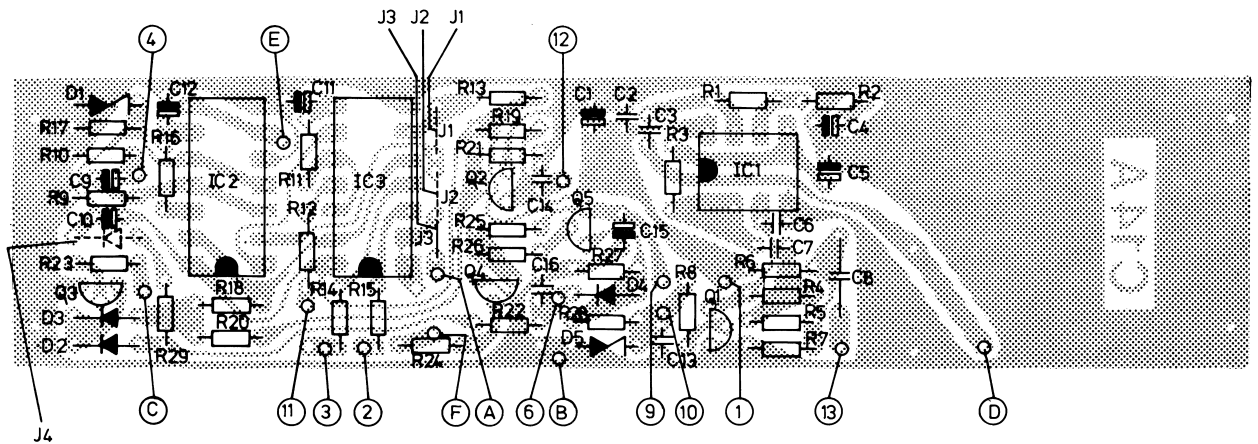
Transpond

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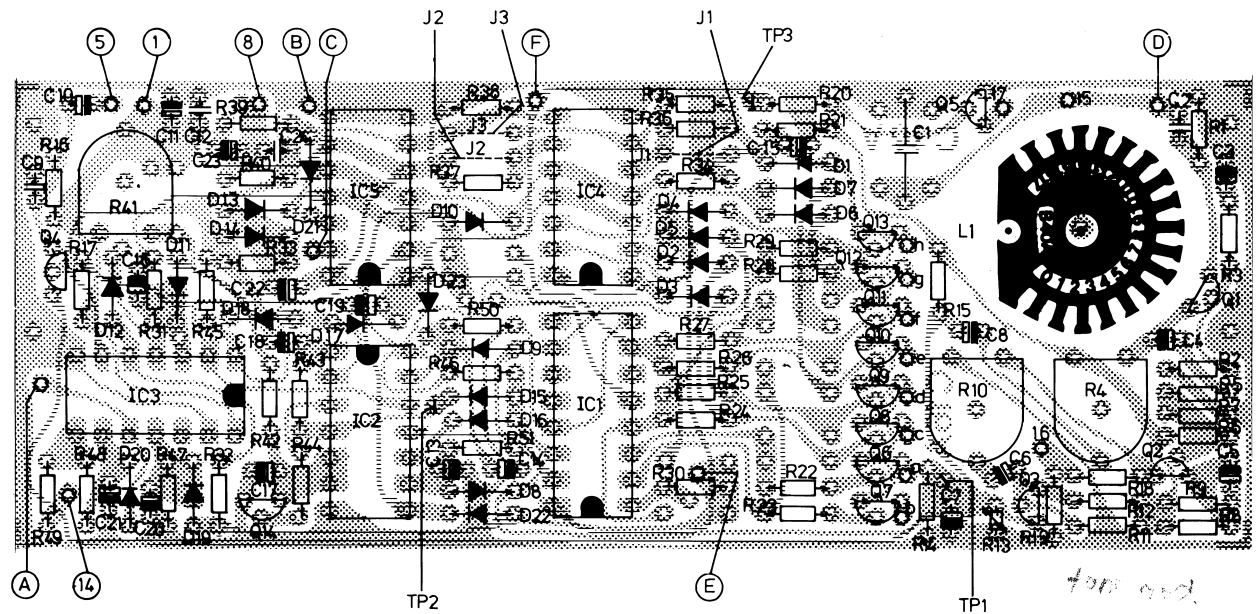
AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
C22	11-504	4,7 μ F/10V tant.	Q10	19-085	BC 338 B
C23	11-502	1 μ F/35V "	Q11	19-085	BC 338 B
C24	11-409	1 nF ker.	Q12	19-085	BC 338 B
			Q13	19-085	BC 338 B
D1	04-062	1N4148	Q14	19-117	BC 238 B
D2	04-062	1N4148			
D3	04-062	1N4148	IC1	09-086	MC 14017 B
D4	04-062	1N4148	IC2	09-072	CD 4093 BE
D5	04-062	1N4148	IC3	09-037	CD 40106 BE
D6	04-062	1N4148	IC4	09-074	CD 4013 AE
D7	04-062	1N4148	IC5	09-074	CD 40 13 AE
D8	04-062	1N4148			
D9	04-062	1N4148	L1	18-677	75425-4E2
D10	04-062	1N4148		18-681	77118-4E2
D11	04-062	1N4148			
D12	04-062	1N4148			
D13	04-062	1N4148			
D14	04-062	1N4148			
D15	04-062	1N4148			
D16	04-062	1N4148			
D17	04-062	1N4148			
D18	04-062	1N4148			
D19	04-062	1N4148			
D20	04-062	1N4148			
D21	04-062	1N4148			
D22	04-062	1N4148			
D23	04-062	1N4148			
Q1	19-113	BF 256 A			
Q2	19-084	BC 308 PL			
Q3	19-084	BC 308 PL			
Q4	19-106	BF 244 B			
Q5	19-085	BC 338 B			
Q6	19-085	BC 338 B			
Q7	19-085	BC 338 B			
Q8	19-085	BC 338 B			
Q9	19-085	BC 338 B			
5-tone Rx/Tx with automatic transp. C16 A1/A4/A7/A8/A9/A10/A11/A12 Tilhører tegn. nr.: 78132-2E2				Tegn.:	Stykl. nr.:
				Kontr.:	78132-4S2

C14 A



B37A



C16 A

Rettet:	5-tone encoder/decoder with automatic transponding	Tegn.: 3-10-78 AMC	Kontr.: 4-10-78 LD
		Stykl. nr.:	
		Tegn. nr.:	
		78132 -3E2	
	219-044/045/048/049/050/051/052/053		
	AP - RADIOTELEFON		

AP-RADIOTELEFON

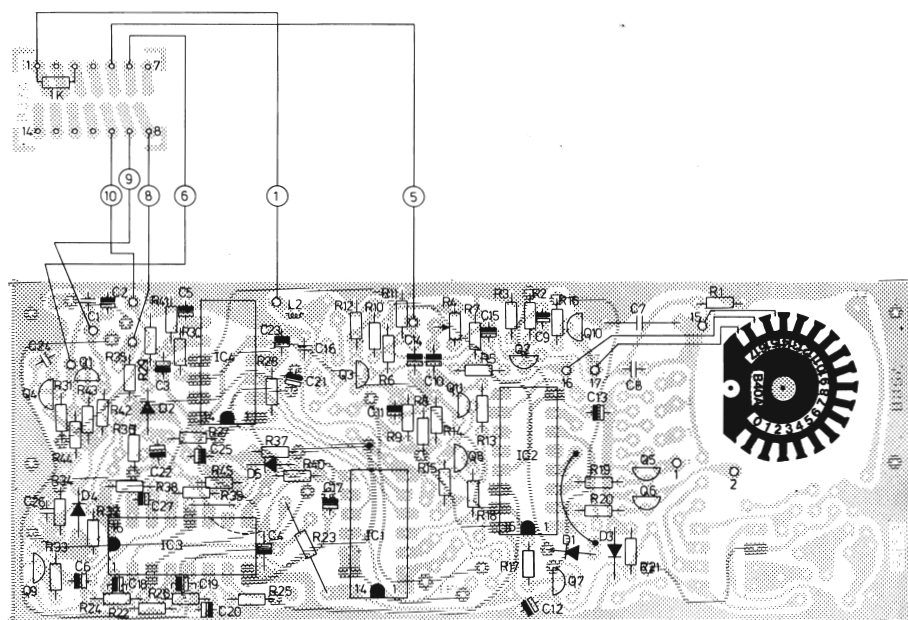
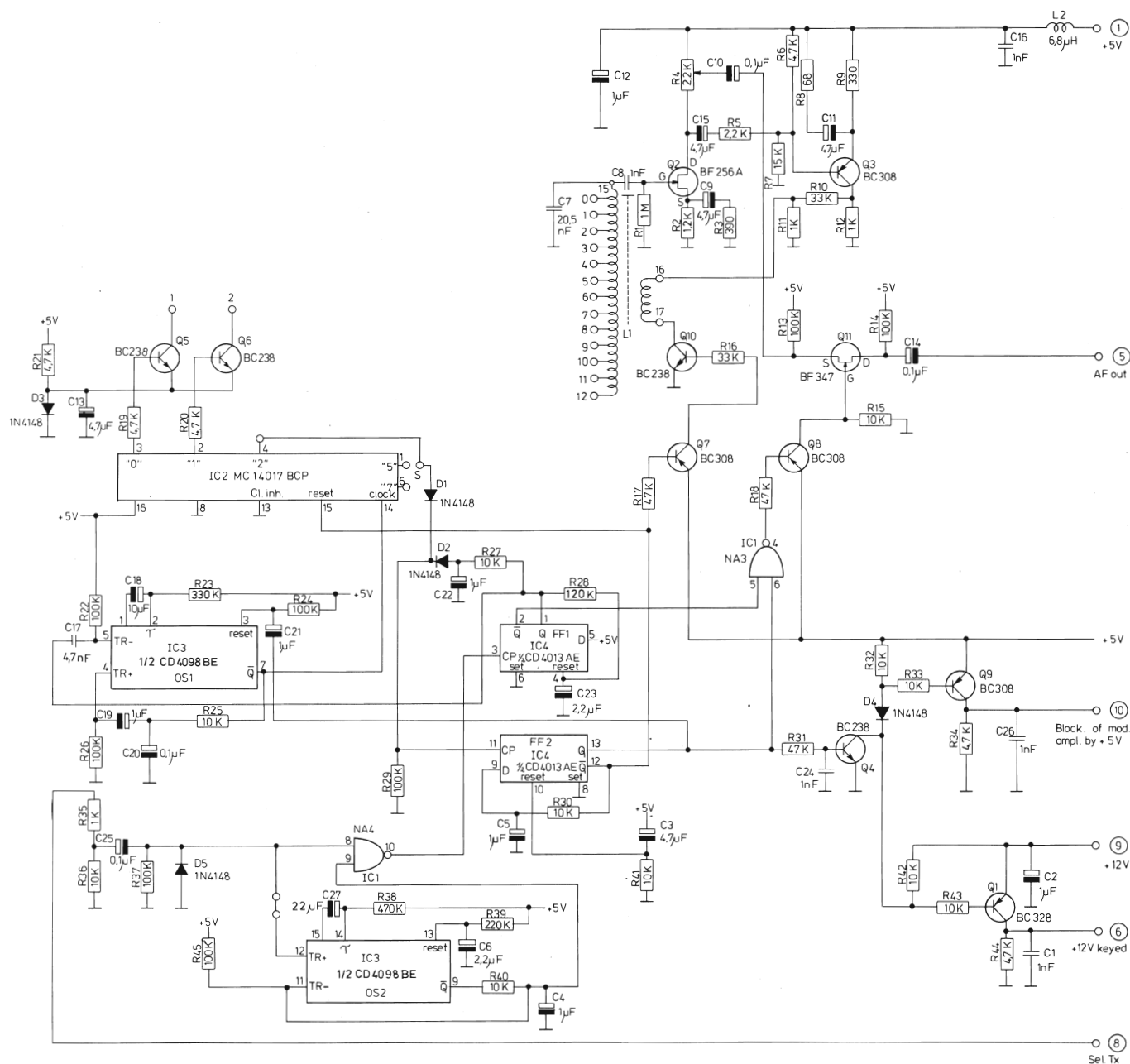
Nr.	Kode	Data	Nr.	Kode	Data
R1	13-310	330 K Ω 1/8W CR 16	C8	11-489	22 nF MKH
R2	13-283	1 K Ω " "	C9	11-502	1 μ F/35V tant.
R3	13-288	2,7 K Ω " "	C10	11-504	4,7 μ F/10V "
R4	13-300	33 K Ω " "	C11	11-504	4,7 μ F/10V "
R5	13-300	33 K Ω " "	C12	11-502	1 μ F/35V "
R6	13-300	33 K Ω " "	C13	11-409	1 nF ker.
R7	13-299	22 K Ω " "	C14	11-409	1 nF "
R8	13-300	33 K Ω " "	C15	11-505	4,7 μ F/25V tant.
R9	13-295	10 K Ω " "	C16	11-409	1 nF ker.
R10	13-295	10 K Ω " "			
R11	13-308	150 K Ω " "	D1	04-045	BZX 83-C4V3
R12	13-295	10 K Ω " "	D2	04-062	1N4148
R13	13-300	33 K Ω " "	D3	04-062	1N4148
R14	13-295	10 K Ω " "	D4	04-062	1N4148
R15	13-295	10 K Ω " "	D5	04-045	BZX 83-C4V3
R16	13-300	33 K Ω " "			
R17	13-306	100 K Ω " "			
R18	13-299	22 K Ω " "	IC1	09-080	LM 358
R19	13-291	4,7 K Ω " "	IC2	09-074	CD 4013AE
R20	13-299	22 K Ω " "	IC3	09-072	CD 4093BE
R21	13-299	22 K Ω " "			
R22	13-291	22 K Ω " "	Q1	19-117	BC 238 BPL
R23	13-300	33 K Ω " "	Q2	19-085	BC 338 BPL
R24	13-300	33 K Ω " "	Q3	19-085	BC 338 BPL
R25	13-295	10 K Ω " "	Q4	19-085	BC 338 BPL
R26	13-287	2,2 K Ω " "	Q5	19-082	BC 328 BPL
R27	13-291	4,7 K Ω " "			
R28	13-281	680 Ω " "			
R29	13-291	4,7 K Ω " "			
C1	11-504	4,7 μ F/10V tant.			
C2	11-416	4,7 nF ker.			
C3	11-393	39 pF "			
C4	11-502	1 μ F/35V tant.			
C5	11-500	0,1 μ F/35V "			
C6	11-409	1 nF ker.			
C7	11-414	3,3 nF "			
Control circuit for C 16 A. Print board C 14 A1 Tilhører tegn. nr.: 78132-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 78132-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-312	1 MΩ 1/8W CR 16	R37	13-306	100 KΩ 1/8W CR 16
R2	13-284	1,2 KΩ " "	R38	13-315	470 KΩ " "
R3	13-278	390 Ω " "	R39	13-299	22 KΩ " "
R4	19-253	2,2 KΩ Trim.ligg.	R40	13-299	22 KΩ " "
R5	13-287	2,2 KΩ 1/8W CR 16	R41	19-261	47 KΩ Trim.ligg.
R6	13-291	4,7 KΩ " "	R42	13-297	15 KΩ 1/8W CR 16
R7	13-296	12 KΩ " "	R43	13-306	100 KΩ " "
R8	13-277	330 Ω " "	R44	13-300	33 KΩ " "
R9	13-269	68 Ω " "	R45	13-306	100 KΩ " "
R10	19-253	1 KΩ Trim.ligg.	R46	13-306	100 KΩ " "
R11	13-299	22 KΩ 1/8W CR 16	R47	13-315	470 KΩ " "
R12	13-267	47 Ω " "	R48	13-298	18 KΩ " "
R13	13-671	33 KΩ NTC	R49	13-302	47 KΩ " "
R14	13-297	15 KΩ 1/8W CR 16	R50	13-310	330 KΩ " "
R15	13-306	100 KΩ " "	R51	13-302	47 KΩ " "
R16	13-306	100 KΩ " "	C1	11-651	20,5 nF styr.
R17	13-306	100 KΩ " "	C2	11-409	1 nF ker.
R18	13-300	33 KΩ " "	C3	11-504	4,7 μF/10V tant.
R19	13-283	1 KΩ " "	C4	11-504	4,7 μF/10V "
R20	13-300	33 KΩ " "	C5	11-509	47 μF/6,3V "
R21	13-288	2,7 KΩ " "	C6	11-500	0,1 μF/35V "
R22	13-313	27 KΩ " "	C7	11-502	1 μF/25V "
R23	13-313	27 KΩ " "	C8	11-502	1 μF/25V "
R24	13-313	27 KΩ " "	C9	11-409	1 nF ker.
R25	13-313	27 KΩ " "	C10	11-502	1 μF/25V tant.
R26	13-313	27 KΩ " "	C11	11-504	4,7 μF/10V "
R27	13-313	27 KΩ " "	C12	11-416	4,7 nF ker.
R28	13-313	27 KΩ " "	C13	11-501	0,47 μF/35V tant.
R29	13-313	27 KΩ " "	C14	11-502	1 μF/25V "
R30	13-297	15 KΩ " "	C15	11-504	4,7 μF/10V "
R31	13-315	470 KΩ " "	C16	11-506	10 μF/25V "
R32	13-306	100 KΩ " "	C17	11-503	2,2 μF/25V "
R33	13-306	100 KΩ " "	C18	11-500	0,1 μF/35V "
R34	13-315	470 KΩ " "	C19	11-503	2,2 μF/25V "
R35	13-315	470 KΩ " "	C20	11-503	2,2 μF/25V "
R36	13-306	100 KΩ " "	C21	11-500	0,1 μF/35V "
5-tone Rx/Tx with automatic transp. C 16 A1/A4/A7/A8/A9/A10/A11/A12 tilhører tegn. nr.: 78132-2E2					Tegn.: Kontr.: Stykl. nr.: 78132-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-310	330 KΩ 1/8W CR 16	C8	11-489	22 nF MKH
R2	13-283	1 KΩ " "	C9	11-502	1 μF/35V tant.
R3	13-288	2,7 KΩ " "	C10	11-504	4,7 μF/10V "
R4	13-300	33 KΩ " "	C11	11-504	4,7 μF/10V "
R5	13-300	33 KΩ " "	C12	11-502	1 μF/35V "
R6	13-300	33 KΩ " "	C13	11-409	1 nF ker.
R7	13-299	22 KΩ " "	C14	11-409	1 nF "
R8	13-300	33 KΩ " "	C15	11-505	4,7 μF/25V tant.
R9	13-295	10 KΩ " "	C16	11-409	1 nF ker.
R10	13-295	10 KΩ " "			
R11	13-308	150 KΩ " "	D1	04-045	BZX 83-C4V3
R12	13-295	10 KΩ " "	D2	04-062	1N4148
R13	13-300	33 KΩ " "	D3	04-062	1N4148
R14	13-295	10 KΩ " "	D4	04-062	1N4148
R15	13-295	10 KΩ " "	D5	04-045	BZX 83-C4V3
R16	13-300	33 KΩ " "	J4	04-062	1N4148
R17	13-306	100 KΩ " "			
R18	13-299	22 KΩ " "	IC1	09-080	LM 358
R19	13-291	4,7 KΩ " "	IC2	09-074	CD 4013AE
R20	13-299	22 KΩ " "	IC3	09-072	CD 4093BE
R21	13-299	22 KΩ " "			
R22	13-291	22 KΩ " "	Q1	19-117	BC 238 BPL
R23	13-300	33 KΩ " "	Q2	19-085	BC 338 BPL
R24	13-300	33 KΩ " "	Q3	19-085	BC 338 BPL
R25	13-295	10 KΩ " "	Q4	19-085	BC 338 BPL
R26	13-287	2,2 KΩ " "	Q5	19-082	BC 328 BPL
R27	13-291	4,7 KΩ " "			
R28	13-281	680 Ω " "			
R29	13-291	4,7 KΩ " "			
C1	11-504	4,7 μF/10V tant.			
C2	11-416	4,7 nF ker.			
C3	11-393	39 pF "			
C4	11-502	1 μF/35V tant.			
C5	11-500	0,1 μF/35V "			
C6	11-409	1 nF ker.			
C7	11-414	3,3 nF "			
Control circuit for C 16 A Print board C 14 A2 Tilhører tegn. nr.: 78132-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 78132-4S2



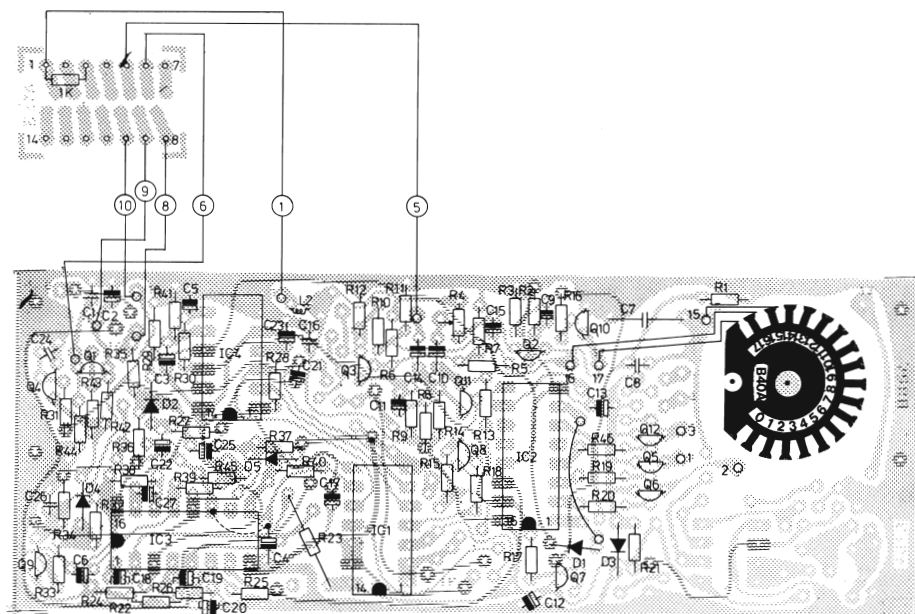
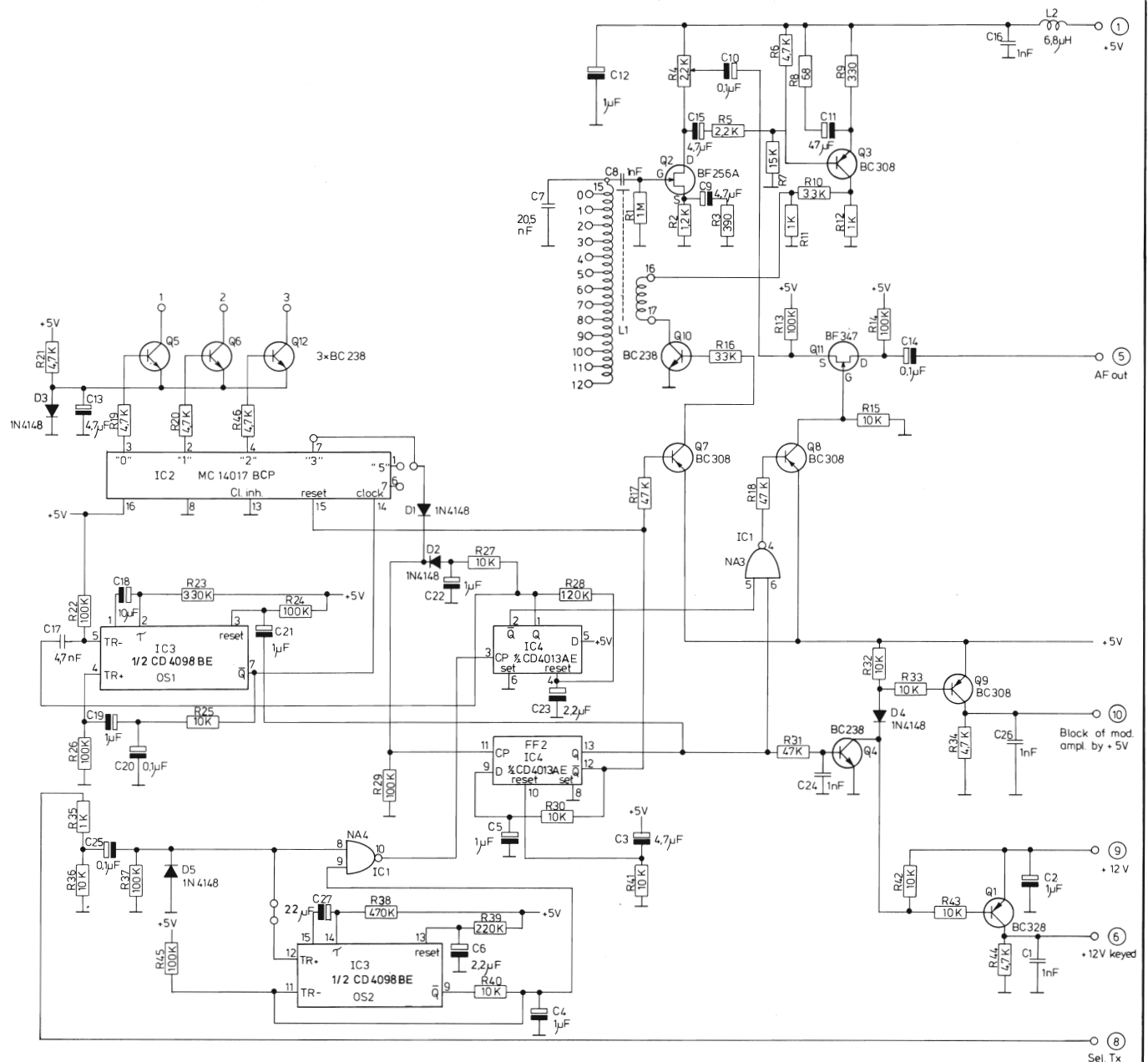
Retrac: 7-2-78 HJ	2-tone Tx (AP-tones)	Tegn.: 30-9-77	Konstr.: 10-10-77
18-11-80 BC/LB	Print board B 85 A 6	AC	LD
		Stykl. nr.:	
	AP-RADIOTELEFON %	Tegn. nr.:	77358-2E2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-312	1 MΩ 1/8W CR 16	R38	13-315	470 KΩ 1/8W CR 16
R2	13-284	1,2 KΩ " "	R39	13-309	220 KΩ " "
R3	13-278	390 Ω " "	R40	13-295	10 KΩ " "
R4	19-255	2,2 KΩ trim. stå.	R41	13-295	10 KΩ " "
R5	13-287	2,2 KΩ 1/8W CR 16	R42	13-295	10 KΩ " "
R6	13-291	4,7 KΩ " "	R43	13-295	10 KΩ " "
R7	13-297	15 KΩ " "	R44	13-291	4,7 KΩ " "
R8	13-269	68 Ω " "	R45	13-306	100 KΩ " "
R9	13-277	330 Ω " "			
R10	13-300	33 KΩ " "	C1	11-409	1 nF ker.
R11	13-283	1 KΩ " "	C2	11-502	1 μF/35V tant
R12	13-283	1 KΩ " "	C3	11-504	4,7 μF/10V "
R13	13-306	100 KΩ " "	C4	11-502	1 μF/35V "
R14	13-306	100 KΩ " "	C5	11-502	1 μF/35V "
R15	13-295	10 KΩ " "	C6	11-503	2,2 μF/25V "
R16	13-300	33 KΩ " "	C7	11-651	20,5 nF styr
R17	13-302	47 KΩ " "	C8	11-409	1 nF ker.
R18	13-302	47 KΩ " "	C9	11-504	4,7 μF/10V tant
R19	13-291	4,7 KΩ " "	C10	11-500	0,1 μF/35V "
R20	13-291	4,7 KΩ " "	C11	11-509	47 μF/6,3V "
R21	13-291	4,7 KΩ " "	C12	11-502	1 μF/35V "
R22	13-306	100 KΩ " "	C13	11-504	4,7 μF/10V "
R23	13-310	330 KΩ " "	C14	11-500	0,1 μF/35V "
R24	13-306	100 KΩ " "	C15	11-504	4,7 μF/10V "
R25	13-295	10 KΩ " "	C16	11-409	1 nF ker.
R26	13-306	100 KΩ " "	C17	11-416	4,7 nF "
R27	13-295	10 KΩ " "	C18	11-521	10 μF/10V mini
R28	13-307	120 KΩ " "	C19	11-502	1 μF/35V tant
R29	13-306	100 KΩ " "	C20	11-500	0,1 μF/35V "
R30	13-295	10 KΩ " "	C21	11-502	1 μF/35V "
R31	13-302	47 KΩ " "	C22	11-502	1 μF/35V "
R32	13-295	10 KΩ " "	C23	11-503	2,2 μF/25V "
R33	13-295	10 KΩ " "	C24	11-409	1 nF ker.
R34	13-291	4,7 KΩ " "	C25	11-500	0,1 μF/35V tant
R35	13-283	1 KΩ " "	C26	11-409	1 nF ker.
R36	13-295	10 KΩ " "	C27	11-507	22 μF/16V tant
R37	13-306	100 KΩ " "			
2-tone Tx (AP tones) Print board B 85 A 6 Tilhører tegn. nr.: 77358-2E2			Rettet: 7-2-78 H.J.		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 77358-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
D1	04-062	1N4148			
D2	04-062	1N4148			
D3	04-062	1N4148			
D4	04-062	1N4148			
D5	04-062	1N4148			
Q1	19-082	BC 328B			
Q2	19-113	BF 256A			
Q3	19-084	BC 308B			
Q4	19-117	BC 238B			
Q5	19-117	BC 238B			
Q6	19-117	BC 238B			
Q7	19-084	BC 308B			
Q8	19-084	BC 308B			
Q9	19 084	BC 308B			
Q10	19-117	BC 238B			
Q11	19-106	BF 347			
IC1	09-072	CD 4093BE			
IC2	09-086	MC 14017BCP			
IC3	09-099	CD4098BE			
IC4	09-074	CD 4013AE			
L2	04-114	L 235 74016-4E			
L1	18-678	76136-4E2			
2-tone Tx (AP tones) Print board B 85 A 6 Tilhører tegn. nr.: 77358-2E2			Rettet:		Tegn.: Kontr.:
					Stykl. nr.: 77358-4S2



Ret: 7-278 HJ	3 tone Tx (AP tones)	Tegn.: 25-9-77	Kontr.: 27-10-77
18-11-80 BC/LB	Print board B85A 5	AC	LD
		Stykl. nr.:	
	AP-RADIOTELEFON %	Tegn. nr.:	77357 - 2E2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-312	1 MΩ 1/8W CR 16	R38	13-315	470 KΩ 1/8W CR 16
R2	13-284	1,2 KΩ " "	R39	13-309	220 KΩ " "
R3	13-278	390 Ω " "	R40	13-295	10 KΩ " "
R4	19-255	2,2 KΩ trim. stå.	R41	13-295	10 KΩ " "
R5	13-287	2,2 KΩ 1/8W CR 16	R42	13-295	10 KΩ " "
R6	13-291	4,7 KΩ " "	R43	13-295	10 KΩ " "
R7	13-297	15 KΩ " "	R44	13-291	4,7 KΩ " "
R8	13-269	68 Ω " "	R45	13-306	100 KΩ " "
R9	13-277	330 Ω " "	R46	13-291	4,7 KΩ " "
R10	13-300	33 KΩ " "			
R11	13-283	1 KΩ " "	C1	11-409	1 nF ker.
R12	13-283	1 KΩ " "	C2	11-502	1 μF/35V tant.
R13	13-306	100 KΩ " "	C3	11-504	4,7 μF/10V "
R14	13-306	100 KΩ " "	C4	11-502	1 μF/35V "
R15	13-295	10 KΩ " "	C5	11-502	1 μF/35V "
R16	13-300	33 KΩ " "	C6	11-503	2,2 μF/25V "
R17	13-302	47 KΩ " "	C7	11-651	20,5 nF styr.
R18	13-302	47 KΩ " "	C8	11-409	1 nF ker.
R19	13-291	4,7 KΩ " "	C9	11-504	4,7 μF/10v tant.
R20	13-291	4,7 KΩ " "	C10	11-500	0,1 μF/35V "
R21	13-291	4,7 KΩ " "	C11	11-509	47 μF/6,3V "
R22	13-306	100 KΩ " "	C12	11-502	1 μF/35V "
R23	13-310	330 KΩ " "	C13	11-504	4,7 μF/10V "
R24	13-306	100 KΩ " "	C14	11-500	0,1 μF/35V "
R25	13-295	10 KΩ " "	C15	11-504	4,7 μF/10V "
R26	13-306	100 KΩ " "	C16	11-409	1 nF ker.
R27	13-295	10 KΩ " "	C17	11-416	4,7 nF "
R28	13-307	120 KΩ " "	C18	11-521	10 μF/10V "
R29	13-306	100 KΩ " "	C19	11-502	1 μF/35V "
R30	13-295	10 KΩ " "	C20	11-500	0,1 μF/35V "
R31	13-302	47 KΩ " "	C21	11502	1 μF/35V "
R32	13-295	10 KΩ " "	C22	11-502	1 μF/35V "
R33	13-295	10 KΩ " "	C23	11-503	2,2 μF/25V "
R34	13-291	4,7 KΩ " "	C24	11-409	1 nF ker.
R35	13-283	1 KΩ " "	C25	11-500	0,1 μF/35V tant.
R36	13-295	10 KΩ " "	C26	11-409	1 nF ker.
R37	13-306	100 KΩ " "	C27	11-507	22 μF/16V tant.
3-tones Tx (AP tones) Print board B 85 A 5 Tilhører tegn. nr.: 77357-2E2			Rettet: 7-2-78 H.J.		<div>Tegn.: Kontr.:</div>
					Stykl. nr.: 77357-4S2

AP-RADIOTELEFON

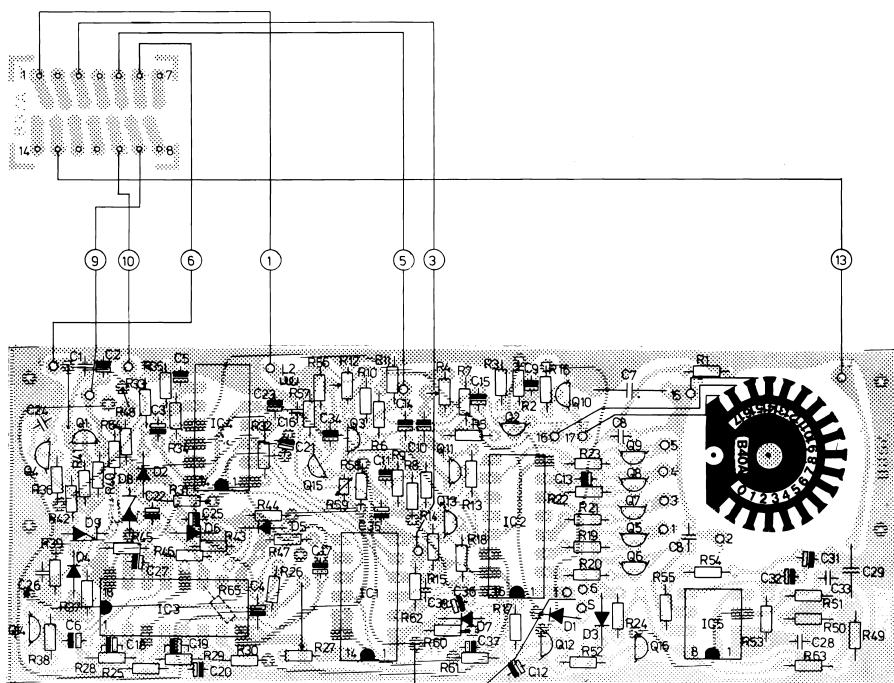
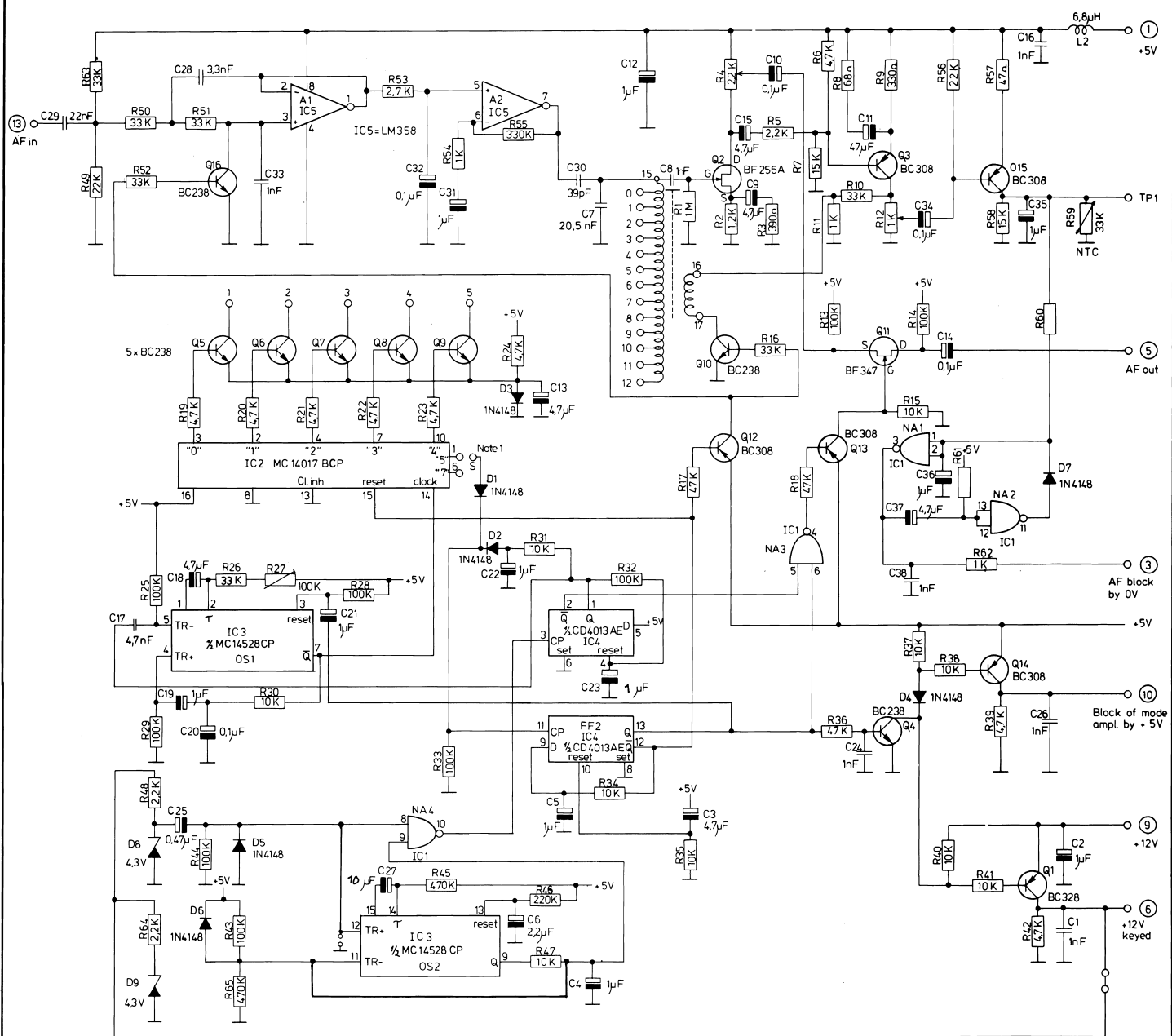
Nr.	Kode	Data	Nr.	Kode	Data
D1	04-062	1N4148			
D2	04-062	1N4148			
D3	04-062	1N4148			
D4	04-062	1N4148			
D5	04-062	1N4148			
Q1	19-082	BC 328B			
Q2	19-113	BF 256A			
Q3	19-084	BC 308B			
Q4	19-117	BC 238B			
Q5	19-117	BC 238B			
Q6	19-117	BC 238B			
Q7	19-084	BC 308B			
Q8	19-084	BC 308B			
Q9	19-084	BC 308B			
Q10	19-117	BC 238B			
Q11	19-106	BF 347			
Q12	19-117	BC 238B			
IC1	09-072	CD 4093BE			
IC2	09-086	MC 14017BCP			
IC3	09-099	CD4098BE			
IC4	09-074	CD 4013AE			
L1	18-678	76136-4E2			
L2	04-114	L 235 74016-4E			
3-tones Tx (AP tones) Print board B 85 A 5 Tilhører tegn. nr.: 77357-2E2			Rettet:		Tegn.: Kontr.:
					Stykl. nr.: 77357-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-312	1 MΩ 1/8W CR 16	R38	13-295	10 KΩ 1/8W CR 16
R2	13-284	1,2 KΩ " "	R39	13-291	4,7 KΩ " "
R3	13-278	390 Ω " "	R40	13-295	10 KΩ " "
R4	19-255	2,2 KΩ Trim. pot.	R41	13-295	10 KΩ " "
R5	13-287	2,2 KΩ 1/8W CR 16	R42	13-291	4,7 KΩ " "
R6	13-291	4,7 KΩ " "	R43	13-306	100 KΩ " "
R7	13-297	15 KΩ " "	R44	13-306	100 KΩ " "
R8	13-269	68 Ω " "	R45	13-307	120 KΩ " "
R9	13-277	330 Ω " "	R46	13-306	100 KΩ " "
R10	13-300	33 KΩ " "	R47	13-295	10 KΩ " "
R11	13-283	1 KΩ " "	R48	13-283	1 KΩ " "
R12	13-283	1 KΩ " "	R49	13-295	10 KΩ " "
R13	13-306	100 KΩ " "			
R14	13-306	100 KΩ " "	C1	11-409	1 nF ker.
R15	13-295	10 KΩ " "	C2	11-502	1 μF/35V tant.
R16	13-300	33 KΩ " "	C3	11-504	4,7 μF/10V "
R17	13-302	47 KΩ " "	C4	11-502	1 μF/10V "
R18	13-302	47 KΩ " "	C5	11-502	1 μF/10V "
R19	13-291	4,7 KΩ " "	C6	11-501	0,47 μF/35V "
R20	13-291	4,7 KΩ " "	C7	11-651	20,5 nF styr.
R21	13-291	4,7 KΩ " "	C8	11-409	1 nF ker.
R22	13-291	4,7 KΩ " "	C9	11-504	4,7 μF/10V tant.
R23	13-291	4,7 KΩ " "	C10	11-500	0,1 μF/35V "
R24	13-291	4,7 KΩ " "	C11	11-509	47 μF/6,3V "
R25	13-306	100 KΩ " "	C12	11-502	1 μF/35V "
R26	13-300	33 KΩ " "	C13	11-504	4,7 μF/10V "
R27	19-262	100 KΩ Trim. pot.	C14	11-500	0,1 μF/35V "
R28	13-306	100 KΩ 1/8W CR 16	C15	11-504	4,7 μF/10V "
R29	13-306	100 KΩ " "	C16	11-409	1 nF ker.
R30	13-295	10 KΩ " "	C17	11-416	4,7 nF "
R31	13-295	10 KΩ " "	C18	11-518	4,7 μF/6,3V "mini
R32	13-307	120 KΩ " "	C19	11-502	1 μF/35V "
R33	13-306	100 KΩ " "	C20	11-500	0,1 μF/35V "
R34	13-295	10 KΩ " "	C21	11-502	1 μF/35V "
R35	13-295	10 KΩ " "	C22	11-502	1 μF/35V "
R36	13-302	47 KΩ " "	C23	11-503	2,2 μF/25V "
R37	13-295	10 KΩ " "	C24	11-409	1 nF ker.
5-tone Tx Print board B 85 A3,4 Tilhører tegn. nr.: 77348-2E2			Rettet: 7-2-78 H.J.		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 77348-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
C25	11-500	0,1 μ F/35V tant.			
C26	11-409	1 nF ker.			
C27	11-507	22 μ F/16V tant.			
D1	04-062	1N4148			
D2	04-062	1N4148			
D3	04-062	1N4148			
D4	04-062	1N4148			
D5	04-062	1N4148			
Q1	19-082	BC 328B			
Q2	19-113	BF 256A			
Q3	19-084	BC 308B			
Q4	19-117	BC 238B			
Q5	19-117	BC 238B			
Q6	19-117	BC 238B			
Q7	19-117	BC 238B			
Q8	19-117	BC 238B			
Q9	19-117	BC 238B			
Q10	19-117	BC 238B			
Q11	19-106	BF 347			
Q12	19-084	BC 308B			
Q13	19-084	BC 308B			
Q14	19-084	BC 308B			
IC1	09-072	CD 4093 BE			
IC2	09-086	MC 14017 BCP			
IC3	09-079	MC 14528 CP			
IC4	09-074	CD 4013 AE			
L1	18-677	75425-4E2, B85A4			
	18-679	76342-4E2, B85A3			
L2	04-114	74016-4E			
5-tone Tx Print board B 85 A3,4 Tilhører tegn. nr.: 77348-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 77348-4S2



Print board	Tones	R60	R61	Note 1: Jumper mounted between	Clock generator OS1 is adj. to:
B85 A1	ZVEI	18K	100K	1-S	70 msec = 14,3 c
B85 A2	CC1R	27K	180K	6-S	100 msec = 10 c

Part: 7-2-78 HJ 14-1-80 B1/AC

1-tone Rx + 5-tone Tx for ID
Print board B 85 A1,2

AP-RADIOTELEFON 1/2

Tegn.: 14-9-77	Kont.: 5-10-77
Stykt. nr.:	LD
Tegn. nr.:	77352-2E2

AP-RADIOTELEFON

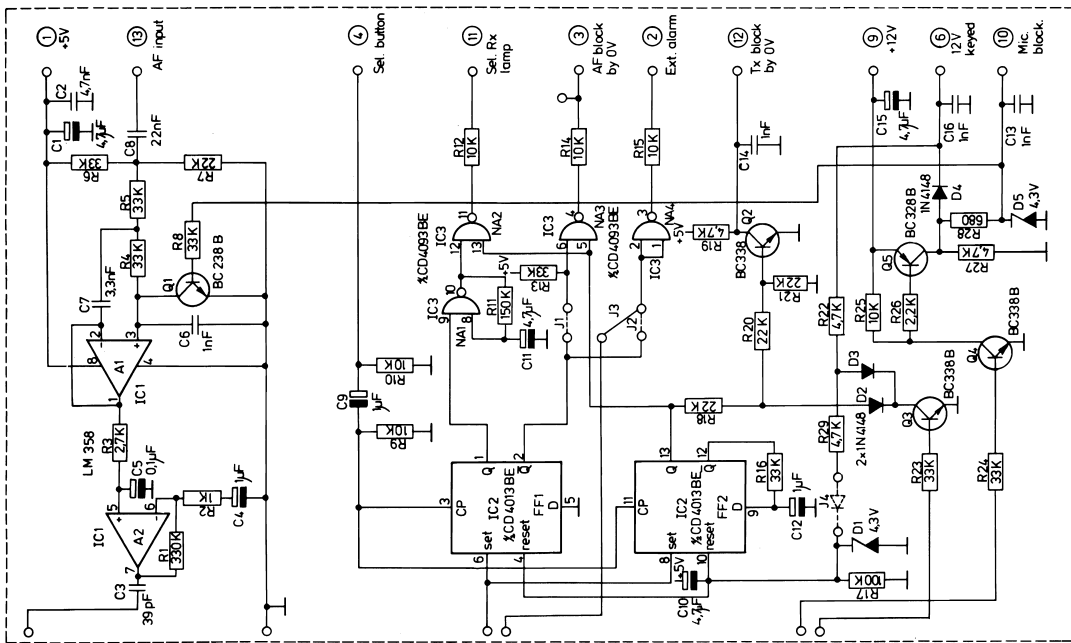
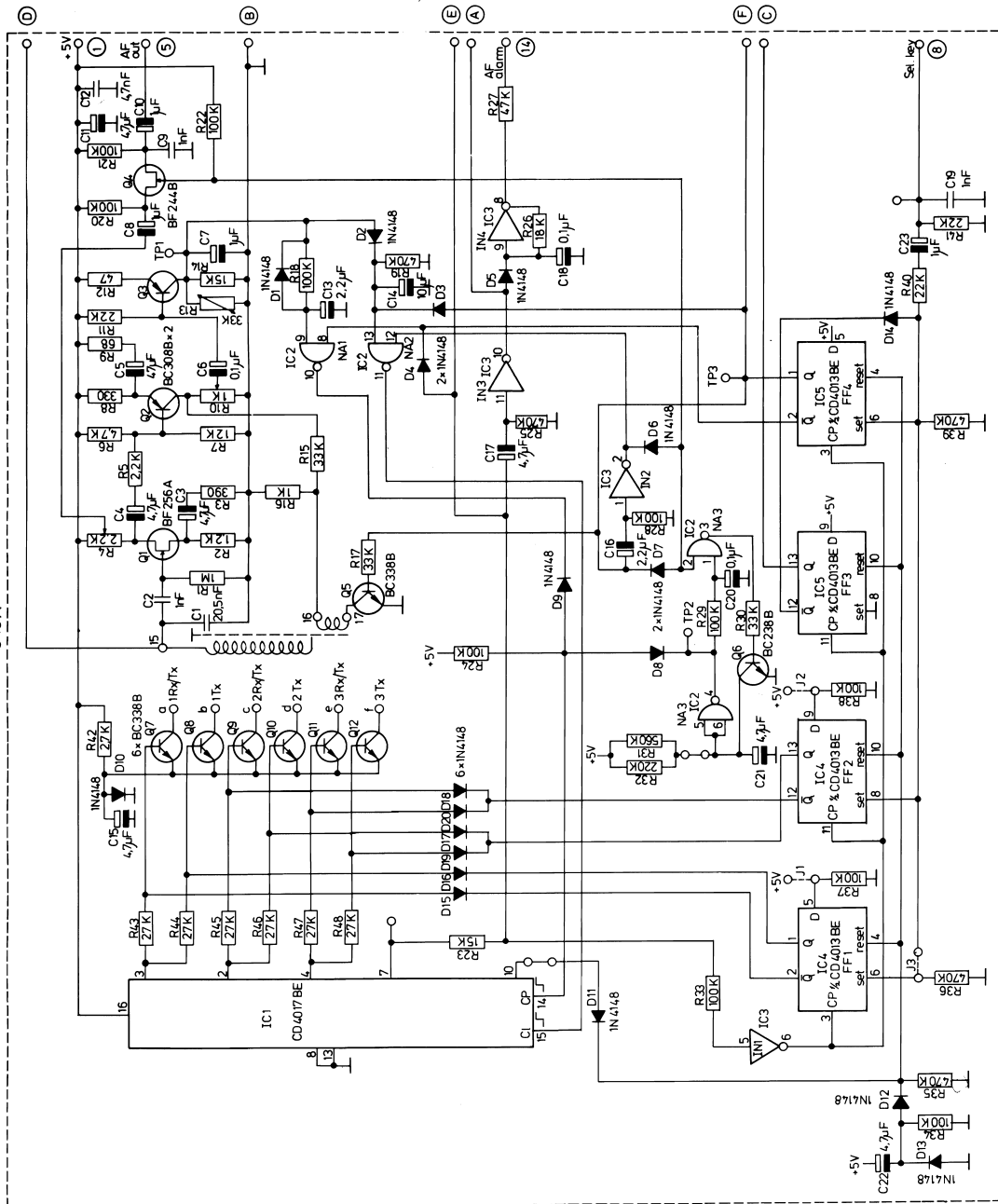
Nr.	Kode	Data	Nr.	Kode	Data
C7	11-651	20,5 nF	D5	04-062	1N4148
C8	11-409	1 nF "	D6	04-062	1N4148
C9	11-504	4,7 µF/10V tant.	D7	04-062	1N4148
C10	11-500	0,1 µF/35V "	D8	04-045	BZX83 - 4,3V
C11	11-509	47 µF/6,3V "	D9	04-045	BZX83 - 4,3V
C12	11-502	1 µF/35V "			
C13	11-504	4,7 µF/10V "	Q1	19-082	BC 328
C14	11-500	0,1 µF/35V "	Q2	19-113	BF 256A
C15	11-504	4,7 µF/10V "	Q3	19-084	BC 308
C16	11-409	1 nF ker.	Q4	19-117	BC 238
C17	11-416	4,7 nF "	Q5	19-117	BC 238
C18	11-504	4,7 µF/6,3V mini	Q6	19-117	BC 238
C19	11-502	1 µF/35V "	Q7	19-117	BC 238
C20	11-500	0,1 µF/35V "	Q8	19-117	BC 238
C21	11-502	1 µF/35V "	Q9	19-117	BC 238
C22	11-502	1 µF/35V "	Q10	19-117	BC 238
C23	11-502	1 µF/35V "	Q11	19-106	BF 347
C24	11-409	1 nF ker.	Q12	19-084	BC 308
C25	11-501	0,47 µF/35V tant.	Q13	19-084	BC 308
C26	11-409	1 nF ker.	Q14	19-084	BC 308
C27	11-506	10 µF/25V tant.	Q15	19-084	BC 308
C28	11-414	3,3 nF ker.	Q16	19-084	BC 308
C29	11-489	22 nF "			
C30	11-393	39 pF "	IC1	09-072	CD 4093BE
C31	11-502	1 µF/35V "	IC2	09-086	MC 14017BCP
C32	11-500	0,1 µF/35V "	IC3	09-079	MC 14528CP
C33	11-409	1 nF ker.	IC4	09-074	CD 4013AE
C34	11-500	0,1 µF/35V tant.	IC5	09-080	LM 358N
C35	11-502	1 µF/35V tant.			
C36	11-502	1 µF/35V "	L1	18-679	76243-4E2
C37	11-504	4,7 µF/10V "	L2	04-114	L 235 (74016-4E)
C38	11-409	1 nF ker.			
D1	04-062	1N4148			
D2	04-062	1N4148			
D3	04-062	1N4148			
D4	04-062	1N4148			
1-tone Rx + 5-tone Tx for ID Print board B 85 A 1,2 Tilhører tegn. nr.: 77352-2E2			Rettet: 7-2-78 H.J.		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 77352-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-312	1 MΩ 1/8W CR 16	R38	13-295	10 KΩ 1/8W CR16
R2	13-284	1,2 KΩ " "	R39	13-291	4,7 KΩ " "
R3	13-278	390 Ω " "	R40	13-295	10 KΩ " "
R4	19-255	2,2 KΩ trim. stå.	R41	13-295	10 KΩ " "
R5	13-287	2,2 KΩ 1/8W CR 16	R42	13-291	4,7 KΩ " "
R6	13-291	4,7 KΩ " "	R43	13-306	100 KΩ " "
R7	13-297	15 KΩ " "	R44	13-306	100 KΩ " "
R8	13-269	68 Ω " "	R45	13-315	470 KΩ " "
R9	13-277	330 Ω " "	R46	13-309	220 KΩ " "
R10	13-300	33 KΩ " "	R47	13-295	10 KΩ " "
R11	13-283	1 KΩ " "	R48	13-287	2,2 KΩ " "
R12	19-252	1 KΩ trim. stå.	R49	13-291	22 KΩ " "
R13	13-306	100 KΩ 1/8W CR 16	R50	13-300	33 KΩ " "
R14	13-306	100 KΩ " "	R51	13-300	33 KΩ " "
R15	13-295	10 KΩ " "	R52	13-300	33 KΩ " "
R16	13-300	33 KΩ " "	R53	13-288	2,7 KΩ " "
R17	13-302	47 KΩ " "	R54	13-283	1 KΩ " "
R18	13-302	47 KΩ " "	R55	13-310	330 KΩ " "
R19	13-291	4,7 KΩ " "	R56	13-291	22 KΩ " "
R20	13-291	4,7 KΩ " "	R57	13-267	47 Ω " "
R21	13-291	4,7 KΩ " "	R58	13-297	15 KΩ " "
R22	13-291	4,7 KΩ " "	R59	13-671	33 KΩ NTC
R23	13-291	4,7 KΩ " "	R60	13-298	18 KΩ 1/8W CR 16 1
R24	13-291	4,7 KΩ " "	R60	13-313	27 KΩ " " 2
R25	13-306	100 KΩ " "	R61	13-306	100 KΩ " " 1
R26	13-300	33 KΩ " "	R61	13-314	180 KΩ " " 2
R27	19-262	100 KΩ trim. ligg.	R62	13-283	1 KΩ " "
R28	13-306	100 KΩ 1/8W CR 16	R63	13-300	33 KΩ " "
R29	13-306	100 KΩ " "	R64	13-287	2,2 KΩ " "
R30	13-295	10 KΩ " "	R65	13-315	470 KΩ " "
R31	13-295	10 KΩ " "			
R32	13-306	100 KΩ " "	C1	11-409	1 nF ker.
R33	13-306	100 KΩ " "	C2	11-502	1 μF/35V tant
R34	13-295	10 KΩ " "	C3	11-504	4,7 μF/10V "
R35	13-295	10 KΩ " "	C4	11-502	1 μF/35V "
R36	13-302	47 KΩ " "	C5	11-502	1 μF/35V "
R37	13-295	10 KΩ " "	C6	11-503	2,2 μF/25V "
1-tone Tx + 5-tone Tx for ID Print board B 85 A 1,2 Tilhører tegn. nr.: 77352-2E2			Rettet:		Tegn.:
					Kontr.:
					Stykl. nr.: 77352-4S2

C16 A

C14A1



Key

Transpond

Tone 2 and 3

Tone 1

IC2 = CD4093 BE
IC3 = CD40106 BE

If automatic transponding is required, it can be cancelled by removing J3 and connecting pin 5-IC3 to ground.
Print board C16 A

Stock no.	Print boards	Tones	L1
219-043	C16A3/C14A1	AP	76136-4E2
219-047	D16A6/C14A1	AGA	77119-4E2

Tone no.	76136-4E2	77119-4E2
0	980	2580
1	1190	2367
2	1380	2172
3	1600	1993
4	1800	1828
5	2010	1677
6	2220	1539
7	2410	1412
8	2590	1295
9	2820	1188
10		1090
11		2960
12		1000
13		917
14		842
		772

3-tone encoder/decoder with automatic transponding
C16A3/C14A1 and C16A6/C14A1

AP-RADIOTELEFON 46

Tegh. nr.: 78162-2E2

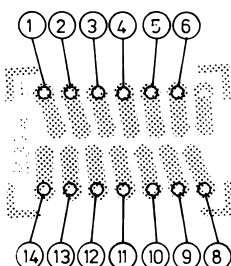
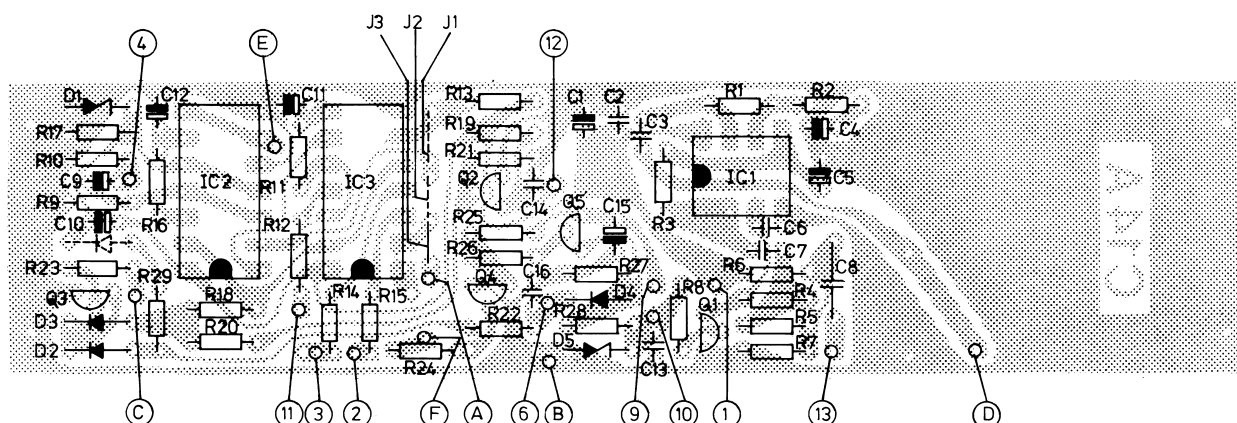
Tegh. nr.: 78162-2E2

Tegh. nr.: 78162-2E2

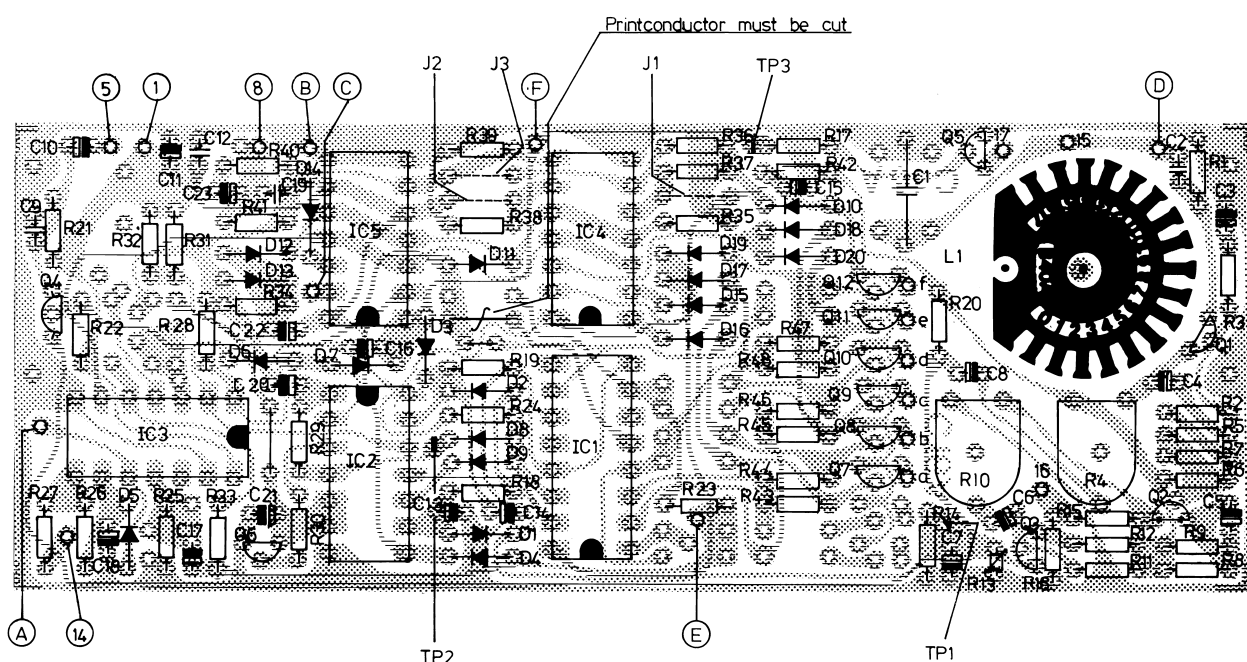
AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-310	330 K Ω 1/8W CR 16	C8	11-489	22 nF MKH
R2	13-283	1 K Ω " "	C9	11-502	1 μ F/35V tant.
R3	13-288	2,7 K Ω " "	C10	11-504	4,7 μ F/10V "
R4	13-300	33 K Ω " "	C11	11-504	4,7 μ F/10V "
R5	13-300	33 K Ω " "	C12	11-502	1 μ F/35V "
R6	13-300	33 K Ω " "	C13	11-409	1 nF ker.
R7	13-299	22 K Ω " "	C14	11-409	1 nF "
R8	13-300	33 K Ω " "	C15	11-505	4,7 μ F/25V tant.
R9	13-295	10 K Ω " "	C16	11-409	1 nF ker.
R10	13-295	10 K Ω " "			
R11	13-308	150 K Ω " "	D1	04-045	BZX 83-C4V3
R12	13-295	10 K Ω " "	D2	04-062	1N4148
R13	13-300	33 K Ω " "	D3	04-062	1N4148
R14	13-295	10 K Ω " "	D4	04-062	1N4148
R15	13-295	10 K Ω " "	D5	04-045	BZX 83-C4V3
R16	13-300	33 K Ω " "			
R17	13-306	100 K Ω " "			
R18	13-299	22 K Ω " "	IC1	09-080	LM 358
R19	13-291	4,7 K Ω " "	IC2	09-074	CD 4013AE
R20	13-299	22 K Ω " "	IC3	09-072	CD 4093BE
R21	13-299	22 K Ω " "			
R22	13-291	22 K Ω " "	Q1	19-117	BC 238 BPL
R23	13-300	33 K Ω " "	Q2	19-085	BC 338 BPL
R24	13-300	33 K Ω " "	Q3	19-085	BC 338 BPL
R25	13-295	10 K Ω " "	Q4	19-085	BC 338 BPL
R26	13-287	2,2 K Ω " "	Q5	19-082	BC 328 BPL
R27	13-291	4,7 K Ω " "			
R28	13-281	680 Ω " "			
R29	13-291	4,7 K Ω " "			
C1	11-504	4,7 μ F/10V tant.			
C2	11-416	4,7 nF ker.			
C3	11-393	39 pF "			
C4	11-502	1 μ F/35V tant.			
C5	11-500	0,1 μ F/35V "			
C6	11-409	1 nF ker.			
C7	11-414	3,3 nF "			
Control circuit for C 16 A Print board C 14 A1 Tilhører tegn. nr.: 78162-2E2			Rettet:		<div>Tegn.:</div> <div>Stykl. nr.:</div> <div>Kontr.:</div> <div>78162-4S2</div>

C14 A1



B37A



C16 A

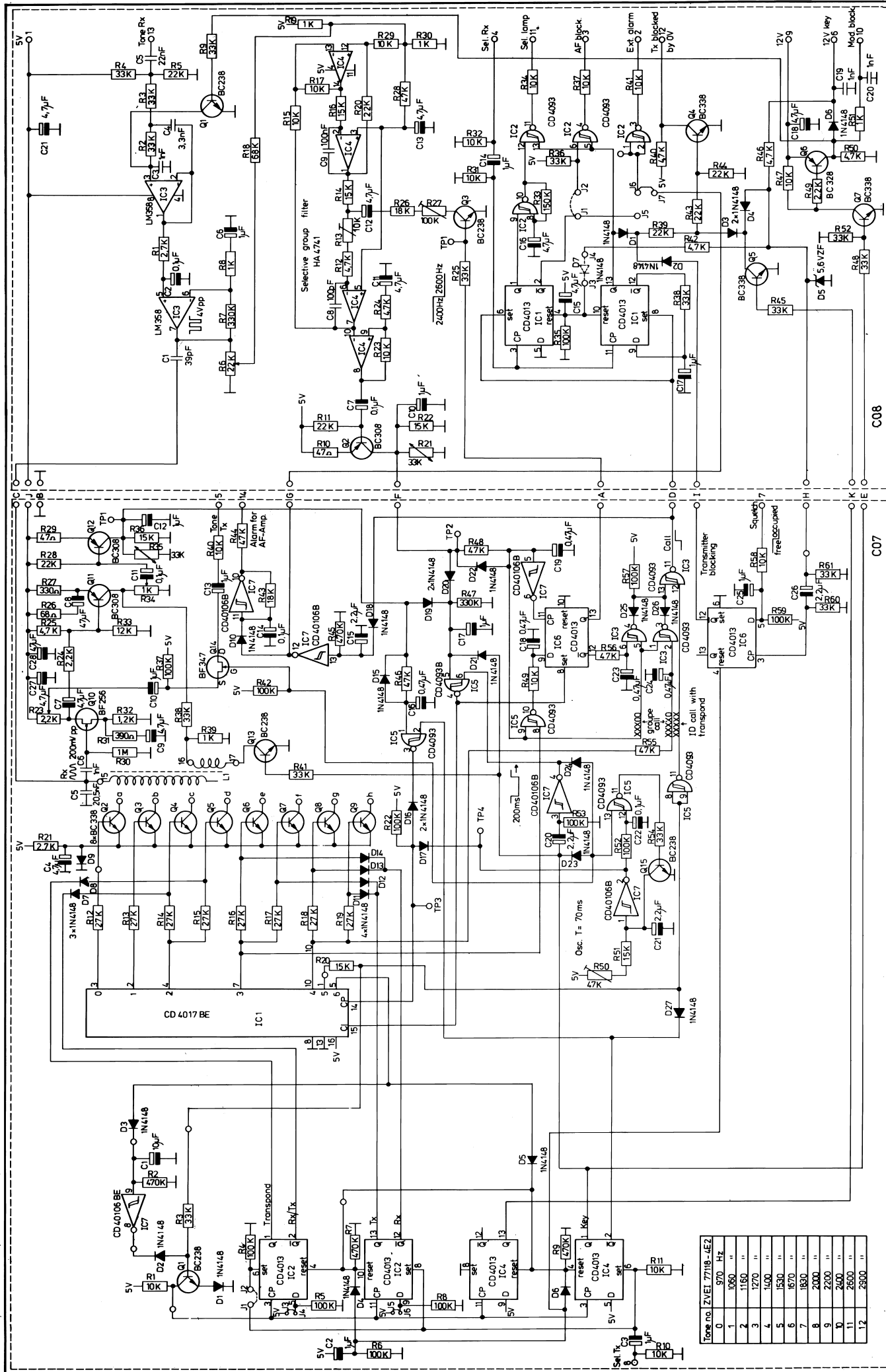
Rettet: 	3-tone encoder/decoder with automatic transponding C16A3/C14A1 and C16A6/C14A1 AP - RADIOTELEFON	Tegn.: 8-11-78 AMC Stykl. nr.: Tegn. nr.: 78162-2E2
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AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-312	1 MΩ 1/8W CR 16	R38	13-306	100 KΩ 1/8W CR 16
R2	13-284	1,2 KΩ " "	R39	13-315	470 KΩ " "
R3	13-278	390 Ω " "	R40	13-299	22 KΩ " "
R4	19-254	2,2 KΩ trim.ligg.	R41	13-299	22 KΩ " "
R5	13-287	2,2 KΩ 1/8W CR 16	R42	13-288	2,7 KΩ " "
R6	13-291	4,7 KΩ " "	R43	13-313	27 KΩ " "
R7	13-296	12 KΩ " "	R44	13-313	27 KΩ " "
R8	13-277	330 Ω " "	R45	13-313	27 KΩ " "
R9	13-269	68 Ω " "	R46	13-313	27 KΩ " "
R10	19-253	1 KΩ trim.ligg.	R47	13-313	27 KΩ " "
R11	13-299	22 KΩ 1/8W CR 16	R48	13-313	27 KΩ " "
R12	13-267	47 Ω " "			
R13	13-671	33 KΩ NTC	C1	11-651	20,5 nF styr.
R14	13-297	15 KΩ 1/8W CR 16	C2	11-409	1 nF ker.
R15	13-300	33 KΩ " "	C3	11-504	4,7 μF/10V tant.
R16	13-283	1 KΩ " "	C4	11-504	4,7 μF/10V "
R17	13-300	33 KΩ " "	C5	11-509	47 μF/6,3V "
R18	13-306	100 KΩ " "	C6	11-500	0,1 μF/35V "
R19	13-315	470 KΩ " "	C7	11-502	1 μF/35V "
R20	13-306	100 KΩ " "	C8	11-502	1 μF/35V "
R21	13-306	100 KΩ " "	C9	11-409	1 nF ker.
R22	13-306	100 KΩ " "	C10	11-502	1 μF/35V tant.
R23	13-297	15 KΩ " "	C11	11-504	4,7 μF/10V "
R24	13-306	100 KΩ " "	C12	11-416	4,7 nF ker.
R25	13-315	470 KΩ " "	C13	11-503	2,2 μF/25V tant.
R26	13-298	18 KΩ " "	C14	11-506	10 μF/25V "
R27	13-302	47 KΩ " "	C15	11-504	4,7 μF/10V "
R28	13-306	100 KΩ " "	C16	11-503	2,2 μF/25V "
R29	13-306	100 KΩ " "	C17	11-504	4,7 μF/10V "
R30	13-300	33 KΩ " "	C18	11-500	0,1 μF/35V "
R31	13-316	560 KΩ " "	C19	11-409	1 nF ker.
R32	13-309	220 KΩ " "	C20	11-500	0,1 μF/35V tant.
R33	13-306	100 KΩ " "	C21	11-504	4,7 μF/10V "
R34	13-306	100 KΩ " "	C22	11-504	4,7 μF/10V "
R35	13-315	470 KΩ " "	C23	11-502	1 μF/35V "
R36	13-315	470 KΩ " "			
R37	13-306	100 KΩ " "			
3-tone encoder/decoder with aut. transp. C 16 A3/A6 Tilhører tegn. nr.: 78162-2E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div> <div>Stykl. nr.: 78162-4S2</div>

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
D1	04-062	1N4148	IC4	09-074	CD 4013 BE
D2	04-062	1N4148	IC5	09-074	CD 4013 BE
D3	04-062	1N4148			
D4	04-062	1N4148	L1	18-678	76136-4E2
D5	04-062	1N4148		18-680	77119-4E2
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			
D17	04-062	1N4148			
D18	04-062	1N4148			
D19	04-062	1N4148			
D20	04-062	1N4148			
Q1	19-113	BF 256 A			
Q2	19-084	BC 308 BPL			
Q3	19-084	BC 308 BPL			
Q4	19-106	BF 244			
Q5	19-085	BC 338 BPL			
Q6	19-117	BC 238 BPL			
Q7	19-085	BC 338 BPL			
Q8	19-085	BC 338 BPL			
Q9	19-085	BC 338 BPL			
Q10	19-085	BC 338 BPL			
Q11	19-085	BC 338 BPL			
Q12	19-085	BC 338 BPL			
IC1	09-086	MC 14017 BE			
IC2	09-072	CD 4093 BE			
IC3	09-037	CD 40106 BE			
3-tone encoder/decoder with aut. transp. C 16 A3/A6 Tilhører tegn. nr.: 78162-2E2			Rettet:		Tegn.:
					Kontr.:
					Stykl. nr.: 78162-4S2

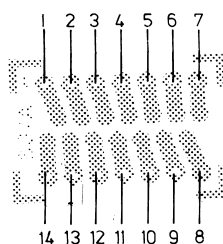
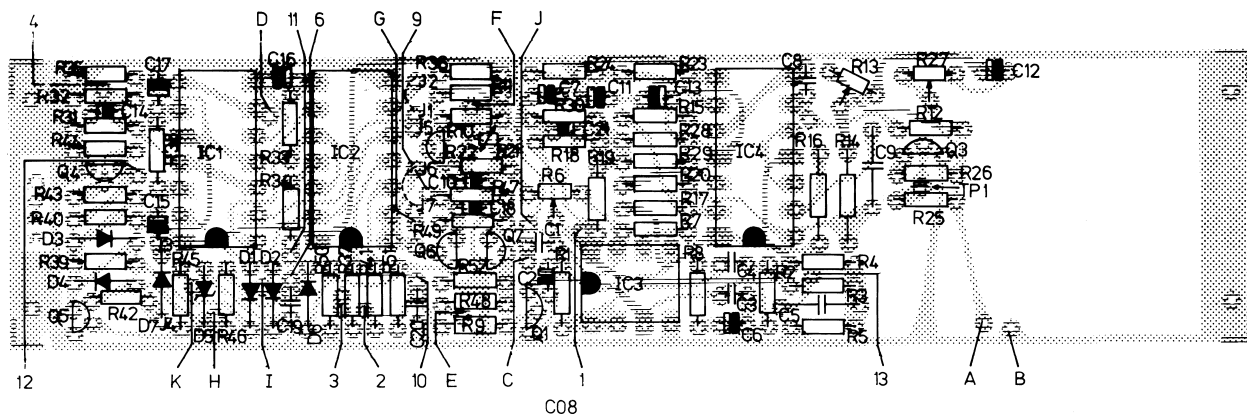


5-tone encoder/decoder, with transpond and group call	
Print board C07A1 and C08A1	
Rev:	
Temp: 13-78	Temp: 13-78
AMC	AMC
780.69 - 2E2	

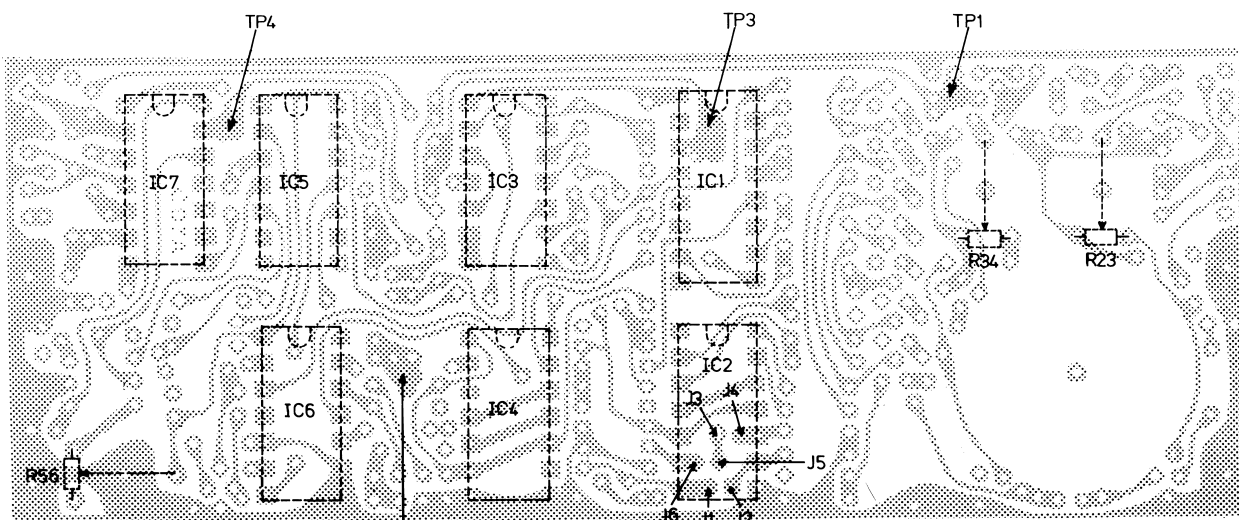
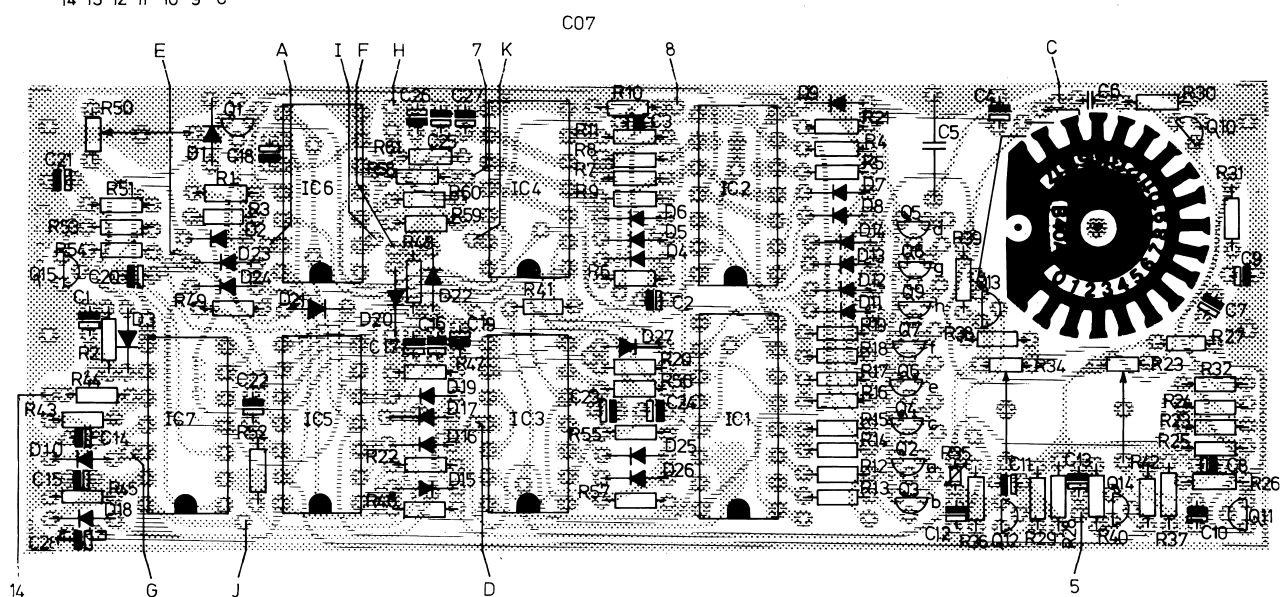
Tone no.	Hz
1	970
2	1050
3	1150
4	1270
5	1400
6	1530
7	1670
8	1830
9	2000
10	2200
11	2400
12	2600

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-288	2,7 K Ω 1/8W CR 16	R38	13-300	33 K Ω 1/8W CR 16
R2	13-300	33 K Ω " "	R39	13-299	22 K Ω " "
R3	13-300	33 K Ω " "	R40	13-291	4,7 K Ω " "
R4	13-300	33 K Ω " "	R41	13-295	10 K Ω " "
R5	13-299	22 K Ω " "	R42	13-291	4,7 K Ω " "
R6	19-269	22 K Ω trim. potm.	R43	13-299	22 K Ω " "
R7	13-310	330 K Ω 1/8W CR 16	R44	13-299	22 K Ω " "
R8	13-283	1 K Ω " "	R45	13-300	33 K Ω " "
R9	13-300	33 K Ω " "	R46	13-291	4,7 K Ω " "
R10	13-267	47 Ω " "	R47	13-295	10 K Ω " "
R11	13-299	22 K Ω " "	R48	13-300	33 K Ω " "
R12	13-291	4,7 K Ω " "	R49	13-287	2,2 K Ω " "
R13	19-271	10 K Ω trim.potm.	R50	13-291	4,7 K Ω " "
R14	13-674	15 K Ω \pm 100ppm	R51	13-283	1 K Ω " "
R15	13-295	10 K Ω 1/8W CR 16	R52	13-300	33 K Ω " "
R16	13-674	15 K Ω \pm 100ppm			
R17	13-295	10 K Ω 1/8W CR 16			
R18	13-304	68 K Ω " "	C1	11-393	39 pF styr.
R19	13-283	1 K Ω " "	C2	11-500	0,1 μ F/35V tant.
R20	13-299	22 K Ω " "	C3	11-409	1 nF ker.
R21	13-671	33 K Ω NTC	C4	11-414	3,3 nF "
R22	13-297	15 K Ω 1/8W CR 16	C5	11-489	22 nF MKH
R23	13-295	10 K Ω " "	C6	11-502	1 μ F/35V tant.
R24	13-291	4,7 K Ω " "	C7	11-500	0,1 μ F/35V "
R25	13-300	33 K Ω " "	C8	11-424	100 pF ker. \pm 5% NPO
R26	13-298	18 K Ω " "	C9	11-491	100 nF MKM
R27	19-273	100 K Ω trim.potm.	C10	11-517	1 μ F/35V tant.
R28	13-302	47 K Ω	C11	11-504	4,7 μ F/10V "
R29	13-295	10 K Ω " "	C12	11-504	4,7 μ F/10V "
R30	13-283	1 K Ω " "	C13	11-504	4,7 μ F/10V "
R31	13-295	10 K Ω " "	C14	11-517	1 μ F/35V "
R32	13-295	10 K Ω " "	C15	11-504	4,7 μ F/10V "
R33	13-308	150 K Ω " "	C16	11-504	4,7 μ F/10V "
R34	13-295	10 K Ω " "	C17	11-502	1 μ F/35V "
R35	13-306	100 K Ω " "	C18	11-505	4,7 μ F/25V "
R36	13-300	33 K Ω " "	C19	11-409	1 nF ker.
R37	13-295	10 K Ω " "	C20	11-409	1 nF "
5-tone encoder/decoder with transpond and group call. Print board C 08 A1 Tilhører tegn. nr.: 78049-2E2				Tegn.:	Stykl. nr.:
				Kontr.:	78049-4S2



B 37



C07
Bottom view

Rettet:

5-tone encoder decoder, with transpond
and group call. Printboard C07A1 and C08A1

AP-RADIOTELEFON

Tegn.: 10-3-78
AMC

Kontr.: 13-3-78
TJ

Stykl. nr.:

Tegn. nr.:

78049-3E2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
C21	11-504	4,7 μ F/10V tant.			
D1	04-062	1N4148			
D2	04-062	1N4148			
D3	04-062	1N4148			
D4	04-062	1N4148			
D5	04-030	5,6 ZVF			
D6	04-062	1N4148			
Q1	19-117	BC 238BP			
Q2	19-084	BC 308BP			
Q3	19-117	BC 238BP			
Q4	19-085	BC 338			
Q5	19-085	BC 338			
Q6	19-082	BC 328BP			
Q7	19-085	BC 338			
IC1	09-074	CD 4013AE			
IC2	09-072	CD 4093BE			
IC3	09-080	LM 358			
IC4	09-092	A1 4741-5			
5-tone encoder/decoder with transpond and group call. Print board C 08 A1 Tilhører tegn. nr. 78049-2E2			Tegn.:		Stykl. nr.:
			Kontr.:		78049-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-295	10 KΩ 1/8W CR 16	R38	13-300	33 KΩ 1/8W CR 16
R2	13-315	470 KΩ " "	R39	13-283	1 KΩ " "
R3	13-300	33 KΩ " "	R40	13-295	10 KΩ " "
R4	13-306	100 KΩ " "	R41	13-300	33 KΩ " "
R5	13-306	100 KΩ " "	R42	13-306	100 KΩ " "
R6	13-306	100 KΩ " "	R43	13-298	18 KΩ " "
R7	13-315	470 KΩ " "	R44	13-302	47 KΩ " "
R8	13-306	100 KΩ " "	R45	13-315	470 KΩ " "
R9	13-315	470 KΩ " "	R46	13-302	47 KΩ " "
R10	13-295	10 KΩ " "	R47	13-310	330 KΩ " "
R11	13-295	10 KΩ " "	R48	13-302	47 KΩ " "
R12	13-313	27 KΩ " "	R49	13-295	10 KΩ " "
R13	13-313	27 KΩ " "	R50	19-261	47 KΩ potm. ligg
R14	13-313	27 KΩ " "	R51	13-297	15 KΩ 1/8W CR 16
R15	13-313	27 KΩ " "	R52	13-306	100 KΩ " "
R16	13-313	27 KΩ " "	R53	13-306	100 KΩ " "
R17	13-313	27 KΩ " "	R54	13-300	33 KΩ " "
R18	13-313	27 KΩ " "	R55	13-302	47 KΩ " "
R19	13-313	27 KΩ " "	R56	13-302	47 KΩ " "
R20	13-297	15 KΩ " "	R57	13-306	100 KΩ " "
R21	13-288	2,7 KΩ " "	R58	13-295	10 KΩ " "
R22	13-306	100 KΩ " "	R59	13-306	100 KΩ " "
R23	19-254	2,2 KΩ potm. ligg	R60	13-300	33 KΩ " "
R24	13-287	2,2 KΩ 1/8W CR 16	R61	13-300	33 KΩ " "
R25	13-291	4,7 KΩ " "			
R26	13-269	68 Ω " "			
R27	13-277	330 Ω " "	C1	11-506	10 μF/25V Tant.
R28	13-299	22 KΩ " "	C2	11-502	1 μF/35V "
R29	13-267	47 Ω " "	C3	11-517	1 μF/35V "
R30	13-312	1 MΩ " "	C4	11-504	4,7 μF/10V "
R31	13-278	390 Ω " "	C5	11-651	20,5 nF ±1% styr.
R32	13-284	1,2 KΩ " "	C6	11-409	1 nF ker.
R33	13-296	12 KΩ " "	C7	11-504	4,7 μF/10V tant.
R34	19-253	1 KΩ potm.ligg.	C8	11-509	47 μF/6,3V "
R35	13-671	33 KΩ NTC	C9	11-504	4,7 μF/10V "
R36	13-297	15 KΩ 1/8W CR 16	C10	11-502	1 μF/35V "
R37	13-306	100 KΩ " "	C11	11-515	0,1 μF/35V "
5-tone encoder/decoder, with transpond and group call. Print board C 07 A1 Tilhører tegn. nr.: 78049-2E2					Tegn.: Kontr.: Stykl. nr.: 78049-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
C12	11-517	1 μ F/35V tant.	D19	04-062	1N4148
C13	11-502	1 μ F/35V "	D20	04-062	1N4148
C14	11-500	0,1 μ F/35V "	D21	04-062	1N4148
C15	11-503	2,2 μ F/25V "	D22	04-062	1N4148
C16	11-501	0,47 μ F/35V "	D23	04-062	1N4148
C17	11-502	1 μ F/35V "	D24	04-062	1N4148
C18	11-501	0,47 μ F/35V "	D25	04-062	1N4148
C19	11-501	0,47 μ F/35V "	D26	04-062	1N4148
C20	11-503	2,2 μ F/25V "	D27	04-062	1N4148
C21	11-503	2,2 μ F/25V "			
C22	11-500	0,1 μ F/35V "			
C23	11-501	0,47 μ F/35V "	Q1	19-117	BC 238BP
C24	11-501	0,47 μ F/35V "	Q2	19-085	BC 338BP
C25	11-502	1 μ F/35V "	Q3	19-085	BC 338BP
C26	11-503	2,2 μ F/25V "	Q4	19-085	BC 338BP
C27	11-504	4,7 μ F/10V "	Q5	19-085	BC 338BP
C28	11-504	4,7 μ F/10V "	Q6	19-085	BC 338BP
			Q7	19-085	BC 338BP
			Q8	19-085	BC 338BP
D1	04-062	1N4148	Q9	19-085	BC 338BP
D2	04-062	1N4148	Q10	19-113	BF 256A
D3	04-062	1N4148	Q11	19-084	BC 308BP
D4	04-062	1N4148	Q12	19-084	BC 308BP
D5	04-062	1N4148	Q13	19-117	BC 238BP
D6	04-062	1N4148	Q14	19-106	BF 347
D7	04-062	1N4148	Q15	19-117	BC 238BP
D8	04-062	1N4148			
D9	04-062	1N4148			
D10	04-062	1N4148	IC1	09-086	CD 4017B
D11	04-062	1N4148	IC2	09-074	CD 4013 AE
D12	04-062	1N4148	IC3	09-072	CD 4093BE
D13	04-062	1N4148	IC4	09-074	CD 4013AE
D14	04-062	1N4148	IC5	09-072	CD 4093BE
D15	04-062	1N4148	IC6	09-074	CD 4013AE
D16	04-062	1N4148	IC7	09-037	CD 40106BE
D17	04-062	1N4148			
D18	04-062	1N4148	S1	77-118	77118-4E2
5-tone encoder/decoder, with transpond and group call. Print board C 07 A1 Tilhører tegn. nr.: 78049-2E2				Tegn.:	Stykl. nr.:
				Kontr.:	78049-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-288	2,7 KΩ 1/8W CR 16	R38	13-300	33 KΩ 1/8W CR 16
R2	13-300	33 KΩ " "	R39	13-299	22 KΩ " "
R3	13-300	33 KΩ " "	R40	13-291	4,7 KΩ " "
R4	13-300	33 KΩ " "	R41	13-295	10 KΩ " "
R5	13-299	22 KΩ " "	R42	13-291	4,7 KΩ " "
R6	19-269	22 KΩ trim. potm.	R43	13-299	22 KΩ " "
R7	13-310	330 KΩ 1/8W CR 16	R44	13-299	22 KΩ " "
R8	13-283	1 KΩ " "	R45	13-300	33 KΩ " "
R9	13-300	33 KΩ " "	R46	13-291	4,7 KΩ " "
R10	13-267	47 Ω " "	R47	13-295	10 KΩ " "
R11	13-299	22 KΩ " "	R48	13-300	33 KΩ " "
R12	13-291	4,7 KΩ " "	R49	13-287	2,2 KΩ " "
R13	19-271	10 KΩ trim.potm.	R50	13-291	4,7 KΩ " "
R14	13-674	15 KΩ \pm 100ppm	R51	13-283	1 KΩ " "
R15	13-295	10 KΩ 1/8W CR 16	R52	13-300	33 KΩ " "
R16	13-674	15 KΩ \pm 100ppm			
R17	13-295	10 KΩ 1/8W CR 16			
R18	13-304	68 KΩ " "	C1	11-393	39 pF styr.
R19	13-283	1 KΩ " "	C2	11-500	0,1 μF/35V tant.
R20	13-299	22 KΩ " "	C3	11-409	1 nF ker.
R21	13-671	33 KΩ NTC	C4	11-414	3,3 nF "
R22	13-297	15 KΩ 1/8W CR 16	C5	11-489	22 nF MKH
R23	13-295	10 KΩ " "	C6	11-502	1 μF/35V tant.
R24	13-291	4,7 KΩ " "	C7	11-500	0,1 μF/35V "
R25	13-300	33 KΩ " "	C8	11-417	150 pF ker. \pm 5% NPO
R26	13-298	18 KΩ " "	C9	11-491	100 nF MKM
R27	19-273	100 KΩ trim.potm.	C10	11-517	1 μF/35V tant.
R28	13-302	47 KΩ	C11	11-504	4,7 μF/10V "
R29	13-295	10 KΩ " "	C12	11-504	4,7 μF/10V "
R30	13-283	1 KΩ " "	C13	11-504	4,7 μF/10V "
R31	13-295	10 KΩ " "	C14	11-517	1 μF/35V "
R32	13-295	10 KΩ " "	C15	11-504	4,7 μF/10V "
R33	13-308	150 KΩ " "	C16	11-504	4,7 μF/10V "
R34	13-295	10 KΩ " "	C17	11-502	1 μF/35V "
R35	13-306	100 KΩ " "	C18	11-505	4,7 μF/25V "
R36	13-300	33 KΩ " "	C19	11-409	1 nF ker.
R37	13-295	10 KΩ " "	C20	11-409	1 nF "
5-tone encoder/decoder with transpond and group call. Print board C 08 A2 Tilhører tegn. nr.: 78053-2E2					<div>Tegn.:</div> <div>Kontr.:</div> <div>Stykl. nr.: 78053-4S2</div>

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-295	10 KΩ 1/8W CR 16	R38	13-300	33 KΩ 1/8W CR 16
R2	13-315	470 KΩ " "	R39	13-283	1 KΩ " "
R3	13-300	33 KΩ " "	R40	13-295	10 KΩ " "
R4	13-306	100 KΩ " "	R41	13-300	33 KΩ " "
R5	13-306	100 KΩ " "	R42	13-306	100 KΩ " "
R6	13-306	100 KΩ " "	R43	13-298	18 KΩ " "
R7	13-315	470 KΩ " "	R44	13-302	47 KΩ " "
R8	13-306	100 KΩ " "	R45	13-315	470 KΩ " "
R9	13-315	470 KΩ " "	R46	13-302	47 KΩ " "
R10	13-295	10 KΩ " "	R47	13-310	330 KΩ " "
R11	13-295	10 KΩ " "	R48	13-302	47 KΩ " "
R12	13-313	27 KΩ " "	R49	13-295	10 KΩ " "
R13	13-313	27 KΩ " "	R50	19-261	47 KΩ potm. ligg
R14	13-313	27 KΩ " "	R51	13-297	15 KΩ 1/8W CR 16
R15	13-313	27 KΩ " "	R52	13-306	100 KΩ " "
R16	13-313	27 KΩ " "	R53	13-306	100 KΩ " "
R17	13-313	27 KΩ " "	R54	13-300	33 KΩ " "
R18	13-313	27 KΩ " "	R55	13-302	47 KΩ " "
R19	13-313	27 KΩ " "	R56	13-302	47 KΩ " "
R20	13-297	15 KΩ " "	R57	13-306	100 KΩ " "
R21	13-288	2,7 KΩ " "	R58	13-295	10 KΩ " "
R22	13-306	100 KΩ " "	R59	13-306	100 KΩ " "
R23	19-254	2,2 KΩ potm. ligg	R60	13-300	33 KΩ " "
R24	13-287	2,2 KΩ 1/8W CR 16	R61	13-300	33 KΩ " "
R25	13-291	4,7 KΩ " "			
R26	13-269	68 Ω " "			
R27	13-277	330 Ω " "	C1	11-506	10 μF/25V Tant.
R28	13-299	22 KΩ " "	C2	11-502	1 μF/35V "
R29	13-267	47 Ω " "	C3	11-517	1 μF/35V "
R30	13-312	1 MΩ " "	C4	11-504	4,7 μF/10V "
R31	13-278	390 Ω " "	C5	11-651	20,5 nF ±1% styr.
R32	13-284	1,2 KΩ " "	C6	11-409	1 nF ker.
R33	13-296	12 KΩ " "	C7	11-504	4,7 μF/10V tant.
R34	19-253	1 KΩ potm.ligg.	C8	11-509	47 μF/6,3V "
R35	13-671	33 KΩ NTC	C9	11-504	4,7 μF/10V "
R36	13-297	15 KΩ 1/8W CR 16	C10	11-502	1 μF/35V "
R37	13-306	100 KΩ " "	C11	11-515	0,1 μF/35V "
5-tone encoder/decoder, with transpond and group call. Print board C 07 A2 Tilhører tegn. nr.: 78053-2E2					<div>Tegn.:</div> <div>Kontr.:</div> <div>Stykl. nr:</div> <div>78053-4S2</div>

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
C12	11-517	1 μ F/35V tant.	D19	04-062	1N4148
C13	11-502	1 μ F/35V "	D20	04-062	1N4148
C14	11-500	0,1 μ F/35V "	D21	04-062	1N4148
C15	11-503	2,2 μ F/25V "	D22	04-062	1N4148
C16	11-501	0,47 μ F/35V "	D23	04-062	1N4148
C17	11-502	1 μ F/35V "	D24	04-062	1N4148
C18	11-501	0,47 μ F/35V "	D25	04-062	1N4148
C19	11-501	0,47 μ F/35V "	D26	04-062	1N4148
C20	11-503	2,2 μ F/25V "	D27	04-062	1N4148
C21	11-503	2,2 μ F/25V "			
C22	11-500	0,1 μ F/35V "			
C23	11-501	0,47 μ F/35V "	Q1	19-117	BC 238BP
C24	11-501	0,47 μ F/35V "	Q2	19-085	BC 338BP
C25	11-502	1 μ F/35V "	Q3	19-085	BC 338BP
C26	11-503	2,2 μ F/25V "	Q4	19-085	BC 338BP
C27	11-504	4,7 μ F/10V "	Q5	19-085	BC 338BP
C28	11-504	4,7 μ F/10V "	Q6	19-085	BC 338BP
			Q7	19-085	BC 338BP
			Q8	19-085	BC 338BP
D1	04-062	1N4148	Q9	19-085	BC 338BP
D2	04-062	1N4148	Q10	19-113	BF 256A
D3	04-062	1N4148	Q11	19-084	BC 308BP
D4	04-062	1N4148	Q12	19-084	BC 308BP
D5	04-062	1N4148	Q13	19-117	BC 238BP
D6	04-062	1N4148	Q14	19-106	BF 347
D7	04-062	1N4148	Q15	19-117	BC 238BP
D8	04-062	1N4148			
D9	04-062	1N4148			
D10	04-062	1N4148	IC1	09-086	CD 4017B
D11	04-062	1N4148	IC2	09-074	CD 4013 AE
D12	04-062	1N4148	IC3	09-072	CD 4093BE
D13	04-062	1N4148	IC4	09-074	CD 4013AE
D14	04-062	1N4148	IC5	09-072	CD 4093BE
D15	04-062	1N4148	IC6	09-074	CD 4013AE
D16	04-062	1N4148	IC7	09-037	CD 40106BE
D17	04-062	1N4148			
D18	04-062	1N4148	S1	75425	75425-4E2
5-tone encoder/decoder, with transpond and group call. Print board C 07 A2					Tegn.:
Tilhører tegn. nr.: 78053-2E2					Kontr.:
					Stykl. nr.:
					78053-4S2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
C21	11-504	4,7 μ F/10V tant.			
D1	04-062	1N4148			
D2	04-062	1N4148			
D3	04-062	1N4148			
D4	04-062	1N4148			
D5	04-030	5,6 ZVF			
D6	04-062	1N4148			
Q1	19-117	BC 238BP			
Q2	19-084	BC 308BP			
Q3	19-117	BC 238BP			
Q4	19-085	BC 338			
Q5	19-085	BC 338			
Q6	19-082	BC 328BP			
Q7	19-085	BC 338			
IC1	09-074	CD 4013AE			
IC2	09-072	CD 4093BE			
IC3	09-080	LM 358			
IC4	09-092	A1 4741-5			
5-tone encoder/decoder with transpond and group call. Print board C 08 A2 Tilhører tegn. nr.: 78053-2E2			Tegn.:		Stykl. nr.:
			Kontr.:		78053-4S2

5 TONE ENCODER/DECODER WITH AUTOMATIC TRANSPONDING AND GROUP CALL (CCIR OR ZVEI).

GENERAL OPERATION.

The print boards C07A1/C08A1 dwg. no. 78049-2E2 are used for ZVEI tones. The print boards C07A2/C08A2 dwg. no. 78053-2E2 are used for CCIR tones. A correct ID call, is indicated by the flashing selective lamp and the acoustic alarm in the loudspeaker. The ID call includes automatic transponding. This reply code can be the ID code, a Tx code or a special code for a paging receiver by only changing the third digit of the ID code.

A group call uses one zero for the last digit, or two zeroes for the last two digits decoding groups of 10 or 100. A correct group call is indicated by the flashing selective lamp and the acoustic alarm. No transpond occurs when a group call is received. In the Tx mode a fixed code is transmitted, or the last three digits can be programmed by thumbwheel switches. Only the last two digits can be programmed if a paging receiver is used.

CIRCUIT DESCRIPTION C07/C08.

The decoder.

The tone input signal passes through an active low pass filter and the network R1, C2 for deemphasis, before the signal is amplified to a square wave at IC 3 pin 7 on C08. The decoder is programmed to the ID code on print board C07, by connecting the collectors of Q2, Q3, Q4, Q6 and Q8 to the tapcoil L 1. The signal at the top of the coil (200 mVpp in receiving mode) is amplified by Q10 and Q11 and rectified by Q12.

The time constant R47, C17 is used to reset the decoder after a call is received or during a call if the tone input code differ from the ID code or the group code. R46, C16 delay the accept of the tones about 40 ms.

The clear input of the counter IC i goes low, when a correct call receives, and the counter is clocked 5 times leaving a high at pin 1. This level activates the call output IC 3 pin

11, setting the flip flops (IC 1, C08) and charging the time constant R 45, C 15. This time constant activates the acoustic alarm oscillator about 1 sec. Setting the flip flops is indicated by the flashing selective lamp and the blocking mode of the transmitter. When the time constant R47, C17 (C07) reset the counter IC 1, the clock line of the flip flops (IC 2 and IC 4) receives an impuls, turning the encoder on for automatic transponding.

The outputs of IC 2 program the transponding code according to the jumpers J3 - J4 and J5 - J6. The Q output of IC4 pin 13 disable the Tx blocking mode of Q4 (C08) during automatic transponding. The Q output of IC 4 pin 1 (C07) turn Q 6 (C08) on for keying the transmitter. The Q output of IC 4 pin 1 (C07) also turn Q 13 on, activating the tone oscillator and charging the time constant C20, R53. Delaying the output gating of the tones (Q14) and the clock oscillator about 200 ms. At the end of the 5 tone sequence pin 5 of the counter goes high, resetting the flip flops IC 2 and IC 4.

GROUP CALL.

The group call uses the ID code with one or two zeroes as the last digits, calling groups of 10 or 100.

A group call for 100 vehicles uses the code XXX00, where X can be any tone no. except zero for the third digit. The zeroes for the two last digits are decoded by the selective group filter on C08. The output from this state variable band pass filter is rectified by Q2, leaving a logical 1 at TP 2 on C07.

Receiving a group call for 100 vehicles means the counter IC 1 (C07) will have a logical 1 at pin 7 after the third digit. The selective group filter detects the zero of the fourth digit and IC 5 (C07) pin 8 and pin 9 will both have a logical 1. The D-input of IC 6 pin 9 will be low when the clock input pin 11 receives an impuls at the end of the fourth digit. The Q output pin 13 of IC 6 goes low, changing the resonans frequency of the group filter from zero to repeat tone. When the group filter detects the repeat tone, IC 3 pin 5 and pin 6 are both logical 1, activating the call output IC 3 pin 11. The flashing selective lamp and the acoustic alarm, indicates a call is received.

When a group of 10 vehicles are called the first four digits are detected by the ID call, leaving a logical 1 at pin 10 of the counter IC 1 (C07). The zero of the last digit is detected by the group filter and IC 3 pin 1 and pin 2 will both be logical 1 activating the call output of IC 3 pin 11. The flashing selective lamp and the acoustic alarm, indicates a call is received.

THE ENCODER.

The selective Tx input receives a 5V impuls setting the flip flops IC 2 for programming the two or three last digits of the Tx code. The Q output pin 1 IC 4 goes high, activating the transmitter and the tone oscillator by turning Q 6 (C08) and Q 13 (C07) on. The Q output also charges the time constant C20, R53, delaying the output gating of the tones (Q14) and the start of the clock oscillator about 200 ms. At the end of the 5 tone sequence pin 5 of the counter IC 1 resets the Tx code and charges the time constant C1, R2. This time constant prevent about 3 sec. the encoder from transmitting, if the decoder receives a transpond from the main station.

USING THE JUMPERS ON C07.

Transpond	:	No jumpers	- ID code
		J5 - J6	- Tx code (Two digits)
		J3 - J4	- Paging code by changing third digit of the ID code.
		J3 - J4 and J5 - J6	- Tx code changing the three last digits
Tx encoder	:	No jumper	- Tx code changing two digits
		J1 - J2	- Tx code changing three digits

USING THE JUMPERS ON C08.

No jumpers	:	AF blocking and no external alarm
J1 - J2	:	The loudspeaker opens when a call is received
J3 - J4	:	Resets IC 1 whenever the transmitter is keyed. Except during transponding.
J5 - J6	:	The external alarm activates only once, when several calls are received without resetting IC 1.
J7 - J8	:	The external alarm activates every time a call is received.

ADJUSTMENT OF THE DECODER.

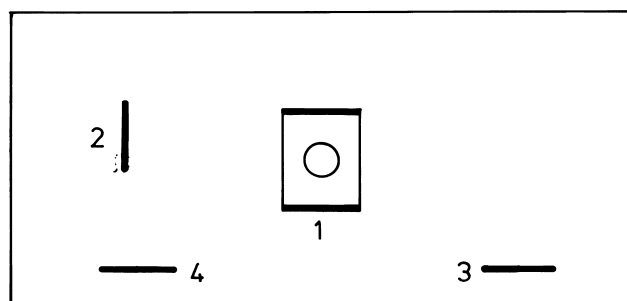
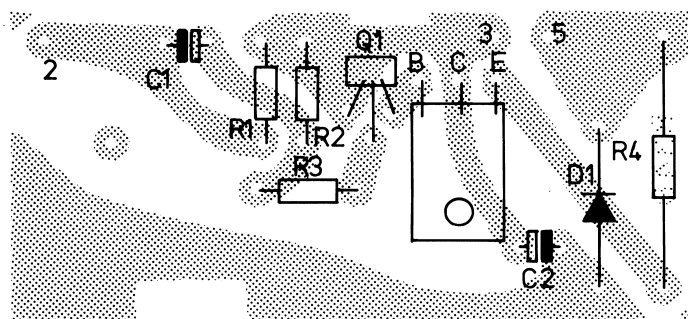
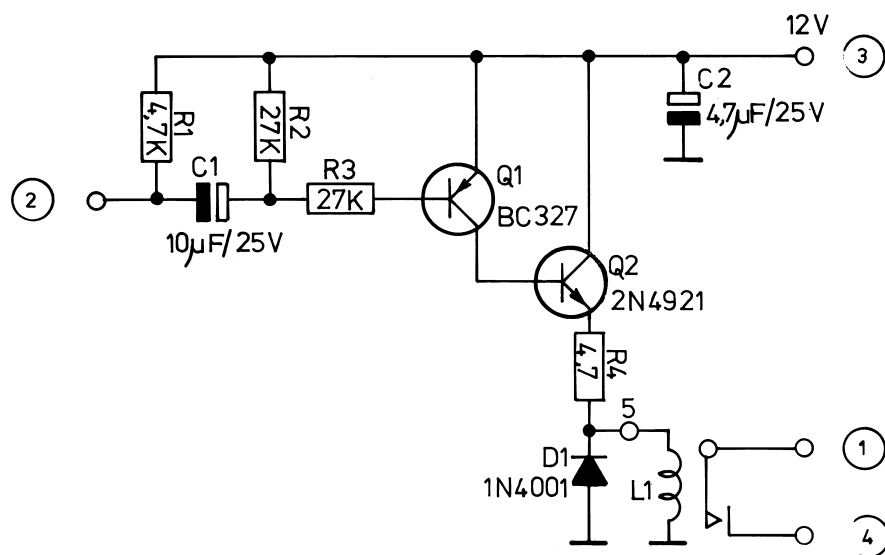
1. The collector of Q2 (C07) is connected to tone no. 6 of the tapcoil.
2. A tone generator is connected to the AF input or a FM-modulated generator is connected to the antenna input.
3. L1 is adjusted to max DC-level at TP 1 (C07).
4. R34 (C07) is adjusted to 1VDC at tone no. 6 \pm 3%.
5. L1 is readjusted to symmetry at 1V \pm 0,1V. DC-level.
6. The adjustment screw is fixed.

ADJUSTMENT OF THE ENCODER.

1. TP3 (C07) is grounded.
2. Selective Tx is activated.
3. R23 (C07) is adjusted to 2,4 kc div. at tone no. 6.
4. An oscilloscope or a counter is connected to TP4 and R50 (C07) is adjusted to T = 100 ms. for CCIR and T = 70 ms for ZVEI.
5. Remove the ground connection of TP 3. The collectors of Q2 - Q9 can now be connected to the wanted Rx code and Tx code.

ADJUSTMENT OF THE GROUP FILTER.

1. TP1 (C08) is connected to the ground.
2. A zero (tone no. 10 of the tapcoil) is connected to the AF input.
3. R13 (C08) is adjusted to max DC level at TP2 (C07).
4. R6 (C08) is adjusted to 1V \pm 0,1VDC at tone no. 10 \pm 3% (TP2 C07).
5. R13 (C08) is readjusted to symmetry at 1VDC.
6. Remove the ground connection of TP1 (C08) and do not touch R13 again or you have to start at point 1.
7. A repeat tone (tone no. 11 of the tapcoil) is connected to the AF input.
8. R27 (C08) is adjusted to symmetry at tone no. 11 \pm 3% (TP2, C07).



Relay box

Rettet: 23-3-76 AC/LT

Extern timing for hornrelay
Print board B 34 B 1

AP-RADIOTELEFON 1/5

Tegn.: 21-4-75
AC

Kontr.: 21-4-75
TJ

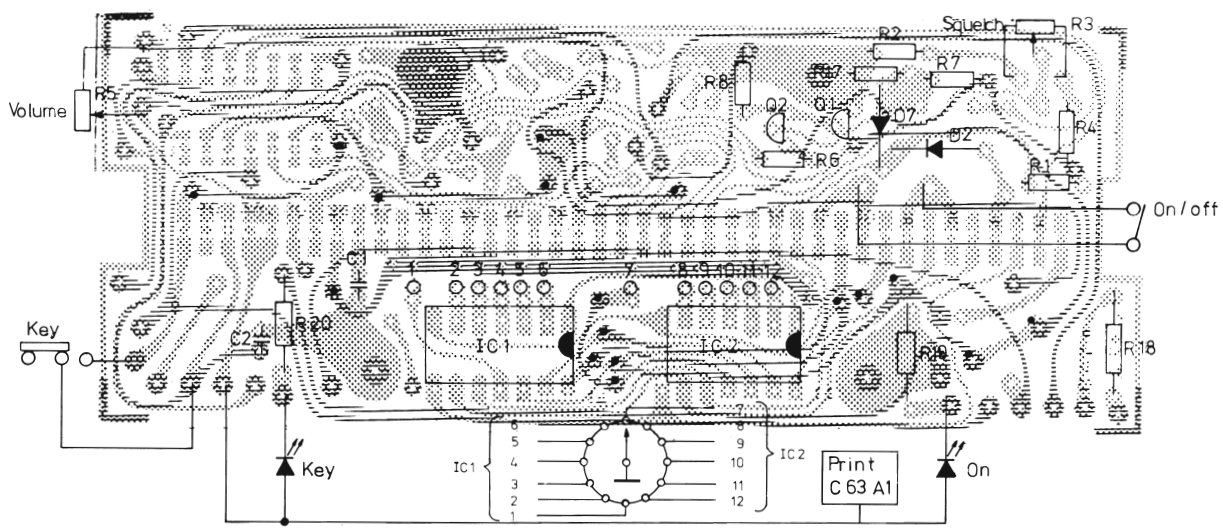
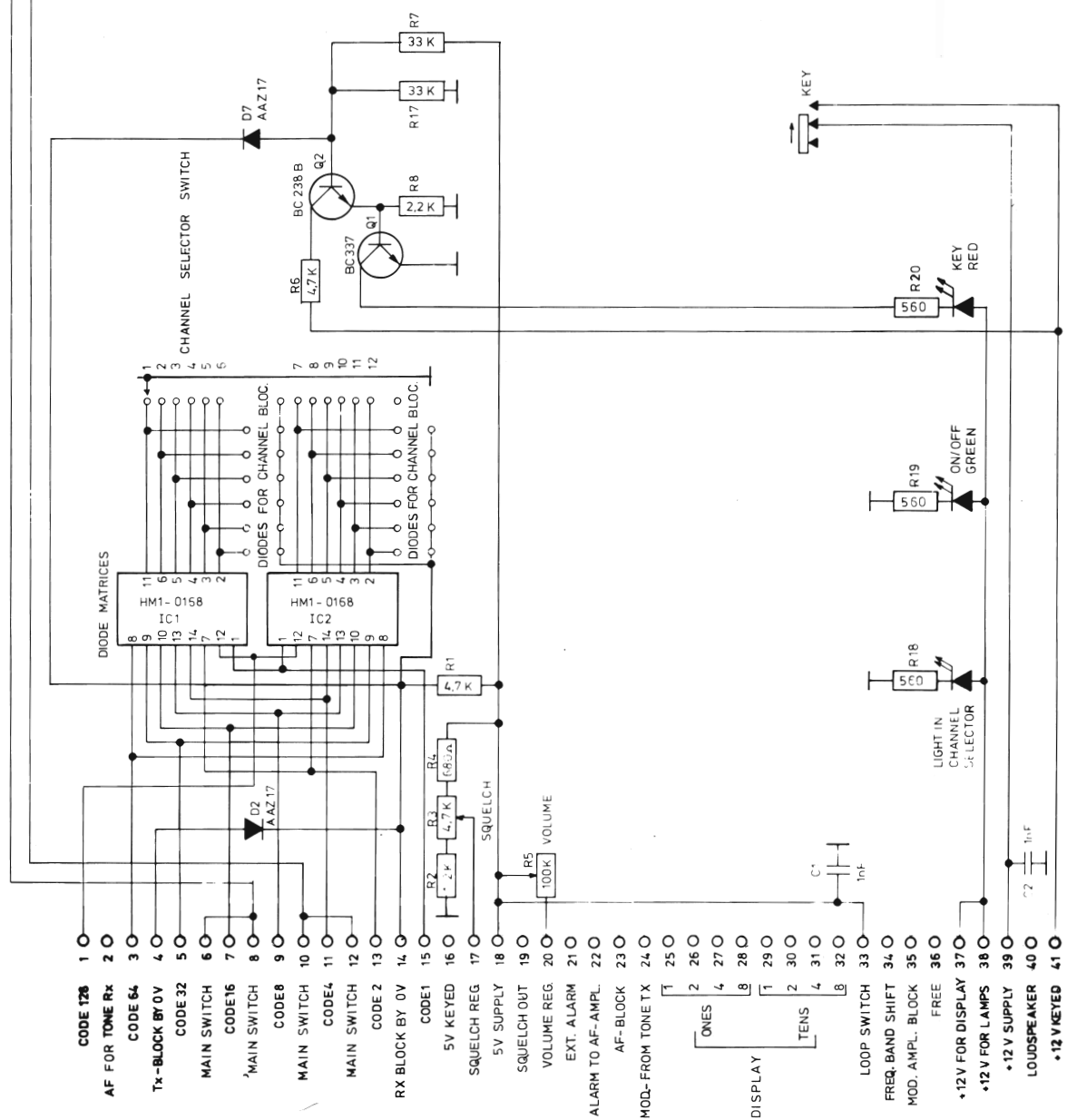
Stykl. nr.: 75169-4S2

Tegn. nr.: 75169-4E2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-291	4,7 K Ω 1/8W CR16			
R2	13-313	27 K Ω " "			
R3	13-313	27 K Ω " "			
R4	13-687	4,7 Ω 6 W Dale			
C1	11-506	10 μ F/25V Tant.			
C2	11-505	4,7 μ F"25V "			
D1	04-060	1N4001			
Q1	19-095	BC327			
Q2	19-175	2N4921			
L1	17-054	Relæ 274-10			
Extern timing hornrelay Print board B 34 B 1 Tilhører tegn. nr.: 75169-4E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div> <div>Stykl. nr.: 75169-4S2</div>

MAIN SWITCH



Retter:	CONTROL CIRCUIT FOR 12 CHANNELS, FRONTSECTION 48	Tegn.: 18-1-77	Kontr.:
	PRINT BOARD C47A3 + C 63 A 12,5 kHz CHANNEL SPACING	AC	
		Stykl. nr.:	
		Tegn. nr.:	
	AP-RADIOTELEFON		81003 - 3E2

AP-RADIOTELEFON

Nr.	Kode	Data	Nr.	Kode	Data
R1	13-291	4,7 K Ω 1/8 W CR16			
R2	13-284	1,2 K Ω " "			
R3	13-291	4,7 K Ω Potm.			
R4	16-022	680 Ω 1/8 W CR16			
R5	16-023	100 K Ω Lin. Potm.			
R6	13-291	4,7 K Ω 1/8 W CR16			
R7	13-300	33 K Ω 1/8 W CR16			
R8	13-287	2,2 K Ω 1/8 W CR16			
R17	13-300	33 K Ω 1/8 W CR16			
R18	13-367	560 Ω 1/4 W CR25			
R19	13-367	560 Ω 1/4 W CR25			
R20	13-367	560 Ω 1/4 W CR25			
C1	11-409	1 nF Ker.			
C2	11-409	1 nF Ker.			
D2	04-002	AAZ17			
D7	04-002	AAZ17			
Q1	19-096	BC337			
Q2	19-093	BC238B			
IC1	09-067	HM1-0168			
IC2	09-067	HM1-0168			
Control circuit for 12 channel Frontsection 48 Print C47+C63 Tilhører tegn. nr.: 81003-3E2			Rettet:		<div>Tegn.:</div> <div>Kontr.:</div>
					Stykl. nr.: 81003-4S2