

handic[®]



SERVICE MANUAL

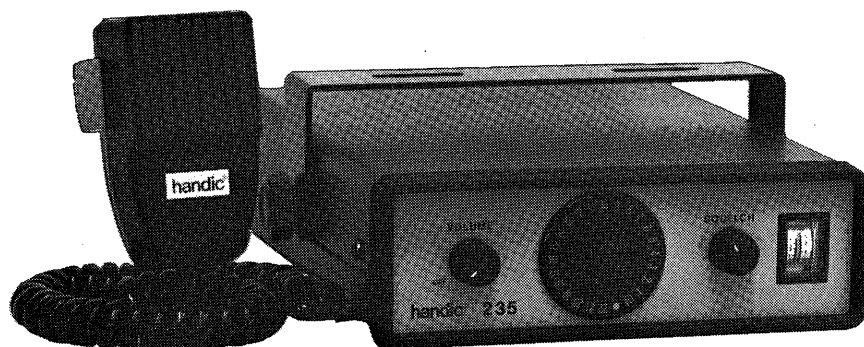
FOR

handic 235

CITIZEN'S BAND TRANSCEIVER

MOBILE TYPE

23 CHANNELS 5 WATT



handic
bolagen



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CONTENTS

	Page
1. SPECIFICATIONS	1
2. SELECTIVE CALL	1
3. DISASSEMBLY INSTRUCTIONS AND DIAGRAM	2
4. GENERAL ALIGNMENT INSTRUCTIONS	3
5. ALIGNMENT POSITIONS	3
6. TRANSMITTER ALIGNMENT CHART	4
7. CRYSTAL FREQUENCY CHECK	4
8. B. P. F. SECTION ALIGNMENT	5
9. TRANSMITTER SECTION ALIGNMENT	5
10. RECEIVER ALIGNMENT CHART	6
11. RECEIVER IF SECTION ALIGNMENT	6
12. RECEIVER SECTION ALIGNMENT	6
13. BLOCK DIAGRAM	7
14. CRYSTAL POSITION DIAGRAM	7
15. PRINTED CIRCUIT BOARD TOP VIEW	8
16. PRINTED CIRCUIT BOARD BOTTOM VIEW	9
17. WIRING DIAGRAM	10
18. TROUBLE SHOOTING	11
19. PARTS LIST	12
20. TRANSISTORS LEAD IDENTIFICATIONS	19
21. SCHEMATIC DIAGRAM	20

SPECIFICATIONS

Description	Nominal spec.	Limit spec.
Frequency range	26.965 – 27.255 MHz	Adjustable to 31 MHz
Frequency tolerance	Less than ± 0.003 %	Less than ± 0.005 %
Operating voltage	13.8 V DC ± 15 %	13.8 V DC ± 10 %
DC power input	5 watts	
RF output (at 13.8 V DC)	3 watts	2.5 watts
Modulation	Below 100 %	
Antenna impedance	50 Ω (unbalanced)	
Sensitivity	Less than 0.7 μ V at 10 dB (S+N)/N	Less than 1 μ V at 10 dB (S+N)/N
Selectivity	80 dB at ± 10 kHz	40 dB at ± 10 kHz
Cross modulation	45 dB	40 dB
Intermediate frequency	1st 10.595 – 10.635 MHz 2nd 455 kHz	
Signal to noise ratio	45 dB at 1 mV input	40 dB at 1 mV input
Squelch sensitivity		
Threshold		Less than 1 μ V
Tight	500 μ V	50 μ V – 3 mV
Audio output (10 % distortion)	3 watts	2 watts
Semiconductors	18 transistor, 2 FET, 18 diodes, 2 zener diodes and 3 thermistors	
Channels	23 channels	
Frequency control	Crystal control (Frequency synthesized)	
Controls	Volume with power switch, Squelch and Channel switch	
Jacks	External speaker, Selective Call and Antenna (S0-239)	
Indicator	Pilot lamps for channel indication, meter	
P. T. T.	Accepted type	
Automatic noise limiter	Series type	
Speaker	8 Ω . 75 mm. Dynamic type	
Size	50(H) x 155(W) x 190(D) mm.	

SELECTIVE CALL

Selective call 6P DIN jack is provided on the back of cabinet.

This jack is matched for h a n d i c S-10 and S-12 selective call units.

DISASSEMBLY INSTRUCTIONS AND DIAGRAM

Removal of the Bonnet :

Step 1 : Remove the Car Mounting Bracket Screws and remove the Car Mounting Bracket.

Step 2 : Remove 4 screws (2 from each side of the unit).

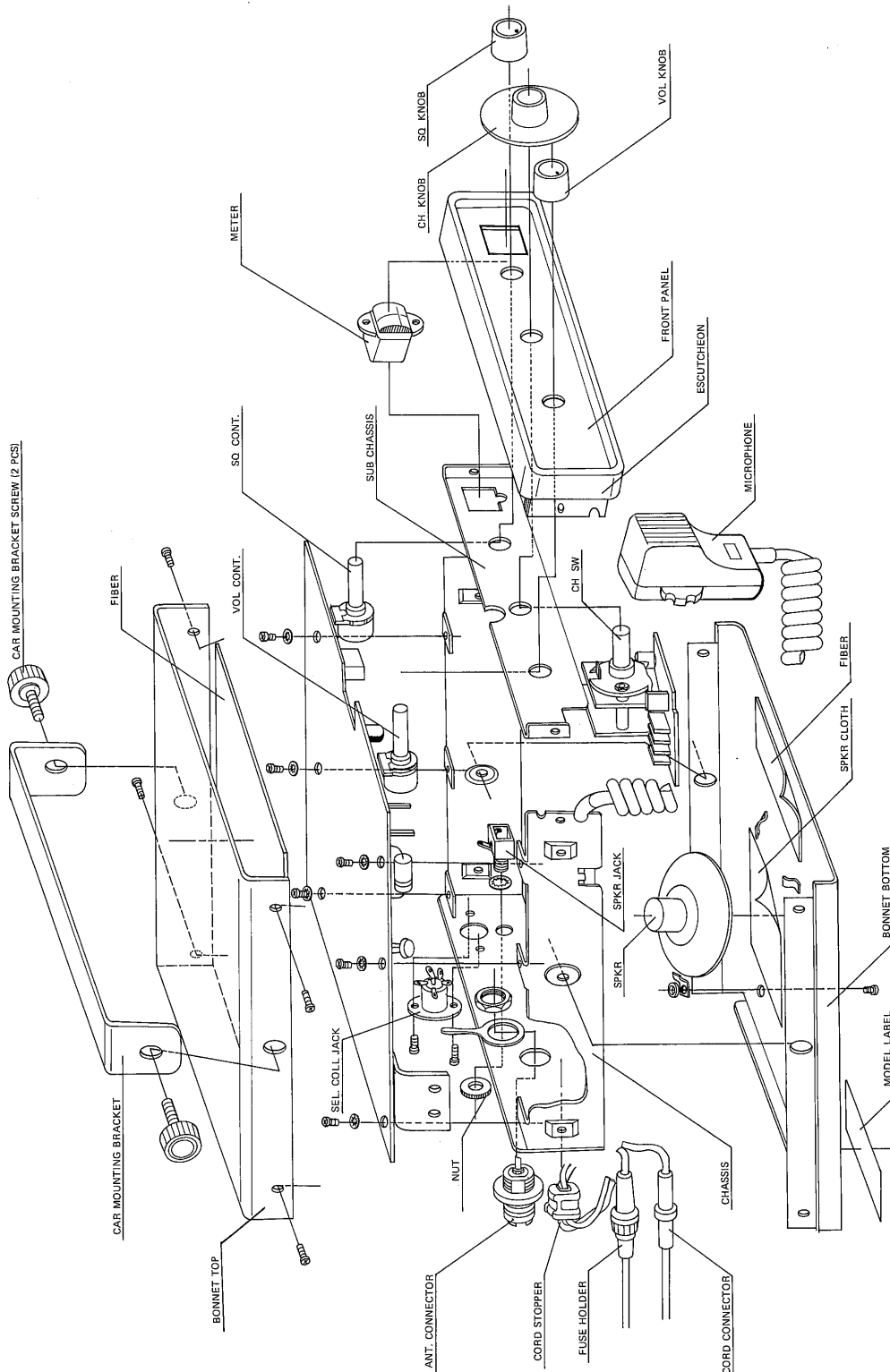


FIGURE 1

GENERAL ALIGNMENT INSTRUCTIONS

Test equipment required

1. RF standard signal generator (S.S.G.)
2. Slow sweep generator (27 MHz, 455 kHz)
3. AF signal generator
4. V.T.V.M.
5. RF power meter
6. Oscilloscope
7. Monitor receiver
8. Frequency counter
9. $8\ \Omega$ dummy load
10. $50\ \Omega$ dummy load

ALIGNMENT POSITIONS

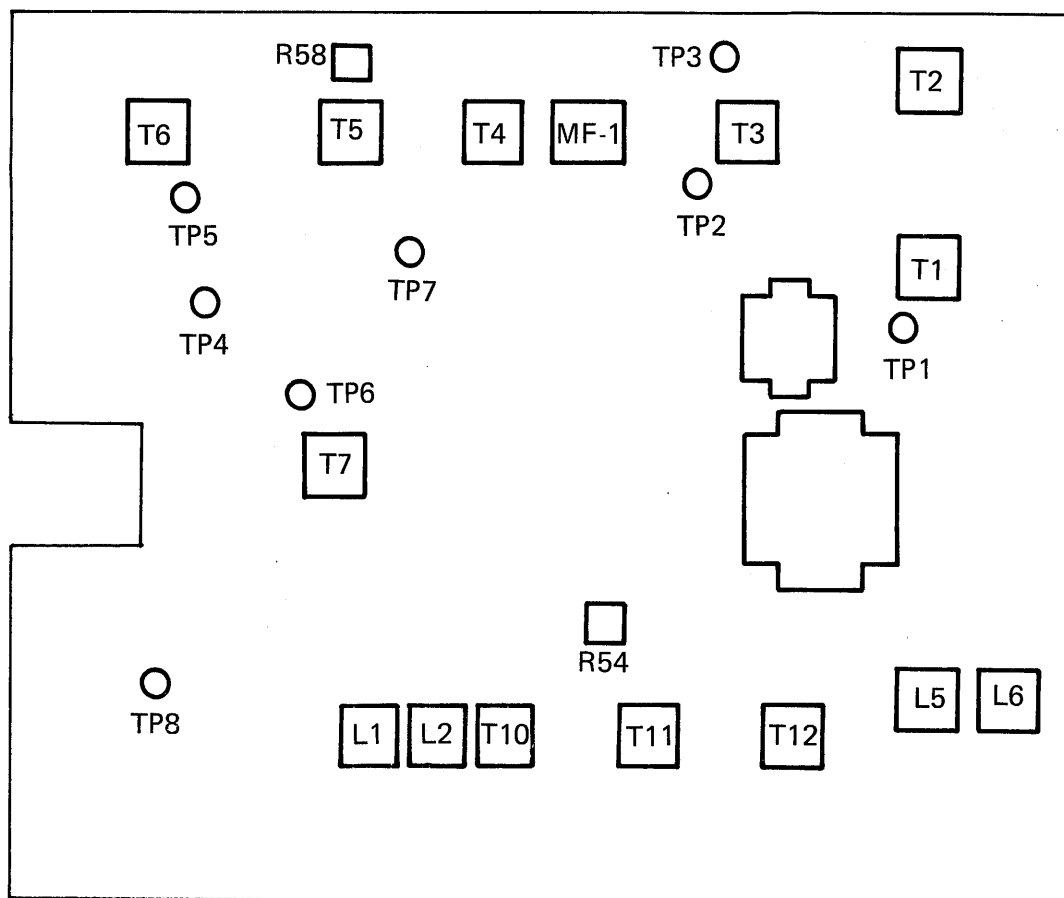


FIGURE 2

TRANSMITTER ALIGNMENT CHART

Transmitter Section

Steps	Control Setting	Test Equipment Connection	Test Equipment Setting	Adjust	Ref. to
1 OSC	Power switch ON. CH 1 – 23 or CH 1 – 11A	Frequency counter As shown in Figure 3		See Note below.	Fig. 3 Table 1 and 2
2 BPF	Power switch ON. CH 10	Sweep generator Oscilloscope	Frequency 27.075 MHz	L1,L2 & T10 Peak waveform.	Fig. 4
3 TX	Power switch ON. CH 10	RF power meter Monitor scope Frequency counter	Supply voltage 13.8 V.	L5, L6 T11, T12 for RF Max.	Fig. 5
4 AMC	Power switch ON. CH 10	AF generator RF power meter Monitor scope	AF generator Frequency 2.5 kHz. Mod. 50 % + 16 dB	R54 (But not so that over- mod.occurs) Mod. 90 – 100 %	Fig. 5,6

Note: Turn back the core approximately one rotation from the stopping point of the oscillation.

CRYSTAL FREQUENCY CHECK

Connect the instrument as shown in Figure 3.

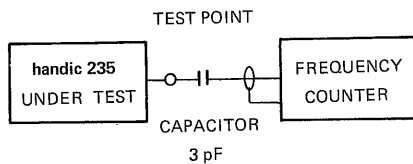


FIGURE 3

	TEST POINT
MASTER OSC	TP6
2ND OSC	TP7
TRANSMIT OSC	TP8

TABLE 1

Item Channel	Receiving or Transmitting Frequency	Test point TP-1 Master Osc.	Test point TP-8 Transmit Osc.	Test point TP-7 RX 2nd Osc.
1	26.965 MHz	37.600 MHz	10.635 MHz	10.180 MHz
2	26.975	"	10.625	10.170
3	26.985	"	10.615	10.160
4	26.005	"	10.595	10.140
5	27.015	37.650	10.635	10.180
6	27.025	"	10.625	10.170
7	27.035	"	10.615	10.160
8	27.055	"	10.595	10.140
9	27.065	37.700	10.635	10.180
10	27.075	"	10.625	10.170
11	27.085	"	10.615	10.160
12	27.105	"	10.595	10.140
13	27.115	37.750	10.635	10.180
14	27.125	"	10.625	10.170
15	27.135	"	10.615	10.160
16	27.155	"	10.595	10.140
17	27.165	37.800	10.635	10.180
18	27.175	"	10.625	10.170
19	27.185	"	10.615	10.160
20	27.205	"	10.595	10.140
21	27.215	37.850	10.635	10.180
22	27.225	"	10.625	10.170
23	27.255	"	10.595	10.160
* 11A	27.095	37.690	10.595	10.140

Note: * Only used for set h a n d i c 235-11A without CH 23.

TABLE 2

B. P. F. SECTION ALIGNMENT

Connect the instrument as shown in Figure 4.

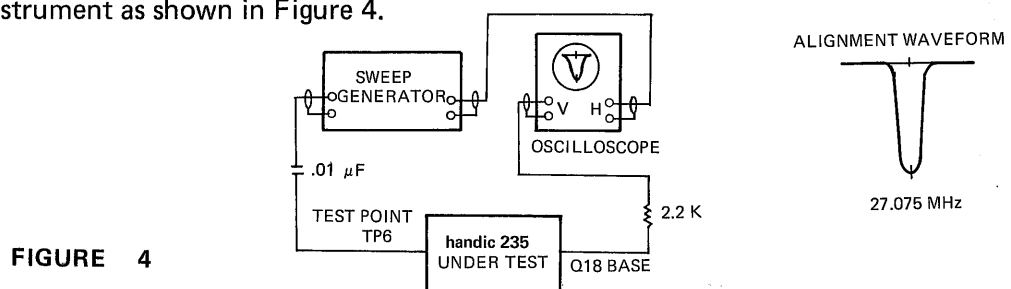


FIGURE 4

TRANSMITTER SECTION ALIGNMENT

Connect the instruments as shown in Figure 5.

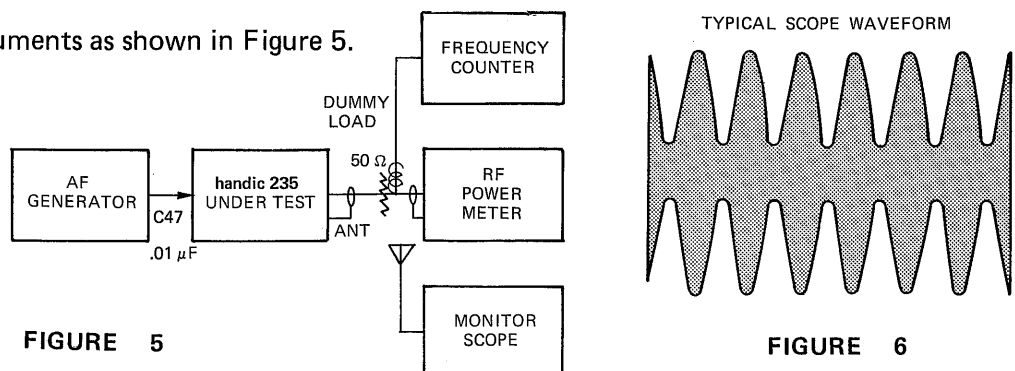


FIGURE 5

FIGURE 6

RECEIVER ALIGNMENT CHART

Note: Alignment of Receiver Section must not be done until Transmitting Section alignment is completed.

Step	Control Setting	Test Equipment Connection	Signal generator Setting	Adjust	Ref. to
1 IF	Power switch ON. Vacant Channel CH22 - 23 or CH22 - 11A (Dial Setting - ●)	Slow sweep generator	Frequency 455 kHz	MF1, T4, T5, T6, Peak wave form	Fig. 7
2 RX	Power switch ON. CH10 Vol. Max. SQ. Min.	S.S.G. Oscilloscope V.T.V.M. 8 Ω dummy load	Frequency 27.075 MHz	T1 (the best point of S/N) T2, T3 (the best sensitivity)	Fig. 8
3 SQ	Power switch ON. CH10 SQ Max.	S.S.G.	Frequency 27.075 MHz	R58 500 μV signal input to open SQ.	Fig. 8

RECEIVER IF SECTION ALIGNMENT

Connect the instrument as shown in Figure 7.

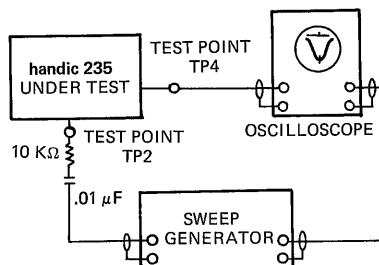
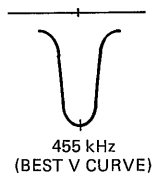


FIGURE 7

ALIGNMENT WAVEFORM



RECEIVER SECTION ALIGNMENT

Connect the instruments as shown in Figure 8.

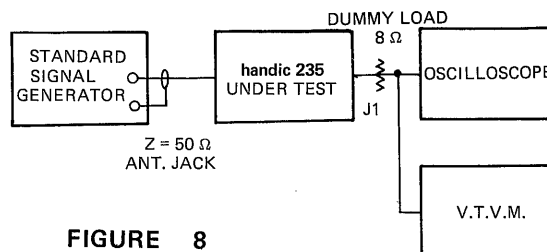


FIGURE 8

BLOCK DIAGRAM

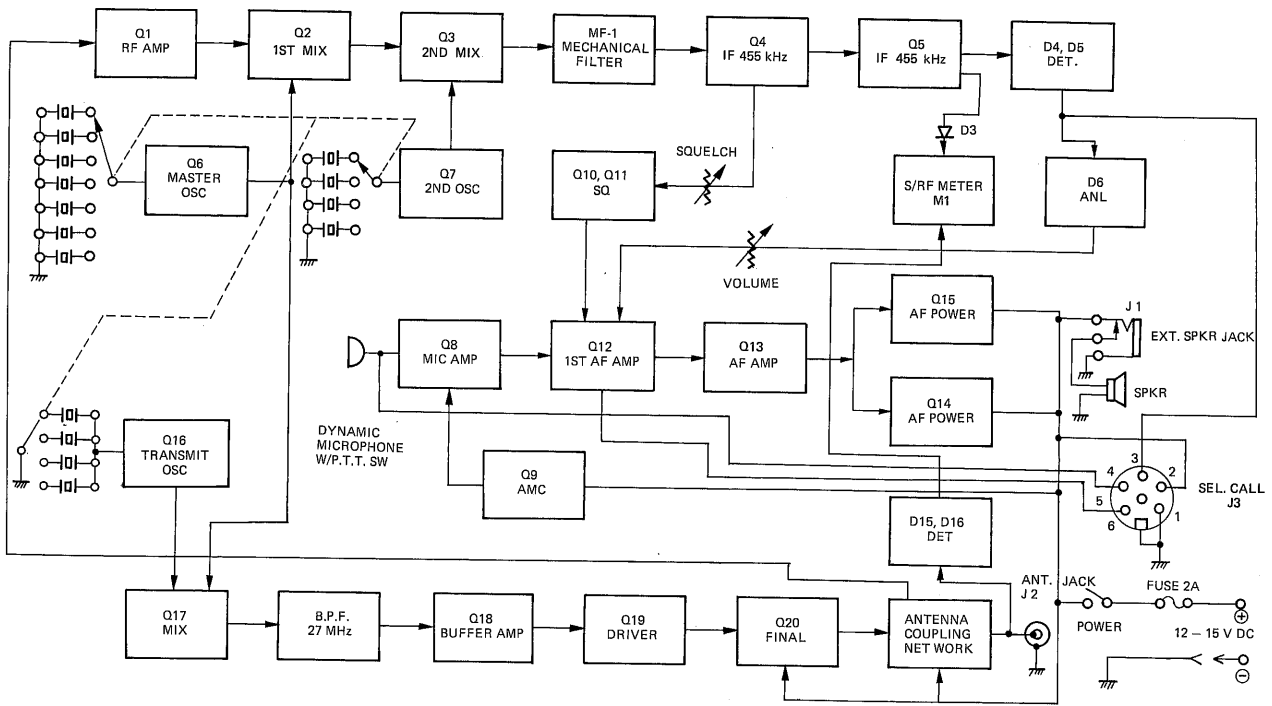


FIGURE 9

CRYSTAL POSITION DIAGRAM

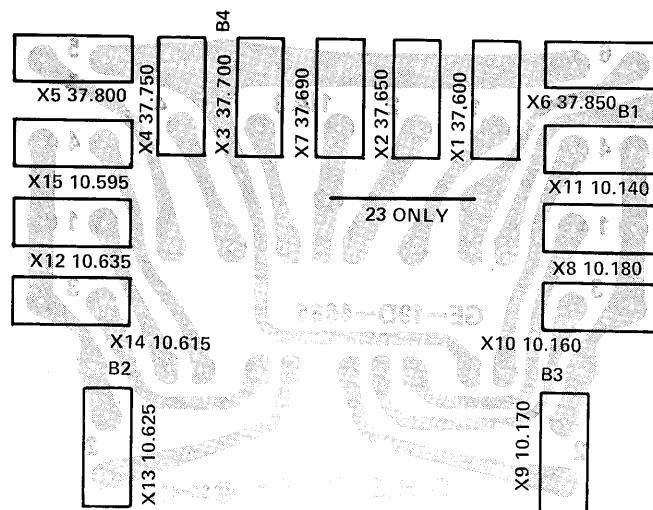


FIGURE 10

PRINTED CIRCUIT BOARD BOTTOM VIEW

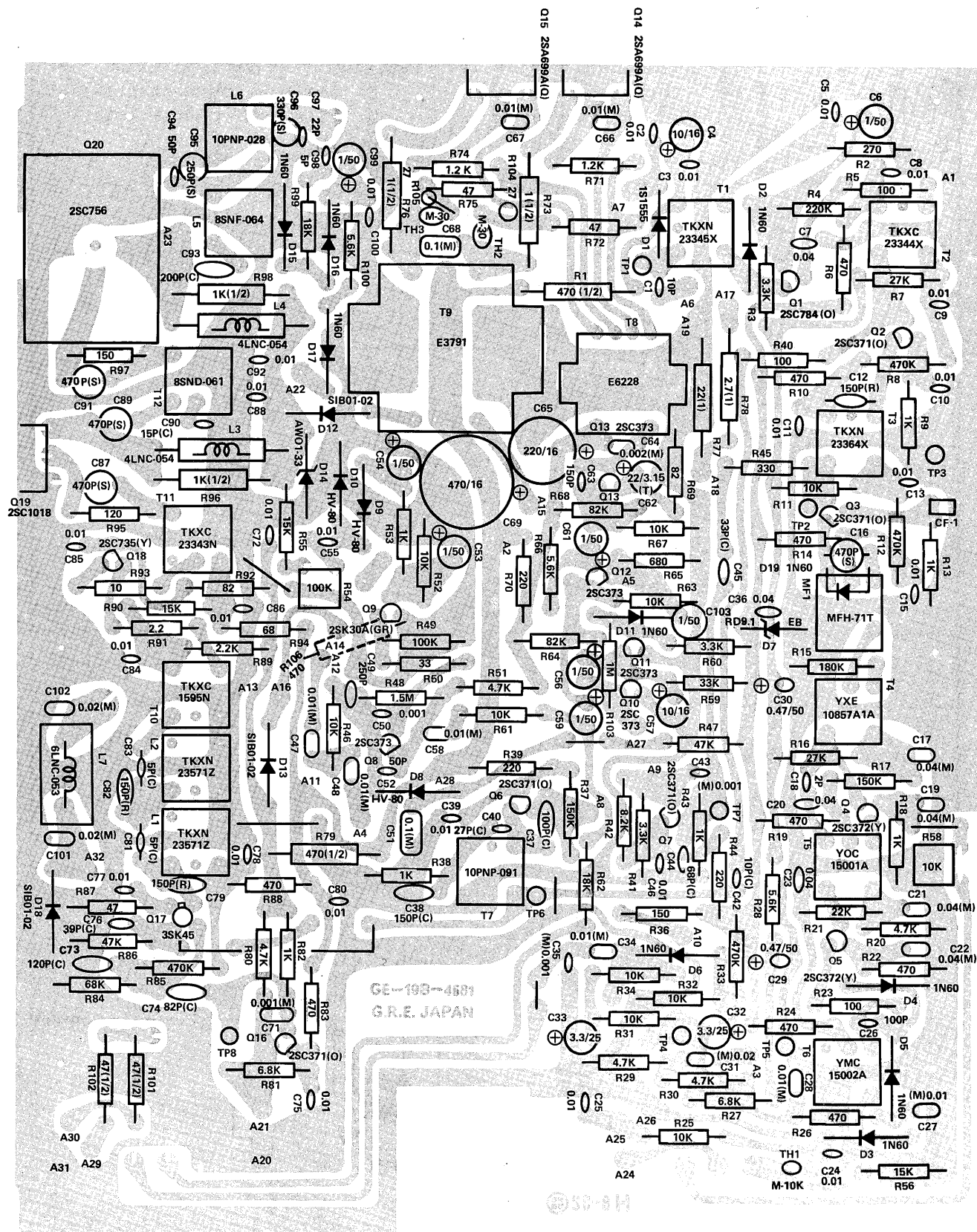


FIGURE 12

WIRING DIAGRAM

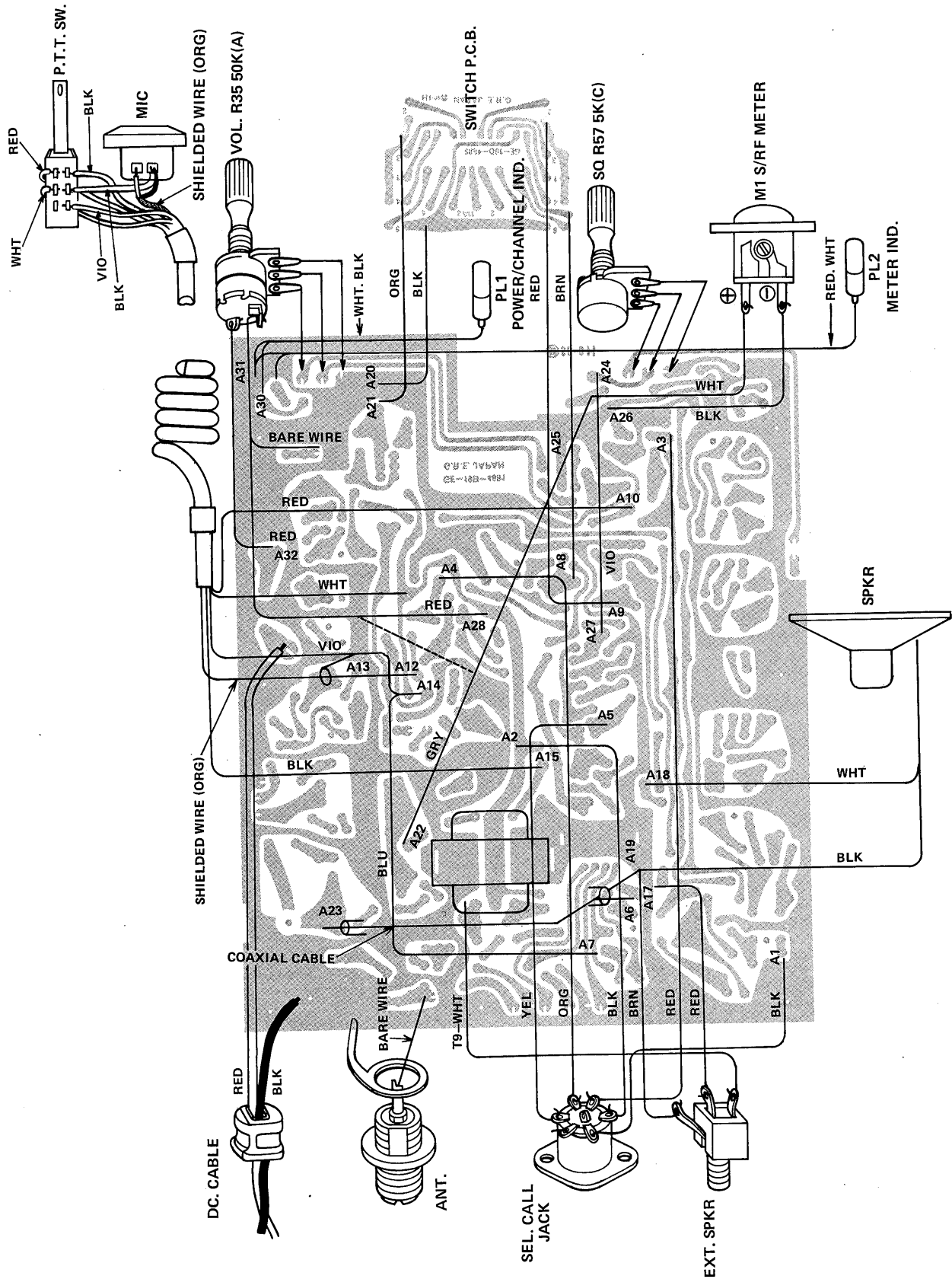


FIGURE 13

TROUBLE SHOOTING

Sympton	Possible Cause
1) Channel lamp and meter lamp does not light and/or set fails to operate when Power is ON.	A) Reverse connection of DC Power line. B) Faulty Power cord. C) Defective Power switch. D) Fuse blown.
2) Fuse blows when Power switch ON.	A) Defective of Q14 or Q15. B) Defective TX final Q19 or Q20. C) Defective C69.
3) Pilot lamp lighted but no sound on any channel.	A) Defective Speaker or defective Ext. speaker Jack J1. B) Defective Q12, Q13, Q14 and Q15 or associated circuit components. C) Defective Q6 or associated circuit components. D) Defective Q7 or associated circuit components. E) Faulty Volume control.
4) Does not receive. Transmitter : OK	A) Defective Q7 or associated circuit components. B) Faulty P.T.T. switch.
5) Reception sensitivity low	A) Faulty RF amplifier or Mixer circuit components B) Faulty IF amplifier circuit. C) Faulty Mechanical filter.
6) Squelch control does not operate.	A) Defective Q10 or Q11. B) Faulty R58 or R57.
7) Does not transmit. Receiver : OK	A) Faulty P.T.T. switch. B) Defective Q16 or associated circuit components.
8) RF power low. Dummy load operating : OK	A) Mismatched antenna. B) Mismatched π network. C) Low supply voltage.
9) No modulation. Receiver : OK	A) Defective microphone cartridge. B) Faulty microphone cord. C) Defective Q8, Q9 or associated circuit components. D) Defective modulator transformer.

PARTS LIST

Ref. No.	Description				handic Stock Number	MFR'S Parts Number
CAPACITORS						
C1	Ceramic	10 pF		± 5 %	990239	FC-50
C2, 3	Ceramic	0.01 μF		- 20 % - + 80 %	990477	MC-70
C4	Electrolytic	10 μF	16 WV	- 10 % - + 50 %	990036	CE04W1C100
C5	Ceramic	0.01 μF		- 20 % - + 80 %	990477	MC-70
C6	Electrolytic	1 μF	50 WV	- 10 % - + 75 %	990008	CE04W1H010
C7	Ceramic	0.04 μF		- 20 % - + 80 %	990491	MC-100
C8-11	Ceramic	0.01 μF		- 20 % - + 80 %	990477	MC-70
C12	Ceramic	150 pF		± 20 %	990456	FCC-120
C13	Ceramic	0.01 μF		- 20 % - + 80 %	990477	MC-70
C14	Not used					
C15	Ceramic	0.01 μF		- 20 % - + 80 %	990477	MC-70
C16	Polystyrene	470 pF (J)			990197	
C17	Mylar	0.04 μF		± 20 %	990127	
C18	Ceramic	2 pF		± 0.25 pF	990211	FC-50
C19	Mylar	0.04 μF		± 20 %	990127	
C20	Ceramic	0.04 μF			990491	MC-100
C21, 22	Mylar	0.04 μF		± 20 %	990127	
C23	Ceramic	0.04 μF		- 20 % - + 80 %	990491	MC-100
C24, 25	Ceramic	0.01 μF		- 20 % - + 80 %	990477	MC-70
C26	Ceramic	100 pF		± 10 %	990295	FC-70
C27, 28	Mylar	0.01 μF		± 20 %	990099	
C29, 30	Electrolytic	0.47 μF	50 WV	- 10 % - + 75 %	990001	
C31	Mylar	0.02 μF		± 20 %	990106	
C32, 33	Electrolytic	3.3 μF	25 WV	- 10 % - + 75 %	990603	CE04W1D3R3
C34	Mylar	0.01 μF		± 20 %	990099	
C35	Mylar	0.001 μF		± 20 %	990085	
C36	Ceramic	0.04 μF		- 20 % - + 80 %	990491	MC-100
C37	Ceramic	100 pF	NPO	± 10 %	990428	FCC-120
C38	Ceramic	150 pF	NPO	± 10 %	990442	FCC-150
C39	Ceramic	27 pF	NPO	± 10 %	990610	FCC-80
C40	Ceramic	0.01 μF		- 20 % - + 80 %	990477	MC-70
C41	Not used					
C42	Ceramic	10 pF	NPO	± 10 %	990377	FCC-50
C43	Mylar	0.001 μF		± 20 %	990085	
C44	Ceramic	68 pF	NPO	± 10 %	990414	FCC-100
C45	Ceramic	33 pF	NPO	± 10 %	990393	FCC-80
C46	Ceramic	0.01 μF			990477	MC-70
C47, 48	Mylar	0.01 μF		± 20 %	990099	
C49	Ceramic	250 pF		± 20 %	990330	FC-90
C50	Ceramic	0.001 μF		- 20 % - + 80 %	990463	MC-60
C51	Mylar	0.1 μF		± 20 %	990099	
C52	Ceramic	50 pF		± 10 %	990281	FC-60
C53, 54	Electrolytic	1 μF	50 WV	- 10 % - + 75 %	990008	CE04W1H010
C55	Ceramic	0.01 μF		- 20 % - + 80 %	990477	MC-70
C56	Electrolytic	1 μF	50 WV	- 10 % - + 75 %	990008	CE04W1H010
C57	Electrolytic	10 μF	16 WV	- 10 % - + 50 %	990036	CE04W1C100
C58	Mylar	0.01 μF		± 20 %	990099	
C59	Electrolytic	1 μF	50 WV	- 10 % - + 75 %	990008	FC-80
C60	Not used					
C61	Electrolytic	1 μF	50 WV	- 10 % - + 75 %	990008	

Ref. No.	Description				handic Stock Number	MFR'S Parts Number
C62	Tantalum	22 μ F	3.15 WV	$\pm 20\%$	990169	CS15E0F220M
C63	Ceramic	150 pF		$\pm 20\%$	990309	FC-80
C64	Mylar	0.002 μ F		$\pm 20\%$	990092	
C65	Electrolytic	220 μ F	16 WV	- 10% - + 50%	990057	CE04W1C221
C66, 67	Mylar	0.01 μ F		$\pm 20\%$	990099	
C68	Mylar	0.1 μ F		$\pm 20\%$	990134	
C69	Electrolytic	470 μ F	16 WV	- 10% - + 50%	990064	CE04W1C471
C70	Not used					
C71	Mylar	0.001 μ F		$\pm 20\%$	990085	
C72	Ceramic	0.01 μ F		- 20% - + 80%	990477	MC-70
C73	Ceramic	120 pF	NPO	$\pm 10\%$	990435	FCC-120
C74	Ceramic	82 pF	NPO	$\pm 10\%$	990421	FCC-100
C75	Ceramic	0.01 μ F		- 20% - + 80%	990477	MC-70
C76	Ceramic	39 pF	NPO	$\pm 10\%$	990400	FCC-80
C77, 78	Ceramic	0.01 μ F		- 20% - + 80%	990477	MC-70
C79	Ceramic	150 pF		$\pm 20\%$	990456	FCC-120
C80	Ceramic	0.01 μ F		- 20% - + 80%	990477	MC-70
C81	Ceramic	5 pF	NPO	± 0.5 pF	990372	FCC-50
C82	Ceramic	150 pF		$\pm 20\%$	990456	FCC-120
C83	Ceramic	5 pF	NPO	± 0.5 pF	990372	FCC-50
C84-86	Ceramic	0.01 μ F		- 20% - + 80%	990477	MC-70
C87	Polystyrene	470 pF(J)		$\pm 20\%$	990197	
C88	Ceramic	0.01 μ F		- 20% - + 80%	990477	MC-70
C89	Polystyrene	470 pF(J)		$\pm 20\%$	990197	
C90	Ceramic	15 pF	NPO	$\pm 10\%$	990386	FCC-60
C91	Polystyrene	470 pF(J)		$\pm 20\%$	990197	
C92	Ceramic	0.01 μ F		- 20% - + 80%	990477	MC-70
C93	Ceramic	200 pF	NPO	$\pm 10\%$	990575	FCC-150
C94	Ceramic	50 pF		$\pm 10\%$	990281	FC-60
C95	Polystyrene	250 pF(J)		$\pm 20\%$	990176	
C96	Polystyrene	330 pF(J)		$\pm 20\%$	990183	
C97	Ceramic	22 pF		$\pm 5\%$	990253	FC-50
C98	Ceramic	5 pF		± 0.5 pF	990218	FC-50
C99	Electrolytic	1 μ F	50 WV	- 10% - + 75%	990008	CE04W1H010
C100	Ceramic	0.01 μ F		- 20% - + 80%	990477	MC-70
C101, 102	Mylar	0.02 μ F		$\pm 20\%$	990106	
C103	Electrolytic	1 μ F	50 WV	- 10% - + 75%	990008	CE04W1H010

RESISTORS

R1	Carbon film	470	1/2 W	$\pm 10\%$	954123	ERD-12TK-471
R2	Carbon film	270	1/4 W	$\pm 5\%$	950413	ERD-14TJ-271
R3	Carbon film	3.3 K	1/4 W	$\pm 5\%$	950595	ERD-14TJ-332
R4	Carbon film	220 K	1/4 W	$\pm 5\%$	950903	ERD-14TJ-224
R5	Carbon film	100	1/4 W	$\pm 5\%$	950343	ERD-14TJ-101
R6	Carbon film	470	1/4 W	$\pm 5\%$	950455	ERD-14TJ-471
R7	Carbon film	27 K	1/4 W	$\pm 5\%$	950749	ERD-14TJ-273
R8	Carbon film	470 K	1/4 W	$\pm 5\%$	950959	ERD-14TJ-474
R9	Carbon film	1 K	1/4 W	$\pm 5\%$	950511	ERD-14TJ-102
R10	Carbon film	470	1/4 W	$\pm 5\%$	950455	ERD-14TJ-471
R11	Carbon film	10 K	1/4 W	$\pm 5\%$	950679	ERD-14TJ-103
R12	Carbon film	470 K	1/4 W	$\pm 5\%$	950959	ERD-14TJ-474

Ref. No.	Description	handic Stock Number	MFR'S Parts Number
R13	Carbon film 1 K 1/4 W ± 5 %	950511	ERD-14TJ-102
R14	Carbon film 470 1/4 W ± 5 %	950455	ERD-14TJ-471
R15	Carbon film 180 K 1/4 W ± 5 %	950889	ERD-14TJ-184
R16	Carbon film 27 K 1/4 W ± 5 %	950749	ERD-14TJ-273
R17	Carbon film 150 K 1/4 W ± 5 %	950875	ERD-14TJ-154
R18	Carbon film 1 K 1/4 W ± 5 %	950511	ERD-14TJ-102
R19	Carbon film 470 1/4 W ± 5 %	950455	ERD-14TJ-471
R20	Carbon film 4.7 K 1/4 W ± 5 %	950623	ERD-14TJ-472
R21	Carbon film 22 K 1/4 W ± 5 %	950735	ERD-14TJ-223
R22	Carbon film 470 1/4 W ± 5 %	950455	ERD-14TJ-471
R23	Carbon film 100 1/4 W ± 5 %	950343	ERD-14TJ-101
R24	Carbon film 470 1/4 W ± 5 %	950455	ERD-14TJ-471
R25	Carbon film 10 K 1/4 W ± 5 %	950679	ERD-14TJ-103
R26	Carbon film 470 1/4 W ± 5 %	950455	ERD-14TJ-471
R27	Carbon film 6.8 K 1/4 W ± 5 %	950651	ERD-14TJ-682
R28	Carbon film 5.6 K 1/4 W ± 5 %	950637	ERD-14TJ-562
R29-30	Carbon film 4.7 K 1/4 W ± 5 %	950623	ERD-14TJ-472
R31-32	Carbon film 10 K 1/4 W ± 5 %	950679	ERD-14TJ-103
R33	Carbon film 470 K 1/4 W ± 5 %	950959	ERD-14TJ-474
R34	Carbon film 10 K 1/4 W ± 5 %	950679	ERD-14TJ-103
R35	Volume control 50 K	984046	VM1R5M1111 50KA
R36	Carbon film 150 1/4 W ± 5 %	950371	ERD-14TJ-151
R37	Carbon film 150 K 1/4 W ± 5 %	950875	ERD-14TJ-154
R38	Carbon film 1 K 1/4 W ± 5 %	950511	ERD-14TJ-102
R39	Carbon film 220 1/4 W ± 5 %	950399	ERD-14TJ-221
R40	Carbon film 100 1/4 W ± 5 %	950343	ERD-14TJ-101
R41	Carbon film 3.3 K 1/4 W ± 5 %	950595	ERD-14TJ-332
R42	Carbon film 8.2 K 1/4 W ± 5 %	950665	ERD-14TJ-822
R43	Carbon film 1 K 1/4 W ± 5 %	950511	ERD-14TJ-102
R44	Carbon film 220 1/4 W ± 5 %	950399	ERD-14TJ-221
R45	Carbon film 330 1/4 W ± 5 %	950427	ERD-14TJ-331
R46	Carbon film 10 K 1/4 W ± 5 %	950679	ERD-14TJ-103
R47	Carbon film 47 K 1/4 W ± 5 %	950791	ERD-14TJ-473
R48	Carbon film 1.5 M 1/4 W ± 5 %	954179	ERD-14TJ-155
R49	Carbon film 100 K 1/4 W ± 5 %	950847	ERD-14TJ-104
R50	Carbon film 33 1/4 W ± 5 %	950259	ERD-14TJ-330
R51	Carbon film 4.7 K 1/4 W ± 5 %	950623	ERD-14TJ-472
R52	Carbon film 10 K 1/4 W ± 5 %	950679	ERD-14TJ-103
R53	Carbon film 1 K 1/4 W ± 5 %	950511	ERD-14TJ-102
R54	Potentiometer 100 K	984018	P6S2A
R55-56	Carbon film 15 K 1/4 W ± 5 %	950707	ERD-14TJ-153
R57	SQUELCH control 5 K	984053	VR10R 5KC
R58	Potentiometer 10 K	984018	P6S2A
R59	Carbon film 33 K 1/4 W ± 5 %	950763	ERD-14TJ-333
R60	Carbon film 3.3 K 1/4 W ± 5 %	950595	ERD-14TJ-332
R61	Carbon film 10 K 1/4 W ± 5 %	950679	ERD-14TJ-103
R62	Carbon film 18 K 1/4 W ± 5 %	950721	ERD-14TJ-183
R63	Carbon film 10 K 1/4 W ± 5 %	950679	ERD-14TJ-103
R64	Carbon film 82 K 1/4 W ± 5 %	950833	ERD-14TJ-823
R65	Carbon film 680 1/4 W ± 5 %	950483	ERD-14TJ-681
R66	Carbon film 5.6 K 1/4 W ± 5 %	950637	ERD-14TJ-562

Ref. No.	Description				handic Stock Number	MFR'S Parts Number
R67	Carbon film	10 K	1/4 W	± 5 %	950679	ERD-14TJ-103
R68	Carbon film	82 K	1/4 W	± 5 %	950833	ERD-14TJ-823
R69	Carbon film	82	1/4 W	± 5 %	950329	ERD-14TJ-820
R70	Carbon film	220	1/4 W	± 5 %	950399	ERD-14TJ-221
R71	Carbon film	1.2 K	1/4 W	± 5 %	950525	ERD-14TJ-122
R72	Carbon film	47	1/4 W	± 5 %	950287	ERD-14TJ-470
R73	Carbon film	1	1/2 W	± 10 %	954095	ERD-12TK-1R0
R74	Carbon film	1.2 K	1/4 W	± 5 %	950525	ERD-14TJ-122
R75	Carbon film	47	1/4 W	± 5 %	950287	ERD-14TJ-470
R76	Carbon film	1	1/2 W	± 10 %	954095	ERD-12TK-1R0
R77	Metal film	22	1 W	± 10 %	954165	RN-1B
R78	Metal film	2.7	1 W	± 10 %	954158	RN-1B
R79	Carbon film	470	1/2 W	± 10 %	954123	ERD-12TK-471
R80	Carbon film	4.7 K	1/4 W	± 5 %	950623	ERD-14TJ-472
R81	Carbon film	6.8 K	1/4 W	± 5 %	950651	ERD-14TJ-682
R82	Carbon film	1 K	1/4 W	± 5 %	950511	ERD-14TJ-102
R83	Carbon film	470	1/4 W	± 5 %	950455	ERD-14TJ-471
R84	Carbon film	68 K	1/4 W	± 5 %	950819	ERD-14TJ-683
R85	Carbon film	470 K	1/4 W	± 5 %	950959	ERD-14TJ-474
R86	Carbon film	47 K	1/4 W	± 5 %	950791	ERD-14TJ-473
R87	Carbon film	47	1/4 W	± 5 %	950287	ERD-14TJ-470
R88	Carbon film	470	1/4 W	± 5 %	950455	ERD-14TJ-471
R89	Carbon film	2.2 K	1/4 W	± 5 %	950567	ERD-14TJ-222
R90	Carbon film	15 K	1/4 W	± 5 %	950707	ERD-14TJ-153
R91	Carbon film	2.2	1/4 W	± 5 %	950063	ERD-14TJ-2R2
R92	Carbon film	82	1/4 W	± 5 %	950329	ERD-14TJ-820
R93	Carbon film	10	1/4 W	± 5 %	950179	ERD-14TJ-100
R94	Carbon film	68	1/4 W	± 5 %	950315	ERD-14TJ-680
R95	Carbon film	120	1/4 W	± 5 %	950357	ERD-14TJ-121
R96	Carbon film	1 K	1/2 W	± 10 %	954130	ERD-12TK-102
R97	Carbon film	150	1/4 W	± 5 %	950371	ERD-14TJ-151
R98	Carbon film	1 K	1/2 W	± 10 %	954130	ERD-12TK-102
R99	Carbon film	18 K	1/4 W	± 5 %	950721	ERD-14TJ-183
R100	Carbon film	5.6 K	1/4 W	± 5 %	950637	ERD-14TJ-562
R101,102	Carbon film	47	1/2 W	± 10 %	954116	ERD-12TK-470
R103	Carbon film	1 M	1/4 W	± 5 %	951015	ERD-14TJ-105
R104,105	Carbon film	27	1/4 W	± 5 %	950245	ERD-14TJ-270
R106	Carbon film	470	1/4 W	± 5 %	950455	ERD-14TJ-471

SEMICONDUCTORS

Q1	Transistor	silicon	Toshiba	992101	2SC784(O)
Q2, 3	Transistor	silicon	Toshiba	992038	2SC371(O)
Q4, 5	Transistor	silicon	Toshiba	992059	2SC372(Y)
Q6, 7	Transistor	silicon	Toshiba	992038	2SC371(O)
Q8	Transistor	silicon	Toshiba	992066	2SC373
Q9	Transistor	silicon	Toshiba	992276	2SK30A(GR)
Q10-13	Transistor	silicon	Toshiba	992066	2SC373
Q14, 15	Transistor	silicon	Matsushita	992017	2SA699A(Q)
Q16	Transistor	silicon	Toshiba	992038	2SC371(O)
Q17	Transistor	silicon	Hitachi	992003	3SK45
Q18	Transistor	silicon	Toshiba	992087	2SC735(Y)
Q19	Transistor	silicon	Mitsubishi	992122	2SC1018
Q20	Transistor	silicon	SONY	992094	2SC756

Ref. No.	Description	handic Stock Number	MFR'S Parts Number
D1	Diode silicon	992150	1S1555
D2-6	Diode germanium	992143	1N60
D7	Diode zener	992206	RD9.1EB
D8-10	Diode silicon	992164	HV-80
D11	Diode germanium	992143	1N60
D12, 13	Diode silicon	992171	SIB01-02
D14	Diode zener	992185	AW01-33
D15-17	Diode germanium	992143	1N60
D18	Diode silicon	992171	SIB01-02
D19	Diode germanium	992143	1N60
TH1	Thermistor	992213	M-10K
TH2, 3	Thermistor	992262	M-30
COIL / TRANSFORMER / FILTER			
T1	ANT. coil	995150	TKXN23345X
T2	RF coil	995157	TKXC23344X
T3	1st IF coil	995164	TKXN23346X
T4	IF coil	995171	YXE10857A1A
T5	IF coil	995178	VOC15001A
T6	IF coil	995185	YMC15002A
T7	OSC. coil	995192	10PNP-091
T8	Input transformer	995381	E6228
T9	Output transformer	995402	E3791
T10	Band pass filter	995199	TKXC15950N
T11	Drive coil	995206	TKXC23343N
T12	Drive coil	995115	8SND-061
L1, 2	Band pass filter	995213	TKXN23571Z
L3, 4	Peaking coil	995220	4LNC-054
L5	T NET coil	995227	8SNF-064
L6	π NET coil	995031	10PNP-028
L7	Choke coil	995143	6LNC-053
CF-1	Ceramic filter		EF-A8
MF-1	Mechanical filter	995346	MFH-71T
SWITCHES			
S1-3	CH. Switch (11A)	994004	S-21P-2224
S1-3	CH. Switch (23 CH.)	994004	S-21P-2224
CRYSTALS			
X1	Crystal 37.600 MHz	452298	
X2	Crystal 37.650 MHz	452305	
X3	Crystal 37.700 MHz	452312	
X4	Crystal 37.750 MHz	452319	
X5	Crystal 37.800 MHz	452326	
X6	Crystal 37.850 MHz	452323	
X7	Crystal 37.690 MHz	452340	
X8	Crystal 10.180 MHz	452347	

Ref. No.	Description	handic Stock Number	MFR'S Parts Number
X9	Crystal 10.170 MHz	452354	
X10	Crystal 10.160 MHz	452361	
X11	Crystal 10.140 MHz	452368	
X12	Crystal 10.635 MHz	452375	
X13	Crystal 10.625 MHz	452382	
X14	Crystal 10.615 MHz	452389	
X15	Crystal 10.595 MHz	452396	
MISCELLANEOUS			
	P.C. Board (Main)	599708	GE-19B-4681
	P.C. Board (Switch)	599715	GE-19D-4685
	Antenna Connector	599428	SO-239
	Sel. Call jack	599645	CS-260
	Speaker jack	599652	SJ-296-1-15
	Line cord strain relief	599659	3P-4
	Meter	599722	220
	Pilot lamp 14 V / 80 mA L = 110 mm.	599729	
	Pilot lamp 14 V / 80 mA L = 220 mm.	599736	
	Pilot lamp holder	599743	BU-687(EAX)
	Lamp jewel	599750	
	Test pin	599449	C.P.T.
	Wrapping post	599757	59BS3015
	DC cable RED	599666	DX-104
	DC cable BRK		DX-106
	Fuse 2 A	599680	
	Speaker	599764	PD-960ST
	Poly case		
	Rear label	599761	GE-19D-4784B-2
	Fuse label 2 A	599768	
	Chassis	599775	GE-19B-4663
	Front chassis	599782	GE-19C-4664
	Front escutcheon holder	599789	GE-19C-4665
	Bonnet (Top)	599796	GE-19B-4666
	Bonnet (Bottom)	599803	GE-19B-4667
	Mounting bracket	599810	GE-19D-4668
	Heat sink	599817	GE-17D-3405
	Front rubber escutcheon	599824	GE-19B-4669
	Front panel	599831	GE-19D-4670
	VR knob	599554	GE-19D-4652
	CH. knob	599838	GE-19D-4671
	CH. dial plate 235/11A	599845	GE-19D-4672
	" 235/23	599852	"
	Mounting bracket screw	599547	GE-16D-3166
	Styrofoam pad for mounting bracket	599859	GE-19D-4673
	Fiber for mounting bracket	599866	
	Speaker cloth	599873	GE-19D-4674
	Earth lug M type	599880	GE-19D-4646
	Speaker mounting bracket	599887	GE-18D-3956
	Fiber for bonnet	599894	GE-19D-4773
	Fiber for crystal	599901	GE-19D-4774
	Wires 1 kit	599908	
	Screws 1 kit	599915	

Ref. No.	Description	handic Stock Number	MFR'S Parts Number
	Microphone case (A)	599575	GE-19C-4655
	Microphone case (B)	599577	GE-19C-4656
	Mic. holder	599582	GE-18D-4453
	Model label	599617	GE-19D-4785B
	handic label	599610	GE-19D-4785A
	Switch	599922	2P-012
	Knob	599603	GE-19D-4657
	Element	599589	UD-11
	MS holder	599624	GE-19D-4661
	Cable	599596	GE-17D-3521

TRANSISTORS LEAD IDENTIFICATIONS

- A: 2SC784(O), 2SC371(O), 2SC372(Y), 2SC373, 2SC735(Y)
- B: SA699A(Q)
- C: 2SC1018
- D: 2SC756
- E: 2SK30A(GR)
- F: 3SK45

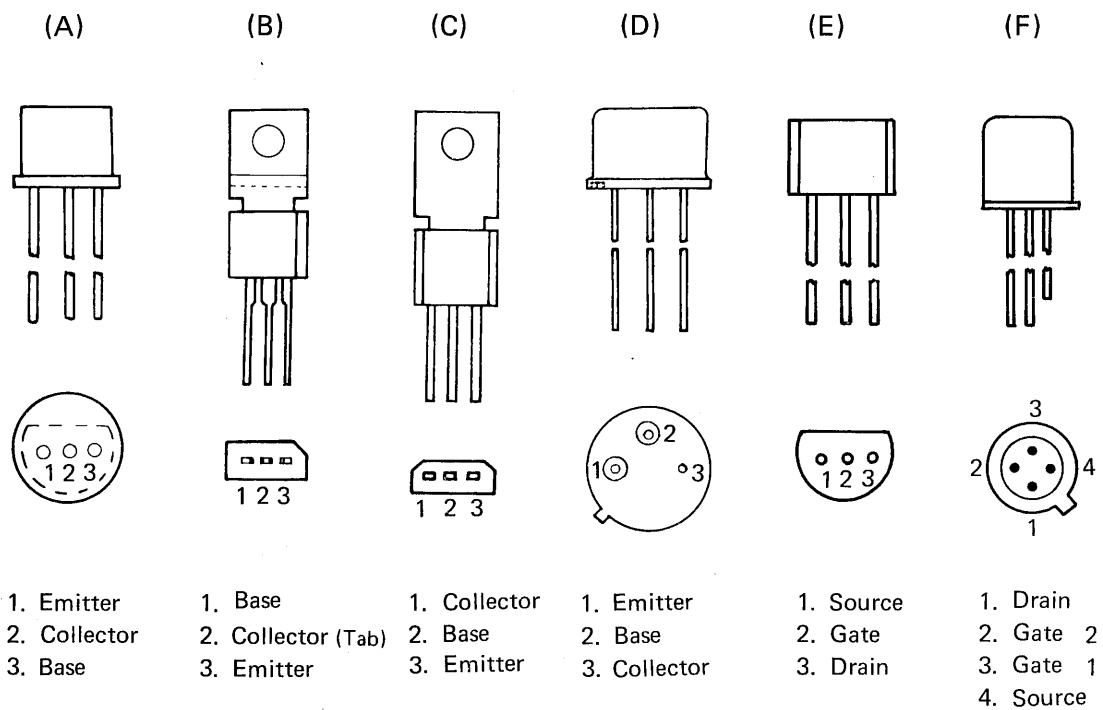
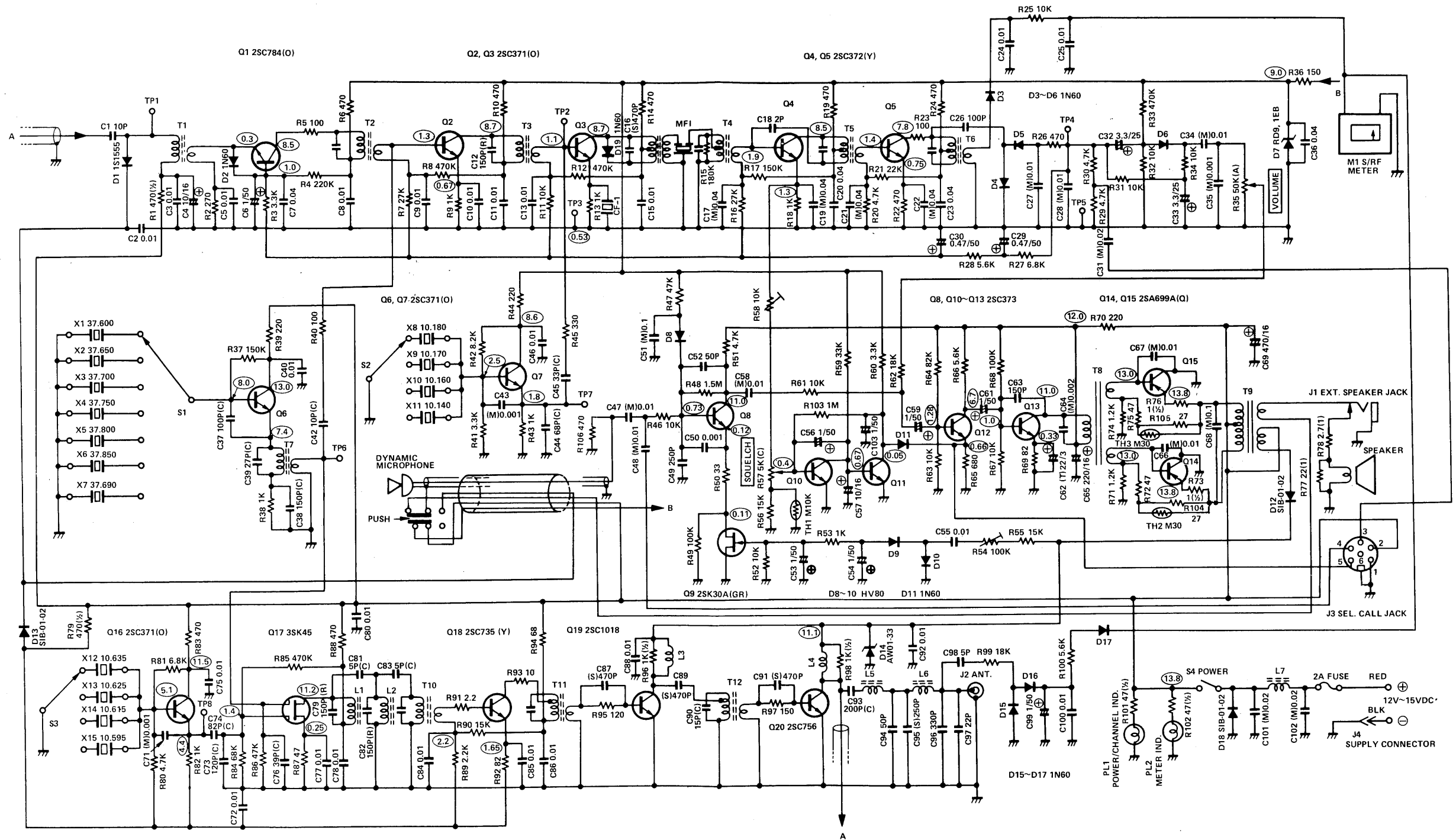


FIGURE 14

SCHEMATIC DIAGRAM



- NOTES:
1. FUNCTION
 J1: EXTERNAL SPEAKER JACK
 J2: ANTENNA JACK (SO-239 TYPE)
 J3: SEL. CALL JACK
 J4: SUPPLY CONNECTOR
 R35: VOLUME CONTROL WITH POWER SWITCH
 R57: SQUELCH CONTROL
 S1~S3: CHANNEL SELECTOR
 S4: POWER SWITCH
 PL1: POWER/CHANNEL INDICATOR
 PL2: METER INDICATOR
 M1: S/R/F METER
 2. RESISTANCE VALUES IN OHM (K=1000 M=1000K)
 3. CAPACITANCE VALUES IN MF (P=PMF)
 4. RATING OR TYPE NUMBER OF COMPONENT PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT WITHOUT NOTICE.
 5. X7: 37.690 USE FOR CHANNEL 11A ONLY
 6. CRYSTAL FREQUENCIES IN MHZ
 7. ○ MARKS DC VOLTAGE MEASURED BY V.T.V.M.