

TH-55AT/E SERVICE MANUAL

KENWOOD
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TECHNICAL DEPT.

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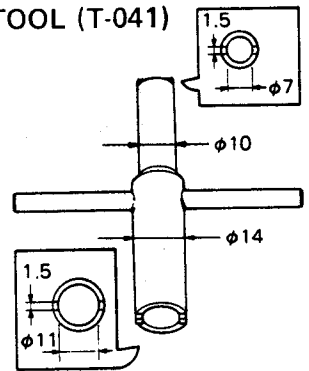
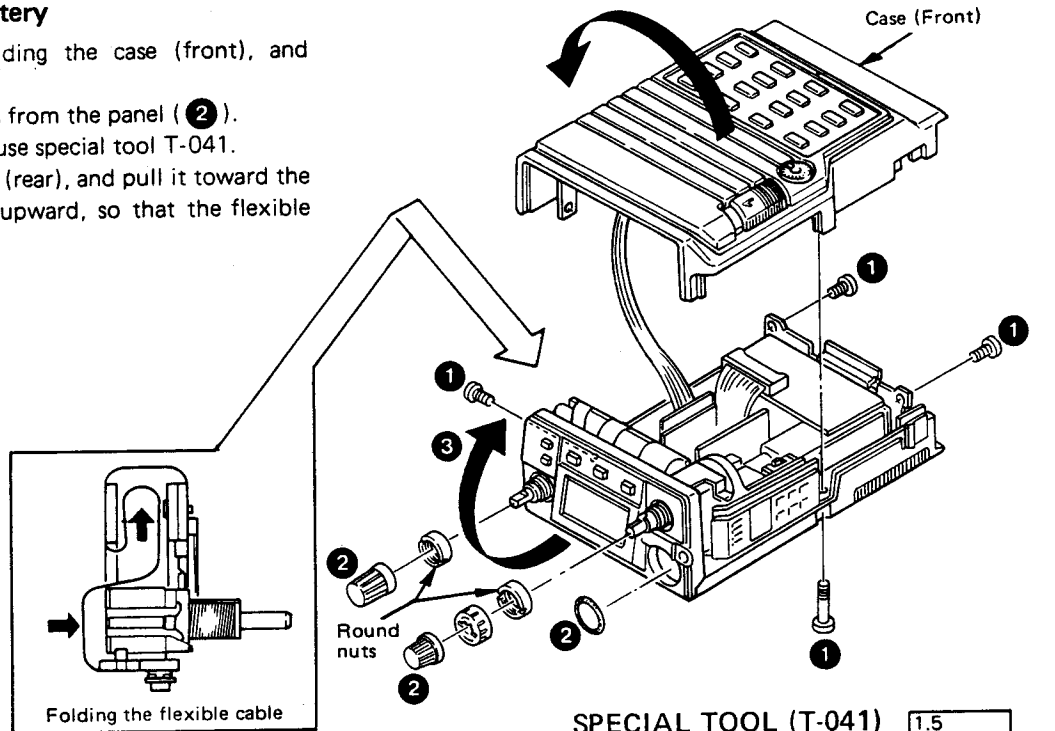
Photo is TH-55AT.

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DISASSEMBLY FOR REPAIR

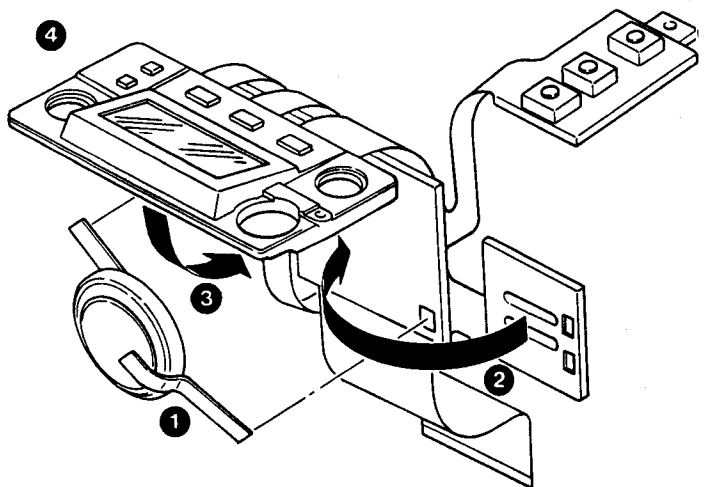
Replacing the Lithium Battery

1. Remove the 4 screws holding the case (front), and remove it (1).
2. Pull out the knobs and rings from the panel (2). To remove the round nuts, use special tool T-041.
3. Hold the panel by the case (rear), and pull it toward the front by slightly lifting it upward, so that the flexible cables come out (3).



T-041 Double-ended nut spanner

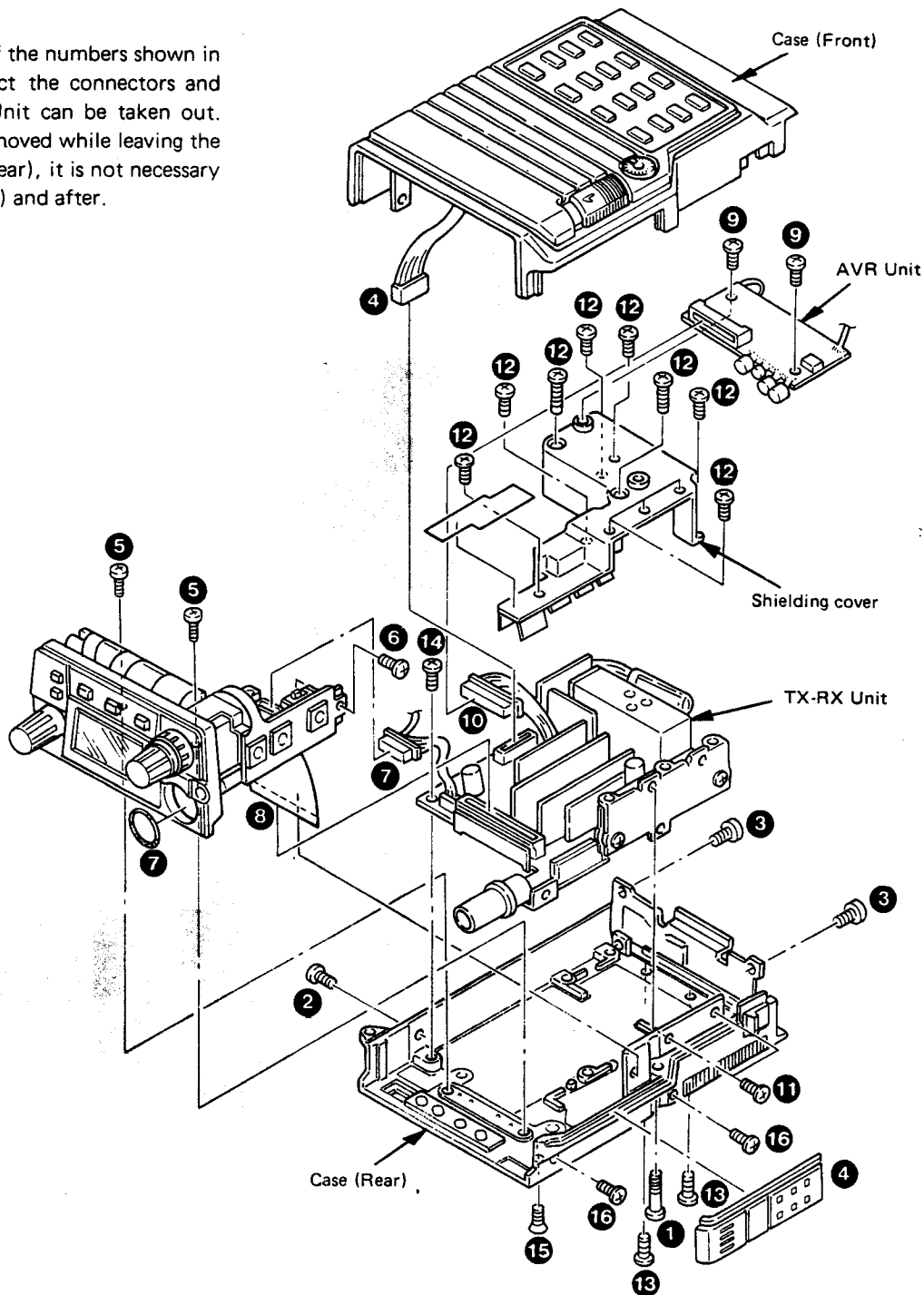
4. After replacing the lithium battery, fold the flexible cables as shown in the illustration (4).



DISASSEMBLY FOR REPAIR

Removing the TX-RX Unit

Remove the screws in the order of the numbers shown in the illustration, and then disconnect the connectors and flexible cables ; now the TX-RX Unit can be taken out. When the shielding cover is to be removed while leaving the TX-RX Unit attached to the case (rear), it is not necessary to remove the screws numbered (14) and after.



CIRCUIT DESCRIPTION

FREQUENCY CONFIGURATION

The TH-55 uses a PLL synthesizer system and a digital VFO that is capable of covering a frequency range of 1258 MHz to 1299.9875MHz in 12.5kHz or 25kHz increments.

Its receiver system configuration is based upon double super-heterodyne operating principles with a first intermediate frequency (IF) of 59.7MHz and a second intermediate frequency of 455kHz.

An incoming signal from the antenna is mixed with the first local oscillator signal to produce the first intermediate frequency of 59.7MHz. The first intermediate frequency is then mixed with the second local oscillator frequency of 59.245MHz to produce the second intermediate frequency of 455kHz.

The transmitter system signal is obtained by doubling the oscillating frequency of the VCO. The signal is then amplified by a linear amplifier and fed to the antenna.

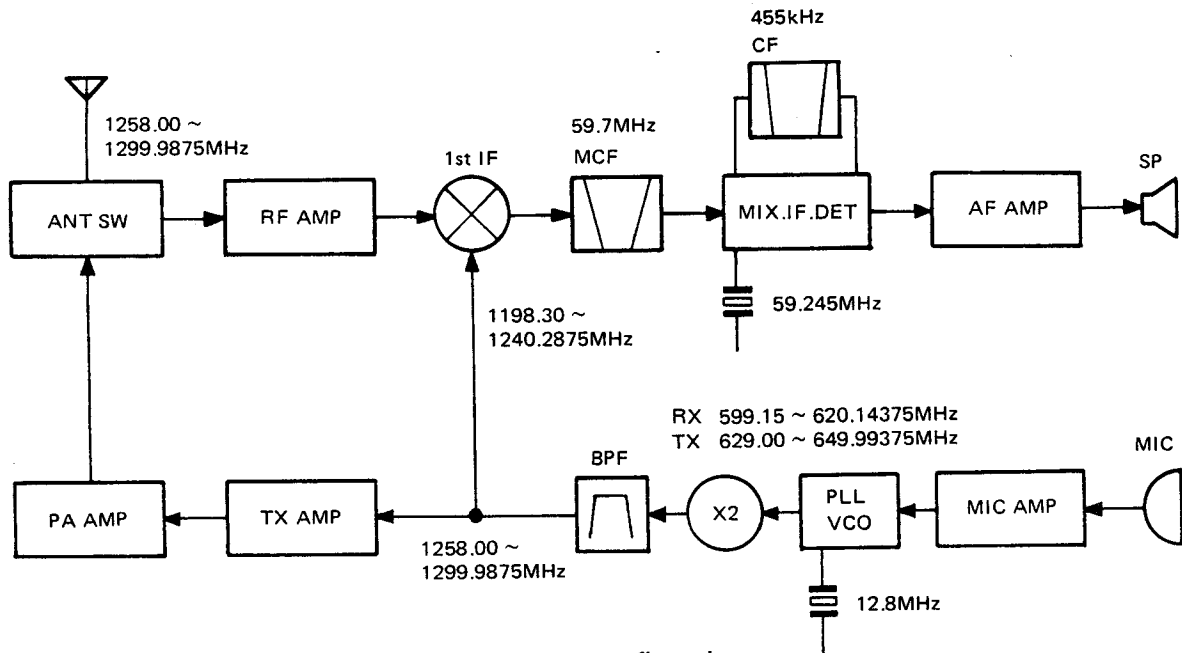


Fig. 1 Frequency configuration

RECEIVER SYSTEM

• General

An incoming signal from the antenna passes through a low-pass filter and an antenna switch and enters the front-end section. The signal is amplified by an RF amplifier composed of Q6 and Q7 : 2SC4095. Undesirable band components are attenuated by helical coils L12 and L13. The processed signal is then mixed with the doubled VCO frequency to produce the first intermediate frequency of 59.7MHz. The signal, in the form of the first intermediate frequency, then passes through the two monolithic crystal filter (MCF) stages for further elimination of undesirable signals. After passing through the MCF stages, the target signal enters IC1 : TK10486MT1(B,C) located inside the IF unit and is mixed with the second local oscillator frequency to produce the second intermediate frequency of 455kHz. The 455kHz IF signal passes through ceramic filter (CF1) and re-enters IC1 for additional amplification and demodulation. The output derived from IC1 is then amplified by the audio frequency (AF) amplifier and fed to the speaker.

Item	Rating
Normal center frequency (fo)	59.700MHz
Pass bandwidth	± 12.5kHz or more at 3dB
Attenuation bandwidth	± 35kHz or less at 25dB ± 100kHz or less at 60dB
Guaranteed attenuation	70dB or more within ± 1MHz 80dB or more within ± 890 ~ 930kHz Spurious : 40dB or more within fo ~ fo + 500kHz
Ripple	2dB or less
Insertion loss	4dB or less
Terminal impedance	560Ω ± 5% / 1.5pF ± 0.1pF

Table 1 MCF (L71-0280-05) (TX-RX unit XF1, XF2)

Item	Rating
Center frequency of 6dB bandwidth (fo)	455kHz ± 1.5kHz
6dB bandwidth	± 7.5kHz or more
40dB bandwidth	± 15kHz or less
Ripple	1.5dB or less (455kHz ± 1.5kHz)
Guaranteed attenuation	27dB or more within fo ± 100kHz
Insertion loss	6dB or less
Terminal impedance	1.5kΩ

Table 2 Ceramic filter (L72-0362-05) (IF unit CF1)

CIRCUIT DESCRIPTION

• Squelch and Mute Circuit

This unit has the T.ALT (Tone Alert) function to produce two muting signals. When a signal is received while the T.ALT function is ON, only a beep tone is sounded.

The microprocessor determines existing conditions and

provides muting signals MU1 and MU2 as necessary. The conditions for various muting operations are listed in table 3. When the microprocessor outputs a logical high, muting takes place.

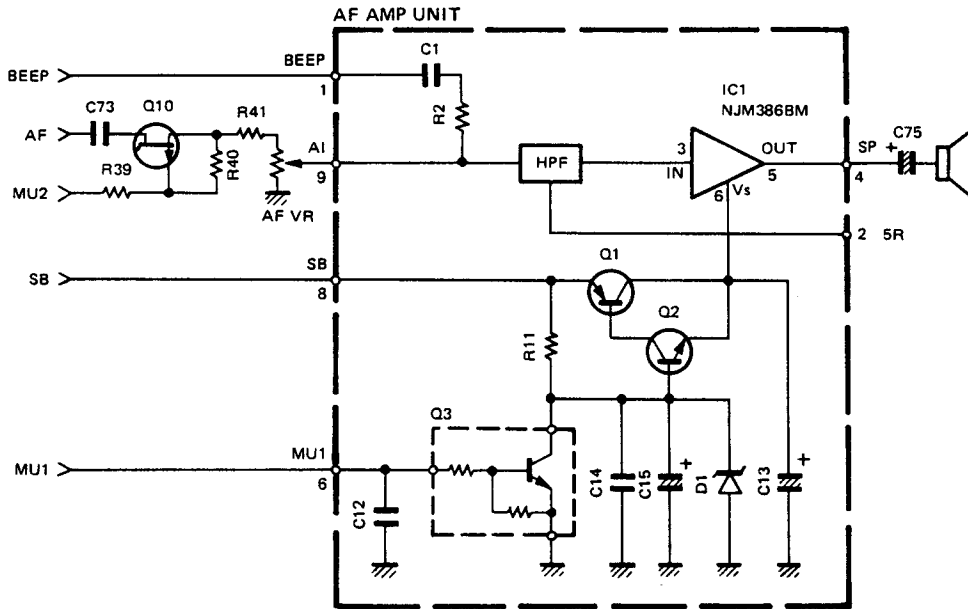


Fig. 2 Mute circuit

Condition		MU1	MU2
Transmission		H	H
Reception	Normal operation	When Squelch is ON	H
		When Squelch is OFF	L
	T.ALT operation	Waiting for Signal	H
		Signal is Received (T.ALT operating)	L

Muted when the level is a logic "H".

Table 3 Muting conditions

• S-Meter Circuit

The signal used to drive the S-meter (signal strength meter) is taken from pin 12 by detecting the output from the IF amplifier IC1 : TK10486MT1(B,C) located in the IF unit. This signal is then directly applied to pin 14 of the microprocessor and is used to control the S-meter section of the liquid crystal display (LCD). Since its display segments operate in pairs, signal strength can be indicated in six levels.

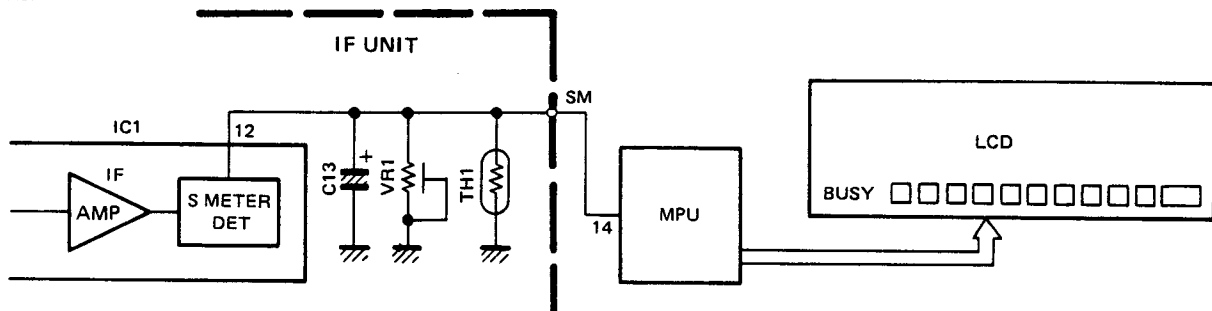


Fig. 3 S-meter circuit

CIRCUIT DESCRIPTION

• RIT Circuit

The RIT circuit achieves a frequency deviation of over $\pm 5\text{kHz}$ by varying the frequency of crystal oscillator X1, which serves as a reference frequency oscillator for the PLL circuit.

During receive, the transistor on the VR1 side, one half of Q2 : FMG2, is turned OFF and the other half is turned ON. Since the reverse bias applied to D1 : MA363 of the PLL unit can be varied by means of VR2 within a range of over $\pm 1\text{V}$, the frequency of the first local oscillator can be varied in excess of $\pm 5\text{kHz}$.

During transmission, the half of Q2 on the VR1 side is turned ON and the other half is turned OFF. This condition inhibits VR2, and as a result, the transmission frequency is fixed as preset by VR1.

Excellent frequency stability is achieved by virtue of thermistor TH1, which temperature-compensates the reference-frequency crystal oscillator.

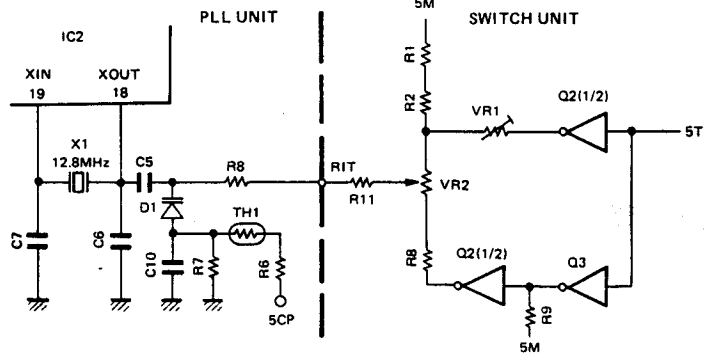


Fig. 4 RIT circuit

TRANSMITTER SYSTEM

• General

The transmitter frequency is obtained by doubling the oscillation frequency of the voltage-controlled oscillator (VCO) in the PLL circuit.

Modulation is achieved by varying the oscillation frequency of the VCO by means of the microphone amplifier's output, which is directly applied to the variable-capacitance (varicap) diode located in the VCO circuit.

The output derived from the VCO is amplified, first in the drive stage, then by the RF power module where the signal is amplified to the required power level and fed to the antenna.

• Modulation Circuit

The signal from the microphone enters the MIC amplifier unit where it is amplified and then limited. The output signal from the limiting amplifier passes through the splatter filter and reaches the MOD terminal by way of the microphone gain control. The signal enters the VCO unit and is applied to varicap diode D2 : MA360 in the VCO circuit, producing variable reactance phase modulation.

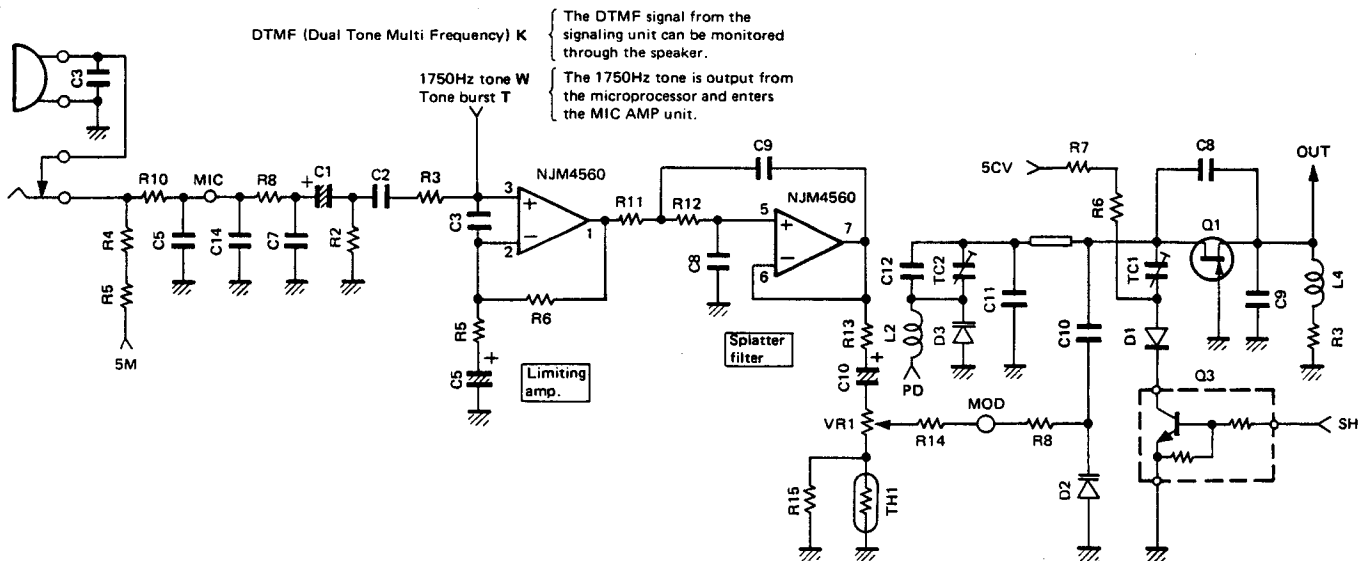


Fig. 5 Modulation circuit

CIRCUIT DESCRIPTION

• Drive and Final Circuits

The modulated signal from the VCO is doubled in frequency, passes through the band-pass filter (BPF) and the transmit/receive switch composed of D1 and D2 : MA77, and enters the drive stage. In the drive stage, the signal is amplified by a two-stage amplifier to approximately +9 dBm. The Automatic Power Control (APC) voltage is used to vary the collector voltage of the first-stage of the power module in order to control the output. The output from the drive circuit is further amplified by the RF power module and fed to the antenna through the antenna switch.

• Hi/Low Switching Circuit

The TH-55 is equipped with a transmit power switch to allow selection of a high output power of 1W (with a power source voltage of 9V) or a low output power of 0.1W.

This switch is used to turn ON/OFF potentiometers VR1 and VR2 in the APC unit, which in turn change the base voltage of Q2. As a result, the CTL voltage is changed.

• APC Circuit

The APC circuit is designed to deliver stable transmitter output power. This circuit operates by detecting the standing wave of the final module's output with the help of a directional coupler. The signal obtained from this coupler is used to provide, automatic power control by controlling Q2, Q3, and Q4 in the APC unit, which in turn vary the power supply voltage of the power module's first stage.

By virtue of the above control operation, stable RF output power can be generated from the final module. Furthermore, a relatively constant current to the final module that is independent of load variations can be provided.

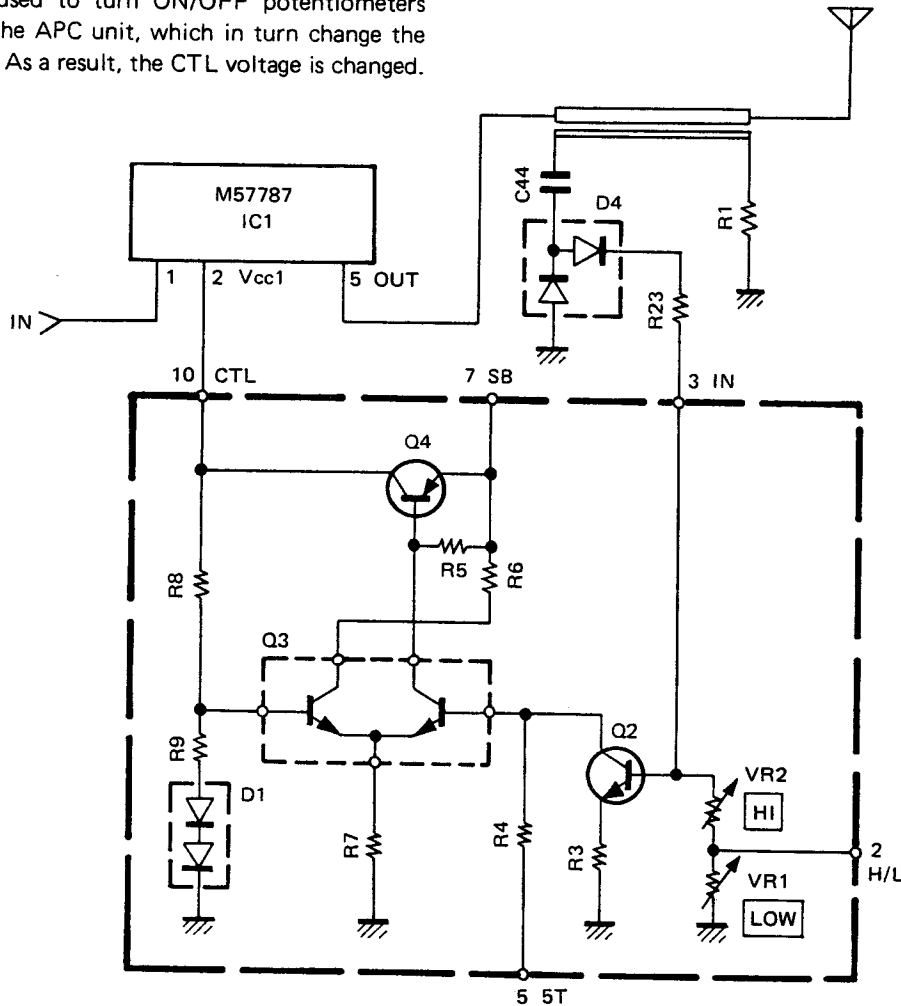


Fig. 6 APC and HI/LOW switching circuit

CIRCUIT DESCRIPTION

POWER SUPPLY CIRCUIT

The individual circuits that make up the TH-55 are operated by power supply voltage SB and one or more of the following voltages, which are obtained from the power supply voltage SB : 5V (5T) transmit B+, 5V (5R) receive B+, 5V (5C) common B+, and 5V (5M) microphone/microprocessor B+.

The signal that appears on the TX terminal is used to switch between 5T and 5R. Since pin 29 of the microprocessor is at a logical low during transmission, transistor Q4 :

2SA1313(Y) turns ON and 5C is supplied at the 5T terminal.

During reception, pin 29 of the microprocessor is open (logical high), transistor Q4 : 2SA1313(Y) turns OFF and, in turn, Q5 and Q6 turn ON supplying 5C at the 5R terminal.

5C is obtained from, 5V three-terminal regulator IC1 : LP2950CZ, a differential amplifier Q2 : FMW1 and Q1 : 2SB1182F5(Q).

The 5V output of regulator IC1 is used to power the microprocessor and the microphone amplifier circuit.

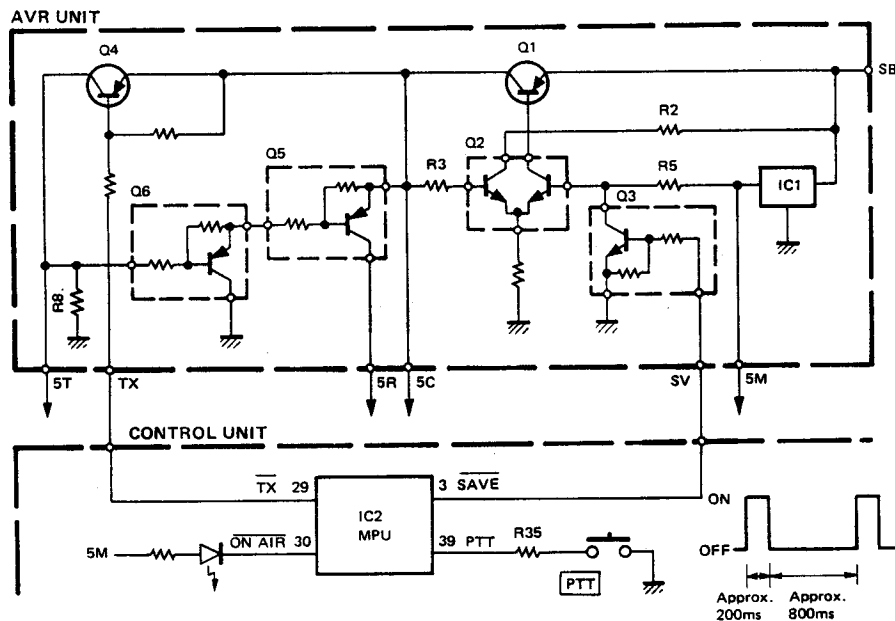


Fig. 7 Power supply circuit

● Battery-save and Automatic Power OFF

The TH-55 is equipped with a battery-save function and an automatic power-off function to save battery power during standby reception. The microprocessor : μ PD75108AG places a control signal on its SAVE pin (pin 3), which activates the battery-save function or the automatic power-off function depending on existing conditions. When this signal is present, all power supplies are turned off except

the 5V (5M) that is used for powering the microprocessor and the microphone amplifier circuit. When the battery-save function is operative, it alternately switches between the ON (normal) state for approximately 200msec. and the OFF (save) state for approximately 800msec.

The power-off function sustains the above OFF state, in which the current consumption is reduced to approximately 5mA.

	Battery-saving operation	Auto power-off operation	To cancel battery-save and auto power-off operation
Operation starting time	10 seconds after the closure of the squelch circuit and if no key has been pressed in the interim.	60 minutes after the closure of the squelch circuit and if no key has been pressed during this period. (A beep tone sounds for 5 seconds after 59 minutes.)	Turn the power switch ON again while holding down the "MHz" key.
Resetting	Receive an incoming signal. Open the squelch function. Or press a key.	Press the MONI key. Turn the power switch ON again.	Turn the power switch ON again while holding down the "MHz" key.
Display	Normal		 APO/BS cancel mark

Table 4 Battery-saving and automatic power-off operation conditions

CIRCUIT DESCRIPTION

PLL SYNTHESIZER SECTION

In the TH-55, a common VCO is used to obtain 40MHz for both transmission and reception.

To obtain comparison frequencies in 12.5kHz and 25 kHz increments, the 12.8MHz oscillation frequency of the reference oscillator is divided by 2048 to produce 6.25kHz. The VCO runs at half the target frequency required for use by both transmitter and receiver sections. The transmit/receive switching signal is felt on the SW1 pin 14 of IC2 : JLC1075F. The output signal derived from the VCO is applied to a frequency-doubler as well as the prescaler IC1 : MB501L. This IC incorporates two modular prescalers, one with a frequency division factor of 1/128 and the other with a frequency division factor of 1/129. Selection is made by way of the MC terminal. The output of the prescaler is applied to the PLL IC IC2 : JLC1075F. Using these two ICs, a pulse-swallow PLL circuit configuration is created.

The output of the phase comparator passes through the charge pump made up of Q2 and Q3 external to the synthesizer section, then through the active low-pass filter (LPF) made up of Q4 : 2SC2712(GR) and Q5 : 2SC3624(L18), and is applied to varicap diode D3 : MA360 in the VCO section.

These PLL division ratios and frequencies are expressed by the following equation :

$$\text{Overall division ratio, } M = A + 128N,$$

where A is the swallow counter division ratio, and N is the main counter division ratio.

A and N are received from the microprocessor as serial data and take on different values between transmission and reception. For this reason, the overall division ratio, M, calculated for transmit is different from its counterpart in receive. The data is stored in a 19-bit shift register.

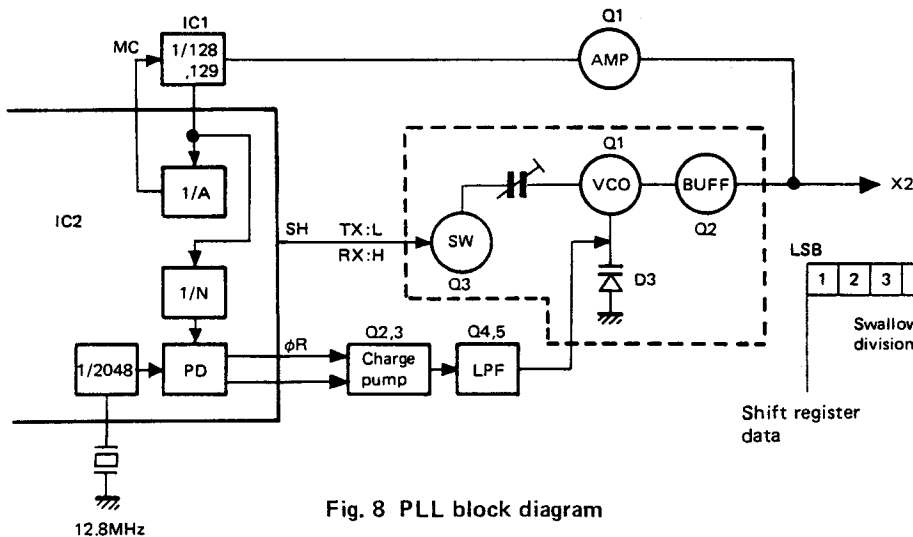


Fig. 8 PLL block diagram

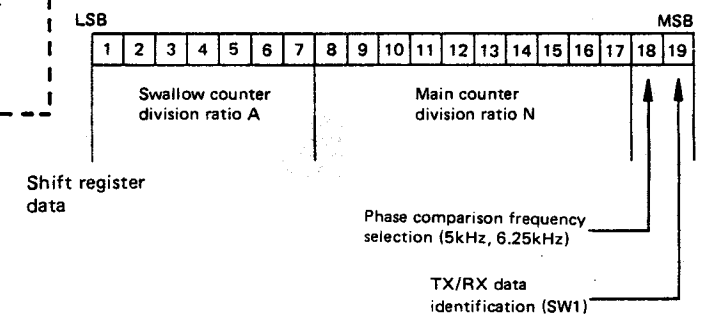


Fig. 9 PLL data configuration

MICROPROCESSOR & PERIPHERAL CIRCUITS

• Tone Alert Function (T.ALT)

The T.ALT function is designed to alert the user by sounding a 5-second beep tone and by flashing the bell (tone alarm) indicator when an incoming signal is received during standby. Terminals S2 and I1 are shorted by pressing the T.ALT switch and the microprocessor senses this switching action and outputs logical high signals on its MU1 and MU2 terminals.

The output on MU1 turns off the power supply (VS) to the AF amplifier, while the output on MU2 turns off the input signal to the AF amplifier by means of Q10 : 2SJ144 (GR).

When an incoming signal is received from the antenna, terminal SC of the IF unit goes from low to high, and this activates the BUSY pin of the microprocessor. When the microprocessor receives this signal, it pulls MU1 low to turn on the power supply of the AF amplifier.

At the same time, the microprocessor outputs a beep tone on its BEEP terminal. This signal is amplified by the AF amplifier and output by speaker SP.

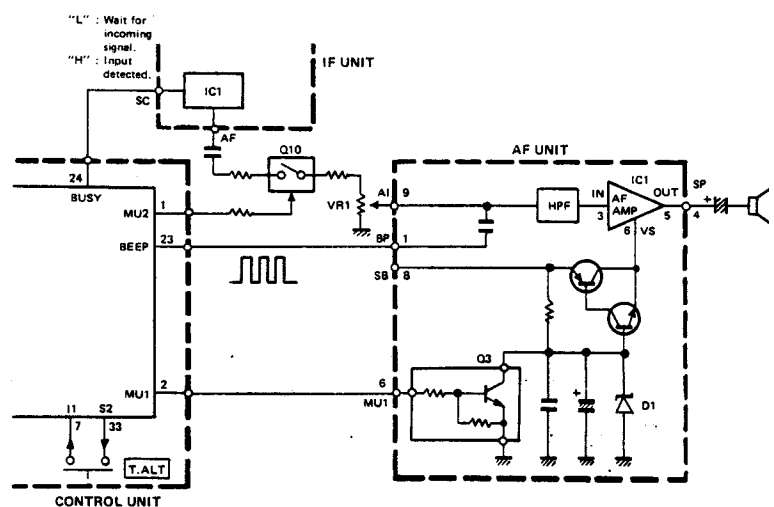


Fig. 10 T.ALT functional circuit

CIRCUIT DESCRIPTION

Reset and Backup Circuits

In the reset and backup circuits, various operations are performed through the detection of voltage 5M. Resetting is done by applying a logical low pulse, which is produced by C1 and Q1 : 2SC2712(Y), to the RESET terminal of the microprocessor. Backup operations are controlled when the 5M voltage drops to approximately 4.5V (4.3V to 4.6V). When this occurs the output of IC3 : S8054ALR goes low.

The microprocessor senses this low state at its VF terminal and goes into the backup mode.

When the 5M voltage rises abruptly, the reset circuit made up of C1 and Q1 resets the microprocessor. When the 5M voltage rises gradually, the reset operation is performed within the microprocessor by the detection of a voltage rise that takes place as the output of IC3 changes from low to high.

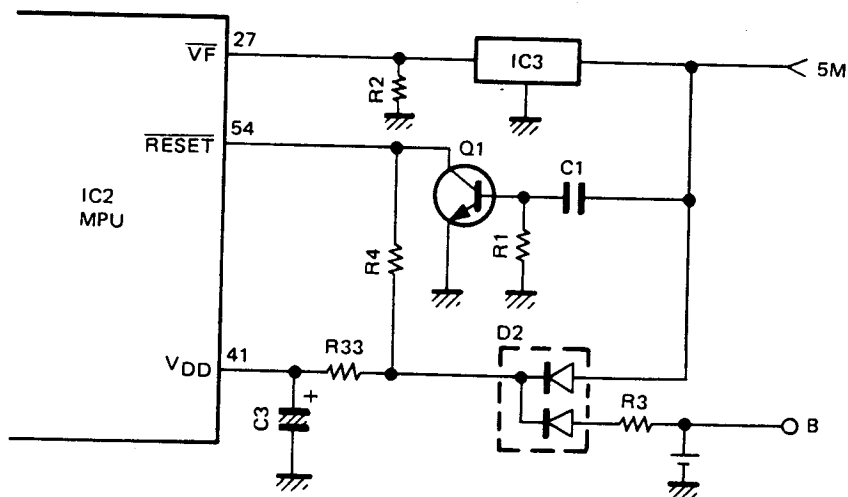


Fig. 11 Reset and backup circuit

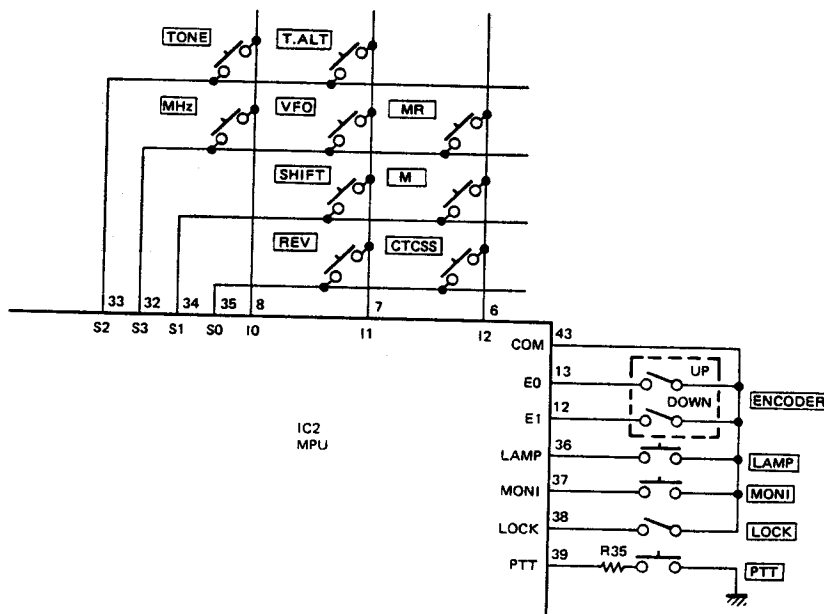
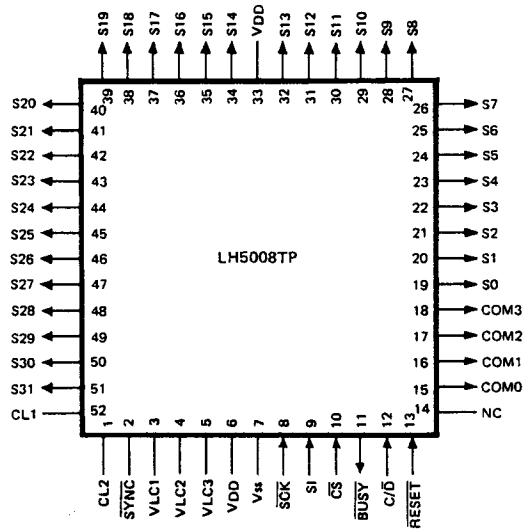


Fig. 12 Keyboard

SEMICONDUCTOR DATA

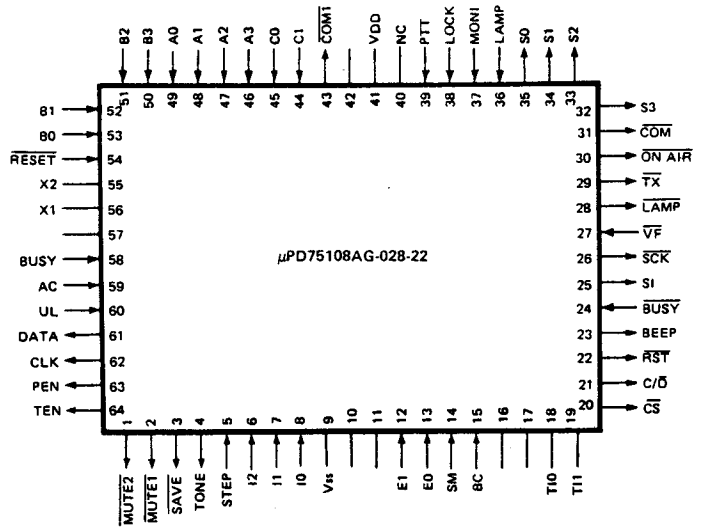
LH5008TP (Control unit IC1)

● Terminal connection diagram



μPD75108AG-028-22 (Control unit IC2)

● Terminal connection diagram



● Terminal functions (LH5008TP)

Pin No.	Name	I/O	Function
1	CL2	-	Internal clock oscillation resistance pin.
2	SYNC	-	Not used.
3, 4	VLC1, VLC2	-	LCD driver power supply.
5	VLC3	-	Ground.
6	VDD	-	+5V power supply.
7	VSS	-	Ground.
8	SCK	I	Shift clock input.
9	SI	I	Serial data input.
10	CS	I	Enable input. "L" : Data input enabled, "H" : Contents of the memory are output
11	BUSY	O	Data input control. "L" : Inhibit, "H" : Permit
12	C/D	I	Input data indentification input. "L" Data, "H" : Command
13	RESET	I	Reset input.
14	NC	-	
15 ~ 17	COM0 ~ COM2	O	Common drive output.
18	COM3	O	Not used.
19 ~ 32	S0 ~ S13	O	Segment drive output.
33	VDD	-	+5V power supply.
34 ~ 45	S14 ~ S25	O	Segment drive output.
46 ~ 51	S26 ~ S31	O	Not used.
52	CL1	-	Internal clock oscillation resistance pin.

SEMICONDUCTOR DATA

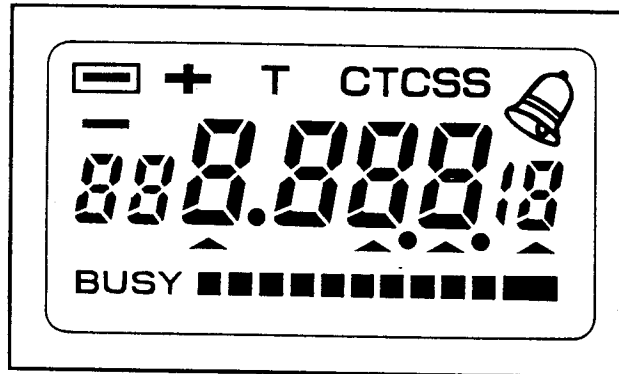
• Terminal functions (μ PD75108AG-028-22)

Pin No.	Name	I/O	During save	Function
1	MUT2	O	L	AF input line control. "L" : ON, "H" : OFF
2	MUT1	O	H	AF amplifier power control. "L" : ON, "H" : OFF
3	SAVE	O	H	Power save control. "L" : ON, "H" : OFF
4	TONE	O	L	Tone output. During transmit, 1750Hz. T, W Type
5	STEP	I	-	Step control. "L" : ON, "H" : OFF
6	I2	I	-	Key matrix input. M, CTCSS, MR
7	I1	I	-	Key matrix input. VFO, T.ALT, SHIFT, REV
8	I0	I	-	Key matrix input. MHz, TONE
9	Vss	-	-	Ground.
10, 11	-	-	-	Ground.
12	E1	I	-	Encoder input. DOWN
13	E0	I	-	Encoder input. UP
14	SM	I	-	S meter input.
15	BC	I	-	Battery voltage check.
16, 17	-	-	-	Ground.
18	TI0	-	-	Ground.
19	TI1	-	-	Ground.
20	CS	O	H	LCD driver control output.
21	C/D	O	H	LCD driver control output.
22	RST	O	H	LCD driver control output.
23	BEEP	O	L	Square wave output when BEEP is on.
24	BUSY	I	-	LCD driver control output.
25	SI	O	-	LCD driver control output.
26	SCK	O	-	LCD driver control output.
27	VF	I	-	Perform backup operation when the 5M voltage drops.
28	LAMP	O	H	Lamp ON/OFF control. "L" : ON, "H" : OFF
29	TX	O	H	Transmit/receive switching. "L" : Transmit, "H" : Receive
30	ON AIR	O	H	ON AIR display output. "L" : ON, "H" : OFF
31	COM	O	L	"L" : normal, "H" : during save or backup.
32	S3	O	L	Key matrix output. MHz, VFO, MR
33	S2	O	L	Key matrix output. TONE, T.ALT
34	S1	O	L	Key matrix output. M, SHIFT
35	S0	O	L	Key matrix output. CTCSS, REV
36	LAMP	I	-	Lamp switch control. "L" : SW ON, "H" : SW OFF
37	MONI	I	-	Monitor switch control. "L" : SW ON, "H" : SW OFF
38	LOCK	I	-	Lock switch control. "L" : SW ON, "H" : SW OFF
39	PTT	I	-	PTT switch control. "L" : SW ON, "H" : SW OFF
40	NC	-	-	Open.
41	VDD	-	-	+5V power supply.
42	-	-	-	Ground.
43	COM1	O	L	
44	C1	I	H	Display switching. "L" : Normal display, "H" : Channel display
45	C0	I	-	VHF/UHF switching. "L" : VHF, "H" : UHF
46 ~ 49	A3 ~ A0	I	-	Destination.
50 ~ 53	B3 ~ B0	I	-	Destination.
54	RESET	I	-	System reset.
55	X2	-	-	
56	X1	-	-	
57	-	-	-	Open.
58	BUSY	I	-	Busy control. "L" : Open, "H" : Busy
59	AC	I	-	Tone squelch control output. "L" : No match, "H" : Match
60	UL	I	-	Unlock output. "L" : Lock, "H" : Unlock
61	DATA	O	L	PLL, TONE data.
62	CLK	O	L	PLL, TONE clock.
63	PEN	O	L	PLL enable.
64	TEN	O	L	CTCSS enable.

SEMICONDUCTOR DATA

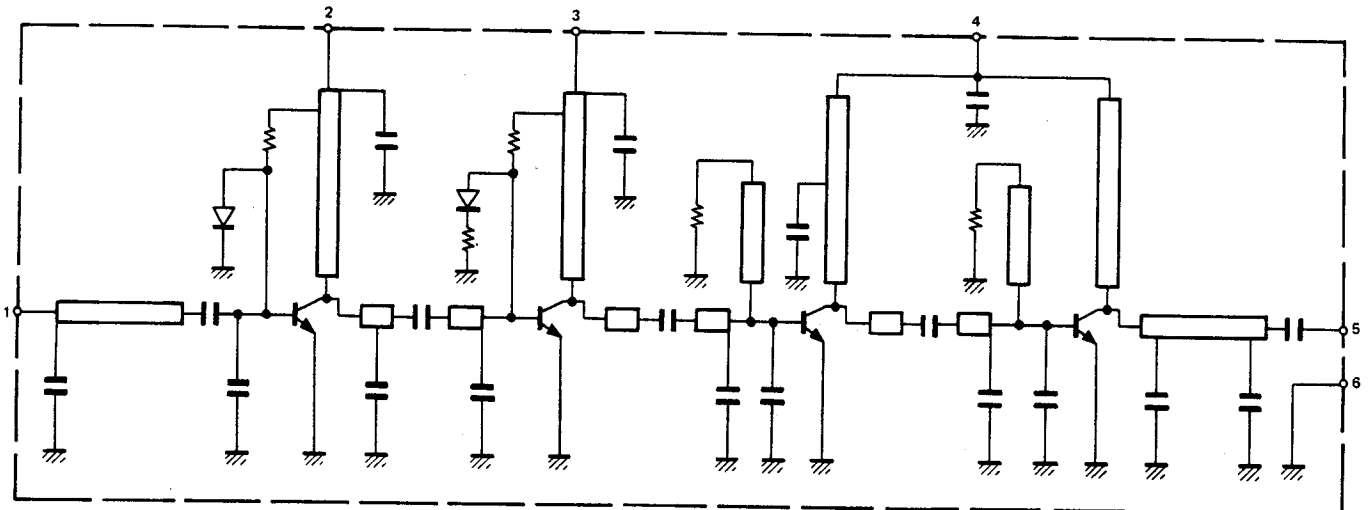
FTD8608 (Control unit LCD)

- All lighting



M57787 (TX-RX unit IC1)

- Equivalent circuit



- 1 : Input
- 2 : Pre-drive + B
- 3 : Bias + B
- 4 : Final + B
- 5 : Output
- 6 : GND (Fin)

• Electrical characteristics

Item	Symbol	Rating			Unit	Condition
		MIN.	TYP.	MAX.		
Output power	P_o	1.5	1.7		W	$V_{cc1} = V_{cc2} = V_{cc3} = 7.2V$ $f = 1.24 \sim 1.3GHz$ $P_{in} = 7mW$ $Z_G = Z_L = 50\Omega$ $T_c = 25^\circ C$
Total efficiency	η_T	28	30		%	
2nd spurious				-30	dB	
Input SWR	ρ_{in}			2.5	-	
Output SWR	ρ_{out}		1.5		-	

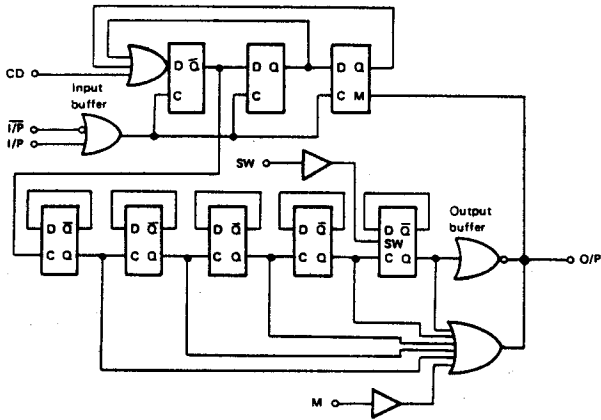
• Maximum rating

Item	Symbol	Condition	Rating	Unit
Operating voltage	$V_{cc1, 2}$		9	V
Operating voltage	V_{cc3}		16	V
Current consumption	I_{cc}		1.5	A
Input power	P_{in}	$Z_G = Z_L = 50\Omega, V_{cc1} \leq 8V, P_o \leq 3W$	10	mW
Output power	P_o	$Z_L = 50\Omega$	5	W
Operating case temperature	$T_c (op)$		-20 ~ +100	$^\circ C$
Storage temperature	T_{stg}		-40 ~ +110	$^\circ C$

SEMICONDUCTOR DATA

MB501L (PLL unit IC1)

• Block diagram



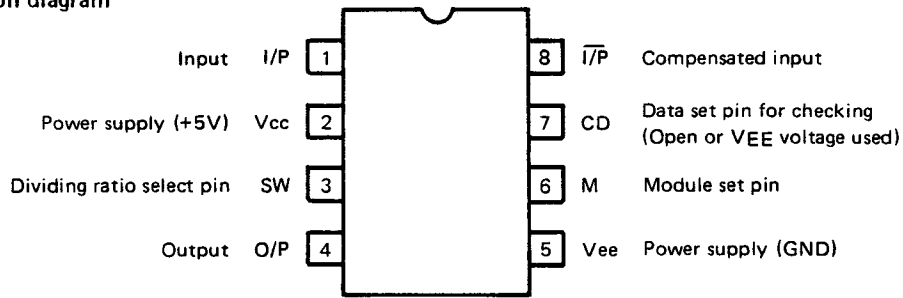
• Function table

SW	M	Division ratio
H	H	64
H	L	65
L	H	128
L	L	129

SW : H ; V_{cc}, L ; Open

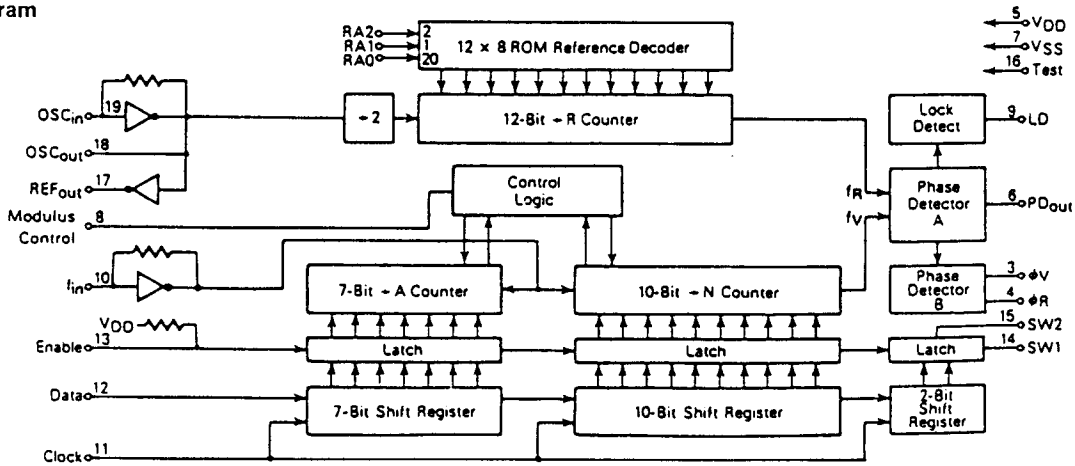
M : H ; 2.0V ~ V_{cc}, L ; V_{EE} ~ 0.8V

• Terminal connection diagram

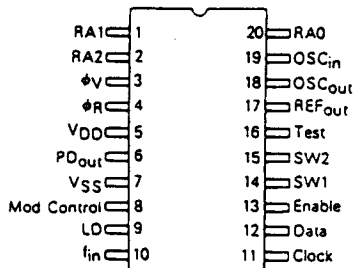


JLC1075F (PLL unit IC2)

• Block diagram



• Terminal connection diagram



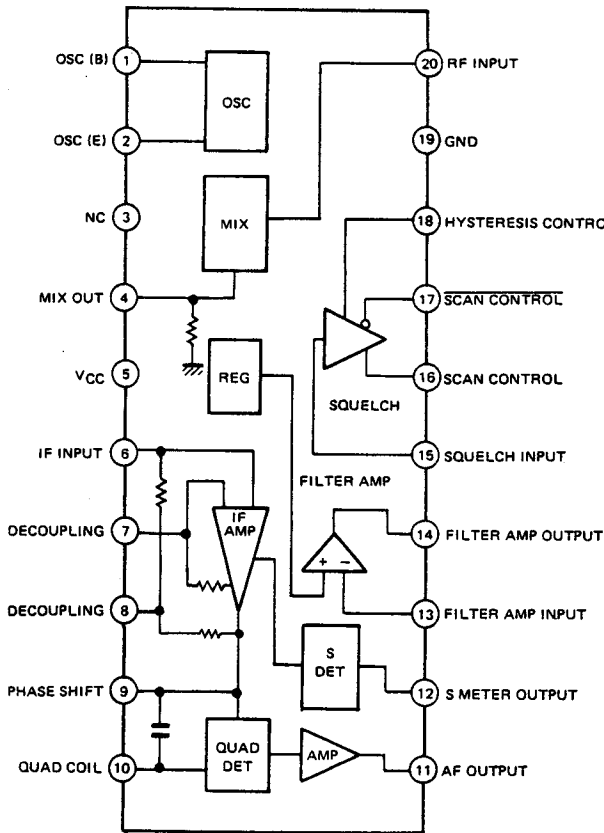
• Total division ratio

Reference address code			Total division ratio
RA2	RA1	RA0	
0	0	0	8
0	0	1	64
0	1	0	128
0	1	1	256
1	0	0	1160
1	0	1	2560
1	1	0	1024
1	1	1	2048

SEMICONDUCTOR DATA/DESCRIPTION OF COMPONENTS

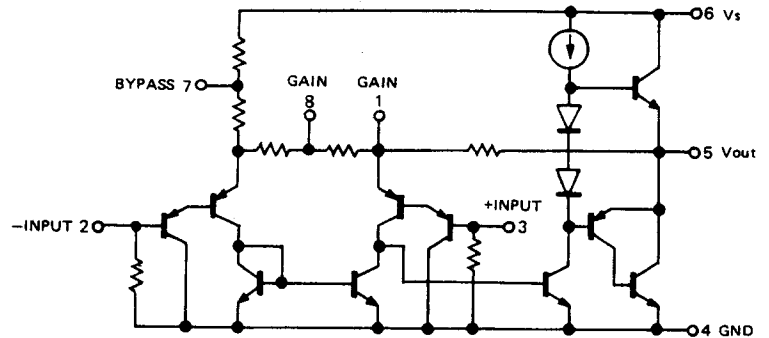
TK10486MT1 (IF unit IC1)

• Block diagram



NJM386BM (AF AMP. unit IC1)

• Equivalent circuit



• Electrical characteristics

Item	Symbol	Rating			Unit	Condition
		MIN.	TYP.	MAX.		
Supply voltage	Vs	4	-	18	V	
Output power	Pour	500	850	-	mW	Vs = 9V, RL = 8Ω, THD = 10%
Voltage gain	Av		46		dB	f = 1kHz, Between 1 and 8 : Connect capacitor (10μF).
Bandwidth	BW		600		kHz	Between 1 and 8 : Open.
Distortion	THD		0.2		%	f = 1kHz, Pour = 125mW, RL = 8Ω
Input resistance	RIN		50		kΩ	

Description of Components

TX-RX UNIT (X57-3250-XX)

Component	Part No.	Operation/Condition/Compatibility
Q1	DTA114YU	Unlock detection switch ; low when locked.
Q2	2SC4093	Frequency multiplication (x 2) and amplification.
Q3, 5	2SC4093	Drive-stage amplifier.
Q4	DTC144EU	Transmission/reception HET selection switch ; ON during reception.
Q6, 7	2SC4095	RF amplifier.
Q8	2SC3585	RX 1st mixer.
Q9	2SC2714(O)	1st IF amplifier, 59.7MHz.
Q10	2SJ144(GR)	AF muting switch (MU2).
IC1	M57787	Power amplifier.
IC2	MD-004	Antenna switch.
D1, 2	MA77	Transmission/reception HET selection switch.
D3	DA204K	Bias setting for Q5.
D4	HSM88AS	Power detection.
D5	MA110	Backflow prevention.

PARTS LIST

CAPACITORS

CC 45 TH 1H 220 J
 1 2 3 4 5 6

CC45



• Capacitor value

1 0 3 = 0.01μF

0 1 0 = 1pF

1 0 0 = 10pF

1 0 1 = 100pF

1 0 2 = 1000pF = 0.001μF

2 2 0 = 22pF
 1st number | Multiplier
 2nd number

- 1 = Type ceramic, electrolytic, etc.
- 2 = Shape round, square, etc.
- 3 = Temp. coefficient
- 4 = Voltage rating
- 5 = Value
- 6 = Tolerance

• Temperature Coefficient

1st Word	C	L	P	R	S	T	U
Color*	Black	Red	Orange	Yellow	Green	Blue	Violet
ppm/°C	0	-80	-150	-220	-330	-470	-750

2nd Word	G	H	J	K	L
ppm/°C	± 30	± 60	± 120	± 250	± 500

Example CC45TH = -470 ± 60 ppm/°C

• Tolerance

Code	C	D	G	J	K	M	X	Z	P	No code
(%)	± 0.25	± 0.5	± 2	± 5	± 10	± 20	+ 40 - 20	+ 80 - 20	+ 100 - 0	10μF-10~+50 4.7μF-10~+75

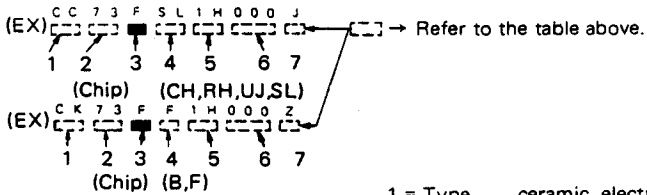
Code	B	C	D	F	G
(pF)	± 0.1	± 0.25	± 0.5	± 1	± 2

Less than 10 pF

• Rating voltage

2nd word											
1st word	A	B	C	D	E	F	G	H	J	K	V
0	1.0	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	-
1	10	12.5	16	20	25	31.5	40	50	63	80	35
2	100	125	160	200	250	315	400	500	630	800	-
3	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	-

• Chip capacitors



Dimension

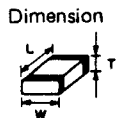
Dimension code	L	W	T
Empty	5.6 ± 0.5	5.0 ± 0.5	Less than 2.0
E	3.2 ± 0.2	1.6 ± 0.2	Less than 1.25
F	2.0 ± 0.3	1.25 ± 0.2	Less than 1.25

Dimension

Dimension code	L	W	T	Wattage
E	3.2 ± 0.2	1.6 ± 0.2	0.57	2B
F	2.0 ± 0.3	1.25 ± 0.2	0.45	2A

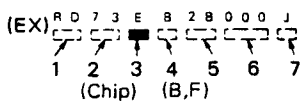
Rating wattage

Cord	Wattage	Cord	Wattage	Cord	Wattage
2A	1/10W	2E	1/4W	3A	1W
2B	1/8W	2H	1/2W	3D	2W
2C	1/6W				

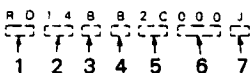


RESISTORS

• Chip resistor (Carbon)



• Carbon resistor (Normal type)



- 1 = Type ceramic, electrolytic, etc.
- 2 = Shape round, square, etc.
- 3 = Dimension
- 4 = Temp. coefficient
- 5 = Voltage rating
- 6 = Value
- 7 = Tolerance.

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TH-55AT/E						
1	3B	*	A01-1050-02	METALLIC CABINET(REAR)	AT E	
2	1A	*	A02-0846-03	PLASTIC CABINET(FRONT)		
2	1A	*	A02-0847-03	PLASTIC CABINET(FRONT)	AT E	
3	2B	*	A11-0406-04	SUB CHASSIS ASSY(ENCODER)		
4	2B	*	A11-0407-04	SUB CHASSIS ASSY(VOL)	AT E	
5	2A		A20-2625-03	PANEL ASSY		
6	3B		A40-0621-04	BOTTOM PLATE	AT E	
7	3B	*	B40-3806-04	MODEL NAME PLATE		
7	3B	*	B40-3807-04	MODEL NAME PLATE	AT E	
8	3B		B42-2437-04	LABEL (SERIAL)		
9	1C		B42-3325-04	LABEL	AT E	
10	3B	*	B01-0664-03	ESCUTCHEON		
11	1B		B03-0547-04	DRESSING PLATE (DTMF)	AT E	
11	1B	*	B03-0550-04	DRESSING PLATE		
12	2C		B09-0309-04	CAP (SP,MIC)	AT E	
13	2B		B10-0698-04	FRONT GLASS		
14	2B		B11-0449-04	FILTER	AT E(W)	
15	1D		B46-0410-20	WARRANTY CARD		
15	1D		B46-0419-00	WARRANTY CARD	AT E(W)	
16	1D	*	B50-8224-00	INSTRUCTION MANUAL		
19	3B		E23-0494-14	TERMINAL (-)	AT E	
20	3B		E23-0605-14	TERMINAL (+)		
21	3B		E04-0168-05	BNC RECEPTACLE		
22	2B	*	F11-1100-03	SHIELDING COVER(TX-RX)	AT E	
23	1A		F19-0650-04	BLIND PLATE (MIC)		
25	2A		F20-0594-04	INSULATING SHEET(CONTROL)	AT E	
26	2B	*	F20-0600-04	INSULATING SHEET(VR)		
27	3B	*	F20-1006-04	INSULATING SHEET(TX-RX)	AT E	
28	3B		F20-1008-04	INSULATING SHEET(BOTTOM PLATE)		
29	3B		F29-0435-05	INSULATOR (BELT HOOK)	AT E	
			F20-0587-04	INSULATING SHEET(LITHIUM BATT)		
33	2A		G02-0505-05	SPRING (VOL,ENCODER)	AT E	
34	1A		G10-0657-04	FELT (SPEAKER)		
35	2A	*	G10-0670-04	NON-WOVEN FABRIC(CASE BOTTOM)	AT E	
36	3B		G13-0852-04	CUSHION		
37	3B		G16-0514-04	SHEET	AT E	
41	1D		H11-0808-14	POLYSTYRENE BOARD		
42	2D		H13-0801-04	PROTECTION BOARD	AT E	
43	2C		H13-0818-04	PROTECTION BOARD		
44	3C	*	H01-8174-02	ITEM CARTON BOX	AT E	
44	3C	*	H01-8175-02	ITEM CARTON BOX		
45	3D	*	H10-2643-02	POLYSTYRENE FOAMED FIXTURE	AT E	
46	1D		H21-0715-04	PROTECTION SHEET		
48	1C		H25-0085-04	PROTECTION BAG (100X200)	AT E	
49	3B		J19-1426-03	HOLDER (POWER TERMINAL)		
50	1A		J21-4223-04	MOUNTING HARDWARE(CASE BOTTOM)	AT E	
51	1A	*	J21-4234-04	MOUNTING HARDWARE(SPEAKER)		
52	1A	*	J21-4235-04	MOUNTING HARDWARE(CASE SIDE)	AT E	
53	2C		J29-0424-04	BELT HOOK		
54	1A	*	J30-0550-04	SPACER (SPEAKER)	AT E	
55	1A		J31-0526-04	MIC SPACER		

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56	2A		J69-0311-05	RING (BNC)		
57	2C		J69-0312-04	HAND STRAP		
-			J99-0311-04	ADHESIVE SHEET (LITHIUM BATT)		
60	3B		K27-0499-04	KNØB (LØ/HI)		
61	1B	*	K27-3029-04	KNØB (F. LØCK)		
62	2A		K29-3096-04	KNØB (VØL)		
63	2A		K29-3097-04	KNØB (SØL)		
64	2A		K29-3098-04	KNØB (ENCØDER)		
65	3B		K29-3100-04	KNØB (RELEASE)		
66	3B		K29-3102-03	KNØB (PTT)		
67	2A		K29-3103-04	KYE TØP (MHZ, MCH)		
68	3B		K29-3104-04	KYE TØP (REV, M)		
69	1A		K29-3105-04	KYE TØP (DTMF)	AT	
70	1B	*	K29-3141-04	KNØB (RIT)		
81	2A		N14-0534-04	NUT (VØL, ENCØDER)		
A	1B		N30-2020-41	PAN HEAD MACHINE SCREW		
B	2B		N32-2012-41	FLAT HEAD MACHINE SCREW		
C	3B		N33-2005-45	ØVAL HEAD MACHINE SCREW (BNC)		
D	1B, 2B		N35-2004-41	BINDING HEAD MACHINE SCREW		
E	1B		N35-2006-41	BINDING HEAD MACHINE SCREW		
F	1B		N39-1450-45	PAN HEAD MACHINE SCREW (RIT)		
G	3B		N39-2040-45	PAN HEAD MACHINE SCREW		
H	1A		N89-2006-46	BINDING HEAD TAPTITE SCREW (SWU)	NIT)	
I	2B		N09-0663-04	SCREW (M1.7X4)		
J	3B		N09-2022-05	SCREW (M2X4)		
K	3A, 2B		N09-2023-05	SCREW (M2X3)		
L	3B		N09-2024-05	SCREW (Ø2X16)		
M	3B		N09-2025-05	SCREW (Ø1.7X3)		
N	1A		N09-2026-05	SCREW (Ø2X3.5)		
Q	3B		N09-2028-05	SCREW (M3X4)		
R1			RD148B2B333J	RD 33K J 1/8W		
85	1A		T07-0251-05	LØUDSPEAKER		
86	2D	*	-T90-0364-05	ANTENNA		
87	1A		T91-0372-05	MICRØPHONE		
89	2D		W09-0382-15	BATTERY CHARGER (120V)	AT	
89	2D		W09-0387-05	BATTERY CHARGER (240V)	E(T)	
89	2D		W09-0388-05	BATTERY CHARGER (220V)	E(W)	
90	2D		W09-0507-05	BATTERY ASSY (PB-6)		
-			W09-0394-05	LITHIUM BATTERY		
95	1A	*	X41-3070-00	SW UNIT	AT	
95	1A	*	X41-3070-61	SW UNIT	E	
96	1B	*	X43-3020-11	AVR		
97	1A	*	X52-3130-00	SIGNALING UNIT (DTMF)	AT	
98	2A	*	X53-3150-11	CØNTRØL UNIT	AT	
98	2A	*	X53-3150-51	CØNTRØL UNIT	E(T)	
98	2A	*	X53-3150-61	CØNTRØL UNIT	E(W)	
99	2B	*	X57-3250-11	TX. RX UNIT	AT	
99	2B	*	X57-3250-61	TX. RX UNIT	E	
SWITCH UNIT (X41-3070-XX) -00 : TH-55AT -61 : TH-55E						
C1	.2	*	C92-0509-05	TANTAL 10UF 6.3WV		
C3			CC73FSL1H101J	CHIP C 100PF J		
C4			CK73EB1E104K	CHIP C 0.10UF K		

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C5 C6 ,7 C8 -15			CK73FB1E103K CC73FSL1H101J CC73FSL1H101J	CHIP C 0.010UF K CHIP C 100PF J CHIP C 100PF J	AT	
J1 J2 W1 W2		*	E11-0421-05 E11-0420-15 E31-3387-05 E31-3388-05	PHONE JACK MIC JACK CONNECTING WIRE CONNECTING WIRE	AT	
JP1 -4 JP5 R1 R2 R3			R92-1061-05 R92-1061-05 RK73FB2A182J R92-0670-05 RK73FB2A271J	JUMPER REST 0 OHM JUMPER REST 0 OHM CHIP R 1.8K J 1/10W CHIP R 0 OHM CHIP R 270 J 1/10W	E	
R4 R5 R6 R7 R8			RK73FB2A182J RK73FB2A471J RK73EB2B101J RK73FB2A152J RK73FB2AB22J	CHIP R 1.8K J 1/10W CHIP R 470 J 1/10W CHIP R 100 J 1/8W CHIP R 1.5K J 1/10W CHIP R 8.2K J 1/10W		
R9 R10 R11 R12 R13			RK73FB2A473J RK73FB2A100J RK73FB2A102J R92-0670-05 RK73FB2A562J	CHIP R 47K J 1/10W CHIP R 10 J 1/10W CHIP R 1.0K J 1/10W CHIP R 0 OHM CHIP R 5.6K J 1/10W	AT	
VR1 VR2		*	R12-2417-05 R05-3445-05	TRIMMING PBT. (5K) POTENTIOMETER (10K)		
Q1 Q2 Q3			DTC144EK FMG2 DTC144EK	DIGITAL TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR	AT E	
AVR UNIT (X43-3020-11)						
C1 C2 -4 C5 C6 ,7 C8			C90-2073-05 CC73FSL1H101J C90-2053-05 CC73FSL1H101J C92-0004-05	ELECTRO 6.8UF 16WV CHIP C 100PF J ELECTRO 47UF 6.3WV CHIP C 100PF J CHIP TAN 1UF 16WV		
C9 -14 C15 C16 -20 C22 C30 -32			CC73FSL1H101J C90-2049-05 CC73FSL1H101J CC73FSL1H101J CC73FSL1H101J	CHIP C 100PF J ELECTRO 15UF 6.3WV CHIP C 100PF J CHIP C 100PF J CHIP C 100PF J		
CN1		*	E40-5165-05	PIN CONNECTOR		
L1 ,2			L92-0122-05	BEAD CORE		
R1 R2 R3 R4 R5			RK73FB2A332J RK73FB2A102J RK73FB2A472J RK73FB2A272J RK73FB2A472J	CHIP R 3.3K J 1/10W CHIP R 1.0K J 1/10W CHIP R 4.7K J 1/10W CHIP R 2.7K J 1/10W CHIP R 4.7K J 1/10W		
R6 R7 R8 R15 R16			RK73FB2A473J RK73FB2A272J RK73FB2A472J RK73FB2A124F RK73FB2A274F	CHIP R 47K J 1/10W CHIP R 2.7K J 1/10W CHIP R 4.7K J 1/10W CHIP R 120K F 1/10W CHIP R 270K F 1/10W		
IC1 Q1			LP2950CZ-5.0 2SB1182F5(Q)	IC (VOLTAGE REGULATOR/ +5V) CHIP TRANSISTOR		

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Q2			FMW1	DIGITAL TRANSISTOR		
Q3			DTC144EK	DIGITAL TRANSISTOR		
Q4			2SA1313(Y)	CHIP TRANSISTOR		
Q5			DTA143XK	DIGITAL TRANSISTOR		
Q6			DTA144EK	DIGITAL TRANSISTOR		
Q8			DTC144EK	DIGITAL TRANSISTOR		
SIGNALING UNIT (X52-3130-00) TH-55AT ONLY						
C1			CE04CWOJ100M	ELECTRØ	10UF	6.3WV
C2	-5		CC73FSL1H101J	CHIP C	100PF	J
C6			CK73FB1H222K	CHIP C	2200PF	K
C7			CK73EB1E104K	CHIP C	0.10UF	K
C8			CK73FB1E103K	CHIP C	0.010UF	K
C9			C92-0003-05	CHIP TAN	0.47UF	25WV
C10			C92-0009-05	CHIP TAN	4.7UF	10WV
C11	,12		CC73FSL1H101J	CHIP C	100PF	J
C13			C92-0009-05	CHIP TAN	4.7UF	10WV
X1			L78-0035-05	RESONATOR		AT
R1			RK73FB2A222J	CHIP R	2.2K	J 1/10W
R2			RK73FB2A103J	CHIP R	10K	J 1/10W
R3			RK73FB2A472J	CHIP R	4.7K	J 1/10W
R4			RK73FB2A122J	CHIP R	1.2K	J 1/10W
R5			RK73FB2A563J	CHIP R	56K	J 1/10W
R6			R92-0670-05	CHIP R	0 ØHM	AT
R7			RK73FB2A101J	CHIP R	100	J 1/10W
VR1			R12-3449-05	TRIMMING PØT.	10K	AT
IC1			LR40872	IC(TONE DIALER)		AT
Q1			2SC2712(GR)	CHIP TRANSISTOR		AT
Q2			DTA114EK	DIGITAL TRANSISTOR		AT
CONTROL UNIT (X53-3150-XX) -11 : K -51 : T -61 : W						
103	2A		A33-0409-04	REFLECTOR		
C1			CK73FB1E222K	CHIP C	0.022UF	K
C2			CK73FB1E103K	CHIP C	0.010UF	K
C3			C92-0010-05	CHIP TAN	6.8UF	6.3WV
C4			CK73FB1H102K	CHIP C	1000PF	K
C5	-7		CK73FB1E103K	CHIP C	0.010UF	K
C11			CC73FSL1H101J	CHIP C	100PF	J
107	2A		E29-0478-04	CONNECTOR		
111	2A		J21-4220-04	MOUNTING HARDWARE		
X1			L78-0036-05	RESONATOR	4.19MHZ	
R1			RK73FB2A563J	CHIP R	56K	J 1/10W
R2			RK73FB2A183J	CHIP R	18K	J 1/10W
R3			RK73FB2A333J	CHIP R	33K	J 1/10W
R4			RK73FB2A473J	CHIP R	47K	J 1/10W
R5			RK73FB2A472J	CHIP R	4.7K	J 1/10W
R6	,7		RK73FB2A473J	CHIP R	47K	J 1/10W
R8			RK73FB2A331J	CHIP R	330	J 1/10W
R9			RK73FB2A562J	CHIP R	5.6K	J 1/10W
R10			RK73FB2A103J	CHIP R	10K	J 1/10W
R11	-15		RK73FB2A473J	CHIP R	47K	J 1/10W

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
R16			RK73FB2A184J	CHIP R 180K J 1/10W		
R17			RK73FB2A390J	CHIP R 39 J 1/10W		
R18			R92-0670-05	CHIP R 0 OHM	E	
R21			R92-0670-05	CHIP R 0 OHM	AT	
R22			R92-0670-05	CHIP R 0 OHM	E	
R23			R92-0670-05	CHIP R 0 OHM		
R25			R92-0670-05	CHIP R 0 OHM	E(W)	
R26			R92-0670-05	CHIP R 0 OHM	E	
R27 ,28			R92-0670-05	CHIP R 0 OHM		
R32			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R33			RK73FB2A101J	CHIP R 100 J 1/10W		
R34			RK73FB2A100J	CHIP R 10 J 1/10W		
R35			R92-0670-05	CHIP R 0 OHM		
R37			RK73FB2A123J	CHIP R 12K J 1/10W	E	
S1 -3			S40-1415-05	PUSH SWITCH (MONI,LAMP,PTT)		
S4			S31-1420-05	SLIDE SWITCH (F.LOCK)		
S5			S31-2414-05	SLIDE SWITCH (LO/HI)		
115	2A		FTD8608	LCD		
D1 ,2			1SS184	DIODE		
D3 ,4			1SS181	DIODE		
D5			SLH34VC3	LED (TX)		
D6 ,7			LN01301C(Q)	LED		
IC1			LH5008TP	IC(LCD CONTROLLER/ DRIVER)		
IC2			75108AG-028-22	IC(MICROPROCESSOR)		
IC3			S8054ALR	IC(RESET IC)		
Q1			2SC2712(Y)	TRANSISTOR		
Q2			2SA1162(Y)	TRANSISTOR		
119	2B		W02-0400-05	ENCODER		
TX-RX UNIT (X57-3250-XX) -11 : TH-55AT -61 : TH-55E						
C1 -5			CC73FSL1H101J	CHIP C 100PF J		
C6			C92-0004-05	CHIP TAN 1UF 16WV		
C7			C90-1408-05	ELECTRO 220UF 6.3WV		
C8			C90-2053-05	ELECTRO 47UF 6.3WV		
C9			CK73FB1H471K	CHIP C 470PF K		
C10			CC73FCH1H1R5C	CHIP C 1.5PF C		
C11			CK73FB1E103K	CHIP C 0.010UF K		
C12			CK73FB1H471K	CHIP C 470PF K		
C13			CC73FSL1H101J	CHIP C 100PF J		
C14			C90-2053-05	ELECTRO 47UF 6.3WV		
C15			CC73FSL1H101J	CHIP C 100PF J		
C16			CC73FCH1H020C	CHIP C 2.0PF C		
C18 -20			CC73FSL1H101J	CHIP C 100PF J		
C21			CK73FB1H471K	CHIP C 470PF K		
C22			CK73FB1E103K	CHIP C 0.010UF K		
C23			CC73FCH1H020C	CHIP C 2.0PF C		
C24			CK73FB1E103K	CHIP C 0.010UF K		
C25 -27			CC73FSL1H101J	CHIP C 100PF J		
C28			CC73FCH1H040C	CHIP C 4.0PF C		
C29			CK73FB1H471K	CHIP C 470PF K		
C30			CK73FB1E103K	CHIP C 0.010UF K		
C31			CK73EB1E104K	CHIP C 0.10UF K		
C32			CK73FB1E103K	CHIP C 0.010UF K		
C33			CC73FSL1H101J	CHIP C 100PF J		
C34			C90-2041-05	ELECTRO 10UF 10WV		

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C35			CC73FSL1H101J	CHIP C 100PF J		
C36			CK73FB1E103K	CHIP C 0.010UF K		
C37			CK73EB1E104K	CHIP C 0.10UF K		
C38			C90-2039-05	ELECTRO 15UF 16WV		
C39			CC73FSL1H101J	CHIP C 100PF J		
C40			CK73FB1E103K	CHIP C 0.010UF K		
C41			CK73EB1E104K	CHIP C 0.10UF K		
C42			C90-2041-05	ELECTRO 10UF 10WV		
C43	-45		CC73FSL1H101J	CHIP C 100PF J		
C46			CC73FCH1H010C	CHIP C 1.0PF C		
C47	.48		CC73FSL1H101J	CHIP C 100PF J		
C49			CK73FB1H102K	CHIP C 1000PF K		
C50	.51		CC73FCH1H040C	CHIP C 4.0PF C		
C52			CC73FCH1H070D	CHIP C 7.0PF D		
C53			CK73FB1H471K	CHIP C 470PF K		
C54			CC73FSL1H101J	CHIP C 100PF J		
C55			CC73FCH1H010C	CHIP C 1.0PF C		
C56			CK73FB1E103K	CHIP C 0.010UF K		
C57	.58		CC73FSL1H101J	CHIP C 100PF J		
C59			CC73GCH1H040C	CHIP C 4.0PF C		
C60			CC73FSL1H101J	CHIP C 100PF J		
C61			CC73FCH1H1R5C	CHIP C 1.5PF C		
C62			CK73FB1E103K	CHIP C 0.010UF K		
C63	.64		CC73FSL1H101J	CHIP C 100PF J		
C65			CC73FCH1H0R5C	CHIP C 0.5PF C		
C66			CC45FCH1H120J	CERAMIC 12PF J		
C67			CK73FB1E103K	CHIP C 0.010UF K		
C68			CC73FCH1H080D	CHIP C 8.0PF D		
C69			CK73FB1E103K	CHIP C 0.010UF K		
C70			CC73FCH1H050C	CHIP C 5.0PF C		
C71			CK73FB1E103K	CHIP C 0.010UF K		
C72			C90-2050-05	ELECTRO 33UF 6.3WV		
C73			CK73FB1E273K	CHIP C 0.027UF K		
C74			C90-2053-05	ELECTRO 47UF 6.3WV		
C75			C90-2052-05	ELECTRO 68UF 10WV		
C77	-79		CC73FSL1H101J	CHIP C 100PF J		
C80			CC73FCH1H1R5C	CHIP C 1.5PF C		
C81			CC73FCH1H020C	CHIP C 2.0PF C		
C82			CC73FCH1H1R5C	CHIP C 1.5PF C		
C83			CC73FSL1H101J	CHIP C 100PF J		
A3		*	E29-0479-04	GND TERMINAL (P. MODULE)		
CN1			E40-5128-05	FPC CONNECTOR (20P)		
CN2		*	E40-5164-05	PIN CONNECTOR (8P)		
CN3			E40-5127-05	PIN CONNECTOR (7P)		
W1		*	E31-3393-05	CONNECTING WIRE(11P-AVR)		
W2		*	E31-3394-05	CONNECTING WIRE(5P-AF, SQ)		
W3		*	E31-3395-05	CONNECTING WIRE(CTCSS)		
A2	2B	*	F11-1104-04	SHIELDING COVER(P. MODULE)		
A4		*	F11-1101-04	SHIELDING COVER(LPF)		
A6		*	F20-0594-04	INSULATING SHEET(FPC-CTCSS)		
A7		*	F10-1372-04	SHIELDING PLATE(DRIVER)		
A1	2B	*	J21-4236-04	MOUNTING HARDWARE(P. MODULE)		
L1			L92-0123-05	BEAD CORE		

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L2			L92-0122-05	BEAD CORE		
L3			L40-1021-14	SMALL FIXED INDUCTOR(1MH)		
L4			L92-0123-05	BEAD CORE		
L5			L92-0122-05	BEAD CORE		
L6			L40-1021-14	SMALL FIXED INDUCTOR(1MH)		
L7 .8		*	L92-0124-05	FERRITE CHIP		
L9		*	L33-0710-05	CHOKE COIL		
L11		*	L34-1230-05	COIL		
L12		*	L79-0830-05	FILTER (HELICAL)		
L13		*	L79-0829-05	FILTER (HELICAL)		
L14		*	L34-4090-05	COIL		
L15			L40-3372-80	SMALL FIXED INDUCTOR(33NH)		
L16 .17			L92-0123-05	BEAD CORE		
L18			L92-0122-05	BEAD CORE		
X1		*	L77-1379-05	CRYSTAL RESONATOR 59.245MHZ		
XF1 .2			L71-0280-05	MCF 59.7MHZ		
P	2B	*	N09-2034-05	SCREW (M2.6X5)		
CP1		*	R90-0706-05	MULTI-COMP 10KX5		
JP1 -3			R92-1061-05	JUMPER REST 0 OHM		
R1			RK73FB2A680J	CHIP R 68 J 1/10W		
R2			RK73FB2A474J	CHIP R 470K J 1/10W		
R3			RK73FB2A473J	CHIP R 47K J 1/10W		
R5			RK73FB2A393J	CHIP R 39K J 1/10W		
R6			RK73FB2A103J	CHIP R 10K J 1/10W		
R7			RK73FB2A473J	CHIP R 47K J 1/10W		
R8			RK73FB2A822J	CHIP R 8.2K J 1/10W		
R9			RK73FB2A391J	CHIP R 390 J 1/10W		
R10			RK73FB2A331J	CHIP R 330 J 1/10W		
R11			RK73FB2A100J	CHIP R 10 J 1/10W		
R12			RK73FB2A331J	CHIP R 330 J 1/10W		
R13			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R14			RK73FB2A470J	CHIP R 47 J 1/10W		
R15			RK73FB2A100J	CHIP R 10 J 1/10W		
R16			RK73FB2A471J	CHIP R 470 J 1/10W		
R17			RK73FB2A390J	CHIP R 39 J 1/10W		
R18			RK73FB2A220J	CHIP R 22 J 1/10W		
R19			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R20			RK73FB2A103J	CHIP R 10K J 1/10W		
R21 .22			RK73FB2A101J	CHIP R 100 J 1/10W		
R23			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R25			RK73FB2A103J	CHIP R 10K J 1/10W		
R26			RK73FB2A471J	CHIP R 470 J 1/10W		
R27			RK73FB2A150J	CHIP R 15 J 1/10W		
R28			RK73FB2A120J	CHIP R 12 J 1/10W		
R29			RK73FB2A153J	CHIP R 15K J 1/10W		
R30			RK73FB2A150J	CHIP R 15 J 1/10W		
R31			RK73FB2A681J	CHIP R 680 J 1/10W		
R32			RD14BB2C822J	RD 8.2K J 1/6W		
R33			RK73FB2A334J	CHIP R 330K J 1/10W		
R34			RK73FB2A103J	CHIP R 10K J 1/10W		
R35			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R36			RK73FB2A331J	CHIP R 330 J 1/10W		
R37			RK73FB2A334J	CHIP R 330K J 1/10W		

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R38			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R39			RK73FB2A104J	CHIP R 100K J 1/10W		
R40			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R41			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R42			RK73FB2A153J	CHIP R 15K J 1/10W		
R50	.51		R92-0670-05	CHIP R 0 0HM		
R52			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R53			RK73FB2A392J	CHIP R 3.9K J 1/10W		
R54			RK73FB2A472J	CHIP R 4.7K J 1/10W		
VR1	2A		R23-9403-05	POTENTIOMETER10K/50K(A.F.SQ)		
D1	.2	*	MA77	CHIP DIODE		
D3			DA204K	CHIP DIODE		
D4			HSM88AS	CHIP DIODE		
D5			MA110	CHIP DIODE		
D6		*	MA77	CHIP DIODE		
IC1		*	M57787	IC(POWER MODULE/ 1.24-1.3GHZ)		
IC2		*	MD-004	IC(ANTENNA CONTROL)		
Q1		*	DTA114YU	DIGITAL TRANSISTOR		
Q2	.3		2SC4093(R27)	CHIP TRANSISTOR		
Q5			2SC4093(R27)	CHIP TRANSISTOR		
Q6	.7	*	2SC4095(R47.6)	CHIP TRANSISTOR		
Q8		*	2SC3585(R44.3)	CHIP TRANSISTOR		
Q9			2SC2714(0)	CHIP TRANSISTOR		
Q10		*	2SJ144(GR)	CHIP FET		
127		*	X58-3210-01	IF UNIT		
128		*	X58-3360-00	PLL.VCO UNIT	AT	
129		*	X58-3370-11	MIC AMP UNIT	E	
129		*	X58-3370-61	MIC AMP UNIT		
130		*	X58-3380-00	AF UNIT		
131		*	X59-3420-00	APC UNIT		
132		*	X59-3430-00	BPF UNIT		
IF UNIT (X58-3210-01)						
C1			CK73EB1E104K	CHIP C 0.10UF K		
C2			C92-0004-05	CHIP TAN 1UF 16WV		
C3			C92-0005-05	CHIP-TAN 2.2UF 6.3WV		
C4			CK73FB1E223K	CHIP C 0.022UF K		
C5	-8		CK73FB1H102K	CHIP C 1000PF K		
C10			CK73FB1H102K	CHIP C 1000PF K		
C11			C92-0001-05	CHIP TAN 0.1UF 35WV		
C13			C92-0005-05	CHIP-TAN 2.2UF 6.3WV		
C14			CC73FCH1H150J	CHIP C 15PF J		
C15			CC73FCH1H220J	CHIP C 22PF J		
C16			CK73FB1E103K	CHIP C 0.010UF K		
C17	-19		CK73EB1E104K	CHIP C 0.10UF K		
C20			CC73FCH1H820J	CHIP C 82PF J		
C21			CK73FB1E103K	CHIP C 0.010UF K		
			E23-0610-05	TERMINAL		
CD1			L79-0817-05	CERAMIC DISCRIMNATER(CDBM455C7		
CF1			L72-0362-05	CERAMIC FILTER (CFUM455E)		
L1			L40-3982-81	SMALL FIXED INDUCTOR(0.39UH)		
R1			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R2			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R3			RK73FB2A102J	CHIP R 1.0K J 1/10W		

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R4			RK73FB2A274J	CHIP R 270K J 1/10W		
R5			RK73FB2A473J	CHIP R 47K J 1/10W		
R6			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R7			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R8			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R9			RK73FB2A561J	CHIP R 560 J 1/10W		
R10			RK73FB2A103J	CHIP R 10K J 1/10W		
R11			RK73FB2A122J	CHIP R 1.2K J 1/10W		
R12			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R14			RK73FB2A681J	CHIP R 680 J 1/10W		
R15			RK73FB2A101J	CHIP R 100 J 1/10W		
TH1			R92-0680-05	FIXED RESISTOR(7.5K)		
VR1		*	R12-5425-05	TRIMMING POT. (150K)S METER		
D1			HSM88AS	CHIP DIODE		
IC1		*	TK10486MT1(B,C)	IC(FM IF)		
Q1			29C2712(GR)	CHIP TRANSISTOR		
PLL UNIT (X58-3360-00)						
C1			CK73GB1E103K	CHIP C 0.010UF K		
C2		*	CK73GB1H471K	CHIP C 470PF K		
C3		*	CC73GCH1H060D	CHIP C 6.0PF D		
C4			CK73GB1H102K	CHIP C 1000PF K		
C5			CC73GCH1H180J	CHIP C 18PF J		
C6			CC73GCH1H120J	CHIP C 12PF J		
C7			CC73GCH1H470J	CHIP C 47PF J		
C8			CC73GCH1H560J	CHIP C 56PF J		
C9	.10		CK73GB1E103K	CHIP C 0.010UF K		
C11			CC73GCH1H220J	CHIP C 22PF J		
C12		*	CK73GB1H471K	CHIP C 470PF K		
C13			C92-0509-05	TANTAL 10UF 6.3WV		
C14			CK73GB1E103K	CHIP C 0.010UF K		
C15			CK73FB1E333K	CHIP C 0.033UF K		
C16		*	CK73GB1H222K	CHIP C 2200PF K		
C17			CK73GB1E103K	CHIP C 0.010UF K		
C18			C92-0509-05	TANTAL 10UF 6.3WV		
C19			CC73FSL1H101J	CHIP C 100PF J		
C20			C92-0003-05	CHIP TAN 0.47UF 25WV		
C24			C92-0504-05	CHIP-TAN 0.68UF 20WV		
C25			C92-0502-05	ELECTRO 0.33UF 35WV		
TC1		*	C05-0361-05	TRIMMING CAP 20PF		
			E23-0603-05	TERMINAL		
A1		*	F11-1102-03	SHIELDING CASE		
A2		*	F11-1103-04	SHIELDING COVER		
L1			L40-2272-80	SMALL FIXED INDUCTOR(22NH)		
X1		*	L77-1378-05	CRYSTAL RESONATOR(12.8MHZ)		
JP1	-3		R92-1061-05	JUMPER REST 0 OHM		
R1			RK73GB1J471J	CHIP R 470 J 1/16W		
R2			RK73GB1J151J	CHIP R 150 J 1/16W		
R3			RK73GB1J153J	CHIP R 15K J 1/16W		
R4			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R5			RK73GB1J473J	CHIP R 47K J 1/16W		
R6			RK73GB1J333J	CHIP R 33K J 1/16W		
R7			RK73GB1J153J	CHIP R 15K J 1/16W		

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R8			RK73GB1J103J	CHIP R 10K J 1/16W		
R9			RK73GB1J223J	CHIP R 22K J 1/16W		
R10			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R11		*	RK73GB1J101J	CHIP R 100 J 1/16W		
R12 ,13			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R14			RK73GB1J103J	CHIP R 10K J 1/16W		
R15		*	RK73GB1J101J	CHIP R 100 J 1/16W		
R16			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R17			RK73GB1J394J	CHIP R 390K J 1/16W		
R18			RK73GB1J103J	CHIP R 10K J 1/16W		
R19 ,20			RD14BB2C103J	RD 10K J 1/6W		
R21			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R22			RK73GB1J472J	CHIP R 4.7K J 1/16W		
D1		*	MA360	CHIP DIODE		
IC1		*	M8501LL	IC(PRE SCALER)		
IC2			JLC1075F	IC(PLL FREQ SYNTHESIZER)		
Q1			2SC4093(R26,27)	CHIP TRANSISTOR		
Q2		*	DTA144EU	DIGITAL TRANSISTOR		
Q3			2SJ144(GR)	CHIP FET		
Q4		*	2SC3624(L18)	CHIP TRANSISTOR		
Q5			2SC2712(GR)	CHIP TRANSISTOR		
TH1		*	159-153-85013	THERMISTER 15K		
		*	X59-3470-00	VCO UNIT		
MIC AMP UNIT (X58-3370-XX) -11 : TH-55AT -61 : TH-55E						
C1			C92-0002-05	CHIP TAN 0.22UF 35WV		
C2			CK73FB1E223K	CHIP C 0.022UF K		
C3 ,4			CC73FSL1H101J	CHIP C 100PF J		
C5 ,6			C92-0005-05	CHIP-TAN 2.2UF 6.3WV		
C7			CK73FB1E103K	CHIP C 0.010UF K		
C8			CC73FSL1H151J	CHIP C 150PF J		
C9			CK73FB1H182K	CHIP C 1800PF K		
C10			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
C11			CK73FB1E103K	CHIP C 0.010UF K		
C12 ,13			CK73FB1E473M	CHIP C 0.047UF M	E	
C13			CK73FB1E103K	CHIP C 0.010UF K	AT	
C14			CK73FB1E103K	CHIP C 0.010UF K		
			E23-0610-05	TERMINAL		
R1			RK73FB2A104J	CHIP R 100K J 1/10W	AT	
R1			RK73FB2A334J	CHIP R 330K J 1/10W	E	
R2			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R3			RK73FB2A103J	CHIP R 10K J 1/10W		
R4			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R5			RK73FB2A391J	CHIP R 390 J 1/10W		
R6			RK73FB2A154J	CHIP R 150K J 1/10W	E	
R6			RK73FB2A823J	CHIP R 82K J 1/10W	AT	
R7			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R8			RK73FB2A100J	CHIP R 10 J 1/10W		
R9			RK73FB2A273J	CHIP R 27K J 1/10W		
R10			RK73FB2A223J	CHIP R 22K J 1/10W		
R11 ,12			RK73FB2A104J	CHIP R 100K J 1/10W		
R13			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R14			RK73FB2A104J	CHIP R 100K J 1/10W		

E: Scandinavia & Europe K: USA P: Canada W: Europe

U: PX(Far East, Hawaii) T: England M: Other Areas

UE: AAFES(Europe) X: Australia

△ indicates safety critical components.