VHF LOW BAND SYNTHESIZED
FM TWO-WAY RADIO

TK-620(H)

SERVICE MANUAL

SUPPLEMENT

KENWOOD

B51-8000-00 (O) 1125

CONTENTS

TK-620(H)

GENERAL/DISASSEMBLY FOR REPAIR

General

FCC COMPLIANCE AND TYPE ACCEPTANCE NUMBERS

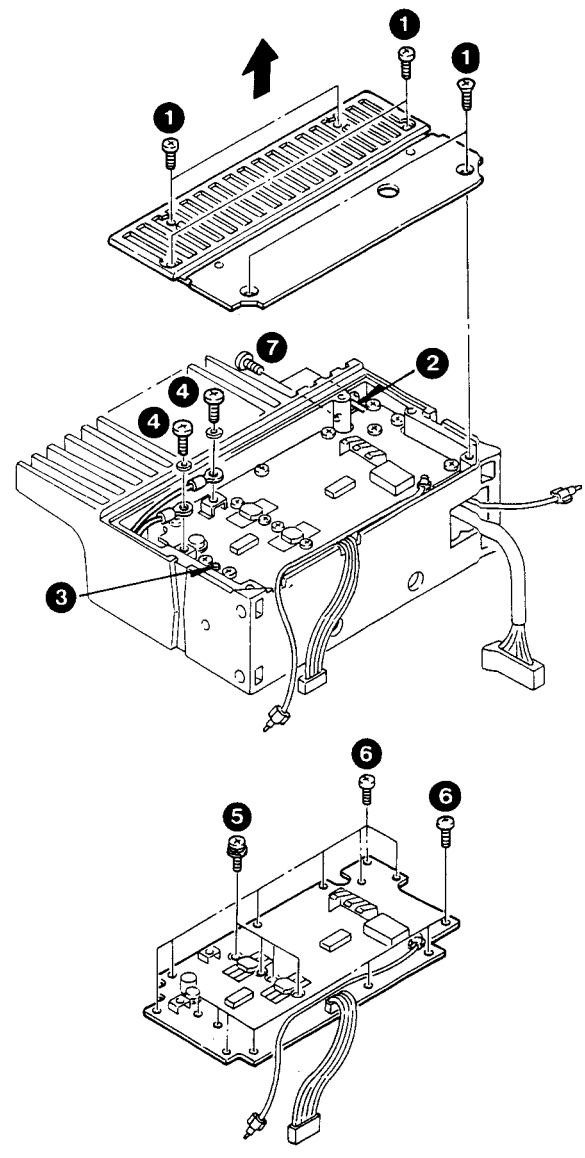
Type acceptance number	Frequency range	Compliance
ALH9TKTK-620H-1	29.7 ~ 37.0MHz	Parts 22 and 90
ALH9TKTK-620H-2	37.0 ~ 50.0MHz	

Disassembly for Repair

Disassembly of Final Unit

1. Final unit (Final) (X45-3240-XX) side

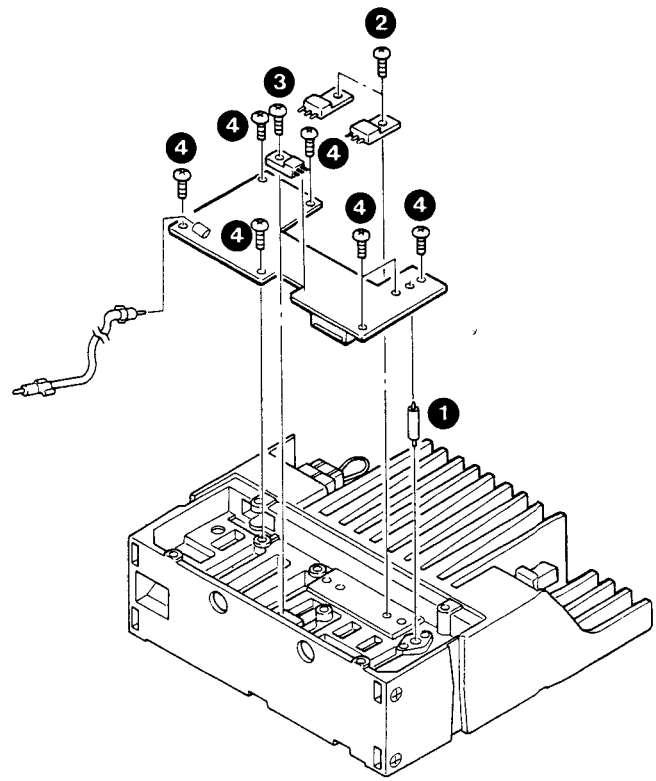
1. Remove the six screws (❶) fixing the shielding cover to remove the shielding cover.
2. Remove the soldered part (❷) of the VHF connector and that (❸) of the lead wire (coaxial cable installed through) from the final unit.
3. Remove the two screws (❹) fixing the lead wires of the power connector.
4. Remove the four screws (❺) fixing the transistor from the heat sink.
5. Remove the 15 screws (❻) fixing the final unit from the heat sink to remove the final unit.
6. Remove the two screws (❼) fixing the VHF connector to remove the connector from the heat sink.



DISASSEMBLY FOR REPAIR

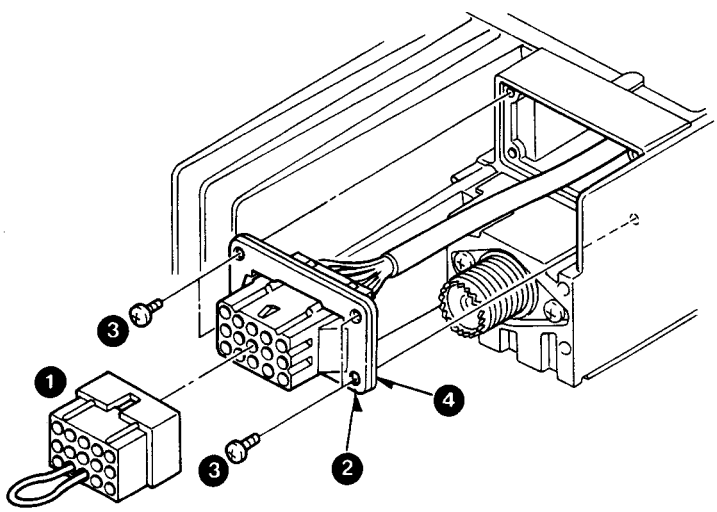
2. Final unit (Drive) (X45-3260-XX) side

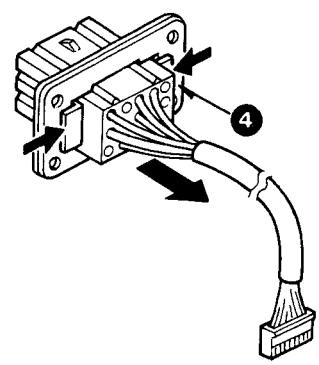
1. Remove the soldered part (❶) of the read wire (coaxial cable installed through) from the final unit.
2. Remove the two screws (❷) fixing the transistor from the hear sink.
3. Remove the screw (❸) fixing the transistor from the heat sink.
4. Remove the seven screws (❹) fixing the final unit from the heat sink to remove the final unit.



3. Removal of accessory connector

1. Remove the four screws (❸) fixing the fitting (❷) of the to the heat sink, and pull out the cable and the accessory connector (❶) together.
2. Remove the packing (❹) from the fitting, then push the part indicated by the arrows (⬅) and pull out the connector in the direction of the arrow (⬅).





TK-620(H)

CIRCUIT DESCRIPTION

Transmitter Circuit

The output signal, at the level of approximately 20mW, from Z4 (Transmitter Voltage Controlled Oscillator, TX VCO) is fed through an 8dB attenuator, then it is amplified by RF amplifiers Q101 (2SC2538-22-A), Q102 (TX pre-driver, 2SC1971) and Q103 (TX driver, 2SC1972), up to a sufficient level for driving final power amplifier transistors.

The driver output signal is applied to each of the final power amplifier transistors Q1 and Q2 (2SC2904 x 2), after going through a two-way power splitter. The transmit signal is amplified to a final transmit power at this stage. The signal is then combined and impedance and matched at the matching circuit. After the above process, the signal passes through K1 (transmit/receive switching relay), a Chebyshev type low-pass filter (L18, L19 and L20), and a forward and reflective power detector circuit, then it is routed to the antenna terminal.

The forward and reflected power detector circuit is located between the low-pass filter and the antenna terminal to maintain output power and to detect antenna load variations to protect the TX power amplifier stages.

The power detector circuit incorporates a broad band dual directional coupler to cover a wide range of frequencies.

The forward power is detected by D2 (1SS101) and is applied to a differential amplifier Q4 and Q5 (2SC3326(A) x 2), where the signal is compared with a reference voltage, after going through VR1 (APC adjustment pot). The output signal from the differential amplifier is applied to Q104 (2SB951A(Q)), which controls a supply voltage to Q101 (RF amplifier), Q102 (TX pre-driver) and Q103 (TX driver) to maintain a constant transmitter output power.

The reflected power is detected by D1 (1SS101), and it is also applied to the differential amplifier (Q4 and Q5).

If the antenna impedance matching becomes abnormal, the output voltage of the reflected power detector increases and this makes the supply voltage, to the power amplifier stages, to drop, causing the transmitter output power to be reduced. This prevents from the output stage transistors being damaged due to the excessive current.

In addition, the temperature rise in the transmitter power amplifier circuit is detected by TH1 (thermister). If the temperature exceeds the preset value because of continuous transmission or an ambient temperature rise, the DC amplifier Q3 (2SC2712(Y)) lowers the reference voltage of the differential amplifier, reducing the transmitter output power to a safe level to prevent damages to the internal components.

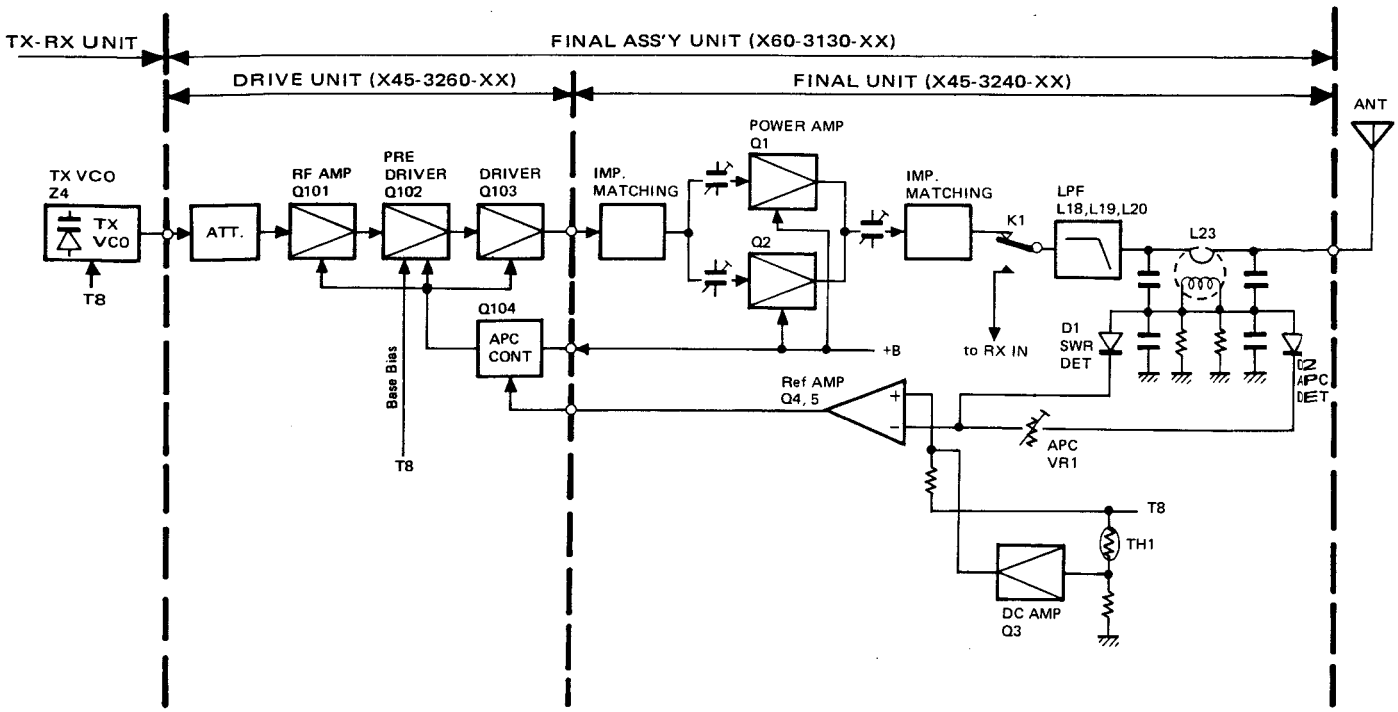


Fig. 1 Transmitter block diagram

CIRCUIT DESCRIPTION

Receiver Circuit

The incoming received signal from the antenna terminal passes through the low-pass filter and the transmit/receive switching relay (K1), then is fed into CN1 in the TX-RX unit.

The signal at CN1 is fed through L13 and L14 (band-pass filter), where undesired signal is eliminated, amplified by RF amplifiers Q6 and Q7 (2SK582 x 2), band limited by another band-pass filter, L17 and L18 then it is applied to D8 (double balanced madulator, ND487C2-3R).

A signal generated by the Common Frequency Synthesizer (COM PLL) is applied as a first local signal to D8, for a down conversion of the receive signal to the first IF (10.7 MHz). It is amplified by Q8 and Q9 (first IF amplifier, 2SK582 x 2).

An incoming signal containing an impulse noise from the antenna is frequency selected at 22MHz and it is amplified by Q1 (2SC2715(Y)) and Q2 (2SC2714(Y)) in Z9 (noise blanker unit, NB unit). It is then AM detected by D1 (HSM88AS).

The detected noise component is waveform shaped into a pulse, synchronizing with the noise, by a following switching circuit Q4 (2SA1162(Y)). The pulse is then inverted by the switching circuit Q5 (2SC2712(Y)), and applied to the gate circuit in the first IF stage.

The gate circuit consists of D9 and D10 (HSM88AS x 2), If there is no incoming impulse noise, those diodes are held on by the bias from the switching circuit Q5, and passes the IF signal. If an impulse noise is present, the bias from Q5 is interrupted momentarily, and the gate turns off to prevent the IF signal from passing through.

The DC component detected by D1 is amplified by Q3 (2SC2715(Y)) and used for an automatic gain control of the RF amplifiers Q1 and Q2, in order to prevent a saturation of the RF amplifier stages in a high field intensity area and to secure noise detection sensitivity.

The IF signal is filtered by XF1 (6-pole monolithic crystal filter), and amplified again by Q12 (IF amplifier, 2SK302(GR)), and is sent to Z8 (module unit (IF)).

The first IF signal sent to IC1 (FM IF system, MC3361D) in Z8. The signal is heterodyned again to 455kHz, using the second local signal generated by the crystal oscillator (11.155MHz), at the second mixer in IC1. The second IF signal is filtered by CF1 (ceramic filter), amplified by limiting amplifiers in IC1, and is detected as an FM signal.

The detected signal is sent from Z8 as the DET OUT signal to Z10 (band-pass filter/voltage controlled amplifier), where the signal is amplified. After this amplification, the signal is routed to CN7 as the DET signal. Unless the optional signaling unit is connected, the signal is looped back to CN7 by a short plug (CN15) and it is routed back to Z10 again. In Z10, the signal passes through a low-pass filter and high-pass filter consists of IC2 (NJM4558M) to attenuate any signals below 300Hz or above 3kHz. The signal then enters an electronic volume control (IC3, M5222FP).

The volume control changes a DC voltage applied to IC3, which controls the gain of IC3. The output of IC3 has a −6dB/Octave de-emphasis characteristics for a frequency range between 300Hz and 3kHz. This signal passes through Q16 and Q17 (squelch switch, 2SC3326(A) x 2), and it is amplified to drive the speaker by IC1 (audio-frequency power amplifier, μPC1242H).

In addition to the receive signal, the ALERT signal from the signaling unit is applied to IC1, therefore, an alert tone can be head from the speaker if so an optional accessory board is installed. This IC1 output is sent to the accessory connector, J3, of the final unit, and drives an internal speaker connected to it. And an external speaker may be driven directly by connecting it to J3.

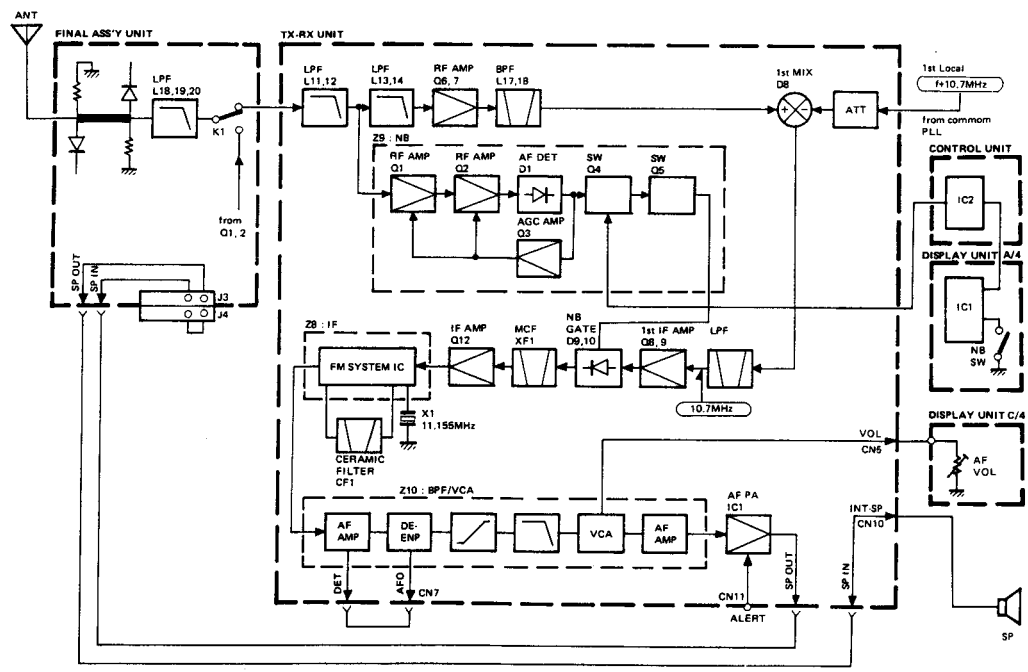


Fig. 2 Receiver block diagram

TK-620(H)

SEMICONDUCTOR DATA/DESCRIPTION OF COMPONENTS

Semiconductor Data

2SC2904 : Power amplifier (Final unit Q1, 2)

- **Electrical characteristics**

Item	Symbol	Condition	Rating			Unit
			MIN.	TYP.	MAX.	
Collector - base breakdown voltage	$V_{(BR)CBO}$	I_C = 20mA, I_E = 0	50			V
Emitter - base breakdown voltage	$V_{(BR)EBO}$	I_E = 20mA, I_C = 0	5			V
Collector - emitter breakdown voltage	$V_{(BR)CEO}$	I_C = 0.1A, R_{BE} = ∞	20			V
Collector cut-off current	I_{CBO}	V_{CB} = 15V, I_E = 0			5	mA
Emitter cut-off current	I_{EBO}	V_{EB} = 3V, I_C = 0			5	mA
DC current amplification factor	h_{FE}	V_{CE} = 10V, I_C = 1A	10	50	180	–
Output power	P_O	f = 30MHz, Vcc = 12.5V, Pin = 7W	100	110		W
Collector efficiency	η_C	f = 30MHz, Vcc = 12.5V, Pin = 7W	55	60		%

(Tc = 25 °C)

Description of Components

FINAL ASS'Y UNIT (X60-3130-XX)

FINAL UNIT (X45-3240-XX) : FINAL ASS'Y

Component	Parts No.	Use/Function	Operation/Condition/Compatibility
Q1, 2	2SC2904	Power amplifier	
Q3	2SC2712(Y)	Protector amplifier	Temperature.
Q4, 5	2SC2712(Y)	APC controller	
D1, 2	1SS101	Detector	
D3	1SS184	Separator	
D4	SG-5LR	Protection	Contrary polar protection.
D5	1SS184	A standard voltage	
D6	1SS184	Protector	

DRIVE UNIT (X45-3260-XX) : FINAL ASS'Y

Component	Parts No.	Use/Function	Operation/Condition/Compatibility
Q101	2SC2538-22-A	RF amplifier	
Q102	2SC1971	Pre-driver amplifier	
Q103	2SC1972	Driver amplifier	
Q104	2SB951A(Q)	APC amplifier	
D101, 102	1SS184	Bias control	

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Ref. No.	Address	New Parts	Parts No.	Description	Destination	Remarks
			TK-620 (H)			
1	3B		A01-1031-12	CASE (LOWER)		
2	1B		A01-1064-02	CASE (UPPER)		
4	1A		A20-2616-13	PANEL ASSY		
6	1A		B03-0545-03	DRESSING PLATE (TX-BUSY-CALL)		
7	1A		B03-0552-03	DRESSING PLATE (MONI-NB)		
7	1A		B03-0553-03	DRESSING PLATE (SCAN)		
8	1A		B11-0437-04	FILTER		
10	3B	*	B40-3954-04	MODEL NAME PLATE	K	
10	3B	*	B40-3955-04	MODEL NAME PLATE	K2	
11	2D		B46-0409-20	WARRANTY CARD		
12	2D		B50-8302-00	INSTRUCTION MANUAL		
14	1D		E30-2036-05	GROUND LEAD		
15	1C	*	E30-2158-05	DC CORD		
CN15			E31-3270-05	SHORT PLUG (12P)		
J4	2B		E31-3228-05	SHORT PLUG (ACC)		
W8	1A		E31-3225-05	CONNECTING WIRE (SP)		
20	1D		F06-2524-05	FUSE (25A)		
21	3A		F11-1057-03	SHIELDING COVER (LOWER)		
22	2A		F11-1121-03	SHIELDING COVER (UPPER)		
27	2A		G09-0405-05	SPRING (CH)		
28	1A		G09-0418-05	SPRING (VOL)		
29	1A		G10-0652-04	FELT (SP)		
30	3B		G10-0663-04	FELT (100 x 85)		
31	1B, 3B		G10-0667-04	FELT (150 x 10)		
32	1B, 3B		G16-0516-14	SHEET (150 x 100)		
33	1B, 3B		G16-0517-04	SHEET (20 x 130)		
34	1A		G53-0535-04	PACKING (MONI/NB)		
37	2D		H02-0605-04	INNER PACKING CASE		
38	3C	*	H01-8268-04	ITEM CARTON BOX		
39	2C		H10-2647-03	POLYSTYRENE FOAMED FIX (FRONT)		
40	2D		H10-2654-03	POLYSTYRENE FOAMED FIX (REAR)		
41	1C		H12-1415-04	PACKING FIXTURE		
41-1	3D		H11-0827-04	PACKING FIXTURE		
42	1D		H25-0123-04	PROTECTION BAG (DC CORD)		
43	1D		H25-0096-04	PROTECTION BAG (FUSE)		
44	2D		H25-0724-04	PROTECTION BAG (RADIO)		
45	1C		H25-0726-04	PROTECTION BAG (MIC)		
47	1D		J19-1376-15	MIC HANGER		
48	1A		J21-4214-03	MOUNTING HARDWARE (VOL/SQL)		
49	1A		J21-4215-03	MOUNTING HARDWARE (SP)		
50	1D		J29-0422-13	MOUNTING BRACKET		
51	1D		J54-0060-03	STAY		
53	1A		K27-0498-04	PUSH KNOB (MONI, NB)		
54	2A		K29-3075-03	KNOB (CH)		
55	1A		K29-3076-13	KNOB (VOL)		
56	1A		K29-3077-03	KNOB (SQL)		
			N89-2608-41	BINDING HEAD TAPTITE SCREW		
59	1D		N99-0330-05	SCREW SET		
A	1A, 1B		N09-0673-05	SCREW (M3 x 6, SP)		
B	1A		N09-0675-05	SCREW		
C	1A, 2D		N09-2030-05	FLAT HEAD MACHINE SCREW		

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Ref. No.	Address	New Parts	Parts No.	Description	Destination	Remarks
D	1B, 3B		N35-3008-45	BINDING HEAD MACHINE SCREW		
E	2A, 3A		N87-2606-46	BINDING HEAD MACHINE SCREW		
62	1A		T07-0247-05	LOUDSPEAKER (FULL RANGE)		
63	2C		T91-0362-05	MICROPHONE (WITH CORD)		
67	2A		X53-3060-10	CONTROL UNIT		
68	1A		X54-3040-10	DISPLAY UNIT		
69	3A		X57-3260-10	TX-RX UNIT	K	
69	3A		X57-3260-11	TX-RX UNIT	K2	
70	2B	*	X60-3130-10	FINAL ASSY	K	
70	2B	*	X60-3130-11	FINAL ASSY	K2	
FINAL UNIT (X45-3240-XX) -10 : K -11 : K2						
C1			CM73F2H331J	CHIP C 330PF J		
C2			CM73F2H560J	CHIP C 56PF J	K2	
C2			CM73F2H750J	CHIP C 75PF J	K	
C3			CC73FCH1H471J	CHIP C 470PF J	K	
C8, 9			CM73F2H751J	CHIP C 750PF J	K	
C8, 9			CM73F2H821J	CHIP C 820PF J	K2	
C10, 11			C90-2025-05	ELECTRO 4.7UF 25WV		
C12, 13			C91-1056-05	CHIP C 4700PF K		
C14, 15			CE04EW1E471M	ELECTRO 470UF 25WV		
C16, 17			CM73F2H471J	CHIP C 470PF J	K2	
C16, 17			CM73F2H681J	CHIP C 680PF J	K	
C18			CM73F2H151J	CHIP C 150PF J	K	
C18			CM73F2H221J	CHIP C 220PF J	K2	
C22			CM73F2H470J	CHIP C 47PF J	K2	
C22			CM73F2H750J	CHIP C 75PF J	K	
C23			CM73F2H471J	CHIP C 470PF J		
C24			C91-1056-05	CHIP C 4700PF K		
C25			CM73F2H620J	CHIP C 62PF J	K2	
C25			CM73F2H820J	CHIP C 82PF J	K	
C26			CM73F2H080D	CHIP C 8.0PF D	K	
C27			CM73F2H101J	CHIP C 100PF J	K2	
C27			CM73F2H151J	CHIP C 150PF J	K	
C28			CM73F2H180J	CHIP C 18PF J	K2	
C28			CM73F2H220J	CHIP C 22PF J	K	
C29			CM73F2H121J	CHIP C 120PF J	K	
C29			CM73F2H820J	CHIP C 82PF J	K2	
C30			CM73F2H430J	CHIP C 43PF J	K2	
C30			CM73F2H510J	CHIP C 51PF J	K	
C31			CM73F2H330J	CHIP C 33PF J	K2	
C31			CM73F2H470J	CHIP C 47PF J	K	
C32, 33			CM73F2H020C	CHIP C 2.0PF C		
C34			CC73FCH1H560J	CHIP C 56PF J	K2	
C34			CC73FCH1H820J	CHIP C 82PF J	K	
C35			CC73FCH1H330J	CHIP C 33PF J		
C36 – 47			CK73FB1H472K	CHIP C 4700PF K		
TC1, 2			C05-0367-05	TRIMMING CAP. 420PF		
TC3			C05-0336-05	TRIMMING CAP. 350PF		
A1			E29-0468-14	LEAD PLATE (ANT)		
CN1			E04-0159-05	RF COAXIAL CABLE RECEPTACLE		
CN2, 3			E23-0491-05	TERMINAL		

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CN4			E40-5166-05	PIN CONNECTOR (6P)		
W1			E31-3273-05	CONNECTOR WITH LEAD (5P)		
A4			F10-1391-04	SHIELDING PLATE		
A2			J31-0531-04	COLLAR		
A3			L34-1190-05	COIL		
L1			L34-1243-05	COIL 4ø7T	K2	
L1			L34-1244-05	COIL 4ø8T	K	
L2, 3			L34-1148-05	COIL 6ø1T		
L4, 5			L39-0421-05	COIL	K2	
L4, 5			L39-0427-05	COIL	K	
L6, 7			L34-0742-05	COIL 3ø5T		
L8, 9			L34-1134-05	COIL 5ø5T		
L10, 11			L34-1147-05	COIL 4ø7T		
L12, 13			L34-1249-05	COIL	K2	
L12, 13			L34-1250-05	COIL	K	
L14, 15			L34-1146-05	COIL 6ø1.5T	K2	
L14, 15			L34-1257-05	COIL 6ø2.5T	K	
L16			L34-1151-05	COIL 6ø6T	K	
L16		*	L34-1240-05	COIL 6ø5.5T	K2	
L17			L33-0692-05	CHOKE COIL 27UH		
L18			L34-1150-05	COIL 6ø8T	K	
L18			L34-1241-05	COIL 6ø7T	K2	
L19			L34-1151-05	COIL 6ø6T	K2	
L19			L34-1241-05	COIL 6ø7T	K	
L20			L34-1256-05	COIL 6ø4.5T	K2	
L20		*	L34-1259-05	COIL 6ø5.5T	K	
L21, 22			L40-2201-81	SMALL FIXED INDUCTOR 22UH		
L23			L39-0447-05	TROIDAL COIL		
L24, 25			L92-0110-05	CORE		
R1			RS14AB3D1R5J	FL-PROOF RS 1.5 J 2W		
R2			RD14FB2B682J	CYLND CHIP R 6.8K J 1/8W	K	
R2			RD41FB2B392J	CYLND CHIP R 3.9K J 1/8W	K2	
R3			RD41FB2B330J	CYLND CHIP R 33 J 1/8W	K2	
R3			RD41FB2B390J	CYLND CHIP R 39 J 1/8W	K	
R4			RD41FB2B560J	CYLND CHIP R 56 J 1/8W		
R5			RD41FB2B153J	CYLND CHIP R 15K J 1/8W		
R6			RD41FB2B100J	CYLND CHIP R 10 J 1/8W		
R7			RD41FB2B470J	CYLND CHIP R 47 J 1/8W		
R8			RD41FB2B103J	CYLND CHIP R 10K J 1/8W		
R9			RD41FB2B122J	CYLND CHIP R 1.2K J 1/8W		
R10			RD41FB2B392J	CYLND CHIP R 3.9K J 1/8W		
R11			RD41FB2B102J	CYLND CHIP R 1.0K J 1/8W		
R12			RD41FB2B221J	CYLND CHIP R 220 J 1/8W		
R13			RD41FB2B102J	CYLND CHIP R 1.0K J 1/8W		
R14			RD41FB2B122J	CYLND CHIP R 1.2K J 1/8W		
R15			RS14AB3A470J	FL-PROOF RS 47 J 1W		
R16, 17			RS14AB3B100J	FL-PROOF RS 10 J 1W		
VR1			R12-3430-05	TRIMMING POT. 10K		
K1			S51-1437-05	RELAY 9V DC		
D1, 2			1SS101	DIODE		
D3			1SS184	CHIP DIODE		
D4			SG-5LR	DIODE		

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D5, 6			1SS184	CHIP DIODE		
Q1, 2	2A		2SC2904	TRANSISTOR		
Q3 – 5			2SC2712(Y)	CHIP TRANSISTOR		
TH1			SDT1000	THERMISTOR 10K		
DRIVE UNIT (X45-3260-XX) -10 : K -11 : K2						
C101			CC73FCH1H680J	CHIP C 68PF J		
C102			CC73FCH1H331J	CHIP C 330PF J		
C103, 104			CK73FB1H472K	CHIP C 4700PF K		
C105			CE04EW1C100M	ELECTRO 10UF 16WV		
C106			CK73FB1H472K	CHIP C 4700PF K		
C107			CC73FCH1H221J	CHIP C 220PF J		
C108, 109			CK73FB1H472K	CHIP C 4700PF K		
C110			CK73EB1H472K	CHIP C 4700PF K		
C111			CK73FB1H472K	CHIP C 4700PF K		
C112			CK73EB1E104K	CHIP C 0.10UF K		
C113			C90-2022-05	OS 22UF 16WV		
C114			CK45B1H152K	CERAMIC 1500PF K		
C115, 116			C91-1056-05	CHIP C 4700PF K		
C117			CK73EB1E104K	CHIP C 0.10UF K		
C118			C90-2022-05	OS 22UF 16WV		
C119			CC73FCH1H221J	CHIP C 220PF J	K2	
C119			CC73FCH1H331J	CHIP C 330PF J	K	
C120			CC73FCH1H221J	CHIP C 220PF J		
C121, 122			CC73FCH1H221J	CHIP C 220PF J	K2	
C121, 122			CC73FCH1H331J	CHIP C 330PF J	K	
C123			C91-1056-05	CHIP C 4700PF K		
C124			CK73FB1B472K	CHIP C 4700PF K		
C125			C90-2044-05	ELECTRO 1UF 25WV		
C126, 127			CK73FB1H472K	CHIP C 4700PF K		
C128			CC73FCH1H331J	CHIP C 330PF J		
C129			CC73FCH1H101J	CHIP C 100PF J		
CN101			E04-0159-05	RF COAXIAL CABLE RECEPTACLE		
CN102			E40-0608-05	PIN CONNCTOR (6P)		
L101			L34-0893-05	COIL 3ø4T		
L102			L40-2292-14	SMALL FIXED INDUCTOR 2.2UH		
L103			L34-0894-05	COIL 3ø5T		
L104			L33-0666-05	CHOKE COIL		
L105			L34-0908-05	COIL 3ø9.5T		
L106			L33-0666-05	CHOKE COIL		
L107			L34-1113-05	COIL 3ø1.5T		
L108			L34-0742-05	COIL 3ø5T		
L109		*	L34-1242-05	COIL 4ø6T		
L110			L34-0742-05	COIL 3ø5T	K	
L110			L34-1039-05	COIL 4ø1.5T	K2	
L111			L34-1243-05	COIL 4ø7T	K2	
L111			L34-1244-05	COIL 4ø8T	K	
L112			L33-0666-05	CHOKE COIL		
L113			L34-1025-05	COIL 3ø5.5T		
L114, 115			L92-0110-05	CORE		
R101			RD41FB2B121J	CYLND CHIP R 120 J 1/8W		
R102			RD41FB2B470J	CYLND CHIP R 47 J 1/8W		
R103			RD41FB2B121J	CYLND CHIP R 120 J 1/8W		

E : Scandinavia & Europe **K** : USA **P** : Canada
U : PX (Far East, Hawaii) **T** : England **M** : Other Areas
UE : AAFES (Europe) **X** : Australia

⚠ indicates safety critical components.

PARTS LIST

* New Parts
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

Ref. No.	Address	New Parts	Parts No.	Description	Destination	Remarks
R104			RD41FB2B222J	CYLND CHIP R 2.2K J 1/8W		
R105			RD41FB2B103J	CYLND CHIP R 10K J 1/8W		
R106			RD41FB2B121J	CYLND CHIP R 120 J 1/8W	K2	
R106			RD41FB2B560J	CYLND CHIP R 56 J 1/8W	K	
R107			RD41FB2B180J	CYLND CHIP R 18 J 1/8W		
R108			RD41FB2B101J	CYLND CHIP R 100 J 1/8W		
R109			RD14BB2C100J	RD 10 J 1/6W		
R110			RD14BB2C271J	RD 270 J 1/6W		
R111			RD14BB2C121J	RD 120 J 1/6W	K2	
R111			RD14BB2C680J	RD 68 J 1/6W	K	
R112			RD14BB2C470J	RD 47 J 1/6W		
R113			RS14AB3A121J	FL-PROOF RS 120 J 1W	K2	
R113			RS14AB3A680J	FL-PROOF RS 68 J 1W	K	
R114			RD41FB2B102J	CYLND CHIP R 1.0K J 1/8W		
R116			RS14DB3H101J	FL-PROOF RS 100 J 5W	K2	
R116			RS14DB3H470J	FL-PROOF RS 47 J 5W	K	
D101, 102			1SS184	CHIP DIODE		
Q101			2SC2538-22-A	TRANSISTOR		
Q102	3B		2SC1971	TRANSISTOR		
Q103	3A		2SC1972	TRANSISTOR		
Q104	3A		2SB951A(Q)	TRANSISTOR		
FINAL ASS'Y (X60-3130-XX) -10 : K -11 : K2						
J1	2B		E04-0167-05	RF COAXIAL CABLE RECEPTACLE		
J2	2B		E31-3383-05	CONNECTOR WITH LEAD		
J3	3B		E31-3384-05	CONNECTOR WITH LEAD		
W4	3A		E31-3256-05	CONNECTOR WIRE		
W5	2A		E31-2104-05	CONNECTOR WITH LEAD (RX)		
W6	3B		E31-3123-05	CONNECTOR WITH LEAD (TX)		
A1	2A		F01-0964-01	HEAT SINK		
A2	1B		F11-1107-02	SHIELDING COVER		
A3	2B		G53-0540-04	PACKING		
A4	2B		J21-4241-04	MOUNTING HARDWARE (POWER SUPPLY)		
A5	2B		J21-4242-04	MOUNTING HARDWARE (ACCY)		
100	1A		N16-0040-41	SPRING WASHER		
E	1B		N35-3008-45	BINDING HEAD MACHINE SCREW		
K	2A		N09-0626-04	SCREW		
L	1A		N32-3008-41	FLAT HEAD MACHINE SCREW		
M	2B		N87-3008-41	BRAZIER HEAD TAPTITE SCREW		
N	1A, 3A		N87-3008-46	BRAZIER HEAD TAPTITE SCREW		
101	2B		X45-3240-10	FINAL UNIT	K	
101	2B		X45-3240-11	FINAL UNIT	K2	
102	3B		X45-3260-10	DRIVE UNIT	K	
102	3B		X45-3260-11	DRIVE UNIT	K2	

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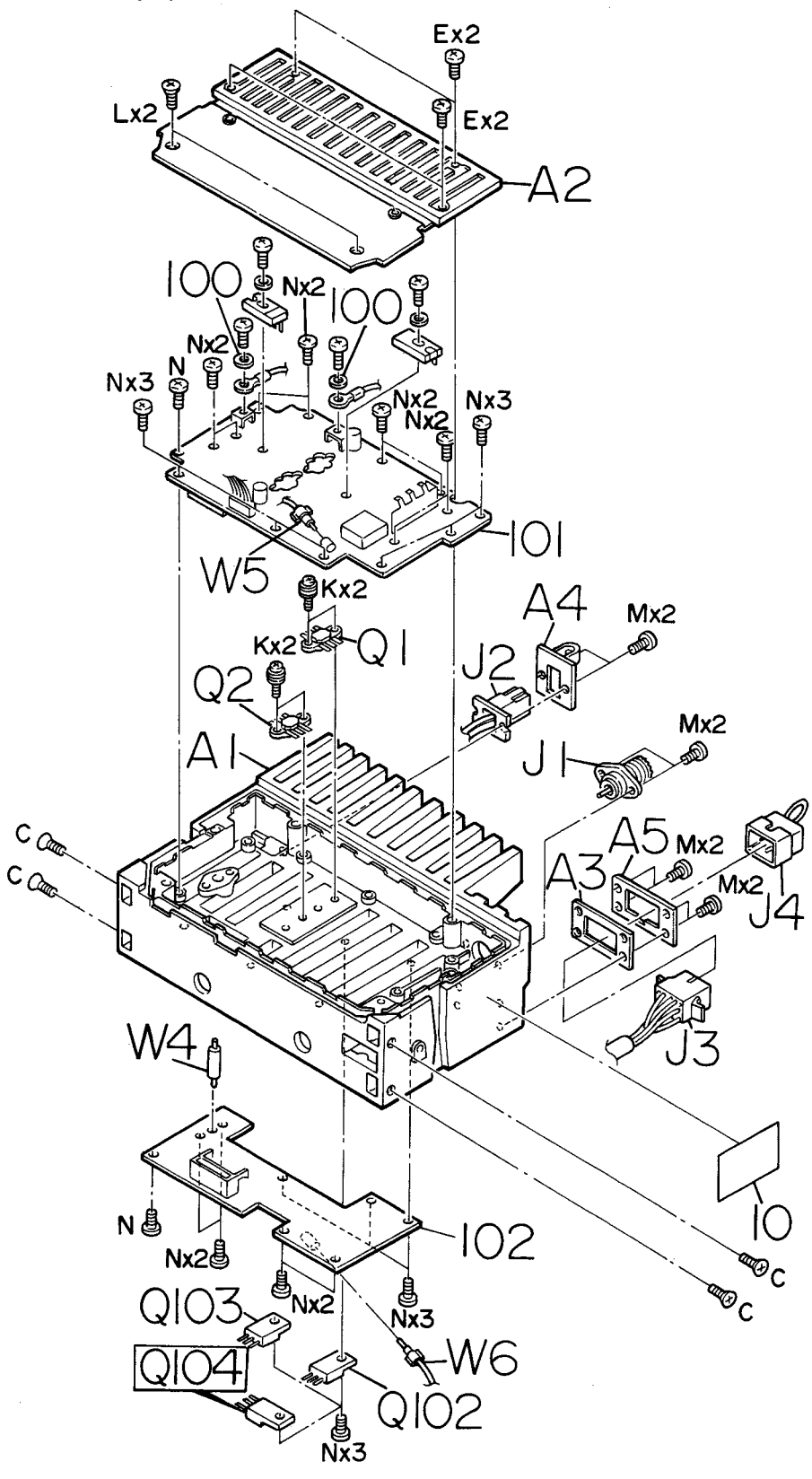
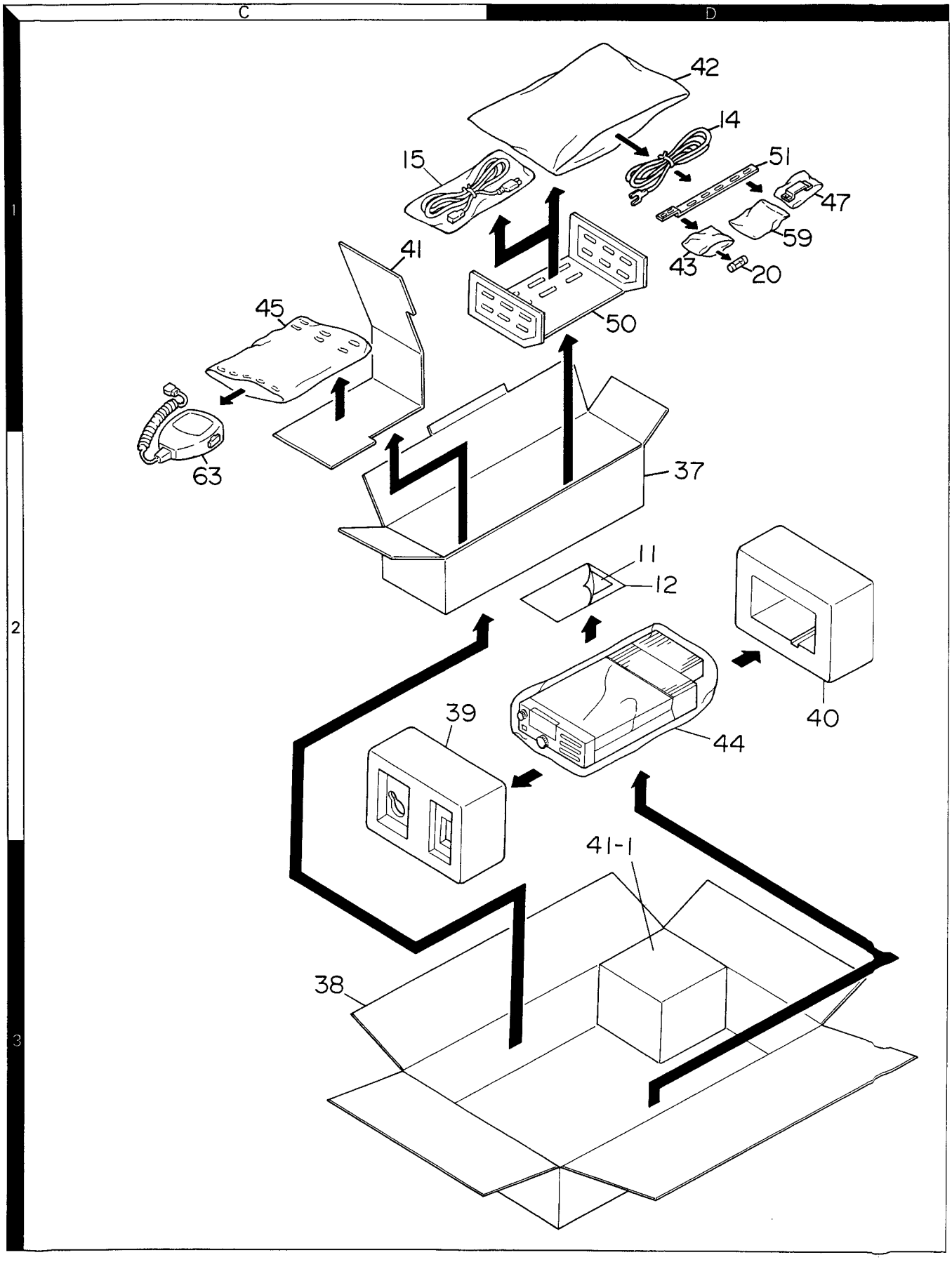
TK-620(H)

DISASSEMBLY

Final ass'y 110W version (70).



PACKING



TK-620(H)

ADJUSTMENT

Test equipment required for alignment

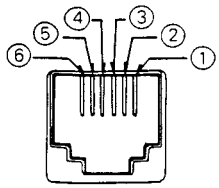
Test Equipment	Major Specifications	
1. Standard Signal Generator (SSG)	Frequency range Modulation Output	29 to 50MHz Frequency modulation and external modulation. 0.1μV to greater than 1mV
2. Power meter	Input impedance Operation frequency Measurement capability	50 ohms 29 to 50MHz or more. Vicinity of 200W.
3. Deviation meter	Frequency range	29 to 50MHz.
4. Digital Volt Meter	Measuring range Accuracy	1~15V DC. High input impedance for minimum circuit loading.
5. Oscilloscope		DC through 30MHz.
6. High sensitivity frequency counter	Frequency range Frequency stability	10Hz to 100MHz. 0.2 ppm or less.
7. Ammeter		30A.
8. AF Volt Meter (AFVTVM)	Frequency range Voltage range	50Hz to 10kHz. 3mV to 3V.
9. Audio Generator (AG)	Frequency range Output	50Hz to 5kHz or more. 0 and 1V.
10. Distortion meter	Capability Input level	3% or less at 1kHz. 50mV to 10Vrms.
11. Voltmeter	Measuring range Input impedance	1.5 to 10V DC or less. 50 kohms/V or greater.
12. 4 ohm dummy load		Approx. 4 ohm, 5W.
13. Regulated power supply		13.4V, approx. 30A. (adjustable from 9~16V) Useful if ammeter equipped.

The set has been adjusted for the frequencies shown in the following table. When required, re-adjust them following the adjustment procedure to obtain the frequencies you want in actual operation.

		RX freq' fR ( ) MHz			TX freq' fT ( ) MHz		
		L	M	H	L	M	H
TK-620(H)	K	35.9	36.4	36.9	36.0	36.5	37.0
	K2	48.9	49.4	49.9	49.0	49.5	50.0

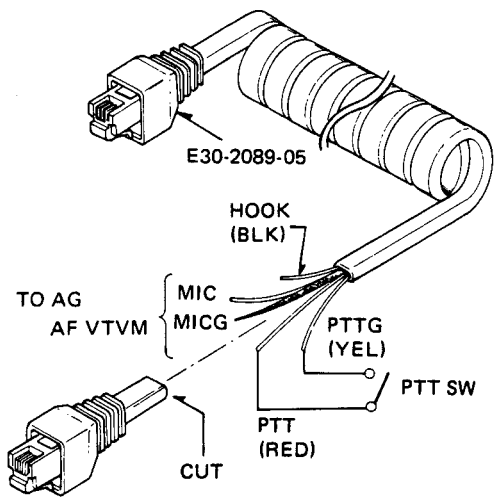
L : Low freq' M : Mid freq' H : Hi freq'

MIC connector front view

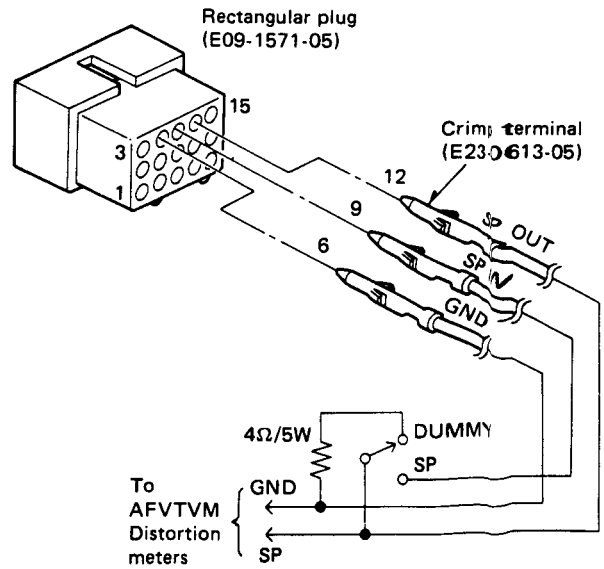


① SB
② PTTG
③ PTT
④ MICG
⑤ MIC
⑥ HOOK

- The following test cables are recommended.



Test cable for Microphone input

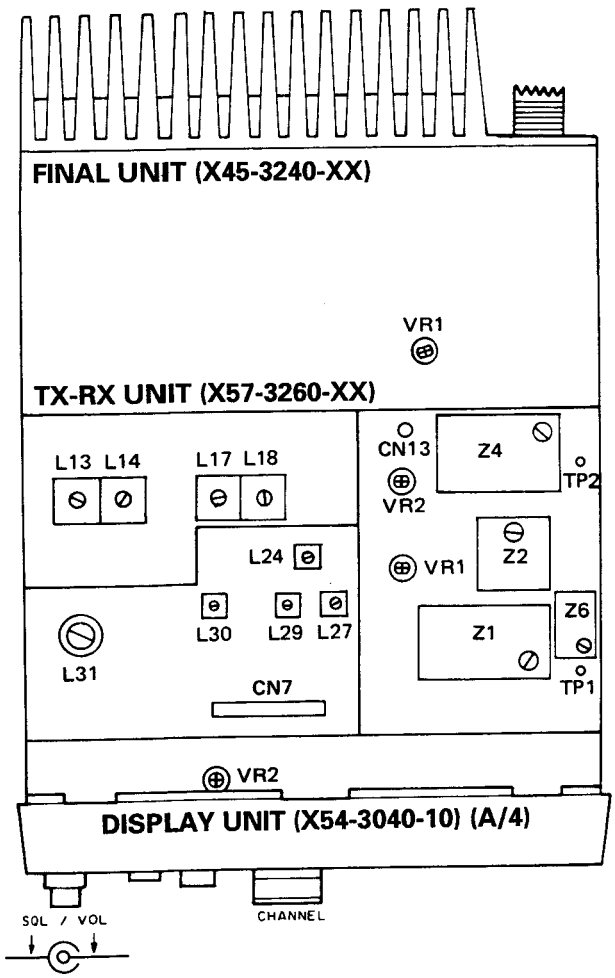


Test cable for Speaker output

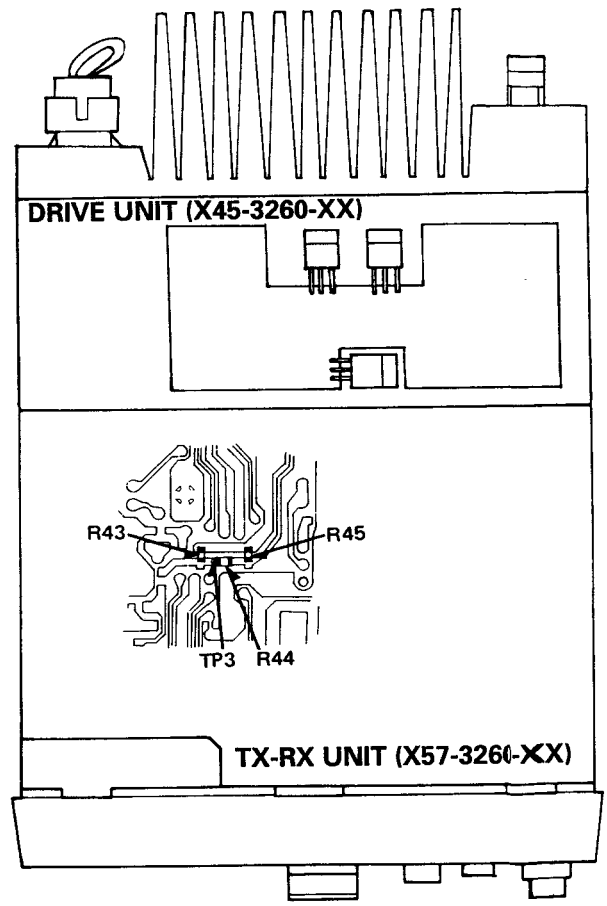
ADJUSTMENT

Adjustment location

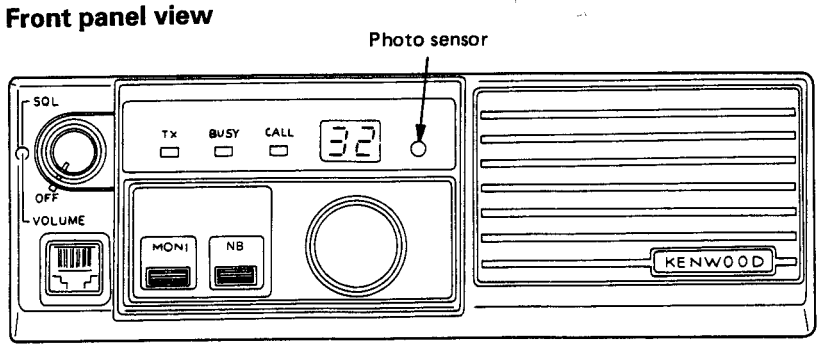
Top view



Bottom view



Front panel view

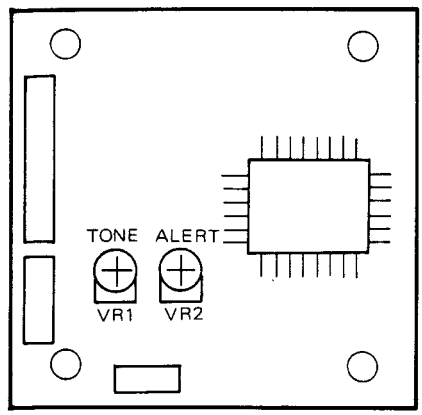


TK-620(H)

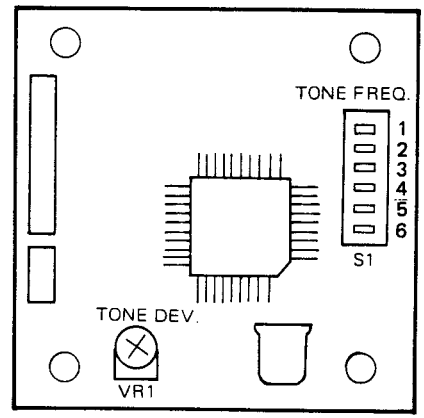
ADJUSTMENT

Adjustment points

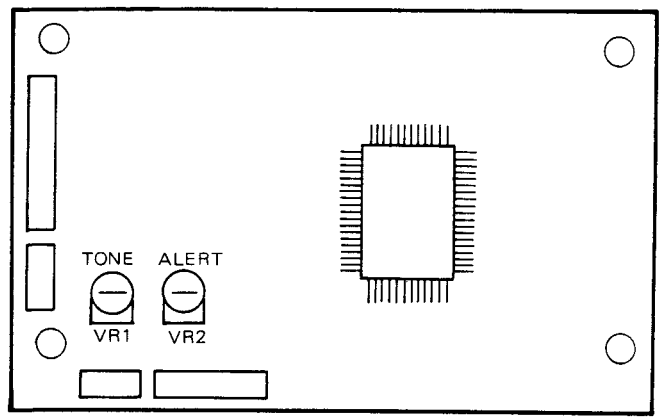
KMS-5



KQT-7



KSK-2

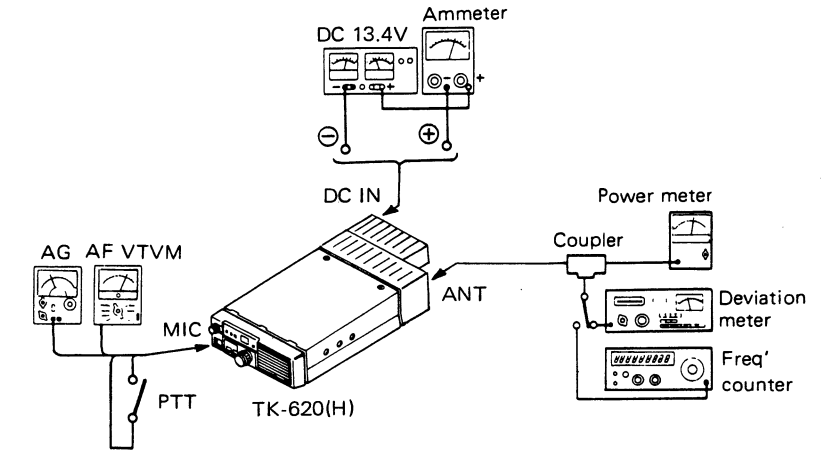


Confirmation of control function (in case KSK-2 control data has not been set.)
(Please check only when the KSK-2 (Option) is added.)

Item	Condition	Operation check
	No conditions are specified. Microphone (MIC) : OFF HOOK SQL VOL : CW MAX MONI SW : OFF Number of channels to be at least two.	
1. Confirmation of DEL/ADD function	1) SCAN SW : OFF Press DEL/ADD SW	If DEL/ADD lamp has been turned off, it is turned on and "pip" sound is heard once.
	2) SCAN SW : ON Press DEL/ADD SW	If DEL/ADD lamp has been turned on, it is turned off and "pip" sound is heard twice.
2. Confirmation of operation of channel switch	1) SCAN SW : OFF	When channel switch is turned, indicated channel changes.
	2) SCAN SW : ON	
3. Check of SCAN and selectable priority channel	1) SCAN SW : ON MIC : ON HOOK	Channel display indicates
	2) MIC : OFF HOOK or MONI SW : ON SQL VOL : CCW MAX	Channel before scanning to be indicated.
4. Confirmation of PTT	1) SCAN SW : OFF PTT SW : ON	TX display to be turned on.
	2) PTT SW : OFF	TX display to be turned off.
	3) PTT SW : ON MIC : ON HOOK	

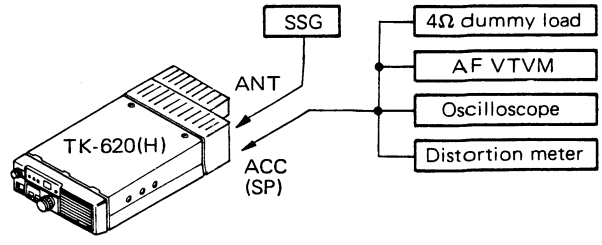
ADJUSTMENT

Alignment

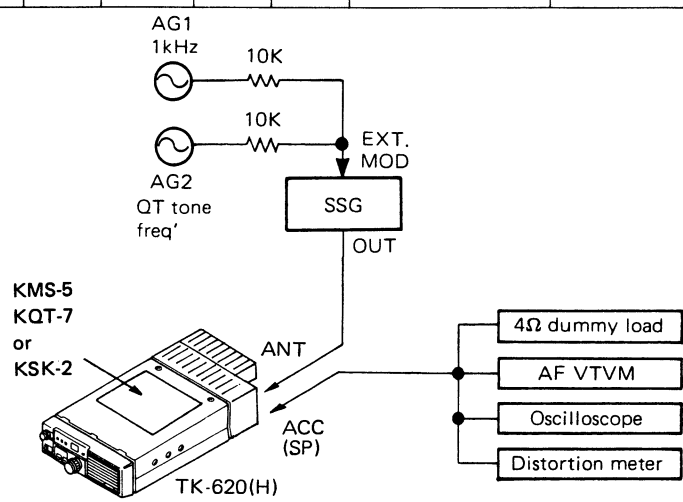
Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) Write freq' designed with EEPROM writer. 2) Connect the power cable to the rear panel. 3) Final unit VR1 : MAX CCW. 4) Power SW : ON							
2. Common PLL Lock Voltage	1) CH : Channel with highest TX FREQ' (fTH). PTT : ON	Power meter DVM	TX-RX	TP1	TX-RX	Z1	6.0V ADJ.	±0.1V
3. TX PLL Lock Voltage				TP2		Z4	5.0V ADJ. Maximize voltage if it does not reach to 5V.	±0.1V
4. TCXO Freq' ADJ.	1) CH : Channel with TX center FREQ' (fTM). PTT : OFF (RX) **Note** : TCXO is adjusted precisely at 25°C. If it is readjusted, the frequency stability is changed. Do not touch it normally.	Power meter FREQ' counter	TX-RX	TP3 (Foil side)	TX-RX	Z6	f + 10.7MHz ADJ.	±50Hz
5. Power ADJ. (APC)	1) CH : Channel with TX center FREQ' (fTM). PTT : ON	Power meter Ammeter	Rear panel	ANT	Final	TC1 TC2 TC3	ADJ. MAX power (VR1 : MAX CW.)	121W or more.
						VR1	113W ADJ.	±3W, 22A or less.
	2) CH : Channel with lowest TX FREQ' (fTL) and channel with highest TX FREQ' (fTH). PTT : ON						Check	105W to 120W. 22A or less.
6. Protection	1) CH : Channel with lowest TX FREQ' (fTL) and channel with highest TX FREQ' (fTH). ANT : Short and open PTT : ON	Ammeter	Rear panel	Power connec-tor			Check	20A or less.
7. Transmit Freq' ADJ.	1) CH : Channel with TX center FREQ' (fTM). ANT : Power meter PTT : ON	Power meter FREQ' counter	Rear panel	ANT	TX-RX	Z2	FREQ' ADJ. of TX	±50Hz
	2) CH : Check other channel. PTT : ON						Check	

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
8. Tone deviation ADJ. KMS-5, KQT-7 and KSK-2 (Option)	1) CH : Set the channel selector to the channel with which QT (CTCSS) is used. Deviation meter filter : LFP :3kHz, HPF : OFF, De-emphasis : OFF PTT : ON	Power meter Deviation meter	Rear panel	ANT	KMS-5	VR1	±0.75kHz	±100Hz
					KQT-7	VR1		
					KSK-2	VR1		
9. Maximum deviation ADJ.	1) Connect AG to the MIC terminal. AG : 1kHz/50mV Deviation meter filter : LPF : 20kHz, HPF : 50Hz, De-emphasis : 750μsec. TX-RX unit VR1 : MAX CW. CH : Channel with highest TX FREQ' (f_{TH}). PTT : ON	Power meter Deviation meter	Rear panel	ANT	TX-RX	VR2	±4.4kHz ADJ. (±4.9kHz ADJ. when signaling unit installed.) Adjust one more than the other by switching between −P and +P.	±100Hz
10. MIC sensitivity ADJ.	1) AG : 1kHz/5mV				TX-RX	VR1	±3.0kHz ADJ. (±3.75kHz ADJ. when signaling unit installed.)	±100Hz
11. Sensitivity ADJ.	1) CH : Channel with RX center FREQ' (f_{RM}).	AF VTVM 4Ω dummy load	Rear panel	EXT.SP	Front panel	AF VOL.	0.78V/4Ω (Noise)	
	2) SSG FREQ' : f_{RM} Output : 500μV/−53dBm MOD : OFF	SSG AF VTVM Distortion meter 4Ω dummy load	Rear panel	EXT.SP	TX-RX	L13 L14 L17 L18	Reduce noise level using L13, L14, L17 and L18. Decrease the SSG output so that noise level is always 20 to 30dB lower than 0.45V. Repeat 3 to 4 times.	
	3) SSG Output : 500μV/−53dBm MOD : 1kHz/±3kHz DEV.					L31	Adjust for maximum AF output.	
	4) SSG Output : 0.32μV/−117dBm					L24 L27 L29 L30	Adjust for maximum SINAD.	
					Front panel	AF VOL.	0.45V/4Ω ADJ.	
							Check	SINAD 12dB or more.
	5) CH : Channel with lowest RX FREQ' (f_{RL}) and channel with highest RX FREQ' (f_{RH}). SSG FREQ' : f_{RL} or f_{RH} Output : 0.32μV/−117dBm				Front panel	AF VOL.	0.45V/4Ω ADJ.	
							Check	SINAD 12dB or more.



ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
	6) CH : Channel with RX center FREQ' (fRM). SSG FREQ' : fRM Output : 500μV/−53dBm	SSG AF VTVM Distortion meter 4Ω dummy load	Rear panel	EXT.SP	Font Panel	AF VOL.	4.0V/4Ω ADJ.	
							Check	S/N 50dB or more. Distortion : 5% or less.
12. Squelch	1) SSG Output : OFF Rotate SQUELCH to a point at which noise disappears.	SSG AF VTVM 4Ω dummy load Oscillo-scope	Rear panel	EXT.SP				SQL index angle : 8:00 ~ 10:00
	2) SSG Output : 0.2μV/−121dBm							Squelch should open. BUSY LED should light.
13. NB	1) SSG Output : 1.58μV/−103dBm MOD : 1kHz/±3kHz DEV.	SSG Oscillo-scope Noise generator	Rear panel	EXT.SP			NB : ON	Confirm noise reduce by NB on. NB LED should light.
14. Adjusting decoder sensitivity for signaling squelch KMS-5, KQT-7 and KSK-2 (Option)	1) CH : Set the channel selector to the channel with which QT (CTCSS) is used. SSG FREQ' : Set it to the FREQ' of the channel mentioned above. SSG Output : Turn the SSG output so that the SINAD sensitivity becomes 10dB.							
	2) SSG MOD SW : EXT. MOD AG1 FREQ' : 1kHz AG2 FREQ' : QT tone freq'.							
	3) AG1 : Power switch OFF. AG2 Output : Adjust the output level of AG2 so that SSG deviation becomes 0.75kHz							
	4) AG1 : Power switch ON. AG1 Output : Adjust the output level of AG1 so that the SSG deviation becomes 3.75kHz. (i.e., QT tone frequency/ 0.75kHz deviation, +1kHz/3kHz deviation) MIC hook : ON hook MONI SW : OFF		Rear panel	EXT.SP	KMS-5 KQT-7 KSK-2		Check	Open.
15. Auto dimmer	1) Blind the photo sensor on the front panel.				Display	VR2	Adjust : Center position	
							Check	The LED display should be dimly lit.
16. ALERT tone level ADJ.	The ALERT tone is generated when the DEL/ADD switch is opened, in the time-out-time operation, etc. The ALERT tone level can be adjusted as desired with KMS-5 : VR2 and KSK-2 : VR2.							

TERMINAL FUNCTIONS

Connector No.	Terminal No.	Terminal Name	Terminal Function
FINAL ASS'Y (X60-3130-XX)			
CN1	–	RX	Receive signal output, coaxial connector.
CN2	–	+B	Power supply input.
CN3	–	GND	GND.
CN4 (CN102)	1	+B	Power supply output (input).
	2	+B	Power supply output (input).
	3	GND	GND.
	4	–	No connect.
	5	APC	APC control signal output (input).
	6	T8	8V output (input) during TX.
CN101	–	TX	Transmission drive input, coaxial connector.
W1	1	GND	GND.
	2	+B	Power supply output (to TX-RX).
	3	+B	Power sypply output (to TX-RX).
	4	R8	8V input during reception.
	5	T8	8V input during transmission.
W4	–	–	Connecting cable between final unit to final unit.
J1	–	ANT	For connection of antenna, M-type coaxial connector.
J2	1	+B	Power supply input.
	2	GND	GND.
J3	1	HOOK	HOOK signal (mic hook) input.
	2	MIC GND	MIC GND.
	3	–	No connect.
	4	–	No connect.
	5	MIC	MIC signal input.
	6	GND	GND.
	7	SB	Power supply output via the power switch.
	8	PTT	PTT signal input.
	9	SP IN	Internal speaker input (for control head).
	10	HORN2	HORN control output.
	11	HORN1	HORN control output.
	12	SP OUT	External spaker output.
	13	–	No connect.
	14	–	No connect.
	15	–	No connect.

SCHEMATIC D

Signal line — Control line — Common DC line — Adjusting points

(X53-3060-10)
IC1 : NJM78L05A
IC2 : 7507SCT(A)-463
IC3 : M51943BML
IC4 : 93C46PI
IC5 : NMC9346E(OPTION)

Q1~4 : DTC114EK
Q5 : 2SC2712(Y)

D1~8 : 1SS184

(X54-3060-10)
IC1 : L78M05T-LR
IC2 : 7556CS(M)-305

Q1 : 2SA1213(Y)
Q2,3 : 2SC2712(Y)
Q4,5 : 2SA1313(Y)
Q6 : DTC114EK

D1 : RD3.0M-B2
D2,4 : 1SS184
D3 : 1SS181
D5 : B30-0838-05
D6 : B30-0837-05
D7 : B30-0841-05
D8,9 : LA301D8
D10 : B30-0840-05
D11 : B30-0839-05

CDS1 : PT1201

CONTROL UNIT(X53-3060-10)

TX-RX UNIT.(X57-3260-XX)

COM VCO *Z1:(X58-3420-XX)

SUB PLL(OPTION)

VCXO Z2:(X58-3160-11)

TX PLL Z3:(X58-3430-10)

COM PLL Z5:(X58-3180-11)

TCXO Z6

MIC AMP Z7:(X59-3210-10)

NB Z9:(X59-3500-10)

BPF/VCA Z10:(X59-3230-10)

DISPLAY UNIT(X54-3040-10)(A/4)

DISPLAY UNIT(X54-3040-10)(B/4)

DISPLAY UNIT(X54-3040-10)(C/4)

DISPLAY UNIT(X54-3040-10)(D/4)

MICROPHONE

MICROPHONE(T91-0362-05)

(X54-3040-10)
IC1 : 7556CS(M)-305
IC2 : TA78L005AP

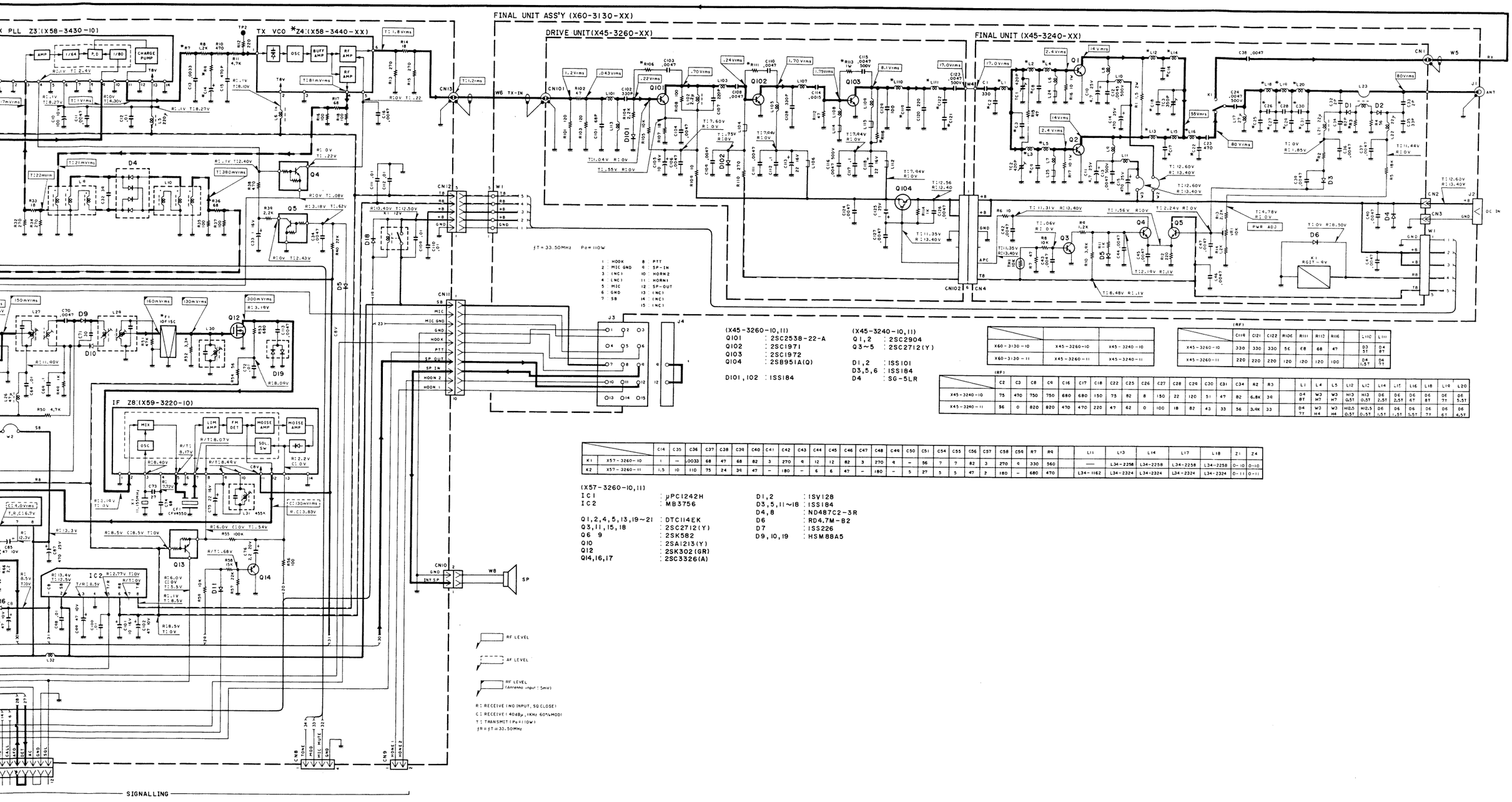
Q1 : 2SA1213(Y)
Q2,3 : 2SC2712(Y)
Q4,5 : 2SA1313(Y)
Q6 : DTC114EK

CDS1 : PT1201

D1 : B30-0857-05
D2 : B30-0855-05
D3 : B30-0856-05
D4 : B30-0860-05(OPTION)
D5 : B30-0856-05(OPTION)
D6 : RD30M-B2
D7,9 : 1SS184
D8 : 1SS181
D10,11 : LA301DA

HOOK	MON	Q21 Base	Q21 Collector	Q20 Collector
ON	ON	0.8	0	OPEN
	OFF	0.8	2.9	0 Ω
OFF	ON	2.95	0	OPEN
	OFF	2.95	0	OPEN
		HOOK	MON	RESET

HEMATIC DIAGRAM



(X45-3260-10,11)

Q101	: 2SC2538-22-A
Q102	: 2SC1971
Q103	: 2SC1972
Q104	: 2SB951A(Q)
D101, 102	: 1SS184

(X45-3240-10,11)

Q1,2	: 2SC2904
Q3~5	: 2SC2712(Y)
D1,2	: 1SS101
D3,5,6	: 1SS184
D4	: SG-5LR

X60-3130-10	X45-3260-10	X45-3240-10
X60-3130-11	X45-3260-11	X45-3240-11

(RF)

	C119	C121	C122	R106	R111	R113	R116	L110	L111
X45-3260-10	330	330	330	5K	68	68	47	D3 5T	D4 8T
X45-3260-11	220	220	220	120	120	120	100	D4 1.5T	D4 7T

(RF)

	C2	C3	C8	C9	C16	C17	C18	C22	C25	C26	C27	C28	C29	C30	C31	C34	R2	R3		L1	L4	L5	L12	L14	L15	L16	L18	L19	L20
X45-3240-10	75	470	750	750	680	680	150	75	82	8	150	22	120	51	47	82	6.8K	30		D4 8T	W3 H7	W3 H7	H13 0.5T	D6 2.5T	D6 2.5T	D6 6T	D6 8T	D6 7T	D6 5.5T
X45-3240-11	56	0	820	820	470	470	220	47	62	0	100	18	82	43	33	56	3.9K	33		D4 7T	W3 H4	W3 H4	H12.5 0.5T	H12.5 0.5T	D6 1.5T	D6 1.5T	D6 5.5T	D6 7T	D6 6T	D6 4.5T

		C14	C35	C36	C37	C38	C39	C40	C41	C42	C43	C44	C45	C46	C47	C48	C49	C50	C51	C54	C55	C56	C57	C58	C59	R7	R9
K1	X57-3260-10	1	—	.0033	68	47	68	82	3	270	9	12	12	82	3	270	9	—	56	7	7	82	3	270	9	330	560
K2	X57-3260-11	1.5	10	110	75	24	36	47	—	180	—	6	6	47	—	180	—	5	27	5	5	47	2	180	—	680	470

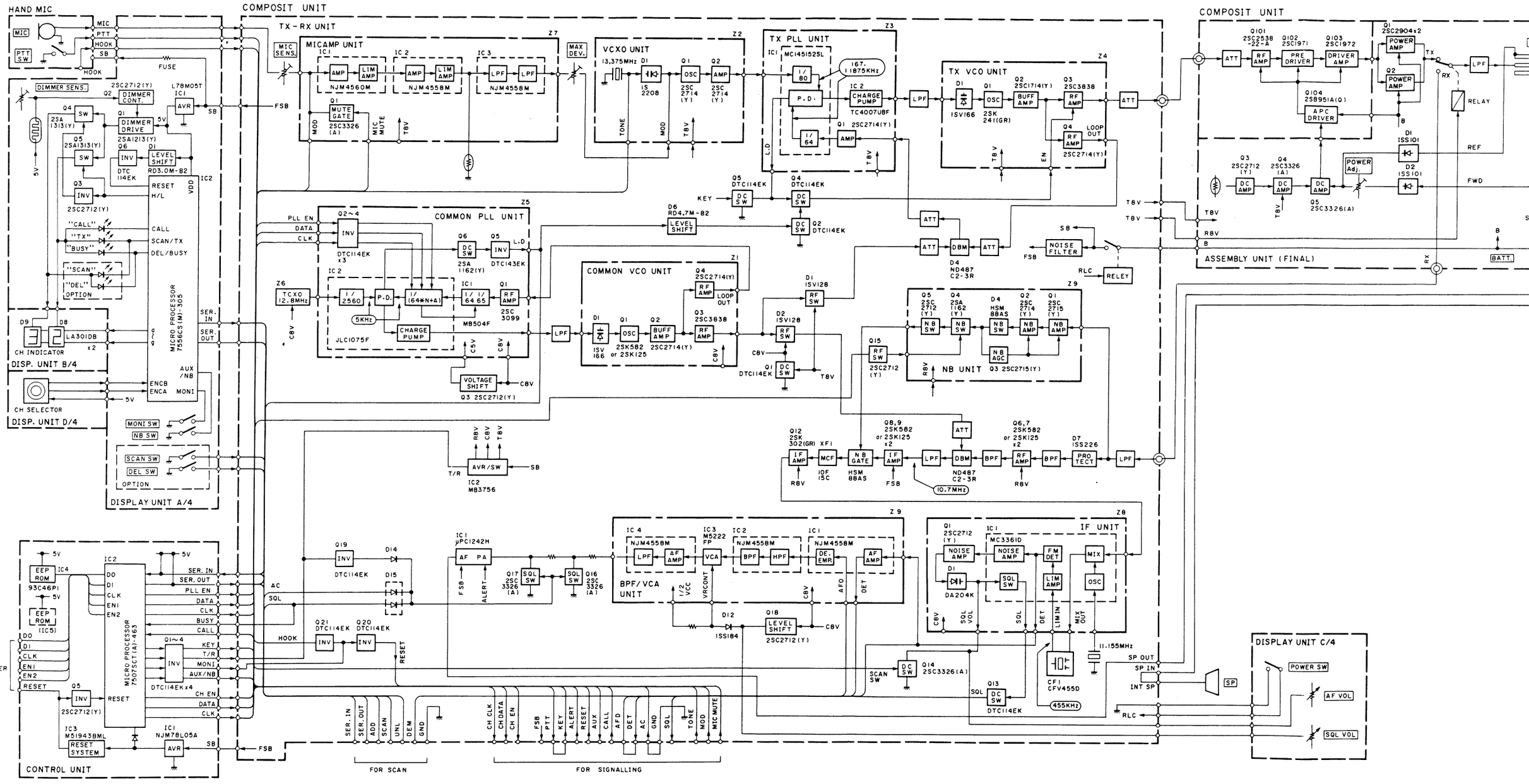
	L11	L13	L14	L17	L18	Z1	Z4
K1	——	L34-2258	L34-2258	L34-2258	L34-2258	0-10	0-10
K2	L34-1162	L34-2324	L34-2324	L34-2324	L34-2324	0-11	0-11

(X57-3260-10,11)

IC1	: μPC1242H
IC2	: MB3756
Q1,2,4,5,13,19~21	: DTC114EK
Q3,11,15,18	: 2SC2712(Y)
Q6 9	: 2SK582
Q10	: 2SA1213(Y)
Q12	: 2SK302(GR)
Q14,16,17	: 2SC3326(A)
D1,2	: 1SV128
D3,5,11~18	: 1SS184
D4,8	: ND487C2-3R
D6	: RD4.7M-B2
D7	: 1SS226
D9,10,19	: HSM88A5

TK-620(H) TK-620(H)

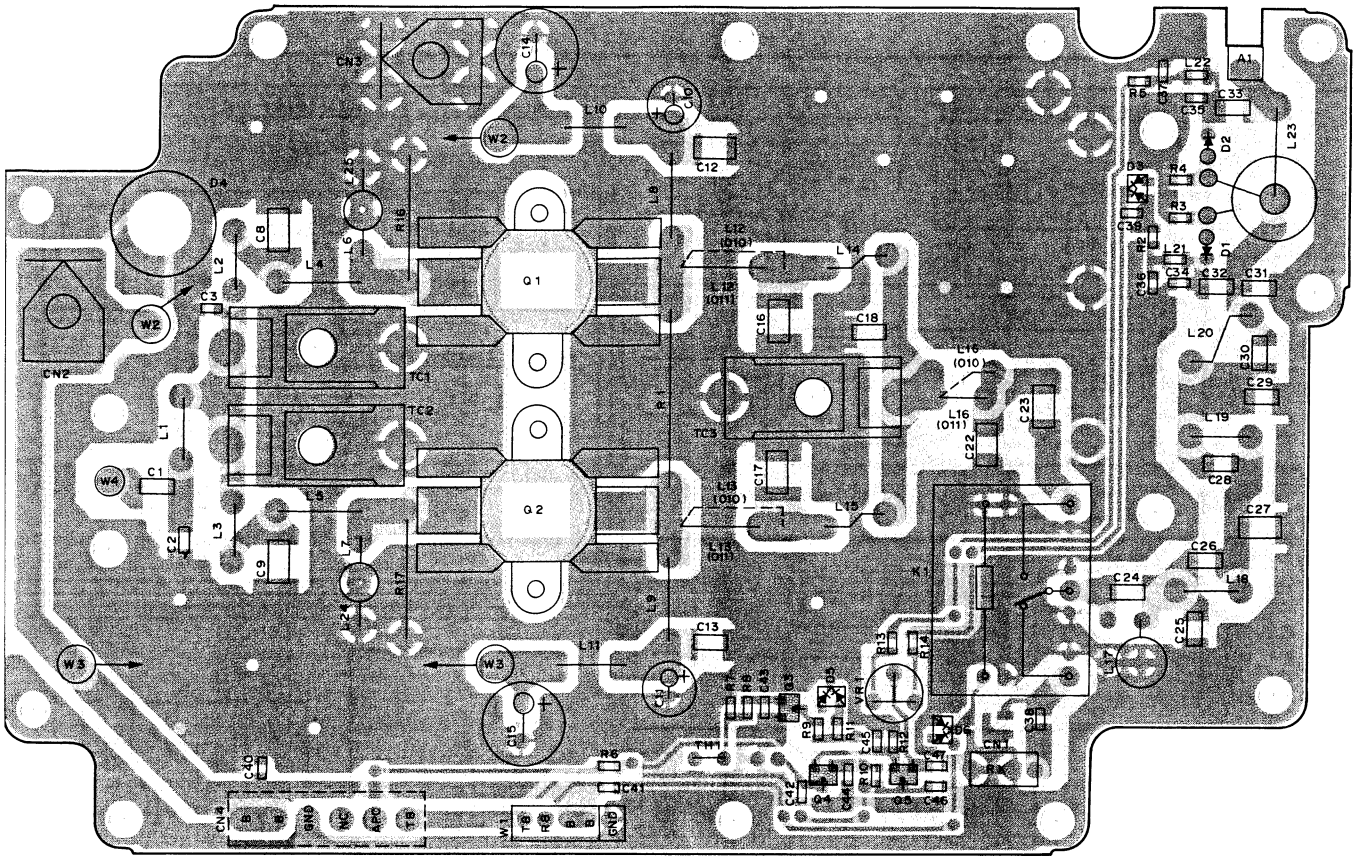
BLOCK DIAGRAM



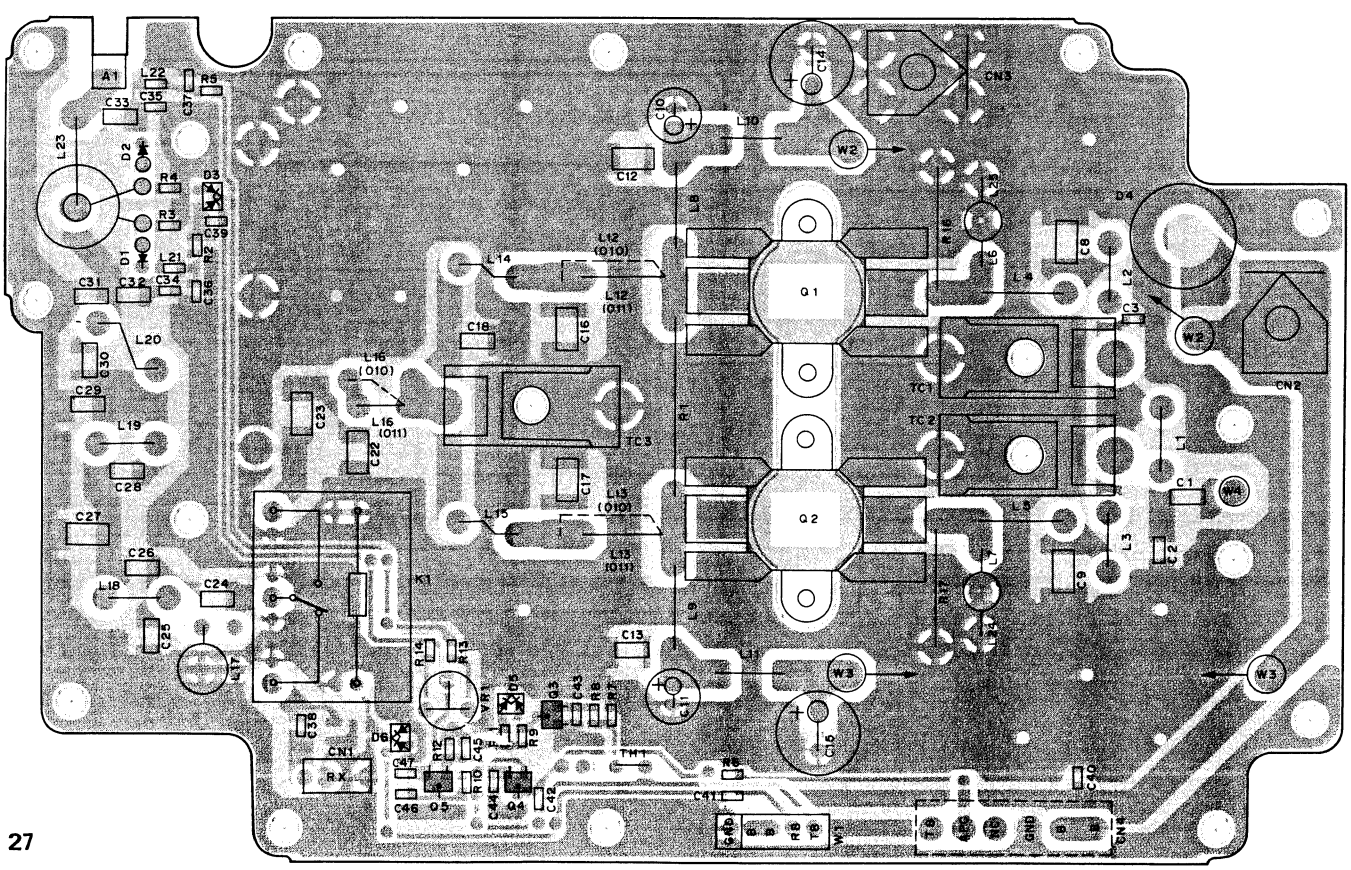
TK-620(H) PC BOARD VIEWS

FINAL UNIT (X45-3240-XX) -10 : K -11 : K2

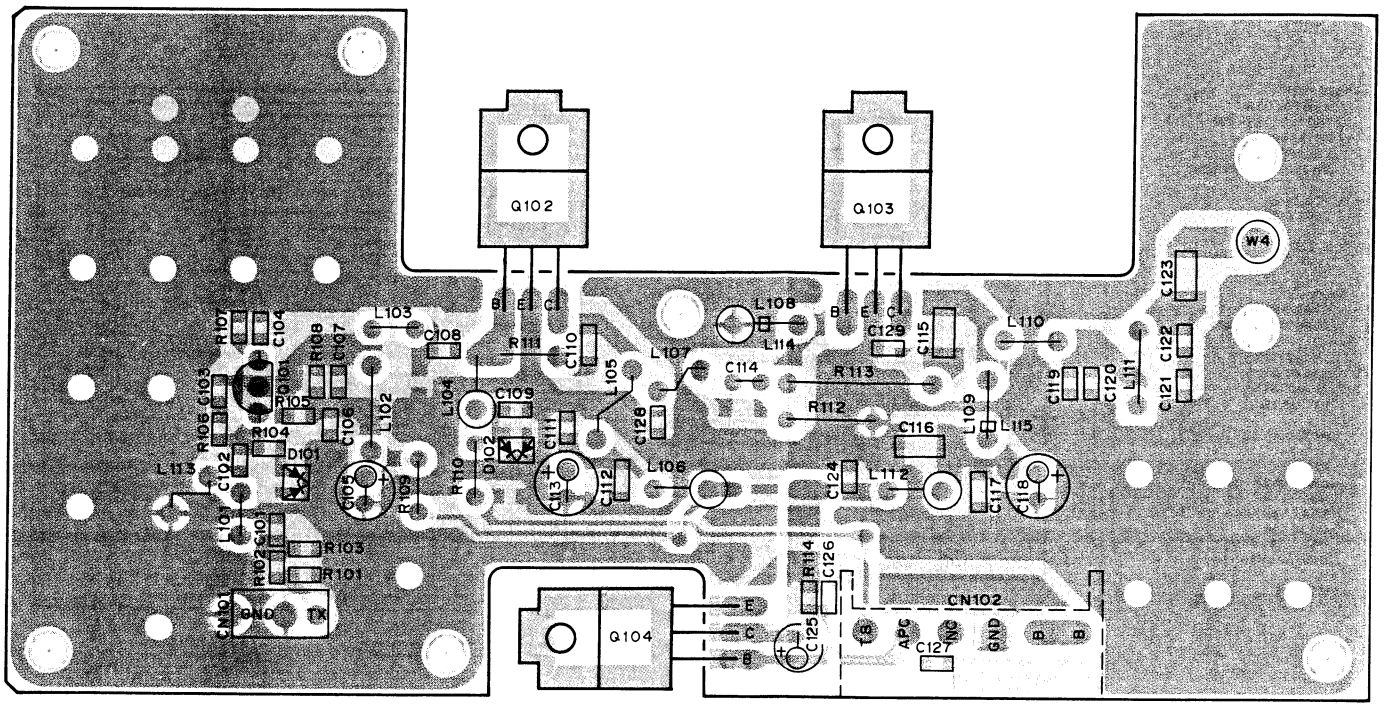
Component side view



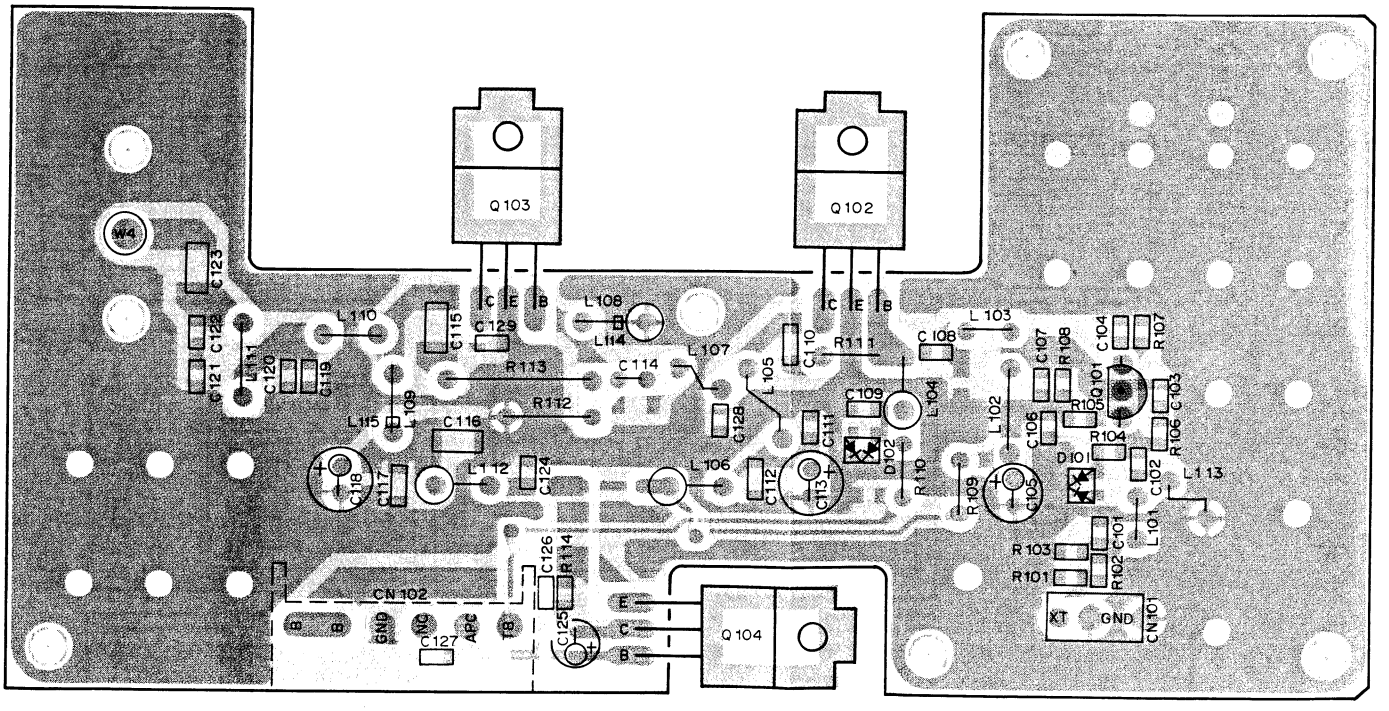
Foil side view



DRIVE UNIT (X45-3260-XX) -10 : K -11 : K2 Component side view

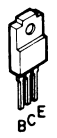


Foil side view

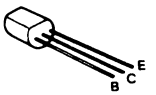


2SC2712

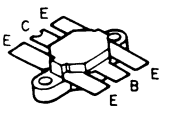
2SB951A



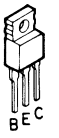
2SC2538-22-A



2SC2904



2SC1971
2SC1972



TK-620(H)

SPECIFICATIONS

GENERAL

Frequency Range	29.7 to 50MHz
Number of Channels	32 semi-duplex channels (Modifiable to 64 semi-duplex channels)
Chennel Spacing	20kHz (PLL channel step 5kHz)
Input Voltage	13.4V DC negative ground
Current Drain	0.4A on standby
	1.0A on receive
	25A on transmit
Duty Cycle	Receiver 100%, Transmitter 20%
Temperature Range	–30°C to +60°C (–22°F to +140°F)
Dimensions	7.05" (179mm) W x 2.36" (60mm) H x 12.36" (314mm) D
Weight	8.38lbs (3.8kg)

RECEIVER

(Measurements made per EIA standard EIA-204-C)

RF Input Impedance	50Ω
Sensitivity	
EIA 12dB SINAD	0.25μV
20dB Quieting	0.35μV
Squelch Sensitivity	0.2μV threshold
Modulation Acceptance	±7kHz
Selectivity	–80dB
Intermodulation	–75dB
Spurious and Image Rejection	–85dB
Audio Power Output	4W at 4Ω less than 5% distortion
Frequency Stability	±0.002% from –30°C to +60°C
Channel Frequency Spread	1MHz

TRANSMITTER

(Measurements made per EIA standard EIA-152-B)

RF Power Output	110W adjustable to 60W
RF Output Impedance	50Ω
Spurious and Harmonics	–70dB
Modulation	
Direct FM Modulation	F3E, ±5kHz for 100% at 1000Hz
FM Noise	–50dB
Microphone Impedance	Low impedance
Audio Distortion	Less than 3% at 1000Hz
Frequency Stability	±0.002% from –30°C to +60°C
Channel Frequency Spread	1MHz

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