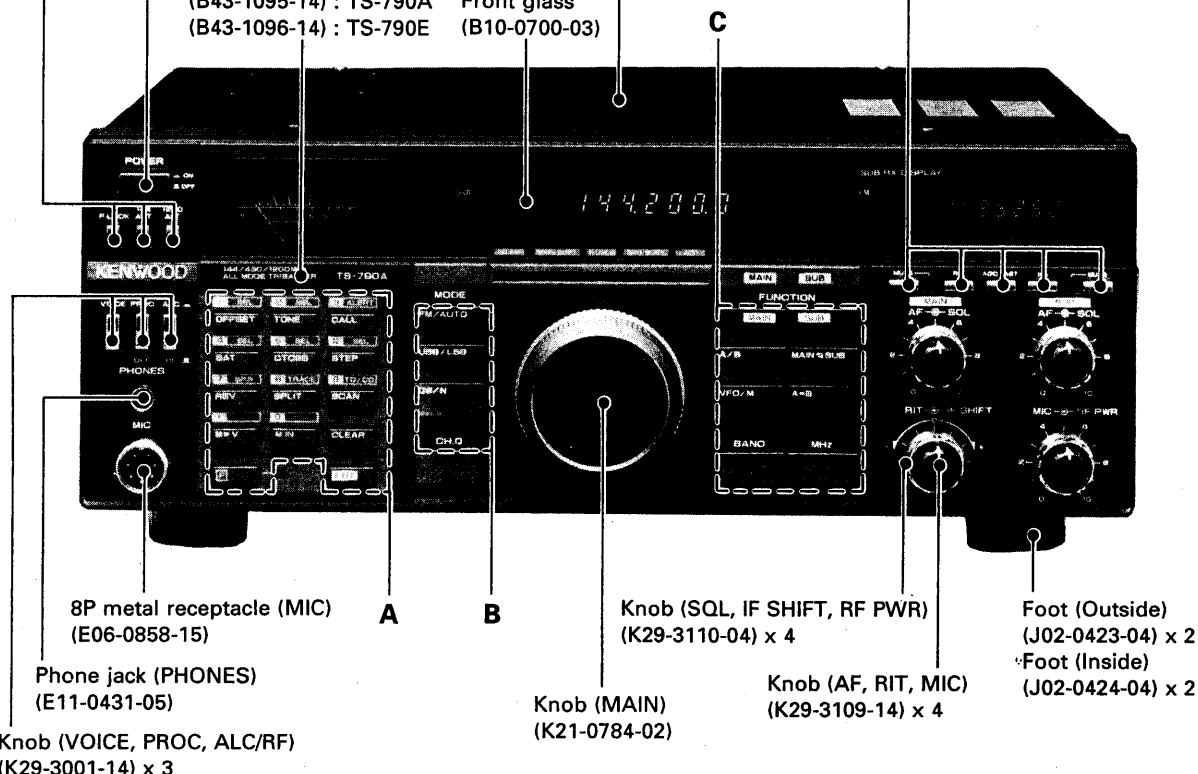


Knob (F. LOCK, 144ATT, 1200ALT)
(K29-3002-14) x 3Knob (POWER)
(K29-0757-04)Badge
(B43-1095-14) : TS-790A
(B43-1096-14) : TS-790EFront glass
(B10-0700-03)Metallic cabinet (Up side)
(A01-1045-01)Knob (MUTE, RIT, AGC FAST, NB)
(K29-3108-04) x 58P metal receptacle (MIC)
(E06-0858-15)Phone jack (PHONES)
(E11-0431-05)Knob (VOICE, PROC, ALC/RF)
(K29-3001-14) x 3

A

B

Knob (SQL, IF SHIFT, RF PWR)
(K29-3110-04) x 4Knob (MAIN)
(K21-0784-02)Knob (AF, RIT, MIC)
(K29-3109-14) x 4Foot (Outside)
(J02-0423-04) x 2
Foot (Inside)
(J02-0424-04) x 2

A

Knob (OFFSET) (K27-3002-04)	Knob (TONE) (K27-3005-04)	Knob (CALL) (K27-3004-04)
Knob (SAT) (K27-3006-04)	Knob (CTCSS) (K27-3003-04) : TS-790A Knob (ALERT) (K27-3030-04) : TS-790E	Knob (STEP) (K27-3007-04)
Knob (REV) (K27-3008-04)	Knob (SPLIT) (K27-3009-04)	Knob (SCAN) (K27-3010-04)
Knob (M > V) (K27-3011-04)	Knob (M. IN) (K27-3012-04)	Knob (CLEAR) (K27-3013-04)
Knob (F) (K27-3014-04)		Knob (ENT) (K27-3015-04)

B

Knob (FM/AUTO) (K27-3016-04)
Knob (USB/LSB) (K27-3017-04)
Knob (CW/N) (K27-3018-04)
Knob (CH.Q) (K27-3025-04)

C

Knob (MAIN) (K27-3019-04)	Knob (SUB) (K27-3023-04)
Knob (A/B) (K27-3020-04)	Knob (MAIN $\geq$ SUB) (K27-3022-04)
Knob (VFO/M) (K27-3024-04)	Knob (A=B) (K27-3021-04)
Knob (BAND) (K27-3025-04)	Knob (MHz) (K27-3025-04)

Photo is TS-790A.

Caution1. Please connect the dummy load to ANT connector, when adjust a transmit output.**Caution2.** In case of repair in the 1.2GHz final unit (option) after repaired a radio conform the receiver sensitivity.

CONTENTS

CIRCUIT DESCRIPTION	3
DESCRIPTION OF COMPONENTS	38
SEMICONDUCTOR DATA	54
CONTROLS AND FUNCTIONS	60
DTAT COMMUNICATIONS	62
OPERATION WITH A PERSONAL COMPUTER	63
1200MHz IF CONNECTOR AND ACC4 CONNECTOR	64
UT-10 (OPTION) INSTALLATION	65
PARTS LIST	67
DISASSEMBLY	119
PACKING	123
ADJUSTMENT	124
TERMINAL FUNCTIONS	144
PC BOARD VIEWS/CIRCUIT DIAGRAM	
SWITCH UNIT (X41-3050-00)	151
RF UNIT (X44-3060-XX) (A/2) : 144MHz	156
RF UNIT (X44-3060-XX) (B/2) : 430MHz	161
RF UNIT (X44-3070-00) : 1.2GHz (OPTION)	166
FINAL UNIT (X45-3150-00) : 1.2GHz (OPTION)	171
144MHz FINAL UNIT (X45-3160-00)	176
430MHz FINAL UNIT (X45-3170-00)	180
IF UNIT (X48-3050-XX)	183
VCO (X58-1000-02)	191
VCO (X58-3390-XX)	191
VCO (X58-3400-XX)	192
VCO (X59-3440-00)	193
LPF (X59-3450-00)	193
PLL UNIT (X50-3080-00) (A/2) : 144MHz	194
PLL UNIT (X50-3080-00) (B/2) : 430MHz	201
PLL UNIT (X50-3090-00) : 1.2GHz (OPTION)	208
CONTROL UNIT (X53-3120-XX)	214
NB (X58-3410-00)	219
AFC (X59-3480-00 (A1), (A2))	220
MODE (A) (X59-3480-00 (B1), (B2))	221
MODE (B) (X59-3480-00 (C1), (C2))	222
S METER (X59-3480-00 (D1), (D2))	223
SQL CONTROL (X59-3480-00 (E1), (E2))	224
ALC (X59-3480-00 (F))	225
STBY (A) (X59-3480-00 (G))	225
STBY (B) (X59-3480-00 (H))	226
SP SEP (X59-3480-00 (J))	227
SIDE TONE (X59-3480-00 (K))	228
AGC AMP (X59-3480-00 (L))	228
BAND SW (X59-3480-00 (M))	229
FM MIC AMP (X59-3480-00 (N))	229
BAND SW (X59-3490-00)	230
SCHEMATIC DIAGRAM	231
BLOCK DIAGRAM	235
LEVEL DIAGRAM	239
PS-31 (DC POWER SUPPLY)	241
SP-31 (EXTERNAL SPEAKER)	247
TSU-5 (CTCSS UNIT)	249
VS-2 (VOICE SYNTHESIZER)	251
SPECIFICATIONS	252

CIRCUIT DESCRIPTION

Model name Unit name	TS-790A			TS-790E
	K	M1	M2	T, W
Switch unit	X41-3050-00	X41-3050-00	X41-3050-00	X41-3050-00
RF unit	X44-3060-11	X44-3060-11	X44-3060-00	X44-3060-00
144MHz Final unit	X45-3160-00	X45-3160-00	X45-3160-00	X45-3160-00
430MHz Final unit	X45-3170-00	X45-3170-00	X45-3170-00	X45-3170-00
IF unit	X48-3050-11	X48-3050-11	X48-3050-11	X48-3050-61
PLL unit	X50-3080-00	X50-3080-00	X50-3080-00	X50-3080-00
Control unit	X53-3120-11	X53-3120-21	X53-3120-22	X53-3120-61
UT-10 (Option)	Composite unit (X60-3040-21) 1.2GHz RF unit (X44-3070-00) 1.2GHz Final unit (X45-3150-00) 1.2GHz PLL unit (X50-3090-21)			

Table 1 Differences between TS-790A and TS-790E

Band Mode	144MHz	430MHz	1200MHz
A1, A3J	Single conversion Superheterodyne	Double conversion Superheterodyne	Triple conversion Superheterodyne
F3	Double conversion Superheterodyne	Triple conversion Superheterodyne	Quadruple- conversion Superheterodyne

Table 2 Type of received frequency conversion by band

● Main IF frequencies

(* Indicates that the frequency is available only in the FM mode.)

Band IF	144MHz	430MHz	1200MHz
1st	10.695MHz	75.925MHz	287.175MHz
2nd	* 455kHz	10.695MHz	41.415MHz
3rd	—	* 455kHz	10.695MHz
4th	—	—	* 455kHz

● Sub IF frequencies

(* Indicates that the frequency is available only in the FM mode.)

Band IF	144MHz	430MHz	1200MHz
1st	10.595MHz	75.925MHz	287.075MHz
2nd	* 455kHz	10.595MHz	41.315MHz
3rd	—	* 455kHz	10.595MHz
4th	—	—	* 455kHz

Table 3 Main and sub IF frequencies

Circuit Configuration by Band

The TS-790A/E is a "triple bander". It's design implements the capability to receive on any two of the three bands at the same time.

The TS-790A/E an RF unit, a final unit, and a PLL unit for each band. Input to the IF unit is switched to the main or sub-band circuitry. The main and sub IF frequencies differ by 100kHz to prevent interference. The sub band IF circuit is only capable of reception, while the main IF circuit is capable of both transmission and reception.

• 144MHz-band block

The 144MHz-band uses single conversion techniques (in SSB or CW mode). The 1st HET oscillator converts to the main IF of 10.695MHz. If the sub IF is set to 144MHz, the 1st HET operates at a 100kHz higher frequency and makes conversion to the sub IF of 10.595MHz.

• 430 MHz-band block

The 430MHz-band uses double conversion techniques (in SSB or CW mode). The 1st HET makes conversion to a 1st IF of 75.925MHz. Since the 1st IF is used to generate both the main and sub band IF frequencies the 1st HET oscillator operates at the same frequency, regardless of which IF, main or sub, is to be generated. The 2nd IF is the same as the 1st IF used in the 144MHz-band block. The 2nd HET operates at 65.23MHz for the main IF, or at 65.33MHz for the sub band IF.

TS-790A/E

CIRCUIT DESCRIPTION

• 1200 MHz-band block

The 1200MHz-band uses triple conversion techniques (in SSB or CW mode). The 1st HET oscillator signal is used to select the main band or sub band IF circuit. The frequency of the HET output, from the PLL unit, differs by 50kHz from the original frequency. It is then doubled by the RF unit to produce a frequency difference of 100kHz. The 2nd HET oscillator signal operates at a local frequency obtained by multiplying 10.24MHz by 24, and the 3rd HET oscillator signal operates at a frequency obtained by multiplying 10.24MHz by three.

• CAR circuit configuration

There are two different CAR frequencies used by the IF unit : one for the main IF and one for the sub IF. These frequencies are generated by the PLL unit. The main and sub IF frequencies differ by 100kHz. For normal IF shift functions, a CAR frequency is supplied to the PLL unit for mixing. In addition to this loop, the TS-790A/E has a different PLL loop to generate the CAR frequency. Therefore, separate PLL circuits are provided for the CAR and the HET signals. (Microcomputer-output data for the CAR and HET PLL is changed at the same time.)

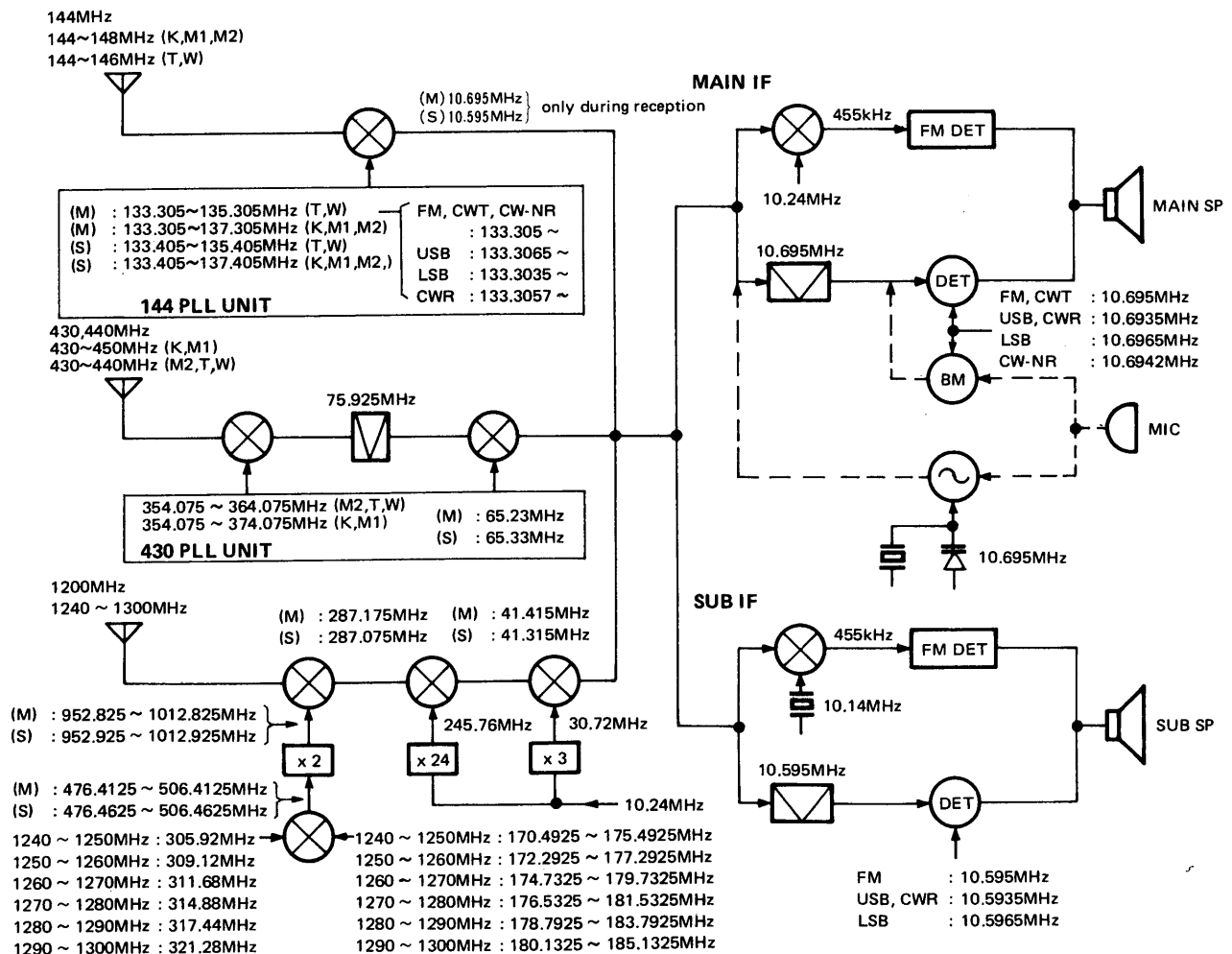


Fig. 1 Circuit configuration by band

CIRCUIT DESCRIPTION

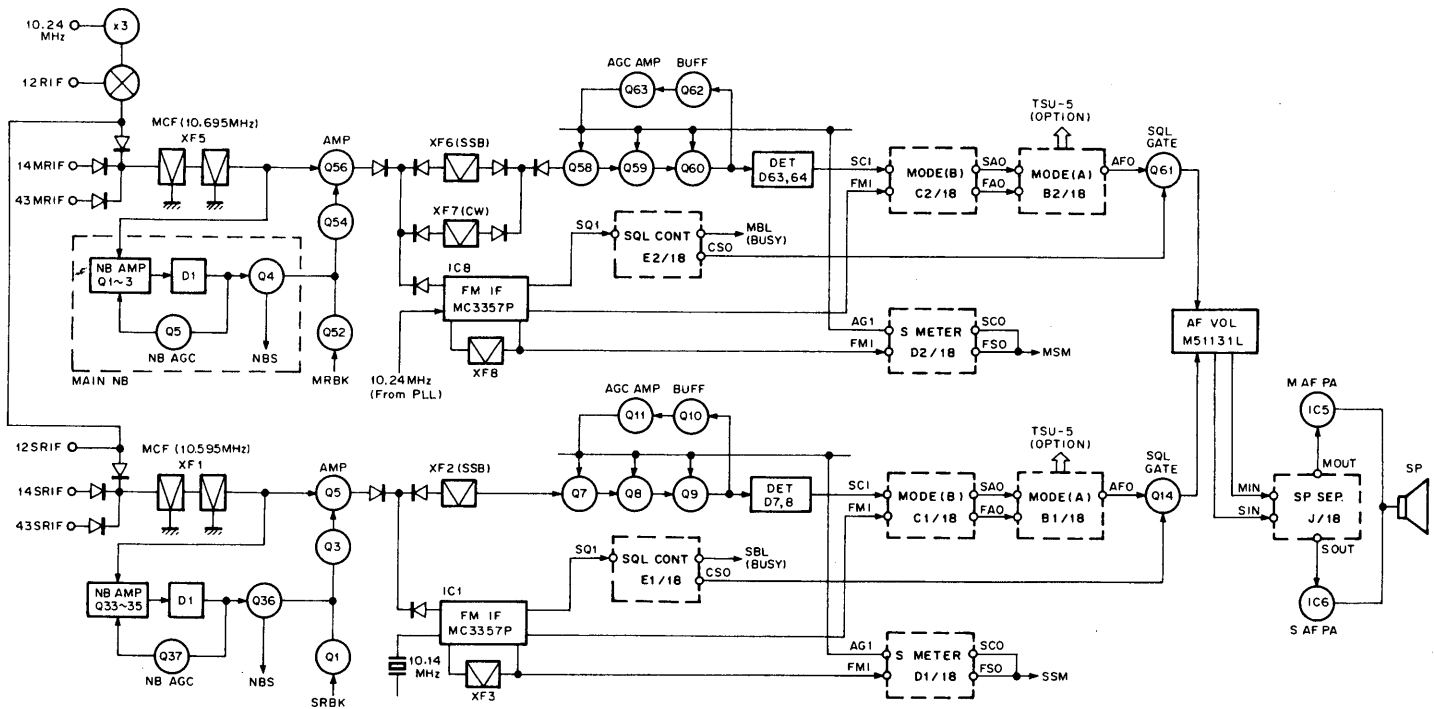


Fig. 2 IF unit block diagram (Main and Sub IF receive circuits)

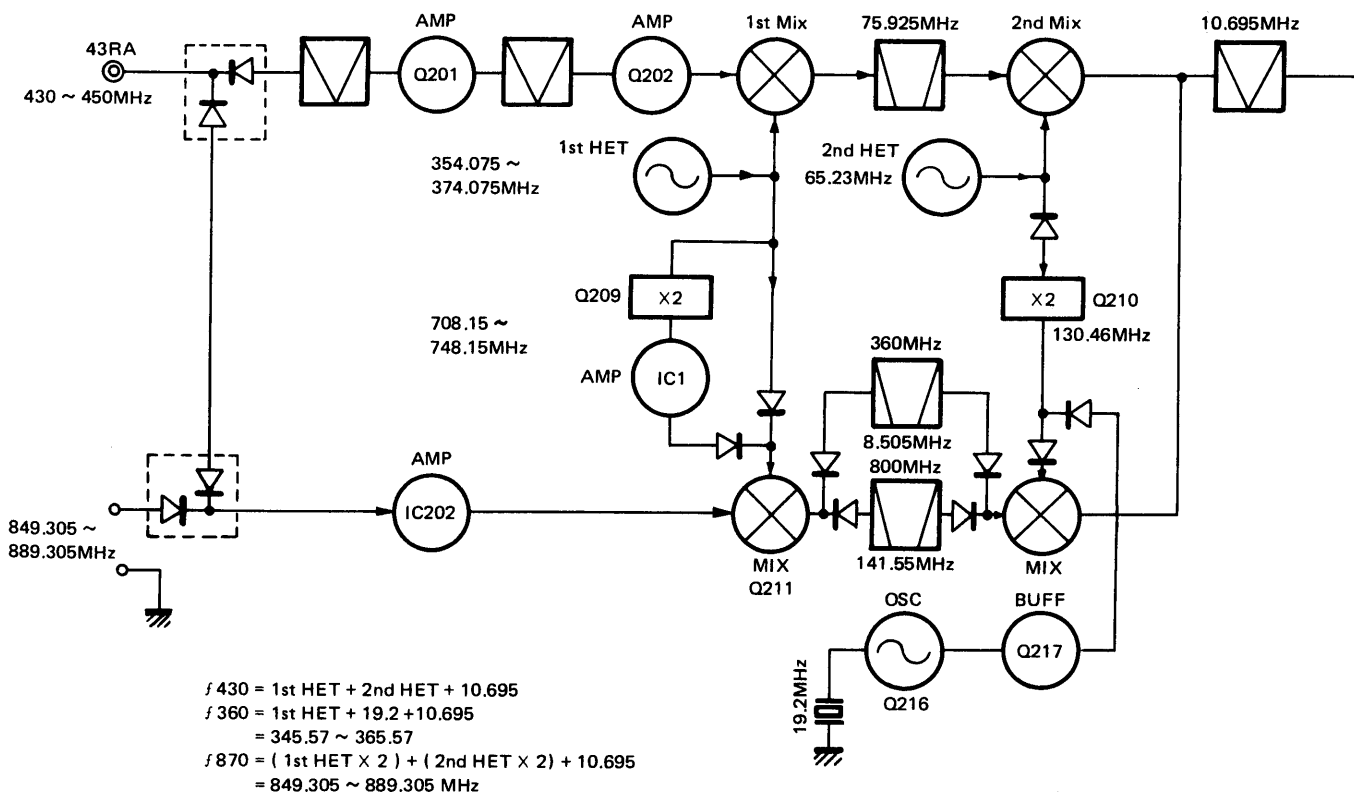


Fig. 3 430MHz RF unit configuration

TS-790A/E

CIRCUIT DESCRIPTION

Analog Signaling System

The TS-790A/E is an all-mode triple bander. It has a different system configuration from the usual mono-band radio in order to implement the capability of simultaneous reception on any two bands.

There are two displays : main and sub. The main unit acts as a transceiver and the sub unit acts as a receiver. Therefore, the TS-790A/E basically has three front-ends (for 144, 430, and 1200MHz) and two IF circuits (main and sub). The two IF circuits are mounted on a single PC board. The main circuit contains the transmitter circuitry.

Figure 4 shows the receive signal flow. Figure 5 shows the transmitter signal flow. In the 144 or 430MHz-band mode, the appropriate RF unit is connected to the IF unit

with an 10.695MHz (main) or 10.595MHz (sub) signal. In the 1200MHz-band mode, the final mixer (used in SSB or CW mode) is contained on the IF unit. Therefore, the RF unit is connected to the IF unit via a 41.415MHz (main) or 41.315MHz (sub) signal.

Figure 6 shows how control signals are generated to select the desired front-ends and select the proper connections to the main or sub IF circuits. This control method may seem redundant, but, if only five control signals (three for band selection and two for main or sub IF selection) were used an additional AND circuit would be needed to produce a signal like 14M. Actually, the six control signals shown in the figure are used directly, or they are combined with other signals such as TXB and RXB.

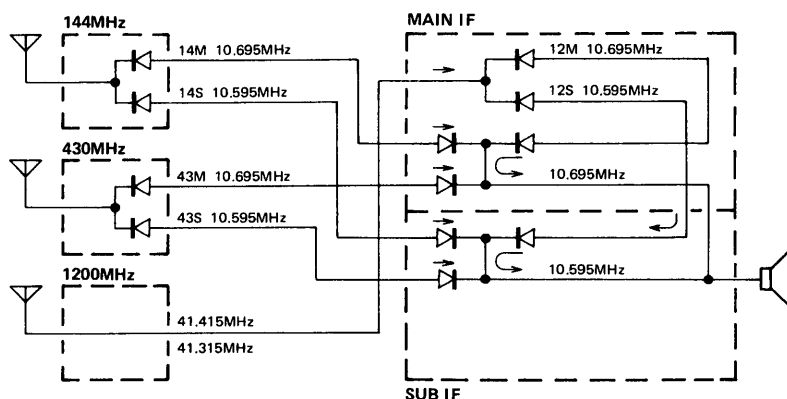


Fig. 4 Received signal flow

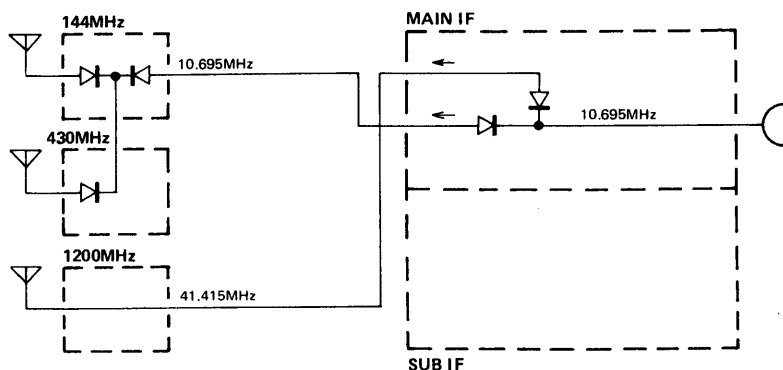


Fig. 5 Transmit signal flow

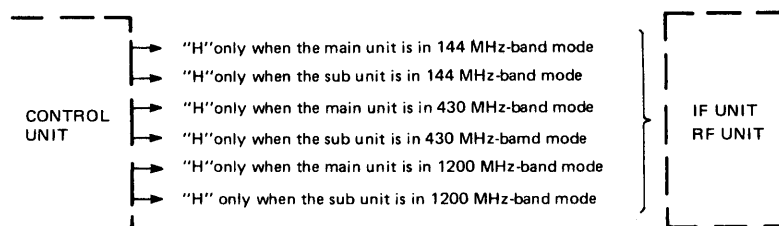


Fig. 6

CIRCUIT DESCRIPTION

• TXB and RXB control circuit for each band

As described above, in order for the appropriate RF unit to be properly connected to the main IF circuit (transceiver) or sub IF circuit (receiver), the TXB and RXB signals, including main or sub band data, are needed in addition to band information. Figure 7 shows the circuit used to generate the information.

Control of 1200MHz-band mode is described below.

1. Control when the main unit is operated in the 1200MHz-band

When the main unit is operated in the 1200MHz-band, the 12M signal is H and the 12S signal is L. During receive, the RXS line becomes H, Q323, Q324, D321, Q325, and Q326 turn on sequentially, causing a logic H to be output from B-RXB. In the 1200MHz-band, this H is used as RXB. That is, the B-RXB is generated from 8V. Although Q321 and Q322 are on, B-TXB is not output because TXB is L.

During transmit, TSB becomes H and B-TXB also becomes H. In the 1200MHz-band, this B-TXB is used as TXB. Since RXS is L, Q326 turns off and B-RXB also becomes L.

2. Control when the sub unit is operated in the 1200MHz-band

When the sub unit is operated in the 1200MHz-band, the 12S signal is H. As a result, Q321 and Q322 turn off, and B-TXB is always L. In addition, D321, Q325, and Q326 are on regardless of the state of RXS, so B-RXB is always H.

Similar circuits are also provided for the 144MHz and 430MHz RF units. They operate in the same way as described for the 1200MHz RF unit.

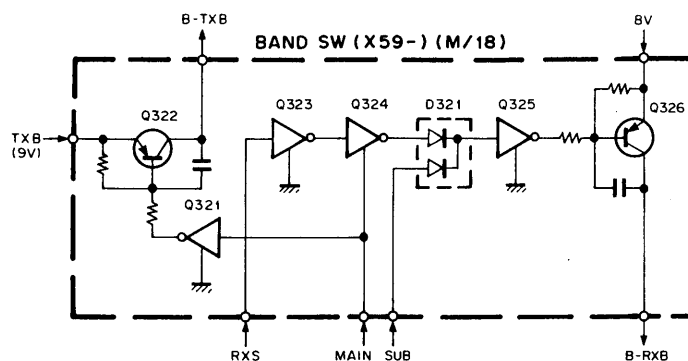


Fig. 7 TXB and RXB control circuit for each band

• Standby circuit

Figure 8 shows the TXB and RXB generation circuit, which is used regardless of the band in which the TS-790A/E operates. When a PTT or packet transmit request is issued, the signal is sent to the CPU in the control unit through the CSS line of the IF unit. The CPU determines whether transmission is disabled. If it is not disabled, the CPU outputs a H signal from CTX line. This H signal is sent to the 144MHz final unit via Q98 and Q123, turning the SW transistor and then TXB (9V) on. The TXB signal is distributed to the final, IF, and RF units.

RXB is the opposite of the TXB logic. Q95 forms a buffer to minimize TXB leakage from the 8V line. The RXS signal has a time constant determined by an electrolytic capacitor connected to the base of Q97. The band switching module uses the signal to generate B-RXB. RXB generated by Q96 cannot be used as a band switching signal due to the time constant, which is determined by many decoupling circuits contained in the circuit following Q96.

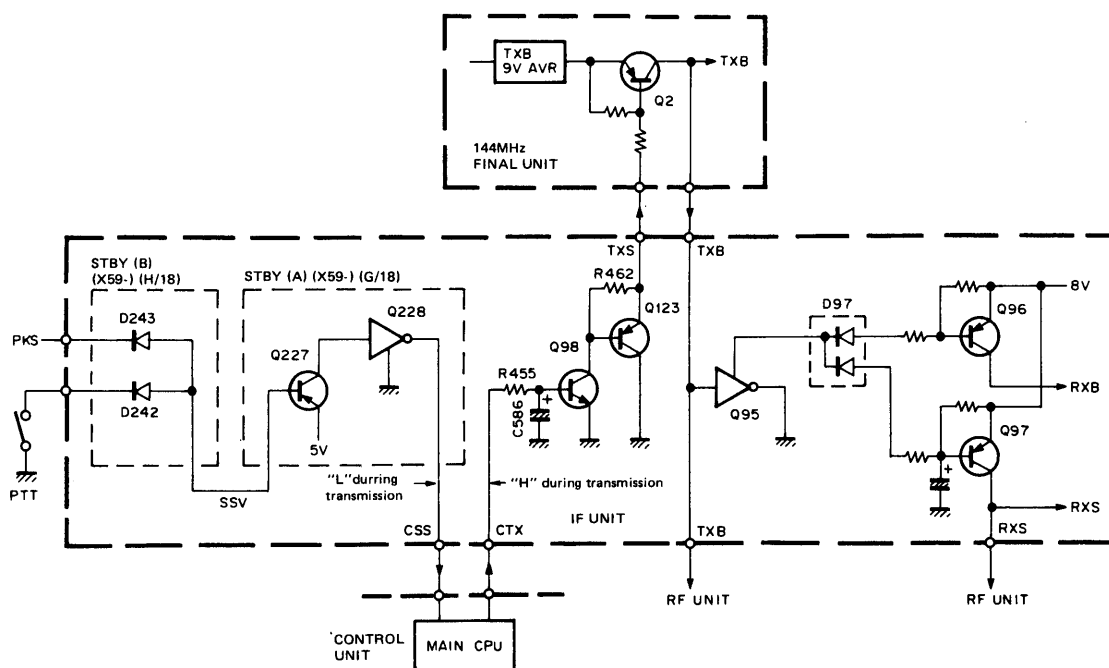


Fig. 8 Standby circuit

TS-790A/E

CIRCUIT DESCRIPTION

• Keying circuit

The TS-790A/E uses semi break-in CW keying. Traditionally, the time constant was determined by an electrolytic capacitor or timer IC. In the TS-790A/E, the time constant is controlled by an A/D converter inside the CPU.

For information on STBY(A) (X59-)(G/18), see the description of module operations. Q22 and Q23 form a switch used to disconnect VR11 from the DL2 line when the TS-790A/E operates in a mode other than CW mode.

In the 144 or 430MHz-band, actual keying operations are done by the drain from the final TIF amplifier and the diode switch. In the 1200MHz-band, it is done by a mixer converting the 10.695MHz drain from the final TIF amplifier to 41.415MHz and an input signal to it.

• ALC and power control circuits

The ALC circuit drives its comparator with a voltage obtained by detecting the standing wave, and using it to generate an ALC voltage. The TS-790A/E power is controlled by changing the threshold voltage of the comparator.

If the power decreases, gain will increase by an amount equal to power decrease. To avoid this, gain is decreased by changing the gate bias of the TIF amplifier, thereby minimizing the amount of ALC loop gain fluctuation due to adjustments of the power control.

When FM or CW is selected from the SSB mode, the power needs to be decreased by approx. 20dB. To do this, Q84 and Q85 are used to change the threshold level.

The RF meter is operated from part of the standing wave detection voltage.

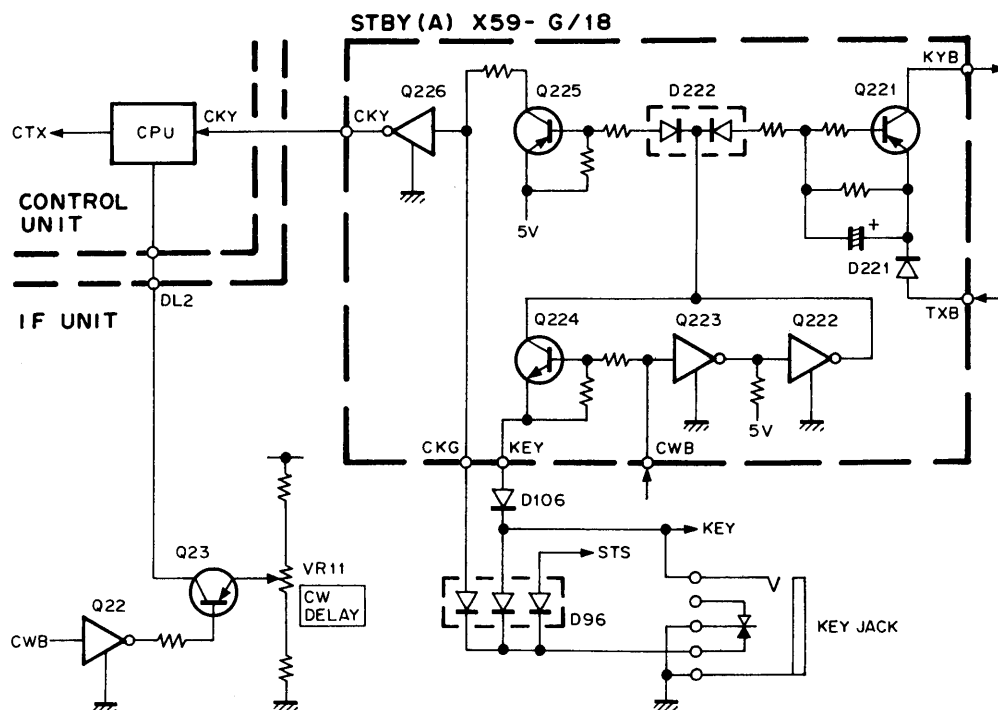


Fig. 9 Keying circuit

CIRCUIT DESCRIPTION

• Squelch circuit

This section will describe how the squelch circuit in the main unit operates.

When the squelch circuit opens, pin 13 of IC8 becomes H. The output voltage from the pin turns on Q181a and Q181b in the SQL control (X59-)(E2/18). Q131b is used to control the packet busy state. It is turned on/off according to a time constant determined by the IC8 squelch circuit, regardless of mode. IC8 operates in any mode including FM mode to allow all-mode squelch. In the FM mode, C546 is not charged because no voltage is supplied to the collector of Q181a. In modes other than FM, the positive (+) side of the capacitor is charged, closing squelch. As a result, a high-impedance state occurs between the collector and emitter of Q181a, and the C546 discharges thru Q182. This allows the squelch tail to be lengthened.

Q120 is a switching transistor which negates input to Q182 when the TS-790A/E is switched from the FM mode to SSB or CW mode squelch. This prevents malfunction of Q182 due to a pulse produced by differentiating input to C546 at its leading edge. On/off operation of the audio signal switches Q61's squelch gate circuit and also turns the AF switch Q18 on/off. Q18 removes unnecessary noise during transmission, or when no memory channel is available, or when the TS-790A/E is switched to a different mode.

Q118 is used to change the switch timing of the squelch gate in FM, SSB, or CW mode. In SSB or CW mode, internal noise is low, so squelch on/off noise will be easily heard when a headphone set is used. To avoid this, the switching interval is made a little longer, as compared with that in FM mode.

When the optional CTCSS unit (TS-790A only) is used, the squelch circuit operates as described below.

When the CTCSS unit is turned on, the CT line becomes H and Q14 turns on, turning Q61 off regardless of whether the squelch is open or closed. As a result, the TS-790A enters a state in which no sound is output. When a tone is detected in this state, the DET line from the CTCSS unit becomes H and Q141 turns on, turning Q142 on. Thus, the TS-790A enters a state in which sound can be output. Even if the CTCSS is operating, the busy LED is linked with the state of the squelch, open or close, to allow busy state monitoring.

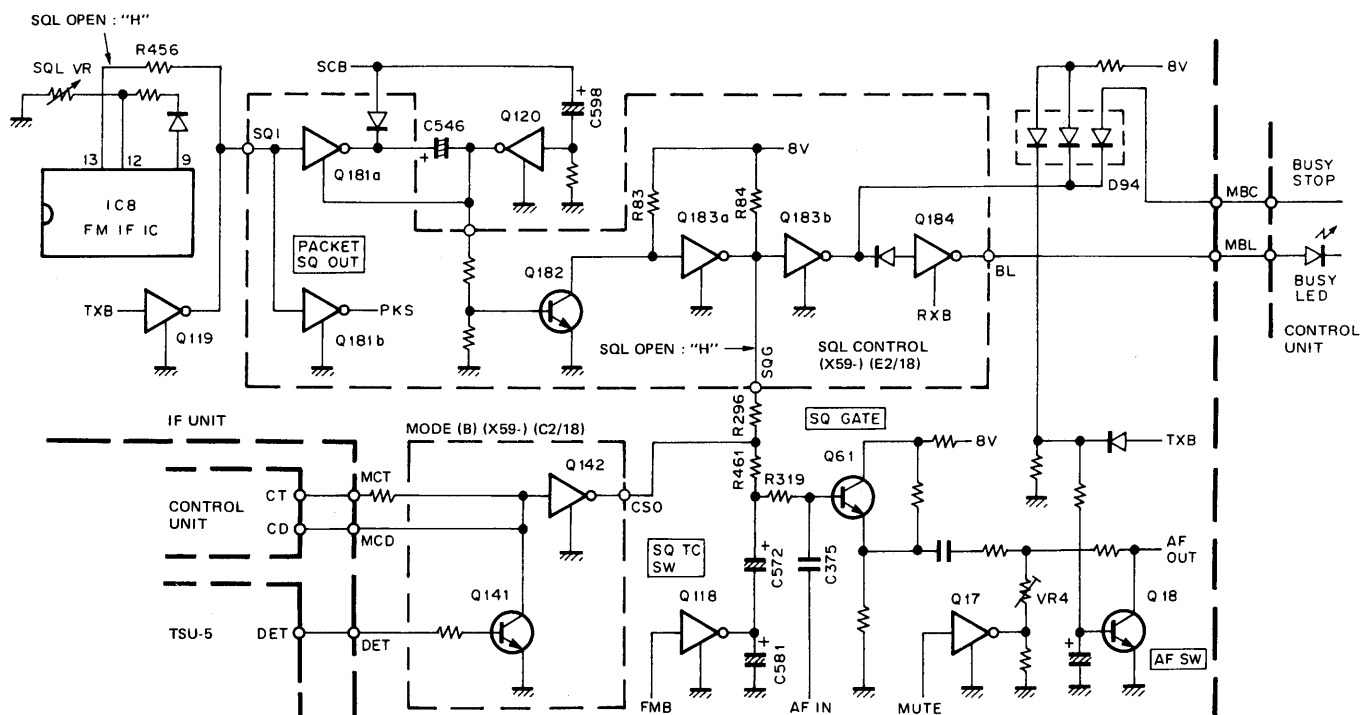


Fig. 10 Squelch circuit

TS-790A/E

CIRCUIT DESCRIPTION

• Speaker separate circuit

The speaker separate circuit allows effective use of the simultaneous two-band reception capability. That is, it provides a speaker separate switch and two external speaker terminals. Using the switch and connecting external speaker units, the TS-790A/E can be used in various ways.

When SP SEP is off, IC262a turns on and mixes AF from the main and sub units. Also, IC262b or IC262c turn off when only one EXT. SP terminal is used. In all other cases, both are on.

IC261 consists of a logic circuit which controls the above operations. When SP SEP turns on, Q19 and Q20 go on. They are used to prevent fluctuation of the audio level which will occur when the SP SEP line toggles between on and off.

Q261 is a transistor that is used to convert the 5V signal from the control unit to 8V.

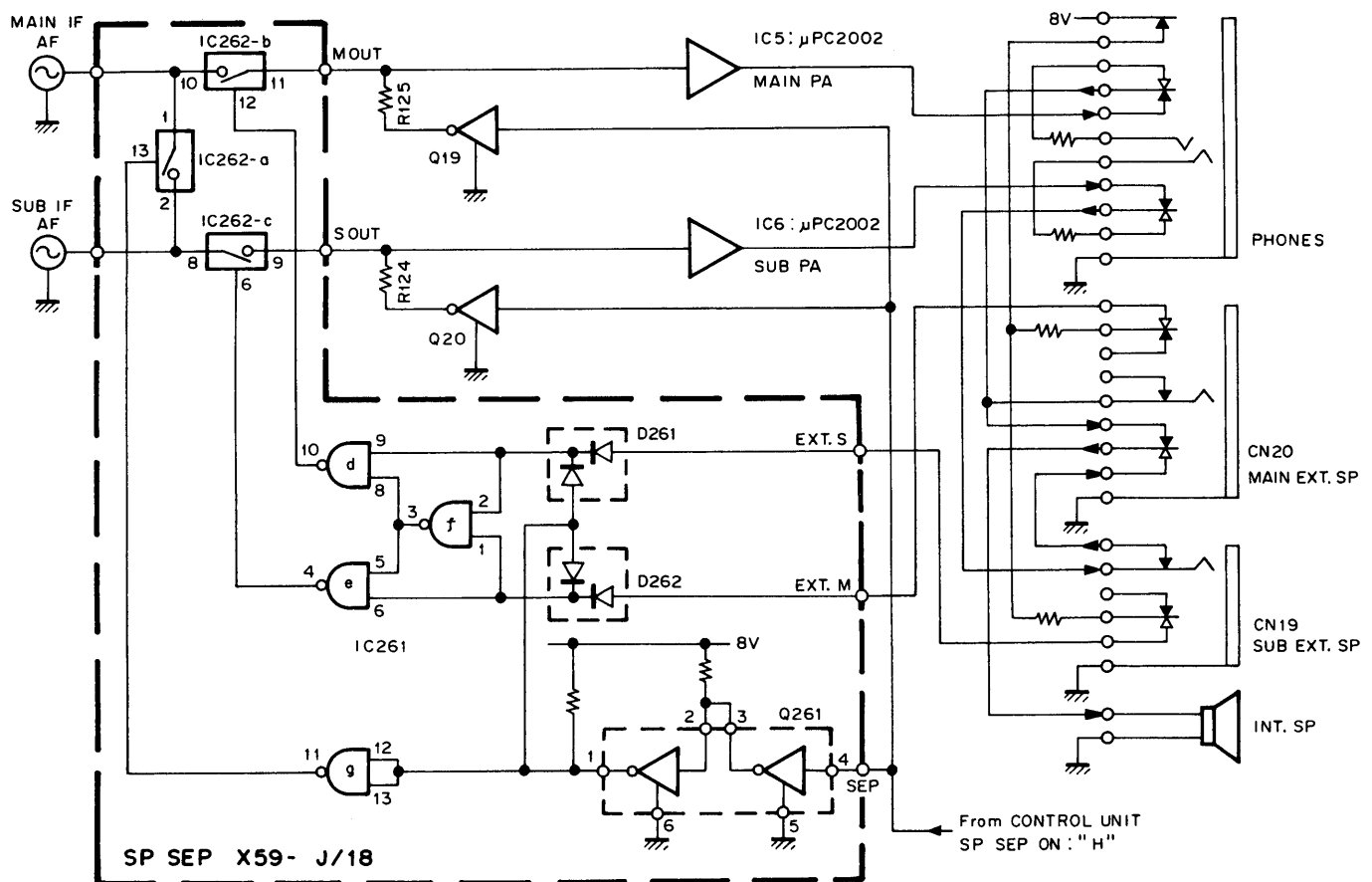


Fig. 11 Speaker separate circuit

CIRCUIT DESCRIPTION

Module Unit in the IF Unit

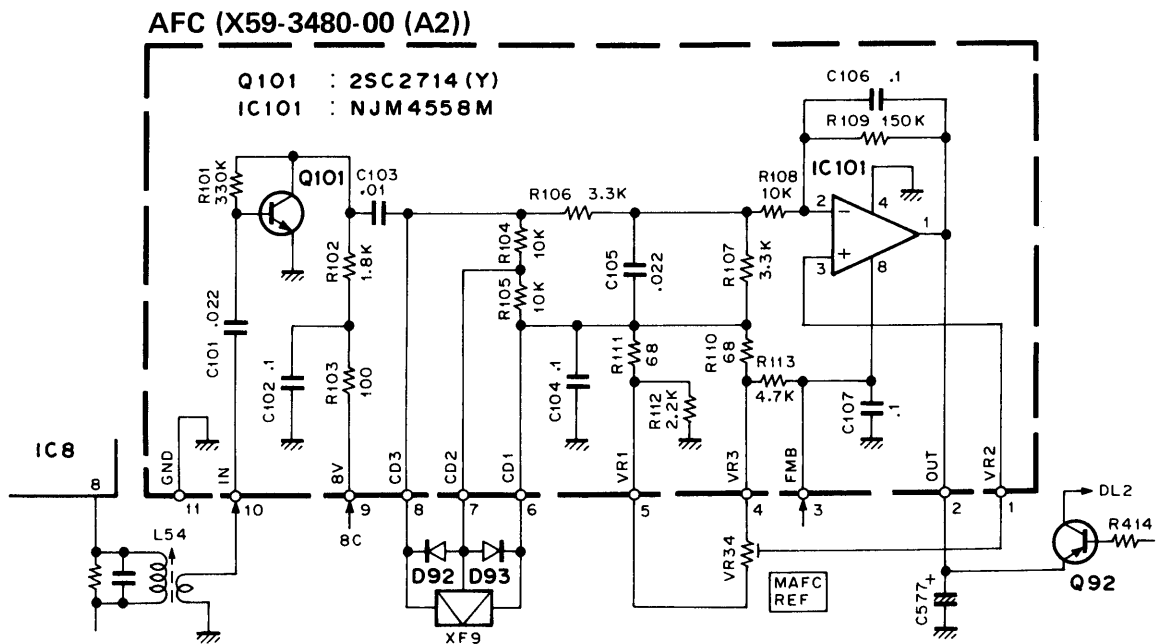
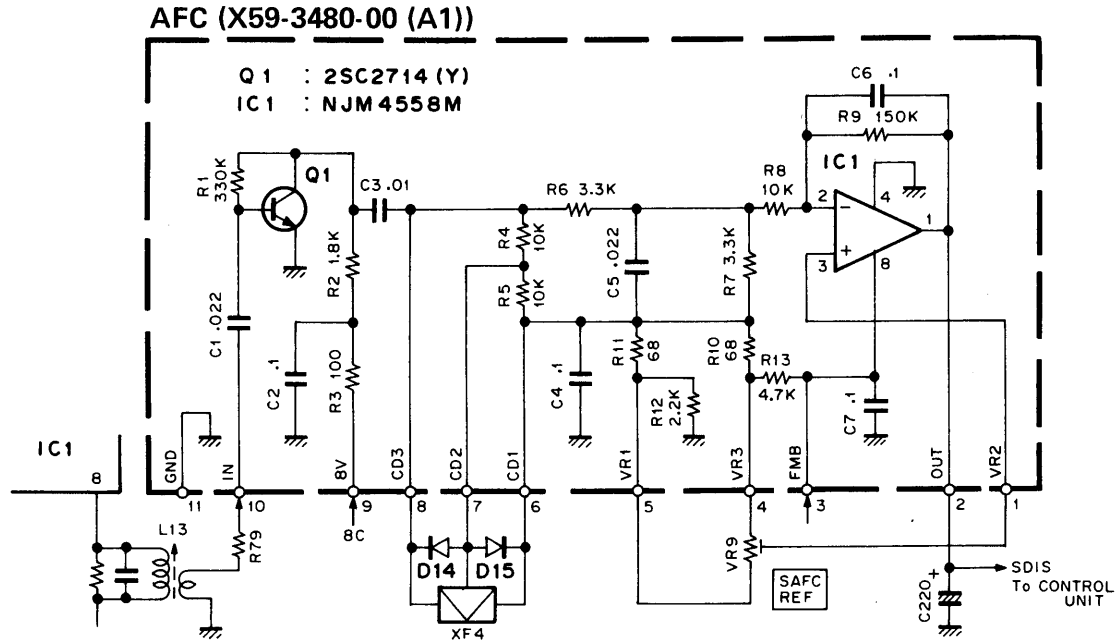
• AFC (ALT) module

(The same circuit is used in the main and sub unit.)

The 455kHz signal is amplified by Q1 and then converted to a DC voltage by the ceramic discriminator connected to CD1 thru CD3.

The DC voltage is amplified by IC1 and then sent to an A/D converter in the control unit.

When no signal is present or when the TS-790A/E is tuned, the OUT pin supplies approx. 2.5V. When the TS-790A/E detunes in the range from -3kHz to +3kHz, it outputs a voltage from -3.1V to 1.9V.



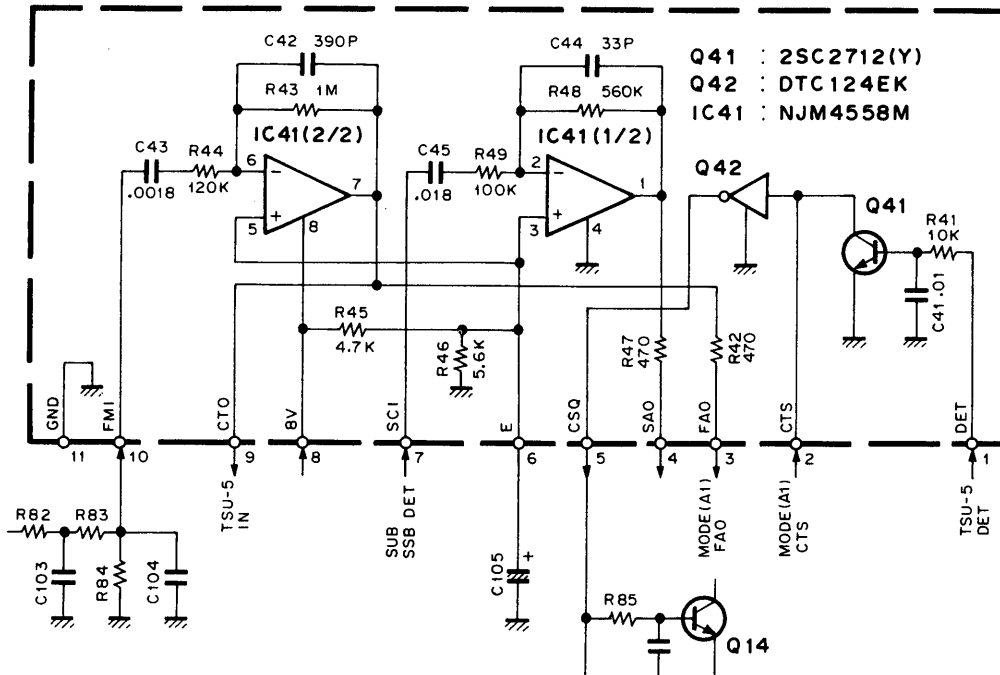
CIRCUIT DESCRIPTION

• MODE (B) module

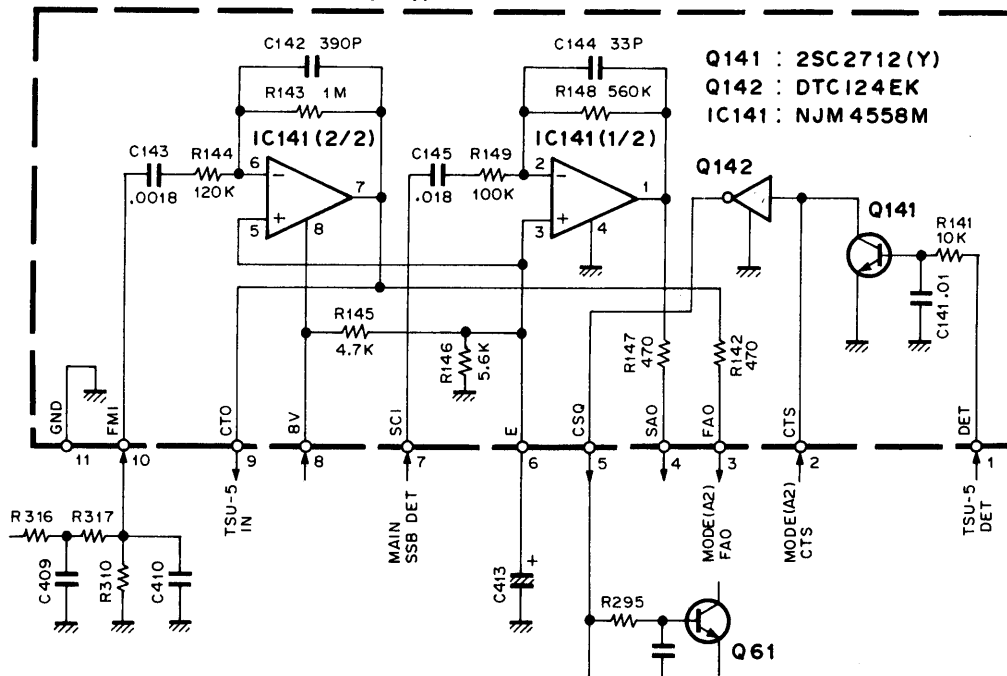
(The same circuit is used in the main and sub unit.)

If the optional CTCSS unit is used, Q41 and Q42 turn the squelch on/off, depending on if the CTCSS unit detected a tone.

MODE (B) (X59-3480-00 (C1))



MODE (B) (X59-3480-00 (C2))



CIRCUIT DESCRIPTION

• S-METER module

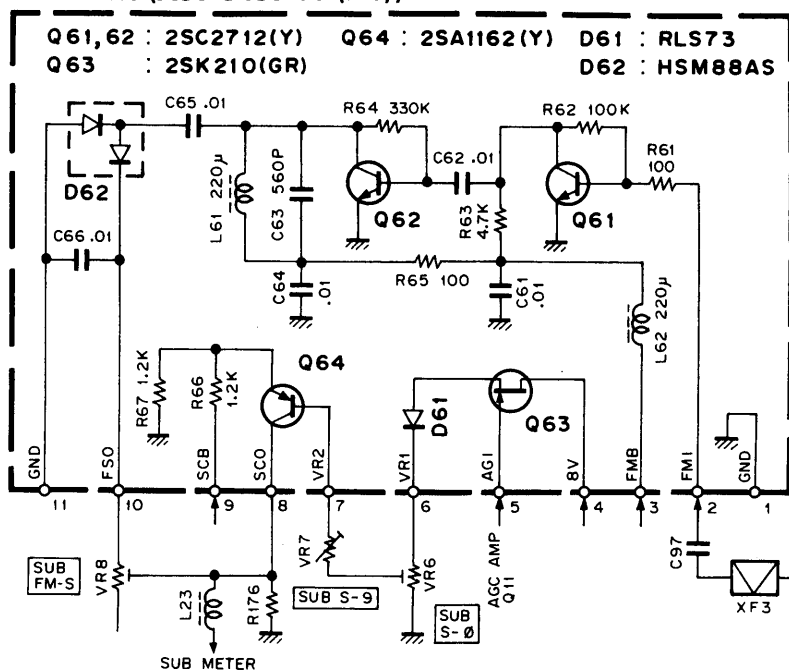
(The same circuit is used in the main and sub unit.)

Q61, Q62, and D62 form the FM S-meter circuit, which amplifies and detects a signal from the 455kHz filter.

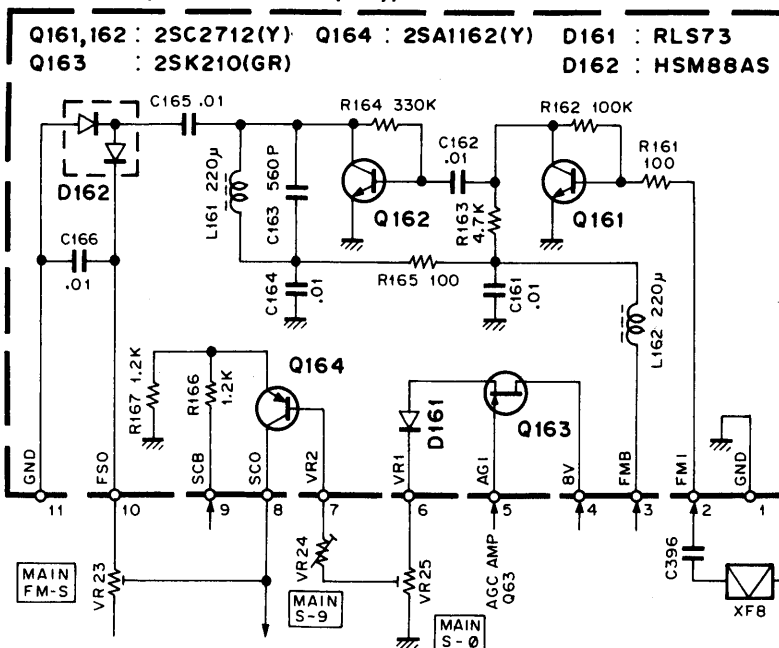
Q43 and Q64 form a SSB S-meter circuit.

The sub unit uses a digital meter, not an analog meter. The SSB S-meter circuit in the sub unit, therefore, is provided with a load of 4.7k Ω resistor. Voltage generated by the resistor is controlled and converted from analog to digital.

S METER (X59-3480-00 (D1))



S METER (X59-3480-00 (D2))



CIRCUIT DESCRIPTION

• SQL CONTROL module

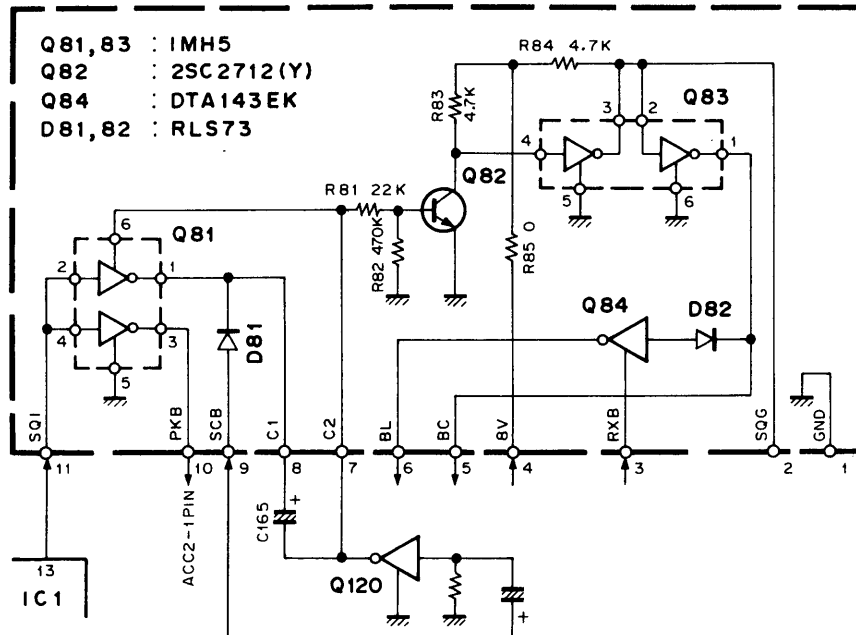
(The same circuit is used in the main and sub unit.)

Q81 send the packet busy control signal to the PKS pin.

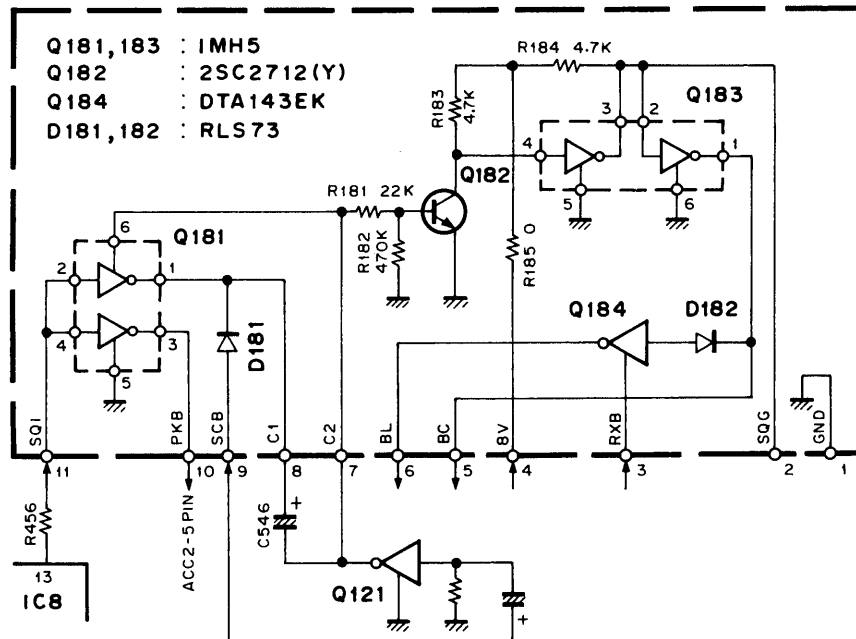
When the squelch is open, the signal is connected to ground.

In SSB or CW mode, the squelch tail is delayed. The BC and BL pins are used to supply the scan stop signal (active L) and the busy LED on signal (active H) to the control unit respectively. The operation of the squelch circuit was described in an earlier section.

SQL CONTROL (X59-3480-00 (E1))



SQL CONTROL (X59-3480-00 (E2))



TS-790A/E

CIRCUIT DESCRIPTION

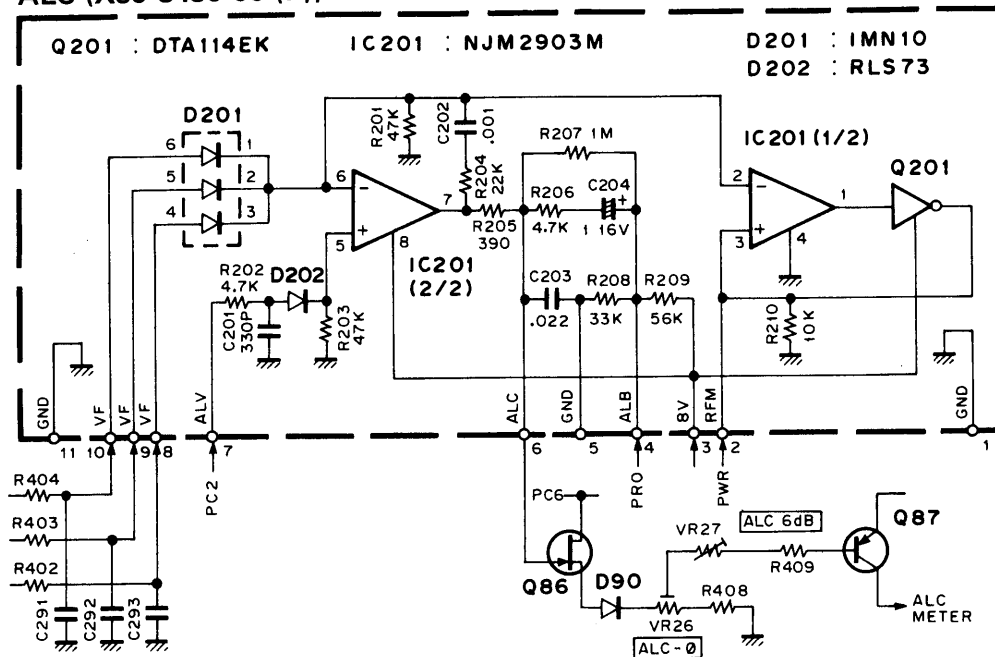
• ALC module

The ALC module generates ALC voltage, using the standing wave voltage from the final unit.

Output voltage from the ALV pin is changed to change the threshold level of the ALC and control power.

One half of IC201 acts as a voltage buffer to operate the RF meter.

ALC (X59-3480-00 (F))



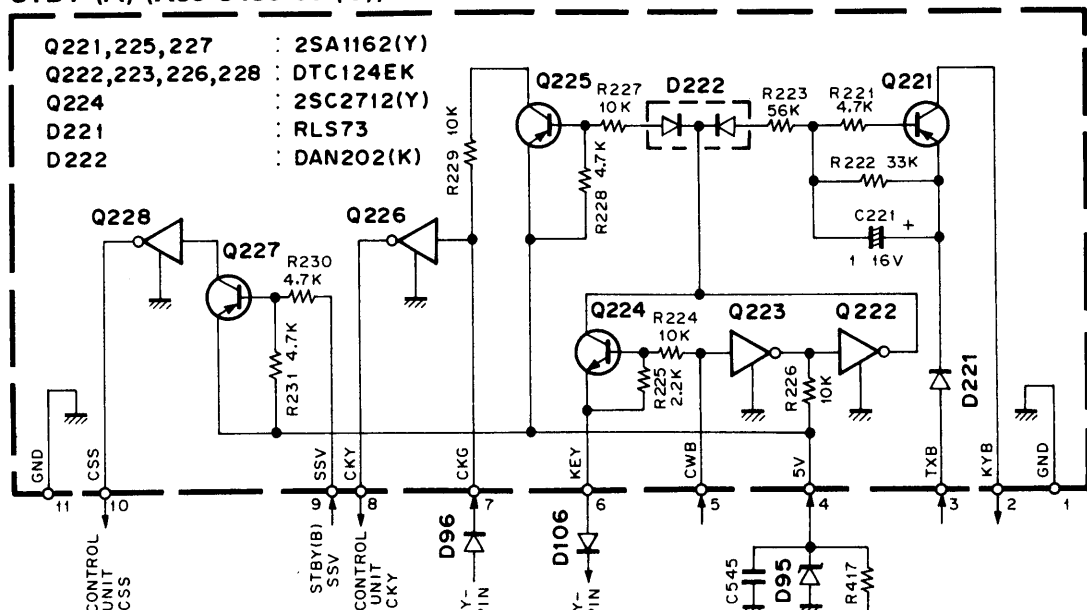
• STBY (A) module

Q227 and Q28 sends the TX GO signal (active L) to the control unit when a semi break-in operation occurs in CW mode or when a transmission request, other than a W or T type tone transmission request, (PTT or SS) is generated.

The CKY pin is used to send the TX GO signal (active L) to the control unit when a semi break-in key down operation occurs.

The KYB pin is used to supply B voltage having a time constant to the TIF amplifier when a semi break-in key down operation occurs.

STBY (A) (X59-3480-00 (G))



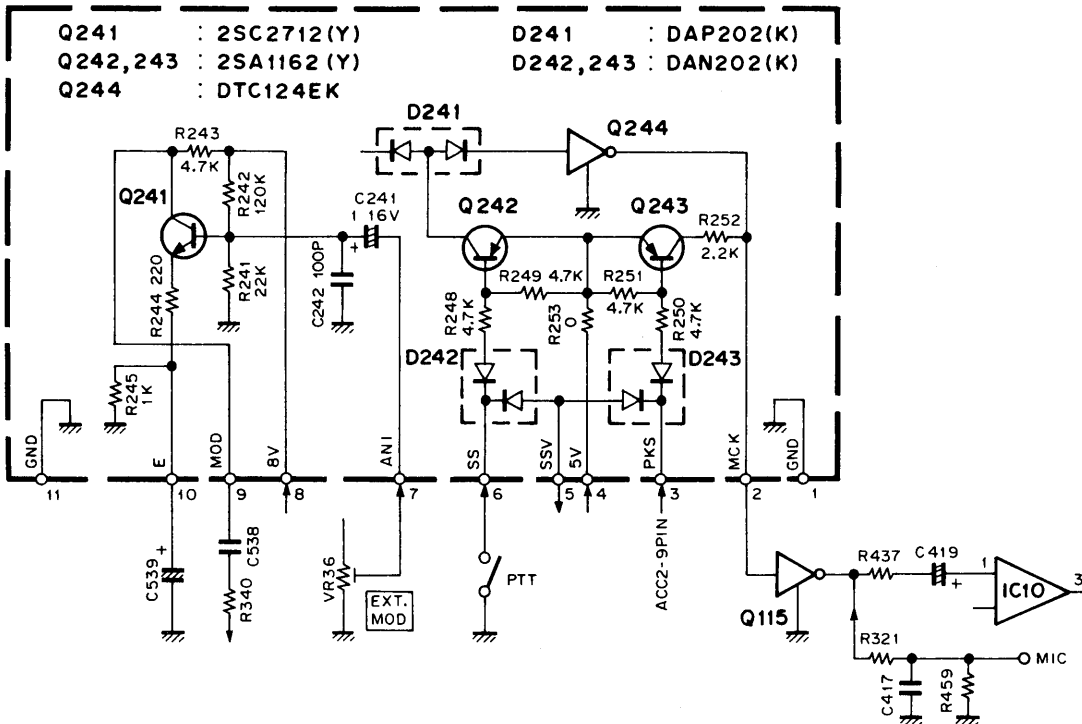
CIRCUIT DESCRIPTION

• STBY (B) module

Q241 receives and amplifies an external analog modulation signal, and sends the signal to the MIC amplifier.

The MCK pin is used to provide a signal which prevents modulation from being caused by input from the MIC when sending the packet standby signal from the PKS pin.

STBY (B) (X59-3480-00 (H))

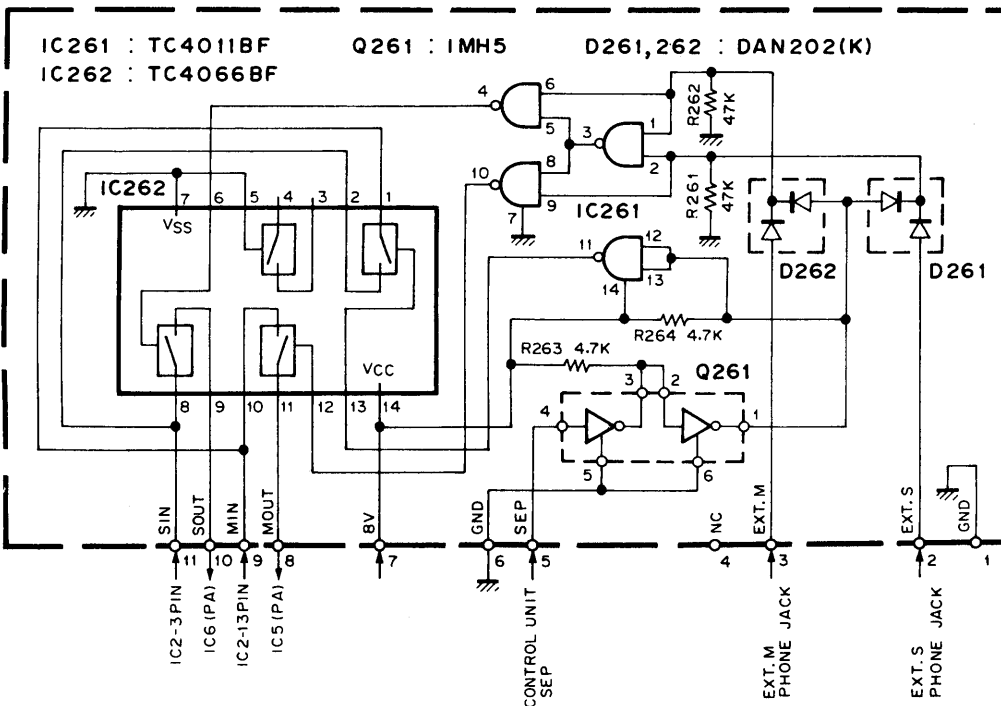


• SP SEP (Speaker separate) module

The speaker separate module determines which one

of the two AF PA IC chips supplies AF from the main or sub IF unit.

SP SEP (X59-3480-00 (J))

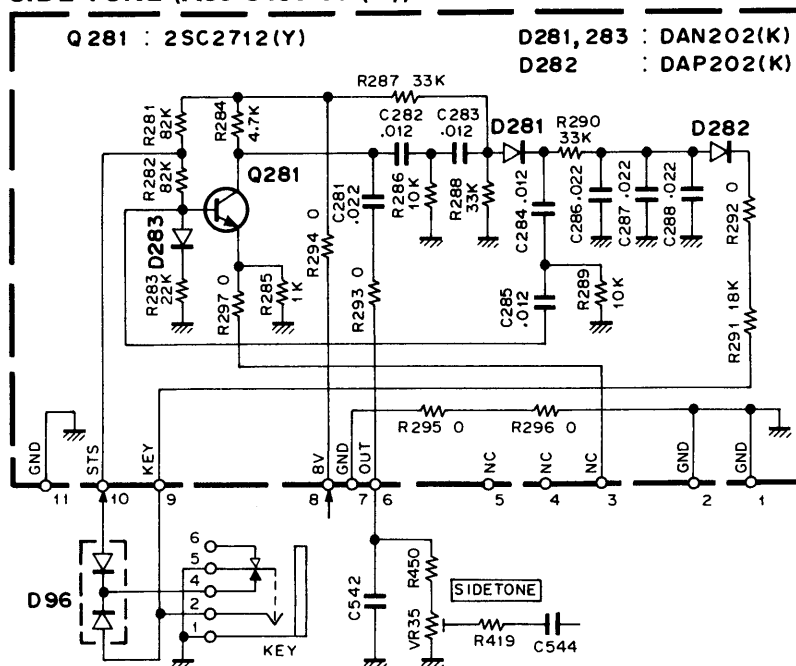


CIRCUIT DESCRIPTION

• SIDETONE module

When a CW key is inserted into the KEY jack, the STS pin is disconnected from ground, and Q281 is ready to operate. When the KEY is closed, the OUT pin emits sidetone.

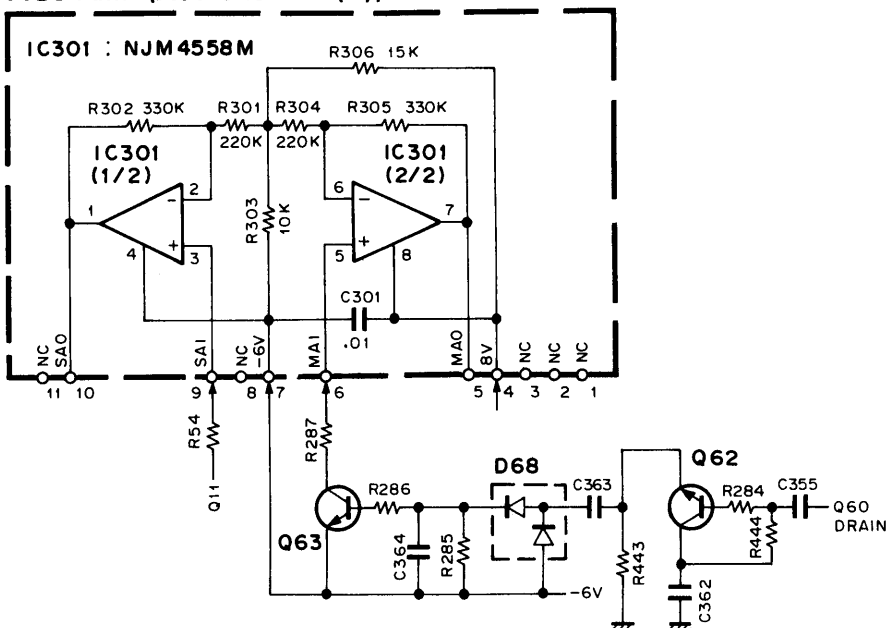
SIDE TONE (X59-3480-00 (K))



• AGC AMP module

The AGC amplifier module generates negative AGC voltage.

AGC AMP (X59-3480-00 (L))

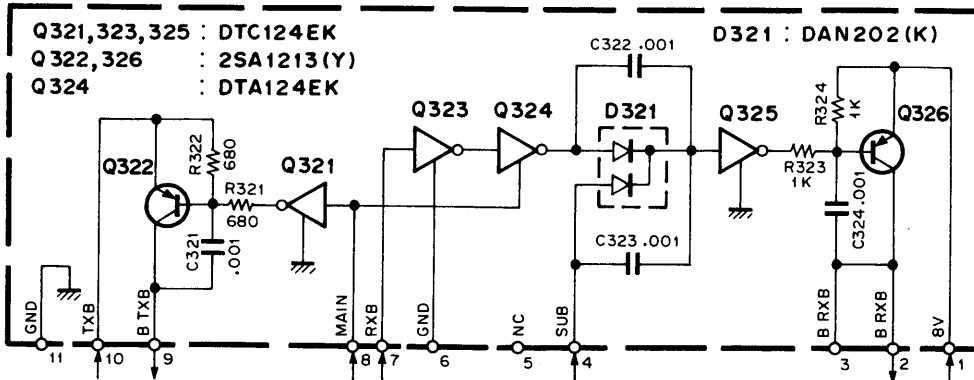


CIRCUIT DESCRIPTION

• BAND SW module

The band switching module generates TXB and RXB for band selection. For example, it generates 14TXB from B-TXB and 43RXB from B-RXB. B-RXB sent to the sub unit does not go off even if the main unit is acting as a transmitter.

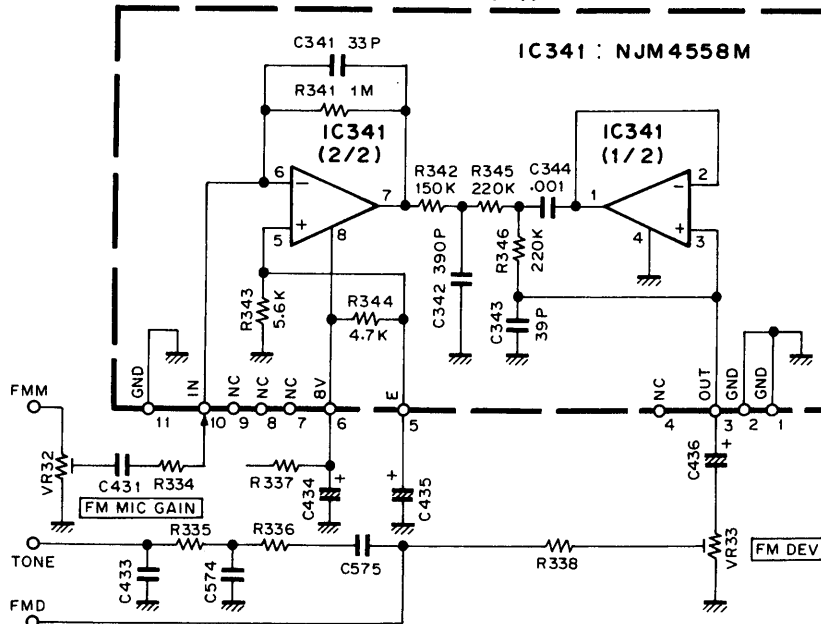
BAND SW (X59-3480-00 (M))



• FM MIC AMP module

IC341 consists of a limiter and a set of LPFs.

FM MIC AMP (X59-3480-00 (N))



TS-790A/E

CIRCUIT DESCRIPTION

Transmit Frequency Components

In FM mode, signals from the two 10.695MHz crystal oscillators in the IF unit are directly modulated. In the SSB or CW mode, the DSB signal is generated, using BM (Balanced Modulation) from IC9 in the iF unit. Then the 10.695MHz signal for SSB is obtained from filter XF6 (10.695MHz).

Band IF	144MHz	430MHz	1200MHz
A1,A3J,FM	Single conversion	Double conversion	Triple conversion

Table 4 Type of transmit signal conversion by band

Band IF	144MHz	430MHz	1200MHz
1st	10.695MHz	10.695MHz	10.695MHz
2nd	—	75.925MHz	41.415MHz
3rd	—	—	287.175MHz

Table 5 Transmit IF frequencies

PLL Configuration

The TS-790A/E contains a dual PLL loop for the 144MHz band, a dual PLL loop and a 2nd HET PLL loop for the 430MHz band, a triple PLL loop for the 1200MHz band, and a pair of main and sub PLL loops, totaling 11 PLL loops, and 11 VCOs.

• 144MHz-band block PLL configuration

The 144MHz-band block contains a dual PLL loop using a 20Hz step VFO. 78.5 to 82.5MHz generated from loop B for 2kHz comparison is divided by 100 in IC3 to generate the 20Hz step output. The 20Hz step output is mixed with 10.24MHz by IC1. The upper portion of the mixed signal is extracted by ceramic filters CF1 and CF2. The output from the filter is mixed with 102.4MHz obtained by multiplying 10.24MHz by 10 to generate a 113.425 to 113.465MHz signal. These frequencies are used as local oscillator frequencies for loop A.

Loop A makes a 40kHz comparison. Signals from its VCO are supplied to the 1st HET. L5, L6, D2, D3, and D4 form a variable low-pass filter (LPF), which is used to remove unnecessary components from output of mixer Q6. Bias voltage to D2, D3, and D4 of the LPF is controlled by IC12 logic, using the 14B1 signal from the control unit and the lock detect signal from loop A, to control its cut-off frequency.

14B1	A loop lock detect	Bias voltage to D2 and D3	LPF cut-off frequency
L	Unlocked	≅ 18V	High
H	Unlocked	≅ 18V	High
L	Locked	≅ 18V	High
H	Locked	≅ 1.5V	Low

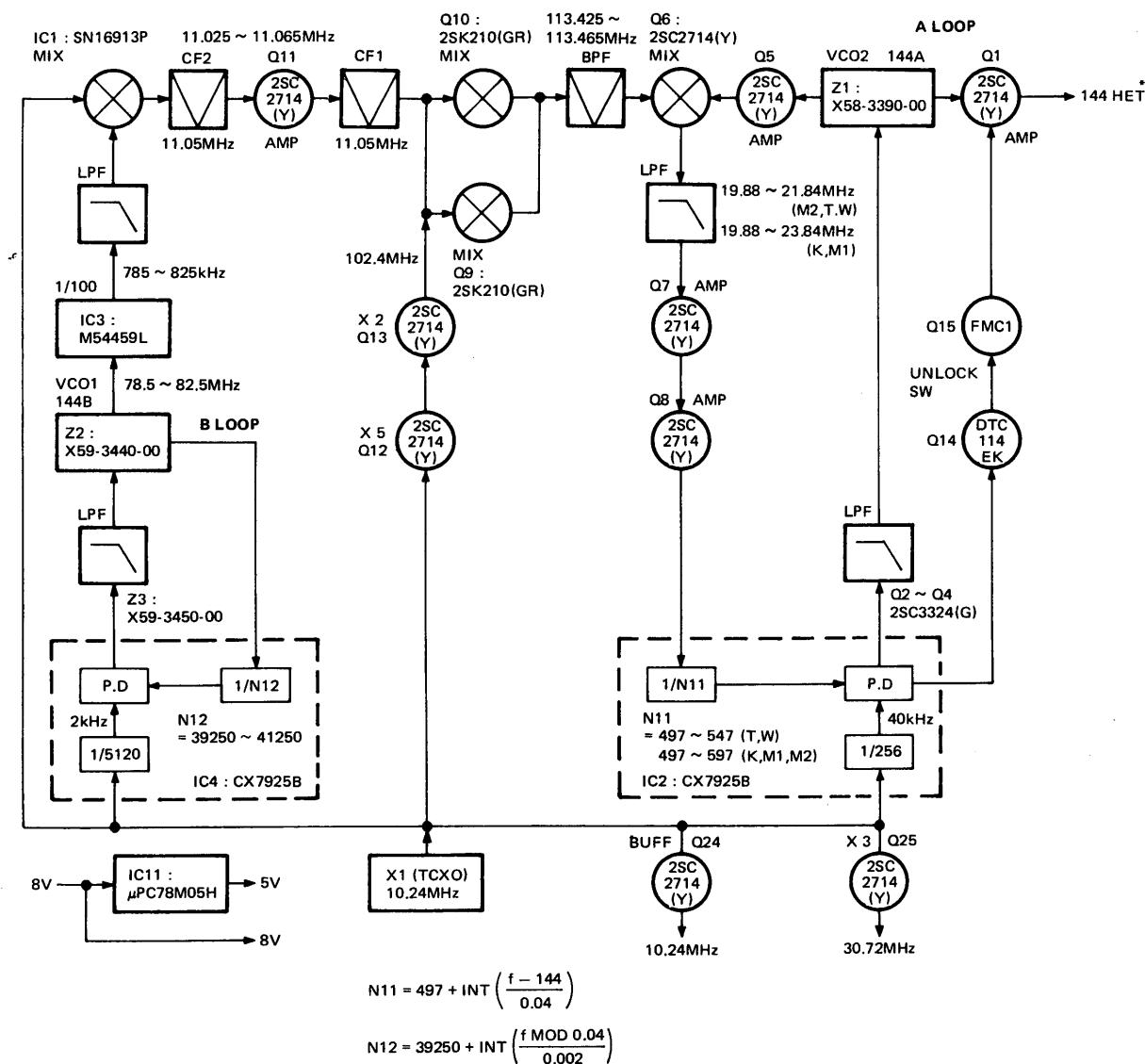
Table 6

The lock detector circuit switches output from pin 8 (AO) of IC2 with Q14 and Q15, and sends unlock information to the Q1 HET amplifier and control unit.

To minimize mutual interference, the 8V power line to each band block is turned off by a switching circuit when it is not used. Each band receives usage information from pin 8 (AO) of the B loop PLL IC chip. The 144MHz PLL uses pin 8 of IC4 to control the switching circuit (Q26 and Q28).

Pin 8 of the PLL IC chip (CX-7925B) can be used to select either lock detect output or general-purpose port. Which to detect is determined by data in the PLL IC when the TS-790A/E power is turned on. The 144MHz PLL sends the IF unit a 10.24MHz local frequency generated by Q24 and a 30.72MHz local frequency generated by Q25 (by multiplying 10.24MHz by three).

CIRCUIT DESCRIPTION



	MAIN (T, W)	MAIN (K, M1, M2)
FM, CWT, CW-NR	133.3050 ~ 135.3050MHz	133.3050 ~ 137.3050MHz
USB	133.3065 ~ 135.3065MHz	133.3065 ~ 137.3065MHz
LSB	133.3035 ~ 135.3035MHz	133.3035 ~ 137.3035MHz
CWR	133.3057 ~ 135.3057MHz	133.3057 ~ 137.3057MHz

	MAIN	SUB
T, W	133.305 ~ 135.305MHz	133.405 ~ 135.405MHz
K, M1, M2	133.305 ~ 137.305MHz	133.405 ~ 137.405MHz

Fig. 12 144MHz PLL block diagram

CIRCUIT DESCRIPTION

• 430MHz-band block PLL configuration

The 430MHz-band block contains a 20Hz-step triple PLL loop and a 2nd HET PLL loop. 79.5 to 83.5MHz VCO output from the 2kHz loop B is divided by 100 in divider IC53 to generate the 20Hz step output. The 20Hz step signal is mixed with 10.24MHz by IC52. The upper portion of the mixed signal is extracted by ceramic filters CF50 and CF51. The filter output is mixed with 122.88MHz obtained by multiplying 10.24MHz by 12 to generate 133.915 to 133.955MHz. These frequencies are then used as local oscillator frequencies for loop C.

Loop C makes a 40kHz comparison. The frequency of the signal from its VCO varies approx. 2MHz to 3MHz. An output frequency from loop C is used as a local oscillator frequency for loop A. The output frequency is mixed by the DBM (L57, L58, and D51), and then sent to the PLL IC through a BPF. VCO output from loop A is supplied to the 1st HET.

Loop A makes a 460kHz comparison. It is supplied with appropriate data according to the value of N21 which varies by 1MHz as shown in Figure 13. Loop C data, therefore, changes in an irregular manner like the VCO23 frequency shown in the table. The graph in Figure 14 illustrates this.

Loop D is the 10kHz-step 2nd HET PLL loop. When the main unit is set to 430MHz, it is locked at 65.23MHz. When the sub unit is set to 430MHz, it is locked at 65.33MHz. The loop is not locked at any other frequency.

The unlock detect circuit OR's output from IC50 in loop A with that from IC55 in the D loop, and switches the OR output, using Q58 and Q59.

8V power to the 430MHz PLL block is obtained by switching output from IC54 with Q74 and Q75.

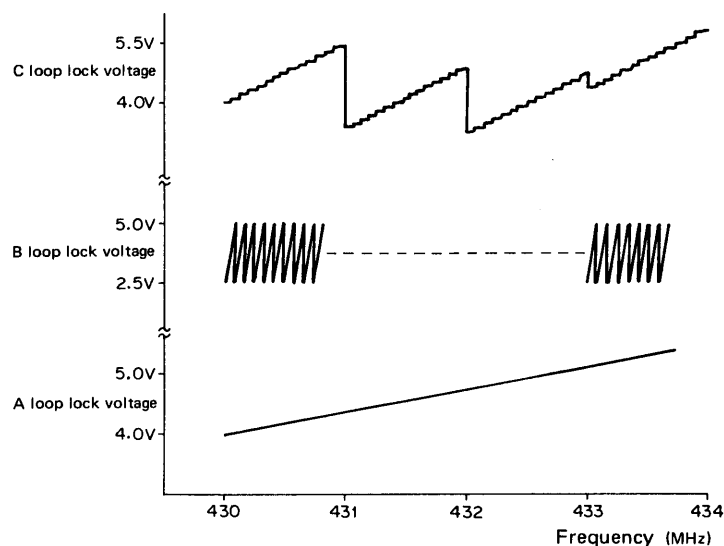
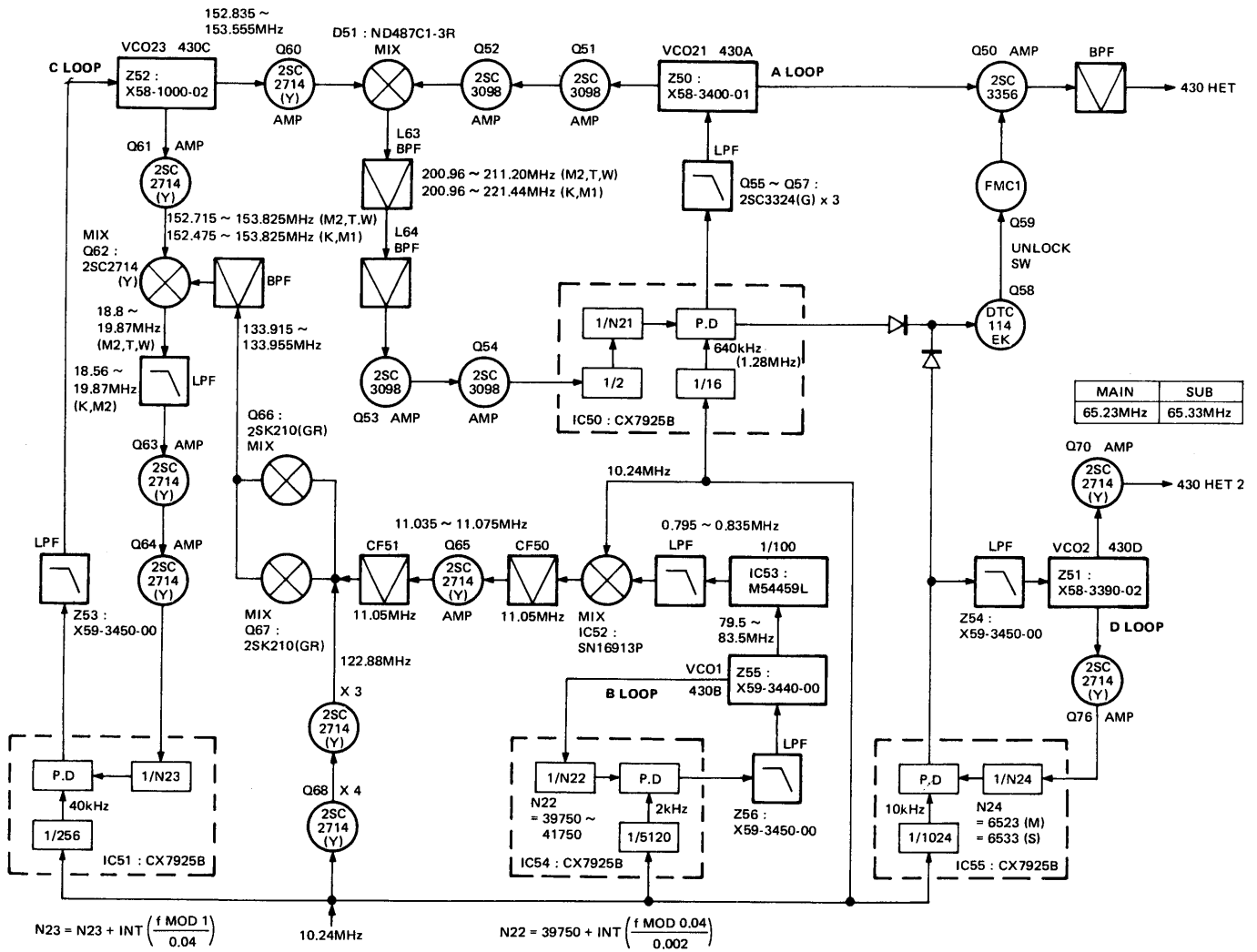


Fig. 14

CIRCUIT DESCRIPTION

	MAIN (M2, T, W)	MAIN (K, M1)
FM, CWT, CW-NR	354.0750 ~ 364.0750MHz	354.0750 ~ 374.0750MHz
USB	354.0765 ~ 364.0765MHz	354.0765 ~ 374.0765MHz
LSB	354.0735 ~ 364.0735MHz	354.0735 ~ 374.0735MHz
CWR	354.0757 ~ 354.0757MHz	354.0757 ~ 374.0757MHz

M2, T, W	354.075 ~ 364.075MHz
K, M1	354.075 ~ 374.075MHz



FREQ'	VCO21	PLL IF21	N21	VCO23	PLL IF23	N23	FREQ'	VCO21	PLL IF21	N21	VCO23	PLL IF23	N23
430	354.075	200.96	314	153.115	19.2	480	441	365.075	212.48	332	152.595	18.68	467
431	355.075	202.24	316	152.835	18.92	473	442	366.075	212.48	332	153.595	19.68	492
432	356.075	202.24	316	153.825	19.92	498	443	367.075	213.76	334	153.315	19.40	485
433	357.075	203.52	318	153.555	19.64	491	444	368.075	215.04	336	153.035	19.12	478
434	358.075	204.8	320	153.275	19.36	484	445	369.075	216.32	338	152.755	19.36	471
435	359.075	206.08	322	152.995	19.08	477	446	370.075	217.60	340	152.475	18.84	464
436	360.075	207.36	324	152.715	18.8	470	447	371.075	217.60	340	153.475	18.56	489
437	361.075	207.36	324	153.715	19.8	495	448	372.075	218.88	342	153.715	19.56	482
438	362.075	208.64	326	153.435	19.52	488	449	373.075	220.16	344	153.195	19.28	475
439	363.075	209.92	328	153.155	19.24	481	450	374.075	221.44	346	152.635	19.00	468
440	364.075	211.2	330	152.875	18.96	474							

Fig. 13 430MHz PLL block diagram

CIRCUIT DESCRIPTION

• 1200MHz-band block PLL configuration

The 1200MHz-band block contains a 10Hz-step triple loop PLL. Since the output frequency from the PLL is doubled by the RF unit, the 20Hz-step VFO is produced in the final stage. 10Hz-step PLL output from loop A is mixed with output from loop C and then passed through a BPF to generate a 500MHz PLL frequency.

Loop B makes a 1kHz comparison. The 1kHz signal is divided by 100 in divider IC2 to generate the 10Hz step output. The other portion of loop B leading to loop A has the same circuit configuration as the 144MHz PLL loop.

Loop C makes a 320kHz comparison. As shown in the table of Figure 15, data supplied to the loop changes each time the frequency varies 10MHz. The frequency of loop C does not vary in regular 5MHz steps (half of the display frequency 10MHz). The sum of C and A loop frequencies varies in 5MHz steps. The loop A lock voltage, therefore, changes like that of loop C in the 430MHz-band block. Mixed A and C loop output is amplified by Q30, Q31, and Q31 for PLL output.

The unlock detect circuit OR's output from IC4 in loop A with that from IC5 in the loop C, and switches the OR output, using Q21, Q21, Q23, and Q24.

Power to the 1200MHz PLL block is obtained by switching output from IC1 with Q74 and Q75.

• CAR PLL configuration

There are two CAR PLL loops : Main and Sub. The PLL section is contained in the same unit as the 144MHz PLL block. Each loop performs 20Hz step operations. These loops have the same configuration, and they only differ in frequencies handled and PLL data supplied. The main loop is described below.

The main loop makes a 2kHz comparison. The output frequency of $45.5\text{MHz} \pm \text{several-hundred kHz}$ is divided by 100 in IC9 to generate $455\text{kHz} \pm \text{several kHz}$. The 455kHz signal is mixed with 10.24MHz by IC8. The upper portion of the mixed frequency is extracted by CF4 to generate $10.695\text{MHz} \pm \text{several kHz}$. The frequency is used as CAR.

In modes other than FM mode, power to the mixer (IC5 and IC8) is supplied by the IF unit through the CAR output coaxial cable. In FM mode, CAR components are not included.

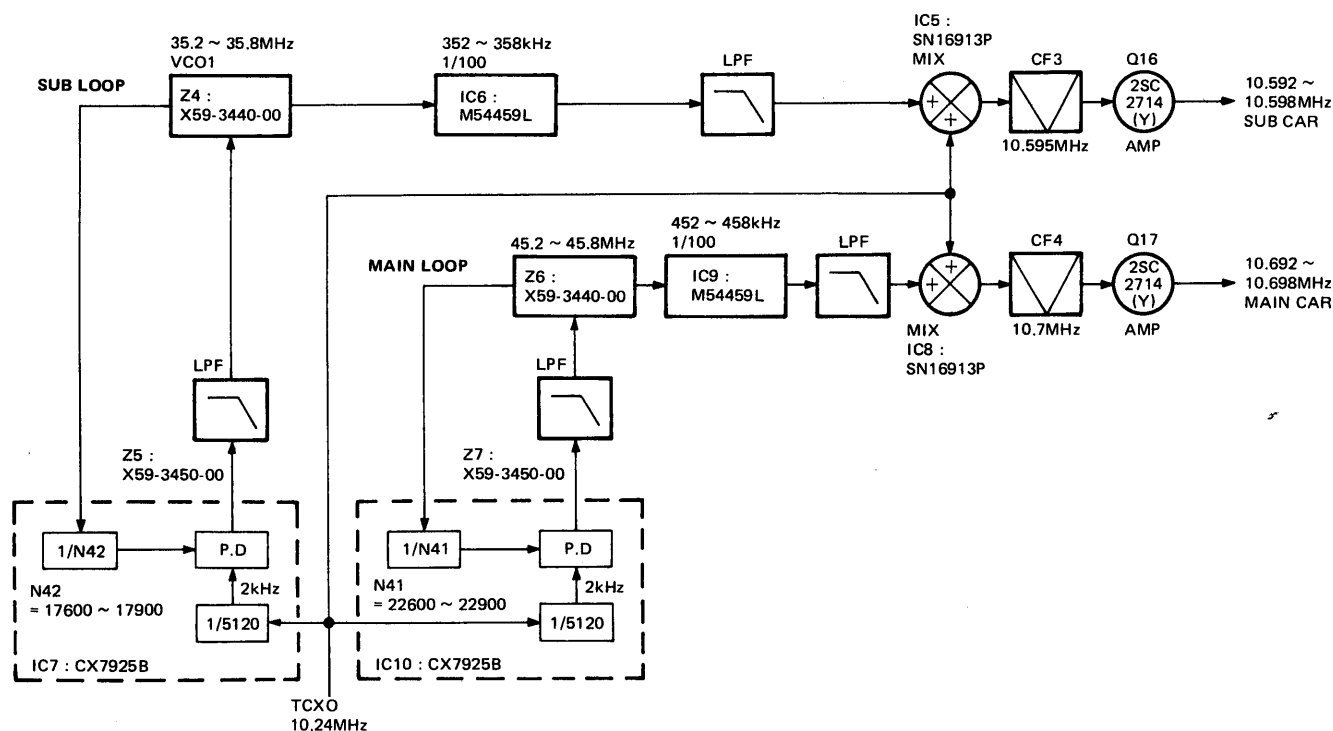


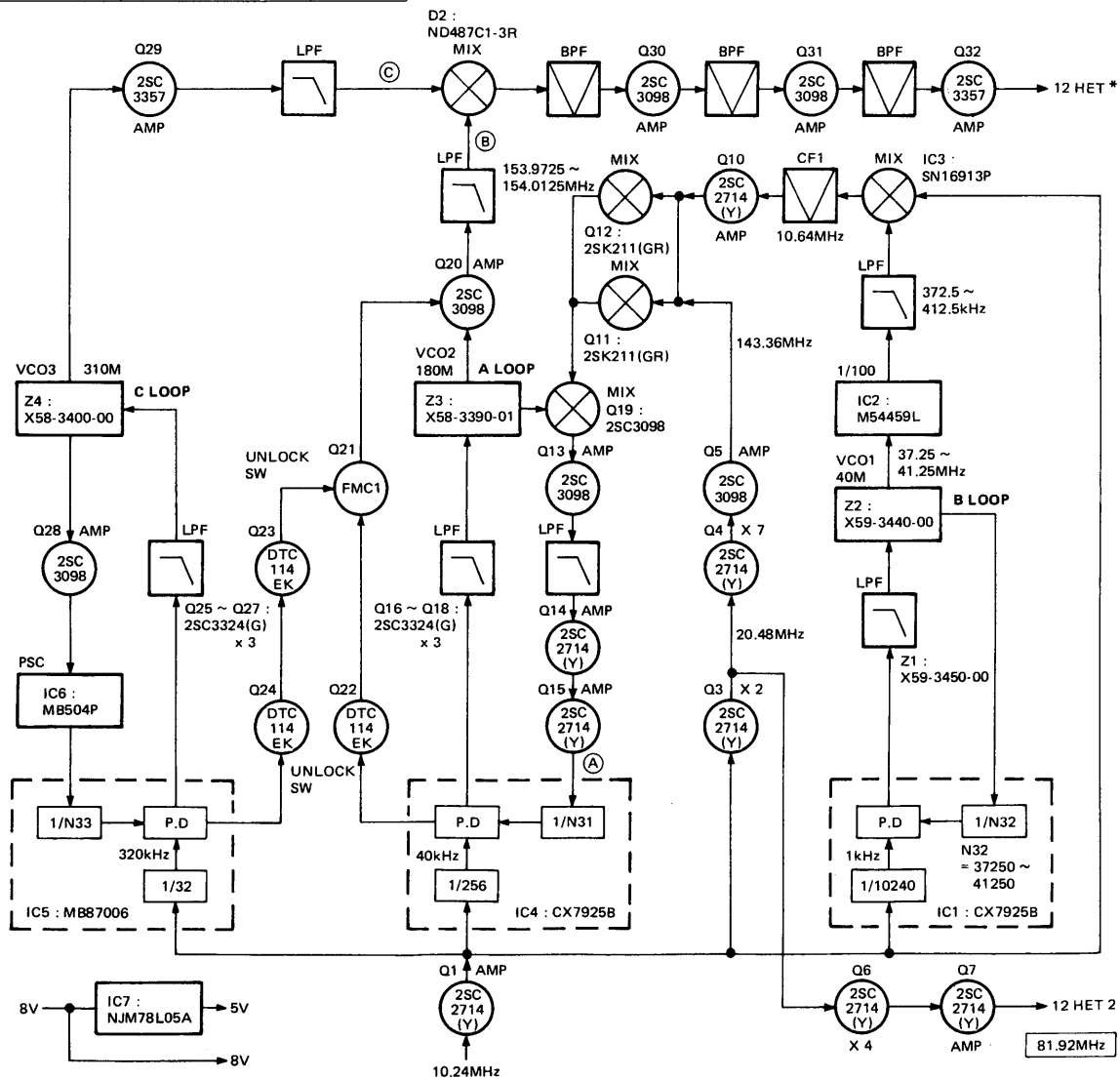
Fig. 16 CAR PLL block diagram

CIRCUIT DESCRIPTION

	(A)	(B)	(C)
1240MHz ~	16.52 ~ 21.52MHz	170.4925 ~ 175.4925MHz	305.92MHz
1250MHz ~	18.32 ~ 23.32MHz	172.2925 ~ 177.2925MHz	309.12MHz
1260MHz ~	20.76 ~ 25.76MHz	174.7325 ~ 179.7325MHz	311.68MHz
1270MHz ~	22.56 ~ 27.56MHz	176.5325 ~ 181.5325MHz	314.68MHz
1280MHz ~	25.00 ~ 30.00MHz	178.7925 ~ 183.7925MHz	317.44MHz
1290MHz ~	26.16 ~ 31.16MHz	180.1325 ~ 185.1325MHz	321.28MHz

	MAIN
FM, CWT, CW-NR	476.41250 ~ 506.41250MHz
USB	476.41325 ~ 506.41325MHz
LSB	476.41175 ~ 506.41175MHz
CWR	476.41285 ~ 506.41285MHz

MAIN	SUB
476.4125 ~ 506.4125MHz	476.4625 ~ 506.4625MHz



FREQ' (MHz)	N33	N31	N32
1260 ~ 1270	974	$519 + \text{INT} \left(\frac{f \text{ MOD } 10}{0.08} \right)$	$37250 + \text{INT} \left(\frac{f \text{ MOD } 0.08}{0.002} \right)$
1270 ~ 1280	984	$564 + \text{INT} \left(\frac{f \text{ MOD } 10}{0.08} \right)$	
1280 ~ 1290	994	$609 + \text{INT} \left(\frac{f \text{ MOD } 10}{0.08} \right)$	
1290 ~ 1300	1004	$654 + \text{INT} \left(\frac{f \text{ MOD } 10}{0.08} \right)$	

FREQ'	HET FREQ'	VCO33	N33	Np	A	VCO31	PLL IF31
1240	476.4125	305.920	956	29	28	170.49250	16.520
1250	481.4125	309.120	966	30	6	172.29250	18.320
1260	486.4125	311.680	974	30	14	174.73250	20.760
1270	491.4125	314.880	984	30	24	176.53250	22.560
1280	496.4125	318.080	994	31	2	178.33250	24.360
1290	501.4125	321.280	1004	31	12	180.13250	26.160

REF = 320kHz, PSC = 1/32, 33

Fig. 15 1200MHz PLL block diagram

TS-790A/E

CIRCUIT DESCRIPTION

Digital Control Circuit

The TS-790A/E digital block consists of several chips including the main CPU (μ PD78C10G-36). It also contains a 32K ROM (27C256A-25), a 8K RAM (TC5564APL-15), and I/O ports (MB89363B and M5M82C55AFP-5), etc., and performs digital control.

The digital control circuit also contains the sub CPU (μ PD75206G-531-1B) specially designed for a fluorescent

character display. It allows data to be easily output to the display, using serial data commands. The sub CPU also controls LED, and synthesizes subtones and beeps. It is controlled by commands from the main CPU.

The main CPU contains an A/D converter and a set of serial ports to allow direct input of analog signals. The TS-790A/E can be controlled by an external personal computer via the IF232C (optional level convertor).

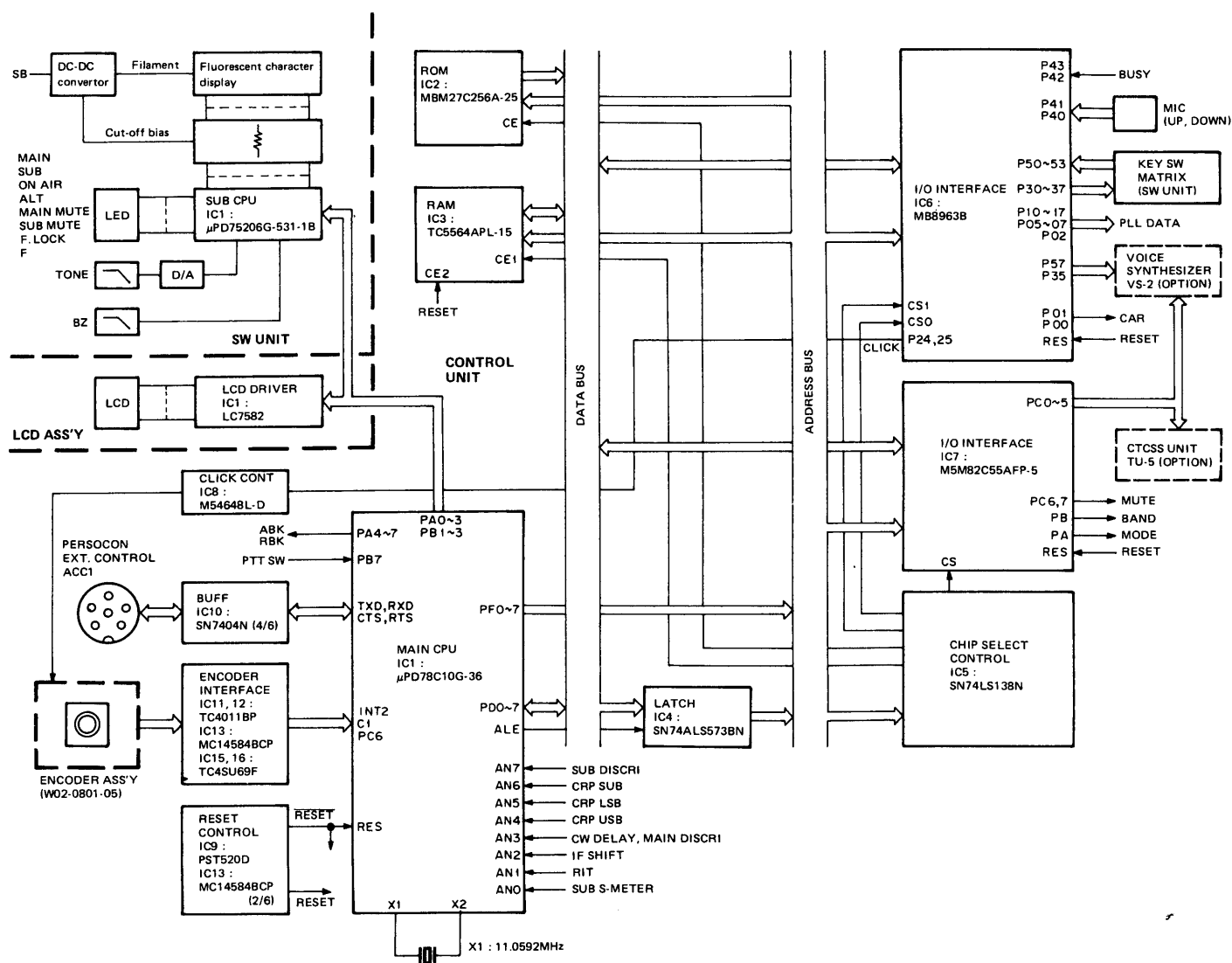


Fig. 17 Digital control block diagram

CIRCUIT DESCRIPTION

Encoder circuit

The TS-790A/E uses a newly developed optical encoder with detent type tuning (channelized) for easier use. The encoder circuit, therefore, contains an additional encoder waveform shaping circuit and an additional detent drive circuit. The Encoder waveform contains two different signals. One is a two-phase count signal whose phases differs 90 degrees and which contains 250 pulses per rotation. The other is used for the channelized tuning

when detent operation occurs and contains 50 pulses per rotation. The control unit extracts an UP/DOWN direction signal and a count signal (when no detent or detent operation occurs) from the two-phase count signal. It then shapes and sends the signals to the main CPU. The 250-pulse count signal is doubled before extraction to convert it to 500 pulses per rotation.

To perform detent control, a solenoid is used to make the ball contact with the encoder gear. The motor driver IC8 (M54648L-D) is used to control the solenoid. When power is supplied to the solenoid by IC8, and 0V is supplied to the SL1 pin and approx. 10V is supplied to the SL2 pin for approx. 30 seconds, the detent feature turns on. When approx. 10V is supplied to the SL1 pin and 0V is supplied to the SL2 pin for approx. 30 seconds, the detent features turns off.

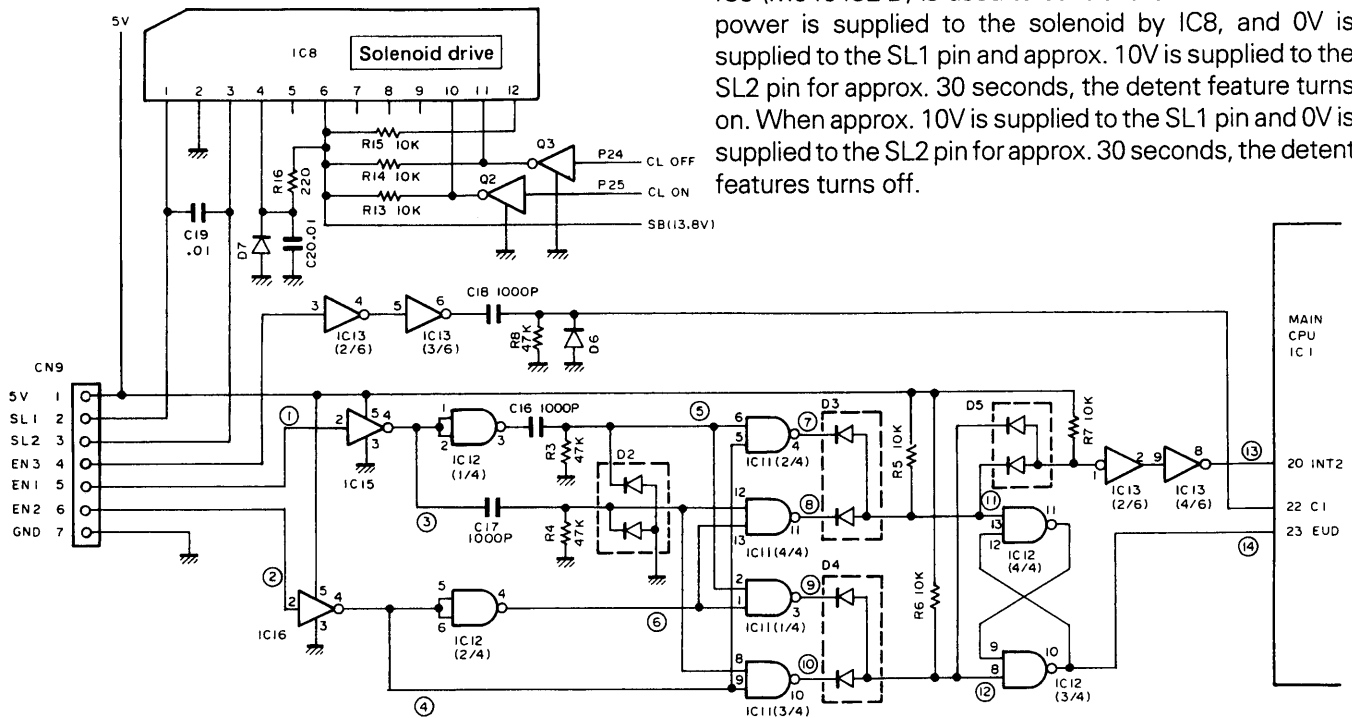


Fig. 18 Encoder waveform shaping, doubling, and solenoid drive circuit

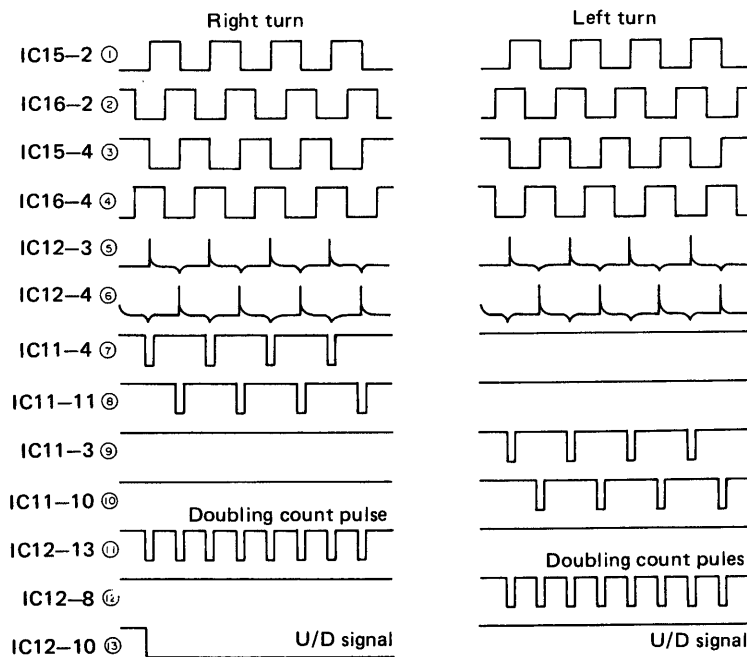


Fig. 19 Timing chart for doubling 250-pulse count signal

CIRCUIT DESCRIPTION

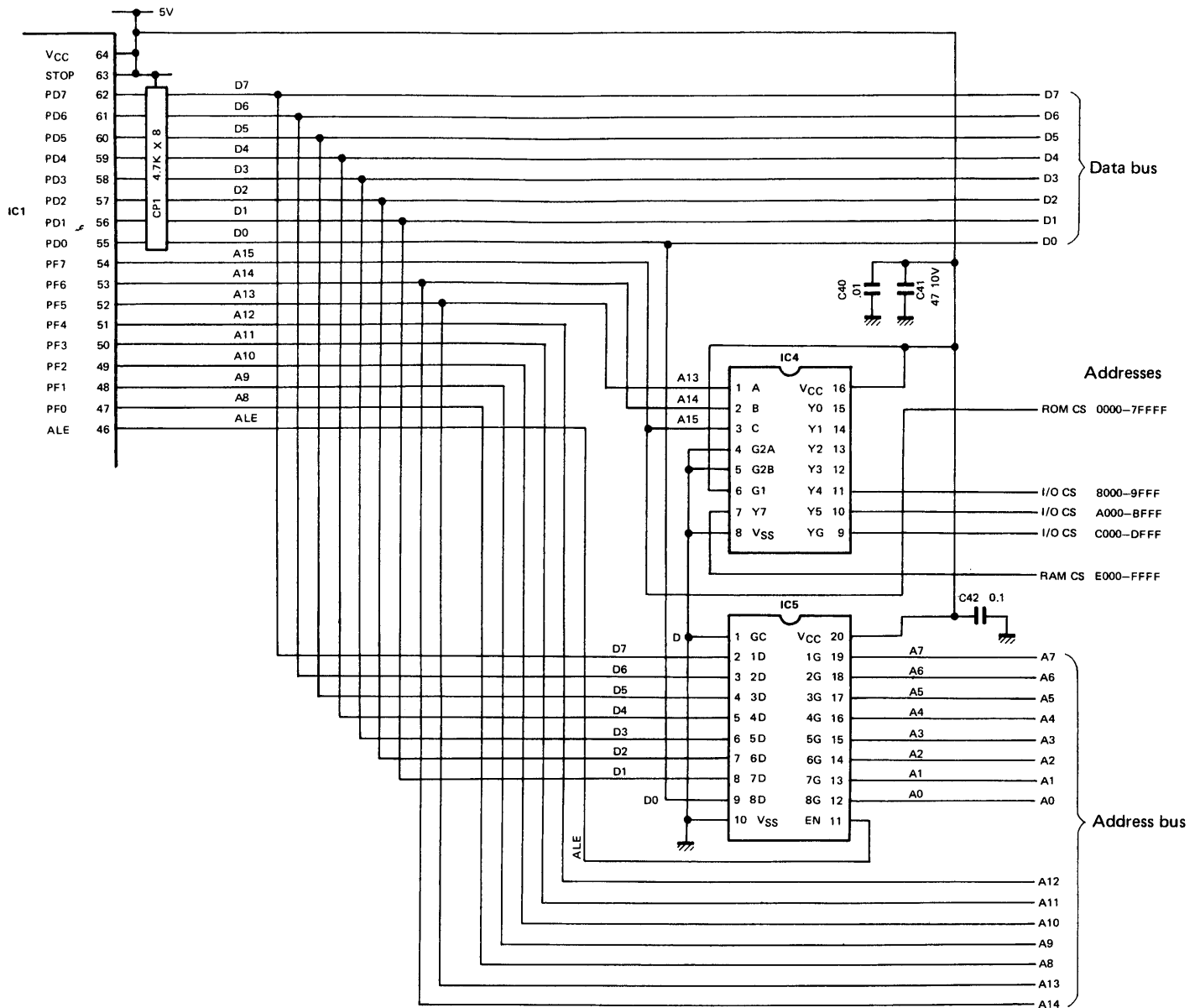


Fig. 21 Address and data separation and address decoder circuits

TS-790A/E

CIRCUIT DESCRIPTION

• Analog signal input

The main CPU (μ PD78C10G-36) contains an A/D converter to allow direct input of analog signals. Incoming analog signals are internally converted to its corresponding digital values.

Port	Input signal
AN0	Sub S meter voltage
AN1	RIT VR voltage
AN2	IF shift VR voltage
AN3	Main discriminator deviation voltage in FM mode, delay VR voltage in CW or CW-N mode.
AN4	USB VR voltage for CAR adjustment
AN5	LSB VR voltage for CAR adjustment
AN6	Sub VR voltage for CAR adjustment
AN7	Sub discriminator deviation voltage

Table 7

• Display data

The fluorescent character display in the main unit is controlled by the 4-bit sub CPU (μ PD75206G-531-1B). The control unit simply needs to send serial data to the display.

The liquid crystal display panel in the sub unit has an LCD driver. The control unit, therefore, can drive the LCD simply by sending serial data.

Display data for the main or sub unit is sent to the switching unit via a flat cable. If the data is for the main unit, it is sent to the sub CPU of the switching unit. If the data is for the sub unit, it is sent to the LCD assembly of the switching unit.

• DC-DC converter

The DC-DC converter drives the fluorescent character display. It receives 13.8V at its DC input pin, and outputs 4.9V AC for the display filament and -25V cut-off bias to the display drive circuit.

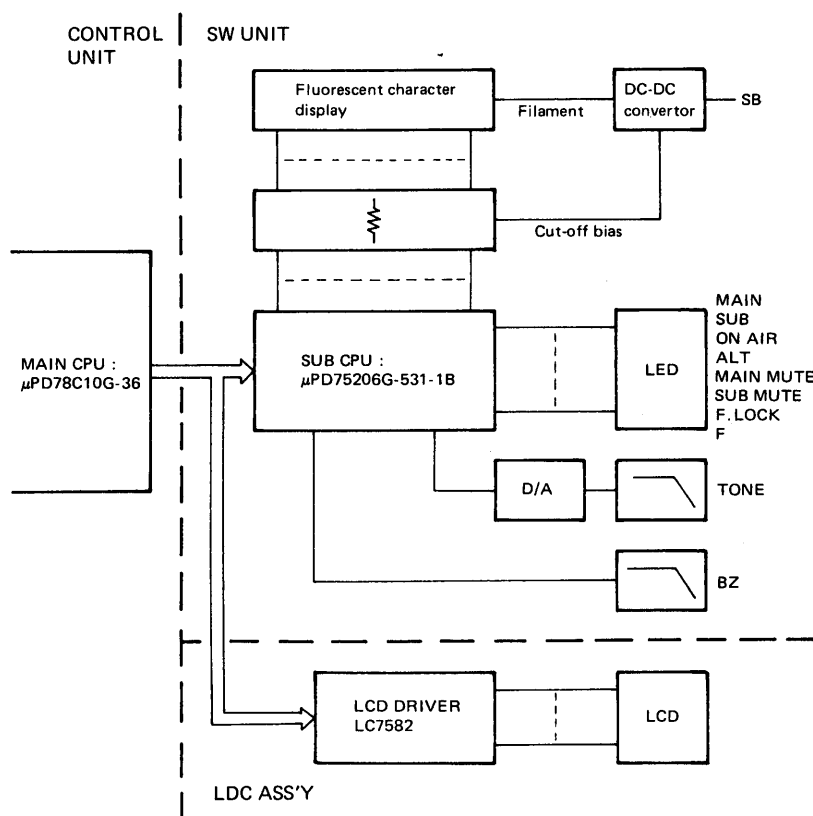


Fig. 23 Display block diagram

CIRCUIT DESCRIPTION

• Sub CPU

The sub CPU is a 4-bit single-chip microcomputer μ PD75206G-531-1B specially designed for control of a fluorescent character display. It reduces load on the main CPU. That is, the main CPU can let the sub CPU control turn-on/off and display scan operations of the fluorescent character display, simply by sending appropriate serial display data to the sub CPU in a command form.

The sub CPU also performs subtone synthesization for the repeat and CTCSS, and beep synthesization for the main and sub units. These operations are also controlled by serial data commands from the main CPU.

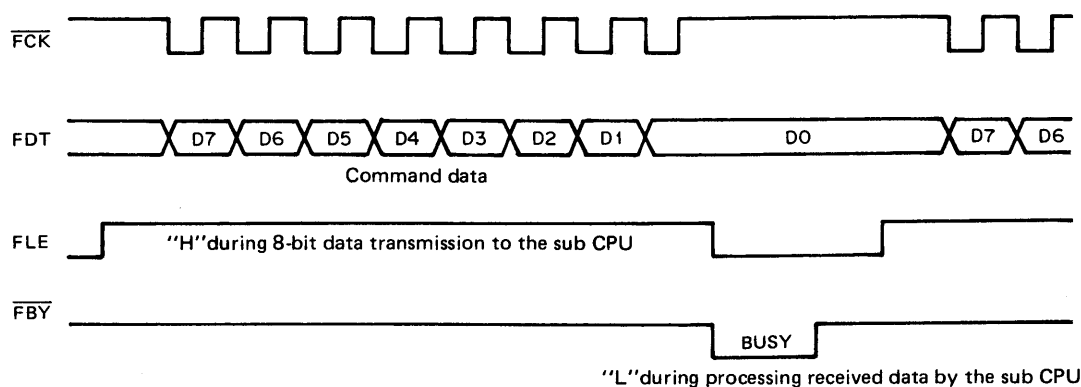
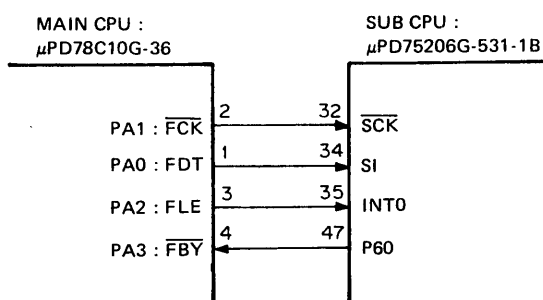


Fig. 24 Timing chart for serial data transmission

• PLL data

The TS-790A/E contains two PLL loops for the 144MHz band, three PLL loops for the 430MHz band, three PLL loops for the 1200MHz band, and two PLL loops for CAR, totaling 11 PLL loops.

Both of the MB87006 and CX7925B need to be supplied with two types of data, one indicating relative divide ratio and the other indicating divide ratios for the variable dividers. The relative frequency division ratio is output when the TS-790A/E power is turned on, since it does not need to be changed. For the division ratio for the variable divider, The VFO frequency or memory frequency is converted to PLL serial data and then sent to each PLL IC chip.

PLL data for the CX7925B contains a difference between a frequency division ratio value and a division ratio data value:

- Relative division ratio data value
= relative division ratio value - 2
- Relative division ratio data value
= relative division ratio value - 2
(when the AMI input pin is used)
- Relative division ratio data value
= relative division ratio value - 8
(when the FMI input pin is used)
- Relative division ratio data value
= relative division ratio value - 2
(when the TVI input pin is used)

When the PLL is unlocked, the PLL unit outputs an unlock signal. The control unit detects the unlock signal and reflects the state by switching the display to the dot display mode.

CIRCUIT DESCRIPTION

LOOP		VCO frequency (MHz)	Ref. (kHz)	Division ratio	PLL IC	CX7925B control data								Enable port name	Remarks
			Ref. division ratio			Input pin	PI1	PI2	A	B	T1	T2			
CAR	MAIN	42.5 ~ 45.8	2	22600 ~ 22900 Center 22750	CX7925B	FMI	L	H	L	L	H	H	MCLE		
			5120												
	SUB	32.5 ~ 35.8	2	17600 ~ 17900 Center 17750	CX7925B	FMI	L	H	L	L	H	H	SCLE		
			5120												
144M	11A	133.305 ~ 137.305 (144 ~ 148)	40	497 ~ 595	CX7925B	AMI	—	L	Lock detect	Shift register output	H	L	14LE1	IF : 19.88 ~ 23.88MHz	
			256												
	12B	78.5 ~ 82.5	2	31250 ~ 41250	CX7925B	FMI	L	H	144M power information	—	L	L	14LE2		14B1
			5120											~ 150M	H
													150M ~	L	
430M	21A	354.075 ~ 375.075	640	155 ~ 170	CX7925B	TVI	H	H	Lock detect	Shift register output	H	L	43LE1	IF : 198.4 ~ 218.6MHz	
			16												
	22B	79.5 ~ 83.5	2	39750 ~ 41750	CX7925B	FMI	L	H	430M power information	—	L	L	43LE2		
			5120												
	23C	154.995 ~ 157.155	40	544 ~ 564	CX7925B	AMI	—	L	L	L	H	H	43LE3	IF : 21.76 ~ 23.24MHz	
			256												
	24D	MAIN : 65.23 SUB : 65.33	10	MAIN : 6523 SUB : 6533	CX7925B	FMI	L	H	Lock detect	Shift register output	H	L	43LE4		
			1024												
1200M	31A	170.4925 ~ 185.1325	40	413 ~ 778	CX7925B	AMI	—	L	Lock detect	Shift register output	H	L	12LE1	IF : 16.52 ~ 31.16MHz	
			256												
	32B	37.25 ~ 41.25	1	37250 ~ 41250	CX7925B	FMI	L	H	1200M power information	—	L	L	12LE2		
			10240												
	33C	305.92 ~ 321.28	320	478 ~ 502	MB87006A + MB504P								12LE3	Prescaler division ratio : 1/32	
			32												

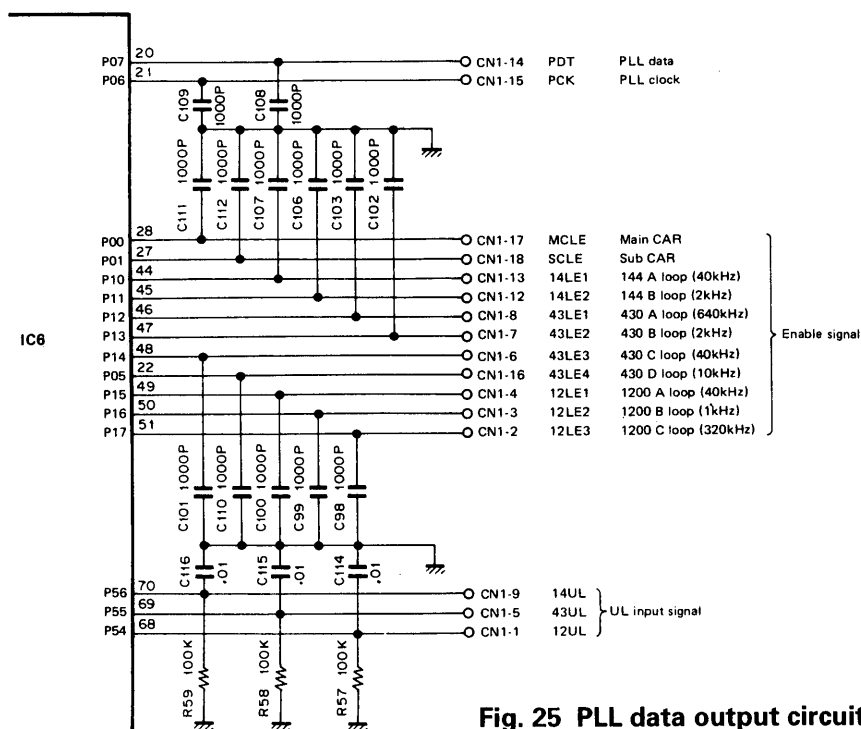


Fig. 25 PLL data output circuit

CIRCUIT DESCRIPTION

• Key scan

Ports P30 and P50 of IC6 form a key scan matrix. The key scan signal is generated, using a negative pulse from P30, to select a corresponding column in the P50 port, and the switch setting of the column is read. When an intersection in the matrix is sensed, its corresponding bit in the P50 port becomes L. This follows the microprocessor to determine which switch is being pressed. Key chatter is absorbed by software.

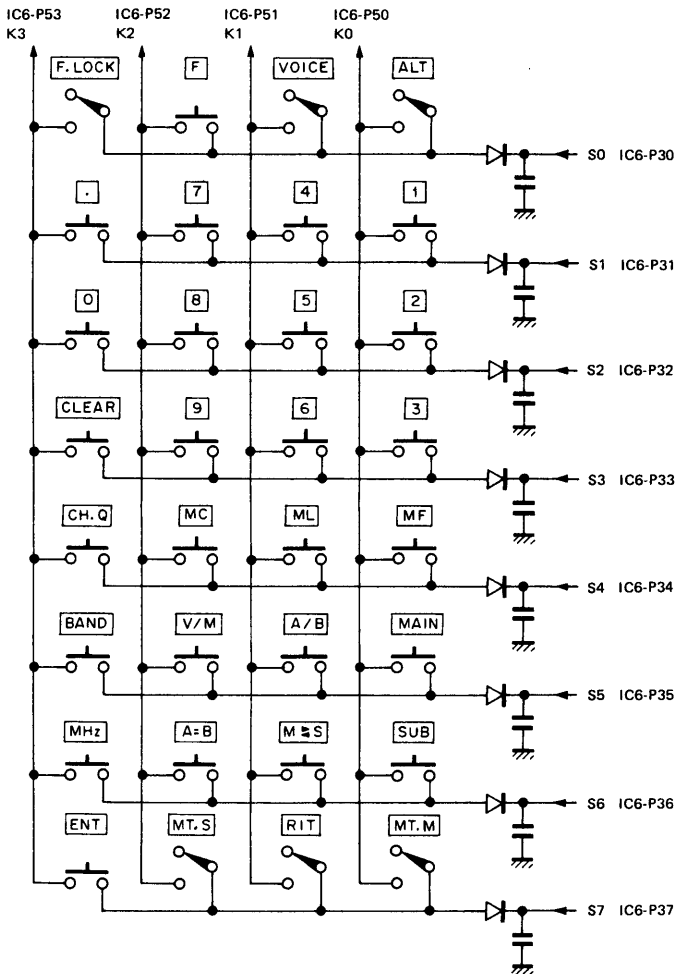


Fig. 26 Key scan matrix

● Output signals

1. Band signals

Signal name	Description
14M 43M 12M	Band signals for the main unit. One of these three band signals is active at any given time to indicate to the other units which band block in the main unit is to be selected. When these signal are active, they provide approx. 8V.
14S 43S 12S	Band signals for the sub unit. One of these three band signals is active at any given time to indicate to the other units what band block in the sub unit is to be selected. When these signal are active, they provide approx. 8V.

2. Mode signals

Signal name	Description
MFMB	Indicates that the main unit is in FM mode.
MSSB	Indicates that the main unit is in LSB or USB mode.
MCWB	Indicates that the main unit is in CW mode.
MCNB	Indicates that the main unit is in CW-N mode.
SFMB	Indicates that the sub unit is in FM mode.
SSCB	Indicates that the sub unit is in LSB, USB or CW mode.

When these signal are active, they provide approx. 8V.

3. Other signals

Signal name	Description
CTX	Active during transmission, active "H".
CRX	Active during reception, active "H".
MABK	Main audio stage blanking signal, active "H".
SABK	Sub audio stage blanking signal, active "H".
MRBK	Main IF stage blanking signal, active "L".
SRBK	Sub IF stage blanking signal, active "L".
MCT	Main CTCSS signal, "H" when on.
SCT	Sub CTCSS signal, "H" when on.
MMUT	Main mute signal, active "H".
SMUT	Sub mute signal, active "H".
VCK VDT	Data output pin for CTCSS unit (TSU-5).
MEN	CTCSS unit data enable for main.
SEN	CTCSS unit data enable for sub.
SEP	SP separate signal, "H" when SP separated.

● Input signals

Signal name	Description
CSS	Standby input, "L" indicates TX.
CKY	Keying input, "L" indicates TX.
MBC	Main busy input, "L" indicates busy.
SBC	Sub busy input, "L" indicates busy.
MCD	Main CTCSS detect signal, "L" indicates busy.
SCD	Sub CTCSS detect signal, "L" indicates busy.

TS-790A/E

CIRCUIT DESCRIPTION

MAIN CPU : μ PD78C10G-36 (IC1)

PA			PB			PC			A/D	
0	FDT (FIP data)	O				TXD		O	AN0	SSRM
1	FCK (FIP CK)	O	LCK (LDC CK)		O	RXD		I	AN1	RIT
2	FLE (FIP LE)	O	LLE (LCD LE)		O	CTS		I	AN2	IFS
3	FBY (FIP BY)	I	LRDY (LCD Ready)		O	INT2 (250 slit)		I	AN3	CW : CLY, FM : MDIS
4	MRBK (M RF BLK)	O	SEP (SP-Sepa)		O	RTS		O	AN4	CRU
5	SRBK (S RF BLK)	O	CRX (Cont-RX)		O	CI (50 slit)		I	AN5	CRL
6	MABK (M AF BLK)	O	CTX (Cont-TX)		O	EUD (Encoder up/down)		I	AN6	CRS
7	SABK (S AF BLK)	O	CSS (Standby)		I	CKY (CW keying)		I	AN7	SDIS

I/O INTERFACE : MB8963B (IC6)

BPA (P0X)			BPB (P1X)			BPC (P2X)		
0	MCLE (M CAR LE)	O	14LE1 (PLL LE 144A)		O	S8 (Type key select)		O
1	SCLE (S CAR LE)	O	14LE2 (PLL LE 144B)		O	S9 (Type key select)		O
2	XB1 (144 band 1)	O	43LE1 (PLL LE 430A)		O	SA		O
3	XB2 (144 band 2)	O	43LE2 (PLL LE 430B)		O	SB		O
4			43LE3 (PLL LE 430C)		O	SL1 (Solenoid off)		O
5	43LE4 (430 2nd HET)	O	12LE1 (PLL LE 1.2A)		O	SL2 (Solenoid click)		O
6	PCK1 (Loop PLL CK)	O	12LE2 (PLL LE 1.2B)		O	STR (VS-2 start)		O
7	PDT (PLL data)	O	12LE3 (PLL LE 1.2C)		O			O
CPA (P3X)			CPB (P4X)			CPC (P5X)		
0	S0 (Key select)	O	MU (Mic up)		I	K0 (Key read)		I
1	S1 (Key select)	O	MD (Mic down)		I	K1 (Key read)		I
2	S2 (Key select)	O	MBC (M-busy)		I	K2 (Key read)		I
3	S3 (Key select)	O	SBC (S-busy)		I	K3 (Key read)		I
4	S4 (Key select)	O	BSY (VS-2 busy)		I	Z UL (1.2 UL)		I
5	S5 (Key select)	O	ATV (ATV)		I	Y UL (430 UL)		I
6	S6 (Key select)	O	MCD (M CTC det)		I	X UL (144 UL)		I
7	S7 (Key select)	O	SCD (S CTC det)		I	12OP (1.2 option)		I

I/O INTERFACE : M5M82C55AFP-5 (IC7)

APA			APB			APC		
0	MFMB (M FM)	O	14M (M 144 band)		O	VDT (VS-2, CTCSS data)		O
1	MSSB (M SSB)	O	43M (M 430 band)		O	VCK (VS-2, CTCSS CK)		O
2	MCWB (M CW)	O	12M (M 1.2 band)		O	MEN (CTCSS M LE)		O
3	MCNB (M CW-N)	O	14S (S 144 band)		O	SEN (CTCSS S LE)		O
4	SFMB (S FM)	O	43S (S 430 band)		O	MCT (CTCSS M on/off)		O
5	SSCB (S SSB, CW)	O	12S (S 1.2 band)		O	SCT (CTCSS S on/off)		O
6	(PA6)		14W (144 wind)		O	MMUT (Mute M on/off)		O
7	PBK (Power on BLK)	O	43W1 (430 wide 1)		O	SMUT (Mute S on/off)		O

Table 9 I/O maps

CIRCUIT DESCRIPTION

• Control unit I/O port functions

1. CPU : μ PD78C10G-36 (IC1)

Port Name	Pin No.	Mane	Functions	I/O	Remarks
Port A	PA0	1	FDT	LCD display data for fluorescent character display.	O
	PA1	2	FCK	Display data clock for fluorescent character display.	O
	PA2	3	FLE	Display data enable for fluorescent character display.	O
	PA3	4	FBY	Display data busy for fluorescent character display.	I "L": Busy, "H": Sub CPU ready to receive
	PA4	5	MRBK	Main RF blanking.	O
	PA5	6	SRBK	Sub RF blanking.	O "L": Blanking
	PA6	7	MABK	Main AF blanking.	O
	PA7	8	SABK	Sub AF blanking.	O "H": Blanking
Port B	PB0	9	—	Not used.	—
	PB1	10	LCK	Display data clock for LCD display.	O
	PB2	11	LLE	Display data enable for LCD display.	O
	PB3	12	LRDY	LCD display on.	O "H": Display ON, "L": Display OFF
	PB4	13	SEP	SP separate signal.	O "H": SP separate
	PB5	14	CRX	Transmit/receive control signals.	O "H": Receive
	PB6	15	CTX		O "H": Transmit
	PB7	16	CSS		I PTT input, "L": Transmit
Port C	PC0	17	TXD	Transmit signal for interface to personal computer.	O
	PC1	18	RXD	Receive signal for interface to personal computer.	I
	PC2	19	CTS	Clear-to-send for interface to personal computer.	I
	PC3	20	INT2	Encoder count data (250 slits).	I
	PC4	21	RTS	Request-to-send for interface to personal computer.	O
	PC5	22	CI	Encoder count data (50 slits).	I
	PC6	23	EUD	Encoder UP/DOWN direction signal.	I
	PC7	24	CKY	CE keying input.	I "L": Keying (transmit)
Control signals	PD0 ~ PD7	55 ~ 62	AD0 ~ AD7	CPU address, data multiplex bus.	I/O
	PF0 ~ PF7	47 ~ 54	A8 ~ A15	CPU high-order address bus.	O
	ALE	46	ALE	Address/data separate signal.	O
	RD, WR	44, 45	RD, WR	Read/write signals.	O
	AVcc	43	AVcc	Power for A/D convertor.	I
	AVREF	42	AVREF	Reference power for A/D convertor.	I
	AN7	41	SDIS	A/D channel 7 sub deviation signal.	I
	AN6	40	CRS	A/D channel 6 sub carrier point adjust.	I
	AN5	39	CRL	A/D channel 5 main LSB carrier point adjust.	I
	AN4	38	CRU	A/D channel 4 main USB carrier point adjust.	I
	AN3	37	DLY	A/D channel 3 CW delay VR input.	I
	AN2	36	IFS	A/D channel 2 IF shift VR input.	I
	AN1	35	RIT	A/D channel 1 RIT VR input.	I
	AN0	34	SSRM	A/D channel 0 sub S meter input.	I
	AVss	33	AVss	Ground for A/D convertor.	—
	X1, X2	30, 31	X1, X2	CPU clock crystal oscillator pins.	I
	RES	28	RES	CPU reset signal.	I

TS-790A/E

CIRCUIT DESCRIPTION

2. Extended I/O : MB89363B (IC6)

Port Name	Pin No.	Mane	Functions	I/O	Remarks
Port A (P0x)	P00	28	MCLE	O	Main CAR PLL data enable.
	P01	27	SCLE	O	Sub CART PLL data enable.
	P02	26	14B1	O	144 PLL band path indication.
	P03	25	—	—	Not used.
	P04	23	—	—	Not used.
	P05	22	43LE4	O	430PLL D loop enable.
	P06	21	PCK	O	PLL data clock.
	P07	20	PDT	O	PLL data.
Port B (P1x)	P10	44	14LE1	O	144 PLL A loop enable.
	P11	45	14LE2	O	144 PLL B loop enable.
	P12	46	43LE1	O	430 PLL A loop enable.
	P13	47	43LE2	O	430 PLL B loop enable.
	P14	48	43LE3	O	430 PLL C loop enable.
	P15	49	12LE1	O	1200 PLL A loop enable.
	P16	50	12LE2	O	1200 PLL B loop enable.
	P17	51	12LE3	O	1200 PLL C loop enable.
Port C (P2x)	P20	38	S8	O	Custom diode, extended diode select.
	P21	39	S9	O	
	P22	40	SA	O	
	P23	43	SB	O	
	P24	37	SL1	O	Solenoid through pulse.
	P25	36	SL2	O	Solenoid detent pulse.
	P26	35	STR	O	VS-2 voice start signal.
	P27	34	43W2	O	430 extended signal.
Port D (P3x)	P30 ~ P33	77 ~ 80	S0 ~ S3	O	Become "L" sequentially for key matrix input. Active "L".
	P34 ~ P37	1 ~ 4	S4 ~ S7		
Port E (P4x)	P40	61	MU	I	"L" : MU SW ON
	P41	60	MD	I	"L" : MD SW ON
	P42	59	MBC	I	"H" : BUSY, "L" : NO BUSY
	P43	58	SBC	I	
	P44	57	BSY	I	"H" : VS-2 sounding
	P45	56	ATV	I	"L" : ATV display ON
	P46	55	MCD	I	"L" : CTCSS signal detected
	P47	54	SCD	I	
Port F (P5x)	P50 ~ P53	67 ~ 64	K0 ~ K3	I	Input key matrix switches specified by S0 to S8 (S9 to SB).
	P54	68	12UL	I	"L" : UNLOCK, "H" : PLL LOCK
	P55	69	43UL	I	
	P56	70	14UL	I	
	P57	71	120P	I	"L" : UT-10 available, "H" : Not available
Control signals	DB0 ~ DB7	12 ~ 19	DB0 ~ DB7	I/O	Data bus.
	RD, WR	76, 5	RD, WR	I	Read/write signals.
	RES	6	RES	I	Reset signal.
	A0, A1	31, 32	A0, A1	I	Port select signals.
	CS0	29	CS0	I	Chip select signal.
	CS1	75	CS1	I	Chip select signal.

CIRCUIT DESCRIPTION

3. Extended I/O : M5M82C55AFP-5 (IC7)

Port Name	Pin No.	Mane	Functions	I/O	Remarks
Port A	PA0	4	MFMB	Main FM mode.	O "H" : FM mode
	PA1	3	MSSB	Main SSB mode.	O "H" : LSB or USB mode
	PA2	2	MCWB	Main CW mode.	O "H" : CW mode
	PA3	1	MCNB	Main CW-N mode.	O "H" : CW-N mode
	PA4	40	SFMB	Sub FM mode.	O "H" : FM mode
	PA5	39	SSCB	Sub SSB or CW mode.	O "H" : LSB, USB, or CW mode
	PA6	38	—	Not used.	—
	PA7	37	—	Not used.	—
Port B	PB0	18	14M	Main 144 band.	O "H" : Main 144
	PB1	19	43M	Main 430 band.	O "H" : Main 430
	PB2	20	12M	Main 1200 band.	O "H" : Main 1200
	PB3	21	14S	Sub 144 band.	O "H" : Sub 144
	PB4	22	43S	Sub 430 band.	O "H" : Sub 430
	PB5	23	12S	Sub 1200 band.	O "H" : Sub 1200
	PB6	24	14W	144 extended band.	O
	PB7	25	43W1	430 extended band.	O
Port C	PC0	14	VDT	Data for VS-2 and CTCSS (TSU-5).	O
	PC1	15	VCK	Clock for CS-2 and CTCSS (TSU-5).	O
	PC2	16	MEN	Enable for main CTCSS.	O
	PC3	17	SEN	Enable for sub CTCSS.	O
	PC4	13	MCT	Main CTCSS ON/OFF signal.	O "H" : CTCSS ON, "L" : OFF
	PC5	12	SCT	Sub CTCSS ON/OFF signal.	O
	PC6	11	MMUT	Main AF mute signal.	O "H" : Mute ON, "L" : Normal
	PC7	10	SMUT	Sub AF mute signal.	O
Control signals	D0 ~ D7	27 ~ 34	D0 ~ D7	Data bus.	I/O
	RD, WR	5, 36	RD, WR	Read/write signals.	I
	CS	6	CS	Chip select.	I
	RES	35	RES	Reset signal.	I "H" : Reset
	A0, A1	8, 9	S0, S1	Port select signals.	I

TS-790A/E

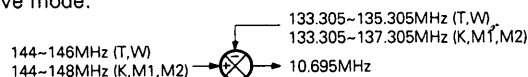
DESCRIPTION OF COMPONENTS

SWITCH UNIT (X41-3050-00)

Component	Use/Function	Operation/Condition/Compatibility
IC1	SUB CPU	CPU of the FL tube (Main display).
Q1	DC-DC convertor for display tube	
Q2	SW	F. LOCK on : on.
Q3	SW	ALT on : on.
Q4	SW	MAIN on : on.
Q5	SW	SUB on : on.
Q6	SW	MAIN MUTE on : on.
Q7	SW	SUB MUTE on : on.
D1		9.1V zener diode.
D2		7.5V zener diode.
D4		43V zener diode.
D5		
D6		30V zener diode.
D7		
D8	S0 key input protection	
D9	S1 key input protection	
D10	S2 key input protection	
D11	S3 key input protection	
D12	S4 key input protection	
D13	S5 key input protection	
D14	S6 key input protection	
D15	S7 key input protection	
D16	SUB BUSY LED	
D17	MAIN BUSY LED	
D18	F (FUNCTION) LED	
D19	ON AIR LED	
D20	F. LOCK LED	
D21	ALT LED	
D22	MAIN LED	
D23	SUB LED	
D24	MAIN MUTE LED	
D25	SUB MUTE LED	

RF UNIT (X44-3060-XX) (A/2) : 144MHz -00 : M2, T, W -11 : K, M1

Component	Use/Function	Operation/Condition/Compatibility
IC1	8V AVR regulator	Input 13.8V, output 8V.
IC2	5V AVR regulator	Input 13.8V, output 5V.
Q1	RF amplifier	Operate in 144MHz receive mode.
Q2	ATT SW	Turn on when a 144ATT SW is on.
Q3	1st mixer	Operate in 144MHz receive mode.
Q4	MAIN receive SW	144MHz sub receive mode : on.
Q5	SUB receive SW	144MHz main receive : on.
Q6	RXB SW	144MHz receive mode : on (except wide band receive mode).
Q7	RXB SW	144MHz wide band receive mode : on.
Q8	Wide band SW	144MHz wide band receive mode : on.



DESCRIPTION OF COMPONENTS

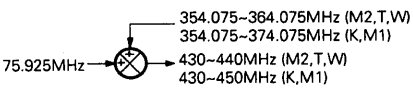
Component	Use/Function	Operation/Condition/Compatibility
Q9, 10	Transmit mixer	Operate in the 144MHz transmit mode. Adjustable with VR1. The spurious of $\pm 10.695\text{MHz}$ reduced with VR1.
Q11	Transmit pre-driver	Operate in the transmit mode.
Q12	Transmit driver	Please careful to ground lead of RF probe when measurement of Q11 and Q12.
D1, 2	Receive filter SW	Switched between 144MHz receive and wide band receive mode.
D3 ~ 6	Vari-cap tuning	144MHz receive vari-cap tuning.
D7	MAIN/SUB receive SW	Switched between 144MHz main receive and sub receive mode.
D8	Wide band SW	Turn on when 144MHz wide band receive mode.
D9	14HET SW	Switched between 144MHz transmit and receive mode.
D10	Transmit IF SW	Switched between 144MHz transmit and 430MHz and 440MHz transmit mode.
D11 ~ 14	Vari-cap tuning	144MHz transmit vari-cap tuning.
D15	Q11 idling	
D16	Q12 idling	
D17, 18	Current reversal prevention	
D19	14RA SW	144MHz transmit mode : on.

RF UNIT (X44-3060-XX) (B/2) : 430MHz -00 : M2, T, W -11 : K, M1

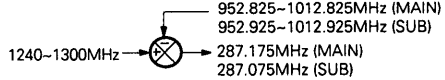
Component	Use/Function	Operation/Condition/Compatibility
IC201, 202	RF amplifier	Operate in the 900MHz wide band receive mode.
Q201, 202	RF amplifier	Operate in the 430MHz and 440MHz receive mode.
Q203	1st mixer	Operate in the 430MHz and 440MHz receive mode.
Q204	1st IF amplifier	Operate in the 430MHz and 440MHz receive mode.
Q205	1st IF amplifier SW	Operate in the 430MHz and 440MHz receive mode.
Q206	MAIN receive SW	430MHz and 440MHz sub receive mode : on.
Q207	SUB receive SW	430MHz and 440MHz main receive mode : on.
Q208	RF amplifier	43HET2 (65.23MHz).
Q209	2 frequency multiplication	Operate in the 900MHz wide band receive mode (430HET x 2).
Q210	2 frequency multiplication	Operate in the 900MHz wide band receive mode (43HET2 x 2 — 130.46MHz).
Q211	Wide band 1st mixer	Operate in the 360MHz and 900MHz wide band receive mode.
Q212	Wide band 1st IF amplifier	Operate in the 360MHz wide band receive mode (8.505MHz).
Q213	Wide band 1st IF amplifier	Operate in the 900MHz wide band receive mode (141.155MHz).
Q214	Wide band 2nd mixer	Operate in the 360MHz and 900MHz wide band receive mode.
Q215	Wide band 2nd mixer SW	360MHz and 900MHz wide band receive mode : on.
Q216	Wide band reference oscillator	Operate in the 360MHz wide band receive mode (19.2MHz).
Q217	Wide band ref. osc. buffer	Operate in the 360MHz wide band receive mode (19.2MHz).
Q218, 219	Transmit 1st mixer	Operate in the 430MHz and 440MHz transmit mode.
Q220	RF amplifier	Operate in the 430MHz and 440MHz transmit mode (75.925MHz).
Q221, 222	RF amplifier	Operate in the 430MHz and 440MHz transmit mode.
Q223	Transmit pre-driver	Operate in the 430MHz and 440MHz transmit mode.
Q224	Transmit driver	Please careful to ground lead of RF probe when measurement of Q223 and Q224.
Q225	Wide band RXB SW	360MHz and 900MHz wide band receive mode : on.
Q226	Wide band SW	360MHz and 900MHz wide band receive mode : on.
Q227	Wide band RXB SW	360MHz and 900MHz wide band receive mode : on.
Q228	Wide band SW	360MHz and 900MHz wide band receive mode : on.
Q229	Wide band RXB SW	360MHz wide band receive mode : on.
Q230	RXB SW	430MHz and 440MHz receive mode : on.

TS-790A/E

DESCRIPTION OF COMPONENTS

Component	Use/Function	Operation/Condition/Compatibility
D201	430, 440MHz and wide band RX SW	Switched between 430MHz and 440MHz and 360MHz receive mode.
D202	MAIN and SUB receive SW	Switched between 430MHz and 440MHz main and sub receive mode.
D203	43HET SW	Switched between 430MHz and 440MHz receive and transmit mode.
D204	43HET2 SW	Switched between 430MHz and 440MHz receive and transmit mode.
D205	43HET SW	Switched between 360MHz and 900MHz wide band receive mode.
D206	43HET2 SW	900MHz wide band receive mode : on.
D207	IC201 reference voltage	5.1V zener diode.
D208	19.2MHz and 43HET2 x 2 SW	Switched between 360MHz and 900MHz wide band receive mode.
D209	43HET and 43HET2 x 2 SW	Switched between 360MHz and 900MHz wide band receive mode.
D210	Wide band input SW	Switched between 360MHz and 900MHz wide band receive mode.
D211	IC202 reference voltage	5.1V zener diode.
D212, 213	Wide band 1st IF SW	Switched between 360MHz and 900MHz wide band receive mode.
D214	Transmit 2nd mixer	Operate in the transmit mode. 
D215	Q223 idling	
D216	Q224 idling	
D217 ~ 220	Current reversal prevention	
D221	Wide band RXB SW	Wide band receive mode : on.
D222	43RA SW	430MHz and 440MHz transmit mode : on.

RF UNIT (X44-3070-00) : Z2 (1.2GHz) OPTION

Component	Use/Function	Operation/Condition/Compatibility
IC1	Amplifier	
Q1	RF amplifier	
Q2	1st mixer	
Q3	Receive IF amplifier	Receive IF 287MHz amplifier.
Q4	1st IF amplifier	1st IF frequency, main : 41.415MHz, sub : 41.315MHz.
Q5	RF SW	Connect DC voltage 5 ~ 12V through RFC to the 12IF terminal : on. Connector : "L", normally : 8V.
Q6	RF SW	Switched IF frequency 287.175MHz to 12IF terminal. Normally : "L", Q5 on : "H".
Q7	SW	Receive mode : Q8 off.
Q8	Transmit IF amplifier	Transmit IF 287MHz amplifier.
Q9	Transmit pre-driver	Transmit frequency 1240 ~ 1300MHz amplifier.
Q10	Receive 2 frequency multiplication	$476.4125 \sim 506.4125\text{MHz} \times 2 = 952.825 \text{ to } \sim 1012.825\text{MHz}$.
Q11	Receive buffer amplifier	952.825 ~ 1012.825MHz buffer amplifier.
Q12	3 frequency multiplication	$12\text{HET2} (81.92\text{MHz}) \times 3 = 245.76\text{MHz}$.
Q13	Amplifier	245.76MHz buffer amplifier.
Q14	IC1 SW	12V voltage supply to IC1 when transmit mode.
D1	Q1 base AVR	Voltage limiter circuit of the Q1 (base).
D2	Receive mixer SW	Receive mode become 12RXB : on, signal supplied to RX mixer Q2.
D3	Receive IF SW	Receive mode become 12RXB : on, apply to IF frequency 287MHz.
D4		Receive mode become 12RXB and transmit mode become 12TXB : on, apply to IF frequency 287MHz.
D5	Receive IF SW	Apply to IF 41.415MHz when receive mode.
D6	Transmit IF SW	Apply to IF 41.415MHz when transmit mode.
D7	12IF input/output SW	287.175MHz input/output to J1 jack.

DESCRIPTION OF COMPONENTS

Component	Use/Function	Operation/Condition/Compatibility
D8	Transmit IF SW	Transmit mode become 12TXB : on, apply IF frequency 287MHz.
D9, 10	Transmit mixer	Change the 1240 ~ 1300MHz from 287.175MHz in the transmit mode.
D11	Transmit mixer SW	Transmit mode become 12TXB : on, 952 ~ 1012MHz signal supplied to D9 and D10.
D12	Q9 base AVR	Voltage limiter circuit of the Q9 (base).
D13	Q11 base AVR	Voltage limiter circuit of the Q11 (base).
D14, 15	IF common mixer	Change the 41.415MHz from 287.175MHz in the receive mode. Change the 287.175MHz from 41.415MHz in the transmit mode.
D16	Protect the time of delay	Protect the time delay to receive mode from transmit mode.

FINAL UNIT (X45-3150-00) : Z3 (1.2GHz) OPTION

Component	Use/Function	Operation/Condition/Compatibility
IC1	Fan starter comparator	DC voltage supplied from No. 8 terminal that the thermister TH1 change a resistor value when getting high temperature.
IC101	Drive power module	
IC102	Final power module	
Q1	Protection SW	Detected DC voltage of D2 with reflect wave : on.
Q2	AVR for Q3	Set the drain voltage of Q3 to 3.0V.
Q3	Receive RF amplifier	GaAs FET.
Q5	Fan starter SW	Detected by thermister, turned on when getting same temperature. Active "L".
D1	Forwarded wave detection	Detected forward wave and make a APC voltage.
D2	Reflected wave detection	Detected reflect wave and make a protection voltage.
D3	Spark prevention	Canceled inverse-electric move force when relay is turned off.
D4	Limiter	Protection in excessive input.
D5		
D6		
D7	IC1 AVR	Voltage supply of IC1 become to constant voltage (7.5V zener diode).
D8, 9	Fan start reversal prevention	

FINAL UNIT (X45-3160-00) : 144MHz

Component	Use/Function	Operation/Condition/Compatibility
IC1	Temperature detection	IC1 (1/2) : Power down, IC1 (2/2) : Fan motor operation.
Q1	Transmit driver	14D terminal : 0.3W, Q1 collector : 1.0W (APC : OFF, RF PWR VR : MIN).
Q2	TXB SW	Adjustable with VR4. Collector voltage is 9.0V in the transmit mode.
Q3	TXB AVR	Approx. 9.3V. If TXB voltage is less than 9.3V, either of the Q3 transistor may be faulty. Please tightend screws.
Q4	Drive + B AVR	Approx. 11.5V. If this voltage is less than 11.0V, either of the Q4 transistor may be faulty. Please tightend screws.
Q5, 6	TXB AVR	
Q7, 8	Drive + B AVR	
Q9	SWR protection control	Adjustable with VR2. Normally, base voltage is 0.2V and collector voltage is 3.0V in the transmit mode. When the antenna is opened, base voltage is 0.6V and collector voltage is 1.7V.
Q10	SW transistor	Operate in transmitter output power is down.
Q11	SW transistor	Operate in cooling fan is working.
Q101	Final PA	
D1	AVR temp. compensation for drive	
D2, 3	Transmit/receive select	Transmit mode : on. If DC source current flows, and no transmitter output is present, either of the diodes may be faulty.
D4	Forwarded wave detection	Adjustable with VR1 in the FM transmit mode. 47W flows when transmitter output is measurement.

TS-790A/E

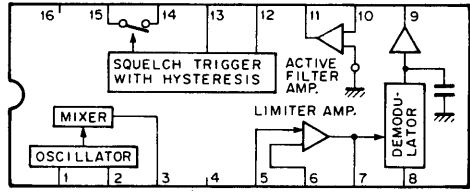
DESCRIPTION OF COMPONENTS

Component	Use/Function	Operation/Condition/Compatibility
D5	Reflected wave detection	Adjustable with VR2. 5.5A flows when the antenna is opened.
D6, 7	TXB AVR temperature compensation	
D8	TXB AVR reference	5.6V zener diode.
D9	Temp. detection circuit ref. voltage	7.5V zener diode.
D10, 11	Surge voltage absorber	Fan motor.
D12	Q1 idling	Anode voltage is 0.6V in the transmit mode.
D13	Wired OR	Operate in transmitter output is down.
D14	Wired OR	Fan motor.
TH1	Temperature detection	Operate in cooling fan is working : approx. 55°C, fan stopped : approx. 45°C. Operate in transmitter output is down : approx. 90°C, transmitter output is present : approx. 80°C.

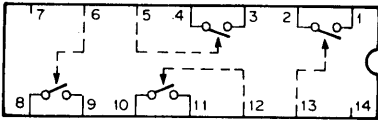
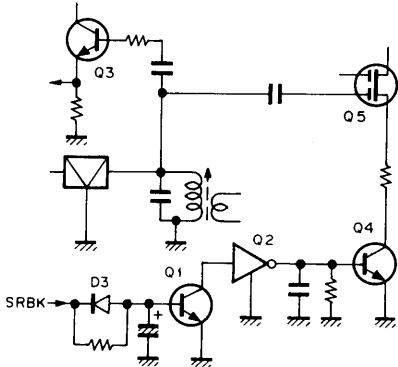
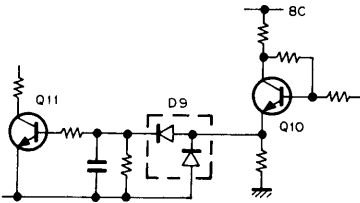
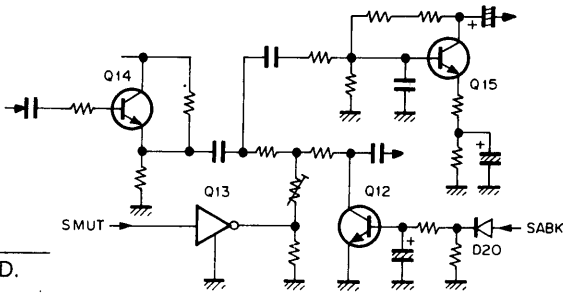
FINAL UNIT (X45-3170-00) : 430MHz

Component	Use/Function	Operation/Condition/Compatibility
IC1	Temperature detection	IC1 (1/2) : Transmitter output is down, IC1 (2/2) : Operate in cooling fan is working.
Q1	SWR protection control	Adjustable with VR2. Normally, base voltage is 0.3V and collector voltage is 3.0V in the transmit mode. When the antenna is opened, base voltage is 0.8V and collector voltage is 2.0V.
Q102, 103	Power hybrid IC	
D1	Protection against reverse power connection	A short-circuit occurs when DC power connection is reversed. If power is not turned on when correct DC power connection is made, it may be due to a burned negative DC cable.
D2, 3	Transmit/receive select	Transmit mode : on. If DC source current flows, and no transmitter output is present, either of the diodes may be faulty.
D4	Forwarded wave detection	Adjustable with VR1 in the FM transmit mode. 42W flows when transmitter output is measurement.
D5	Reflected wave detection	Adjustable with VR2. 7A flows when the antenna is opened.
D6	Wired OR	Operate in transmitter output is down.
D7	Wired OR	Fan motor.
D8	Temp. detection circuit ref. voltage	7.5V zener diode.

IF UNIT (X48-3050-XX) -11 : K, M1, M2 -61 : T, W

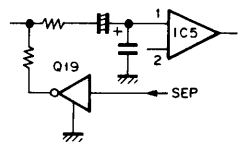
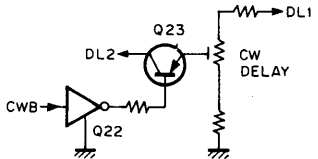
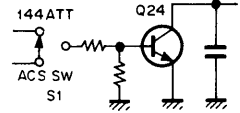
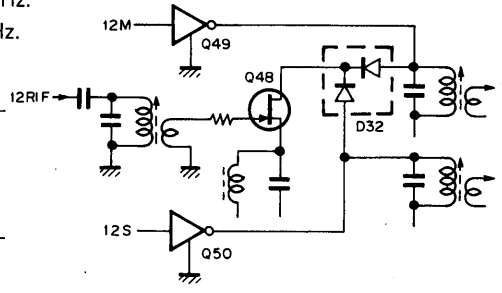
Component	Use/Function	Operation/Condition/Compatibility
IC1	SUB FM MIX, IF, SQL	FM RX, SSB SQ 10.695MHz → 455kHz. 
IC2	2ch AF VR	Separately main and sub.
IC3	10V AVR	DC power supply for IC2.
IC4	2ch AF MUTE	Operate in AF mute when POWER SW is turned on and off.
IC5, 6	AF PA	IC5 : main, IC6 : sub.
IC7	8V AVR	DC power supply for sub IF.
IC8	MAIN FM MIX, IF, SQL	FM RX, SSB SQ 10.595MHz → 455kHz.
IC9	BM	Balanced modulator.
IC10	MIC amplifier, processor	Operate in the SSB mode (processor).
IC11	8V AVR	DC power supply for main IF.

DESCRIPTION OF COMPONENTS

Component	Use/Function	Operation/Condition/Compatibility
IC12, 13	AGC select	IC12 : 144MHz, 1.2GHz. IC13 : 430MHz, 440MHz. 
IC14	24V AVR	DC power supply for VCO vari-cap diodes in PLL unit.
Q1, 2	DC SW	Sub IF blanking SW.
Q3	NB buffer amplifier	
Q4	NB gate SW	
Q5	Receive IF amplifier	
Q6	RF SW	
Q7	Receive 1st IF amplifier	SSB, CW 10.595MHz.
Q8	Receive 2nd IF amplifier	SSB, CW 10.595MHz.
Q9	Receive 3rd IF amplifier	SSB, CW 10.595MHz.
Q10	RF buffer amplifier	Pick up to AGC input. 
Q11	AGC amplifier	
Q12	AF SW	
Q13	AF SW	
Q14	SQ gate	
Q15	AF amplifier	Sub ext. output and AF LED.
Q16	AF amplifier	Main ext. output and AF LED.
Q17	AF SW	Main AF mute.
Q18	AF SW	Main AF killer.

TS-790A/E

DESCRIPTION OF COMPONENTS

Component	Use/Function	Operation/Condition/Compatibility
Q19	AF SW	SP SEP : on. Approx. 6dB attenuation of the AF input. 
Q20	AF SW	SP SEP : on. Approx. 6dB attenuation of the AF input.
Q21	AF amplifier	AF output for VOX-4 (AF output = Main + Sub).
Q22, 23	DC SW	CW delay control signal sent to the control unit in the CW mode. 
Q24	DC SW	ACS SW : on. ACC terminal is turned short circuit. 
Q25	AF buffer amplifier	Sub AF LED lighting circuit.
Q26	DC SW	Mute SW of the sub AF LED lighting circuit.
Q27, 28	DC SW	Sub AF LED lighting circuit.
Q29	AF buffer amplifier	Main AF LED lighting circuit.
Q30	DC SW	Mute SW of the main AF LED lighting circuit
Q31, 32	DC SW	Main AF LED lighting circuit.
Q33 ~ 35	NB IF amplifier	10.595MHz.
Q36	NB gate SW	
Q37	NB AGC amplifier	
Q48	1.2GHZ receive 3rd mixer	Main RX : 41.415MHz → 10.695MHz. Sub RX : 41.315MHz → 10.595MHz.
Q49	RF SW	Main 1.2GHz mode : on. 
Q50	RF SW	Sub 1.2GHz mode : on.
Q51	RF amplifier	30.72MHz.
Q52, 53	DC SW	Main IF blanking SW.
Q54	MAIN NB gat4e SW	Blanking : off.
Q55	NB buffer amplifier	
Q56	Receive IF amplifier	Main SSB, FM common IF 10.695MHz.
Q57	RF SW	SSB, CW mode : on.
Q58 ~ 60	Receive IF amplifier	SSB, CW IF amplifier 10.695MHz.
Q61	SQ gate	
Q62	RF buffer amplifier	AGC.
Q63	AGC amplifier	

DESCRIPTION OF COMPONENTS

Component	Use/Function	Operation/Condition/Compatibility
Q64	DC SW	Main SSB, CW receive mode : "H".
Q65	DC SW	Transmit mode : on, mute to main RX IF.
Q66	DC SW	Processor SW is turn on : on. Increase gain of IC10 to 20dB.
Q67	AF amplifier	Processor control AF amplifier.
Q68	AF buffer amplifier	MIC amplifier output for FM mode.
Q69	MIC amplifier	SSB 2nd MIC amplifier.
Q70	RF SW	Receive mode : on.
Q71	DC SW	FM transmit mode : "H".
Q72	DC SW	Main SSB, CW receive mode : "H".
Q73	10.695MHz OSC	10.695MHz output from the crystal oscillator is modulated.
Q74	OSC buffer amplifier	
Q76	Transmit IF amplifier	All band common ALC (10.695MHz).
Q77	Transmit IF amplifier	144MHz and 430 ~ 450MHz transmitter output control, keying.
Q78	1.2GHz transmit 1st mixer	10.695MHz → 41.415MHz, keying.
Q80	1.2GHz transmit IF amplifier	
Q81	DC SW	144MHz and 430 ~ 450MHz transmit mode : "H".
Q82	DC SW	1.2GHz transmit mode : apply to KEY + B voltage.
Q83	DC SW	144MHz and 430 ~ 450MHz transmit mode : apply to KEY + B voltage.
Q84	DC SW	Main 1.2GHz : on.
Q85	DC SW	SSB transmit mode : on. Reduce the transmitter output to approx. 2dB.
Q86	DC buffer amplifier	ALC meter circuit.
Q87	DC amplifier	ALC meter circuit.
Q88	DC SW	SSB transmit mode : TXB voltage is present and DC power supply for the ALC meter circuit.
Q89	DC SW	CONT terminal (ACC4) is "H" : on.
Q90	DC SW	CONT terminal (ACC4) is "H" : off. Stop to TIF output.
Q91	DC SW	SSB, CW transmit mode : "H".
Q92	DC SW	Main CW (main without CW mode) : ALT output is sent to control unit.
Q93	DC SW	Main CW mode : on.
Q94	DC SW	Main CW mode : off.
Q95	DC SW	Receive mode : on.
Q96	DC SW	Make the RXB voltage of IF unit.
Q97	DC SW	Make the RXB voltage of STBY circuit.
Q98	DC SW	TXB (9V) voltage in the 144 final unit : on (transmit mode).
Q99	DC SW	Make the transmit information of ext. interface.
Q100	DC SW	144MHz transmit mode : on.
Q101	DC SW	430MHz and 440MHz transmit mode : on.
Q102	DC SW	1.2GHz transmit mode : on.
Q103	DC SW	144MHz transmit mode : on, open collector.
Q104, 105	DC SW	430MHz and 440MHz transmit mode : on, open collector.
Q106, 107	DC SW	1.2GHz band : on.
Q108	DC SW	SSB and CW receive mode : "H".
Q109	DC SW	FM receive mode : "H".
Q110	1.2GHz KEY SW	1.2GHz keying circuit.
Q111	DC SW	1.2GHz TXG : off.
Q112	RF SW	Transmit mode : mute to main IF.
Q113	DC SW	Transmit with time delay : on, mute to main IF.
Q114	DC SW	Transmit mode : off.
Q115	MIC mute	MIC input : off when transmit to packet communication.
Q116	DC SW	FM mode : processor off.
Q117	SQ TIME CONST SW	FM mode : on, C580 is short-circuit.

TS-790A/E

DESCRIPTION OF COMPONENTS

Component	Use/Function	Operation/Condition/Compatibility
Q118	SQ TIME CONST SW	FM mode : on, C581 is short-circuit.
Q119	Transmit SQ OFF	Transmit mode : main SQ output become compulsory off position.
Q120	DC SW	Mode select mode : main SQ output become compulsory off position.
Q121	DC SW	Mode select mode : sub SQ output become compulsory off position.
Q123	DC SW	TXB (9V) voltage in the 144 final unit : on (transmit mode).
Q124	Transmit RD mute	Tone signal to CTCSS unit : off (transmit mode : on).
D1	RF SW	Sub receive 1.2GHz : on.
D2	RF SW	Sub 144MHz and 430 ~ 450MHz receive mode : on.
D3	C36 discharge	
D4	Q5 (gate2) bias temp. compensation	
D5	RF SW	FM IF and SSB IF select.
D6	RF SW	SSB SQ SW is SSB mode : on.
D7, 8	SSB DET	
D9	AGC DET	
D10	C128 charge holding	
D11	DC SW	Main AF output muted.
D12	RF SW	FM IF and SSB SQ select.
D13	Noise RECT.	
D14, 15	Discriminat DET	
D16	SQ DC SW	
D17	5V zener diode	DC power supply (5V) for sub CTCSS unit.
D18	AF RECT.	Sub AF LED.
D19	AF RECT.	Main AF LED.
D20	DC SW	Sub AF output muted.
D21	NB DET	
D22	NB SW	Increase threshold level to Q36 base voltage.
D23	DC OR	Operates in OR : NB and sub RBK.
D24	FM IF limiter	
D25	DC SW	Transmit mode : main AF output muted.
D31	RF SW	1.2GHz receive selected : on.
D32	RF SW	1.2GHz receive select : main or sub.
D33	RF SW	1.2GHz receive mode : on.
D34	RF SW	1.2GHz transmit mode : on.
D35	RF SW	1.2GHz main receive mode : on.
D36	RF SW	1.2GHz sub receive mode : on.
D37	RF SW	144MHz and 430 ~ 450MHz main receive mode : on.
D38 ~ 40	Current reversal prevention	
D41	C313 discharge	
D42	RF SW	Main NB is active : on.
D43	DC SW	Main CWB + SSB.
D44	DC SW	Main CWB + SSB + CNB = SCNB.
D45	DC SW	Main CWB + SSB = SCB.
D46	DC SW	Main CWB + CNB.
D47	DC SW	14S + 43S + 12S = FET Q5 bias voltage (gate2).
D48	DC SW	14M + 43M + 12M = FET Q56 bias voltage (gate2).
D49	Q56(gate2) bias temp. compensation	
D50	DC SW	14M + 34M.
D51	RF SW	Main receive mode : on.
D52	DC SW	Main SCB + CNB.
D53, 54	SSB filter SW	Main SSB and CW mode : on.
D55, 56	CWN filter SW	Main CWN mode : on.

DESCRIPTION OF COMPONENTS

Component	Use/Function	Operation/Condition/Compatibility
D57	RF SW	Main FM mode : on.
D58	RF SW	Main SSB and CW receive mode : on.
D59	RF SW	Main SSB and CW transmit mode : on.
D60	RF SW	Main SSB and CW squelch operate : on.
D61	RF ATT	Set to S1 with main SSB receive mode.
D62	RF SW	Main CAR transmit/receive select SW.
D63, 64	SSB DET	
D65	-6V zener diode	-6V AVR for DC-DC convertor.
D67	Current reversal prevention	
D68	AGC DET	
D69	RF SW	Main FM receive mode : on.
D70	RF SW	Main SSB and CW receive mode : on (SSB SQ).
D71	Current reversal prevention	Main transmit mode : SQ output become compulsory off position.
D72	Noise RECT.	
D73	Processor AF RECT.	
D74	5V zener diode	DC power supply for main CTCSS unit.
D75	DC SW	MIC amplifier is turned off when main CW and FM transmit mode.
D76	Current reversal prevention	CW transmit mode : unbalanced to balanced modulator.
D77	RF SW	Carrier signal input to balanced modulator.
D78	RF SW	Blanced modulator switching.
D79	RF SW	SSB and CW transmit mode : on.
D80	RF SW	Operate in FM transmit mode (10.695MHz). 10.695MHz output from the crystal oscillator is frequency modulated with a vari-cap diode.
D81	Vari-cap diode	FM modulation.
D82	DC SW	12M + 12S.
D83	RF SW	1.2GHz transmit mode : on.
D84	RF SW	144MHz and 430 ~ 450MHz transmit mode : on.
D85	RF SW	1.2GHz transmit mode : on.
D86	RF SW	144MHz and 430 ~ 450MHz transmit mode : on (CW keying switch).
D87, 88	Current reversal prevention	
D89	DC level shift	Transmitter output decrease when DC power supply is lower than normal voltage.
D90	Temperature compensation	ALC meter.
D91	Current reversal prevention	Ext. ALC.
D92, 93	Discriminat DET	Main ALT.
D94	DC SW	Main squelch switching.
D95	5V zener diode	5V AVR.
D96 ~ 98	Current reversal prevention	
D99	Spike-killer	
D100	Current reversal prevention	Ext. ALC.
D101	DC level shift	Ext. ALC.
D102, 103	Current reversal prevention	
D104	FM IF limiter	
D105	5V zener diode	5V AVR.
D106 ~ 108	Current reversal prevention	

TS-790A/E

DESCRIPTION OF COMPONENTS

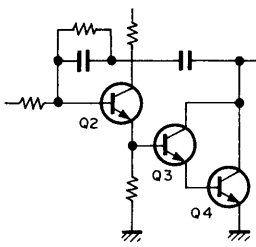
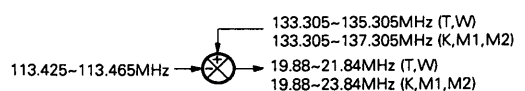
COLLECTION MODULE (X59-3480-00) : This PC board located in the IF unit

Component		Use/Function	Operation/Condition/Compatibility
(A1)	(A2)	AFC (ALT)	
IC1	IC101	DC amplifier	Amplified to ceramic discriminator output.
Q1	Q101	IF amplifier	Amplified to 455kHz signal.
(B1)	(B2)	MODE (A)	
IC21	IC121	Mode SW	FM, SSB and CW AF selectable with MODE (B) unit.
Q21	Q121	AF amplifier	Amplified FM detection output and sent a receive tone signal to CTCSS unit.
Q22	Q122	DC SW	Connect the HPF of CTCSS unit to FM AF line when CTCSS is turned on.
(C1)	(C2)	MODE (B)	
IC41	IC141	AF amplifier	AF output of SSB, CW and FM mode.
Q41	Q141	DC SW	Detected to tone in the CTCSS unit : on.
Q42	Q142	DC SW	CTCSS on : on.
(D1)	(D2)	S METER	
Q61	Q161	RF amplifier	455kHz FM S-meter.
Q62	Q162	RF amplifier	455kHz FM S-meter.
Q63	Q163	DC amplifier	SSB and CW S-meter.
Q64	Q164	DC amplifier	SSB and CW S-meter.
(E1)	(E2)	SQL CONTROL	
Q81	Q181	SQL DC SW	SQL opened : on. Q81 and Q181 (1/2) : SQL control for packet communication.
Q82	Q182	DC SW and delay	SQL opened : on. Given delay time to closing tail in the CW and SSB mode.
Q83	Q183	DC SW	SQL opened : send a "H" level to SQG terminal. Then, BC terminal is short-circuit.
Q84	Q184	BSY LED SW	SQL opened : "H". Then, LED will lights.
D81	D181	Current reversal prevention	
D82	D192	Current reversal prevention	
(F)		ALC	
IC201		ALC amp. and RF meter buffer amp.	Make a ALC and RF meter voltage.
Q201		DC buffer amplifier	RF meter.
D201		Current reversal prevention	
D202		D201 temperature compensation	
(G)		STBY (A)	
Q221		KYB SW	Supplied to keying voltage with time constant when CW key is down.
Q222		DC SW	CW mode : off.
Q223		DC SW	CW mode : on.
Q224		KEY SW	CW mode : on, require to transmitter with KEY.
Q225		CKY SW	Detected that CW plug insert to KEY jack.
Q226		CKY SW	KEY down in the CW mode : on, information to CPUs (Semi break-in transmit).
Q227, 228		STBY SW	PTT and SS terminals : short-circuit, transmit information to CPU.
D221, 222		Current reversal prevention	
(H)		STBY (B)	
Q241		AF amplifier	Amplified to ext. modulation when operates in packet communication.
Q242		PTT, SS SW	PTT and SS transmit mode : on.
Q243		Packet communication SW	Packet communication transmit mode : on.
Q224		DC SW	PTT and packet communication transmit mode : on, canceled to MIC stop circuit.
(J)		SP SEP	
IC261		Logic IC	Detected that EXT. M and EXT. S plug insert to EXT. jack.
IC262		Analog SW	Switched AF output between main and sub from signal of IC261.
Q261		DC SW	SEP signal level shift.
D261, 262		Current reversal prevention	
(K)		SIDE TONE	
Q281		AF OSC	
D281		OSC SW	
D282		Current reversal prevention	
D283		Temperature compensation	

DESCRIPTION OF COMPONENTS

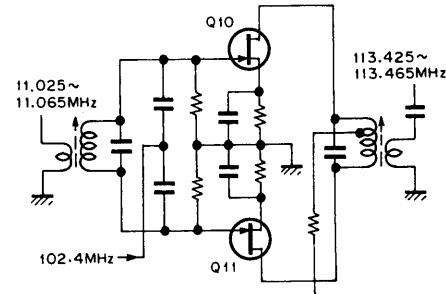
Component	Use/Function	Operation/Condition/Compatibility
(L) AGC AMP		
IC301	AGC amplifier	Operate in the SSB or CW mode.
(M) BAND SW		
Q321	DC SW	1.2GHz main band : on.
Q322	DC SW	On : apply to TXB voltage.
Q323	DC SW	Receive mode : on.
Q324	DC SW	1.2GHz main receive mode : "H".
Q325	DC SW	Q324 on or 1.2GHz sub band : on,
Q326	DC SW	Q325 on : "H" (band RXB).
D321	Current reversal prevention	
(N) FM MIC AMP		
IC341	Limiter LPF	FM modulation.

PLL UNIT (X50-3080-00) (A/2) : 144MHz

Component	Use/Function	Operation/Condition/Compatibility
IC1	Mixer	2 : input 10.24MHz, 5 : input 785 ~ 825kHz, 1 : output 11.025 ~ 11.065MHz
IC2	A loop PLL IC	7 : VCO input main : 133.305 ~ 135.305MHz (T, W), 133.305 ~ 137.305MHz (K, M1, M2), sub : 133.405 ~ 135.405MHz (T, W), 133.405 ~ 135.405MHz (K, M1, M2) 5 : Reference input 10.24MHz
IC3	Frequency 1/100 divider	4 : input 78.5 ~ 82.5MHz, 8 : output 785 ~ 825kHz
IC4	B loop PLL IC	7 : VCO input 78.5 ~ 82.5MHz, 5 : reference input 10.24MHz
IC5	Mixer	2 : input 10.24MHz, 5 : input : 452 ~ 458kHz, 1 : output 10.592 ~ 10.598MHz
IC6	Frequency 1/100 divider	4 : input 35.2 ~ 35.8MHz, 8 : output 352 ~ 358kHz
IC7	PLL IC	7 : VCO input 35.2 ~ 35.8MHz, 5 : reference input 10.24MHz
IC8	Mixer	2 : input 10.24MHz, 5 : input 452 ~ 458kHz, 1 : output 10.692 ~ 10.698MHz
IC9	Frequency 1/100 divider	4 : input 45.2 ~ 45.8MHz, 8 : output 452 ~ 458kHz
IC10	PLL IC	7 : VCO input 45.2 ~ 45.8MHz, 5 : reference input 10.24MHz
IC11	5V AVR	Input 8V, output 5V.
IC12	UNLOCK SW	
Q1	RF amplifier	Main : 133.305 ~ 135.305MHz (T, W), 133.305 ~ 137.305MHz (K, M1, M2) Sub : 133.405 ~ 135.405MHz (T, W), 133.405 ~ 137.405MHz (K, M1, M2)
Q2 ~ 4	PLL lowpass filter	
Q5	Amplifier	133.305 ~ 137.305MHz
Q6	Mixer	
Q7, 8	Amplifier	19.88 ~ 23.84MHz

TS-790A/E

DESCRIPTION OF COMPONENTS

Component	Use/Function	Operation/Condition/Compatibility
Q9, 10	Balanced mixer	
Q11	Amplifier	11.05MHz
Q12	5 frequency multiplication	$10.24 \times 5 = 51.2\text{MHz}$
Q13	2 frequency multiplication	$51.2 \times 2 = 102.4\text{MHz}$
Q14, 15	UNLOCK SW	DC voltage of Q1 stopped When PLL is unlocked.
Q16	Amplifier	Sub CAR : 10.592 ~ 10.598MHz
Q17	Amplifier	Main CAR : 10.692 ~ 10.698MHz
Q18 ~ 24	Buffer amplifier	10.24MHz buffer amplifier.
Q25	3 frequency multiplication	$10.24 \times 3 = 30.72\text{MHz}$
Q26	UNLOCK SW	DC voltage of Q5 ~ 12 stopped when Q28 switched.
Q27	UNLOCK SW	DC voltage of vari-cap diodes D2 ~ 4 stopped when IC12 and Q27 switched.
Q28	UNLOCK SW	Switched IC4 unlock voltage.
D2 ~ 4	Vari-cap diode	
D5	B loop VCO	
D6	SUB CAR VCO	
D7	MAIN CAR VCO	

PLL UNIT (X50-3080-00) (B/2) : 430MHz

Component	Use/Function	Operation/Condition/Compatibility
IC50	A loop PLL IC	7 : VCO input 354.075 ~ 364.075MHz (M2, T, W), 354.075 ~ 374.075MHz (K, M1) 5 : Reference input 10.24MHz
IC51	C loop PLL IC	7 : VCO input 152.715 ~ 153.825MHz (M2, T, W), 152.475 ~ 153.825MHz (K, M1) 5 : reference input 10.24MHz
IC52	Mixer	2 : input 10.24MHz, 5 : input 795 ~ 835kHz, 1 : output 11.035 ~ 11.075MHz
IC53	Frequency 1/100 divider	4 : input 79.5 ~ 83.5MHz, 8 : output 795 ~ 835kHz
IC54	B loop PLL IC	7 : VCO input 79.5 ~ 83.5MHz, 5 : reference input 10.24MHz
IC55	D loop PLL IC	7 : VCO input (main) 65.23MHz, (sub) 65.33MHz, 5 : reference input 10.24MHz
Q50	RF amplifier	354.075 ~ 364.075MHz (M2, T, W), 354.075 ~ 374.075MHz (K, M1)
Q51	RF amplifier	
Q52	RF amplifier	
Q53, 54	RF amplifier	200.96 ~ 221.44MHz
Q55 ~ 57	PLL lowpass filter	Converted to DC voltage from PD output (pulse) in the A loop PLL IC.

DESCRIPTION OF COMPONENTS

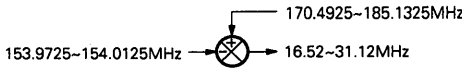
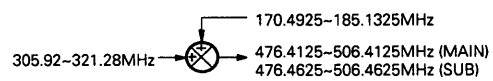
Component	Use/Function	Operation/Condition/Compatibility
Q58, 59	PLL UNLOCK SW (A loop)	Q50 voltage stopped when PLL is unlocked.
Q60, 61	RF amplifier	
Q62	Mixer	
Q63, 64	RF amplifier	18.56 ~ 19.7MHz
Q65	RF amplifier	11.035 ~ 11.075MHz
Q66, 67	Mixer	
Q68	4 frequency multiplication	$10.24 \times 4 = 40.96\text{MHz}$
Q69	3 frequency multiplication	$40.96 \times 3 = 122.88\text{MHz}$
Q70	RF amplifier	HET (main) 65.23MHz, (sub) 65.33MHz
Q71 ~ 73	Buffer amplifier	10.24MHz
Q74, 75	PLL UNLOCK SW (D loop)	Voltage of VCO and etc. stopped when D loop PLL is unlocked.
Q76	Buffer amplifier	Main : 65.23MHz, sub : 65.33MHz
D50		
D51	Mixer	
D52		
D53	B loop VCO	

PLL UNIT : Z1 (X51-3090-21) (1.2GHz)

Component	Use/Function	Operation/Condition/Compatibility
IC1	B loop PLL IC	B loop VCO 37.25 ~ 41.25MHz
IC2	Frequency 1/100 divider	B loop VCO (37.25 ~ 41.25MHz) divided 1/100 : 0.3725 ~ 0.4125MHz
IC3	Mixer	
IC4	A loop PLL IC	A loop VCO 170.4925 ~ 185.1325MHz
IC5	C loop PLL IC	Pulse swallow counter with IC6.
IC6	C loop pre-scaler	Pulse swallow counter with IC5.
IC7	5V AVR	AVR input : 8V, output : 5V.
Q1	10.24MHz buffer amplifier	Amplified 10.24MHz TCXO to enough level in the PLL unit.
Q3	10.24MHz 2 frequency multiplication	$10.24\text{MHz} \times 2 = 20.48\text{MHz}$
Q4	20.48MHz 7 frequency multiplication	$20.48\text{MHz} \times 7 = 143.36\text{MHz}$
Q5	143.36MHz buffer amplifier	
Q6	20.48MHz 4 frequency multiplication	$20.48\text{MHz} \times 4 = 81.92\text{MHz}$
Q7	81.92MHz buffer amplifier	Amplified Q7 to enough level of 12HET in the PLL unit.
Q8	UNLOCK SW	Switched unlocked output in the B loop PLL IC (IC1).
Q9	10.24MHz buffer amplifier	Amplified that enough level to mixer IC (IC3).
Q10	10.6MHz buffer amplifier	Amplified that mixed output from IC3.
Q11, 12	Balanced mixer	
Q13 ~ 15	A loop PLL IF amplifier	Amplified PLL IF 16.52 ~ 31.12MHz in the A loop.

TS-790A/E

DESCRIPTION OF COMPONENTS

Component	Use/Function	Operation/Condition/Compatibility
Q16 ~ 18	A loop PLL LPF	Changed to DC voltage from PD output in the A loop PLL IC (IC4).
Q19	A loop PLL IF mixer	
Q20	A loop VCO buffer amplifier	Amplified A loop VCO output 170.4925 ~ 185.1325MHz
Q21	UNLOCK SW	Stopped voltage of Q20 when PLL is unlocked.
Q22	A loop PLL UNLOCK SW	Switched unlock output when A loop PLL is unlocked.
Q23, 24	C loop PLL UNLOCK SW	Switched unlock output when C loop PLL is unlocked.
Q25 ~ 27	C loop PLL LPF	Changed to DC voltage from PD output in the C loop PLL IC (IC5).
Q28, 29	C loop VCO buffer amplifier	Amplified C loop VCO output 305.92 ~ 321.28MHz
Q30 ~ 32	12HET RF amplifier	Main : 476.4125 ~ 506.4125MHz Sub : 476.4625 ~ 506.4625MHz
Q33	1.2GHz 8V SW	Stopped 8V DC supply when B loop PLL is unlocked.
D1	B loop VCO vari-cap diode	Oscillated DC voltage to vari-cap diode in the B loop LPF.
D2	Mixer	
D3		

CONTROL UNIT (X53-3120-XX) -11 : K -21 : M1 -22 : M2 -61 : T, W

Component	Use/Function	Operation/Condition/Compatibility
IC1	CPU	
IC2	ROM	
IC3	RAM	
IC4	Address latch	
IC5	Address decode	
IC6, 7	Expand I/O	
IC8	Solenoid drive	
IC9	DC power supply reset	
IC10	Serial buffer	
IC11, 12	Encoder pulse interface	
IC13	Encoder pulse interface	
IC14		
IC15, 16	Encoder pulse interface	
Q1	RAM back-up control	
Q2, 3	Solenoid pulse control	
Q4	900MHz signal switching	
Q5	360MHz signal switching	
Q6	14S band signal switching	
Q7	14M band signal switching	
Q8	43S band signal switching	
Q9	43M band signal switching	
Q10	12S band signal switching	
Q11	12M band signal switching	
Q12	MAIN CWN + B mode signal switching	
Q13	MAIN CW + B mode signal switching	

DESCRIPTION OF COMPONENTS

Component	Use/Function	Operation/Condition/Compatibility
Q14	MAIN SSB + B mode signal switching	
Q15	MAIN FM + B mode signal switching	
Q16	SUB FM + B mode signal switching	
Q17	SUB CW + B mode signal switching	
Q18	ATV input buffer amplifier	
D1	Reset pulse electric capacitor discharge	
D2 ~ 5	Encoder pulse interface	
D6	Encoder pulse interface (50 slit)	
D7	Solenoid upper voltage limiter	
D12, 13	Back-up voltage select	
D14	MU terminal protection	
D15	MD terminal protection	
D21 ~ 24	Distination diode	
D29, 30	Distination diode	

SEMICONDUCTOR DATA

Ceramic filter : L72-0367-05
(144, 430MHz PLL unit CF1, 2, 50, 51)

• Electrical characteristics

Item	Rating
Center frequency (fo)	Within 11.050MHz ± 50kHz
3dB attenuation bandwidth	Within 150 ± 40kHz
20dB attenuation bandwidth	380kHz or less
Insertion loss	8.0dB or less $20 \cdot \log \left(\frac{E1}{2 \cdot E2} \right)$
Ripple	1.0dB or less
Spurious attenuation	38dB or more at 9 to 12MHz
Input and output impedance	330Ω

Ceramic filter : L72-0368-05
(144, 430MHz PLL unit CF3)

• Electrical characteristics

Item	Rating
Center frequency (fo)	Within 10.595MHz ± 50kHz
3dB attenuation bandwidth	Within 150 ± 40kHz
20dB attenuation bandwidth	380kHz or less
Insertion loss	8.0dB or less $20 \cdot \log \left(\frac{E1}{2 \cdot E2} \right)$
Ripple	1.0dB or less
Spurious attenuation	38dB or more at 9 to 12MHz
Input and output impedance	330Ω

Ceramic filter : L72-0369-05
(144, 430MHz PLL unit CF4)

• Electrical characteristics

Item	Rating
Center frequency (fo)	Within 10.700MHz ± 50kHz
3dB attenuation bandwidth	Within 150 ± 40kHz
20dB attenuation bandwidth	380kHz or less
Insertion loss	8.0dB or less $20 \cdot \log \left(\frac{E1}{2 \cdot E2} \right)$
Ripple	1.0dB or less
Spurious attenuation	38dB or more at 9 to 12MHz
Input and output impedance	330Ω

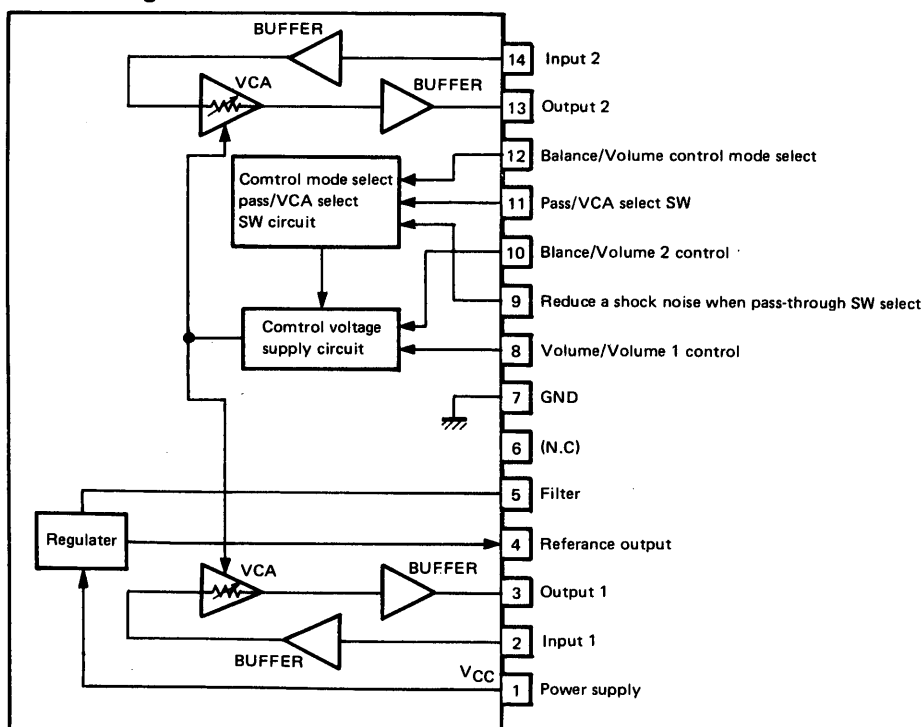
CW crystal filter : L71-0283-15
(IF unit XF7)

• Electrical characteristics

Item	Rating
Nominal center frequency	10.695MHz
Center frequency declination	Within ±80Hz at 6dB and 25°C
6dB pass bandwidth	500Hz or more
Insertion loss	Within 5dB ± 2dB
I/O terminating impedance	1200Ω/6pF
Temperature	-10°C ~ +50°C

2 channel AF volume : M51131L (IF unit IC2)

• Block diagram



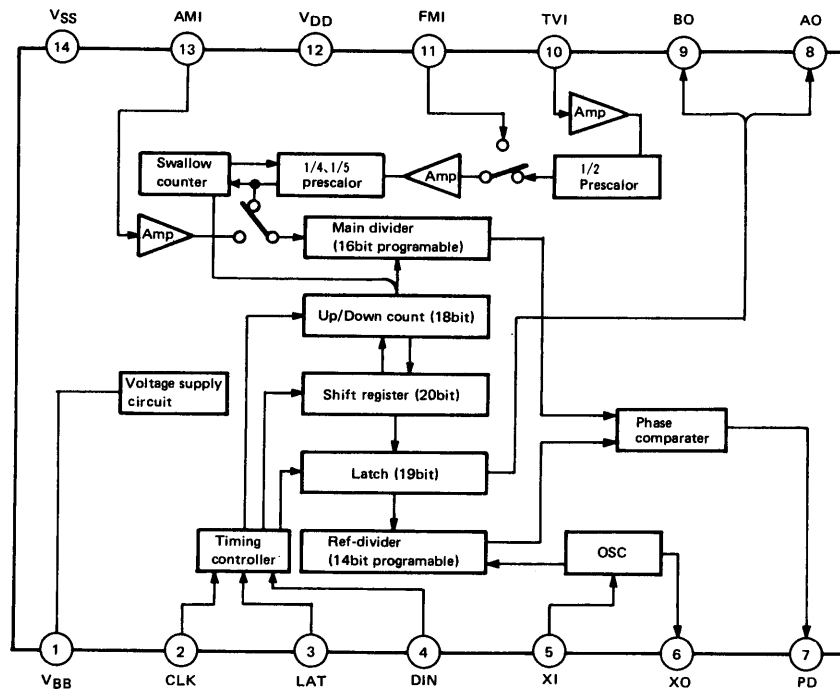
SEMICONDUCTOR DATA

PLL IC : CX-7925B or CX-7925B-1 (144, 430MHz PLL unit IC2,4,7,10,50,51,54,55)
 1.2GHz PLL unit IC1,4

• Description of terminals

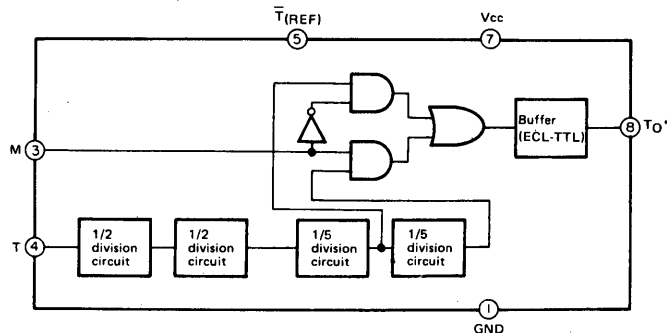
No.	Symbol	Description
1	VBB	PC board terminal (connect the 0.01 μ F capacitor to shortcircuit (GND)).
2	CLK	Clock input terminal of the 20 bit series input.
3	LAT	Latch signal input terminal of the shift register input and UP/DOWN clock input terminal.
4	DIN	Data input terminal and UP/DOWN mode select terminal ("H" : UP, "L" : DOWN).
5	XI	Reference signal oscillator (X'tal) connection terminals (Max. 13MHz, Typ 4MHz).
6	XO	
7	PD	Phase comparator output terminal.
8	AO	External control signal output terminal/UNLOCK output terminal (E/E MOS push-pull).
9	BO	External control signal output terminal/data check terminal (E/E MOS push-pull).
10	TVI	RF signal input terminal (Max. 300MHz or 350MHz), installed 1/2 prescaler.
11	FMI	RF signal input terminal (Max. 150MHz or 180MHz).
12	VDD	Power supply terminal (+5V).
13	AMI	RF signal input terminal (Max. 40MHz or 50MHz).
14	Vss	GND terminal.

• Block diagram



1/100 divider : M54459L (144, 430MHz PLL unit IC3,6,9,53)
 1.2GHz PLL unit IC2

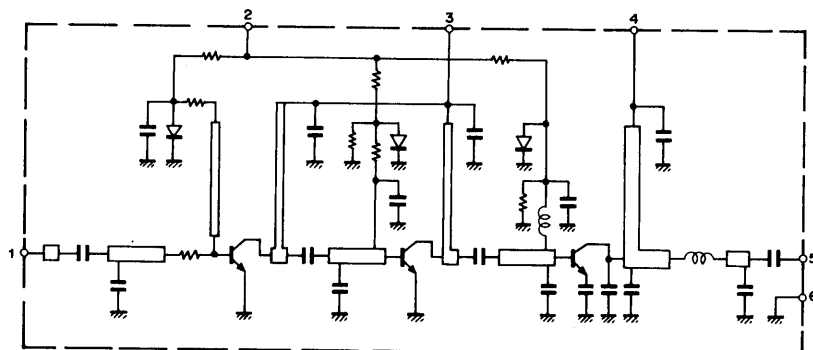
• Block diagram



SEMICONDUCTOR DATA

Power module : M57716 (430MHz final unit Q102)

• Equivalent circuit



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

• Max rating (Tc = 25°C)

Item	Symbol	Rating	Unit
Operating voltage	VCC	17	V
Current consumption	ICC	6	A
Base bias voltage	VBB	10	V
Operating case temperature	Tc (op)	-30 ~ +110	°C
Storage temperature	Tstg	-40 ~ +110	°C

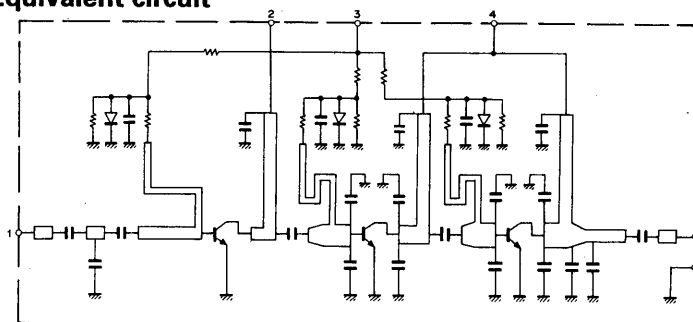
• Electrical characteristics (Tc = 25°C)

Item	Symbol	Condition	Rating			Unit
			MIN.	TYP.	MAX.	
Output power	Po	Vcc1 = Vcc2 = 12.5V, VBB = 9V, f = 430 ~ 440MHz, pin = 0.2W	18.5	19		W
Total efficiency	η_T		40	42		%
Power gain linearity	Gp	Vcc1 = Vcc2 = 12.5V, VBB = 9V, f = 430 ~ 440MHz, pin = 10dBm	21			dB

SEMICONDUCTOR DATA

Power module : M57762 (1.2GHz final unit IC102)

• Equivalent circuit



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

• Max rating (Tc = 25°C)

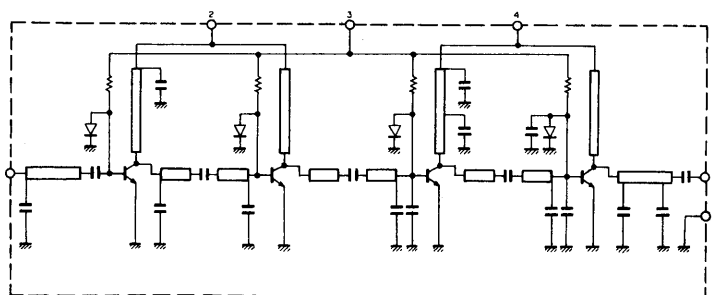
Item	Symbol	Condition	Rating	Unit
Operating voltage	Vcc		17	V
Base bias voltage	VBB		10	V
Current consumption	Icc		8	A
Input power	Pin	ZG = ZL = 50 Ω, Vcc = 12.5V, VBB = 9V	2	W
Output power	Po	ZG = ZL = 50 Ω	25	W
Operating case temperature	Tc (op)		-30 ~ +110	°C
Storage temperature	Tstg		-40 ~ +110	°C

• Electrical characteristics (Tc = 25°C)

Item	Symbol	Condition	Rating			Unit
			MIN.	TYP.	MAX.	
Output power	Po	Vcc = 12.5V, VBB = 9V, f = 1.24 ~ 1.3GHz, Pin = 1W, ZG = ZL = 50 Ω	18	20		W
Total efficiency	ηT		30	35		%
Base bias current	Ibb				500	mA
2nd transmission spurious					-30	dB
Input SWR	pin				2.0	
Output SWR	pout			1.5		
Power gain linearity	Gp	Vcc = 12.5V, VBB = 9V, f = 1.24 ~ 1.3GHz, Pin = 10dBm, ZG = ZL = 50 Ω	13			dB
3rd IMD		Vcc = 12.5V, VBB = 9V, f = 1.24 ~ 1.3GHz,			20	dB
5th IMD		Δf = 2kHz, Po ≤ 14W PEP, ZG = ZL = 50 Ω			-31	dB

Power module : M67715 (1.2GHz final unit IC101)

• Equivalent circuit



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

• Max rating (Tc = 25°C)

Item	Symbol	Condition	Rating	Unit
Operating voltage	Vcc1		9	V
Operating voltage	Vcc2		16	V
Base bias voltage	VBB		9	V
Current consumption	Icc		1.5	A
Input power	Pin	ZG = ZL = 50 Ω	10	mW
Output power	Po		4	W
Operating case temperature	Tc (op)		-20 ~ +100	°C
Storage temperature	Tstg		-40 ~ +110	°C

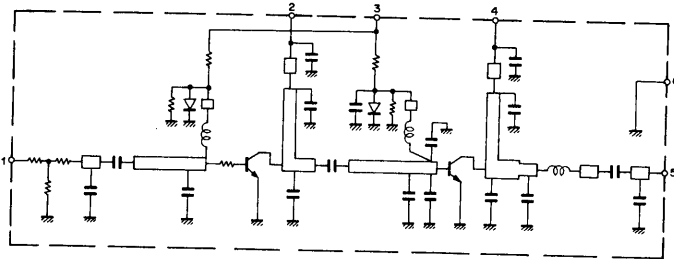
• Electrical characteristics (Tc = 25°C)

Item	Symbol	Condition	Rating			Unit
			MIN.	TYP.	MAX.	
Output power	Po	Vcc = 8V, VBB = 8V, f = 1.24 ~ 1.3GHz, Pin = 10mW, ZG = ZL = 50 Ω	1.5	1.7		W
Total efficiency	ηT		23	25		%
2nd transmission spurious					-30	dB
3rd transmission spurious					-35	dB
Input SWR	pin				2.5	—
Output SWR	pout			1.5		—
Power gain linearity	GPT	Vcc = 8V, VBB = 8V, f = 1.24 ~ 1.3GHz, Pin = 0dBm, ZG = ZL = 50 Ω	23	25		dB
3rd IMD	IMD3	Vcc = 8V, VBB = 8V, f = 1.24 ~ 1.3GHz,			-23	dB
5th IMD	IMD5	PEP ≤ 1.6W, ZG = ZL = 50 Ω, Δf = 20kHz			-30	dB

SEMICONDUCTOR DATA

Power module : M67727 (144MHz final unit Q101)

• Equivalent circuit



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

• Max rating (Tc = 25°C)

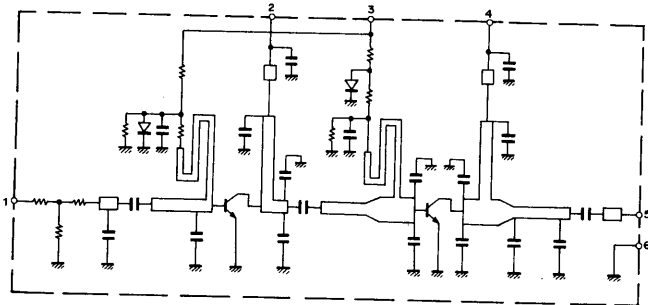
Item	Symbol	Condition	Rating	Unit
Operating voltage	Vcc		16	V
Base bias voltage	Vbb		10	V
Current consumption	Icc		24	A
Input power	Pin	Vcc1 ≤ 12.5V, ZG = 50Ω	0.8	W
Output power	Pout	ZL = 50Ω	78	W
Operating case temperature	Tc (op)		-30 ~ +110	°C
Storage temperature	Tstg		-40 ~ +110	°C

• Electrical characteristics (Tc = 25°C)

Item	Symbol	Condition	Rating			Unit
			MIN.	TYP.	MAX.	
Output voltage	Po	Vcc = 12.5V, Vbb = 9V, f = 144 ~ 148MHz, Pin = 0.5W, ZG = ZL = 50Ω	60	65		W
Total efficiency	ηT		50	55		%
2nd transmission spurious					-30	dB
3rd transmission spurious					-35	dB
Input SWR	pin				2.8	
Output SWR	pout			1.5		
3rd IMD	3rd. IMD	Vcc1 = Vcc2 = 12.5V, Vbb = 9V, f = 144 ~ 148MHz		-27	-25	dB
5th IMD	5th. IMD	Po ≤ 45W PEP, Δf = 2kHz, ZG = ZL = 50Ω		-35	-31	dB
Power gain linearity	GPT	Vcc1 = Vcc2 = 12.5V, Vbb = 9V, f = 144 ~ 148MHz, Pin = 10mW, ZG = ZL = 50Ω	21	23		dB

Power module : M67728 (430MHz final unit Q103)

• Equivalent circuit



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

• Max rating (Tc = 25°C)

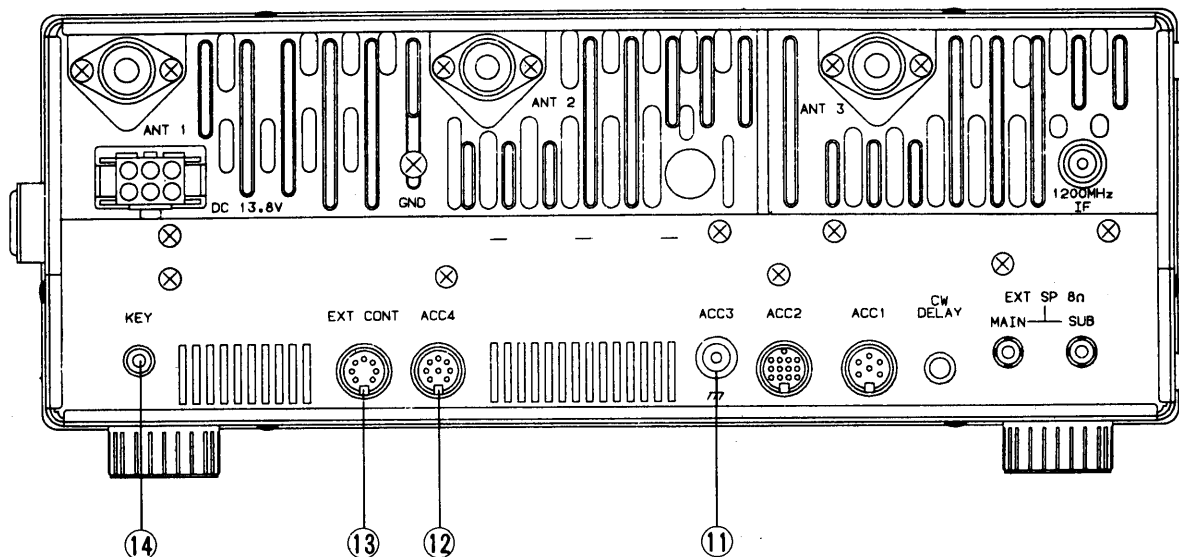
Item	Symbol	Condition	Rating	Unit
Operating voltage	Vcc		16	V
Base bias voltage	Vbb		10	V
Current consumption	Icc		25	A
Input power	Pin	Vcc1 ≤ 12.5V, ZG = 50Ω	14	W
Output power	Pout	ZL = 50Ω	78	W
Operating case temperature	Tc (op)		-30 ~ +110	°C
Storage temperature	Tstg		-40 ~ +110	°C

• Electrical characteristics (Tc = 25°C)

Item	Symbol	Condition	Rating			Unit
			MIN.	TYP.	MAX.	
Output voltage	Po	Vcc = 12.5V, Vbb = 9V, f = 430 ~ 450MHz, Pin = 10W, ZG = ZL = 50Ω	60	65		W
Total efficiency	ηT		40	45		%
2nd transmission spurious					-30	dB
3rd transmission spurious					-35	dB
Input SWR	pin				2.8	
Output SWR	pout			1.5		
3rd IMD	3rd. IMD	Vcc1 = Vcc2 = 12.5V, Vbb = 9V, f = 430 ~ 450MHz		-27	-25	dB
5th IMD	5th. IMD	Po ≤ 45W PEP, Δf = 2kHz, ZG = ZL = 50Ω		-35	-31	dB
Power gain linearity	GPT	Vcc1 = Vcc2 = 12.5V, Vbb = 9V, f = 430 ~ 450MHz, Pin = 100mW, ZG = ZL = 50Ω	7	9		dB

TS-790A/E

CONTROLS AND FUNCTIONS

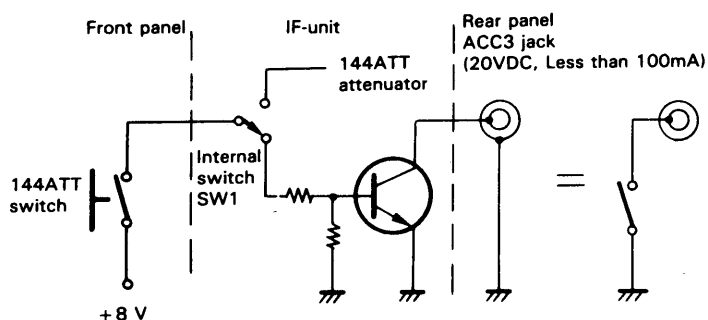
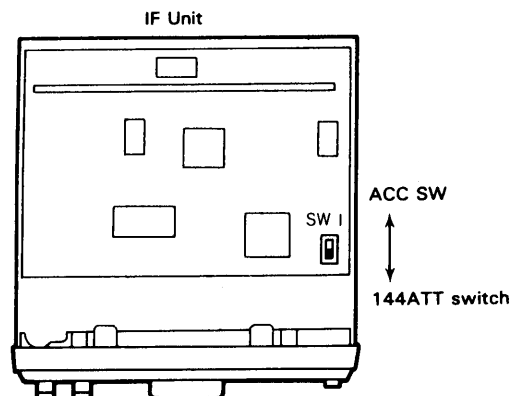


⑪ ACC 3 jack

The front-panel 144ATT switch can be used to control an external pre-amplifier for example when switch SW1 (IF unit X48-3050-XX) is placed to the rear as shown in the accompanying figure.

Cautions:

1. The 144ATT switch cannot be used to control internal receiver gain when the ACC3 jack is used.
2. The outer conductor of the jack is grounded.



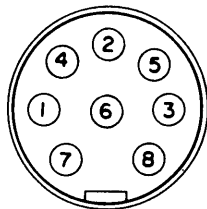
Caution:

Do not try to drive a relay directly.

CONTROLS AND FUNCTIONS

⑫ ACC4 connector

This connector can be used to control an Amateur TV terminal unit.



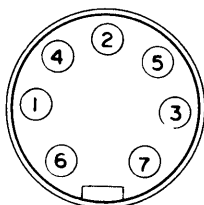
ACC4 View from the rear panel.

ACC4 pin assignments

Pin number	Symbol	Use
1	ALC	Output of internal ALC voltage.
2	GND	Ground.
3	N C	Unused.
4	CNT	When 5 to 12 V is applied to this terminal, the transmitter IF signal to the RF unit will be blocked.
5	N C	Unused.
6	12TXB	Voltage of about 8.8 V is output during transmission at 1200 MHz (maximum permissible output current 50 mA).
7	C B	The DC supply voltage applied to the power terminal will be available at this terminal via a choke coil and the power switch (maximum permissible output current 100 mA).
8	S S	External push to talk terminal transmission starts when grounded (voltage approximately 5 V).

⑬ EXT CONT connector

Used to control external devices like a linear amplifier. Use the 7-pin DIN plug provided.



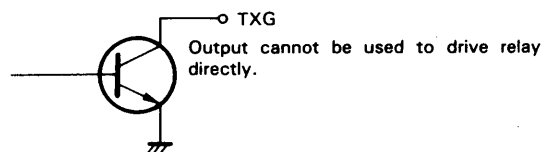
EXT CONT View from the rear panel.

EXT CONT pin assignments

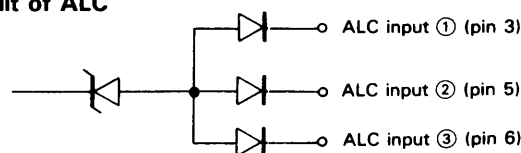
Pin number	Symbol	Use
1	43TXG	Grounded during transmission in 430 MHz band. Normally at high impedance. (Maximum permissible voltage 20 V, maximum permissible current 10 mA).
2	S S	External push to talk terminal transmission starts when grounded.
3	ALC	External ALC input ①. ALC threshold is about -6 V.
4	12TXG	Grounded during transmission in 1200 MHz band. Normally at high impedance. (Maximum permissible voltage 20 V, maximum permissible current 10 mA). (Optional in the TS-790A/790E).
5	ALC	External ALC input ②. ALC threshold is about -6 V.
6	14TXG	Grounded during transmission in 144 MHz band. Normally at high impedance. (Maximum permissible voltage 20 V, maximum permissible current 10 mA).
7	ALC	External ALC input ③. ALC threshold is about -6 V.

Reference information

- Circuit of each TXG (pin numbers 1, 4, and 6).



- Circuit of ALC



⑭ KEY jack

Using shielded line, connect a 1/8" phone plug to this jack for CW operation. Open-terminal voltage is approximately 5.5 VDC.

DATA COMMUNICATIONS

Packet communications will require the use of a terminal unit (available from your dealer).

1. The Accessory 2 terminal has been provided for connection of Data communications devices. All necessary connections can be accomplished from the same connector.
2. When using AFSK (Audio Frequency Shift Keying) or modulating the signal with any form of audio tones you should select LSB or USB. If F2 operation is desired select the FM mode.
3. The transceiver will transmit according to the signals received on the STBY pin of the connector. These inputs are generated by the terminal unit in response to inputs from the associated terminal input device.
4. When using LSB, or USB the MIC gain control should be used to adjust the input level for an on scale ALC meter reading.
5. Various forms of data communication like AFSK, RTTY and PACKET are possible.

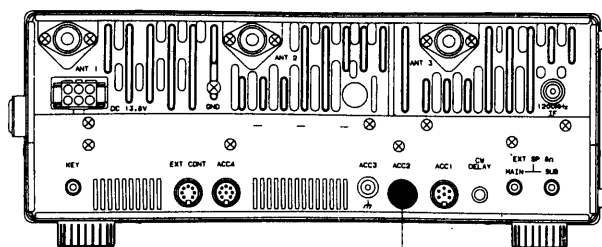
Cautions:

1. Do not transmit key down for a extended periods since damage to the unit might occur.
2. After continued transmission, allow the system to cool before retransmitting.

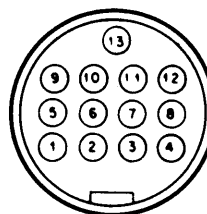
ACC2 pin assignments

Pin number	Symbol	Use
1	SAF	SUB receiver audio at a fixed level independent of AF control setting. Output voltage: 300 mV/47kΩ or more at high input level
2	ACC	Connected in parallel with ACC 3 pin jack.
3	MAF	MAIN receiver audio at a fixed level independent of AF control setting. Output voltage: 300 mV/47 kΩ or more at high input level.
4	GND	Ground of MAF. (Connect GND of MAIN audio output's shield cable).

5	MSQ	GND when MAIN squelch is open (MAIN BUSY indicator is lit). Open when MAIN squelch is closed (MAIN BUSY indicator is out). When connection is made to this terminal, you cannot send packets while squelch is open. In SSB-CW mode, reception signal will disappear and the squelch will take time to close.
6	MSM	MAIN S-meter output (parallel with device's S-meter). Reading of the internal S-meter will be incorrect if you terminate with an impedance of less than 10 kΩ.
7	SSQ	GND when SUB band squelch is open (SUB BUSY indicator is lit). Open when SUB squelch is closed (SUB BUSY indicator is out). Normally unused since MAIN channel is used for packet communication.
8	GND	Ground of SAF. (Connect GND of SUB audio output's shield cable).
9	PKS	Standby terminal exclusively for terminal units. When this terminal is used, the front panel microphone audio input will be muted automatically.
10	SSM	SUB S-meter output (analog voltage). Reading of the internal S-meter will be incorrect if you terminate with an impedance of less than 50 kΩ. Do not apply external voltage to this terminal.
11	PKD	Transmit audio input terminal (10 mV, 1 kHz) from terminal.
12	GND	Ground of PKD. (Connect GND of data signal shield cable)
13	S S	PTT terminal. Transmission begins when grounded. Use Pin 4 or 8 as chassis GND.



ACC2 connector



View from the rear panel.

OPERATION WITH A PERSONAL COMPUTER

Control with a personal computer is possible with the optional IF-232C interface. For more information, refer to the manuals provided with the interface.

■ Function list

- AUTO INFORMATION ON/OFF setting
- BUSY signal readout
- CTCSS number selection and readout
- CTCSS ON/OFF selection and readout
- DESTINATION CODE selection and readout
- Same function as microphone UP/DOWN switch
- VFO A and VFO B frequency selection and readout
- VFO A and VFO B MEMORY CALL setting
- Model No. readout for transceiver recognition
- Display of transceiver current condition
- LOCK ON/OFF setting and display
- AUTO LOCK TUNE ON/OFF selection and readout
- Memory channel setting
- Mode setting
- Memory display
- MUTE ON/OFF selection and readout
- Memory entry
- OFFSET setting
- RIT frequency clearance
- RIT frequency UP/DOWN
- RIT ON/OFF setting
- RX: For receive operation, TX:For transmit operation
- Scan ON/OFF setting
- S-Meter signal output
- SPLIT ON/OFF setting
- STEP ON/OFF setting
- Sub-tone frequency setting
- TONE ON/OFF setting
- Generation of synthesized voice

TS-790A/E

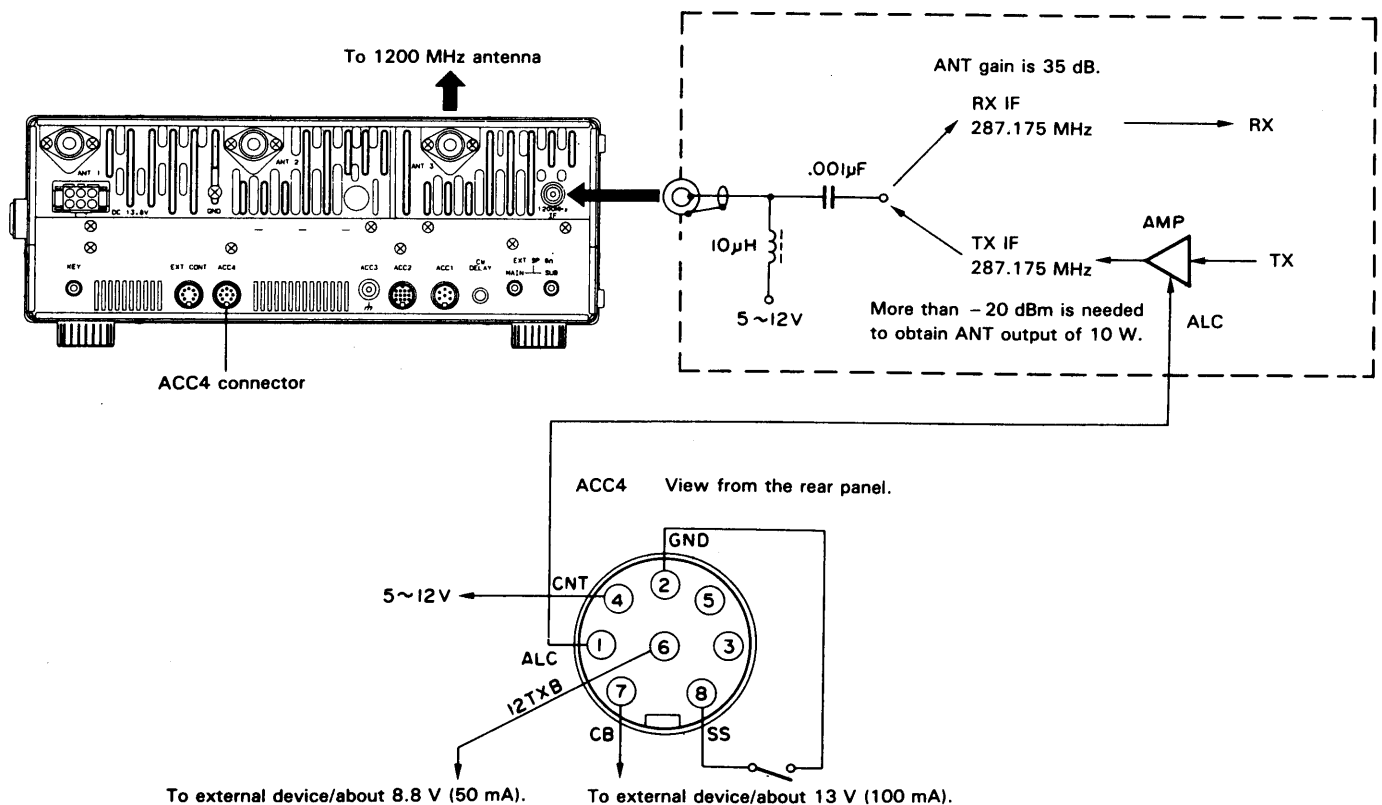
1200MHz IF CONNECTOR AND ACC4 CONNECTOR

A 5 to 12VDC bias may be applied to the 1200 MHz IF connector, to allow a 1200 MHz IF signal to be used for transmission or reception.

1. Set the MAIN channel to the 1200 MHz band.
2. Apply 5 to 12 V to CNT terminal of the ACC4 connector.

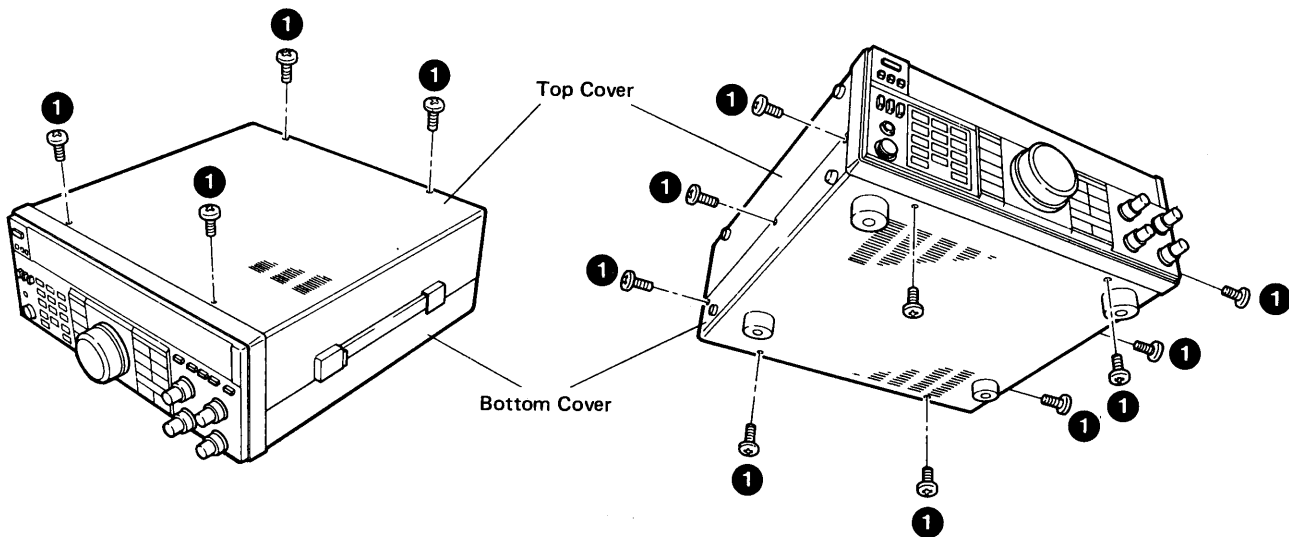
Cautions:

1. When voltage is applied to CNT, you cannot use the front panel microphone jack and internal speaker for transmission and reception.
2. Advanced skills and knowledge will be needed for this type of operation. Be very careful to make connections exactly as shown.

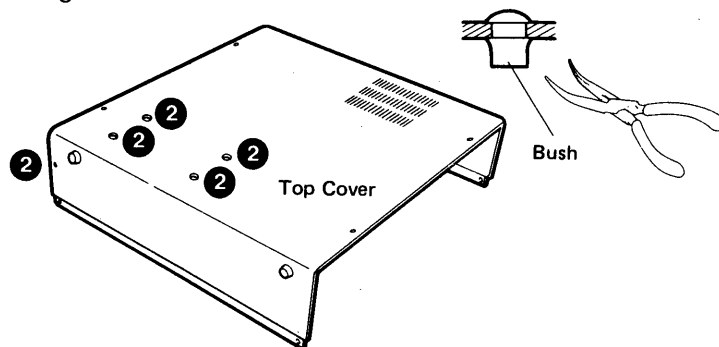


UT-10 (OPTION) INSTALLATION

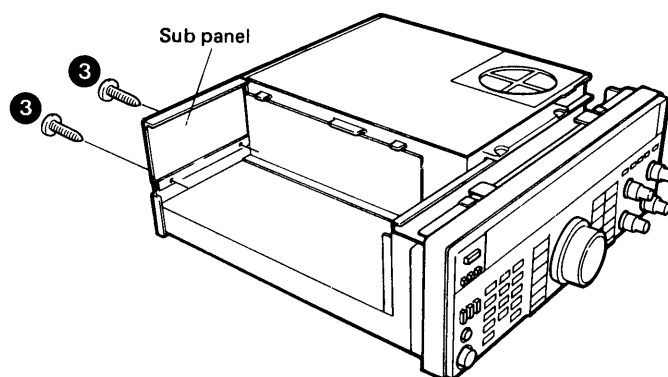
1. Remove the 14 screws holding the top cover and bottom cover (**1**).



2. Remove the 5 bushings from the top cover using diagonal cutters (**2**).



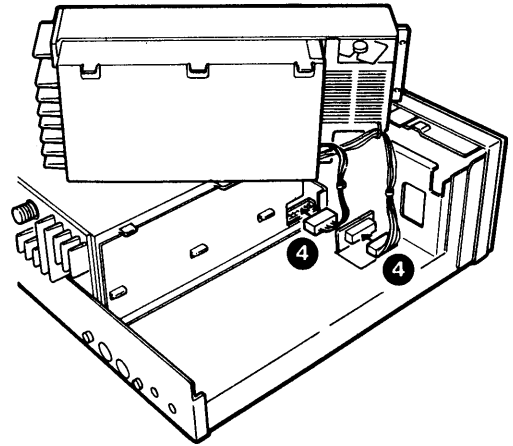
3. Remove the blind plate from the rear of the chassis (**3**).
Keep the 2 screws removed for later use. They are not needed now.



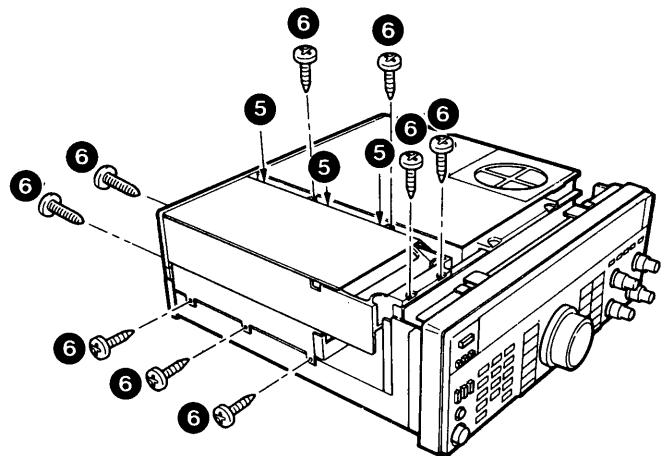
TS-790A/E

UT-10 (OPTION) INSTALLATION

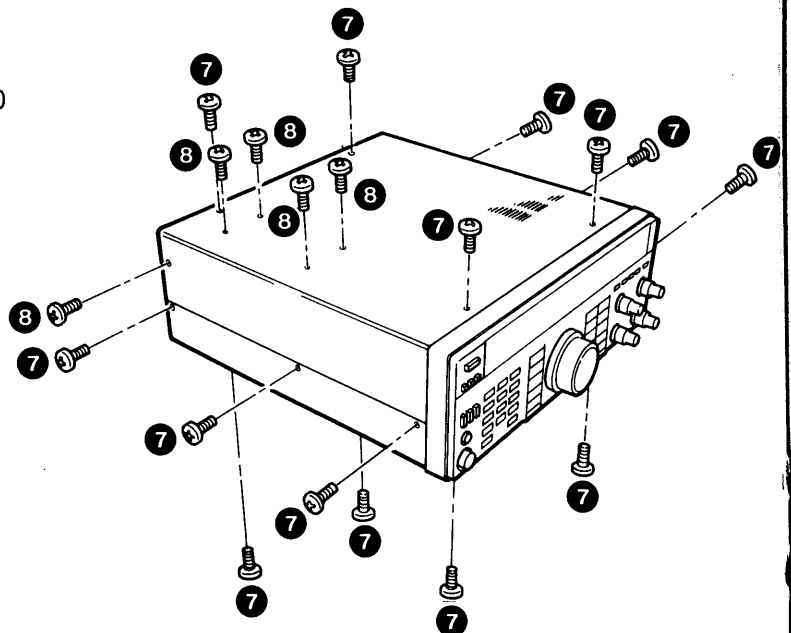
4. Attach the 18-pin connector and the 11-pin connector from the UT-10 (4).



5. Place the UT-10 as shown in figure. Fasten it to the chassis with 3 screws (5) and 9 self tapping screws (M3 x 8) (6).



6. Replace the top and bottom covers (7).
Use 5 pan head screws provided with the UT-10 (8).



PARTS LIST

PRECAUTIONS ABOUT PARTS LIST

● On general purpose chip parts

From a part number, the resistance value and capacity value are omitted, and "XXX" is used instead. (Ex.: RD41DB2BXXXJ)

In this case, from the circuit diagram, the reference number and resistance value and capacitance value are read, and they are changed into a part number making use of the following table:

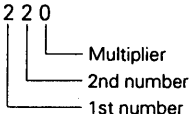
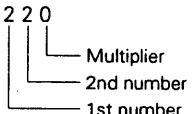
In addition, it should be noted that of those parts represented by serial reference numbers, some numbers may be unused. The unused numbers are listed on the circuit diagram.

● On resistance RD14BB

Of resistance RD14BB, any part number of less than 1/4W is omitted from the parts list.

● On symbols occurring on parts list

* : indicates new parts $\triangle$: indicates safety critical components
 E : Europe K : USA P : Canada W : Europe
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Resistor value	Capacitor value
$22\Omega = 2\ 2\ 0$  $0.5\Omega = 0R5$ $1\Omega = 010$ $10\Omega = 100$ $100\Omega = 101$ $1000\Omega = 1K\Omega = 102$ $10K\Omega = 103$ $100K\Omega = 104$ $1000K\Omega = 1M\Omega = 105$	$22pF = 2\ 2\ 0$  $0.5pF = 0R5$ $1pF = 010$ $10pF = 100$ $100pF = 101$ $1000pF = 0.001\mu F = 102$ $0.01\mu F = 103$

Letter "R" is used for the decimal point. In this case, all become significant figures.

TS-790A/E

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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
TS-790A/E						
1	1A	*	A01-1045-01	METALLIC CABINET(UP SIDE)	KM1M2 TW	
2	3A	*	A01-1046-01	METALLIC CABINET(BOTTOM)		
3	3A	*	A10-1288-11	CHASSIS		
4	1C	*	A20-2636-03	PANEL		
4	1C	*	A20-2637-03	PANEL	KM1M2 TW	
5	3C	*	A22-0754-02	SUB PANEL		
6	2B	*	A23-1503-12	REAR PANEL		
7	2C	*	A33-0410-04	REFLECTOR (METER)		
8	1A,1B	*	A20-2671-02	PANEL ASSY		
8	1A,1B	*	A20-2672-02	PANEL ASSY		
9	1D	*	B01-0663-02	PANEL ESCUTCHEON		
10	1D	*	B10-0700-03	FRONT GLASS		
11	1C	*	B11-0434-04	FILTER	KM1M2 TW	
12	1D	*	B11-0436-04	FILTER(ON AIR,BUSY,F.LOCK,ALT)		
13	1D	*	B11-0458-04	FILTER(MAIN)		
14	1D	*	B11-0459-04	FILTER(SUB)		
15	1D	*	B11-0464-04	FILTER (MUTE)		
16	2C	*	B30-0817-15	LAMP (14V 80MA)		
18	2C	*	B31-0660-05	METER		
19	2D	*	B38-0305-15	LCD ASSY		
20	2B	*	B40-3773-14	MODEL NAME PLATE(TS-790A)		
20	2B	*	B40-3774-14	MODEL NAME PLATE(TS-790E)		
21	1D	*	B42-3314-04	LABEL (CASE UP SIDE)		
23	1C	*	B43-1095-14	BADGE (TS-790A)		
23	1C	*	B43-1096-14	BADGE (TS-790E)		
-			B30-0866-08	LAMP (12V 100MA) LCD		
-			B42-2454-04	LABEL (SERIAL NO CARTON BOX)		
-		*	B42-3316-04	LABEL (SUB RX DISPLAY)		
-			B42-3343-04	LABEL (SERIAL NO)		
-			B46-0410-20	WARRANTY CARD		
-			B46-0419-00	WARRANTY CARD		
-		*	B50-8254-00	INSTRUCTION MANUAL		
-		*	B50-8262-00	INSTRUCTION MANUAL		
			C91-1075-05	CERAMIC 470PF K	K W	
			E07-0751-05	7P DIN PLUG		
			E07-0852-15	8P MEAL PLUG		
			E07-1351-05	13P PLUG		
			E30-2065-25	DC CORD ASSY		
25	2F		E04-0167-05	M TYPE RECEPTACLE(ANT)		
25	2F		E04-0170-05	N TYPE RECEPTACLE(ANT)		
26	1F		E23-0015-04	GND LUG		
27	2F	*	E23-0616-04	GND LUG (ANT)		
-		*	E31-3303-05	CONNECTING WIRE(430HET)		
-		*	E31-3407-05	CONNECTING WIRE(IF-CONT)		
-		*	E31-3408-05	CONNECTING WIRE(IF-CONT)	TW	
-		*	E31-3409-05	CONNECTING WIRE(CONT-PLL)		
-		*	E31-3410-15	CONNECTING WIRE(CONT-SW)		
-		*	E31-3411-05	CONNECTING WIRE(CONT-SW)		
-		*	E31-3412-05	CONNECTING WIRE(IF-SW)		
-		*	E31-3431-15	CONNECTING WIRE(FAN)		
-		*	E31-3433-05	CONNECTING WIRE(430HET2)		
-		*	E31-3453-05	CONNECTING WIRE(CTCSS)		

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PARTS LIST

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-		*	E31-3456-05	CONNECTING WIRE(GND LUG)		
-		*	E31-3487-05	CONNECTING WIRE(144HET)		
			F05-1531-05	FUSE (15A)		
30	2E	*	F05-2036-05	FUSE (20A)		
31	2E	*	F01-0956-11	HEAT SINK		
32	1F	*	F09-0420-05	FAN		
		*	F11-1079-12	SHIELDING COVER(FINAL)		
33	3F	*	F11-1080-02	SHIELDING COVER(RF)		
34	2B	*	F11-1081-03	SHIELDING COVER(PLL)		
35	1D	*	F15-0659-04	SHADE (FL)		
36	2B	*	F19-0655-03	BLIND PLATE (REAR PANEL)		
37	2F	*	F19-0709-05	HOLE BUSHING		
38	3D		F20-0559-14	INSULATING BOARD(VOLUME)		
39	3D		F20-0551-04	INSULATING BOARD(SUB PANEL)		
		*	G02-0584-04	FLAT SPRING (FINAL)		
			G11-0609-04	CUSHION		
			G13-0855-04	CUSHION (MIC)		
40	3F		G02-0574-04	FLAT SPRING (RF)		
41	2A	*	G02-0575-04	FLAT SPRING (CONT)		
42	1B		G10-0638-14	NON-WOVEN FABRIC(CASE UPSIDE)		
43	1A		G10-0656-04	FELT(SP)		
44	1A, 3E	*	G10-0676-04	NON-WOVEN FABRIC(CASE SIDE)		
45	1D	*	G10-0677-04	NON-WOVEN FABRIC(ESCUTCHEON)		
46	3A		G13-0631-04	CUSHION (CASE BOTTOM)		
47	1B		G13-0648-04	CUSHION (VCO COVER)		
48	3A		G13-0840-04	CUSHION (CASE BOTTOM)		
49	1E, 3F		G13-0847-04	CUSHION (FINAL, RF SHIELD)		
50	1C	*	G13-0859-04	CUSHION (14KEY)		
51	1D	*	G13-0860-04	CUSHION (MODE)		
52	1D	*	G13-0861-04	CUSHION (FUNCTION)		
53	1F	*	G13-0898-04	CUSHION (SP)		
54	1E, 1F	*	G13-0902-04	CUSHION (FINAL SHIELD)		
55	2E	*	G13-0909-04	CUSHION (HEAT SHINK)		
56	3B		G13-0887-04	CUSHION (IF)		
-		*	H01-8142-14	ITEM CARTON BOX(TS-790A)	KM1M2	
-		*	H01-8143-14	ITEM CARTON BOX(TS-790E)	TW	
-			H03-2697-04	OUTER PACKING CASE(TS-790A)	KM1M2	
-			H03-2698-04	OUTER PACKING CASE(TS-790E)	TW	
-		*	H10-2637-01	POLYSTYRENE FOAMED FIX(FRONT)		
-		*	H10-2638-01	POLYSTYRENE FOAMED FIX(REAR)		
-		*	H13-0820-04	PROTECTION BOARD		
-			H20-1414-03	PROTECTION COVER		
-			H25-0029-04	PROTECTION BAG (FUSE)		
-			H25-0079-04	PROTECTION BAG (MIC)		
-			H25-0112-04	PROTECTION BAG (DC CORD)		
58	3B		J02-0049-14	FOOT (REAR)		
59	3A		J02-0423-04	FOOT (FRONT OUTSIDE)		
60	3A		J02-0424-04	FOOT (FRONT INSIDE)		
61	1A, 3A		J02-0441-05	FOOT (SIDE)		
63	3C		J31-0141-04	COLLAR (MIC)		
64	2C		J32-0768-04	BOSS (POWER SW)		
65	3A		J32-0794-04	BOSS (VS-2)		
66	1A	*	J42-0454-05	HOLE BUSHING		

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67	2F		J50-0401-05	HINGE		
-			J13-0404-05	FUSE HOLDER		
-			J61-0307-05	WIRE BAND (RF)		
70	1B		K01-0407-05	HANDLE		
71	2C	*	K21-0784-02	KNØB	MAIN	
72	1C	*	K27-3002-04	KNØB (BUTTON)	OFFSET	
73	2C	*	K27-3003-04	KNØB (BUTTON)	CTCSS	KM1M2
73	2C	*	K27-3030-04	KNØB (BUTTON)	ALERT	TW
74	1C	*	K27-3004-04	KNØB (BUTTON)	CALL	
75	1C	*	K27-3005-04	KNØB (BUTTON)	TONE	
76	1C	*	K27-3006-04	KNØB (BUTTON)	SAT	
77	2C	*	K27-3007-04	KNØB (BUTTON)	STEP	
78	2C	*	K27-3008-04	KNØB (BUTTON)	REV	
79	2C	*	K27-3009-04	KNØB (BUTTON)	SPLIT	
80	2C	*	K27-3010-04	KNØB (BUTTON)	SCAN	
81	2C	*	K27-3011-04	KNØB (BUTTON)	M?V	
82	2C	*	K27-3012-04	KNØB (BUTTON)	M. IN	
83	2C	*	K27-3013-04	KNØB (BUTTON)	CLEAR	
84	2C	*	K27-3014-04	KNØB (BUTTON)	F	
85	2C	*	K27-3015-04	KNØB (BUTTON)	ENT	
86	2C	*	K27-3016-04	KNØB (BUTTON)	FM/AUTO	
87	2C	*	K27-3017-04	KNØB (BUTTON)	USB/LSB	
88	2C	*	K27-3018-04	KNØB (BUTTON)	CW/N	
89	2C	*	K27-3019-04	KNØB (BUTTON)	MAIN	
90	2C	*	K27-3020-04	KNØB (BUTTON)	A/B	
91	2C	*	K27-3021-04	KNØB (BUTTON)	A=B	
92	2C	*	K27-3022-04	KNØB (BUTTON)	MAIN??SUB	
93	2C	*	K27-3023-04	KNØB (BUTTON)	SUB	
94	2C	*	K27-3024-04	KNØB (BUTTON)	VFO/M	
95	2C	*	K27-3025-04	KNØB (BUTTON)	CH. Q. BAND, MHZ	
96	2C		K29-0757-04	KNØB	POWER	
97	2C		K29-3001-14	KNØB	VOICE, PROC, ALC	
98	2C		K29-3002-14	KNØB	ATT, F. LOCK, ALT	
99	3D	*	K29-3108-04	KNØB	MUTE, RIT, AGC, NB	
100	2C	*	K29-3109-14	KNØB	AF, RIT, MIC	
101	2C	*	K29-3110-04	KNØB	SQL, IF SHIFT, RF POW	
102	2F		N15-1040-46	FLAT WASHER (GND)		
103	1C		N19-0637-04	FLAT WASHER (MAIN KNØB)		
A	1E		N09-0626-04	SCREW	POWER MODULE	
B	1E, 1F		N09-0649-05	SCREW	POWER MODULE	
C	3C		N09-0699-05	SCREW	PANEL	
D	2F		N30-4014-41	PAN HEAD MACHINE SCREW (GND)		
E	2D		N32-2606-46	FLAT HEAD MACHINE SCR (SW PCB)		
F	2C		N32-3006-46	FLAT HEAD MACHINE SCREW (POWER)		
G	1A, 3G		N33-3006-41	OVAL HEAD MACHINE SCREW (CASE)		
I	2E		N35-3008-46	BINDING HEAD MACHINE SCR (FAN)		
J	2A, 3E		N87-2606-46	BRAZIER HEAD TAPTITE SCR (PCB)		
K	1F, 2B		N87-3006-46	BRAZIER HEAD TAPTITE SCR (SHIEL)		
L	2E, 2F		N87-3008-46	BRAZIER HEAD TAPTITE SCR (ANT)		
M	3A, 3B		N87-4010-46	BRAZIER HEAD TAPTITE SCR (FOOT)		
N	2F, 3F		N88-3006-46	FLAT HEAD TAPTITE SCREW (HINGE)		
O	2B		N88-3008-46	FLAT HEAD TAPTITE SCR (REAR PANE)		
P	2C, 3D		N35-3006-41	BINDING HEAD MACHINE SCREW (SUB)		

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104 -	2C		S40-2437-15 S50-1406-05	PUSH SWITCH (POWER) TACT SWITCH		
105 -	1F		T07-0252-15 T91-0352-15	LOUD SPEAKER(FULL RANGE) MICROPHONE		
IC1 TH001	2E		LC7582 5TP41L	IC(LCD DRIVER) THERMISTER		
106	2D	*	W02-0801-05	ENCODER		
107	2C,3D	*	X41-3050-00	SWITCH UNIT	M2TW KM1	
108	3E,3F	*	X44-3060-00	RF UNIT		
108	3E,3F	*	X44-3060-11	RF UNIT		
110	2F	*	X45-3160-00	144MHZ FINAL UNIT		
111	2E	*	X45-3170-00	430MHZ FINAL UNIT		
112	3B	*	X48-3050-11	IF UNIT	KM1M2 TW	
112	3B	*	X48-3050-61	IF UNIT		
113	2A,2B	*	X50-3080-00	PLL UNIT		
114	2A	*	X53-3120-11	CONTROL UNIT	K M1	
114	2A	*	X53-3120-21	CONTROL UNIT		
114	2A	*	X53-3120-22	CONTROL UNIT	M2 TW	
114	2A	*	X53-3120-61	CONTROL UNIT		
SWITCH UNIT (X41-3050-00)						
D16 -18			B30-0856-05	LED (GREEN SF. BUSY)		
D19			B30-0855-05	LED (RED ON AIR)		
D20			B30-0856-05	LED (GREEN SF. LOCK)		
D21			B30-0857-05	LED (YELLOW ALT)		
D22		*	B30-0862-05	LED (GREEN MAIN)		
D23		*	B30-0863-05	LED (YELLOW SUB)		
D24 ,25		*	B30-0864-05	LED (RED/GREEN MUTE)		
C1 -8			CK73FB1H471K	CHIP C 470PF K		
C9 ,10			CC73FCH1H150J	CHIP C 15PF J		
C11 -14			CK73FB1HXXXXK	CHIP C K		
C15 ,16			CK73FB1E103K	CHIP C 0.010UF K		
C17			CE04NW1C100M	ELECTRO 10UF 16WV		
C18			CK45F1H473Z	CERAMIC 0.047UF Z		
C19		*	CE04EW1H470M	ELECTRO 47UF 50WV		
C20			CK45F1H473Z	CERAMIC 0.047UF Z		
C21		*	CE04EW1E221M	ELECTRO 220UF 25WV		
C22 ,23			CK73FB1H102K	CHIP C 1000PF K		
C24 ,25			CK73FB1E103K	CHIP C 0.010UF K		
C26			CK45B1H222K	CERAMIC 2200PF K		
C27 -29			CK73FB1H102K	CHIP C 1000PF K		
CN1		*	E40-0817-05	PIN CONNECTOR (8P LCD ASSY)		
CN3		*	E40-5038-05	FPC CONNECTOR (14P SERIAL)		
CN4			E40-5131-05	FPC CONNECTOR (16P KEY. MIC)		
CN6 ,7			E40-3238-05	PIN CONNECTOR (EH3P MU. MD)		
CN8			E40-3243-05	PIN CONNECTOR (EH8P MIC. PWR)		
CN9		*	E40-3304-05	PIN CONNECTOR (EHS7P AF/SOL)		
CN10		*	E40-3253-05	PIN CONNECTOR (PH9P MIC)		
CN11			E40-3252-05	PIN CONNECTOR (PH8P PHONE)		
CN12		*	E40-5036-05	FPC CONNECTOR (12P SW)		
J1	2C	*	E11-0431-05	PHONE JACK (PHONES)		
J2	2C		E06-0858-15	8P METAL RECEPTACLE(MIC)		

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TS-790A/E

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W6 W7		* *	E31-3422-05 E31-3423-05	CONNECTING WIRE(2P SUB GND) CONNECTING WIRE(4P RIT. IFS)		
A2 ,3 A7		* *	G13-0862-04 G13-0903-04	CUSHION CUSHION		
A4 A5 ,6		* *	J19-1427-03 J39-0431-04	HOLDER SPACER		
L1 T1 X1		* *	L40-1011-13 L19-0366-05 L77-1333-05	SMALL FIXED INDUCTOR (100UH) BALUN TRANSFORMER (DC/DC) CRYSTAL RESONATOR(4.194304MHZ)		
CP1 R1 -7 R8 R9 -11 R12			R90-0598-05 RK73FB2AXXXJ RD14BB2C680J RK73FB2AXXXJ RD14BB2C680J	MULTI-COMP (10K-20K) CHIP R J 1/10W RD 68 J 1/6W CHIP R J 1/10W RD 68 J 1/6W		
R13 -34 R35 ,36 R37 R38 ,39 R40 -64		* *	RK73FB2AXXXJ RD14BB2C2R2J RD14BB2C223J RD14CB2E101J RK73FB2AXXXJ	CHIP R J 1/10W RD 2.2 J 1/6W RD 22K J 1/6W RD 100 J 1/4W CHIP R J 1/10W		
R65 R66 -69 VR1 ,2 VR3 VR4	3D 3D 3D	* * * *	RS14DB2H470J RK73FB2AXXXJ R19-9412-05 R24-9407-05 R19-3425-05	FL-PROOF RS 47 J 1/2W CHIP R J 1/10W POTENTIOMETER 50K,10K(AF/SOL) POTENTIOMETER 10K,50K(MIC/PWR) POTENTIOMETER (10K,B)		
VR5 VR6		* *	R12-1085-05 R12-1083-05	TRIMMING POT. (2.2K) RIT TRIMMING POT. (1K) IF SHIFT		
S1 S2 S3 ,4 S5 ,6 S7 -9			S40-2441-15 S40-2440-15 S40-2441-15 S40-2440-15 S50-1412-05	PUSH SWITCH (F.LOCK) PUSH SWITCH (144ATT) PUSH SWITCH (ALT.VOICE) PUSH SWITCH (PROC,ALC/RF) SENSITIVE SW(OFFSET,TONE,CAL)		
S10 -12 S13 -15 S16 -18 S19 -22 S23 -25			S50-1426-05 S50-1412-05 S50-1426-05 S50-1412-05 S50-1426-05	SENSITIVE SW(AUTO,MAIN,SUB) SENSITIVE SW(SAT,CTCSS/ALERT) SENSITIVE SW(LSB/USB,A/B,M??S) SENSITIVE SW(F,REV,SPLIT,SCAN) SENSITIVE SW(CW/N,VFO/M,A=B)		
S26 -28 S29 -31 S32 S33 -35 S36 ,37			S50-1412-05 S50-1426-05 S50-1412-05 S40-2441-15 S40-2440-15	SENSITIVE SW(M?V,M.IN,CLEAR) SENSITIVE SW(CH.Q,BAND,MHZ) SENSITIVE SW(ENT) PUSH SW(MAIN/SUB MUTE,RIT) PUSH SW(AGC,NB)		
A1 D1 D2 D4 D5		* * * * *	FIP14KM7 RD9.1M-B2 RD7.5M-B2 RD43EB 1SS81	DISPLAY TUBE CHIP ZENER DIODE CHIP ZENER DIODE CHIP ZENER DIODE CHIP DIODE		
D6 D7 D8 -15 IC1 Q1		* * * * *	RD30EB2 US1090 RLS73 75206G-531-1B 2SC366B(Y)	CHIP ZENER DIODE CHIP DIODE CHIP DIODE IC(MICROPROCESSOR) TRANSISTOR		
Q2 -7			DTA143EK	DIGITAL TRANSISTOR		

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RF UNIT (X44-3060-XX) -00 : TS-790A (M2), TS-790E -11 : TS-790 (K, M1)						
C1			CC73FRH1H120J	CHIP C 12PF J		
C2 -4			CC73FCH1HXXXJ	CHIP C J		
C5			CC73FRH1H070D	CHIP C 7.0PF D		
C6 ,7			CK73FB1H102K	CHIP C 1000PF K		
C8			CC73FCH1H270J	CHIP C 27PF J		
C9			CC73FCH1H100D	CHIP C 10PF D		
C10			CC73FCH1H270J	CHIP C 27PF J		
C11 -13			CK73FB1H102K	CHIP C 1000PF K		
C14			CC73FCH1H100D	CHIP C 10PF D		
C15			CK73FB1H102K	CHIP C 1000PF K		
C16			CK73EB1E473K	CHIP C 0.047UF K		
C17 -20			CK73FB1H102K	CHIP C 1000PF K		
C21			CK73FB1E103K	CHIP C 0.010UF K		
C22		*	CC73FTH1H120J	CHIP C 12PF J		
C23			CC73FRH1H030C	CHIP C 3.0PF C		
C24 ,25			CK73FB1H102K	CHIP C 1000PF K		
C26 ,27			CC73FCH1HXXXC	CHIP C C		
C28		*	CC73FTH1H120J	CHIP C 12PF J		
C29 -31			CC73FCH1HXXXC	CHIP C C		
C32		*	CC73FTH1H120J	CHIP C 12PF J		
C33			CC73FCH1H010C	CHIP C 1.0PF C		
C34			CK73FB1H102K	CHIP C 1000PF K		
C35			CC73FCH1H270J	CHIP C 27PF J		
C36			CC73FCH1H030C	CHIP C 3.0PF C		
C37 ,38			CK73FB1E103K	CHIP C 0.010UF K		
C39		*	CC73FTH1H100D	CHIP C 10PF D		
C40			CC73FCH1H330J	CHIP C 33PF J		
C41 -44			CK73FB1E103K	CHIP C 0.010UF K		
C45 ,46			CK73FB1H102K	CHIP C 1000PF K		
C47 -49			CK73FB1E103K	CHIP C 0.010UF K		
C50 ,51			CC73FRH1H101J	CHIP C 100PF J		
C52 -54			CK73FB1E103K	CHIP C 0.010UF K		
C55		*	CC73FTH1H180J	CHIP C 18PF J		
C56			CK73FB1H102K	CHIP C 1000PF K		
C57			CC73FRH1H220J	CHIP C 22PF J		
C60			CC73FCH1H060D	CHIP C 6.0PF D		
C61			CC73FCH1H1R5C	CHIP C 1.5PF C		
C62		*	CC73FTH1H120J	CHIP C 12PF J		
C63 ,64			CC73FCH1H0R5C	CHIP C 0.5PF C		
C65		*	CC73FTH1H120J	CHIP C 12PF J		
C66 -68			CC73FCH1HXXXC	CHIP C C		
C69		*	CC73FTH1H120J	CHIP C 12PF J		
C70			CC73FCH1H1R5C	CHIP C 1.5PF C		
C71			CC73FCH1H180J	CHIP C 18PF J		
C72 ,73			CK73FB1H102K	CHIP C 1000PF K		
C74 ,75			CC73FCH1H100D	CHIP C 10PF D		
C77			CK73FB1H102K	CHIP C 1000PF K		
C78			CE04EW1H010M	ELECTR0 1.0UF 50WV		
C79			CK73FB1H102K	CHIP C 1000PF K		
C80			CK73FB1E103K	CHIP C 0.010UF K		
C81 ,82			CK73FB1H102K	CHIP C 1000PF K		
C83			CC73FCH1H150J	CHIP C 15PF J		
C84			CK73FB1H102K	CHIP C 1000PF K		

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C85 C86 ,87 C88 ,89 C90 C91			CK45F1H473Z CK73FB1H102K C90-0817-05 CK73FB1H102K CE04EW1A470M	CERAMIC 0.047UF Z CHIP C 1000PF K ELECTR0 1000UF 16WV CHIP C 1000PF K ELECTR0 47UF 10WV		
C92 C93 C94 C95 -99 C100-102			CE04EW1C221M CK73FB1H102K CE04EW1A470M CK73FB1HXXXK CC73FCH1H020C	ELECTR0 220UF 16WV CHIP C 1000PF K ELECTR0 47UF 10WV CHIP C K CHIP C 2.0PF C		
C103-201 C202 C204 C205 C206			CK73FB1EXXXK CC73FCH1H470J CK73FB1H102K CK73EB1E473K CC73FCH1H101J	CHIP C K CHIP C 47PF J CHIP C 1000PF K CHIP C 0.047UF K CHIP C 100PF J		
C207,208 C209 C209 C210 C211			CK73FB1H102K CC73FCH1H020C CC73FCH1H1R5C CK73FB1H102K CC73FCH1H390J	CHIP C 1000PF K CHIP C 2.0PF C CHIP C 1.5PF C CHIP C 1000PF K CHIP C 39PF J	KM1 M2TW	
C212 C213 C214 C215 C215			CK73FB1H102K CC73FCH1H030C CK73FB1H102K CC73FCH1H010C CC73FCH1H020C	CHIP C 1000PF K CHIP C 3.0PF C CHIP C 1000PF K CHIP C 1.0PF C CHIP C 2.0PF C	KM1 M2TW	
C216,217 C218-220 C221 C222 C223			CC73FCH1HXXXJ CK73FB1H102K CC73FCH1H180J CC73FCH1H060D CK73FB1H102K	CHIP C J CHIP C 1000PF K CHIP C 18PF J CHIP C 6.0PF D CHIP C 1000PF K		
C224 C225 C226,227 C228 C229			CK73FB1E103K CK73FB1H102K CK73FB1E103K CK73FB1H102K CC73FCH1H220J	CHIP C 0.010UF K CHIP C 1000PF K CHIP C 0.010UF K CHIP C 1000PF K CHIP C 22PF J		
C230 C231 C232 C233 C234			CK73FB1E103K CC73FCH1H010C CK73FB1E103K CK73FB1H102K CC73FCH1H220J	CHIP C 0.010UF K CHIP C 1.0PF C CHIP C 0.010UF K CHIP C 1000PF K CHIP C 22PF J		
C235 C236,237 C238 C239 C241,242			CK73FB1H102K CC73FCH1H220J CK73FB1H102K CK73FB1E103K CK73FB1H102K	CHIP C 1000PF K CHIP C 22PF J CHIP C 1000PF K CHIP C 0.010UF K CHIP C 1000PF K		
C243 C244 C245 C246 C247			CC73FCH1H220J CK73FB1H102K CC73FCH1H0R5C CC73FCH1H100D CK73FB1H102K	CHIP C 22PF J CHIP C 1000PF K CHIP C 0.5PF C CHIP C 10PF D CHIP C 1000PF K		
C248 C249 C250 C251 C252			CC73FCH1H050C CK73FB1H102K CC73FCH1H020C CK73FB1H102K CC73FCH1H010C	CHIP C 5.0PF C CHIP C 1000PF K CHIP C 2.0PF C CHIP C 1000PF K CHIP C 1.0PF C		

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C253 C254-257 C258-261 C262 C263			CK73FB1H102K CC73FCH1HXXXJ CC73FCH1H050C CK73FB1H102K CC73FCH1H101J	CHIP C 1000PF K CHIP C J CHIP C 5.0PF C CHIP C 1000PF K CHIP C 100PF J		
C264 C265 C266 C267 C268			CK73FB1H102K CC73FCH1H120J CK73FB1H102K CK73FB1E103K CC73FCH1H120J	CHIP C 1000PF K CHIP C 12PF J CHIP C 1000PF K CHIP C 0.010UF K CHIP C 12PF J		
C269 C270 C271 C272 C273			CC73FCH1H101J CK73FB1H102K CK73FB1E103K CC73FCH1H010C CC73FCH1H470J	CHIP C 100PF J CHIP C 1000PF K CHIP C 0.010UF K CHIP C 1.0PF C CHIP C 47PF J		
C274 C275 C276-278 C279 C280			CK73FB1E103K CK73FB1H102K CC73FCH1H0R5C CC73FCH1H470J CK73FB1E103K	CHIP C 0.010UF K CHIP C 1000PF K CHIP C 0.5PF C CHIP C 47PF J CHIP C 0.010UF K		
C281 C282 C283 C284 C285, 286			CC73FCH1H101J CC73FCH1H100D CK73FB1E103K CK73FB1H102K CC73FCH1HXXXJ	CHIP C 100PF J CHIP C 10PF D CHIP C 0.010UF K CHIP C 1000PF K CHIP C J		
C287 C288 C289 C290 C291			CK73FB1H331K CK73FB1E103K CC73FCH1H100D CK73FB1E103K CC73FRH1H120J	CHIP C 330PF K CHIP C 0.010UF K CHIP C 10PF D CHIP C 0.010UF K CHIP C 12PF J		
C292, 293 C294 C295, 296 C297 C298-301			CK73FB1E103K CC73FCH1H470J CC73FCH1H100D CK73FB1H102K CK73FB1E103K	CHIP C 0.010UF K CHIP C 47PF J CHIP C 10PF D CHIP C 1000PF K CHIP C 0.010UF K		
C302 C303 C304 C305 C306-311			CC73FCH1H120J CC73FCH1H0R5C CC73FCH1H101J CK73FB1E103K CK73FB1HXXXK	CHIP C 12PF J CHIP C 0.5PF C CHIP C 100PF J CHIP C 0.010UF K CHIP C K		
C312 C313, 314 C315 C316, 317 C318			CC73FCH1H101J CK73FB1H331K CC73FCH1H101J CK73FB1H331K CC73FCH1H120J	CHIP C 100PF J CHIP C 330PF K CHIP C 100PF J CHIP C 330PF K CHIP C 12PF J		
C319 C320 C321 C322 C323			CK73FB1H331K CE04EW1H010M CK73FB1H102K CC73FCH1H330J CK73FB1H331K	CHIP C 330PF K ELECTR0 1.0UF 50WV CHIP C 1000PF K CHIP C 33PF J CHIP C 330PF K	M2TW	
C324 C325 C326-328 C329 C330			CC73FCH1H090D CC73FCH1H050C CK73FB1H102K CK73FB1E103K CK73FB1H102K	CHIP C 9.0PF D CHIP C 5.0PF C CHIP C 1000PF K CHIP C 0.010UF K CHIP C 1000PF K		

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TC1 TC201, 202 TC203 TC204			C05-0350-05 C05-0354-05 C05-0349-05 C05-0355-05	TRIMMING CAP 20P TRIMMING CAP 3P TRIMMING CAP 10P TRIMMING CAP 30P		
CN1 CN2 CN3 CN4 CN5		*	E04-0157-05 E04-0154-05 E04-0157-05 E40-3237-05 E40-5163-05	RF COAXIAL CABLE RECEPTACLE RF COAXIAL CABLE RECEPTACLE RF COAXIAL CABLE RECEPTACLE PIN CONNECTOR (EH2P) PIN CONNECTOR (TN-50L3P)		
CN6 CN7 CN8 CN9 CN10			E40-3241-05 E40-3239-05 E04-0157-05 E40-5069-05 E40-3237-05	PIN CONNECTOR (EH6P) PIN CONNECTOR (EH4P) RF COAXIAL CABLE RECEPTACLE PIN CONNECTOR (EH12P) PIN CONNECTOR (EH2P)		
CN11 CN201-203 CN204 CN205 CN206			E04-0157-05 E04-0157-05 E40-3237-05 E04-0157-05 E40-3237-05	RF COAXIAL CABLE RECEPTACLE RF COAXIAL CABLE RECEPTACLE PIN CONNECTOR (EH2P) RF COAXIAL CABLE RECEPTACLE PIN CONNECTOR (EH2P)		
CN207 CN208 CN209 CN210-213 TP201, 202			E40-5066-05 E40-3237-05 E04-0157-05 E04-0154-05 E23-0512-05	PIN CONNECTOR (EH9P) PIN CONNECTOR (EH2P) RF COAXIAL CABLE RECEPTACLE RF COAXIAL CABLE RECEPTACLE TERMINAL		
W1 W5 W206 W207 W208-210		*	E31-3157-05 E31-3448-05 E31-3449-05 E31-0381-05 E31-1960-05	CONNECTING WIRE CONNECTING WIRE CONNECTING WIRE CONNECTING WIRE CONNECTING WIRE		
W211			E31-0302-05	CONNECTING WIRE	M2TW	
A1 A2 A3 , 4			F02-0414-05 F10-1258-04 F11-0836-05	HEAT SINK(CAP/ADDITION TYPE) SHIELDING PLATE SHIELDING COVER		
L1 L2 , 3 L4 L5 , 6 L7		*	L40-6891-14 L31-0267-05 L40-6891-14 L34-1153-05 L40-6891-14	SMALL FIXED INDUCTOR(6.8UH) COIL(ANT) SMALL FIXED INDUCTOR(6.8UH) COIL SMALL FIXED INDUCTOR(6.8UH)		
L8 L9 -11 L12 L13 , 14 L15		*	L40-4701-17 L31-0267-05 L34-0956-05 L30-0281-15 L31-0313-05	SMALL FIXED INDUCTOR(47UH) COIL(ANT) COIL IFT COIL		
L16 L17 L18 L19 L20 -22			L40-2201-17 L40-3391-17 L40-2201-17 L34-0886-05 L31-0180-05	SMALL FIXED INDUCTOR(22UH) SMALL FIXED INDUCTOR(3.3UH) SMALL FIXED INDUCTOR(22UH) TUNING COIL TUNING COIL		
L23 L24 L25 L26 L27			L34-0452-05 L34-1164-05 L34-0452-05 L40-1092-17 L34-1157-05	COIL COIL COIL SMALL FIXED INDUCTOR(1UH) COIL		

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L28 ,29 L30 L31 ,32 L31 ,32 L201			L15-0016-05 L40-2201-17 L40-2211-48 L40-2211-81 L40-2201-17	LOW-FREQUENCY CHOKE COIL SMALL FIXED INDUCTOR(22UH) SMALL FIXED INDUCTOR(220UH) SMALL FIXED INDUCTOR(220UH) SMALL FIXED INDUCTOR(22UH)		
L202 L203 L204,205 L204,205 L206		*	L34-1051-05 L34-1052-05 L79-0836-05 L79-0837-05 L34-0895-05	COIL COIL HELICAL BLOCK (5HW) HELICAL BLOCK (5HW) COIL	KM1 M2TW	
L207 L208,209 L210 L211,212 L214,215		*	L34-1051-05 L34-4097-05 L34-2271-05 L30-0281-15 L34-2271-05	COIL COIL (76MHZ) TUNING COIL IFT TUNING COIL		
L216 L217 L218-220 L221 L222		*	L40-2201-17 L79-0828-05 L34-0683-05 L40-4701-17 L40-2201-17	SMALL FIXED INDUCTOR(22UH) HELICAL BLOCK (7HW) TUNING COIL SMALL FIXED INDUCTOR(47UH) SMALL FIXED INDUCTOR(22UH)		
L223,224 L225 L226,227 L228,229 L230-232			L34-1040-05 L40-2201-17 L34-1040-05 L34-0781-05 L34-0683-05	COIL SMALL FIXED INDUCTOR(22UH) COIL TUNING COIL TUNING COIL		
L233 L234 L235 L236 L237-239		*	L40-4701-17 L34-0749-05 L31-0313-05 L34-4094-05 L34-4089-05	SMALL FIXED INDUCTOR(47UH) TUNING COIL COIL COIL (76MHZ) COIL (76MHZ)		
L240,241 L242 L242 L243 L244,245		*	L39-0441-05 L79-0836-05 L79-0837-05 L79-0835-05 L34-1040-05	COIL HELICAL BLOCK (5HW) HELICAL BLOCK (5HW) HELICAL BLOCK (5HT) COIL	KM1 M2TW	
L247 L248 L249,250 L249,250 X201		*	L34-1079-05 L33-0025-05 L40-2211-48 L40-2211-81 L71-0286-05	COIL CHOKE COIL SMALL FIXED INDUCTOR(220UH) SMALL FIXED INDUCTOR(220UH) CRYSTAL FILTER (MCF 75.925MHZ)	KM1	
X202		*	L77-1377-05	CRYSTAL RESONATOR (19.2MHZ)		
R1 -11 R12 R13 -44 R45 R46 -54			RK73FB2AXXXJ R92-0670-05 RK73FB2AXXXJ R92-0670-05 RK73FB2AXXXJ	CHIP R J 1/10W CHIP R 0 OHM J 1/10W CHIP R J 1/10W CHIP R 0 OHM J 1/10W CHIP R J 1/10W		
R55 R56 -215 R216 R217-332 R333		*	RS14KB3D4R7J RK73FB2AXXXJ R92-0670-05 RK73FB2AXXXJ RD14BB2C470J	FL-PROOF RS 4.7 J 2W CHIP R J 1/10W CHIP R 0 OHM J 1/10W CHIP R J 1/10W RD 47 J 1/6W	KM1	
VR1		*	R12-0104-05	TRIMMING POT. 220		
D1 ,2			DAN235(K)	CHIP DIODE		

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D3 -6 D7 -10 D11 -14 D15 -18 D19		*	1SV205 DAN235(K)	CHIP VARI-CAP DIODE CHIP DIODE		
		*	1SV205 RLS73 RLS135	CHIP VARI-CAP DIODE CHIP DIODE CHIP DIODE		
D201-206 D207 D208-210 D211 D212,213			DAN235(K) RD5.1M-B2 DAN235(K) RD5.1M-B2 DAN235(K)	CHIP DIODE CHIP ZENER DIODE CHIP DIODE CHIP ZENER DIODE CHIP DIODE		
D214 D215-220 D221 D222 IC1			ND487C1-3R RLS73 DAN235(K) RLS135 UPC7808H	DIODE CHIP DIODE CHIP DIODE CHIP DIODE IC(VOLTAGE REGULATOR/ +8V)		
IC2 IC201,202 Q1 Q2 Q3		*	UPC7805H UPC1651G 3SK184(R) 2SC2714(Y) 3SK179(L)	IC(VOLTAGE REGULATOR/ +5V) IC(OP AMP) CHIP FET CHIP TRANSISTOR CHIP FET		
Q4 ,5 Q6 Q7 Q8 Q9 ,10			DTC124EK 2SC2712(Y) DTA143EK DTC124EK 2SK211(GR)	DIGITAL TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR CHIP FET		
Q11 Q12 Q201 Q202 Q203			2SC3357 2SC2538-22-A 3SK184(R) 2SK125 3SK184(R)	CHIP TRANSISTOR TRANSISTOR CHIP FET FET CHIP FET		
Q204 Q205-207 Q208 Q209 Q210		*	2SK508(K53) DTC124EK 2SC2714(Y) 2SC3098 2SC2714(Y)	CHIP FET DIGITAL TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR		
Q211 Q212,213 Q214 Q215 Q216,217			3SK184(R) 2SC2714(Y) 3SK179(L) DTC124EK 2SC2714(Y)	CHIP FET CHIP TRANSISTOR CHIP FET DIGITAL TRANSISTOR CHIP TRANSISTOR		
Q218,219 Q220 Q221 Q222,223 Q224			2SK211(GR) 2SC3098 2SC3356 2SC3357 2SC2762	CHIP FET CHIP TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR TRANSISTOR		
Q225 Q226 Q227 Q228 Q229			DTA143EK DTC124EK 2SA1213(Y) DTC124EK DTA143EK	DIGITAL TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR		
Q230			2SA1213(Y)	CHIP TRANSISTOR		
Z1 Z201		*	X59-3490-00	MODULE UNIT (BAND SW)		
		*	X59-3490-00	MODULE UNIT (BAND SW)		

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144MHz FINAL UNIT (X45-3160-00)						
C1			C90-2039-05	ELECTR0	15UF	16WV
C2			CK73FB1H102K	CHIP C	1000PF	K
C3			CE04EW1C101M	ELECTR0	100UF	16WV
C4			CK73FB1H102K	CHIP C	1000PF	K
C5			CE04EW1C220M	ELECTR0	22UF	16WV
C6 ,7			CK73FB1H102K	CHIP C	1000PF	K
C8			CS15E1VR47M	TANTAL	0.47UF	35WV
C9 -11			CK73FB1H102K	CHIP C	1000PF	K
C12			CK45F1H473Z	CERAMIC	0.047UF	Z
C13			CE04EW1C221M	ELECTR0	220UF	16WV
C14 ,15			CK73FB1H102K	CHIP C	1000PF	K
C16			CC45SL2H080D	CERAMIC	8.0PF	D
C17			CK73FB1H102K	CHIP C	1000PF	K
C18			CC45SL2H220J	CERAMIC	22PF	J
C19			CK45B2H102K	CERAMIC	1000PF	K
C20			CC45SL2H220J	CERAMIC	22PF	J
C21			CC73FCH1H180J	CHIP C	18PF	J
C22 ,23			CC45SL2HXXXJ	CERAMIC		J
C24			CC45SL2H100D	CERAMIC	10PF	D
C25			CC45SL2H150J	CERAMIC	15PF	J
C26 -35			CK73FB1HXXXX	CHIP C		K
C36			CE04EW1C331M	ELECTR0	330UF	16WV
C37			CK73FB1H103K	CHIP C	0.010UF	K
C38			CK73FB1E223K	CHIP C	0.022UF	K
C39			CE04EW1C100M	ELECTR0	10UF	16WV
C40 -50			CK73FB1HXXXX	CHIP C		K
C51			CE04CW1C100M	ELECTR0	10UF	16WV
C52			CK73FB1H102K	CHIP C	1000PF	K
C53			CE04EW1C100M	ELECTR0	10UF	16WV
C54 -59			CK73FB1HXXXX	CHIP C		K
C60 -62			CC73FCH1HXXXJ	CHIP C		J
C63 ,64			CK73FB1H102K	CHIP C	1000PF	K
TC1 -4		*	C05-0365-05	TRIMMING CAP	50PF	
A1 -6			E23-0606-04	TERMINAL		
A8			E29-0440-14	TERMINAL (GND)		
CN1			E40-5066-05	PIN CONNECTOR(EH9P)		
CN2		*	E40-0502-05	PIN CONNECTOR(5P)		
CN3 -7			E40-3237-05	PIN CONNECTOR(EH2P)		
TP1			E23-0512-05	TERMINAL		
W1			E31-1959-05	CONNECTING WIRE		
W3 ,4			E31-1959-05	CONNECTING WIRE		
W6			E31-1959-05	CONNECTING WIRE		
W22		*	E31-3396-05	CONNECTING WIRE(14RA)		
W23			E31-2061-05	CONNECTING WIRE(14D)		
A7			F02-0414-05	HEAT SINK(CAP/ADDITION TYPE)		
L1			L34-1019-05	COIL	(2.5T)	
L2			L34-0908-05	COIL	(9.5T)	
L3			L34-0894-05	COIL	(5T)	
L4			L34-0452-05	COIL	(6T)	
L5			L34-0908-05	COIL	(9.5T)	
L6			L34-0742-05	COIL	(5T)	

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L7 L8 L9 L10 L11		*	L34-0823-05 L40-3391-19 L40-1092-19 L34-0894-05 L34-0895-05	VHF COIL (3T) SMALL FIXED INDUCTOR (3.3MH) SMALL FIXED INDUCTOR (1MH) COIL (5T) COIL (6T)		
L12			L34-1079-05	COIL (1.5T)		
R1 R2 -4 R5 R6 -16 R17		*	RD14BB2E151J RK73FB2AXXXJ RS14DB2H151J RK73FB2AXXXJ RS14DB2H100J	RD 150 J 1/4W CHIP R J 1/10W FL-PROOF RS 150 J 1/2W CHIP R J 1/10W FL-PROOF RS 10 J 1/2W		
R18 -31 R32 R33 R34 R35		*	RK73FB2AXXXJ RD14CB2E271J RS14KB2H271J RK73FB2A102J R92-0670-05	CHIP R J 1/10W RD 270 J 1/4W FL-PROOF RS 270 J 1/2W CHIP R 1.0K J 1/10W CHIP R 0 OHM		
R36 VR1 ,2 VR3 VR4 W2		*	RK73FB2A272J R12-3132-05 R12-0091-05 R12-1083-05 R92-0150-05	CHIP R 2.7K J 1/10W TRIMMING POT. 47K TRIMMING POT. 100 TRIMMING POT. 1K JUMPER REST 0 OHM		
W5			R92-0150-05	JUMPER REST 0 OHM		
D1 D2 D3 D4 ,5 D6 ,7			RLS73 UM9401 MI308 HSM88AS RLS73	CHIP DIODE DIODE DIODE CHIP DIODE CHIP DIODE		
D8 D9 D10 -14 IC1 Q1		*	RLZJ5.6B RLZJ7.5 RLS73 BA718 2SC1947	CHIP ZENER DIODE(5.6V) CHIP ZENER DIODE(7.5V) CHIP DIODE IC(OP AMP X2) TRANSISTOR		
Q2 Q3 ,4 Q5 Q6 Q7			2SA1213(Y) 2SA1307(Y) 2SA1162(Y) 2SC2712(Y) 2SC1815(Y)	CHIP TRANSISTOR TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR TRANSISTOR		
Q8 Q9 -11 Q101 TH1		*	2SA1162(Y) 2SC2712(Y) M67727 5TP41L	CHIP TRANSISTOR CHIP TRANSISTOR IC(POWER MODULE/144-148MHZ) THERMISTER		
430MHz FUNAL UNIT (X45-3170-00)						
C1 C2 C3 C4 C5			C90-2039-05 CK73FB1H102K CE04EW1C101M CK73FB1H102K CE04EW1C220M	ELECTRO 15UF 16WV CHIP C 1000PF K ELECTRO 100UF 16WV CHIP C 1000PF K ELECTRO 22UF 16WV		
C6 C7 C8 C9 -14 C15			CK73FB1H102K CK45F1H473Z CE04EW1C221M CK73FB1H102K CM73F2H100D	CHIP C 1000PF K CERAMIC 0.047UF Z ELECTRO 220UF 16WV CHIP C 1000PF K CHIP C 10PF D		
C16			CC45SL2H020C	CERAMIC 2.0PF C		

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C17			CK73FB1H102K	CHIP C 1000PF K		
C18			CC73FCH1H050C	CHIP C 5.0PF C		
C19			CC45SL2H030C	CERAMIC 3.0PF C		
C20			CM73F2H080D	CHIP C 8.0PF D		
C21			CC45SL2H120J	CERAMIC 12PF J		
C22			CM73F2H120J	CHIP C 12PF J		
C23			CC45SL2H040C	CERAMIC 4.0PF C		
C24			CM73F2H160J	CHIP C 16PF J		
C25			CC45SL2H070D	CERAMIC 7.0PF D		
C26			CM73F2H070D	CHIP C 7.0PF D		
C27 ,28			CK73FB1H102K	CHIP C 1000PF K		
C29			CC73FCH1H0R5C	CHIP C 0.5PF C		
C30 -37			CK73FB1HXXXK	CHIP C K		
C38			CE04EW1C101M	ELECTR0 100UF 16WV		
C39			CK73FB1H102K	CHIP C 1000PF K		
C40			C90-2039-05	ELECTR0 15UF 16WV		
C41			CK73FB1H102K	CHIP C 1000PF K		
C42			CE04EW1C220M	ELECTR0 22UF 16WV		
C43			CK73FB1H102K	CHIP C 1000PF K		
C44			CC45SL2H060D	CERAMIC 6.0PF D		
C45 ,46			CC45SL2H080D	CERAMIC 8.0PF D		
C47			CC45SL2H040C	CERAMIC 4.0PF C		
C48			CK73FB1H102K	CHIP C 1000PF K		
C49			CM73F2H100D	CHIP C 10PF D		
C50 -59			CK73FB1HXXXK	CHIP C K		
C60			CC73FSL1H471J	CHIP C 470PF J		
C61 ,62			CK45B1H471J	CERAMIC 470PF J		
C63 ,64			CC45SL1H101J	CERAMIC 100PF J		
A1			E23-0606-04	TERMINAL		
A2			E29-0440-14	TERMINAL (GND)		
CN1		*	E40-0902-05	PIN CONNECTOR (9P)		
CN2			E40-3238-05	PIN CONNECTOR (EH3P)		
CN3			E40-3750-05	PIN CONNECTOR (EH14P)		
TP1			E23-0512-05	TERMINAL		
W1		*	E31-2032-05	CONNECTING WIRE(43D)		
W2		*	E31-3397-05	CONNECTING WIRE(43RA)		
L1			L34-1040-05	COIL (1T)		
L2			L34-0908-05	COIL (9.5T)		
L3			L34-1019-05	COIL (2.5T)		
L4			L34-1113-05	COIL (1.5T)		
L5			L34-1040-05	COIL (1T)		
L6			L34-1032-05	COIL (3.5T)		
L7			L40-1092-17	SMALL FIXED INDUCTOR (1UH)		
L8 -10			L34-1019-05	COIL (2.5T)		
L11			L40-2282-13	SMALL FIXED INDUCTOR (0.22UH)		
R1			RS14DB2H151J	FL-PROOF RS 150 J 1/2W		
R2 -6			RK73FB2AXXXJ	CHIP R J 1/10W		
R7			R92-0670-05	CHIP R 0 OHM		
R8 -16			RK73FB2AXXXJ	CHIP R J 1/10W		
R17			RS14KB2H271J	FL-PROOF RS 270 J 1/2W		
VR1 ,2		*	R12-3132-05	TRIMMING POT. 47K		
VR3		*	R12-0091-05	TRIMMING POT. 100		
D1			DSA3A1	DIODE		

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D2 D3 D4 ,5 D6 ,7 D8			UM9401 MI308 HSM88AS RLS73 RLZJ7.5	DIODE DIODE CHIP DIODE CHIP DIODE CHIP ZENER DIODE		
IC1 Q1 Q102 Q103		*	BA718 2SC2712(Y) M57716 M67728	IC(OP AMP X2) CHIP TRANSISTOR IC(POWER MODULE) IC(POWER MODULE/430-450MHZ)		
IF UNIT (X48-3050-XX) -11 : TS-790A -61 : TS-790E						
C1 -12 C13 -33 C34 C35 C36			CK73FB1H102K CK73FB1EXXXK CC73FCH1H040C CC73FCH1H470J CE04EW1H010M	CHIP C 1000PF K CHIP C K CHIP C 4.0PF C CHIP C 47PF J ELECTRO 1.0UF 50WV		
C37 ,38 C39 C40 C41 C42 -44			CK73FB1E103K CK73FB1H102K CK73FB1E103K CC73FSL1H101J CK73FB1E103K	CHIP C 0.010UF K CHIP C 1000PF K CHIP C 0.010UF K CHIP C 100PF J CHIP C 0.010UF K		
C45 C46 -51 C52 C53 ,54 C55			CK73FB1H102K CK73FB1E103K CK73FB1H102K CK73FB1E103K CC73FCH1H020C	CHIP C 1000PF K CHIP C 0.010UF K CHIP C 1000PF K CHIP C 0.010UF K CHIP C 2.0PF C		
C56 -61 C62 C63 -68 C69 C70			CK73FB1E103K CC73FCH1H050C CK73FB1E103K CC73FCH1H100D CC73FCH1H220J	CHIP C 0.010UF K CHIP C 5.0PF C CHIP C 0.010UF K CHIP C 10PF D CHIP C 22PF J		
C71 -73 C74 C75 C76 -79 C80			CK73FB1E103K CC73FSL1H221J CE04EW1C220M CK73FB1E103K CC73FSL1H471J	CHIP C 0.010UF K CHIP C 220PF J ELECTRO 22UF 16WV CHIP C 0.010UF K CHIP C 470PF J		
C81 -83 C84 C85 C86 C87			CK73FB1HXXXK CK73FB1E103K CE04CW1H010M CE04CW1V2R2M CK73FB1E223K	CHIP C K CHIP C 0.010UF K ELECTRO 1.0UF 50WV ELECTRO 2.2UF 35WV CHIP C 0.022UF K		
C88 C89 ,90 C91 -94 C95 C96			CC73FCH1H330J CK73FB1H821K CC73FSL1HXXXJ C90-2046-05 CK73FB1E103K	CHIP C 33PF J CHIP C 820PF K CHIP C J ELECTRO 22UF 10WV CHIP C 0.010UF K		
C97 C98 ,99 C100 C101 C102			CC73FCH1H060D CK73FF1E104Z CC73FCH1H120J CK73FB1H222K CK73FB1E103K	CHIP C 6.0PF D CHIP C 0.10UF Z CHIP C 12PF J CHIP C 2200PF K CHIP C 0.010UF K		
C103 C104 C105,106 C107,108 C109			CK73FB1H102K CK73FB1H682K CE04EW1C100M CE04EW1H010M CK73FB1E103K	CHIP C 1000PF K CHIP C 6800PF K ELECTRO 10UF 16WV ELECTRO 1.0UF 50WV CHIP C 0.010UF K		

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C110			CE04EW1C100M	ELECTR0 10UF 16WV		
C111-113			CK73EB1E104K	CHIP C 0.10UF K		
C114			CC73FSL1H101J	CHIP C 100PF J		
C115			CE04EW1C100M	ELECTR0 10UF 16WV		
C116			CE04EW1H010M	ELECTR0 1.0UF 50WV		
C117			CE04EW1C100M	ELECTR0 10UF 16WV		
C118-120			CK73EB1EXXXK	CHIP C K		
C121			CC73FSL1H101J	CHIP C 100PF J		
C122			CE04EW1C100M	ELECTR0 10UF 16WV		
C123			CE04EW1H010M	ELECTR0 1.0UF 50WV		
C124-126			CK73FB1H102K	CHIP C 1000PF K		
C127			CK73FB1E223K	CHIP C 0.022UF K		
C128			CE04EW1A102M	ELECTR0 1000UF 10WV		
C129			CE04EW1H010M	ELECTR0 1.0UF 50WV		
C130			CE04EW1E220M	ELECTR0 22UF 25WV		
C131			CE04EW1H010M	ELECTR0 1.0UF 50WV		
C132,133			CK73FB1H102K	CHIP C 1000PF K		
C134			CK73FB1E103K	CHIP C 0.010UF K		
C135			C90-2046-05	ELECTR0 22UF 10WV		
C136			CK73FB1E103K	CHIP C 0.010UF K		
C137			CE04EW1H010M	ELECTR0 1.0UF 50WV		
C138			CE04EW1H4R7M	ELECTR0 4.7UF 50WV		
C139,140			CK73FB1E103K	CHIP C 0.010UF K		
C141			CK73FB1H102K	CHIP C 1000PF K		
C142			CK73FB1E103K	CHIP C 0.010UF K		
C143			CE04EW1C100M	ELECTR0 10UF 16WV		
C144,145			CK73FB1H682K	CHIP C 6800PF K		
C146			CE04EW1C100M	ELECTR0 10UF 16WV		
C147			CE04EWOJ471M	ELECTR0 470UF 6.3WV		
C148			CK73FB1E103K	CHIP C 0.010UF K		
C149			CE04EW1C221M	ELECTR0 220UF 16WV		
C150			CK73FF1E104Z	CHIP C 0.10UF Z		
C151			CK73FB1E103K	CHIP C 0.010UF K		
C152			CE04EW1C221M	ELECTR0 220UF 16WV		
C153			CE04EWOJ471M	ELECTR0 470UF 6.3WV		
C154			CK73FB1E103K	CHIP C 0.010UF K		
C155			CE04EW1C221M	ELECTR0 220UF 16WV		
C156			CK73FF1E104Z	CHIP C 0.10UF Z		
C157			CK73FB1E103K	CHIP C 0.010UF K		
C158			CE04EW1C221M	ELECTR0 220UF 16WV		
C159			CE04EW1H010M	ELECTR0 1.0UF 50WV		
C160,161			CE04EW1C100M	ELECTR0 10UF 16WV		
C162			CE04EW1H010M	ELECTR0 1.0UF 50WV		
C163,164			CK73FB1E103K	CHIP C 0.010UF K		
C165			CS15E1A220M	TANTAL 22UF 10WV		
C166-171			CK73FF1E104Z	CHIP C 0.10UF Z		
C172,173			CE04EW1C100M	ELECTR0 10UF 16WV		
C174-180			CK73FB1E103K	CHIP C 0.010UF K		
C181			CC73FSL1H471J	CHIP C 470PF J		
C182-184			CK73FB1E103K	CHIP C 0.010UF K		
C185			CE04EW1H010M	ELECTR0 1.0UF 50WV		
C186			CK73FB1E103K	CHIP C 0.010UF K		
C187			CE04EW1C100M	ELECTR0 10UF 16WV		
C188			CK73EB1E104K	CHIP C 0.10UF K		
C189			CK73FB1E223K	CHIP C 0.022UF K		

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C190-205 C206, 207 C208 C209 C210, 211			CK73FB1H102K CK73FB1E103K CK73FB1H102K CK73FB1E223K CK73FB1H102K	CHIP C 1000PF K CHIP C 0.010UF K CHIP C 1000PF K CHIP C 0.022UF K CHIP C 1000PF K		
C212 C213 C214, 215 C216 C217			CK73FB1E103K CC73FCH1H270J CE04EW1H010M CE04EW1HR47M CE04EW1H010M	CHIP C 0.010UF K CHIP C 27PF J ELECTR0 1.0UF 50WV ELECTR0 0.47UF 50WV ELECTR0 1.0UF 50WV		
C218, 219 C220 C221-223 C224-232 C233			CK73EB1E104K CE04EW1H010M CK73EB1EXXXK CC73FSL1H471J CK73FB1E103K	CHIP C 0.10UF K ELECTR0 1.0UF 50WV CHIP C K CHIP C 470PF J CHIP C 0.010UF K		
C251-290 C291-293 C294 C295 C296			CK73FB1HXXXK CC73FSL1H471J CK73FB1H102K CK73FB1E103K CC73FCH1H020C	CHIP C K CHIP C 470PF J CHIP C 1000PF K CHIP C 0.010UF K CHIP C 2.0PF C		
C297-300 C301 C302, 303 C304 C305-308			CK73FB1E103K CC73FCH1H120J CK73FB1E103K CC73FCH1H020C CK73FB1E103K	CHIP C 0.010UF K CHIP C 12PF J CHIP C 0.010UF K CHIP C 2.0PF C CHIP C 0.010UF K		
C309 C310 C311, 312 C313 C314			CC73FCH1H060D CC73FCH1H470J CK73FB1E103K CE04EW1H010M CK73FB1H102K	CHIP C 6.0PF D CHIP C 47PF J CHIP C 0.010UF K ELECTR0 1.0UF 50WV CHIP C 1000PF K		
C315-320 C321 C322-325 C326 C327-335			CK73FB1E103K CC73FCH1H220J CK73FB1E103K CC73FCH1H100D CK73FB1E103K	CHIP C 0.010UF K CHIP C 22PF J CHIP C 0.010UF K CHIP C 10PF D CHIP C 0.010UF K		
C337-344 C345 C346-350 C351 C352-354			CK73FB1E103K CC73FCH1H030C CK73FB1E103K CC73FCH1H050C CK73FB1E103K	CHIP C 0.010UF K CHIP C 3.0PF C CHIP C 0.010UF K CHIP C 5.0PF C CHIP C 0.010UF K		
C355 C356-363 C364 C365 C367			CC73FCH1H100D CK73FB1E103K CC73FSL1H221J CE04EW1C220M CE04EW1C100M	CHIP C 10PF D CHIP C 0.010UF K CHIP C 220PF J ELECTR0 22UF 16WV ELECTR0 10UF 16WV		
C368 C369 C370 C371 C372-374			CK73FB1E103K CC73FSL1H101J CC73FCH1H220J CC73FSL1H471J CK73FB1HXXXK	CHIP C 0.010UF K CHIP C 100PF J CHIP C 22PF J CHIP C 470PF J CHIP C K		
C375 C376 C377 C378 C379			CK73FB1E103K CE04EW1C100M CK73EB1E104K CE04EW1C470M CK73FB1E103K	CHIP C 0.010UF K ELECTR0 10UF 16WV CHIP C 0.10UF K ELECTR0 47UF 16WV CHIP C 0.010UF K		

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C380 C381 C382 C383 C384		*	CK73FB1H682K CE04EW1H470M CE04EW1H220M CK73FB1H682K CK73FB1E103K	CHIP C 6800PF K ELECTR0 47UF 50WV ELECTR0 22UF 50WV CHIP C 6800PF K CHIP C 0.010UF K		
C385 C386 C387-391 C392 C393,394			CE04EW1H220M CE04EW1C331M CK73FB1E103K C90-2046-05 CK73FB1E103K	ELECTR0 22UF 50WV ELECTR0 330UF 16WV CHIP C 0.010UF K ELECTR0 22UF 10WV CHIP C 0.010UF K		
C395 C396 C397 C398 C399			CK73FF1E104Z CC73FCH1H060D CC73FCH1H120J CK73FF1E104Z CK73FB1H222K	CHIP C 0.10UF Z CHIP C 6.0PF D CHIP C 12PF J CHIP C 0.10UF Z CHIP C 2200PF K		
C400 C401,402 C403 C404 C405			CC73FSL1H121J CK73FB1H821K CC73FCH1H330J CK73FB1H102K CK73FB1E223K	CHIP C 120PF J CHIP C 820PF K CHIP C 33PF J CHIP C 1000PF K CHIP C 0.022UF K		
C406 C407 C408 C409,410 C411,412			CE04CW1H010M CE04CW1V2R2M CK73FB1E103K CK73FB1HXXXK CE04EW1H010M	ELECTR0 1.0UF 50WV ELECTR0 2.2UF 35WV CHIP C 0.010UF K CHIP C K ELECTR0 1.0UF 50WV		
C413 C414 C415 C416 C417,418			CE04CW1A100M CE04EW1C100M CK73FB1E103K C90-2046-05 CC73FSL1H101J	ELECTR0 10UF 10WV ELECTR0 10UF 16WV CHIP C 0.010UF K ELECTR0 22UF 10WV CHIP C 100PF J		
C419 C420 C421 C422 C423,424			CE04EW1H010M CK73FB1H222K CE04EW1H4R7M CE04EW1C470M CE04EW1H010M	ELECTR0 1.0UF 50WV CHIP C 2200PF K ELECTR0 4.7UF 50WV ELECTR0 47UF 16WV ELECTR0 1.0UF 50WV		
C425 C426 C427 C428 C429			CE04EW1C100M CE04EW1C470M CE04EW1H4R7M CK73FB1H102K CE04EW1H010M	ELECTR0 10UF 16WV ELECTR0 47UF 16WV ELECTR0 4.7UF 50WV CHIP C 1000PF K ELECTR0 1.0UF 50WV		
C430 C431 C432 C433 C434,435			CE04EW1C100M CK73FB1E103K CC73FSL1H471J CK73FB1H102K CE04EW1C100M	ELECTR0 10UF 16WV CHIP C 0.010UF K CHIP C 470PF J CHIP C 1000PF K ELECTR0 10UF 16WV	TW	
C436 C437 C438 C439 C440			CE04EW1H010M CK73FB1E103K CE04EW1H010M CC73FSL1H101J CE04EW1H010M	ELECTR0 1.0UF 50WV CHIP C 0.010UF K ELECTR0 1.0UF 50WV CHIP C 100PF J ELECTR0 1.0UF 50WV		
C441,442 C443 C444-448 C449 C450-453			CE04EW1C470M CE04EW1H010M CK73FB1EXXXK CK73FB1H102K CK73FB1E103K	ELECTR0 47UF 16WV ELECTR0 1.0UF 50WV CHIP C K CHIP C 1000PF K CHIP C 0.010UF K		

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C454			CE04EW1C100M	ELECTRØ 10UF 16WV		
C455			CC73FCH1H220J	CHIP C 22PF J		
C456, 457			CK73FB1E103K	CHIP C 0.010UF K		
C458			CC73FCH1H030C	CHIP C 3.0PF C		
C459			CK73FB1H102K	CHIP C 1000PF K		
C460			CC73FCH1H020C	CHIP C 2.0PF C		
C461			CC73FUJ1H100D	CHIP C 10PF D		
C462, 463			CC73FSL1HXXXJ	CHIP C J		
C464			CK73FB1E103K	CHIP C 0.010UF K		
C465			CC73FCH1H030C	CHIP C 3.0PF C		
C466-470			CK73FB1E103K	CHIP C 0.010UF K		
C471			CK73FB1H102K	CHIP C 1000PF K		
C472-477			CK73FB1E103K	CHIP C 0.010UF K		
C478			CE04EW1H4R7M	ELECTRØ 4.7UF 50WV		
C479, 480			CK73FB1E103K	CHIP C 0.010UF K		
C481, 482			CC73FCH1H080D	CHIP C 8.0PF D		
C483, 484			CK73FB1E103K	CHIP C 0.010UF K		
C485			CC73FTH1H070D	CHIP C 7.0PF D		
C486			CK73FB1E103K	CHIP C 0.010UF K		
C487			CC73FCH1H020C	CHIP C 2.0PF C		
C488			CK73FB1E103K	CHIP C 0.010UF K		
C489			CC73FCH1H0R5C	CHIP C 0.5PF C		
C490-493			CK73FB1E103K	CHIP C 0.010UF K		
C495			CE04EW1H4R7M	ELECTRØ 4.7UF 50WV		
C496			CK73FB1E103K	CHIP C 0.010UF K		
C497-508			CK73FB1H102K	CHIP C 1000PF K		
C509			CE04EW1A101M	ELECTRØ 100UF 10WV		
C510			CK73FB1E103K	CHIP C 0.010UF K		
C511			CE04EW1C100M	ELECTRØ 10UF 16WV		
C513-520			CK73FB1HXXXK	CHIP C K		
C521-523			CK73FB1E103K	CHIP C 0.010UF K		
C524-526			CK73FB1H102K	CHIP C 1000PF K		
C527			CK73FB1E103K	CHIP C 0.010UF K		
C528			CK73FF1E104Z	CHIP C 0.10UF Z		
C529-534			CK73FB1H102K	CHIP C 1000PF K		
C537			CE04EW1A101M	ELECTRØ 100UF 10WV		
C538			CK73EB1E104K	CHIP C 0.10UF K		
C540-542			CK73FB1H102K	CHIP C 1000PF K		
C543			CE04EW1C100M	ELECTRØ 10UF 16WV		
C544, 545			CK73FB1E103K	CHIP C 0.010UF K		
C546			CS15E1A220M	TANTAL 22UF 10WV		
C547			CK73FB1E223K	CHIP C 0.022UF K		
C548			CK73EB1E104K	CHIP C 0.10UF K		
C549-551			CK73FB1E103K	CHIP C 0.010UF K		
C552			CE04EW1C471M	ELECTRØ 470UF 16WV		
C553			CK73FB1E103K	CHIP C 0.010UF K		
C554-558			CK73FB1H102K	CHIP C 1000PF K		
C559			CK73FB1H223K	CHIP C 0.022UF K		
C560			CE04EW1C470M	ELECTRØ 47UF 16WV		
C561, 562			CK73FB1E103K	CHIP C 0.010UF K		
C567			CE04EW1HR47M	ELECTRØ 0.47UF 50WV		
C568			CE04EW1C100M	ELECTRØ 10UF 16WV		
C569			CE04EW1HR47M	ELECTRØ 0.47UF 50WV		
C571			CE04EW1A101M	ELECTRØ 100UF 10WV		
C572			CE04EW1H010M	ELECTRØ 1.0UF 50WV		

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C573 C574 C575 C577 C578			CE04EW1HR47M CK73FB1E103K CK73FB1H223K CE04EW1H010M CK73FB1E223K	ELECTR0 0.47UF 50WV CHIP C 0.010UF K CHIP C 0.022UF K ELECTR0 1.0UF 50WV CHIP C 0.022UF K	KM1M2 KM1M2	
C579 C580-582 C583 C584,585 C586,587			CK73FB1E103K CE04EW1H010M CE04EW1C100M CK73EB1E104K CS15E1VR47M	CHIP C 0.010UF K ELECTR0 1.0UF 50WV ELECTR0 10UF 16WV CHIP C 0.10UF K TANTAL 0.47UF 35WV		
C588,589 C590 C591 C592-594 C595			CE04EW1H4R7M CC73FSL1H101J CK73FF1E104Z C91-0117-05 CK73FB1E473M	ELECTR0 4.7UF 50WV CHIP C 100PF J CHIP C 0.10UF Z CERAMIC 0.01UF K CHIP C 0.047UF M		
C596 C597 C598 C599 TC1			CK73FB1E223K CK45F1H473Z CK73FB1E103K CK73FF1E104Z C05-0355-05	CHIP C 0.022UF K CERAMIC 0.047UF Z CHIP C 0.010UF K CHIP C 0.10UF Z TRIMMING CAP 30PF		
TC2 TC3			C05-0348-05 C05-0355-05	TRIMMING CAP 6PF TRIMMING CAP 30PF		
CN1 CN2 CN3 CN4 CN5		*	E04-0154-05 E40-3239-05 E40-5036-05 E40-3243-05 E13-0166-05	RF COAXIAL CABLE RECEPTACLE PIN CONNECTOR (4P) FPC CONNECTOR (12P) PIN CONNECTOR (8P) PHONE JACK ACC3		
CN6 CN7 CN8 CN9 CN10,11		*	E06-0658-05 E06-1352-05 E31-3452-05 E40-5016-05 E40-3239-05	DIN RECEPTACLE (6P)ACC1 DIN RECEPTACLE (13P)ACC2 CONNECTING WIRE(7P) PIN CONNECTOR (2P) PIN CONNECTOR (4P)	KM1M2 KM1M2	
CN12,13 CN14 CN16 CN17 CN18			E40-3237-05 E40-3241-05 E40-3241-05 E40-3237-05 E04-0154-05	PIN CONNECTOR (2P) PIN CONNECTOR (6P) PIN CONNECTOR (6P) PIN CONNECTOR (2P) RF COAXIAL CABLE RECEPTACLE		
CN19,20 CN21 CN22 CN30 CN31		*	E11-0434-05 E40-5139-05 E40-3237-05 E40-3239-05 E40-3237-05	PHONE JACK EXT.S,EXT.M FPC CONNECTOR (24P) PIN CONNECTOR (2P) PIN CONNECTOR (4P) PIN CONNECTOR (2P)		
CN32 CN33 CN34 CN35 CN36			E40-3242-05 E04-0154-05 E40-3237-05 E40-3238-05 E40-3241-05	PIN CONNECTOR (7P) RF COAXIAL CABLE RECEPTACLE PIN CONNECTOR (2P) PIN CONNECTOR (3P) PIN CONNECTOR (6P)		
CN38 CN39 CN40 CN41 CN42		*	E06-0859-05 E40-0211-05 E40-5016-05 E31-3238-05 E11-0433-05	DIN RECEPTACLE (8P)ACC4 PIN CONNECTOR (2P) PIN CONNECTOR (2P) CONNECTING WIRE(7P) PHONE JACK KEY	KM1M2 KM1M2	
CN43 CN44			E06-0752-05 E40-3242-05	DIN RECEPTACLE (7P)EXT. CONT PIN CONNECTOR (7P)		

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CN45			E40-3240-05	PIN CONNECTOR (5P)		
CN46			E40-3238-05	PIN CONNECTOR (3P)		
CN47			E40-3237-05	PIN CONNECTOR (2P)		
CN48			E40-5066-05	PIN CONNECTOR (9P)		
CN49			E04-0154-05	RF COAXIAL CABLE RECEPTACLE		
CN50		*	E40-3751-05	PIN CONNECTOR (15P)		
CN51-53			E04-0154-05	RF COAXIAL CABLE RECEPTACLE		
CN54			E40-5141-05	FPC CONNECTOR (26P)		
CN55			E40-3237-05	PIN CONNECTOR (2P)		
W3			E31-3451-15	CONNECTING WIRE(2P)		
W4			E31-3450-15	CONNECTING WIRE(4P)		
W5 ,6			E31-3237-05	CONNECTING WIRE	KM1M2	
A1		*	F02-0436-04	HEAT SINK(CAP/ADDITION TYPE)		
A2 ,3		*	G02-0574-04	FLAT SPRING		
			G13-0905-04	CUSHION	KM1M2	
L1		*	L34-4108-05	TUNING COIL (10.7MHZ)		
L2 -7			L30-0281-15	IFT		
L8 ,9			L40-4701-17	SMALL FIXED INDUCTOR(47UH)		
L10 -12			L40-1021-14	SMALL FIXED INDUCTOR(1MH)		
L13			L30-0531-05	IFT		
L14 ,15			L40-3391-13	SMALL FIXED INDUCTOR(3.3UH)		
L16 ,17			L30-0281-15	IFT		
L18			L40-1021-14	SMALL FIXED INDUCTOR(1MH)		
L19			L40-4701-14	SMALL FIXED INDUCTOR(47UH)		
L20 -29			L40-1001-19	SMALL FIXED INDUCTOR(10UH)		
L30 ,31			L34-2041-05	TUNING COIL		
L32 ,33			L30-0281-15	IFT		
L34 ,35			L40-4701-17	SMALL FIXED INDUCTOR(47UH)		
L36 ,37			L34-2038-05	TUNING COIL		
L38		*	L34-4093-05	TUNING COIL (30MHZ)		
L39			L40-4701-14	SMALL FIXED INDUCTOR(47UH)		
L40			L40-4701-17	SMALL FIXED INDUCTOR(47UH)		
L41		*	L34-4108-05	COIL (10.7MHZ)		
L42 ,43			L30-0281-15	IFT		
L44 -46			L40-4701-17	SMALL FIXED INDUCTOR(47UH)		
L47 -50			L30-0281-15	IFT		
L51 ,52			L40-4701-17	SMALL FIXED INDUCTOR(47UH)		
L53			L40-1021-14	SMALL FIXED INDUCTOR(1MH)		
L54			L30-0531-05	IFT		
L55 ,56			L40-1021-14	SMALL FIXED INDUCTOR(1MH)		
L57			L40-4701-17	SMALL FIXED INDUCTOR(47UH)		
L58			L40-4705-25	SMALL FIXED INDUCTOR(47UH)		
L59			L33-0691-05	CHOKE COIL		
L60			L40-4701-17	SMALL FIXED INDUCTOR(47UH)		
L61 -63			L30-0281-15	IFT		
L64			L34-0858-05	TUNING COIL		
L65 -67			L34-2041-05	TUNING COIL		
L68 ,69			L40-4701-17	SMALL FIXED INDUCTOR(47UH)		
L70			L15-0306-05	LOW-FREQUENCY CHOKE COIL(700UH)		
L71			L40-3391-14	SMALL FIXED INDUCTOR(3.3UH)		
L72			L40-4701-17	SMALL FIXED INDUCTOR(47UH)		
L73			L40-2211-48	SMALL FIXED INDUCTOR(220UH)		
L73			L40-2211-81	SMALL FIXED INDUCTOR(220UH)		

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X1		*	L77-1381-05	CRYSTAL RESONATOR (10.14MHZ)		
X2			L77-1305-05	CRYSTAL RESONATOR (10.695MHZ)		
XF1		*	L71-0281-05	CRYSTAL FILTER (10.595MHZFM)		
XF2		*	L71-0282-05	CRYSTAL FILTER (10.595MHZSSB)		
XF3			L72-0315-05	CERAMIC FILTER (CFW455F FM)		
XF4			L79-0446-05	FILTER (455DISC)		
XF5			L71-0216-05	CRYSTAL FILTER (10.695MHZFM)		
XF6			L71-0249-05	CRYSTAL FILTER (10.695MHZSSB)		
XF7		*	L71-0283-15	CRYSTAL FILTER (10.695MHZCW)		
XF8			L72-0315-05	CERAMIC FILTER (CFW455F FM)		
XF9			L79-0446-05	FILTER (455DISC)		
			N09-0666-05	SCREW		
			N35-3004-46	BINDING HEAD MACHINE SCREW		
R1 -78			RK73FB2AXXXJ	CHIP R J 1/10W		
R79			R92-0670-05	CHIP R 0 0HM J 1/10W		
R80 -176			RK73FB2AXXXJ	CHIP R J 1/10W		
R177			R92-0670-05	CHIP R 0 0HM J 1/10W		
R178-300			RK73FB2AXXXJ	CHIP R J 1/10W		
R301,302			RD14BB2E471J	RD 470 J 1/4W		
R303-408			RK73FB2AXXXJ	CHIP R J 1/10W		
R409			R92-0670-05	CHIP R 0 0HM J 1/10W		
R410-432			RK73FB2AXXXJ	CHIP R J 1/10W		
R433			R92-0670-05	CHIP R 0 0HM J 1/10W		
R434-462			RK73FB2AXXXJ	CHIP R J 1/10W		
R463-467			R92-0670-05	CHIP R 0 0HM J 1/10W		
R468			RD14BB2C103J	RD 10K J 1/6W		
R469,470			R92-0670-05	CHIP R 0 0HM J 1/10W		
R471,472			RK73FB2AXXXJ	CHIP R J 1/10W		
VR1			R12-0432-05	TRIMMING P0T. (500)		
VR2 -4			R12-2414-05	TRIMMING P0T. (5K)		
VR5 ,6			R12-3447-05	TRIMMING P0T. (10K)		
VR7			R12-7407-05	TRIMMING P0T. (500K)		
VR8 -10			R12-4414-05	TRIMMING P0T. (50K)		
VR11		*	R05-2402-05	P0TENTIOMETER(5K)		
VR14-17			R12-2414-05	TRIMMING P0T. (5K)		
VR18			R12-4414-05	TRIMMING P0T. (50K)		
VR19			R12-3447-05	TRIMMING P0T. (10K)		
VR20			R12-0432-05	TRIMMING P0T. (500)		
VR21			R12-2414-05	TRIMMING P0T. (5K)		
VR22			R12-1090-05	TRIMMING P0T. (4.7K)		
VR23			R12-3133-05	TRIMMING P0T. (47K)		
VR24			R12-6019-05	TRIMMING P0T. (50K)		
VR25,26			R12-3127-05	TRIMMING P0T. (10K)		
VR27			R12-6019-05	TRIMMING P0T. (50K)		
VR28			R12-7407-05	TRIMMING P0T. (500K)		
VR29			R12-2414-05	TRIMMING P0T. (5K)		
VR30			R12-3447-05	TRIMMING P0T. (10K)		
VR31			R12-0432-05	TRIMMING P0T. (500)		
VR32			R12-2414-05	TRIMMING P0T. (5K)		
VR33			R12-3447-05	TRIMMING P0T. (10K)		
VR34			R12-4414-05	TRIMMING P0T. (50K)		
VR35			R12-2414-05	TRIMMING P0T. (5K)		
VR36			R12-3447-05	TRIMMING P0T. (10K)		

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VR37 W1 ,2			R12-4414-05 R92-1061-05	TRIMMING PNT. (50K) JUMPER REST 0 OHM		
SW1			S31-1411-05	SLIDE SWITCH (ATT-ACS)		
D1			RLS135	CHIP DIODE		
D2			DAN235(K)	CHIP DIODE		
D3 ,4			RLS73	CHIP DIODE		
D5			DAN235(K)	CHIP DIODE		
D6			RLS135	CHIP DIODE		
D7 -9			HSM88AS	CHIP DIODE		
D10 ,11			RLS73	CHIP DIODE		
D12			DAN235(K)	CHIP DIODE		
D13			HSM88AS	CHIP DIODE		
D14 ,15			1S5101	DIODE		
D16			IMN10	CHIP DIODE		
D17			MTZ3.0JA	CHIP ZENER DIOD		
D18 ,19			HSM88AS	CHIP DIODE		
D20			RLS73	CHIP DIODE		
D21		*	HSM276S	CHIP DIODE		
D22			RLS73	CHIP DIODE		
D23			DAN202(K)	CHIP DIODE		
D24			1S5226	CHIP DIODE		
D25			RLS73	CHIP DIODE		
D31			RLS135	CHIP DIODE		
D32			DAN235(K)	CHIP DIODE		
D33 -36			RLS135	CHIP DIODE		
D37			DAN235(K)	CHIP DIODE		
D38 -41			RLS73	CHIP DIODE		
D42			RLS135	CHIP DIODE		
D43 -46			DAN202(K)	CHIP DIODE		
D47 ,48			IMN10	CHIP DIODE		
D49			RLS73	CHIP DIODE		
D50			DAN202(K)	CHIP DIODE		
D51			RLS135	CHIP DIODE		
D52			DAN202(K)	CHIP DIODE		
D53 ,54			HSM88AS	CHIP DIODE		
D55 -60			RLS135	CHIP DIODE		
D61			1SV128	CHIP DIODE		
D62			DAN235(K)	CHIP DIODE		
D63 ,64			HSM88AS	CHIP DIODE		
D65			MTZ6.2JA	CHIP ZENER DIODE		
D67			RLS73	CHIP DIODE		
D68			HSM88AS	CHIP DIODE		
D69 ,70			RLS135	CHIP DIODE		
D71			RLS73	CHIP DIODE		
D72			HSM88AS	CHIP DIODE		
D73			1N60	DIODE		
D74			MTZ3.0JA	CHIP ZENER DIODE		
D75			DAN202(K)	CHIP DIODE		
D76			RLS73	CHIP DIODE		
D77			RLS135	CHIP DIODE		
D78			HSM88AS	CHIP DIODE		
D79 ,80			RLS135	CHIP DIODE		
D81			1S2208	DIODE		

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D82 D83 -86 D87 D88 D89			DAN202(K) RLS135 DAN202(K) RLS73 MTZ5.1JA	CHIP DIODE CHIP DIODE CHIP DIODE CHIP DIODE CHIP ZENER DIODE		
D90 D92 ,93 D94 D95 D96			RLS73 1SS101 IMN10 MTZ5.1JA IMN10	CHIP DIODE DIODE CHIP DIODE CHIP ZENER DIODE CHIP DIODE		
D97 D98 -100 D101 D102,103 D104			DAN202(K) IMN10 MTZ9.1JA RLS73 1SS226	CHIP DIODE CHIP DIODE CHIP ZENER DIODE CHIP DIODE CHIP DIODE		
D105 D106-108 IC1 IC2 IC3			MTZ5.1JA RLS73 MC3357P M51131L LA5010	CHIP ZENER DIODE (5.1V) CHIP DIODE IC(LOW POWER FM IF) IC(AF VR) IC(LOW SATURATION REGULATOR)		
IC4 IC5 ,6 IC7 IC8 IC9			TA7324P UPC2002V UPC7808H MC3357P AN612	IC(OP AMP) AF.MUTE IC(OP AMP X2)AF PA IC(VOLTAGE REGULATOR/ +8V) IC(LOW POWER FM IF) IC(BALANCE MODULATOR)		
IC10 IC11 IC12,13 IC14 Q1			UPC1158H2 UPC7808H TC4066BP AN78L24 2SC2712(Y)	IC(ALC AMP) MIC AMP IC(VOLTAGE REGULATOR/ +8V) IC(ANALOG/ DIGITAL SW) IC(VOLTAGE REGULATOR) CHIP TRANSISTOR		
Q2 Q3 Q4 Q5 Q6			DTC124EK 2SC2714(Y) 2SC2712(Y) 3SK131(M) DTC124EK	DIGITAL TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR CHIP FET DIGITAL TRANSISTOR		
Q7 -9 Q10 -12 Q13 Q14 -16 Q17			3SK131(M) 2SC2712(Y) DTC124EK 2SC2712(Y) DTC124EK	CHIP FET CHIP TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR		
Q18 Q19 ,20 Q21 Q22 Q23			2SC2712(Y) DTC124EK 2SC2712(Y) DTC124EK 2SA1162(Y)	CHIP TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR		
Q24 Q25 Q26 Q27 Q28			2SD1624S FMU1 DTC124EK DTC143TK DTA124EK	CHIP TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR		
Q29 Q30 Q31 Q32 Q33 -35			FMU1 DTC124EK DTC143TK DTA124EK 2SC2714(Y)	DIGITAL TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR		

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Q36 ,37			2SC2712(Y)	CHIP TRANSISTOR		
Q48			2SK125-5	FET		
Q49 ,50			DTC124EK	DIGITAL TRANSISTOR		
Q51			2SC2026	TRANSISTOR		
Q52			2SC2712(Y)	CHIP TRANSISTOR		
Q53			DTC124EK	DIGITAL TRANSISTOR		
Q54			2SC2712(Y)	CHIP TRANSISTOR		
Q55			2SC2714(Y)	CHIP TRANSISTOR		
Q56			3SK131(M)	CHIP FET		
Q57			DTC124EK	DIGITAL TRANSISTOR		
Q58 -60			3SK131(M)	CHIP FET		
Q61 -63			2SC2712(Y)	CHIP TRANSISTOR		
Q64		*	FMC2	DIGITAL TRANSISTOR		
Q65 ,66			DTC124EK	DIGITAL TRANSISTOR		
Q67			2SC2712(Y)	CHIP TRANSISTOR		
Q68			FMC1	DIGITAL TRANSISTOR		
Q69			2SC2712(Y)	CHIP TRANSISTOR		
Q70			DTC124EK	DIGITAL TRANSISTOR		
Q71 ,72		*	FMC2	DIGITAL TRANSISTOR		
Q73 -75			2SC2714(Y)	CHIP TRANSISTOR		
Q76 ,77			3SK131(M)	CHIP FET		
Q78 ,79			2SK210(GR)	CHIP FET		
Q80			3SK131(M)	CHIP FET		
Q81 -83		*	FMC2	DIGITAL TRANSISTOR		
Q84 ,85			DTC124EK	DIGITAL TRANSISTOR		
Q86			2SK210(GR)	CHIP FET		
Q87			2SA1162(Y)	CHIP TRANSISTOR		
Q88		*	FMC2	DIGITAL TRANSISTOR		
Q89 ,90			DTC124EK	DIGITAL TRANSISTOR		
Q91		*	FMC2	DIGITAL TRANSISTOR		
Q92			2SA1162(Y)	CHIP TRANSISTOR		
Q93 ,94			DTC124EK	DIGITAL TRANSISTOR		
Q95			DTA124EK	DIGITAL TRANSISTOR		
Q96			2SA1213(Y)	CHIP TRANSISTOR		
Q97			2SA1162(Y)	CHIP TRANSISTOR		
Q98 ,99			2SC2712(Y)	CHIP TRANSISTOR		
Q100-102		*	DTA143TK	DIGITAL TRANSISTOR		
Q103-105			DTC143EK	DIGITAL TRANSISTOR		
Q106			DTC124EK	DIGITAL TRANSISTOR		
Q107			2SA1213(Y)	CHIP TRANSISTOR		
Q108,109		*	FMC2	DIGITAL TRANSISTOR		
Q110			DTC124EK	DIGITAL TRANSISTOR		
Q111,112			DTC143TK	DIGITAL TRANSISTOR		
Q113			2SC2712(Y)	CHIP TRANSISTOR		
Q114			DTA124EK	DIGITAL TRANSISTOR		
Q115			DTC124EK	DIGITAL TRANSISTOR		
Q117-119			DTC124EK	DIGITAL TRANSISTOR		
Q120,121			DTC114TK	DIGITAL TRANSISTOR		
Q122		*	FMC2	DIGITAL TRANSISTOR		
Q123			2SA1162(Y)	CHIP TRANSISTOR		
Q124			DTC124EK	DIGITAL TRANSISTOR		
Q125			DTC144WK	DIGITAL TRANSISTOR		
Q126			DTC124EK	DIGITAL TRANSISTOR		
TH1 -4			112-502-2	THERMISTOR (5K)		
TH5			112-501-2	THERMISTOR (500)		

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TH6 TH7 ,8 Z1			112-301-2 112-501-2 W02-0808-05 * X58-3410-00 * X59-3480-00	THERMISTOR (300) THERMISTOR (500) DC-DC MODULE SUB UNIT (NB) MODULE UNIT		
PLL UNIT (X50-3080-00)						
C1 ,2 C3 ,4 C5 ,6 C7 C8			CC73FCH1HXXXJ CK73FB1H102K CC73FCH1HXXXJ CK73FB1H102K CE04EW1A221M	CHIP C J CHIP C 1000PF K CHIP C J CHIP C 1000PF K ELECTRO 220UF 10WV		
C9 C10 ,11 C12 C13 C14		*	C91-1102-05 CK73FB1H102K CE04EW1E101M CQ92M1H472K C91-1083-05	FILM 0.10UF J CHIP C 1000PF K ELECTRO 100UF 25WV MYLAR 4700PF K FILM 0.47UF 63WV		
C15 -17 C18 C19 C20 C21 -23			CK73FB1H102K CE04EW1E101M CC73FCH1H220J CC73FSL1H101J CK73FB1HXXXK	CHIP C 1000PF K ELECTRO 100UF 25WV CHIP C 22PF J CHIP C 100PF J CHIP C K		
C24 ,25 C26 -34 C35 C36 ,37 C38			CC73FCH1H050C CK73FB1HXXXK CC73FSL1H101J CK73FB1H102K CK73FB1E223K	CHIP C 5.0PF C CHIP C K CHIP C 100PF J CHIP C 1000PF K CHIP C 0.022UF K		
C39 C40 C41 C42 C43			CK73FB1H102K CK73FB1E223K CK73FF1E104Z CK73FB1H102K CC73FCH1H0R5C	CHIP C 1000PF K CHIP C 0.022UF K CHIP C 0.10UF Z CHIP C 1000PF K CHIP C 0.5PF C		
C44 C45 -47 C48 ,49 C50 C51			CC73FCH1H070D CK73FB1H103K CC73FCH1H220J CK73FB1E223K CC73FCH1H470J	CHIP C 7.0PF D CHIP C 0.010UF K CHIP C 22PF J CHIP C 0.022UF K CHIP C 47PF J		
C52 -55 C56 C57 C58 C59			CK73FB1H103K CK73FB1E223K CK73FB1H103K CC73FCH1H080D CK73FB1H103K	CHIP C 0.010UF K CHIP C 0.022UF K CHIP C 0.010UF K CHIP C 8.0PF D CHIP C 0.010UF K		
C60 C61 C62 C63 C64 ,65			CC73FCH1H220J CK73FB1H103K CC73FCH1H0R5C CC73FCH1H220J CK73FB1HXXXK	CHIP C 22PF J CHIP C 0.010UF K CHIP C 0.5PF C CHIP C 22PF J CHIP C K		
C66 C67 C68 C69 C70			CC73FCH1H0R5C CK73FB1H102K CK73FF1E104Z CK73FB1E223K CE04EW1A470M	CHIP C 0.5PF C CHIP C 1000PF K CHIP C 0.10UF Z CHIP C 0.022UF K ELECTRO 47UF 10WV		
C71 C72			CK73FB1H102K CQ92M1H333K	CHIP C 1000PF K MYLAR 0.033UF K		

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C73			CE04EW1A470M	ELECTR0 47UF 10WV		
C74			C092M1H562K	MYLAR 5600PF K		
C75			CK73FB1H102K	CHIP C 1000PF K		
C76			CC73FCH1H220J	CHIP C 22PF J		
C77		*	CC73FUJ1H180J	CHIP C 18PF J		
C78			CE04EW1A101M	ELECTR0 100UF 10WV		
C79 -81			CK73FB1H103K	CHIP C 0.010UF K		
C82			CK73FB1E223K	CHIP C 0.022UF K		
C83 -86			CK73FB1HXXXK	CHIP C K		
C87			CE04EW1HR47M	ELECTR0 0.47UF 50WV		
C88 ,89			CK73FB1H102K	CHIP C 1000PF K		
C90 ,91			CK73FB1E223K	CHIP C 0.022UF K		
C92			CK73FB1H103K	CHIP C 0.010UF K		
C93			CC73FCH1H220J	CHIP C 22PF J		
C94 -97			CK73FB1H103K	CHIP C 0.010UF K		
C98			CK73FB1E223K	CHIP C 0.022UF K		
C99			CK73FB1H103K	CHIP C 0.010UF K		
C100			CC73FCH1H050C	CHIP C 5.0PF C		
C101			CK73FB1H681K	CHIP C 680PF K		
C102			CK73FB1H102K	CHIP C 1000PF K		
C103			CK73FB1H681K	CHIP C 680PF K		
C104			CK73FB1E223K	CHIP C 0.022UF K		
C105			CK73FB1H103K	CHIP C 0.010UF K		
C106			CK73FB1H102K	CHIP C 1000PF K		
C107			CK73FB1E223K	CHIP C 0.022UF K		
C108			CE04EW1A101M	ELECTR0 100UF 10WV		
C109		*	CC73FUJ1H220J	CHIP C 22PF J		
C110			CC73FCH1H220J	CHIP C 22PF J		
C111			CK73FB1H102K	CHIP C 1000PF K		
C112			CE04EW1A470M	ELECTR0 47UF 10WV		
C113			C092M1H333K	MYLAR 0.033UF K		
C114			C092M1H562K	MYLAR 5600PF K		
C115			CK73FF1E104Z	CHIP C 0.10UF Z		
C116			CK73FB1E223K	CHIP C 0.022UF K		
C117			CK73FB1H102K	CHIP C 1000PF K		
C118			CK73FB1E223K	CHIP C 0.022UF K		
C119			CK73FB1H103K	CHIP C 0.010UF K		
C120			CK73FB1E223K	CHIP C 0.022UF K		
C121			CC73FCH1H220J	CHIP C 22PF J		
C122-125			CK73FB1HXXXK	CHIP C K		
C126			CK73FB1E223K	CHIP C 0.022UF K		
C127			CK73FB1H103K	CHIP C 0.010UF K		
C128			CC73FCH1H050C	CHIP C 5.0PF C		
C129-131			CK73FB1HXXXK	CHIP C K		
C132			CK73FB1E223K	CHIP C 0.022UF K		
C133,134			CK73FB1HXXXK	CHIP C K		
C135			CK73FB1E223K	CHIP C 0.022UF K		
C136			CE04EW1A101M	ELECTR0 100UF 10WV		
C137		*	CC73FUJ1H220J	CHIP C 22PF J		
C138			CC73FCH1H180J	CHIP C 18PF J		
C139			CK73FB1H102K	CHIP C 1000PF K		
C140			C092M1H333K	MYLAR 0.033UF K		
C141			C092M1H562K	MYLAR 5600PF K		
C142			CE04EW1A470M	ELECTR0 47UF 10WV		
C143			CK73FB1H103K	CHIP C 0.010UF K		

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C144			CK73FF1E104Z	CHIP C 0.10UF Z		
C145			CK73FB1E223K	CHIP C 0.022UF K		
C146-148			CK73FB1H102K	CHIP C 1000PF K		
C149,150			CK73FB1E223K	CHIP C 0.022UF K		
C151,152			CC73FCH1H180J	CHIP C 18PF J		
C153			CK73FB1H102K	CHIP C 1000PF K		
C154,155			CK73FB1E223K	CHIP C 0.022UF K		
C156			CC73FCH1H070D	CHIP C 7.0PF D		
C157			CE04EW1A470M	ELECTR0 47UF 10WV		
C158			CK73FB1E223K	CHIP C 0.022UF K		
C159			CC73FCH1H100D	CHIP C 10PF D		
C160			CK73FB1E223K	CHIP C 0.022UF K		
C161			CK73FB1H102K	CHIP C 1000PF K		
C162			CC73FSL1H101J	CHIP C 100PF J		
C163			CK73FB1E223K	CHIP C 0.022UF K		
C164			CC73FSL1H101J	CHIP C 100PF J		
C165			CK73FB1E223K	CHIP C 0.022UF K		
C166			CK73FB1H103K	CHIP C 0.010UF K		
C167			CC73FCH1H050C	CHIP C 5.0PF C		
C168			CK73FB1E223K	CHIP C 0.022UF K		
C169			CC73FCH1H0R5C	CHIP C 0.5PF C		
C170			CK73FB1E223K	CHIP C 0.022UF K		
C171			CK73FB1H103K	CHIP C 0.010UF K		
C172			CC73FCH1H220J	CHIP C 22PF J		
C173			CK73FB1E223K	CHIP C 0.022UF K		
C174			CC73FCH1H0R5C	CHIP C 0.5PF C		
C175			CK73FB1H103K	CHIP C 0.010UF K		
C176			CK73FB1E223K	CHIP C 0.022UF K		
C177			CC73FSL1H560J	CHIP C 56PF J		
C178-188			CK73FB1HXXXK	CHIP C K		
C189			CC73FCH1H470J	CHIP C 47PF J		
C190-207			CK73FB1HXXXK	CHIP C K		
C208,209			CE04EW1A101M	ELECTR0 100UF 10WV		
C210-213			CK73FB1HXXXK	CHIP C K		
C214			CE04EW1A101M	ELECTR0 100UF 10WV		
C215-217			CE04EW1A470M	ELECTR0 47UF 10WV		
C216			CK73FB1E223K	CHIP C 0.022UF K		
C218			CK73FB1H103K	CHIP C 0.010UF K		
C219			CC73FCH1H390J	CHIP C 39PF J		
C220			CK73FB1H103K	CHIP C 0.010UF K		
C221-222			CC73FCH1HXXXJ	CHIP C J		
C250			CC73FCH1H070D	CHIP C 7.0PF D		
C251			CC73FCH1H010C	CHIP C 1.0PF C		
C252			CC73FCH1H100D	CHIP C 10PF D		
C253			CC73FCH1H020C	CHIP C 2.0PF C		
C254-256			CC73FCH1H070D	CHIP C 7.0PF D		
C257			CK73FB1H471K	CHIP C 470PF K		
C258			CC73FSL1H101J	CHIP C 100PF J		
C259,260			CK73FB1H102K	CHIP C 1000PF K		
C261			CC73FSL1H101J	CHIP C 100PF J		
C262			CC73FCH1H050C	CHIP C 5.0PF C		
C263-265			CK73FB1HXXXK	CHIP C K		
C266			CC73FCH1H470J	CHIP C 47PF J		
C267			CK73FB1H102K	CHIP C 1000PF K		
C269			CC73FSL1H101J	CHIP C 100PF J		

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C270 C271, 272 C273, 274 C275 C276-278			CK73FB1H103K CC73FCH1HXXXJ CK73FB1H102K CC73FCH1H030C CK73FB1H102K	CHIP C 0.010UF K CHIP C J CHIP C 1000PF K CHIP C 3.0PF C CHIP C 1000PF K		
C279 C280 C281 C282 C283			CK73FB1E223K CK73FF1E104Z CK73FB1H102K CQ92M1H102K C91-1083-05	CHIP C 0.022UF K CHIP C 0.10UF Z CHIP C 1000PF K MYLAR 1000PF K FILM 0.47UF 63WV		
C284, 285 C286 C287 C288 C289		*	CK73FB1H102K CE04EW1A221M CK73FB1H102K C91-1102-05 CE04EW1HR47M	CHIP C 1000PF K ELECTR0 220UF 10WV CHIP C 1000PF K FILM 0.10UF J ELECTR0 0.47UF 50WV		
C290, 291 C292 C293 C294, 295 C296			CK73FB1HXXXK CE04EW1E101M CC73FCH1H390J CK73FB1H102K CC73FCH1H030C	CHIP C K ELECTR0 100UF 25WV CHIP C 39PF J CHIP C 1000PF K CHIP C 3.0PF C		
C297, 298 C299 C300 C301 C302			CK73FB1HXXXK CE04EW1A221M CK73FB1H102K CQ92M1H332K C91-1074-05	CHIP C K ELECTR0 220UF 10WV CHIP C 1000PF K MYLAR 3300PF K FILM 0.33UF 63WV		
C303 C304, 305 C306 C307, 308 C309			CE04EW1A470M CK73FB1H103K CC73FCH1H030C CK73FB1H102K CC73FCH1H020C	ELECTR0 47UF 10WV CHIP C 0.010UF K CHIP C 3.0PF C CHIP C 1000PF K CHIP C 2.0PF C		
C310 C311, 312 C313 C314-316 C317			CK73FB1H102K CK73FB1E223K CK73FB1H102K CC73FCH1HXXXJ CK73FB1E223K	CHIP C 1000PF K CHIP C 0.022UF K CHIP C 1000PF K CHIP C J CHIP C 0.022UF K		
C318, 319 C320 C321 C322 C323			CK73FB1HXXXK CK73FB1E223K CK73FB1H102K CK73FB1E223K CE04EW1A470M	CHIP C K CHIP C 0.022UF K CHIP C 1000PF K CHIP C 0.022UF K ELECTR0 47UF 10WV		
C324 C325 C326 C327 C328-331			CK73FB1H102K CK73FF1E104Z CK73FB1H103K CK73FB1E223K CK73FB1H103K	CHIP C 1000PF K CHIP C 0.10UF Z CHIP C 0.010UF K CHIP C 0.022UF K CHIP C 0.010UF K		
C332 C333 C334 C335, 336 C337-339			CC73FCH1H080D CC73FCH1H470J CK73FB1H103K CC73FCH1H100D CK73FB1HXXXK	CHIP C 8.0PF D CHIP C 47PF J CHIP C 0.010UF K CHIP C 10PF D CHIP C K		
C340 C341, 342 C343 C344 C345, 346			CC73FCH1H070D CC73FCH1HXXXD CC73FCH1H150J CK73FB1E223K CC73FCH1HXXXC	CHIP C 7.0PF D CHIP C D CHIP C 15PF J CHIP C 0.022UF K CHIP C C		

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C347,348 C349 C350 C351,352 C353			CK73FB1H103K CC73FCH1H0R5C CC73FCH1H470J CK73FB1H102K CK73FB1E223K	CHIP C 0.010UF K CHIP C 0.5PF C CHIP C 47PF J CHIP C 1000PF K CHIP C 0.022UF K		
C354 C355 C356 C357 C358			CE04EW1A470M CK73FF1E104Z CQ92M1H333K CQ92M1H562K CE04EW1A470M	ELECTR0 47UF 10WV CHIP C 0.10UF Z MYLAR 0.033UF K MYLAR 5600PF K ELECTR0 47UF 10WV		
C359,360 C361 C362 C363 C364-366		*	CK73FB1HXXXK CC73FCH1H220J CC73FUJ1H180J CE04EW1A101M CK73FB1HXXXK	CHIP C K CHIP C 22PF J CHIP C 18PF J ELECTR0 100UF 10WV CHIP C K		
C367 C368-371 C372 C373 C374			CK73FB1E223K CK73FB1HXXXK CE04EW1A470M CK73FB1E223K CK73FF1E104Z	CHIP C 0.022UF K CHIP C K ELECTR0 47UF 10WV CHIP C 0.022UF K CHIP C 0.10UF Z		
C375 C376 C377 C378 C379,380			CK73FB1H102K C91-1083-05 CQ92M1H472K CE04EW1A470M CK73FB1H103K	CHIP C 1000PF K FILM 0.47UF 63WV MYLAR 4700PF K ELECTR0 47UF 10WV CHIP C 0.010UF K		
C381 C382 C383 C384 C385		*	CC73FCH1H030C CK73FB1H102K C91-1102-05 CK73FB1H102K CE04EW1A221M	CHIP C 3.0PF C CHIP C 1000PF K FILM 0.10UF J CHIP C 1000PF K ELECTR0 220UF 10WV		
C386 C387 C388-391 C392 C393			CK73FB1H102K CC73FCH1H020C CK73FB1HXXXK CC73FSL1H101J CC73FCH1H100D	CHIP C 1000PF K CHIP C 2.0PF C CHIP C K CHIP C 100PF J CHIP C 10PF D		
C394 C395 C396 C397-407 C408			CK73FB1E223K CK73FB1H103K CE04EW1A101M CK73FB1HXXXK CC73FCH1H100D	CHIP C 0.022UF K CHIP C 0.010UF K ELECTR0 100UF 10WV CHIP C K CHIP C 10PF D		
C409 C410 C411,412 C413-416 C417			CC73FCH1H120J CC73FCH1H030C CC73FCH1H100D CC73FCH1HXXXD CE04EW1A470M	CHIP C 12PF J CHIP C 3.0PF C CHIP C 10PF D CHIP C D ELECTR0 47UF 10WV		
C418 C419,420 C421 C422 TC1			CC73FCH1H120J CC73FCH1H100D CC73FCH1H050C CC73FCH1H100D C05-0350-05	CHIP C 12PF J CHIP C 10PF D CHIP C 5.0PF C CHIP C 10PF D TRIMMING CAP (20P)		
TC50			C05-0349-05	TRIMMING CAP (10P)		
A11 CN1 CN2		*	E29-0440-14 E40-5137-05 E40-3308-05	TERMINAL (GND) PIN CONNECTOR (22P) PIN CONNECTOR (11P)		

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CN3			E40-3237-05	PIN CONNECTOR (2P)		
CN4 -6			E04-0154-05	RF COAXIAL CABLE RECEPTACLE		
CN7			E40-3237-05	PIN CONNECTOR (2P)		
CN8			E04-0154-05	RF COAXIAL CABLE RECEPTACLE		
CN9			E40-5069-05	PIN CONNECTOR (12P)		
CN50,51			E04-0154-05	RF COAXIAL CABLE RECEPTACLE		
TP1 -12			E23-0465-05	TERMINAL		
TP50,51			E23-0465-05	TERMINAL		
TP53-61			E23-0465-05	TERMINAL		
W1		*	E31-3392-05	CONNECTING WIRE		
A1 -4			F11-0817-04	SHIELDING COVER		
A5 -8			F11-0818-24	SHIELDING COVER		
A9			F10-1258-04	SHIELDING PLATE		
A10		*	F11-1120-04	SHIELDING COVER		
CF1 ,2		*	L72-0367-05	CERAMIC FILTER (SFE 11.050MJ)		
CF3		*	L72-0368-05	CERAMIC FILTER (SFE 10.595MJ)		
CF4		*	L72-0369-05	CERAMIC FILTER (SFE 10.7MJ-27)		
CF50,51		*	L72-0367-05	CERAMIC FILTER (SFE 11.050MJ)		
L1			L34-1025-05	COIL (5.5T)		
L2			L34-1026-05	COIL (7.5T)		
L3 ,4		*	L40-1001-19	SMALL FIXED INDUCTOR (10U)		
L5 ,6		*	L40-1892-19	SMALL FIXED INDUCTOR (1.8U)		
L7 ,8			L34-2044-05	TUNING COIL		
L9			L34-2043-05	TUNING COIL		
L10			L31-0313-05	COIL		
L11			L30-0281-15	IFT		
L12		*	L40-1001-19	SMALL FIXED INDUCTOR (10U)		
L13 ,14			L34-2232-05	TUNING COIL		
L15 ,16			L34-2042-05	TUNING COIL		
L17			L32-0676-05	OSCILLATING COIL		
L18		*	L40-1001-19	SMALL FIXED INDUCTOR (10U)		
L19 ,20			L40-1011-14	SMALL FIXED INDUCTOR (100U)		
L21			L40-2211-14	SMALL FIXED INDUCTOR (220U)		
L22			L30-0281-15	IFT		
L23 ,24			L40-2211-14	SMALL FIXED INDUCTOR (220U)		
L25			L32-0197-05	OSCILLATING COIL		
L26			L40-2211-14	SMALL FIXED INDUCTOR (220U)		
L27			L30-0281-15	IFT		
L28 ,29		*	L40-1811-14	SMALL FIXED INDUCTOR (180U)		
L30		*	L32-0633-05	OSCILLATING COIL		
L31 ,32		*	L40-1001-19	SMALL FIXED INDUCTOR (10U)		
L33		*	L40-6891-19	SMALL FIXED INDUCTOR (6.8U)		
L34		*	L40-1001-19	SMALL FIXED INDUCTOR (10U)		
L35 ,36			L34-2038-05	TUNING COIL		
L37 ,38			L30-0289-05	IFT		
L39			L40-1092-19	SMALL FIXED INDUCTOR (1U)		
L50 -53			L34-1058-05	COIL (2.5T)		
L54 ,55		*	L40-1582-19	SMALL FIXED INDUCTOR (0.15U)		
L56		*	L40-1001-19	SMALL FIXED INDUCTOR (10U)		
L57 ,58		*	L39-0441-05	COIL		
L59 ,60		*	L40-1582-19	SMALL FIXED INDUCTOR (0.15U)		
L61		*	L40-1001-19	SMALL FIXED INDUCTOR (10U)		
L62			L34-0683-05	TUNING COIL		
L63 ,64		*	L79-0831-05	FILTER MODULE		

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L65 ,66 L67 L68 ,69 L70 L71		*	L40-1001-19 L40-1582-19 L40-4791-19 L40-1001-19 L30-0281-15	SMALL FIXED INDUCTOR (10U) SMALL FIXED INDUCTOR (0.15U) SMALL FIXED INDUCTOR (4.7U) SMALL FIXED INDUCTOR (10U) IFT		
L72 L73 L74 ,75 L76 ,77 L78 ,79		*	L31-0313-05 L34-4091-05 L34-4092-05 L34-2041-05 L34-2044-05	COIL TUNING COIL TUNING COIL TUNING COIL TUNING COIL		
L80 L81 L83 L84 L85		*	L40-1001-19 L32-0676-05 L40-1001-19 L34-2271-05 L40-1001-19	SMALL FIXED INDUCTOR (10U) OSCILLATING COIL SMALL FIXED INDUCTOR (10U) TUNING COIL SMALL FIXED INDUCTOR (10U)		
L86 ,87 L88 L89 L90 L91 ,92			L40-1011-14 L34-1032-05 L34-1177-05 L34-1032-05 L40-2272-80	SMALL FIXED INDUCTOR (100U) COIL (3.5T) COIL (4.5T) COIL (3.5T) SMALL FIXED INDUCTOR (0.022U)		
X1		*	L77-1392-05	TCXO (10.24MHZ)		
R1 -362			RK73FB2AXXXJ	CHIP R J 1/10W		
D2 D3 D4 D5 -7 D50			1SV164 1SV166 1SV164 1SV166 1SS184	CHIP VARI-CAP DIODE CHIP VARI-CAP DIODE CHIP VARI-CAP DIODE CHIP VARI-CAP DIODE CHIP DIODE		
D51 D52 D53 IC1 IC2			ND487C1-3R 1SS184 1SV166 SN16913P CX-7925B	DIODE CHIP DIODE CHIP VARI-CAP DIODE IC(DUBLE BALANCED MIXERS) IC(DIGITAL SELECT PLL)		
IC2 IC3 IC4 IC4 IC5		*	CX-7925B-1 M54459L CX-7925B CX-7925B-1 SN16913P	IC(DIGITAL SELECT PLL)ER PLL) IC(PRE SCALER) IC(DIGITAL SELECT PLL) IC(DIGITAL SELECT PLL)ER PLL) IC(DUBLE BALANCED MIXERS)		
IC6 IC7 IC7 IC8 IC9		*	M54459L CX-7925B CX-7925B-1 SN16913P M54459L	IC(PRE SCALER) IC(DIGITAL SELECT PLL) IC(DIGITAL SELECT PLL)ER PLL) IC(DUBLE BALANCED MIXERS) IC(PRE SCALER)		
IC10 IC10 IC11 IC12 IC50,51		*	CX-7925B CX-7925B-1 UPC78M05H TC4581F CX-7925B	IC(DIGITAL SELECT PLL) IC(DIGITAL SELECT PLL)ER PLL) IC(VOLTAGE REGULATOR/ +5V) IC(AND GATE) IC(DIGITAL SELECT PLL)		
IC50,51 IC52 IC53 IC54,55 IC54,55		*	CX-7925B-1 SN16913P M54459L CX-7925B CX-7925B-1	IC(DIGITAL SELECT PLL)ER PLL) IC(DUBLE BALANCED MIXERS) IC(PRE SCALER) IC(DIGITAL SELECT PLL) IC(DIGITAL SELECT PLL)ER PLL)		
Q1			2SC2714(Y)	CHIP TRANSISTOR		

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Q2 -4 Q5 -8 Q9 ,10 Q11 -13 Q14		*	2SC3324(G) 2SC2714(Y) 2SK210(GR) 2SC2714(Y) DTC114EK	CHIP TRANSISTOR CHIP TRANSISTOR CHIP FET CHIP TRANSISTOR DIGITAL TRANSISTOR		
Q15 Q16 ,17 Q18 -23 Q24 ,25 Q26		*	FMC1 2SC2714(Y) FMU1 2SC2714(Y) 2SA1213(Y)	DIGITAL TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR		
Q27 ,28 Q50 Q51 -54 Q55 -57 Q58		*	DTC114EK 2SC3356 2SC3098 2SC3324(G) DTC114EK	DIGITAL TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR		
Q59 Q60 -65 Q66 ,67 Q68 -70 Q71 -73		*	FMC1 2SC2714(Y) 2SK210(GR) 2SC2714(Y) FMU1	DIGITAL TRANSISTOR CHIP TRANSISTOR CHIP FET CHIP TRANSISTOR DIGITAL TRANSISTOR		
Q74 Q75 Q76		*	DTC114EK 2SA1213(Y) 2SC2714(Y)	DIGITAL TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR		
Z1 Z2 Z3 Z4 Z5		*	X58-3390-00 X59-3440-00 X59-3450-00 X59-3440-00 X59-3450-00	SUB UNIT (VC02 144A) MODULE UNIT (VC01) MODULE UNIT (LPF) MODULE UNIT (VC01) MODULE UNIT (LPF)		
Z6 Z7 Z50 Z51 Z52		*	X59-3440-00 X59-3450-00 X58-3400-01 X58-3390-02 X58-1000-02	MODULE UNIT (VC01) MODULE UNIT (LPF) SUB UNIT (VC03 430A) SUB UNIT (VC02 430D) SUB UNIT (VC0 430C)		
Z53 ,54 Z55 Z56		*	X59-3450-00 X59-3440-00 X59-3450-00	MODULE UNIT (LPF) MODULE UNIT (VC01) MODULE UNIT (LPF)		
CONTROL UNIT (X53-3120-XX) -11 : K -21 : M1 -22 : M2 -61 : T, W						
C1 C2 C3 C4 C5			CE04EW1A470M C91-0119-05 CE04EW1A470M C91-0119-05 CE04EW1E221M	ELECTRO 47UF 10WV CERAMIC 0.047UF K ELECTRO 47UF 10WV CERAMIC 0.047UF K ELECTRO 220UF 25WV		
C6 C7 C8 C9 C10 ,11			C91-0119-05 CE04EW1A470M CK73FB1E103K CE04EW1H3R3M CC73FCH1H100D	CERAMIC 0.047UF K ELECTRO 47UF 10WV CHIP C 0.010UF K ELECTRO 3.3UF 50WV CHIP C 10PF D		
C12 -14 C16 -18 C19 C20 C21			CK73FB1E103K CK73FB1H102K CK45F1H103Z CK73FB1E103K CE04EW1A470M	CHIP C 0.010UF K CHIP C 1000PF K CERAMIC 0.010UF Z CHIP C 0.010UF K ELECTRO 47UF 10WV		
C22 -28 C29			CK73FB1E103K C90-2058-05	CHIP C 0.010UF K ELECTRO 47UF 10WV		

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C30			CK73FF1E104Z	CHIP C 0.10UF Z		
C31 -38			CK73FB1H102K	CHIP C 1000PF K		
C39			CK73FB1E103K	CHIP C 0.010UF K		
C40			CK73FF1E104Z	CHIP C 0.10UF Z		
C41			CE04EW1A470M	ELECTR 47UF 10WV		
C42 ,43			CK73FF1E104Z	CHIP C 0.10UF Z		
C44			C90-2041-05	ELECTR 10UF 10WV		
C45			CK73FF1E104Z	CHIP C 0.10UF Z		
C46			CE04EW1A470M	ELECTR 47UF 10WV		
C47			CK73FF1E104Z	CHIP C 0.10UF Z		
C48 -56			CK73FB1E103K	CHIP C 0.010UF K		
C57 -60			CK73FB1H102K	CHIP C 1000PF K		
C61			CK73FB1E103K	CHIP C 0.010UF K		
C62 -65			CK73FB1H102K	CHIP C 1000PF K		
C66 -71			CK73FB1E103K	CHIP C 0.010UF K		
C74 -76			CK73FB1H102K	CHIP C 1000PF K		
C77			CK73FB1E103K	CHIP C 0.010UF K		
C78 ,79			CK73FB1H102K	CHIP C 1000PF K		
C80 -82			CK73FB1E103K	CHIP C 0.010UF K		
C83 -86			CK73FB1H102K	CHIP C 1000PF K		
C87 -89			CK73FB1E103K	CHIP C 0.010UF K		
C90 -95			CK73FB1H102K	CHIP C 1000PF K		
C96			CK73FB1E103K	CHIP C 0.010UF K		
C97			CK73FF1E104Z	CHIP C 0.10UF Z		
C98 -103			CK73FB1H102K	CHIP C 1000PF K		
C105			CK73FB1E103K	CHIP C 0.010UF K		
C106-112			CK73FB1H102K	CHIP C 1000PF K		
C113-116			CK73FB1E103K	CHIP C 0.010UF K		
C117-120			CK73FB1H471K	CHIP C 470PF K		
C121			CK73FB1E103K	CHIP C 0.010UF K		
C122-129			CK73FF1E104Z	CHIP C 0.10UF Z		
C130-161			CK73FB1HXXXK	CHIP C K		
C162-165			CK73FF1E104Z	CHIP C 0.10UF Z		
C166-185			CK73FB1HXXXK	CHIP C K		
CN1		*	E40-5137-05	FPC CONNECTOR (22P)		
CN2			E40-3239-05	PIN CONNECTOR (4P)		
CN3			E40-3240-05	PIN CONNECTOR (5P)		
CN4			E40-3303-05	PIN CONNECTOR (6P)		
CN5		*	E40-5038-05	FPC CONNECTOR (14P)		
CN6			E40-5141-05	PIN CONNECTOR (26P)		
CN7			E40-5131-05	FPC CONNECTOR (16P)		
CN8		*	E40-5139-05	FPC CONNECTOR (24P)		
CN9			E40-3242-05	PIN CONNECTOR (7P)		
CN10			E40-3237-05	PIN CONNECTOR (2P)		
CN11			E40-3240-05	PIN CONNECTOR (5P)		
CN12			E40-3237-05	PIN CONNECTOR (2P)		
CN13		*	E02-2015-05	IC SOCKET (28P)		
L1			L40-1011-17	SMALL FIXED INDUCTOR (100U)		
L2 ,3			L40-4701-17	SMALL FIXED INDUCTOR (47U)		
X1		*	L77-1380-05	CRYSTAL RESONATOR (11.0592MHZ)		
CP1			R90-0455-05	MULTI-COMP 4.7KX8 J 1/4W		
R1 -78			RK73FB2AXXXJ	CHIP R J 1/10W		
R79 ,80			R92-0670-05	CHIP R 0 OHM		
R81 -83			R92-0679-05	CHIP R 0 OHM		

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VR1 -3		*	R12-1090-05	TRIMMING PNT. (4.7K)		
D1			RLS73	CHIP DIODE		
D2 -5			DAP202(K)	CHIP DIODE		
D6			RLS73	CHIP DIODE		
D7		*	RLZ12JB	CHIP ZENER DIODE		
D12 -15			RLS73	CHIP DIODE		
D21			RLS73	CHIP DIODE		
D22			1SS133	CHIP DIODE		
D23			1SS133	CHIP DIODE		
D24			1SS133	CHIP DIODE		
D29 ,30			1SS133	CHIP DIODE		
D32			1SS133	CHIP DIODE		
IC1		*	UPD78C10G-36	IC(MICROPROCESSOR)		
IC2		*	27C256A-25JAN5	IC(RAM)		
IC2		*	27C256AD-20JAN5	IC(RAM)		
IC3		*	TC5564APL-15	IC(8KX8 RAM)		
IC4		*	SN74ALS573BN	IC(TRIPRE UNBUFFERED INVERTER)		
IC5			SN74LS138N	IC(DECODERS)		
IC6		*	MB89363B	IC(MICROPROCESSOR)		
IC7			MSM82C55AFP-5	IC(MICROPROCESSOR)		
IC8		*	M54648L-D	IC(BI-DIRECTIONAL MOTOR DR)		
IC9			PST520D	IC(LOW POWER RESET)		
IC10			SN7404N	IC(6-CIRCUIT INVERTER)		
IC11,12			TC4011BP	IC(NAND X4)		
IC13			MC14584BCP	IC(ENCODER IC)		
IC15,16		*	TC4SU69F	IC(INVERTER GATE)		
Q2 -5			DTC124EK	DIGITAL TRANSISTOR		
Q6 -17		*	FMC1	DIGITAL TRANSISTOR		
Q18			DTC124EK	DIGITAL TRANSISTOR		
BA1		*	W09-0514-05	LITHIUM BATTERY		
VCO (X58-1000-02)						
C1			C092M1H473K	MYLAR 0.047UF K		
C2			CK73FB1H102K	CHIP C 1000PF K		
C3			CC73FCH1H130J	CHIP C 13PF J		
C4 ,5			CC73FCH1HXXXD	CHIP C 1000PF K		
C6			CK73FB1H102K	CHIP C 1000PF K		
C7			CC73FCH1H180J	CHIP C 18PF J		
C8			CC73FCH1H050C	CHIP C 5.0PF C		
C9			CK73FB1H102K	CHIP C 1000PF K		
TC1			C05-0031-15	TRIMMING CAP 10PF		
			E23-0464-05	TERMINAL		
			F11-1018-04	SHIELDING COVER		
			F11-1056-04	SHIELDING COVER		
L1			L32-0682-05	OSCILLATING COIL (3.3U)		
L2			L33-0690-05	CHOKE COIL (3.5T)		
R1 -5			RK73FB2AXXXJ	CHIP R J 1/10W		
D1			1SV50	VARI-CAP DIODE		
Q1			2SK125	FET		
Q2			2SC2714(Y)	CHIP TRANSISTOR		

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VCO (X58-3390-XX) -00 : 144A -02 : 430D						
A7			B42-2437-04	LABEL		
C1			CK73FB1H102K	CHIP C 1000PF K		
C2			CC73FSL1H101J	CHIP C 100PF J		
C3			CC73FCH1H180J	CHIP C 18PF J		430D
C3			CC73FCH1H220J	CHIP C 22PF J		144A
C4			CC73FCH1H100D	CHIP C 10PF D		144A
C4			CC73FCH1H220J	CHIP C 22PF J		430D
C5			CC73FCH1H070D	CHIP C 7.0PF D		
C6			CC73FCH1H120J	CHIP C 12PF J		144A
C6			CC73FCH1H180J	CHIP C 18PF J		430D
C7			CC73FCH1H030C	CHIP C 3.0PF C		
C7			CC73FCH1H120J	CHIP C 12PF J		
C8 ,9			CK73FB1H102K	CHIP C 1000PF K		
C10			CC73FCH1H020D	CHIP C 2.0PF D		430D
C10			CC73FCH1H030C	CHIP C 3.0PF C		144A
C11			CK73FB1H102K	CHIP C 1000PF K		
TC1			C05-0349-05	TRIMMING CAP (10PF)		
TP1 -3			E23-0486-05	TERMINAL		
A1		*	F11-1085-04	SHIELDING COVER		
A2		*	F11-1086-04	SHIELDING COVER		
A6		*	G13-0904-04	CUSHION		
L1			L33-0690-05	CHOKE COIL (3.3U)		
L2		*	L34-2313-05	COIL		430D
L2		*	L34-2315-05	COIL		144A
A3 -5			N30-2604-41	PAN HEAD MACHINE SCREW		
R1 -7			RK73FB2AXXXJ	CHIP R J 1/10W		
D1			1SV166	CHIP VARI-CAP DIODE		
Q1		*	2SK508NV(K52)	CHIP FET		
Q2			2SC2714(Y)	CHIP TRANSISTOR		
VCO (X58-3400-01)						
A7			B42-2437-04	LABEL		
C1			CK73FB1H102K	CHIP C 1000PF K		
C2			CC73FSL1H101J	CHIP C 100PF J		
C3			CC73FCH1H120J	CHIP C 12PF J		
C4			CC73FCH1H100D	CHIP C 10PF D		
C5			CC73FCH1H030C	CHIP C 3.0PF C		
C6 ,7			CC73FCH1HXXD	CHIP C D		
C8			CK73FB1H102K	CHIP C 1000PF K		
C9			CC73FCH1HR75C	CHIP C 0.75PF C		
C10			CK73FB1H102K	CHIP C 1000PF K		
C11			CC73FSL1H101J	CHIP C 100PF J		
C12			CK73FB1H102K	CHIP C 1000PF K		
TC1			C05-0348-05	TRIMMING CAP 6PF		
TP1 -3			E23-0486-05	TERMINAL		
A1			F11-1085-04	SHIELDING COVER		
A2			F11-1086-04	SHIELDING COVER		

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A6			G13-0904-04	CUSHION		
L1		*	L34-2316-05	COIL		
L2			L33-0663-05	CHOKE COIL		
L3 ,4		*	L40-1092-19	SMALL FIXED INDUCTOR (1U)		
A3 -5			N30-2604-41	PAN HEAD MACHINE SCREW		
R1 -6			RK73FB2AXXXJ	CHIP R J 1/10W		
D1			1SV166	CHIP VARI-CAP DIODE		
Q1			2SK508NV(K52)	CHIP FET		
Q2			2SC3356	CHIP TRANSISTOR		
NB (X58-3410-00)						
C1 -7			CK73FB1E103K	CHIP C 0.010UF K		
C8			CE04CW1C100M	ELECTRO 10UF 16WV		
C9			CK73FB1E103K	CHIP C 0.010UF K		
C10			CK73FB1H331K	CHIP C 330PF K		
C11			CK73FB1E103K	CHIP C 0.010UF K		
C12			CK73FB1H102K	CHIP C 1000PF K		
C13			CE04CW1H010M	ELECTRO 1.0UF 50WV		
C14 ,15			CK73FB1E103K	CHIP C 0.010UF K		
W1		*	E40-0411-05	PIN CONNECTOR (4P)		
W2			E40-0311-05	PIN CONNECTOR (3P)		
L1			L40-4701-14	SMALL FIXED INDUCTOR (47U)		
L2 ,3			L30-0281-15	IFT		
L4			L40-1021-14	SMALL FIXED INDUCTOR (1M)		
R1 -14			RK73FB2AXXXJ	CHIP R J 1/10W		
D1			HSM276S	CHIP DIODE		
D2			RLS73	CHIP DIODE		
Q1 -3			2SC2714(Y)	CHIP TRANSISTOR		
Q4 ,5			2SC2712(Y)	CHIP TRANSISTOR		
VCO (X59-3440-00)						
C1			CC73FCH1H080D	CHIP C 8.0PF D		
C2			CK73FB1H102K	CHIP C 1000PF K		
C3			CC73FCH1H030C	CHIP C 3.0PF C		
C4			CK73FB1H103K	CHIP C 0.010UF K		
			E23-0471-05	TERMINAL		
L1			L40-1011-48	SMALL FIXED INDUCTOR (100U)		
R1 -7			RK73FB2AXXXJ	CHIP R J 1/10W		
Q1			2SK210(GR)	CHIP FET		
Q2			2SC2714(Y)	CHIP TRANSISTOR		
LPF (X59-3450-00)						
C1			CK73FB1H103K	CHIP C 0.010UF K		
			E23-0471-05	TERMINAL		
R1 -4			RK73FB2AXXXJ	CHIP R J 1/10W		
Q1 -3			2SC3324(G)	CHIP TRANSISTOR		
MODULE UNIT (X59-3480-00)						
C1			CK73FB1E223K	CHIP C 0.022UF K		

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C2			CK73EB1E104K	CHIP C 0.10UF K		
C3			CK73FB1E103K	CHIP C 0.010UF K		
C4			CK73EB1E104K	CHIP C 0.10UF K		
C5			CK73FB1E223K	CHIP C 0.022UF K		
C6 ,7			CK73EB1E104K	CHIP C 0.10UF K		
C21			CK73FB1H392K	CHIP C 3900PF K		
C22			C92-0004-05	CHIP TAN 1UF 16WV		
C41			CK73FB1E103K	CHIP C 0.010UF K		
C42			CC73FSL1H391J	CHIP C 390PF J		
C43			CK73FB1H182K	CHIP C 1800PF K		
C44			CC73FCH1H330J	CHIP C 33PF J		
C45			CK73FB1H183K	CHIP C 0.018UF K		
C61 ,62			CK73FB1E103K	CHIP C 0.010UF K		
C63			CC73FSL1H561J	CHIP C 560PF J		
C64 -101			CK73FB1EXXXK	CHIP C K		
C102			CK73EB1E104K	CHIP C 0.10UF K		
C103			CK73FB1E103K	CHIP C 0.010UF K		
C104			CK73EB1E104K	CHIP C 0.10UF K		
C105			CK73FB1E223K	CHIP C 0.022UF K		
C106,107			CK73EB1E104K	CHIP C 0.10UF K		
C121			CK73FB1H392K	CHIP C 3900PF K		
C122			C92-0004-05	CHIP TAN 1UF 16WV		
C141			CK73FB1E103K	CHIP C 0.010UF K		
C142			CC73FSL1H391J	CHIP C 390PF J		
C143			CK73FB1H182K	CHIP C 1800PF K		
C144			CC73FCH1H330J	CHIP C 33PF J		
C145			CK73FB1H183K	CHIP C 0.018UF K		
C161,162			CK73FB1E103K	CHIP C 0.010UF K		
C163			CC73FSL1H561J	CHIP C 560PF J		
C164-166			CK73FB1E103K	CHIP C 0.010UF K		
C201			CC73FCH1H331J	CHIP C 330PF J		
C202			CK73FB1H102K	CHIP C 1000PF K		
C203			CK73FB1E223K	CHIP C 0.022UF K		
C204			C92-0004-05	CHIP TAN 1UF 16WV		
C221			C92-0004-05	CHIP TAN 1UF 16WV		
C241			C92-0004-05	CHIP TAN 1UF 16WV		
C242			CC73FCH1H101J	CHIP C 100PF J		
C281			CK73FB1E223K	CHIP C 0.022UF K		
C282-285			CK73FB1H123K	CHIP C 0.012UF K		
C286-301			CK73FB1EXXXK	CHIP C K		
C321-324			CK73FB1H102K	CHIP C 1000PF K		
C341			CC73FCH1H330J	CHIP C 33PF J		
C342			CC73FSL1H391J	CHIP C 390PF J		
C343			CC73FCH1H390J	CHIP C 39PF J		
C344			CK73FB1H102K	CHIP C 1000PF K		
			E23-0471-05	TERMINAL		
L61 ,62		*	L40-2211-48	SMALL FIXED INDUCTOR (220UH)		
L161,162		*	L40-2211-48	SMALL FIXED INDUCTOR (220UH)		
R1 -26			RK73FB2AXXXJ	CHIP R J 1/10W		
R27			R92-0670-05	CHIP R 0 OHM		
R28 -84			RK73FB2AXXXJ	CHIP R J 1/10W		
R85			R92-0670-05	CHIP R 0 OHM		
R101-126			RK73FB2AXXXJ	CHIP R J 1/10W		

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R127			R92-0670-05	CHIP R 0 0HM		
R128-166			RK73FB2AXXXJ	CHIP R J 1/10W		
R167			RK73EB2B122J	CHIP R 1.2K J 1/8W		
R181-184			RK73FB2AXXXJ	CHIP R J 1/10W		
R185			R92-0670-05	CHIP R 0 0HM		
R201-252			RK73FB2AXXXJ	CHIP R J 1/10W		
R253			R92-0670-05	CHIP R 0 0HM		
R261-291			RK73FB2AXXXJ	CHIP R J 1/10W		
R292-297			R92-0670-05	CHIP R 0 0HM		
R301-346			RK73FB2AXXXJ	CHIP R J 1/10W		
D61			RLS73	CHIP DIODE		
D62			HSM88AS	CHIP DIODE		
D81 ,82			RLS73	CHIP DIODE		
D161			RLS73	CHIP DIODE		
D162			HSM88AS	CHIP DIODE		
D181,182			RLS73	CHIP DIODE		
D201		*	IMN10	CHIP DIODE		
D202			RLS73	CHIP DIODE		
D221			RLS73	CHIP DIODE		
D222			DAN202(K)	CHIP DIODE		
D241			DAP202(K)	CHIP DIODE		
D242,243			DAN202(K)	CHIP DIODE		
D261,262			DAN202(K)	CHIP DIODE		
D281			DAN202(K)	CHIP DIODE		
D282			DAP202(K)	CHIP DIODE		
D283			DAN202(K)	CHIP DIODE		
D321			DAN202(K)	CHIP DIODE		
IC1			NJM4558M	IC(OP AMP X2)		
IC21			TC4066BF	IC(BILATERAL SWITCH X4)		
IC41			NJM4558M	IC(OP AMP X2)		
IC101			NJM4558M	IC(OP AMP X2)		
IC121			TC4066BF	IC(BILATERAL SWITCH X4)		
IC141			NJM4558M	IC(OP AMP X2)		
IC201		*	NJM2903M	IC(COMPARATOR X2)		
IC261			TC4011BF	IC(NAND X4)		
IC262			TC4066BF	IC(BILATERAL SWITCH X4)		
IC301			NJM4558M	IC(OP AMP X2)		
IC341			NJM4558M	IC(OP AMP X2)		
Q1			2SC2714(Y)	CHIP TRANSISTOR		
Q21			2SC2712(Y)	CHIP TRANSISTOR		
Q22		*	IMH5	DIGITAL TRANSISTOR		
Q41			2SC2712(Y)	CHIP TRANSISTOR		
Q42			DTC124EK	DIGITAL TRANSISTOR		
Q61 ,62			2SC2712(Y)	CHIP TRANSISTOR		
Q63			2SK210(GR)	FET		
Q64			2SA1162(Y)	CHIP TRANSISTOR		
Q81		*	IMH5	DIGITAL TRANSISTOR		
Q82			2SC2712(Y)	CHIP TRANSISTOR		
Q83		*	IMH5	DIGITAL TRANSISTOR		
Q84			DTA143EK	DIGITAL TRANSISTOR		
Q101			2SC2714(Y)	CHIP TRANSISTOR		
Q121			2SC2712(Y)	CHIP TRANSISTOR		
Q122		*	IMH5	DIGITAL TRANSISTOR		
Q141			2SC2712(Y)	CHIP TRANSISTOR		
Q142			DTC124EK	DIGITAL TRANSISTOR		

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Q161,162 Q163 Q164 Q181 Q182		*	2SC2712(Y) 2SK210(GR) 2SA1162(Y) 1MH5 2SC2712(Y)	CHIP TRANSISTOR CHIP FET CHIP TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR		
Q183 Q184 Q201 Q221 Q222,223		*	1MH5 DTA143EK DTA114EK 2SA1162(Y) DTC124EK	DIGITAL TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR		
Q224 Q225 Q226 Q227 Q228			2SC2712(Y) 2SA1162(Y) DTC124EK 2SA1162(Y) DTC124EK	CHIP TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR		
Q241 Q242,243 Q244 Q261 Q281		*	2SC2712(Y) 2SA1162(Y) DTC124EK 1MH5 2SC2712(Y)	CHIP TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR		
Q321 Q322 Q323 Q324 Q325			DTC124EK 2SA1213(Y) DTC124EK DTA124EK DTC124EK	DIGITAL TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR		
Q326			2SA1213(Y)	CHIP TRANSISTOR		
BAND SW (X59-3490-00)						
C1 -4			CK73FB1H102K E23-0471-05	CHIP C 1000PF K TERMINAL (11P)		
R1 -4			RK73FB2AXXXJ	CHIP R J 1/10W		
D1 Q1 Q2 Q3 Q4			DAN202(K) 2SA1213(Y) DTC124EK 2SA1213(Y) DTC124EK	CHIP DIODE CHIP TRANSISTOR DIGITAL TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR		
Q5 Q6			DTA124EK DTC124EK	DIGITAL TRANSISTOR DIGITAL TRANSISTOR		

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UT-10 (OPTION)						
-			B42-2454-04 B50-8250-10	LABEL INSTRUCTION MANUAL		
-			H01-8207-04	ITEM CARTON BOX		
-			H03-2743-04	OUTER PACKING CASE		
-			H12-1412-03	CARTON BOARD		
-			H25-0029-04	PROTECTION BAG		
-			H25-0723-04	PROTECTION BAG		
			N33-3006-41 N87-3008-46	ØVAL HEAD MACHINE SCREW BRAZIER HEAD TAPTITE SCREW		
			X60-3040-21	COMPOSITE UNIT		
RF UNIT (X44-3070-00)						
C1 ,2			CC73FCH1HXXC	CHIP C	C	
C3			CC73FCH1H330J	CHIP C	33PF J	
C4			CK73FB1H103K	CHIP C	0.010UF K	
C5 ,6			CC73FCH1H100D	CHIP C	10PF D	
C7			CE04EW1H100M	ELECTRO	10UF 50WV	
C8			CC73FCH1H100D	CHIP C	10PF D	
C9 -14			CC73FCH1HXXC	CHIP C	C	
C15			CC73FCH1H150J	CHIP C	15PF J	
C16			CC73FCH1H030C	CHIP C	3.0PF C	
C17 ,18			CC73FCH1HXXXJ	CHIP C	J	
C19			CC73FCH1H100D	CHIP C	10PF D	
C20			CK73FB1H221K	CHIP C	220PF K	
C21			CC73FCH1H150J	CHIP C	15PF J	
C22			CK73FB1H221K	CHIP C	220PF K	
C23			CC73FCH1H100D	CHIP C	10PF D	
C24 ,25			CC73FCH1HXXC	CHIP C	C	
C26			CK73FB1H221K	CHIP C	220PF K	
C27			CK73EB1E473K	CHIP C	0.047UF K	
C28 ,29			CK73FB1H221K	CHIP C	220PF K	
C30			CC73FCH1H120J	CHIP C	12PF J	
C31			CC73FCH1H080D	CHIP C	8.0PF D	
C32 ,33			CK73FB1H221K	CHIP C	220PF K	
C34			CC73FCH1H270J	CHIP C	27PF J	
C35			CK73FB1H222K	CHIP C	2200PF K	
C36 -38			CC73FCH1HXXXJ	CHIP C	J	
C39			CC73FCH1H100D	CHIP C	10PF D	
C40 ,41			CK73FB1H103K	CHIP C	0.010UF K	
C42			CC73FCH1H100D	CHIP C	10PF D	
C43 ,44			CC73FCH1H330J	CHIP C	33PF J	
C45			CK73FB1H221K	CHIP C	220PF K	
C46			CC73FRH1H060D	CHIP C	6.0PF D	
C47			CC73FCH1H390J	CHIP C	39PF J	
C48			CC73FRH1H060D	CHIP C	6.0PF D	
C49			CC73FCH1H100D	CHIP C	10PF D	
C50 ,51			CK73FB1HXXXK	CHIP C	K	
C52			CC73FCH1H100D	CHIP C	10PF D	
C53			CK73FB1H103K	CHIP C	0.010UF K	
C54			CC73FCH1H680J	CHIP C	68PF J	
C55 -57			CK73FB1H221K	CHIP C	220PF K	
C58			CC73FCH1H100D	CHIP C	10PF D	

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C59 ,60			CK73FB1H221K	CHIP C 220PF K		
C61			CC73FCH1H150J	CHIP C 15PF J		
C62			CC73FCH1H040C	CHIP C 4.0PF C		
C63 ,64			CC73FCH1H120J	CHIP C 12PF J		
C65			CC73FCH1H030C	CHIP C 3.0PF C		
C66			CC73FCH1H100D	CHIP C 10PF D		
C67 -69			CK73FB1H221K	CHIP C 220PF K		
C70 ,71			CC73FCH1HXXXC	CHIP C C		
C72			CC73FCH1H330J	CHIP C 33PF J		
C73			CK73FB1H103K	CHIP C 0.010UF K		
C74 ,75			CC73FCH1H100D	CHIP C 10PF D		
C76			CE04EW1A101M	ELECTR0 100UF 10WV		
C77			CC73FCH1H100D	CHIP C 10PF D		
C78 ,79			CC73FCH1HXXXC	CHIP C C		
C80			CC73FCH1H070D	CHIP C 7.0PF D		
C81			CC73FCH1H180J	CHIP C 18PF J		
C82			CC73FCH1H75C	CHIP C 0.75PF C		
C83 -85			CC73FCH1HXXXJ	CHIP C J		
C86			CC73FCH1H010C	CHIP C 1.0PF C		
C87 ,88			CC73FCH1HXXXJ	CHIP C J		
C89 ,90			CC73FCH1HXXXC	CHIP C C		
C91 ,92			CC73FCH1HXXXJ	CHIP C J		
C94			CK73FB1H103K	CHIP C 0.010UF K		
C95			CC73FCH1H100D	CHIP C 10PF D		
C96			CC73FCH1H150J	CHIP C 15PF J		
C97			CE04EW1H100M	ELECTR0 10UF 50WV		
C98			CC73FCH1H180J	CHIP C 18PF J		
C100			CC73FCH1H050C	CHIP C 5.0PF C		
C101			CC73FCH1H150J	CHIP C 15PF J		
C102			CK73FB1H221K	CHIP C 220PF K		
C103,104			CC73FRH1H470J	CHIP C 47PF J		
C106			CK73FB1H221K	CHIP C 220PF K		
C107			CC73FCH1H100D	CHIP C 10PF D		
C108			CK73FB1H222K	CHIP C 2200PF K		
C109			CC73FRH1H070D	CHIP C 7.0PF D		
C110			CC73FCH1H101J	CHIP C 100PF J		
C111			CC73FRH1H080D	CHIP C 8.0PF D		
C112			CC73FCH1H0R5C	CHIP C 0.5PF C		
C113			CC73FRH1H080D	CHIP C 8.0PF D		
C114			CC73FCH1H101J	CHIP C 100PF J		
C115			CC73FRH1H070D	CHIP C 7.0PF D		
C116			CC73FCH1H030C	CHIP C 3.0PF C		
C117-119			CK73FB1H221K	CHIP C 220PF K		
C120,121			CC73FCH1HXXXJ	CHIP C J		
C122-125			CC73FCH1H100D	CHIP C 10PF D		
C126			CK73FB1H221K	CHIP C 220PF K		
C127			CC73FCH1H100D	CHIP C 10PF D		
C128			CK73FB1H221K	CHIP C 220PF K		
C129			CC73FCH1H100D	CHIP C 10PF D		
C130			CK73FB1H221K	CHIP C 220PF K		
C131			CC73FCH1H100D	CHIP C 10PF D		
C132			CK73FB1H221K	CHIP C 220PF K		
C133			CC73FCH1H100D	CHIP C 10PF D		
C134			CK73FB1H221K	CHIP C 220PF K		
C135			CC73FCH1H100D	CHIP C 10PF D		

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TS-790A/E

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C136,137 C138-141			CK73FB1HXXXK CC73FCH1H100D	CHIP C K CHIP C 10PF D		
A12 -16 CN1 CN2 CN3 CN4			E29-0455-04 E04-0159-05 E40-3238-05 E04-0159-05 E40-3242-05	TERMINAL (GND) MINI PIN JACK A (12RA) PIN CONNECTOR EH3P MINI PIN JACK A (12HET) PIN CONNECTOR EH7P		
CN5 CN6 CN7 J1 TP1			E04-0159-05 E04-0154-05 E40-3240-05 E13-0166-05 E04-0154-05	MINI PIN JACK A (12D) RF COAXIAL CABLE RECEPTACLE PIN CONNECTOR EH5P PIN JACK RF COAXIAL CABLE RECEPTACLE		
TP2 TP3 -6			E40-0211-05 E04-0154-05	PIN CONNECTOR 2P RF COAXIAL CABLE RECEPTACLE		
A1 A2 A3 A4 A5		*	F10-1384-04 F10-1385-04 F10-1386-04 F10-1387-04 F10-1388-04	SHIELDING PLATE SHIELDING PLATE SHIELDING PLATE SHIELDING PLATE SHIELDING PLATE		
A6 -8 A9 -11			F11-0836-05 F11-1040-05	SHIELDING COVER SHIELDING COVER		
L1 ,2 L3 L4 L5 L6		*	L79-0827-05 L34-1083-05 L34-1079-05 L34-1124-05 L79-0650-15	HELICAL BLOCK 1.27GHZ COIL 1T COIL 1.5T COIL 6.5T HELICAL RESONATOR 287MHZ		
L7 L8 L9 L10 L11		*	L34-1035-05 L34-1120-05 L79-0650-15 L34-1084-05 L34-1027-05	COIL 11.5T COIL 2.5T HELICAL RESONATOR 287MHZ COIL 4.5T COIL 5.5T		
L12 L13 L14 ,15 L16 L17		*	L34-2041-05 L34-1027-05 L34-4050-05 L34-1207-05 L79-0650-15	TUNING COIL 41MHZ COIL 5.5T COIL COIL 3.5T HELICAL RESONATOR 287MHZ		
L18 L19 L20 ,21 L22 L23		*	L34-1083-05 L39-0446-05 L79-0827-05 L34-1058-05 L34-1083-05	COIL 1T TROIDAL COIL HELICAL BLOCK 1.27GHZ COIL 2.5T COIL 1T		
L25 L26 L27 L28 -31 L32		*	L34-1083-05 L79-0839-05 L34-0956-05 L34-4050-05 L34-1079-05	COIL 1T HELICAL BLOCK 983MHZ COIL 82MHZ COIL COIL 1.5T		
L33 L34 -42			L39-0441-05 L33-0666-05	TROIDAL COIL CHOKE COIL		
R1 -104			RK73FB2AXXXJ	CHIP R J 1/10W		
D1 D2 D3 -8		*	RLZJ5.6 1SV128 RLS135	CHIP ZENER DIODE (5.6V) CHIP DIODE CHIP DIODE		

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D9 ,10 D11 D12 ,13 D14 ,15 D16		*	HSM276S 1SV128 RLZJ5.6 HSM276S RLS135	CHIP DIODE CHIP DIODE CHIP ZENER DIODE (5.6V) CHIP DIODE CHIP DIODE				
IC1 Q1 Q2 ,3 Q4 Q5 -7 Q8 ,9 Q10 Q11 Q12 Q13 Q14		*	UPC1659G 2SC4093 3SK184(R) 2SK125 2SC2712(Y) 2SC4093 2SC3356 2SC3357 2SC3098 2SC3357 FMC3	IC(DRIVE IC) CHIP TRANSISTOR CHIP FET FET CHIP TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR				
FINAL UNIT (X45-3150-00)								
C1 C2 ,3 C4 C5 C6 C7 C8 C9 C10 -12 C13 C14 C15 C16 C17 C18 C19 C20 C21 ,22 C27 -30 C31 C32 C33 -35 C36 C37 -41 C42 C43 C44 C45 C46 C47 ,48 C49 C50 C51 C52 C53 ,54 C55 C56			CC73FCH1H1R5C CK73FB1H102K CE04EW1E470M CC73FCH1H100D CE04EW1E470M CK73FB1H102K CC73FCH1H100D CE04EW1E470M CC73FCH1HXXXC CK73FB1H102K CC73FCH1H100D CE04EW1E470M CK73FB1H102K CC73FCH1H100D CE04EW1E470M CK73FB1H102K CC73FCH1H100D CE04EW1E470M CM73F2AXXXC CM73F2A330J CC73FCH1H010C CC73FCH1H100D CC73FCH1H010C CC73FCH1HXXXD CK73FB1H103K CC73FCH1H100D CC73FCH1H130J CC73FCH1H050C CC73FCH1H060D CC73FCH1HXXXC CC73FCH1H090D CK73FB1H103K CC73FCH1H100D CC73FCH1H330J CC73FCH1HXXXC CC73FCH1H100D CK73FB1H103K	CHIP C CHIP C ELECTRO CHIP C ELECTRO CHIP C CHIP C ELECTRO CHIP C CHIP C CHIP C ELECTRO CHIP C ELECTRO CHIP C CHIP C ELECTRO CHIP C CHIP C ELECTRO CHIP C CHIP C CHIP C CHIP C CHIP C CHIP C CHIP C CHIP C CHIP C CHIP C CHIP C CHIP C CHIP C CHIP C CHIP C CHIP C CHIP C CHIP C CHIP C CHIP C CHIP C CHIP C	1.5PF 1000PF 47UF 10PF 47UF 1000PF 10PF 47UF 1000PF 10PF 47UF 1000PF 10PF 47UF 1000PF 10PF 47UF 33PF 1.0PF 10PF 1.0PF 1.0PF 0.010UF 10PF 13PF 5.0PF 6.0PF 9.0PF 0.010UF 10PF 33PF 10PF 0.010UF	C K 25WV D 25WV K D 25WV C K D 25WV K D 25WV K D 25WV J C D D D K D J C D C D K		

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C57			CC73FCH1H100D	CHIP C 10PF D		
C58			CK73FB1H103K	CHIP C 0.010UF K		
C59			CE04EW1E470M	ELECTR 47UF 25WV		
C60 -70			CC73FCH1HXXD	CHIP C D		
C71			CK73FB1H103K	CHIP C 0.010UF K		
C72 ,73			CC73FCH1H100D	CHIP C 10PF D		
C74			CK73FB1H221K	CHIP C 220PF K		
C75			CC73FCH1H100D	CHIP C 10PF D		
C76			CK73FB1H221K	CHIP C 220PF K		
C77			CC73FCH1H100D	CHIP C 10PF D		
C78			CK73FB1H221K	CHIP C 220PF K		
C79 ,80			CC73FCH1H100D	CHIP C 10PF D		
C81			CK73FB1H221K	CHIP C 220PF K		
C82			CC73FCH1H100D	CHIP C 10PF D		
C83			CK73FB1H221K	CHIP C 220PF K		
C84 -89			CC73FCH1H100D	CHIP C 10PF D		
C90			CK73FB1H221K	CHIP C 220PF K		
C91 -93			CC73FCH1H100D	CHIP C 10PF D		
C94			CK73FB1H221K	CHIP C 220PF K		
C95 -97			CC73FCH1H100D	CHIP C 10PF D		
C98			CK73FB1H221K	CHIP C 220PF K		
C100-104			CC73FCH1H100D	CHIP C 10PF D		
C105			CK73FB1H221K	CHIP C 220PF K		
C106-110			CC73FCH1H100D	CHIP C 10PF D		
TC1 ,2		*	C05-0368-05	TRIMMING CAP 10PF		
CN1			E40-3237-05	PIN CONNECTOR EH2P		
CN2			E40-3242-05	PIN CONNECTOR EH7P		
CN3			E40-3239-05	PIN CONNECTOR EH4P		
W1 ,2			E31-2067-05	CONNECTING WIRE		
A1		*	F10-1383-04	SHIELDING PLATE (POWER MODULE)		
-			J61-0307-05	WIRE BAND		
L1			L92-0121-05	BALLOON COIL		
L2 -6			L33-0666-05	CHOKE COIL		
L9			L33-0666-05	CHOKE COIL		
L10 ,11			L34-1166-05	COIL		
L12			L39-0421-04	COIL		
L13 -20			L33-0666-05	CHOKE COIL		
R1 -34			RK73FB2AXXXJ	CHIP R J 1/10W		
R35			RD14CB2E271J	RD 270 J 1/4W		
VR1			R12-3132-05	TRIMMING PBT. 47K		
K1			S51-1434-05	RELAY		
D1 ,2		*	HSM88ASR	CHIP DIODE		
D3			RLS73	CHIP DIODE		
D4		*	HSM88ASR	CHIP DIODE		
D5			RLZJ4.3	ZENER DIODE (4.3V)		
D6			RLS73	CHIP DIODE		
D7			RLZJ7.5	ZENER DIODE (7.5V)		
D8 ,9			RLS73	CHIP DIODE		
IC1			BA718	IC (OP AMP X2)		
Q1			2SC2712(Y)	CHIP TRANSISTOR		
Q2			2SA1162(Y)	CHIP TRANSISTOR		

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Q3 Q5 Q101 Q102 TH1			MGF1502 2SC2712(Y) M67715 M57762 5TP41L	FET CHIP TRANSISTOR IC(POWER MODULE/ 450-470MHZ) IC(POWER MODULE/ 1.24-1.3GHZ) THERMISTOR (10K)		
PLL UNIT (X50-3090-21)						
C1 ,2 C3 C4 C5 C6 ,7			CK73FB1HXXXK CC73FCH1H020C CK73FB1H223K CC73FCH1H060D CK73FB1HXXXK	CHIP C CHIP C 2.0PF C CHIP C 0.022UF K CHIP C 6.0PF D CHIP C		
C8 C9 C10 ,11 C12 C13			CC73FCH1H0R5C CC73FCH1H180J CK73FB1H103K CC73FCH1H0R5C CC73FCH1H100D	CHIP C 0.5PF C CHIP C 18PF J CHIP C 0.010UF K CHIP C 0.5PF C CHIP C 10PF D		
C14 ,15 C16 C17 ,18 C19 C20			CK73FB1H102K CC73FCH1H120J CK73FB1H103K CC73FCH1H0R5C CC73FCH1H120J	CHIP C 1000PF K CHIP C 12PF J CHIP C 0.010UF K CHIP C 0.5PF C CHIP C 12PF J		
C21 ,22 C23 ,24 C25 -27 C28 C29			CK73FB1H103K CC73FCH1H270J CK73FB1HXXXK CE04EW1E470M C092M1H473K	CHIP C 0.010UF K CHIP C 27PF J CHIP C K ELECTRO 47UF 25WV MYLAR 0.047UF K		
C30 C31 C32 C33 ,34 C35		*	C092M1H103K CE04EW1E470M CK73FB1H222K CC73FUJ1HXXXJ CC73FCH1H470J	MYLAR 0.010UF K ELECTRO 47UF 25WV CHIP C 2200PF K CHIP C J CHIP C 47PF J		
C36 C37 C38 ,39 C40 C41 -44			CK73FB1H102K CE04EW1E470M CK73FB1HXXXK CC73FCH1H330J CK73FB1HXXXK	CHIP C 1000PF K ELECTRO 47UF 25WV CHIP C K CHIP C 33PF J CHIP C K		
C45 C46 ,47 C48 C49 C50			CE04EW1H4R7M CK73FB1HXXXK CC73FCH1H181J CK73FB1H561K CC73FCH1H820J	ELECTRO 4.7UF 50WV CHIP C K CHIP C 180PF J CHIP C 560PF K CHIP C 82PF J		
C51 C52 ,53 C54 C55 C56 -60			CK73FB1H331K CC73FCH1HXXXD CK73FB1H223K CC73FCH1H120J CK73FB1HXXXK	CHIP C 330PF K CHIP C D CHIP C 0.022UF K CHIP C 12PF J CHIP C K		
C61 C62 -64 C65 ,66 C67 -70 C71			CC73FCH1H470J CK73FB1HXXXK CC73FCH1H100D CK73FB1HXXXK CC73FCH1H070D	CHIP C 47PF J CHIP C K CHIP C 10PF D CHIP C K CHIP C 7.0PF D		
C72 C73 ,74 C75 C76			CC73FCH1H030C CK73FB1HXXXK CC73FCH1H150J CK73FB1H102K	CHIP C 3.0PF C CHIP C K CHIP C 15PF J CHIP C 1000PF K		

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C77 ,78 C79 -88 C89 C90 C91			CC73FCH1HXXXJ CK73FB1HXXXK CE04EW1H4R7M C91-1083-05 C092M1H222K	CHIP C J CHIP C K ELECTR0 4.7UF 50WV FILM 0.47UF 63WV MYLAR 2200PF K		
C92 C93 C94 C95 ,96 C97 ,98		*	CK73FB1H103K CE04EW1E470M C91-1102-05 CK73FB1H471K CE04EW1A101M	CHIP C 0.010UF K ELECTR0 47UF 25WV FILM 0.10UF J CHIP C 470PF K ELECTR0 100UF 10WV		
C99 C100,101 C102 C103 C104			CC73FCH1H070D CK73FB1H471K CC73FCH1H050C CK73FB1H103K CC73FCH1H680J	CHIP C 7.0PF D CHIP C 470PF K CHIP C 5.0PF C CHIP C 0.010UF K CHIP C 68PF J		
C105,106 C107-110 C111 C112 C113			CK73FB1H471K CC73FCH1HXXXJ CK73FB1H103K CE04EW1HR47M CC73FCH1H101J	CHIP C 470PF K CHIP C J CHIP C 0.010UF K ELECTR0 0.47UF 50WV CHIP C 100PF J		
C114 C115,116 C117 C118 C119			CK73FB1H102K CC73FCH1H151J CK73FB1H223K CE04EW1H4R7M C91-1083-05	CHIP C 1000PF K CHIP C 150PF J CHIP C 0.022UF K ELECTR0 4.7UF 50WV FILM 0.47UF 63WV		
C120 C121 C122 C123 C124,125		*	C092M1H102K CK73FB1H103K CE04EW1E470M C91-1102-05 CC73FCH1H151J	MYLAR 1000PF K CHIP C 0.010UF K ELECTR0 47UF 25WV FILM 0.10UF J CHIP C 150PF J		
C126 C127 C128,129 C130-134 C135,136			CE04EW1E470M CC73FCH1H151J CE04EW1A101M CC73FCH1HXXXJ CK73FB1HXXXK	ELECTR0 47UF 25WV CHIP C 150PF J ELECTR0 100UF 10WV CHIP C J CHIP C K		
C138-143 C144 C145,146 C147 C148,149			CC73FCH1H151J CK73FB1H102K CC73FCH1H680J CK73FB1H102K CC73FCH1H680J	CHIP C 150PF J CHIP C 1000PF K CHIP C 68PF J CHIP C 1000PF K CHIP C 68PF J		
C150 C151,152 C153 C154 C155			CK73FB1H102K CC73FCH1H680J CE04EW1H4R7M CC73FCH1H120J CC73FCH1H060D	CHIP C 1000PF K CHIP C 68PF J ELECTR0 4.7UF 50WV CHIP C 12PF J CHIP C 6.0PF D		
C156,157 C158 C159-161 C162 C163-170			CK73FB1H103K CE04EW1H4R7M CK73FB1H103K CE04EW1A101M CC73FSL1H221J	CHIP C 0.010UF K ELECTR0 4.7UF 50WV CHIP C 0.010UF K ELECTR0 100UF 10WV CHIP C 220PF J		
C172 C173 C174-176			CC73FCH1H470J CC73FCH1H040C CC73FCH1H100D	CHIP C 47PF J CHIP C 4.0PF C CHIP C 10PF D		
CN1 ,2			E04-0154-05	RF COAXIAL CABLE RECEPTACLE		

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TP1 -7 TP9 TP11 W1		*	E23-0512-05 E23-0512-05 E04-0154-05 E31-3427-05	TERMINAL TERMINAL RF COAXIAL CABLE RECEPTACLE CONNECTING WIRE 11P		
A1 A2 A3			F11-0817-04 F11-0818-24 F10-1206-04	SHIELDING COVER SHIELDING COVER SHIELDING PLATE		
CF1 L1 ,2 L3 -5 L6 -8 L9		*	L72-0349-05 L30-0536-05 L34-0683-05 L34-4106-05 L34-1026-05	CERAMIC FILTER SFJ10.7MA-D IFT 20MHZ COIL 143/154MHZ COIL 82MHZ COIL 7.5T		
L10 L11 L12 L13 L14 ,15			L40-1001-14 L32-0198-05 L40-1001-14 L40-1011-14 L40-2211-14	SMALL FIXED INDUCTOR 10UH OSCILLATING COIL 40MHZ SMALL FIXED INDUCTOR 10UH SMALL FIXED INDUCTOR 100UH SMALL FIXED INDUCTOR 220UH		
L16 L17 L18 L19 ,20 L21 ,22		*	L31-0313-05 L40-1001-14 L34-4107-05 L34-0683-05 L40-1592-17	COIL 10.6MHZ SMALL FIXED INDUCTOR 10UH COIL 154MHZ COIL 143/154MHZ SMALL FIXED INDUCTOR 1.5UH		
L23 -25 L26 -28 L29 L30 L31			L40-1001-14 L34-1207-05 L40-1001-14 L34-1079-05 L40-1001-14	SMALL FIXED INDUCTOR 10UH COIL 3.5T SMALL FIXED INDUCTOR 10UH COIL 1.5T SMALL FIXED INDUCTOR 10UH		
L32 -34 L35 ,36 L37 L38 ,39 L40		*	L34-1079-05 L39-0441-05 L79-0856-05 L79-0857-05 L34-1083-05	COIL 1.5T TROIDAL COIL HELICAL BLOCK 491MHZ HELICAL BLOCK 491MHZ COIL 1T		
L41			L30-0281-15	IFT		
R1 -144 W2			RK73FB2AXXXJ R92-1061-05	CHIP R J 1/10W JUMPER RES 0 OHM		
D1 D2 D3 IC1 IC1			1SV166 ND487C1-3R RLS73 CX-7925B CX-7925B-1	CHIP DIODE DIODE CHIP DIODE IC(DIGITAL SELECT PLL) IC(DIGITAL SELECT PLL)		
IC2 IC3 IC4 IC4 IC5			M54459L SN16913P CX-7925B CX-7925B-1 MB87006A	IC(PRE SCALER) IC(DUBLE BALANCED MIXERS) IC(DIGITAL SELECT PLL) IC(DIGITAL SELECT PLL) IC(FREQ SYNTHESIZER PLL)		
IC6 IC7 Q1 -4 Q5 Q6 ,7			MB504P NJM78L05A 2SC2714(Y) 2SC3098 2SC2714(Y)	IC(MODULUS PRE SCALER) IC(VOLTAGE REGULATOR/ +5V) CHIP TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR		
Q8 Q9 ,10 Q11 ,12			DTC114EK 2SC2714(Y) 2SK210(GR)	DIGITAL TRANSISTOR CHIP TRANSISTOR CHIP FET		

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Q13 Q14 ,15 Q16 -18 Q19 ,20 Q21			2SC3098 2SC2714(Y) 2SC3324(G) 2SC3098 FMC1	CHIP TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR		
Q22 -24 Q25 -27 Q28 Q29 Q30 ,31			DTC114EK 2SC3324(G) 2SC3098 2SC3357 2SC3098	DIGITAL TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR		
Q30 ,31 Q32 Q33			2SC3356 2SC3357 2SA1213(Y)	CHIP TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR		
Z1 Z2 Z3 Z4		*	X59-3450-00 X59-3440-00 X58-3390-01 X58-3400-00	MODULE UNIT MODULE UNIT SUB UNIT SUB UNIT	LPF 40MHZ VCO 180MHZ VCO 310MHZ VCO	
VCO (X58-3390-01)						
A7 C1 C2 C3 ,4 C5 ,6 C7 C8 ,9 C10 C11 C12 TC1 TP1-3 A1 A2 A6 L1 L2 A3 -5 R1 -7 D1 Q1 Q2			B42-2437-04 CK73FB1H102K CC73FSL1H101J CC73FCH1H120J CC73FCH1HXXXD CC73FCH1H030C CK73FB1H102K CC73FCH1H0R5C CK73FB1H102K CC73FCH1H010C C05-0348-05 E23-0486-05 F11-1085-04 F11-1086-04 G13-0904-04 L33-0690-05 L34-2314-05 N30-2604-41 RK73FB2AXXXJ 1SV166 2SK508NV(K52) 2SC2714(Y)	SERIAL LABEL CHIP C 1000PF K CHIP C 100PF J CHIP C 12PF J CHIP C D CHIP C 3.0PF C CHIP C 1000PF K CHIP C 0.5PF C CHIP C 1000PF K CHIP C 1.0PF C TRIMMING CAP 6PF TERMINAL SHIELDING CASE SHIELDING COVER CUSHION CHOKE COIL 3.3UH COIL (3-1/2) PAN HEAD MACHINE SCREW CHIP R J 1/10W CHIP VARI-CAP DIODE CHIP FET CHIP TRANSISTOR		
VCO (X58-3400-00)						
A7 C1 C2 C3 ,4 C5 C6 ,7 C8 C9			B42-2437-04 CK73FB1H102K CC73FSL1H101J CC73FCH1HXXXD CC73FCH1H030C CC73FCH1HXXXD CK73FB1H102K CC73FCH1HR75C	SERIAL LABEL CHIP C 1000PF K CHIP C 100PF J CHIP C D CHIP C 3.0PF C CHIP C D CHIP C 1000PF K CHIP C 0.75PF C		

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C10 C11 C12 C13 C14			CK73FB1H102K CC73FSL1H101J CK73FB1H102K CC73FCH1H010C CK73FB1H102K	CHIP C 1000PF K CHIP C 100PF J CHIP C 1000PF K CHIP C 1.0PF C CHIP C 1000PF K		
C15 TC1			CC73FSL1H101J C05-0348-05	CHIP C 100PF J TRIMMING CAP 6PF		
TP1 -4			E23-0486-05	TERMINAL		
A1 A2			F11-1085-04 F11-1086-04	SHIELDING CASE SHIELDING COVER		
A6			G13-0904-04	CUSHION		
L1 L2 L3 .4		*	L34-2314-05 L33-0663-05 L40-1092-19	COIL (3-1/2T) CHOKE COIL 1UH SMALL FIXED INDUCTOR 1UH		
A3 -5			N30-2604-41	PANHEAD		
R1 -6			RK73FB2AXXXJ	CHIP R J 1/10W		
D2 Q1 Q2			1SV164 2SK508NV(K52) 2SC3356	CHIP VARI-CAP DIODE CHIP FET CHIP TRANSISTOR		
VCO (X59-3440-00)						
C1 C2 C3 C4			CC73FCH1H080D CK73FB1H102K CC73FCH1H030C CK73FB1H103K	CHIP C 8.0PF D CHIP C 1000PF K CHIP C 3.0PF C CHIP C 0.010UF K		
			E23-0471-05	TERMINAL		
L1			L40-1011-48	SMALL FIXED INDUCTOR 100UH		
R1 -7			RK73FB2AXXXJ	CHIP R J 1/10W		
Q1 Q2			2SK210(GR) 2SC2714(Y)	CHIP FET CHIP TRANSISTOR		
LPF (X59-3450-00)						
C1			CK73FB1H103K	CHIP C 0.010UF K		
			E23-0471-05	TERMINAL		
R1 -4			RK73FB2AXXXJ	CHIP R J 1/10W		
Q1 -3			2SC3324(G)	CHIP TRANSISTOR		
COMPOSITE UNIT (X60-3040-21)						
C1			B41-0649-04	CAUTION LABEL(SHIELDING COVER)		
			CK45F1H103Z	CERAMIC 0.010UF Z		
J1	1H	*	E31-3301-05 E31-3428-25 E31-3429-05 E04-0170-05	CONNECTING WIRE(HET1,HET2) CONNECTING WIRE CONNECTING WIRE(FAN) N TYPE RECEPTACLE(ANT)		
A1 A2	2H 2G	*	F11-1135-03 F10-1206-04 F01-0960-11	SHIELDING COVER(FINAL) SHIELDING PLATE HEAT SINK		

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.

PARTS LIST

* New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

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
A3	1H	*	F11-1114-04	SHIELDING COVER(ANT)		
A4	1H	*	F11-1082-13	SHIELDING COVER(FINAL)		
A5	2H	*	F11-1083-02	SHIELDING COVER(RF)		
A6	2G	*	F09-0421-05	FAN		
A7	3H	*	F11-1084-02	SHIELDING COVER(PLL)		
A8			G13-0631-04	CUSHION		
200	2H		J19-0306-05	LEAD HOLDER		
201		*	J32-0907-04	BOSS		
-			J61-0307-05	WIRE BAND		
L1 -3			L92-0118-05	BEAD CORE		
A	1H		N09-0626-04	SCREW		
E	1H		N32-2606-46	FLAT HEAD MACHINE SCREW		
I	1G		N35-3008-46	BINDING HEAD MACHINE SCREW		
J	1H, 2H		N87-2606-46	BRAZIER HEAD TAPTITE SCREW		
K	1H, 2H		N87-3006-46	BRAZIER HEAD TAPTITE SCREW		
L	1H		N87-3008-46	BRAZIER HEAD TAPTITE SCREW		
N	3G		N88-3006-46	FLAT HEAD TAPTITE SCREW		
R	3H	*	N09-2037-14	SCREW		
S	1H		N35-3004-46	BINDING HEAD MACHINE SCREW		
Z1	3H		X50-3070-21	PLL UNIT		
Z2	2H	*	X44-3070-00	RF UNIT		
Z3	1H	*	X45-3150-00	FINAL UNIT		

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

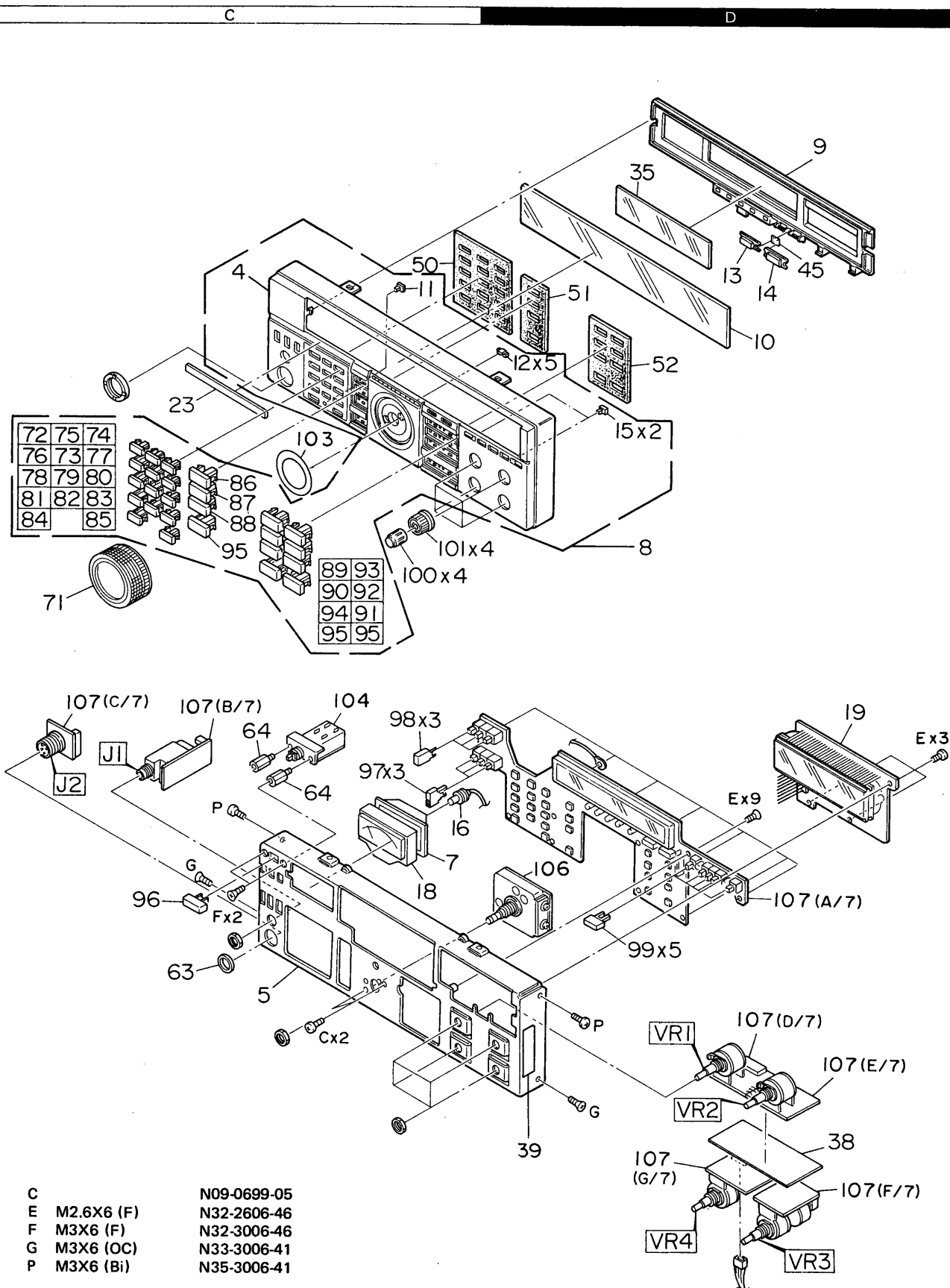
U: PX(Far East, Hawaii) T: England M: Other Areas

UE: AAFES(Europe) X: Australia

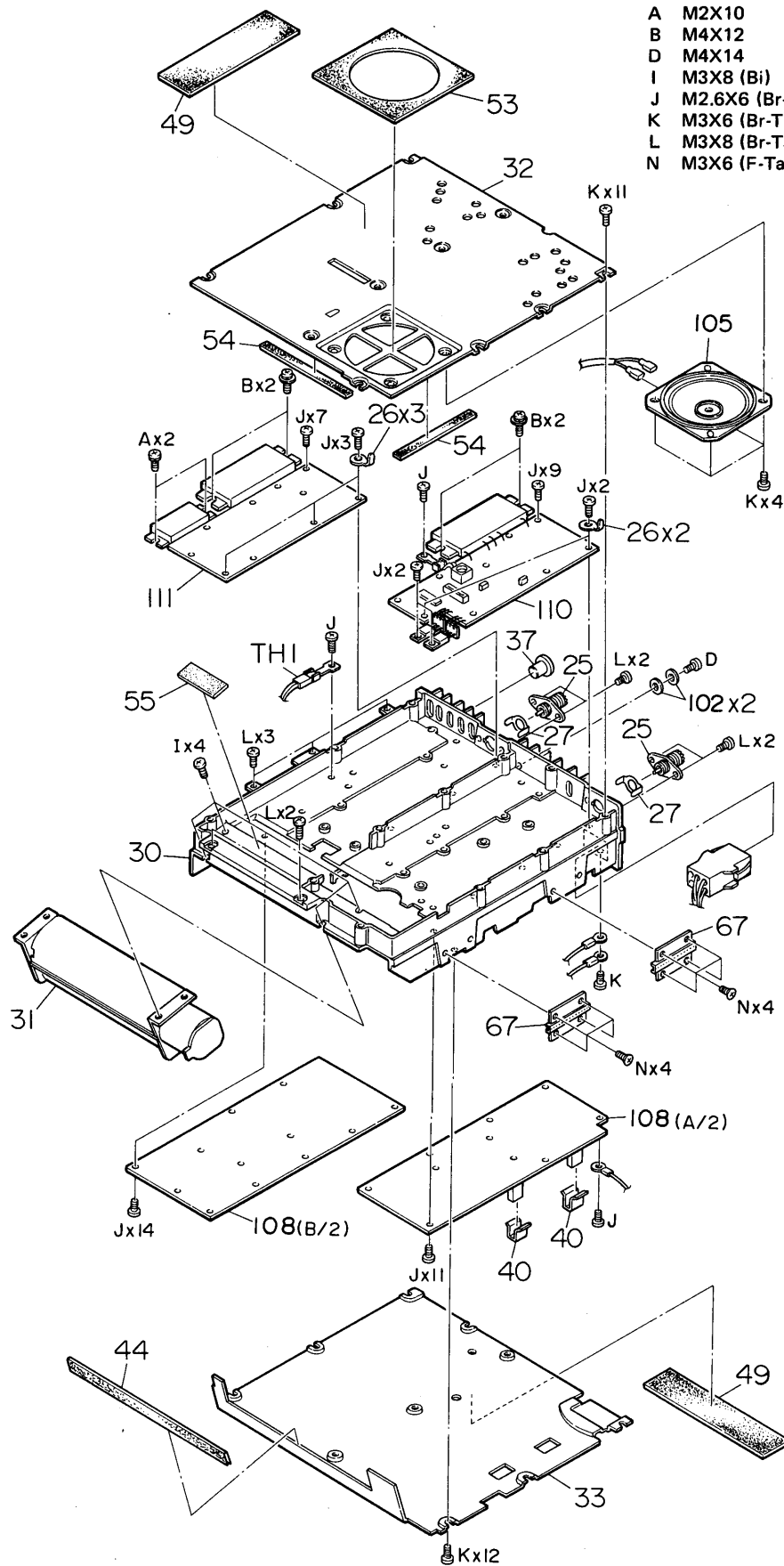
 indicates safety critical components.

IS-790A/E

DISASSEMBLY



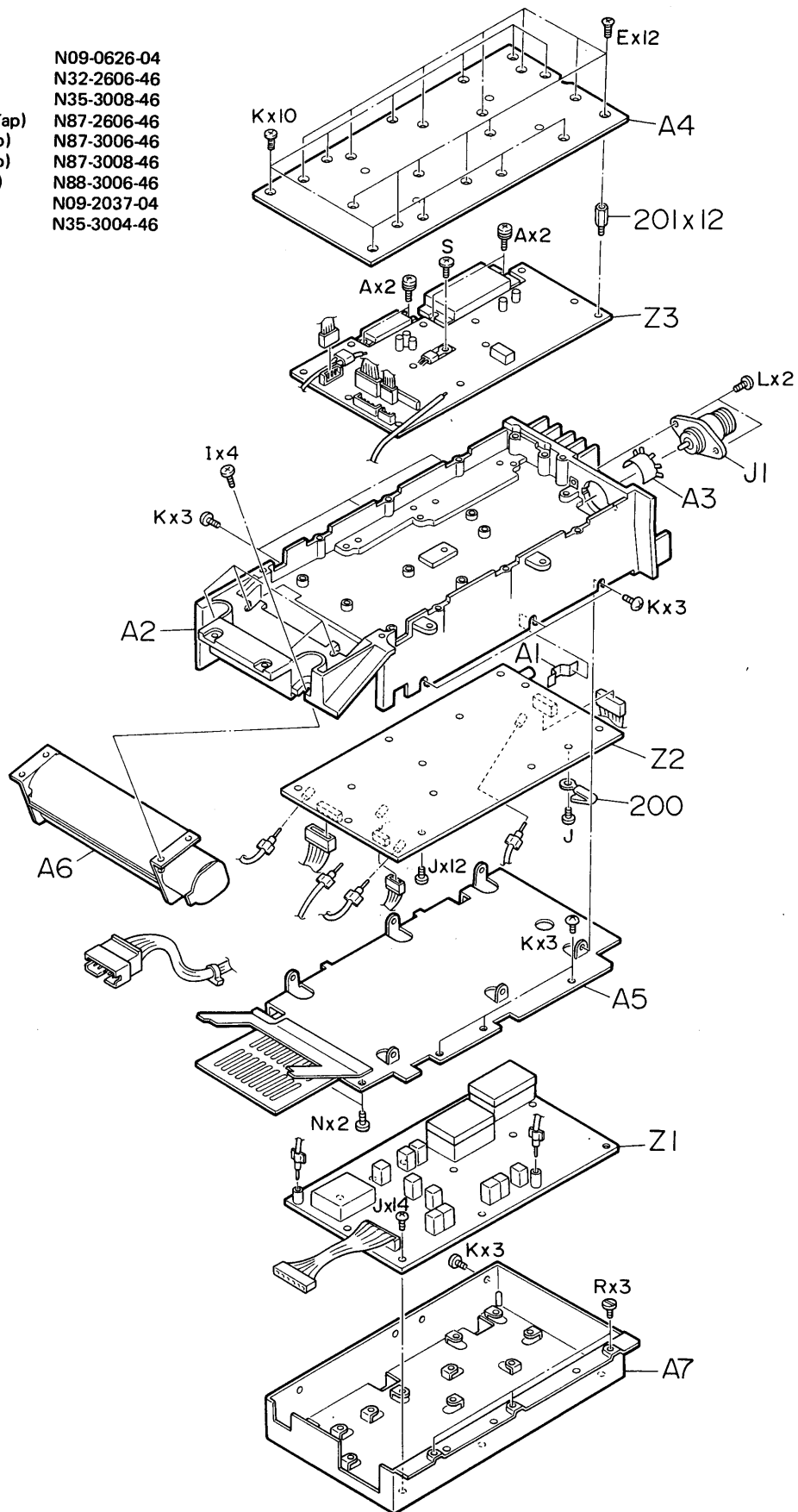
DISASSEMBLY



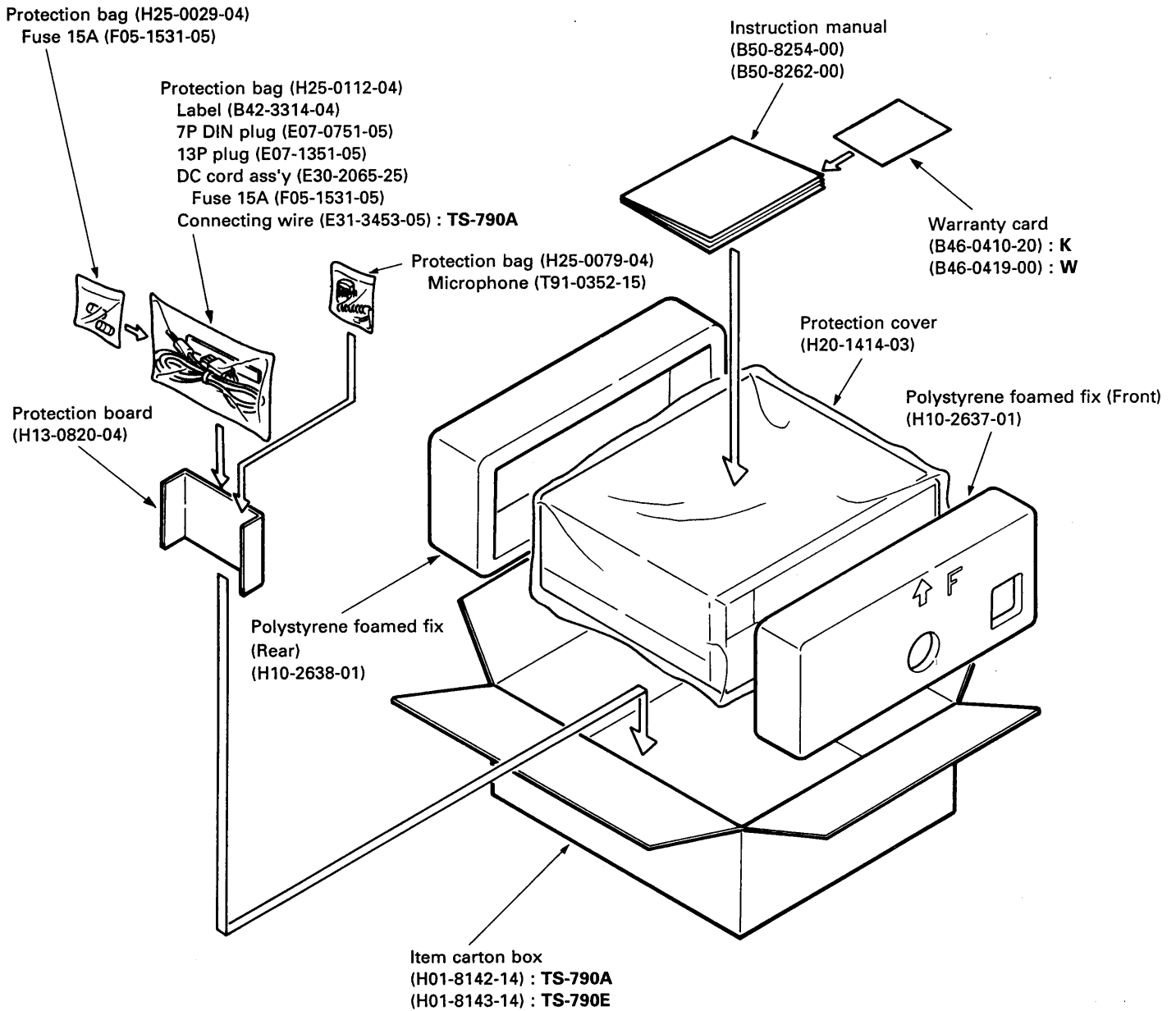
A	M2X10	N09-0626-04
B	M4X12	N09-0649-05
D	M4X14	N30-4014-41
I	M3X8 (Bi)	N35-3008-46
J	M2.6X6 (Br-Tap)	N87-2606-46
K	M3X6 (Br-Tap)	N87-3006-46
L	M3X8 (Br-Tap)	N87-3008-46
N	M3X6 (F-Tap)	N88-3006-46

DISASSEMBLY (UT-10 : OPTION)

A	M3X10	N09-0626-04
E	M2.6X6 (F)	N32-2606-46
I	M3X8 (Bi)	N35-3008-46
J	M2.6X6 (Br-Tap)	N87-2606-46
K	M3X6 (Br-Tap)	N87-3006-46
L	M3X8 (Br-Tap)	N87-3008-46
N	M3X6 (F-Tap)	N88-3006-46
R	M3X6 (F-Tap)	N09-2037-04
S	M3X4 (Bi)	N35-3004-46



PACKING



REQUIRED TEST EQUIPMENT

1. **DC V.M and Tester**
 - 1) High input impedance
2. **RF VTVM (RF V.M)**
 - 1) Input impedance : 1M Ω min., 2pF max.
 - 2) Voltage range : F.S = 10mV to 300V
 - 3) Frequency range : Up to 450MHz
3. **Frequency Counter (f. counter)**
 - 1) Input sensitivity : Approx. 50mV
 - 2) Frequency range : Up to 1300MHz
4. **DC Power Supply**
 - 1) Voltage : 10V to 17V, variable
 - 2) Current : 15A min.
5. **Power Meter**
 - 1) Measurement range : Approx. 50W, 3W, 1W
 - 2) Frequency range : 1300MHz
6. **AF VTVM (AF V.M)**
 - 1) Input impedance : 1M Ω min.
 - 2) Voltage range : F.S = 1mV to 30V
 - 3) Frequency range : 50Hz to 10kHz
7. **AF Generator (AG)**
 - 1) Output frequency : 100Hz to 10kHz
 - 2) Output voltage : 0.5mV to 1V
8. **Linear Detector**
 - 1) Frequency range : 450MHz
9. **Spectrum Analyzer**
 - 1) Frequency range : 450MHz
10. **Directional Coupler**
11. **Oscilloscope**
 - 1) High sensitivity oscilloscope with horizontal input terminal
12. **SSG**
 - 1) Frequency range : 1300MHz band
 - 2) Modulation: AM and FM MOD.
 - 3) Output level : -20dB μ to 100dB μ
13. **Dummy Load**
 - 1) 8 Ω , 5W (approx.)
14. **Noise Generator**
 - 1) Must generate ignition-like noise containing harmonics beyond 450MHz.
15. **Sweep Generator**
 - 1) Sweep range : 144MHz and 450MHz bands
16. **Tracking Generator**

PREPARATION

- 1) Unless otherwise specified, knobs and switches should be set as follows **Table 10**.

POWER SW	ON	RIT SW	OFF
F. LOCK	OFF	AGC FAST	OFF
144 ATT	OFF	NB	OFF
1200 ALT	OFF	MAIN AF VR	MIN
PROC	OFF	SUB AF VR	MIN
MODE	Any freq.	MAIN SQL VR	MIN
FUNCTION	MAIN	SUB SQL VR	MIN
A/B	A	RIT VR	Center
VFO/M	VFO	IF SHIFT VR	Center
MUTE (MAIN)	OFF	MIC VR	MIN
MUTE (SUB)	OFF	RF POWER	MAX

Table 10

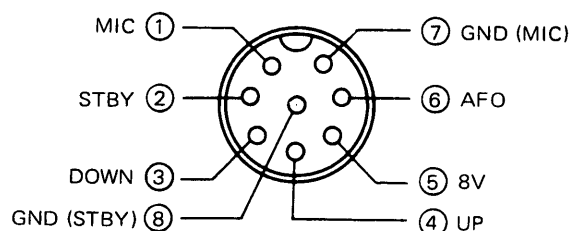


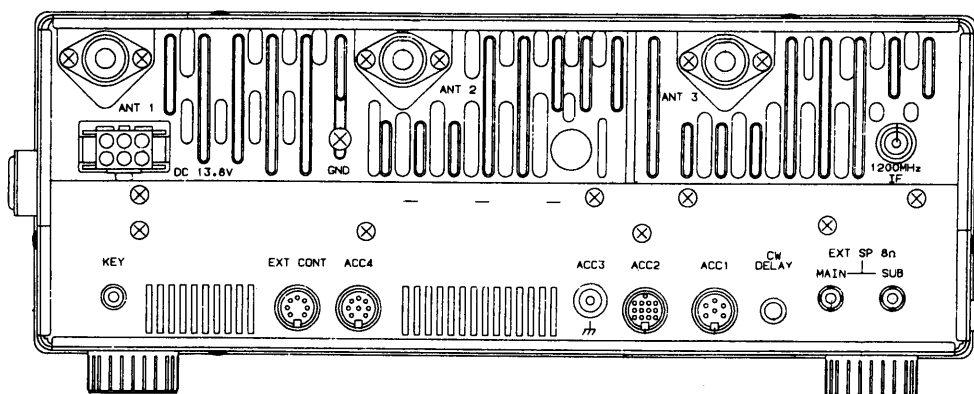
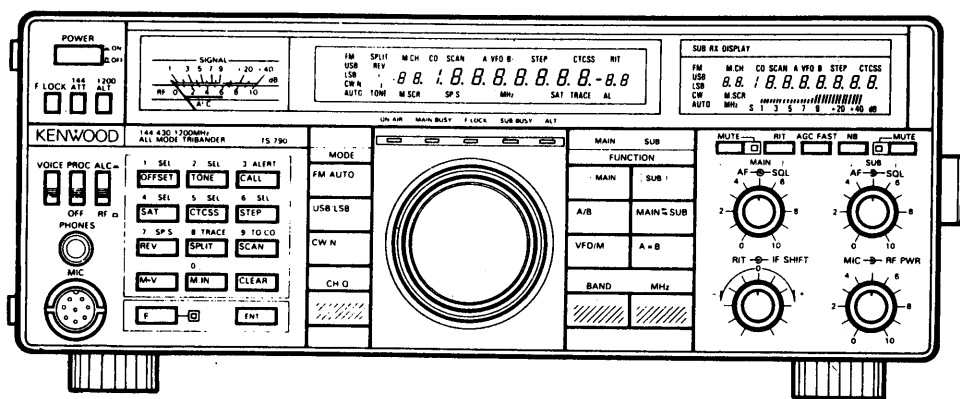
Fig. 27 MIC terminals (view from front panel side)

- 2) Use an insulated adjusting rod to adjust trimmers and coils.
- 3) To prevent damaging SSG, never set the stand by switch to SEND while adjusting the receiver section.
- 4) Be sure to turn the power switch OFF, before connecting the power cable to a power source.
- 5) SSG output levels are those at the time the output terminal is open.

Caution1. Please connect the dummy load to ANT connector, when adjust a transmit output.

Caution2. In case of repair in the 1.2GHz final unit (option) after repaired a radio conform the receiver sensitivity

ADJUSTMENT



COMMON ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Reset	1) Turn the POWER SW ON, holding the [A=B] SW down. Release the [A=B] SW and select MODE : FM.	MAIN DISPLAY FM A VFO 145.000 AUTO SUB DISPLAY FM A VFO 433.000 AUTO						
2. Voltage setting (1) AVR 9T	1) MAIN display VFO : 433.000.0 MODE : USB Connect the microphone to MIC jack. STBY : SEND	DVM (Digital voltmeter)	144M Final	CN1-3	144M Final	VR4	9.0V	±0.1V
3. Carrier balance	1) FUNC : MAIN MODE : USB IF unit VR19 : MIN	Oscilloscope (100MHz)	IF	TP6	IF	TC3	MIN	Oscilloscope should require to measurement more than 100MHz.
	TP4			TC1				
4. Voltage setting (2) RFG (AGC)	1) MAIN display VFO : 145.020 MODE : USB STBY : REC	DVM	IF	TP1	IF	VR19	2.5V	±0.1V
5. Voltage setting (3) RB voltage	1) VFO : Any frequency MODE : USB FUNC : MAIN (MAIN RB)			TP2		VR21	1.6V	±0.1V
	2) FUNC : SUB (SUB RB)			TP3		VR2		
6. Voltage setting (4) IF SHIFT	1) MODE : USB IF SHIFT : Center (12 o'clock)	DVM	SW (G/7)	W7-2 (IFS)	SW (G/7)	VR6	2.2V	±0.1V

ADJUSTMENT

144MHz PLL SYSTEM ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. TCXO	1) VFO : 145.000.0 MODE : FM	f. counter	144M PLL	TP5	144M PLL		102.400000MHz	±10Hz
2. 10.24MHz	1) VFO : 145.000.0 MODE : FM	RF V.M		TP12		L37 L38	Repeat for MAX.	0.08V or more.
3. 30.72MHz	1) VFO : 145.000.0 MODE : FM			CN3-1 (30.72)		L35 L36	Repeat for MAX.	0.15V or more.
4. 51.2MHz	1) VFO : 145.000.0 MODE : FM			TP6		L13 L14	Repeat for MAX.	
5. 102.4MHz	1) VFO : 145.000.0 MODE : FM			TP5		L15 L16	Repeat for MAX.	0.12V (–6dBm) or more.
6. 11.025MHz	1) VFO : 145.020.0 MODE : FM			TP4		L10 L11	Repeat for MAX.	0.3V (2.5dBm) or more.
7. MAIN CAR VCO	1) FUNC : MAIN VFO : 145.000.0 MODE : USB	DVM		TP11		L30	4.0V	±0.1V
	2) MODE : LSB						Check	4.3 ~ 4.7V
8. SUB CAR VCO	1) FUNC : SUB MODE : USB			TP9	144M PLL	L25	4.0V	±0.1V
	2) MODE : LSB							Check
9. MAIN CAR	1) FUNC : MAIN VFO : 145.000.0 MODE : USB	RF V.M		TP10	144M PLL	L27	MAX. Then adjust L27 to 3.6V.	±0.01V
10. SUB CAR	1) FUNC : SUB MODE : USB					TP8	L22	MAX.
11. B loop VCO	1) FUNC : MAIN VFO : 145.000.0 MODE : FM	DVM		TP7		L17	2.5V	±0.1V
	2) VFO : 149.999.9							Check
12. A loop VCO	1) VFO : 144.000.0 MODE : FM			TP2	144M VCO (Z1)	TC1	4.0V	±0.1V
	2) VFO : 145.999.9						Check	4.7 ~ 5.3V
13. 113MHz	1) FUNC : MAIN VFO : 145.020.0 MODE : FM	RF V.M	TP3	144M PLL	L7, L8 L9, L10 L16	Repeat for MAX.	0.08V or more. Turn the core of L8 down from the MAX position when level is not specified.	
14. HET	1) VFO : 145.000.0 MODE : USB				TP1	TC1	MAX.	
15. UNLOCK	1) FUNC : MAIN VFO : 145.000.0	MAIN display				TP2	Connect the TP2 terminal in the 144M PLL unit to the ground.	Display should decimal point.

FM

A VFO

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FM	A VFO
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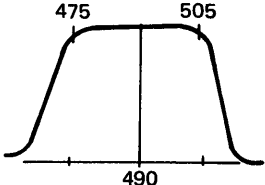
ADJUSTMENT

430MHz PLL SYSTEM ADJUSTMENT

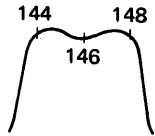
Item	Condition	Measurement			Adjustment			Specifications/Remarks	
		Test-equipment	Unit	Terminal	Unit	Parts	Method		
1. 133MHz	1) FUNC : MAIN MAIN display : 433.020.0 MODE : FM	RF V.M	430M PLL	TP55	430M PLL	L72 L73 L74 L75	Repeat for MAX.	0.08V (-9dBm) or more.	
2. 40.96MHz	1) VFO : 433.000.0 MODE : FM			TP58		L76 L77	Repeat for MAX.		
3. 122.88MHz	1) VFO : 433.000.0 MODE : FM			TP57		L78 L79	Repeat for MAX.	0.20V (-1dBm) or more.	
4. 153MHz	1) VFO : 433.020.0 MODE : FM			TP53		L62	MAX.	0.07V (-10dBm) or more.	
5. 11.025MHz	1) VFO : 433.020.0 MODE : FM			TP56		L71 L72	Repeat for MAX.	0.25V or more.	
6. B loop VCO	1) VFO : 430.000.0 MODE : FM	DVM		TP59		L81	2.5V	±0.1V	
	2) VFO : 432.999.9						Check	4.5 ~ 5.5V	
7. C loop VCO	1) VFO : 430.000.0 MODE : FM			TP54		430M VCO (Z52)	TC1	4.0V	±0.1V
	2) VFO : 430.999.9							Check	4.5 ~ 5.5V
8. A loop VCO	1) VFO : 430.000.0 MODE : FM			TP51		430M VCO (Z50)	TC1	4.0V	±0.1V
	2) VFO : 439.999.9 M2, T, W VFO : 449.999.9 K, M1							Check	7.5 ~ 9.5V M2, T, W 12.0 ~ 15.0V K, M1
9. D loop VCO	1) VFO : 430.000.0 MODE : FM			TP60		430M VCO (Z51)	TC1	4.0V	±0.1V
	2) FUNC : SUB SUB display : 144MHz FUNC : MAIN							Check	Display will change to MAIN from SUB. 4.0 ~ 4.3V
		MAIN DISPLAY			SUB DISPLAY				
		FM A VFO 145.000 AUTO			FM M.CH A VFO 06 430.000 AUTO				
10. HET	1) VFO : 435.000.0 M2, T, W VFO : 440.000.0 K, M1	RF V.M		TP50	430M PLL	TC50	MAX.		
11. HET2	1) VFO : 435.000.0 M2, T, W VFO : 440.000.0 K, M1			TP61		L84	MAX.	0.12V or more.	
12. UNLOCK	1) HET1 VFO : 433.000.0 M2, T, W VFO : 440.000.0 K, M1	MAIN display				TP51	Connect the TP51 or TP61 terminal in the 430M PLL unit to the ground.	Display should decimal point.	
	2) HET2 VFO : 433.000.0 M2, T, W VFO : 440.000.0 K, M1					TP60			
					FM A VFO				

ADJUSTMENT

1.2GHz PLL SYSTEM ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. 20.48MHz	1) VFO : 1260.040 MODE : FM	RF V.M	1.2G PLL	TP1	1.2G PLL	L1 L2	MAX.	0.30V or more.
2. 81.92MHz	1) VFO : 1260.040 MODE : FM			TP3		L2, L6 L7, L8	Repeat for MAX.	0.08V (−10dBm) or more.
3. 143.36MHz	1) VFO : 1260.040 MODE : FM			TP2		L2, L3 L4, L5	Repeat for MAX.	0.12V or more.
4. 153.9725MHz	1) VFO : 1260.040 MODE : FM			TP5		L41, L16 L18, L19 L20	Repeat for MAX.	0.07V or more.
5. HET BPF, HET level (490MHz)	1) VFO : 1280.000 MODE : FM Connect the tracking generator to TP11. Disconnect the CN2 on the 1.2GHz PLL unit. Connect the spectrum analyzer to the CN2 terminal. Spectrum analyzer frequency : 496.4MHz	Tracking generator Spectrum analyzer		TP11 CN2 (12HET)		L37, L38 L39	Adjust balance for wave.	
	2) VFO : 1280.000 MODE : FM	RF V.M		CN2 (12HET)				
6. B loop VCO	1) VFO : 1260.000.0 MODE : FM	DVM		TP4	1.2G PLL	L11	2.5V	±0.1V
	2) VFO : 1299.999.9						Check	5.5 ~ 6.5V
7. A loop VCO	1) VFO : 1299.999.9 MODE : FM			TP7	1.2G VCO (Z3)	TC1	17V	±0.3V
	2) VFO : 1260.000.0						Check	7.5 ~ 9.5V
8. C loop VCO	1) VFO : 1299.999.9 MODE : FM			TP9	1.2G VCO (Z4)	TC1	8.0V	±0.3V
	2) VFO : 1260.000.0						Check	14.0 ~ 17.0V

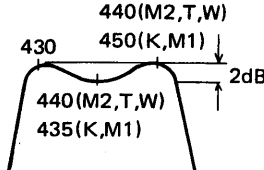
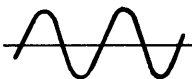
144MHz RECEIVER SYSTEM ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. RX helical	1) VFO : 145.040.0 144ATT : OFF MODE : FM				144M RF	L9	Turn the core of L9 up the 1.5 turn position.	
	Connect the TP2 terminal on the 144M PLL unit to the ground (GND). Disconnect the TP2 terminal from the ground after adjust.	Tracking generator Spectrum analyzer	Rear panel 144M RF	ANT1 (144MHz) CN2 (TP)		L2, L3	Adjust for the waveform perform shown on right.	
								VERT MODE : 2dB/DIV 

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
2. Sensitivity	1) FUNC : MAIN VFO : 145.040.0 T, W VFO : 146.040.0 K, M1, M2 MODE : FM SUB AF : MIN MAIN SQL : MIN MAIN AF : Adjust the AF VOL. to 0.63V with 8Ω dummy. SSG f : 145.040.0 T, W SSG f : 146.040.0 K, M1, M2 MOD : 1kHz DEV : 5kHz Output : 3.2 ~ 100μV (-103 ~ 73dBm)	SSG 8Ω dummy Oscilloscope AF V.M	Rear panel	ANT1 (144MHz) EXT. SP (MAIN)	144M RF	L9 L10 L11 L12 L13	Repeat the adjustment in order of L9, L10, L11, L12 and L13. Repeat for MAX S-meter reading.	Waveform of oscilloscope. 
	2) FUNC : SUB SUB VFO : 145.040.0 T, W SUB VFO : 146.060.0 K, M1, M2 MAIN AF : MIN SUB SQL : MIN SUB AF : 0.63V	MAIN S-meter		EXT. SP (SUB)		L14	Repeat for MAX S-meter reading.	

430MHz RECEIVER SYSTEM ADJUSTMENT

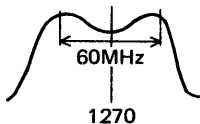
Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. RX helical	1) VFO : 435.040.0 M2, T, W VFO : 440.040.0 K, M1 MODE : FM Disconnect the CN202 (43HET) on the 430M RF unit.  Check that the L206 is about 8mm.	Tracking generator Spectrum analyzer	Rear panel 430M RF	ANT2 (430MHz) CN210 (TP)	430M RF	TC201 TC202 L204 L205	MAX gain. Adjust for the waveform perform	VERT MODE : 2dB/DIV 
2. Sensitivity	1) FUNC : MAIN VFO : 435.040.0 M2, T, W VFO : 440.040.0 K, M1 MODE : FM SUB AF : MIN MAIN SQL : MIN MAIN AF : Adjust the AF VOL. to 0.63V with 8Ω dummy. SSG f : 435.040.0 M2, T, W SSG f : 440.040.0 K, M1 MOD : 1kHz DEV : 5kHz Output : 3.2 ~ 100μV (-103 ~ 73dBm)	SSG 8Ω dummy Oscilloscope AF V.M	Rear panel	ANT2 (430MHz) EXT. SP (MAIN)		L214 L215 L210	Repeat the adjustment in order of L214, L215 and L210. Repeat for MAX S-meter reading.	Waveform of oscilloscope 
	2) FUNC : SUB SUB VFO : 435.040.0 M2, T, W SUB VFO : 440.040.0 K, M1 MAIN AF : MIN SUB SQL : MIN SUB AF : 0.63V	MAIN display		EXT. SP (SUB)		L211 TC203 L208 L209 L212	Repeat the adjustment in order of L211, TC203, L208 and L209. Repeat for MAX S-meter reading. Repeat for MAX S-meter reading.	

TS-790A/E

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
3. IF GAIN	1) FUNC : MAIN VFO : 435.040.0 MODE : USB SSG f : 435.041 MOD : OFF Output : 5 μ V (-93dBm)	SSG 8 Ω dummy Oscilloscope AF V.M MAIN S-meter	Rear panel	ANT2 (430MHz) EXT. SP (MAIN)	IF	VR17	Set the S-meter to "9".	
	2) FUNC : SUB	SUB S-meter		EXT. SP (SUB)		VR14	Set the S-meter to "9".	
4-1. 370MHz	1) FUNC : MAIN VFO : 370.000.0 MODE : FM SSG f : 370.000 MOD : 1kHz DEV : 3kHz Output : 3 ~ 10 μ V	SSG 8 Ω dummy Oscilloscope AF V.M	Rear panel	ANT2 (430MHz) EXT. SP (MAIN)	430M RF	L228 L229 L234	Repeat for MAX.	
4-2. 19.2MHz frequency	2) VFO : 370.000.0 MODE : FM	f. counter		CN211 (TP)		TC204	19.2000MHz	± 10 Hz
5. 870MHz	1) FUNC : MAIN VFO : 870.000.0 MODE : FM SSG f : 870.000 MOD : 1kHz DEV : 3kHz Output : 0.5 μ V (-113dBm)	SSG 8 Ω dummy Oscilloscope AF V.M		TP201 TP202 (GND)		L230 L231 L232 L217 L218 L219 L220	Repeat for MAX.	

1.2GHz RECEIVER SYSTEM ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. RX BPF (Helical)	1) Connect the tracking generator to ANT3 terminal. Tracking generator output : -20dBm Disconnect the CN3 (12HET) on the 1.2GHz RF unit. Connect the spectrum analyzer to TP1 terminal.	Tracking generator Spectrum analyzer	Rear panel 1.2G RF	ANT3 (1.2GHz) TP1	1.2G RF	L1, L2	Adjust obtain the proper 30MHz bandwidth.	1270 $\pm$ 30MHz Set the output of TP1 to -43dBm with 1270MHz. Band edge level : -1.5dB or less. 
2. RX IF	1) VFO : 1268.000.0 Connect the SSG to ANT3 (1.2GHz) terminal. SSG f : 1268.000 MOD : 1kHz DEV : 5kHz Output : 1mV (-47dBm) Connect the spectrum analyzer to J1 (12IF) terminal on the 1.2GHz RF unit. 1.2GHz RF unit TP2 : Short	SSG Spectrum analyzer	Rear panel 1.2G RF	ANT3 (1.2GHz) J1 (12IF) TP2		L6	Repeat for MAX.	12IF output : -30dBm or more.
	2) TP2 : Open						Check	12IF output level should 20dBm down.
3. RIF	1) VFO : 1268.000.0 SSG output : 11 μ V (-86dBm)	SSG	Rear panel	ANT3 (1.2GHz)	1.2G RF	L9 L12	Set the S-meter "8 ~ 9 + 10dB"	

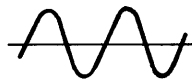
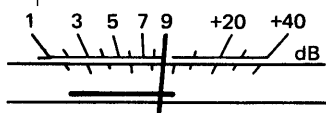
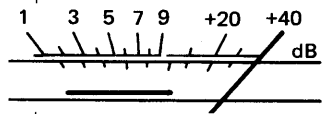
ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
4. IF	1) FUNC : MAIN VFO : 1295.000.0 SUB AF : MIN MODE : FM SSG f : 41.415 MOD : 1kHz DEV : 5kHz Output : 0.27 μ V (-58dBm)	SSG 8 Ω dummy Oscilloscope AF V.M MAIN S-meter	Rear panel	ANT3 (1.2GHz) EXT. SP (MAIN)	IF	L36 L37 L38 L30 L31 L33	Repeat for S-meter reading MAX.	
	2) FUNC : SUB SSG f : 41.315	SUB S-meter		EXT. SP (SUB)		L32	Repeat for MAX.	
5. IF GAIN	1) FUNC : MAIN VFO : 1295.000.0 MODE : USB SSG f : 41.415 MOD : OFF Output : 0.4mV (-55dBm)	SSG 8 Ω dummy Oscilloscope AF V.M MAIN S-meter	Rear panel	ANT3 (1.2GHz) EXT. SP (MAIN)		VR16	Set the S-meter to "9".	
	2) FUNC : SUB SSG f : 41.315	SUB S-meter		EXT. SP (SUB)		VR15	Set the S-meter to "9".	

RECEIVER COMMON SYSTEM ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. MAIN IF GAIN (FM)	1) FUNC : MAIN VFO : 145.040.0 T, W VFO : 146.040.0 K, M1, M2 MODE : FM SUB AF : MIN MAIN SQL : MIN SSG f : 145.040 T, W SSG f : 146.040 K, M1, M2 MOD : 1kHz DEV : 5kHz Output : 2 ~ 100 μ V (-101 ~ -67dBm)	SSG 8 Ω dummy Oscilloscope AF V.M MAIN S-meter	Rear panel	ANT1 (144MHz) EXT. SP (MAIN)	IF	L41 L42 L43 VR18	Repeat for S-meter reading MAX. Repeat the adjust- ment in order of L41 and L42 (3 times).	
2. MAIN discri.	1) VFO : 145.040.0 SSG f : 145.040 MOD : 1kHz DEV : 3kHz Output : 0.5mV (-53dBm) MAIN AF : 6.3V					L54	AF MAX.	
3. MAIN ALT center detection	1) VFO : 145.040.0 SSG f : 145.040 MOD : OFF Output : 5 μ V (-93dBm)	DC V.M	AFC module (A2)	2 pin (OUT)		VR34	2.5V	$\pm 0.05V$
4. MAIN IF GAIN (SSB, CW)	1) VFO : 145.040.0 MODE : USB AGC : FAST MAIN AF : 0.63V SSG f : 145.041 MOD : OFF Output : 0.18 μ V (-123dBm)	SSG 8 Ω dummy Oscilloscope AF V.M	Rear panel	ANT1 (144MHz) EXT. SP (MAIN)		L43 L47 L48 L49 L50	Repeat for AF out- put MAX. Repeat the adjust- ment in order of L43 and L47 (3 times).	
	2) SSG output : 0.16 μ V (-125dBm)						Check	10dB or more at SSG output 0.16 μ V (-125dBm).

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
5. MAIN IF NB GAIN	1) SSG output : 10dBμ	DC V.M	NB unit	TP1	NB unit	L2, L3	Repeat for DC output MIN.	4.0V or more after adjustment (SSG RF : OFF).
6. MAIN tight squelch sensitivity	1) MAIN SQL : MAX SSG output : 0.5μV (-103dBm)				IF	VR20	MAX. (Fully clockwise). Turn the VR20 counterclockwise to the point at which squelch just opens.	No AF output.
7. MAIN SQL threshold point	1) MAIN SQL : Threshold point SSG output : 0.18μV (-123dBm) AGC : FAST After adjustment MAIN SQL : MIN						Adjust to threshold point Turn off the SSG output. Then, turn the SQL vol. counterclockwise to the point at which squelch just opens. Then, turn the SQL vol. clockwise to the point at which squelch just close. SSG RF : ON	SQL VR : 8 : 00 ~ 11 : 00 SQL open.
8. RIT	1) SSG output : 5μV (-93dBm) RIT VR : Center (12 o'clock)	Oscilloscope			SW (G/7)	VR5	Adjust of same frequency to the RIT OFF position.	Receive frequency should change that the RIT vol. will variable 
9-1. S-meter (1) (SSB, CW)	1) S-ø SSG RF : OFF	MAIN S-meter			IF	VR25	Set the S-meter to mechanical "0" point.	
	2) S-1 SSG RF : ON Output : 0.4μV (-115dBm)					VR22	Set the S-meter to "+1".	
	3) S-9 SSG output : 5μV (-93dBm)					VR24	Set the S-meter to "+9".	
9-2. S-meter (2) (FM)	1) VFO : 145.060.0 MODE : FM SSG f : 145.060 MOD : 1kHz DEV : 3kHz Output : 12μV (-86dBm)					VR23	Set the S-meter to "+40".	
10. SUB IF GAIN (FM)	1) FUNC : SUB SUB VFO : 145.040.0 T, W SUB VFO : 146.040.0 K, M1, M2 MODE : FM MAIN AF : MIN SUB SQL : MIN SUB AF : 0.63V SSG f : 145.040 T, W SSG f : 146.040 K, M1, M2 MOD : 1kHz DEV : 5kHz Output : 2 ~ 100μV (-101 ~ -67dBm)	SSG 8Ω dummy Oscilloscope AF V.M SUB S-meter	Rear panel	ANT1 (144MHz) EXT. SP (SUB)		L1 L2 L3 VR10	Repeat for S-meter reading MAX. Repeat the adjustment in order of L1 and L2 (3 times).	

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
11. SUB disci.	1) VFO : 145.040.0 SSG f : 145.040 MOD : 1kHz DEV : 3kHz Output : 0.5mV (-53dBm)	SSG 8Ω dummy Oscilloscope AF V.M	Rear panel	ANT1 (144MHz) EXT. SP (SUB)	IF	L13	AF MAX.	
12. SUB ALT center detection	1) VFO : 145.040.0 SSG f : 145.040 MODE : OFF Output : 5μV (-93dBm)	DC V.M	AFC module (A1)	2 pin (OUT)		VR9	2.5V	±0.05V
13. SUB IF GAIN (SSB, CW)	1) VFO : 145.040.0 MODE : USB MAIN AF : MIN SUB SQL : MIN SUB AF : 0.63V SSG f : 145.041 MOD : OFF Output : 1.6μV (-103dBm)					L6	Turn the core of L6 counterclockwise from surface of the coil.	
	2) SSG output : 0.16μV (-125dBm)					L3, L4 L5, L7	Repeat for AF output MAX.	
							Check	S/N : 10dB or more. AF level : 0.63V/8Ω or more.
14. SUB NB GAIN	1) SSG output : 1.6μV (-103dBm)	DC V.M (Multi-voltmeter)	IF	TP5	IF	L16 L17	Repeat for DC voltage MIN.	4.0V or more after adjust to SUB NB GAIN when the SSG RF off position.
15-1. SUB S-meter (1) (SSB, CW)	1) S-ø SSG RF : OFF AGC : FAST	SUB S-meter				VR6	Set the SUB S-meter to zero (S1 dot disappeared).	
	2) S-1 SSG RF : ON Output : 4μV (-113dBm)					L6	Set the SUB S-meter to S1 (2 dots).	A VFO 1 4 5.0 3 9.0 S 1 3 5 7 9 +20 +40 dB
	3) S-9 SSG output : 5μV (-93dBm)					VR7	Set the SUB S-meter to S9. Conform the S1 reading after adjust to S-9.	S 1 3 5 7 9 +20 +40 dB
	4) SUB display : 145.060.0 SSG RF : OFF	DC V.M SUB S-meter	IF	TP1		VR19	2.3V	±0.1V
		DC V.M	IF	TP1		VR6	Set the SUB S-meter to S2.	S 1 3 5 7 9 +20 +40 dB
	5) SSG output : 4μV (-113dBm)	SUB S-meter				VR19	2.5V	±0.1V
15-2. SUB S-meter (2) (FM)	1) VFO : 145.060.0 MODE : FM SSG f : 145.060 MOD : 1kHz DEV : 3kHz Output : 12μV (-86dBm)					L6	Set the SUB S-meter to S1.	
						VR7	Set the SUB S-meter to S9.	
16. SUB tight squelch sensitivity						VR8	Set the SUB S-meter to "+40" (Full scale).	A VFO 1 4 5.0 6 0 0 S 1 3 5 7 9 +20 +40 dB
	1) VFO : 145.040.0 MODE : USB MAIN AF : MIN SUB SQL : MAX SUB AF : 0.63V SSG f : 145.041 MOD : OFF Output : 0.5μV (-113dBm)					VR1	MIN (counterclockwise)	AF output disappeared.
						VR1	Turn the VR1 clockwise to the point at which squelch just opens.	AF output appeared.

TS-790A/E

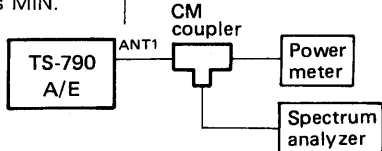
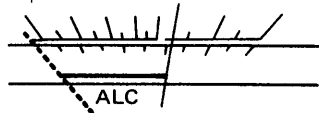
ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
17. SUB threshold sensitivity	1) VFO : 145.040.0 MODE : USB MAIN AF : MIN SUB AF : 0.63V SUB SQL : Threshold point SSG f : 145.041 MOD : OFF Output : 0.18 μ V (-123dBm) After checked SUB SQL : MIN	SSG 8 Ω dummy Oscilloscope AF V.M	Rear panel	ANT1 (144MHz) EXT. SP (MAIN)	IF		Adjust to threshold point Turn off the SSG output. Then, turn the SQL vol. counterclockwise to the point at which squelch just opens. Then, the SQL vol. clockwise to the point at which squelch just close. Then, SSG RF : ON.	SQL VOL : 8 : 00 ~ 11 : 00 Squelch just opens.
18: MUTE	1) FUNC : MAIN VFO : 145.040.0 MODE : FM SSG f : 145.040 MOD : 1kHz DEV : 3kHz Output : 50 μ V (-73dBm)					VR4	Set the AF output to 0.63V/8 Ω with MAIN MUTE : OFF. MAIN MUTE : ON Set the VR4 to 12dB attenuation of the AF output. After adjust to VR4 MAIN MUTE : OFF and MAIN AF : MIN.	MUTE LED : Green — Red Attenuation : 8 ~ 16dB
	2) FUNC : SUB SUB VFO : 145.040.0			EXT. SP (SUB)		VR3	Set the AF output to 0.63V/8 Ω with SUB MUTE : OFF. SUB MUTE : ON Set the VR3 to 12dB attenuation of the AF output. After adjust to VR3 SUB MUTE : OFF and SUB AF : MIN.	MUTE LED : Green — Red Attenuation : 8 ~ 16dB

144MHz TRANSMITTER SYSTEM ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. FM OSC (TIF)	1) VFO : 144.980.0 T, W VFO : 145.980.0 K, M1, M2 MODE : FM MIC terminal : 50 Ω termination Disconnect the 14D and 43D coax. cable on the RF unit. STBY : SEND	RF V.M	IF	CN35-2 (TIF)	IF	L62	MAX	50mVrms or more.
		f. counter				TC2	10.6950MHz	± 100 Hz
2. DRIVE	1) VFO : 144.980.0 T, W VFO : 145.980.0 K, M1, M2 MODE : FM SUB AF : MIN MIC VR : MIN RF PWR VR : Set the RF PWR VR clockwise, then set the indication of RF V.M to 2.7Vrms. STBY : SEND	RF V.M (50 Ω termination)	144M RF	CN8 (14D)	144M RF	L15	MAX.	
						L19 L20 L21 L22 TC1	Adjust in order of L19, L20, L21, L22 and TC1. Repeat for MAX.	2.7V or more.

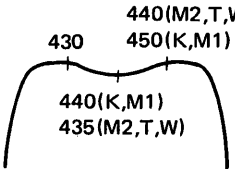
ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
3. Power	1) VFO : 144.980.0 T, W VFO : 145.980.0 K, M1, M2 MODE : FM 144M final unit VR1 : MIN VR2 : MAX RF PWR VR : 45W Disconnect the CN4 connect- or on the 144M final unit. STBY : SEND	DC V.M (Tester)	144M Final	TP1	144M Final	TC1 TC2 TC3 TC4	Repeat for MAX.	
	2) NULL	Power meter	Rear panel	ANT1 (144MHz)		VR3	DC MIN.	
	3) Full power RF PWR VR : MAX						Check	53W or more.
4. APC	1) VFO : 144.980.0 T, W VFO : 145.980.0 K, M1, M2 MODE : FM RF PWR VR : MAX STBY : SEND				144M Final	VR1	47W	±0.5W
5. RF meter	1) ALC/RF : RF STBY : SEND	MAIN S-meter					Check	RF scale : 8 ~ 10
6. Low power	1) RF PWR VR : MIN						Check	1.0 ~ 7.0W RF scale : 1 ~ 4
7. Protection	1) VFO : 147.980.0 MODE : CW ANT1 : Open STBY : SEND	DC A.M (DC power supply galvo- meter)	Rear panel	ANT1 (144MHz)	144M Final	VR2	5.5A	±0.1A
8. 10.7MHz spurious	1) VFO : 147.980.0 STBY : SEND	Power meter CM coupler Spectrum analyzer	Rear panel	ANT1 (144MHz)	144M RF	VR1	fo ± 10.7MHz spurious MIN.	-60dB or more. 
9. SSB power check	1) VFO : 144.980.0 T, W VFO : 145.980.0 K, M1, M2 MODE : USB RF PWR VR : MAX MIC VR : Center (12 o'clock) AG : 1.0kHz/5mV STBY : SEND	Power meter	Rear panel	ANT1 (144MHz)			Check	35W ± 4W
	2) RF PWR VR : MIN							3.0W ± 2.0W
10. ALC meter	1) VFO : 144.980.0 T, W VFO : 145.980.0 K, M1, M2 MODE : USB ALC/RF : ALC RF PWR VR : MAX MIC VR : MIN MIC input : 560Ω termination STBY : SEND	Power meter	Rear panel	ANT1 (144MHz)	IF	VR26	Set the ALC meter to mechanical "0" point.	
	2) MIC input : AG 1kHz/2mV	MAIN S-meter			Front panel	MIC VR	Set the ALC meter to mechanical "0" point.	
	3) MIC input : AG 1kHz/4mV				IF	VR27	ALC zone MAX.	

TS-790A/E

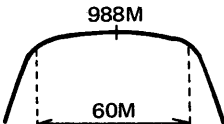
ADJUSTMENT

430MHz TRANSMITTER SYSTEM ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. TX helical	1) VFO : 435.000.0 M2, T, W VFO : 440.000.0 K, M1 Disconnect the CN202 (43HET) on the 430M RF unit. STBY : SEND	Tracking generator Spectrum analyzer	430M RF	CN213 (TP) CN205 (43D)	430M RF	L242 L243	Adjust obtain the proper 20MHz (K, M1) and 10MHz (M2, T, W) bandwidth.	
2. DRIVE	1) VFO : 434.980.0 M2, T, W VFO : 439.980.0 K, M1 MODE : FM SUB AF : MIN MIC VR : MIN RF PWR VR : Set the RF PWR VR clockwise, then set the indication of RF V.M to 2.7Vrms. STBY : SEND	RF V.M (50Ω termination)		CN205 (43D)		L235 L236 L237 L238 L239	MAX Repeat for MAX. adjust in order of L236, L237, L238 and L239.	2.7V or more. (RF PWR VR : MAX)
3. POWER (NULL)	1) VFO : 434.980.0 M2, T, W VFO : 439.980.0 K, M1 MODE : FM 430M final unit VR1 and VR2 : MIN RF PWR VR : 40W STBY : SEND 2) RF PWR VR : MAX	Power meter DC V.M (Tester)	Rear panel 430M Final	ANT2 (430MHz) TP1 (TP)	430M Final	VR3	DC MIN. Check	50W or more.
4. APC	1) VFO : 434.980.0 M2, T, W VFO : 439.980.0 K, M1 MODE : FM 430M final unit VR1 and VR2 : MIN RF PWR VR : MAX STBY : SEND	Power meter	Rear panel	ANT2 (430MHz)	430M Final	VR1	42W	±0.5W
5. RF meter	1) ALC/RF : RF STBY : SEND	MAIN S-meter					Check	RF scale : 8 ~ 10
6. Low power	1) RF PWR VR : MIN STBY : SEND						Check	1.0 ~ 7.0W RF scale : 1 ~ 4
7. Protection (current)	1) VFO : 434.980.0 M2, T, W VFO : 439.980.0 K, M1 MODE : CW ANT2 : Open STBY : SEND	DC A.M (DC power supply galvo-meter)	Rear panel	ANT2 (430MHz)	430M Final	VR2	7.0A	±0.5A
8. SSB power check	1) VFO : 434.980.0 M2, T, W VFO : 439.980.0 K, M1 MODE : USB RF PWR VR : MAX MIC VR : Center (12 o'clock) AG : 1.0kHz/5mV STBY : SEND 2) RF PWR VR : MIN	Power meter	Rear panel	ANT2 (430MHz)			Check	26.0 ~ 35.0W 3.0W ± 2.0W

ADJUSTMENT

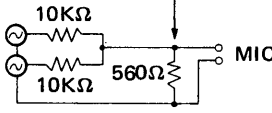
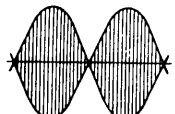
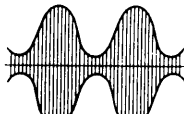
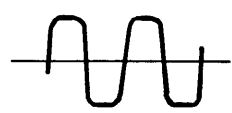
1.2GHz TRANSMITTER SYSTEM ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. HET BPF (L26 helical)	1) Disconnect the CN13(12HET) connector on the 1.2GHz RF unit. Connect the tracking generator to TP4 (HET BPF). Output : 0dBm Connect the spectrum analyzer to TP5 (HET). STBY : SEND	Tracking generator Spectrum analyzer	1.2G RF	TP4 TP5	1.2G RF	L26	Adjust for the waveform perform shown on right.	988 ± 30MHz 
2. HET level check	1) Connect the spectrum analyzer to TP5 (HET). VFO : 1240.000.0 or 1299.999.9 STBY : SEND	Spectrum analyzer	1.2G RF	TP5			Check	-20dBm or more.
3. HET2	1) Connect the CN6 (12HET2) connector from the 1.2GHz PLL unit. Connect the spectrum analyzer to TP6 (HET2). VFO : 1270.000.0 STBY : SEND			TP6	1.2G RF	L27 L28 L29 L30 L31	Repeat for MAX. (245.76MHz)	-20dBm or more.
4. TX BPF (L20, 21 helical)	1) Connect the tracking generator to TP3 (TX BPF). Output : -20dBm Connect the spectrum analyzer to CN5 (12D). STBY : SEND	Tracking generator Spectrum analyzer		TP3 CN5 (12D)		L20 L21	Adjust obtain the proper 1270 ± 30 MHz bandwidth.	12D output level (1270MHz) : -13dBm Band edge level (1240, 1300MHz) : Within 2.0dBm
5. TX IF	1) Connect the SSG to J1 (12IF) connector. SSG f : 289MHz Output : -20dBm Connect the spectrum analyzer to TP5 (12D). TP2 (290BPF) : Short STBY : SEND	SSG Spectrum analyzer		J1 (12IF) CN5 (12D) TP2		L14 L15 L17	Repeat for MAX.	12D output level : 0dB or more.
	2) TP2 (290BPF) : Open						Check	12D output level : -20dBm or less.
6. TX IF GAIN	1) VFO : 1295.000 FUNC : MAIN MODE : FM RF PWR VR : MAX STBY : SEND	RF V.M (50Ω termination)		CN7-5 (12TIF)	IF	L64 L65 L66 L67 L61 L63	Repeat for MAX.	80mVrms or more.
7. POWER	1) VFO : 1280.000 MODE : FM STBY : SEND	Power meter	Rear panel	ANT3 (1.2GHz)	1.2G Final	TC1 TC2	MAX.	14W or more.
8. APC	1) VFO : 1280.000 MODE : FM STBY : SEND					VR1	12W	

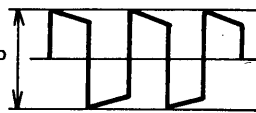
TS-790A/E

ADJUSTMENT

TRANSMITTER COMMON SYSTEM ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Carrier balance	1) VFO : 434.980.0 M2, T, W VFO : 439.980.0 K, M1 MODE : USB/LSB MIC input : 560Ω termination MIC VR : MIN STBY : SEND	Power meter CM coupler Spectrum analyzer	Rear panel	ANT2 (430MHz)	IF	VR29 VR30	MODE : USB Repeat for MIN. After check MODE : LSB	45dB or more.
2. Carrier point	1) VFO : 144.980.0 T, W VFO : 145.980.0 K, M1, M2 MIC VR : Center (12 o'clock) MIC input : AG 400Hz/1mV AG 2.6kHz/1mV STBY : SEND	Power meter CM coupler Oscilloscope AG (2 radios) AF V.M	Rear panel	ANT1 (144MHz)	Control	VR3	Set the VR3 to centered (Mechanical point).	Set the AG output to 1mVrms 
	2) MODE : USB STBY : SEND					VR1	Signal should not contain any noise.	
	3) MODE : LSB STBY : SEND					VR2	OK  NG 	
3. CW level	1) MODE : CW RF/ALC : ALC RF PWR VR : MAX IF unit CN39 : Shorted STBY : SEND	Power meter MAIN S-meter			IF	VR28	ALC zone for MAX.	
4. Processor level	1) MODE : USB MIC input : AG 1kHz/10mV PROC SW : OFF STBY : SEND				Fromt panel	MIC VR	ALC zone for MAX.	
	2) PROC SW : ON STBY : SEND				IF	VR37	ALC zone for MAX.	
	3) MIC input : AG 11Hz/1mV STBY : SEND After check PROC SW : OFF						Check	ALC meter reading within ALC zone.
5. FM DEV	1) MODE : FM MIC input AG 1kHz/20mV M2, T, W AG 1kHz/30mV K, M1 TONE : OFF (check) STBY : SEND	Power meter CM coupler Linear detector or Modulation analyzer AG Oscilloscope			IF	VR33	±4.5kHz	±0.1kHz 
	2) MIC input AG 1kHz/2mV M2, T, W AG 1kHz/3mV K, M1					VR32	±3.0kHz	±0.1kHz 
	3) Check to item 1).							

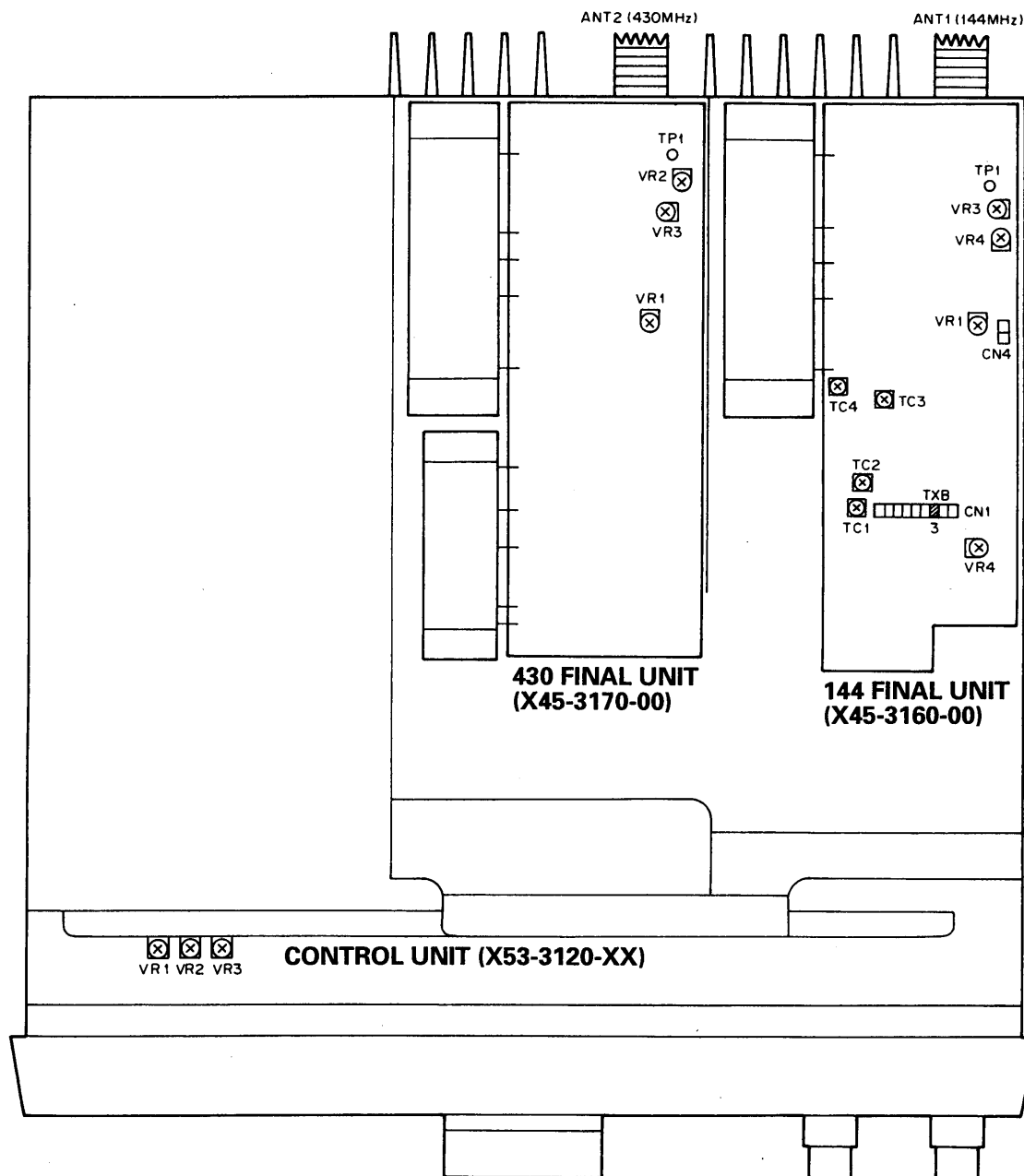
ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
6. CTCSS and TONE K, M1, M2	1) MIC input : 560Ω termination [CTCSS] SW : ON STBY : SEND	Power meter CM coupler Linear detector Oscilloscope f. counter	Rear panel	ANT1 (144MHz)			Check	MAIN display : CTCSS LED will light. f : 88.5Hz DEV : ±0.5 ~ 1.0kHz 
	2) VFO : 439.000.0 MODE : FM [TONE] SW : ON STBY : SEND							MAIN display : TONE LED will light. f : 88.5Hz DEV : ±0.5 ~ 1.0kHz
	3) [CTCSS] SW : ON SUB AF : MIN MAIN AF : Center (12 o'clock) Set the monitor radio to same frequency with CTCSS ON or OFF.	Monitor radio		EXT. SP (MAIN)			Monitor radio CTCSS : OFF	AF output disappeared. MAIN display : CTCSS LED will light.
							Monitor radio CTCSS : ON	AF output appeared. MAIN display : CTCSS LED will light.
	4) FUNC : SUB [CTCSS] SW : ON MAIN AF : MIN SUB AF : Center (12 o'clock) Set the monitor radio to same frequency with CTCSS ON or OFF.			EXT. SP (SUB)			Monitor radio CTCSS : OFF	AF output disappeared. SUB display : CTCSS will light.
							Monitor radio CTCSS : ON	AF output appeared. SUB display : CTCSS will light.
7. TONE T, W	1) [TONE] SW : Holding down Connect the f. counter to the linear detector output.						Check	f : 1750Hz DEV : 2.5 ~ 4.5kHz
8. Side tone	1) MODE : CW SUB AF : MIN MAIN AF : MIN KEY : DOWN Connect a CW key (or its equivalent) to the KEY terminal.	Power meter	Rear panel	ANT1 (144MHz)	IF	VR35	0.1Vrms Press the key and confirm that signal are transmitted, then set 0.1Vrms.	±0.02Vrms
		CW KEY 8Ω dummy Oscilloscope AF V.M		KEY EXT. SP (SUB)		VR11 (DELAY)	Change to MAX from MIN position. Then, set centered.	Confirm that time delay will operate.
9. BEEP	1) MAIN AF : MIN IF unit VR5 : Center [MHz] key : Push to 2 or 3 times.						Check VR5 : 0.4Vpp 0.2 ~ 0.6Vp-p 	

TS-790A/E

ADJUSTMENT

ADJUSTMENT POINT (UPPER)



CONTROL UNIT (X53-3120-XX)

VR1 ~ 3 : Carrier point

FINAL UNIT (X45-3170-00) : 430MHz

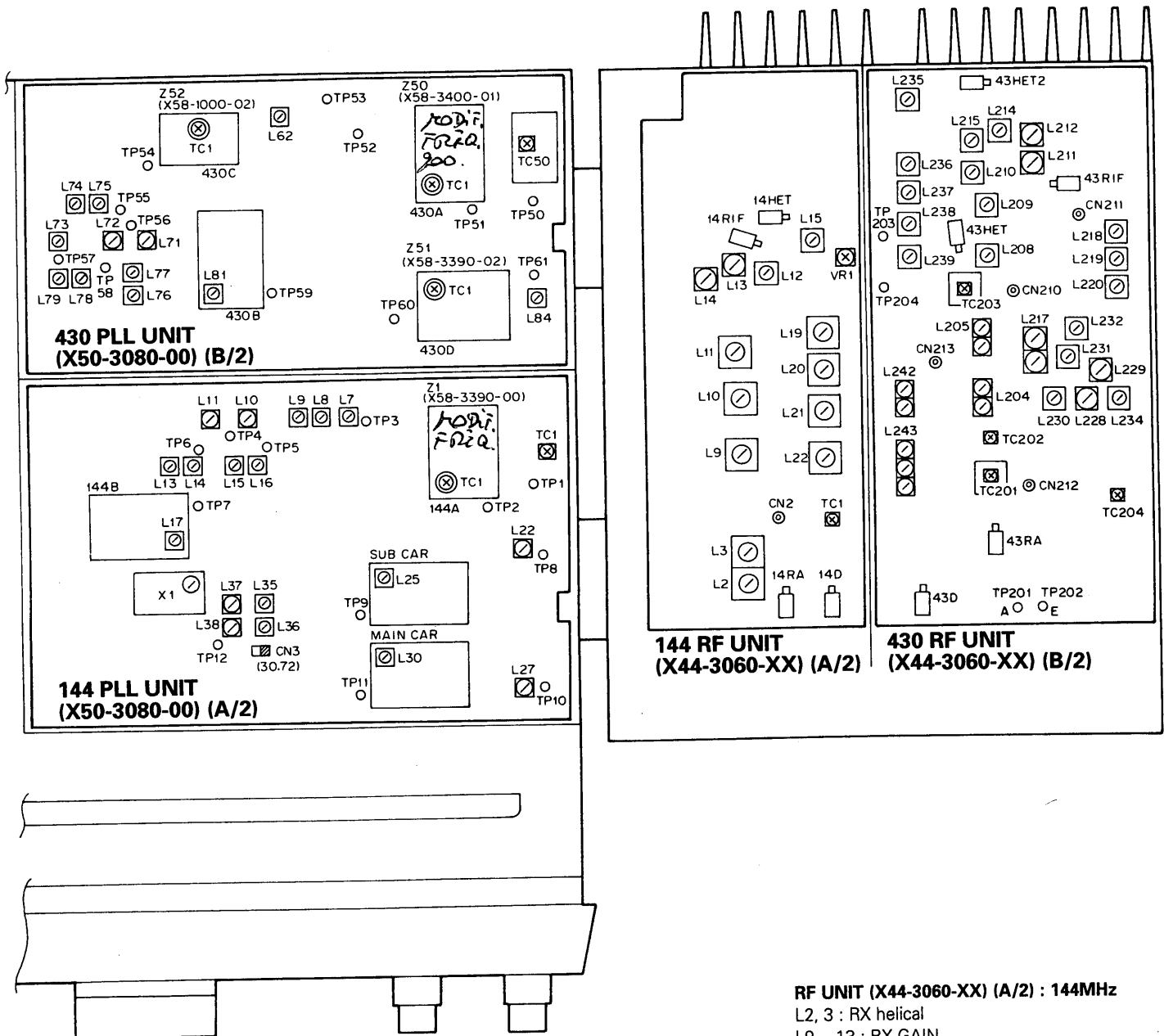
VR1 : APC
VR2 : Protection
VR3 : POWER (NULL)

FINAL UNIT (X45-3160-00) : 144MHz

VR1 : APC
VR2 : Protection
VR3 : POWER (NULL)
VR4 : TXB (9T)
TC1 ~ 4 : TX POWER

ADJUSTMENT

ADJUSTMENT POINT (RF UNIT, PLL UNIT)



PLL UNIT (X50-3080-00) (A/2) : 144MHz

L7 ~ 10, 16 : 133MHz level
 L10, 11 : 11.025MHz level
 L13, 14 : 51.2MHz level
 L15, 16 : 102.4MHz level
 L17 : VCO B loop
 L22 : SUB CAR
 L25 : SUB CAR VCO
 L27 : MAIN CAR
 L30 : MAIN CAR VCO
 L35, 36 : 30.72MHz level
 L37, 38 : 10.24MHz level
 TC1 : HET level
VCO2 144A : Z1 (X58-3390-00)
 TC1 : VCO A loop

PLL UNIT (X50-3080-00) (B/2) : 430MHz

L62 : 153MHz level
 L71, 72 : 11.025MHz level
 L72 ~ 75 : 133MHz level
 L76, 77 : 40.96MHz level
 L78, 79 : 122.88MHz level
 L81 : VCO B loop
 L84 : HET2 (65MHz) level
 TC50 : HET level
VCO 430C : Z52 (X58-1000-02)
 TC1 : VCO C loop
VCO2 430D : Z51 (X58-3390-02)
 TC1 : VCO D loop
VCO 430A : Z50 (X58-3400-01)
 TC1 : VCO A loop

RF UNIT (X44-3060-XX) (A/2) : 144MHz

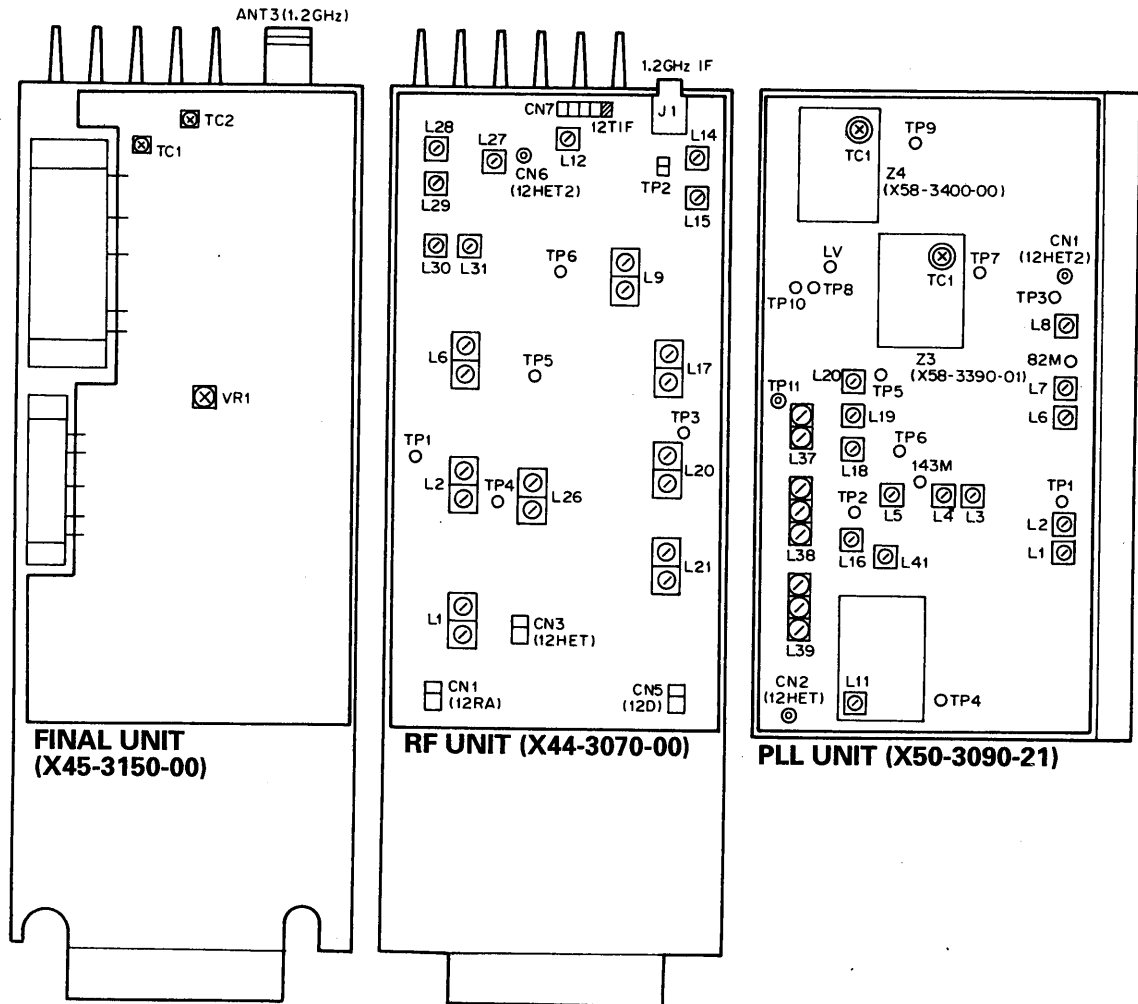
L2, 3 : RX helical
 L9 ~ 13 : RX GAIN
 L13 : RX GAIN (MAIN)
 L14 : RX GAIN (SUB)
 L15, 19 ~ 22 : TX DRIVE
 TC1 : TX DRIVE
 VR1 : TX 10.7MHz spurious

RF UNIT (X44-3060-XX) (B/2) : 430MHz

L204, 205 : RX helical
 L208 ~ 210, 214, 215 : RX GAIN
 L211 : RX GAIN (MAIN)
 L212 : RX GAIN (SUB)
 L217 ~ 220, 230 ~ 232 : 870MHz level
 L228, 229, 234 : 370MHz level
 L235 ~ 239 : TX DRIVE
 TC201, 202 : RX helical
 TC203 : RX GAIN
 TC204 : 19.2MHz frequency

ADJUSTMENT

ADJUSTMENT POINT (UT-10) : OPTION



FINAL UNIT (X45-3150-00)

VR1 : APC
TC1, 2 : APC

RF UNIT (X44-3070-00)

L1, 2 : RX BPF
L6 : RX IF
L9, 12 : RIF
L14, 15, 17 : TX IF
L20, 21 : TX BPF
L26 : HET BPF
L27 ~ 31 : HET2

PLL UNIT (X50-3090-21)

L1, 2 : 20.48MHz level
L2 ~ 5 : 143.36MHz level
L2, 6 ~ 8 : 81.92MHz level
L11 : VCO B loop
L16, 18 ~ 20, 41 : 153.9725MHz level
L37 ~ 39 : HET BPF (490MHz)
180M VCO : Z3 (X58-3390-01)
TC1 : VCO A loop
310M VCO : Z4 (X58-3400-00)
TC1 : VCO C loop

TS-790A/E

TERMINAL FUNCTIONS

Connector No.	Terminal No.	Terminal Name	Terminal Function
SWITCH UNIT (X41-3050-00)			
CN1	1	GND	GND
	2	LRDY	SUB LCD ASS'Y RESET output
	3	FDT	SUB LCD ASS'Y serial data
	4	LCK	SUB LCD ASS'Y serial clock
	5	LLE	SUB LCD ASS'Y enable
	6	5V	+5V
	7	LAMP	SUB LCD ASS'Y pilot lamp voltage
	8	GND	GND for lamp
CN3	1	SBL	SUB LED input
	2	MBL	MAIN LED input
	3	LCK	SUB LCD ASS'Y serial clock
	4	NC	Not used
	5	GND	GND
	6	GND	GND
	7	RES	SUB CPU reset input
	8	FBY	MAIN display BUSY
	9	FLE	MAIN display enable
	10	FDT	MAIN display serial data
	11	FCK	MAIN display serial clock
	12	LLE	SUB LCD ASS'Y enable
	13	LRDY	SUB LCD ASS'Y reset
	14	5V	+5V
CN4	1	GND	GND
	2	MU	MIC UP output
	3	MD	MIC DOWN output
	4	S0	Key scan input (S0)
	5	S1	Key scan input (S1)
	6	S2	Key scan input (S2)
	7	S3	Key scan input (S3)
	8	K0	Key return output (K0)
	9	K1	Key return output (K1)
	10	K2	Key return output (K2)
	11	K3	Key return output (K3)
	12	S4	Key scan input (S4)
	13	S5	Key scan input (S5)
	14	S6	Key scan input (S6)
	15	S7	Key scan input (S7)
	16	GND	GND
CN6	1	MD	MIC DOWN input
	2	MU	MIC UP input
	3	8V	+8V
CN7	1	TON	TONE output
	2	BEP	BEEP output
	3	GND	GND
CN8	1	GND	GND
	2	PC2	APC input
	3	PC3	APC output
	4	PC5	APC input (Q77,80 on IF unit)
	5	PC6	APC output
	6	MV3	MIC amp. input (from MIC GAIN VR)
	7	MV2	MIC amp. output (to Q69 on IF unit)
	8	GND	GND
CN9	1	MAV	MAIN volume control output
	2	SAV	SUB volume control output
	3	AVC	Elect. volume ref. input
	4	AVG	Elect. volume IC GND
	5	MSQ	MAIN SQL output
	6	SSQ	SUB SQL output
	7	GND	GND
CN10	1	GND	GND
	2	MIC	MIC output (from microphone)

Connector No.	Terminal No.	Terminal Name	Terminal Function
	3	GND	GND
	4	SS	MIC PTT output
	5	AF0	AF input for VOX-4
	6	GND	GND
	7	8V	+8V
	8	MU	MIC UP output (from microphone)
	9	MD	MIC DOWN output (from microphone)
CN11	1	PHS	Headphone information
	2	8V	+8V
	3	GND	GND
	4	SSP	SUB AF PA input
	5	EXS	SUB EXT.SP
	6	GND	GND
	7	EXM	MAIN EXT.SP
	8	MSP	MAIN AF PA input
CN12	1	8V	+8V
	2	RB	G2 (gate2) voltage of RX SSB IF amp. input
	3	MAGS	MAIN AGC select (to AGC SW)
	4	SAGS	SUB AGC select (to AGC SW)
	5	NBS	NB SW output (grounded when NB on)
	6	PWR	RF level select output (from ALC/RF SW)
	7	ALM	ALC level select output (from ACL/RF SW)
	8	MSM	MAIN S-meter input
	9	PRS	Processor output voltage (+8V appeared when PROC on)
	10	14ATT	144RF ATT operation (+8V appeared when ATT on)
	11	MAL	MAIN AF LED input voltage
	12	SAL	SUB AF LED input voltage
W6	1	SB	+13.8V input
	2	GND	GND
W7	1	RIT	RIT output
	2	IFS	IF SHIFT output
	3	VRE	Control unit +8V
	4	GND	GND
		SM	S-meter input voltage
		GND	GND
		LAMP	Pilot lamp voltage
		LAMP	Pilot lamp GND
RF UNIT (X44-3060-XX) (A/2) : 144MHz			
CN1		14RA	144MHz RX ANT input
CN2		TP	Test point (144MHz RX helical)
CN3		14HET	144MHz PLL input (127 ~ 162MHz)
CN4	1	TIF	TX IF input (10.695MHz)
	2	GND	GND
CN5	1	SB	+13.8V DC input voltage (from POWER SW)
	2	GND	GND
	3	GND	GND
CN6	1	GND	GND
	2	GND	GND
	3	CB	+13.8V DC output voltage (from SB)
	4	CB	+13.8V DC output voltage (from SB)
	5	CB	+13.8V DC output voltage (from SB)
	6	GND	GND
CN7	1	SB	+13.8V DC output voltage (from POWER SW)
	2	8V	+8V DC output (from IC1)

Connector No.	Terminal No.	Terminal Name	Terminal Function
	3	5V	+5V DC output (from IC2)
	4	GND	GND
CN8		14D	144MHz DRIVE output (144 ~ 148MHz)
CN9	1	9T43	+9V voltage output when TX (to 430MHz RF unit)
	2	TXB	+9V voltage input when TX (from 144MHz final unit)
	3	TXB	+9V voltage input when TX (from 144MHz final unit)
	4	14TXB	+9V voltage output when 144MHz TX
	5	14W	+5V voltage input when wide 144MHz wide band operation (from IF unit)
	6	14AGC	144MHz AGC voltage input (from IF unit)
	7	14ATT	144MHz ATT input (+8V appeared when ATT on)
	8	RXS	+8V voltage input when RX
	9	14M	144MHz MAIN BAND signal input
	10	14S	144MHz SUB BAND signal input
	11	8C	+8V voltage input
	12	CV	144MHz VCO input (DC voltage)
CN10	1	14SRIF	144MHz SUB RX IF output (10.595MHz)
	2	GND	GND
CN11		14MRIF	144MHz MAIN RX IF output (10.695MHz)
RF UNIT (X44-3060-XX) (B/2) : 430MHz			
CN201		43RA	430MHz RX ANT input
CN202		43HET	430MHz PLL input (354 ~ 374MHz)
CN203		43HET2	CAR input MAIN : 65.23MHz, SUB : 65.33MHz
CN204	1	GND	GND
	2	43TIF	430MHz TX IF input (10.695MHz)
CN205		43D	430MHz DRIVE output (430 ~ 450MHz)
CN206	1	43TXB	+9V voltage output when 430MHz TX
	2	GND	GND
CN207	1	43W1	+8V voltage input when 430MHz wide band operation
	2	43W2	+8V voltage input when 430MHz wide band operation
	3	8C	+8V voltage input
	4	43S	430MHz SUB BAND signal input
	5	43M	430MHz MAIN BAND signal input
	6	RXS	+8V voltage input when RX
	7	43AGC	430MHz AGC voltage input
	8	NC	Not used
	9	9T43	+9V voltage input when TX
CN208	1	43SRIF	430MHz SUB RX IF output (10.595MHz)
	2	GND	GND
CN209		43MRIF	430MHz MAIN RX IF output (10.695MHz)
CN210		TP	Test point (430 ~ 450MHz RX helical)
CN211		TP	Test point (19.2MHz)
CN212		TP	Test point (RX helical when 430MHz wide band operation)
CN213		TP	Test point (430 ~ 450MHz TX helical)
RF UNIT (X44-3070-00) : 1.2GHz			
CN1		12RA	1.2GHz RX ANT input
CN2	1	12TXB	+9V voltage output when 1.2GHz TX
	2	12RXB	+8V voltage output when 1.2GHz RX

Connector No.	Terminal No.	Terminal Name	Terminal Function
	3	-6	-6V voltage input
CN3		12HET	1.2GHz PLL input (486 ~ 506MHz)
CN4	1	GND	GND
	2	12V	+12V voltage input when TX
	3	12AGC	1.2GHz AGC voltage
	4	12CB	1.2GHz common +B (13.8V)
	5	12RXB	+8V voltage input when 1.2GHz RX
	6	12TXB	+9V voltage input when 1.2GHz TX
	7	-6	-6V voltage input
CN5		12D	1.2GHz DRIVE output (1240 ~ 1300MHz)
CN6		12HET2	PLL HET input (81.92MHz)
CN7	1	GND	GND
	2	12RIF	1.2GHz RX IF MAIN : 41.415MHz, SUB : 41.315MHz
	3	NC(GND)	Not used
	4	GND	GND
	5	12TIF	1.2GHz TX IF (41.415MHz)
J1		12IF	1.2GHz IF (MAIN : 287.175MHz, SUB : 287.075MHz)
FINAL UNIT (X45-3150-00) : 1.2GHz			
CN1	1	FAN-	Fan starter output voltage
	2	FAN+	+13.8V (from POWER SW)
CN2	1	SB	+13.8V (from POWER SW)
	2	-6	-6V voltage input
	3	12RXB	+8V voltage input when 1.2GHz RX
	4	12TXB	+9V voltage input when 1.2GHz TX
	5	NC(GND)	Not used
	6	12VR	1.2GHz protection detect output
	7	12VF	1.2GHz ALC detect output
CN3	1	B	+13.8V DC input
	2	B	+13.8V DC input
	3	12V	+12V voltage input when TX
	4	12V	+12V voltage input when TX
W1		12D	1.2GHz DRIVE input (1240 ~ 1300MHz)
W2		12RA	1.2GHz RX RF amp. output
FINAL UNIT (X45-3160-00) : 144MHz			
CN1	1	TXS	+8V voltage input when TX
	2	GND	GND
	3	TXB	+9V voltage output when TX
	4	TXB	+9V voltage output when TX
	5	TXB	+9V voltage output when TX
	6	TXB	+9V voltage output when TX
	7	14TXB	+9V voltage input when 144MHz TX
	8	12V	+12V voltage output when TX
	9	NC	Not used
CN2	1	B	+13.8V input (from 430MHz final unit)
	2	B	+13.8V input (from 430MHz final unit)
	3	GND	GND
	4	GND	GND
	5	12V	+12V voltage output when TX (to 430MHz final unit)
CN3	1	FAN-	Fan starter output
	2	FAN+	+13.8V DC (from POWER SW)
CN4	1	14VR	144MHz protection detect output
	2	14VF	144MHz ALC detect output
CN5	1	43TH	Temperature detect input
	2	M	Fan detect input
CN6	1	SB	+13.8V input (from POWER SW)
	2	SB	+13.8V output (to 430MHz final unit)

Connector No.	Terminal No.	Terminal Name	Terminal Function
CN7	1	PD	POWER DOWN output
	2	GND	GND
W22		14RA	144MHz RX ANT output
W23		14D	144MHz DRIVE input
FINAL UNIT (X45-3170-00) : 430MHz			
CN1	1	B	+13.8V output (to POWER SW)
	2	B	+13.8V output (to POWER SW)
	3	B	+13.8V output (to 1.2GHz final unit)
	4	B	+13.8V output (to 1.2GHz final unit)
	5	B	+13.8V output (to 144MHz final unit)
	6	B	+13.8V output (to 144MHz final unit)
	7	12V	+12V voltage input when TX (from 144MHz final unit)
	8	GND	GND
	9	GND	GND
CN2	1	SB	+13.8V input (from 144MHz final unit)
	2	B	+13.8V DC input (from 6P plug)
	3	B	+13.8V DC input (from 6P plug)
CN3	1	12VR	1.2GHz protection detect input
	2	12VF	1.2GHz ALC detect input
	3	14VR	144MHz protection detect input
	4	14VF	144MHz ALC detect input
	5	PRO	All band protection output
	6	12VF	1.2GHz protection detect output
	7	43VF	430MHz protection detect output
	8	14VF	144MHz protection detect output
	9	43TXB	+9V voltage input when 430MHz TX
	10	GND	GND
	11	M	Fan detect output
	12	43TH	Temperature detect output
	13	TH	Thermister detect input
	14	GND	GND
W1		43D	430MHz DRIVE input
W2		43RA	430MHz RX ANT output
IF UNIT (X48-3050-XX)			
CN1		12SRIF	1.2GHz SUB RX IF input (10.595MHz)
CN2	1	GND	GND
	2	14SRIF	144MHz SUB RX IF input (10.595MHz)
	3	GND	GND
	4	43SRIF	430MHz SUB RX IF input (10.595MHz)
CN3	1	SAL	SUB AF LED output (to SW unit)
	2	MAL	MAIN AF LED output (to SW unit)
	3	14ATT	144MHz ATT control input (from SW unit)
	4	PRS	Processor control input
	5	MSM	MAIN S-meter output
	6	ALM	ALC meter input
	7	PWR	RF meter input
	8	NBS	NB control input (grounded when NB on)
	9	SAGS	SUB AGC select
	10	MAGS	MAIN AGC select
	11	RB	RX SSB IF AGC ref. voltage
	12	8V	+8V
CN4	1	TXD	TX data input
	2	RXD	RX data output
	3	GND	GND
	4	CTS	TX available data output
	5	RTS	TX request data input
	6	GND	GND
	7	DGD	Digital GND
	8	GND	GND

Parsonal computer control signal

Connector No.	Terminal No.	Terminal Name	Terminal Function
CN5		RCA	ACC3 (RCA)
CN6 (ACC1)	1	DGD	Parsonal computer control signal I/O
	2	TXD	
	3	RXD	
	4	CTS	
	5	RTS	
	6	NC	
CN7 (ACC2)	1	SAF	SUB AF output voltage (Ref. 300mV/47Ω)
	2	ACC	Connect to ACC3 pin jack of CN5 with parallel
	3	MAF	MAIN AF output voltage (Ref. 300mV/47Ω)
	4	GND	GND
	5	MSQ	GND level when MAIN SQL opened
	6	MSM	MAIN S-meter output
	7	SSQ	GND level when SUB SQL opened
	8	GND	GND
	9	DTS	STBY terminal for terminal only
	10	SSM	SUB S-meter output
	11	ANI	Data signal input from terminal
	12	GND	GND
	13	SS	STBY terminal (grounded when TX)
CN8	1	CTC	Clock output
	2	RD	Tone detect AF output
	3	5C	+5V voltage output
	4	GND	GND
	5	DET	"H" level when tone detected
	6	CTD	Tone data output
	7	CTS	Enable output
CN9	1	OUT	FM AF line output when operated
	2	IN	SUB CTCSS
CN10	1	CB	+13.8V (from POWER SW)
	2	GND	GND
	3	GND	GND
	4	VD	VS-2 input
CN11	1	PHS	"H" level when connected headphone
	2	8V	+8V
	3	GND	GND
	4	CB	Common +13.8V
CN12	1	AF0	AF output for VOX-4
	2	GND	GND
CN13	1	SP	Internal speaker output
	2	GND	GND
CN14	1	GND	GND
	2	SSP	SUB AF PA output
	3	EXS	Connect the SUB EXT. SP jack
	4	GND	GND
	5	EXM	Connect the MAIN EXT. SP jack
	6	MSP	MAIN AF PA output
CN16	1	MAV	MAIN volume control input
	2	SAV	SUB volume control input
	3	AVC	Elect. volume ref. output
	4	AVG	GND
	5	MSQ	MAIN SQL input
	6	SSQ	SUB SQL input
CN17	1	HV	+24V
	2	CV	PLL VCO voltage (DC voltage)
CN18		SCAR	SUB CAR input (10.592 ~ 10.598MHz)
CN19		EXT. S	Connect the SUB EXT. SP jack
CN20		EXT. M	Connect the MAIN EXT. SP jack

to SUB CTCSS unit

Connector No.	Terminal No.	Terminal Name	Terminal Function
CN21	1	MCD	MAIN CTCSS detect signal
	2	NC	Not used
	3	NC	Not used
	4	SEP	Speaker separate signal
	5	SMUT	SUB MUTE signal
	6	MMUT	MAIN MUTE signal
	7	SABK	SUB audio stage blanking signal
	8	DEN	SUB CTCSS data (enable)
	9	SCT	SUB CTCSS signal
	10	ATV	1.2GHz TIF STOP signal
	11	SBL	SUB BUSY LED signal
	12	SBC	SUB BUSY output
	13	SRBK	SUB IF stage blanking signal
	14	NC	Not used
	15	NC	Not used
	16	SSCB	SUB SSB, CW mode signal
	17	SFMB	SUB FM mode signal
	18	SSM	SUB S-meter output
	19	DL2	CW semi-break-in delay signal MAIN disci output signal
	20	DL1	CE break-in delay ref. voltage
	21	NC	Not used
	22	SDIS	SUB ALT disci output signal
	23	NC	Not used
	24	SCD	SUB CTCSS detect signal
CN22	1	GND	GND
	2	ANI	External modulation AF output
CN30	1	12RIF	1.2GHz RX IF input MAIN : 41.415MHz, SUB : 41.315MHz
	2	GND	GND
	3	GND	GND
	4	30.72	30.72MHz input (from PLL unit)
CN31	1	GND	GND
	2	FMD	FM modulation input (from FM MIC amp.)
CN32	1	-6	-6V
	2	12TXB	+9V voltage appeared when 1.2GHz TX
	3	12RXB	+8V voltage appeared when 1.2GHz RX
	4	12CB	1.2GHz common +B (+13.8V)
	5	12AGC	1.2GHz AGC voltage output
	6	PD	POWER DOWN input
	7	GND	GND
CN33		10.24M	10.24MHz ref. OSC input
CN34	1	12TIF	1.2GHz TX IF output (41.415MHz)
	2	GND	GND
CN35	1	GND	GND
	2	TIF	144MHz TX IF output (10.695MHz)
	3	ICN	Internal connection
CN36	1	ICN	Internal connection
	2	PC6	TIF gain control
	3	PC5	TIF gain control
	4	PC3	ALC threshold control
	5	PC2	ALC threshold control
	6	GND	GND
CN38 (ACC4)	1	ALC	Internal ALC output voltage
	2	GND	GND
	3	NC	Not used
	4	ATV	1.2GHz TIF STOP signal input
	5	NC	Not used
	6	12TXB	+9V voltage output when 1.2GHz TX
	7	CB	Common +B (+13.8V)
	8	SS	STBY terminal

Connector No.	Terminal No.	Terminal Name	Terminal Function
CN39	1		} Shorted when use to ALC meter (all mode)
	2		
CN40	1	OUT	} FM AF line output when operated MAIN CTCSS
	2	IN	
CN41	1	CTC	Clock output
	2	RD	Tone detect AF output
	3	5C	+5V voltage output
	4	GND	GND
	5	DET	"H" level when tone detected
	6	CTD	Tone data output
	7	CTS	Enable output
CN42		KEY	Connect to the KEY jack
CN43 (EXT. CONT)	1	430TXG	"GND" level when 430MHz TX
	2	SS	STBY terminal (GND : transmit)
	3	ALC	External ALC input 1
	4	1.2TXG	"GND" level when 1.2GHz TX
	5	ALC	External ALC input 2
	6	144TXG	"GND" level when 144MHz TX
	7	ALC	External ALC input 3
CN44	1	BEP	BEEP input
	2	TON	TONE input
	3	GND	GND
	4	FMM	FM MIC amp. input (to AF MIC amp.)
	5	GND	GND
	6	GND	GND
	7	FMD	FM modulation output
CN45	1	FMM	FM MIC amp. output
	2	GND	GND
	3	GND	GND
	4	MV2	SSB MIC amp. input
	5	MV3	SSB MIC amp. output (from IC10)
CN46	1	GND	GND
	2	MIC	MIC input (from microphone)
	3	SS	STBY terminal (MIC PTT)
CN47	1	GND	GND
	2	CB	Common +B (+13.8V)
CN48	1	TXB	+9V voltage appeared when TX
	2	TXB	+9V voltage appeared when TX
	3	TXS	TXB control signal output
	4	GND	GND
	5	14VF	144MHz ALC detect input
	6	43VF	430MHz ALC detect input
	7	12VF	1.2GHz ALC detect input
	8	PRO	All band protection detect input
	9	GND	GND
CN49		MCAR	MAIN CAR input (10.692 ~ 10.698MHz)
CN50	1	43W2	Band information
	2	43W1	Band information
	3	14W	Band information
	4	14S	144MHz SUB band signal
	5	14M	144MHz MAIN band signal
	6	43S	430MHz SUB band signal
	7	43M	430MHz MAIN band signal
	8	14ATT	144MHz ATT
	9	8V	+8V
	10	8V	+8V
	11	RXS	Band RXB control signal output
	12	RXS	Band RXB control signal output
	13	43AGC	430MHz AGC voltage
	14	14AGC	144MHz AGC voltage
	15	CV	VCO voltage (DC voltage)
CN51		14MRIF	144MHz MAIN RX IF input

Connector No.	Terminal No.	Terminal Name	Terminal Function
CN52		43MRIF	430MHz MAIN RX IF input
CN53		12SRIF	1.2GHz SUB RX IF output
CN54	1	GND	GND
	2	CKY	TX control signal output when semi-break-in
	3	MFMB	MAIN FM +B input (+8V)
	4	MSSB	MAIN SSB +B input (+8V)
	5	MCWB	MAIN CW +B input (+8V)
	6	MCNB	MAIN CW-N +B input (+8V)
	7	MRBK	MAIN IF stage blanking signal
	8	MBL	MAIN BUSY LED
	9	MBC	MAIN BUSY output
	10	MEN	MAIN CTCSS data (enable)
	11	VCK	CTCSS clock input
	12	VDT	CTCSS dtat input
	13	MCT	MAIN CTCSS control input
	14	MABK	MAIN audio stage blanking signal
	15	CRX	Not used
	16	CTX	STBY signal input
	17	CSS	STBY signal output
	18	12M	1.2GHz MAIN band signal
	19	12S	1.2GHz SUB band signal
	20	43M	430MHz MAIN band signal
	21	43S	430MHz SUB band signal
	22	14M	144MHz MAIN band signal
	23	14S	144MHz SUB band signal
	24	14W	144MHz wide band signal
	25	43W1	430MHz wide band signal (360MHz)
	26	43W2	430MHz wide band signal (900MHz)
CN55	1	ANI	External modulation AF input
	2	GND	GND
NB (X58-3410-00) : PC board located in IF unit			
W1	1	MNBI	Signal input (10.695MHz)
	2	GND	GND
	3	GND	GND
	4	MNBG	Blanking signal output
W2	1	MSCR	MAIN SSB, CW mode signal input
	2	NBS	MAIN NB switch input (grounded when NB on)
	3	GND	GND
PLL UNIT (X50-3080-00) (A/2) : 144MHz			
CN1	1	GND	GND
	2	8V	+8V
	3	8V	+8V
	4	120P	UT-10 option information output from CN2 connector (120P)
	5	SCLE	SUB CAR PLL IC (IC7) latch pulse
	6	MCLE	MAIN CAR PLL IC (IC10) latch pulse
	7	43LE4	430MHz D loop latch pulse (to 43LE4 of W1)
	8	PCK	PLL serial clock
	9	PDT	PLL serial data
	10	14LE1	144MHz A loop (IC2) latch pulse
	11	14LE2	144MHz B loop (IC4) latch pulse
	12	14B1	144MHz PLL wide band data Normally : "L", 150MHz or more : "L"
	13	NC	Not used
	14	14UL	144MHz A loop UNLOCK information
	15	43LE1	430MHz A loop latch pulse (to 43LE1 of W1)
	16	43LE2	430MHz B loop latch pulse (to 43LE2 of W1)

Connector No.	Terminal No.	Terminal Name	Terminal Function
	17	43LE3	430MHz C loop latch pulse (to 43LE3 fo W1)
	18	43UL	430MHz UNLOCK information (from 43UL of W1)
	19	12LE1	1.2GHz A loop latch pulse (to 12LE1 of CN2)
	20	12LE2	1.2GHz B loop latch pulse (to 12LE2 of CN2)
	21	12LE3	1.2GHz C loop latch pulse (to 12LE3 of CN2)
	22	12UL	1.2GHz PLL UNLOCK information
CN2	1	120P	UT-10 option information "L" : Used, "H" : Not used
	2	PCK	PLL serial clock
	3	PDT	PLL serial data
	4	12LE1	1.2GHz A loop (IC4) latch pulse
	5	12LE3	1.2GHz C loop (IC5) latch pulse
	6	12UL	1.2GHz A and C loop UNLOCK information
	7	12LE2	1.2GHz B loop (IC1) latch pulse
	8	HV	+24V (for VCO vari-cap diode)
	9	8V	+8V
	10	GND	GND
	11	10.24	10.24MHz ref. OSC output for 1.2GHz
CN3	1	30.72	10.24MHz x 3 (to IF unit)
	2	GND	GND
CN4		10.24M	10.24MHz OSC for FM mode (to IF unit)
CN5		MCAR	MAIN CAR (10.692 ~ 10.698MHz)
CN6		SCAR	SUB CAR (10.592 ~ 10.598MHz)
CN7	1	HV	+24V
	2	CV	PLL VCO voltage (DC voltage)
CN8		14HET	144MHz PLL output MAIN : 133.305 ~ 137.305MHz SUB : 133.405 ~ 137.405MHz
CN9	1	PCK	PLL serial clock
	2	PDT	PLL serial data
	3	43UL	430MHz A and D loop UNLOCK information "H" : Lock, "L" : Unlock
	4	43LE3	430MHz C loop (IC51) latch pulse
	5	43LE2	430MHz B loop (IC54) latch pulse
	6	43LE1	430MHz A loop (IC50) latch pulse
	7	43LE4	430MHz D loop (IC55) latch pulse
	8	HV	+24V (for VCO vari-cap diode)
	9	8V	+8V
	10	5V	+5V (for PLL IC)
	11	10.24	10.24MHz ref. OSC output for 430MHz
	12	GND	GND
PLL UNIT (X50-3080-00) (B/2) : 430MHz			
CN50		43HET	430MHz 1st HET output (354 ~ 374MHz)
CN51		43HET2	430MHz 2nd HET output (65MHz)
W1	1	PCK	PLL serial clock
	2	PDT	PLL serial data
	3	43UL	430MHz A and D loop UNLOCK information "H" : Lock, "L" : Unlock
	4	43LE3	430MHz C loop (IC51) latch pulse
	5	43LE2	430MHz B loop (IC54) latch pulse
	6	43LE1	430MHz A loop (IC50) latch pulse
	7	43LE4	430MHz D loop (IC55) latch pulse

Connector No.	Terminal No.	Terminal Name	Terminal Function
	8	HV	+24V (for VCO vari-cap diode)
	9	8V	+8V
	10	5V	+5V (for PLL IC)
	11	10.24	10.24MHz ref. OSC output for 430MHz
	12	GND	GND
PLL UNIT (X50-3090-21) : 1.2GHz			
CN1		12HET2	1.2GHz 2nd HET/3 (81.92MHz)
CN2		12HET	1.2GHz 1st HET/2 (81.92MHz) (476.41 ~ 506.41MHz)
W1	1	10.24	10.24MHz ref. OSC input for 1.2GHz
	2	GND	GND
	3	8V	+8V
	4	HV	+24V (for VCO vari-cap diode)
	5	12LE2	1.2GHz B loop (IC1) latch pulse
	6	12UL	1.2GHz A and C loop UNLOCK information
	7	12LE3	1.2GHz C loop (IC5) latch pulse
	8	12LE1	1.2GHz A loop (IC4) latch pulse
	9	PDT	PLL serial data
	10	PCK	PLL serial clock
	11	120P	UT-10 option information (normally GND)
CONTROL UNIT (X53-3120-XX)			
CN1	1	12UL	1.2GHz UNLOCK information input "L" : Unlock
	2	12LE3	1.2GHz PLL C loop enable signal
	3	12LE2	1.2GHz PLL B loop enable signal
	4	12LE1	1.2GHz PLL A loop enable signal
	5	43UL	430MHz UNLOCK information input "L" : Unlock
	6	43LE3	430MHz PLL C loop enable signal
	7	43LE2	430MHz PLL B loop enable signal
	8	43LE1	430MHz PLL A loop enable signal
	9	14UL	144MHz UNLOCK information input "L" : Unlock
	10	NC	Not used
	11	14B1	144MHz PLL bandpass indicate
	12	14LE2	144MHz PLL B loop enable signal
	13	14LE1	144MHz PLL A loop enable signal
	14	PDT	PLL data output
	15	PCK	PLL data clock output
	16	43LE4	430MHz PLL D loop enable signal
	17	MCLE	MAIN CAR PLL enable signal
	18	SCLE	SUB CAR PLL enable signal
	19	120P	1.2GHz option (UT-10) judgement "L" : Used
	20	8V	+8V
	21	8V	+8V
	22	GND	GND
CN2	1	RIT	RIT volume input
	2	IFS	IF SHIFT volume input
	3	VRE	RIT and IF SHIFT volume ref. power supply output
	4	GND	GND
CN3	1	NC	Not used
	2	8V	+8V
	3	5V	+5V
	4	GND	GND
	5	GND	GND
CN4	1	SD	Voice data } Option
	2	SCK	Voice data clock } VS-2

Connector No.	Terminal No.	Terminal Name	Terminal Function
	3	BSY	Utterance BUSY signal "H" : Utterance
	4	STR	Utterance start signal "H" : Start
	5	5C	DC power supply (+5V)
	6	GND	GND
CN5	1	5V	+5V (for display)
	2	LRDY	LCD indicator on "H" : Indicator on
	3	LLE	LCD indicator data enable
	4	FCK	SUB CPU data clock for FL tube
	5	FDT	SUB CPU data for FL tube
			LCD indicator data output
	6	FLE	SUB CPU data enable signal for FL tube
	7	FBY	Data BUSY signal for FL tube
	8	RES	SUB CPU reset signal for FL tube "L" : Reset
	9	GND	GND
	10	GND	GND
	11	NC	Not used
	12	LCK	LCD indicator data clock
	13	MBL	MAIN BUSY LED output
	14	SBL	SUB BUSY LED output
CN6	1	43W2	430MHz wide band signal (360MHz)
	2	43W1	430MHz wide band signal (900MHz)
	3	14W	144MHz wide band signal
	4	14S	144MHz SUB band signal
	5	14M	144MHz MAIN band signal
	6	43S	430MHz SUB band signal
	7	43M	430MHz MAIN band signal
	8	12S	1.2GHz SUB band signal
	9	12M	1.2GHz MAIN band signal
	10	CSS	STBY input "L" : SEND, "H" : REC
	11	CTX	TX indication "H" : TTL level when TX
	12	CRX	RX indication "H" : TTL level when RX
	13	MABK	MAIN AF blanking "H" : Blanking
	14	MCT	MAIN CTCSS ON/OFF "H" : CTCSS on
	15	VDT	CTCSS (TSU-5) data
	16	VCK	CTCSS (TSU-5) clock
	17	MEN	MAIN CTCSS (TSU-5) enable
	18	MBC	MAIN BUSY control "H" : BUSY
	19	MBL	MAIN BUSY LED
	20	MRBK	MAIN RF blanking "L" : Blanking
	21	MCNB	MAIN CW-N mode signal
	22	MCWB	MAIN CW mode signal
	23	MSSB	MAIN SSB mode signal
	24	MFMB	MAIN FM mode signal
	25	CKY	Keying input "L" : Keying
	26	GND	GND
CN7	1	GND	GND
	2	S7	Key matrix select output "L" : Select
	3	S6	
	4	S5	
	5	S4	
	6	K3	Key matrix input
	7	K2	
	8	K1	
	9	K0	
	10	S3	Key matrix select output "L" : Select
	11	S2	
	12	S1	
	13	S0	
	14	MD	MIC DOWN SW input "L" : ON
	15	MU	MIC UP SW input "L" : ON
	16	GND	GND

TERMINAL FUNCTIONS

Connector No.	Terminal No.	Terminal Name	Terminal Function
CN8	1	SCD	SUB CTCSS detect "L" : Signal detect
	2	GND	GND
	3	SDIS	SUB deviation signal
	4	GND	GND
	5	DL1	Ref voltage for CW delay volume
	6	DL2	CW delay volume signal
	7	SSM	SUB S-meter signal
	8	SFMB	SUB FM mode signal
	9	SSCB	SUB LSB, USB and CW mode signal ON : 8V OFF : 0V
	10	NC	Not used
	11	NC	Not used
	12	SRBK	SUB RF blanking "L" : Blanking
	13	SBC	SUB BUSY control "H" : BUSY
	14	SBL	SUB BUSY LED
	15	ATV	ATV indicate SW ATV indicator become display when added voltage
	16	SCT	SUB CTCSS ON/OFF "H" : CTCSS on
	17	SEN	SUB CTCSS (TSU-5) data enable
	18	SABK	SUB AF blanking "H" : Blanking
	19	MMUT	MAIN AF MUTE signal "H" : MUTE on
	20	SMUT	SUB AF MUTE signal "H" : MUTE on
	21	SEP	Separate SW "H" : Separate
	22	GND	GND
	23	NC	Not used
	24	MCD	MAIN CTCSS detect "L" : Signal detect

Connector No.	Terminal No.	Terminal Name	Terminal Function
CN9	1	5V	+5V DC power supply voltage
	2	SL1	Solenoid voltage
	3	SL2	Will start to solenoid when voltage become to solenoid
	4	EN3	Click encoder pulse (50 slit)
	5	EN2	Through encoder pluse (250 slit)
	6	EN1	Through encoder pluse (250 slit)
	7	GND	GND
CN10	1	SB	Lump voltage supply for SW unit Power supply for FL tube DC-DC convertor
	2	GND	GND
CN11	1	TXD	TX signal (TTL level)
	2	RXD	RX signal (TTL level)
	3	CTS	TX possibility (TTL level)
	4	RTS	TX request (TTL level)
	5	DGD	Digital GND
CN12	1	SB	+13.8V (Solenoid startor, meter lump, DC-DC convertor for FL tube)
	2	NC	Not used