

ALL MODE TRANSCEIVER

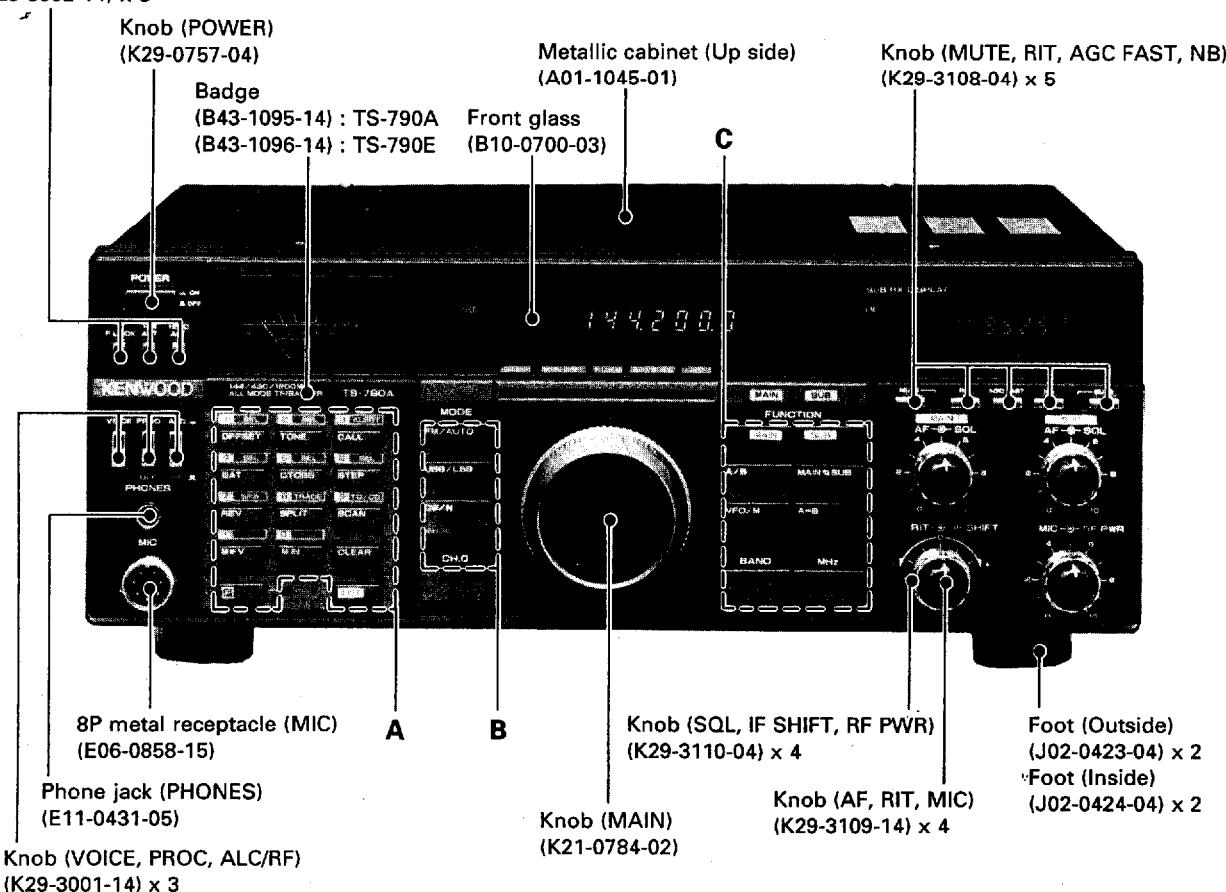
# TS-790A/E

## SERVICE MANUAL

KENWOOD

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Knob (F. LOCK , 144ATT, 1200ALT)  
(K29-3002-14) x 3

**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≠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.

# TS-790A/E

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## CIRCUIT DESCRIPTION

Model name	TS-790A			TS-790E
Unit name	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.)

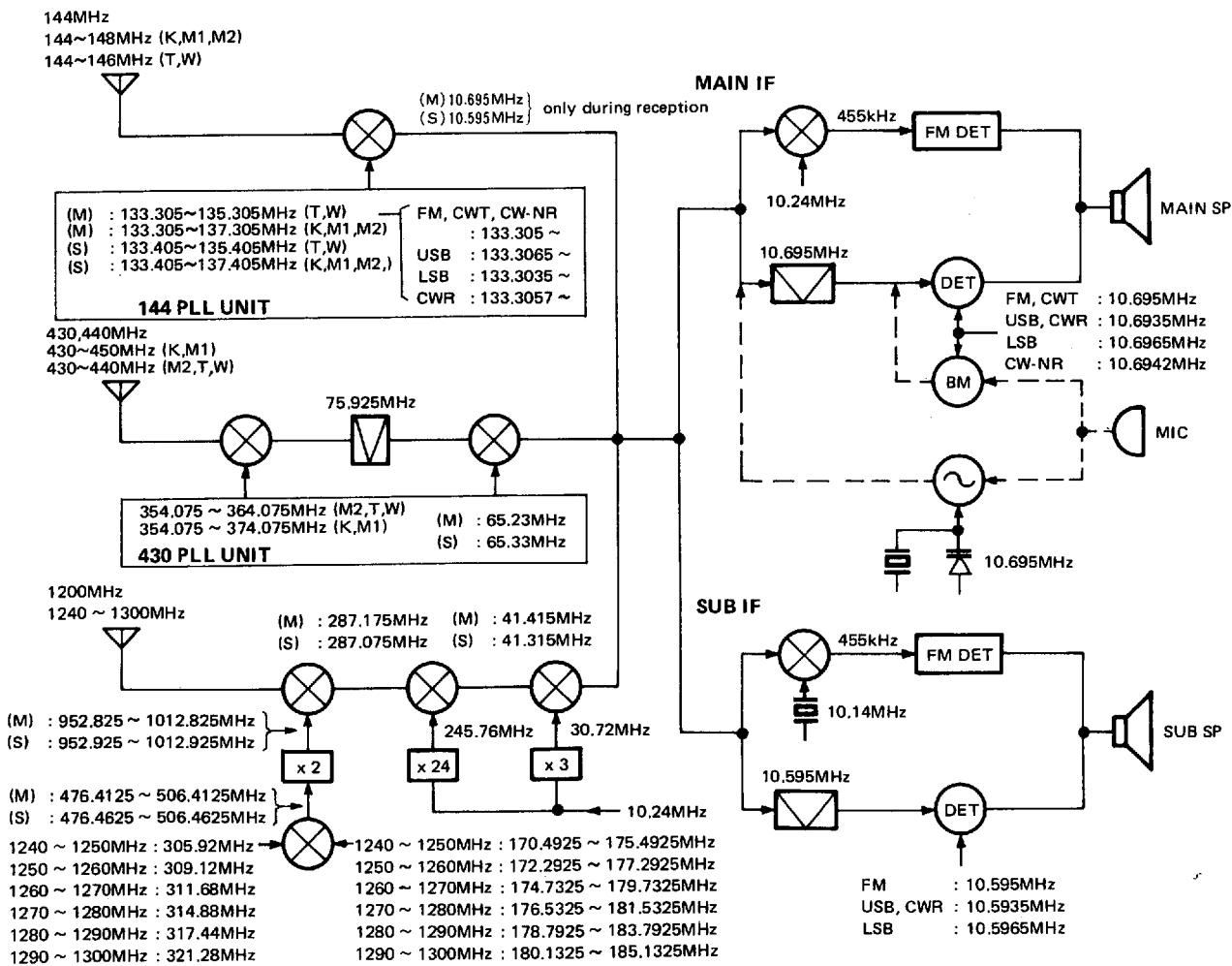


Fig. 1 Circuit configuration by band

# CIRCUIT DESCRIPTION

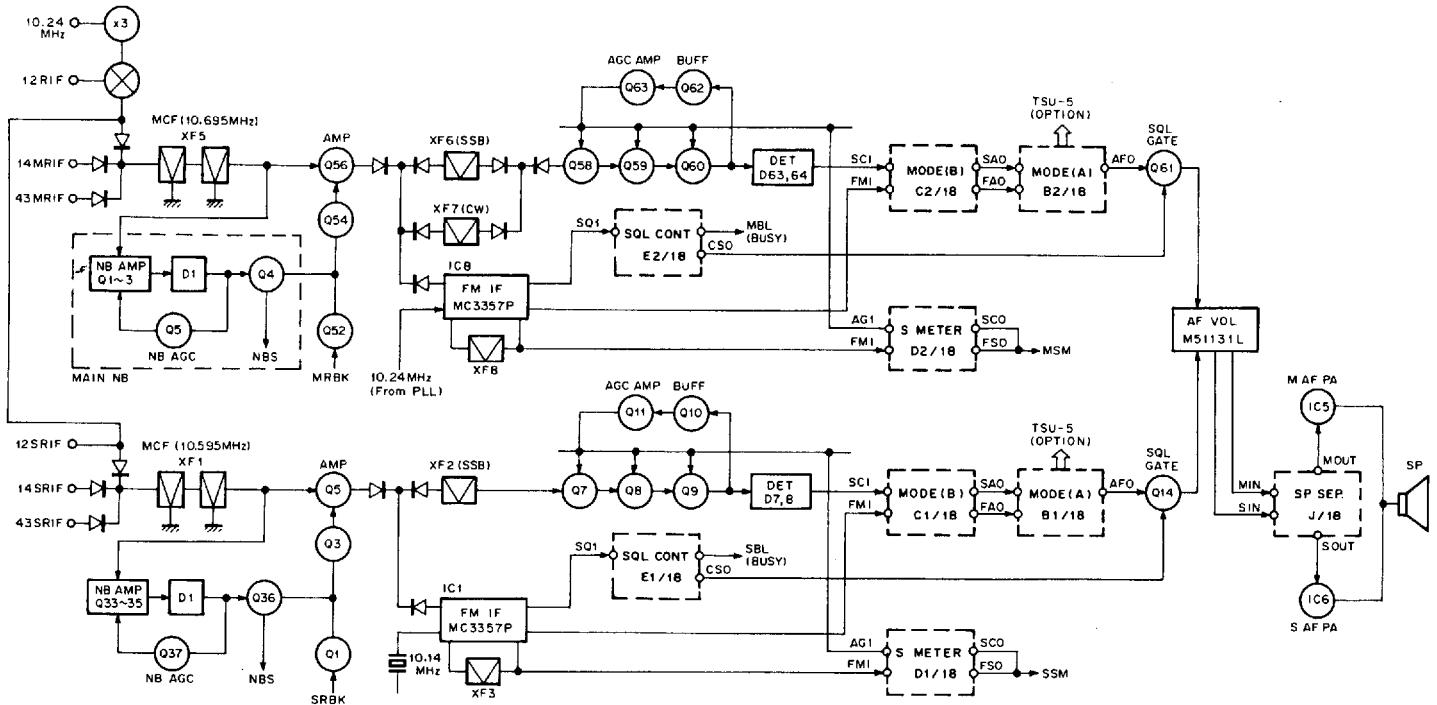


Fig. 2 IF unit block diagram (Main and Sub IF receive circuits)

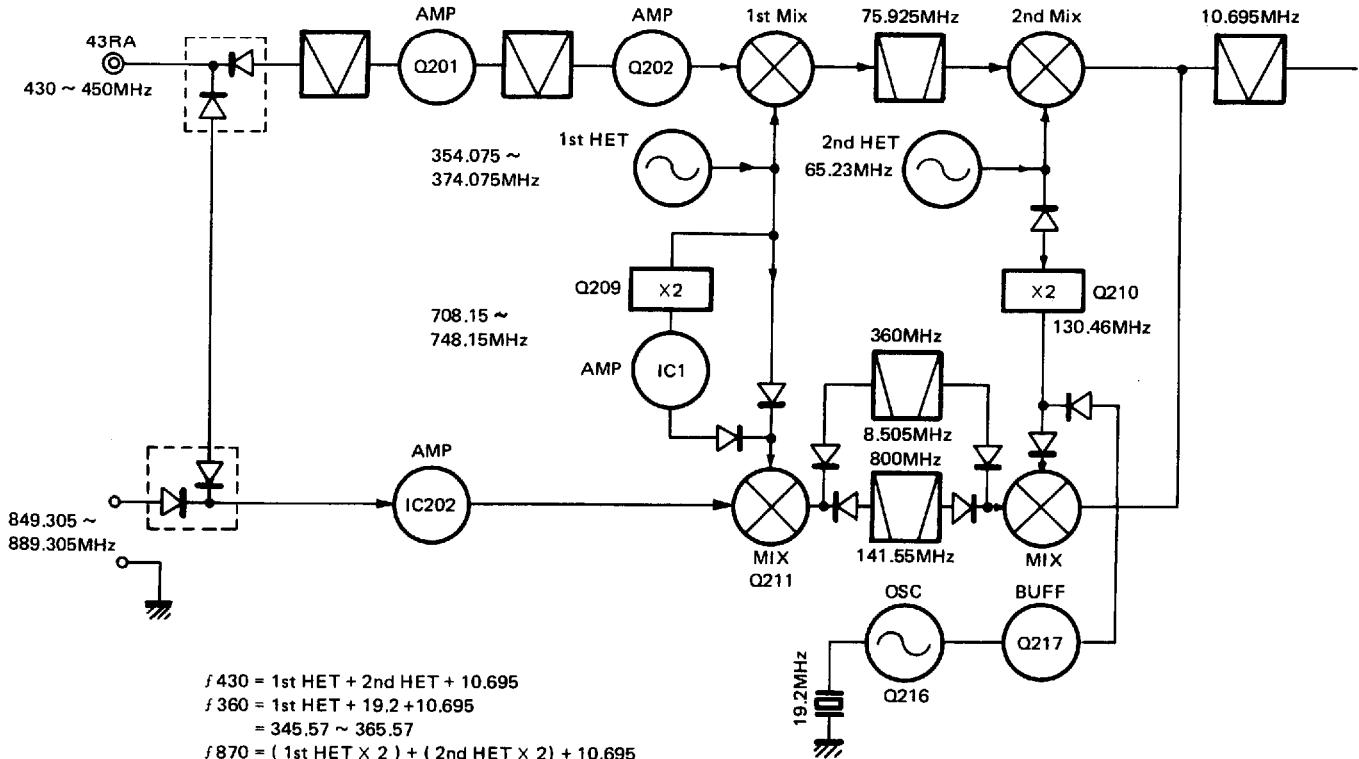


Fig. 3 430MHz RF unit configuration

# 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.

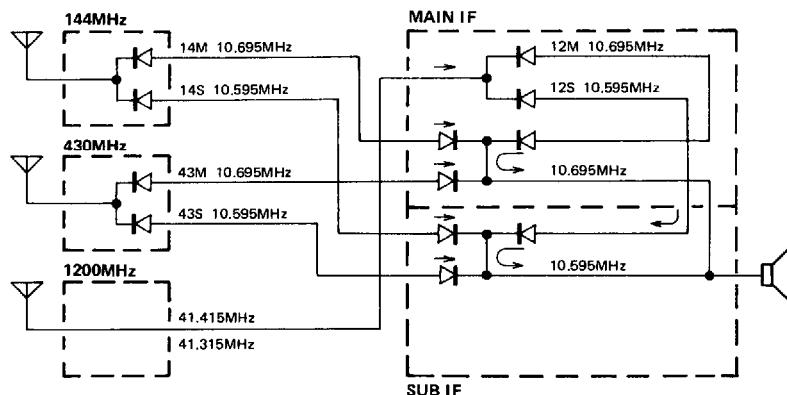


Fig. 4 Received signal flow

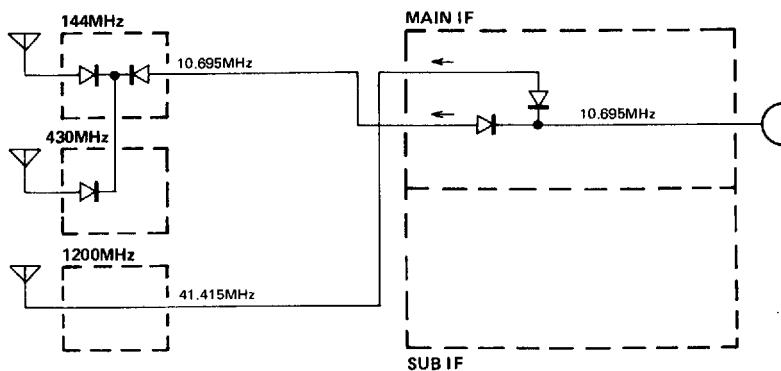


Fig. 5 Transmit signal flow

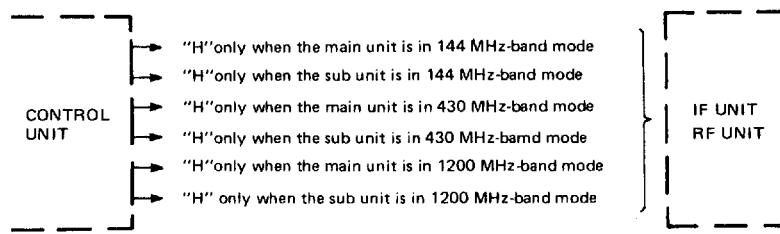


Fig. 6

# 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.

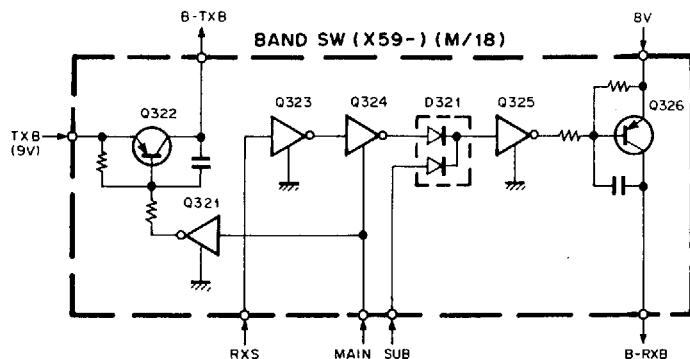


Fig. 7 TXB and RXB control circuit for each band

## • 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.

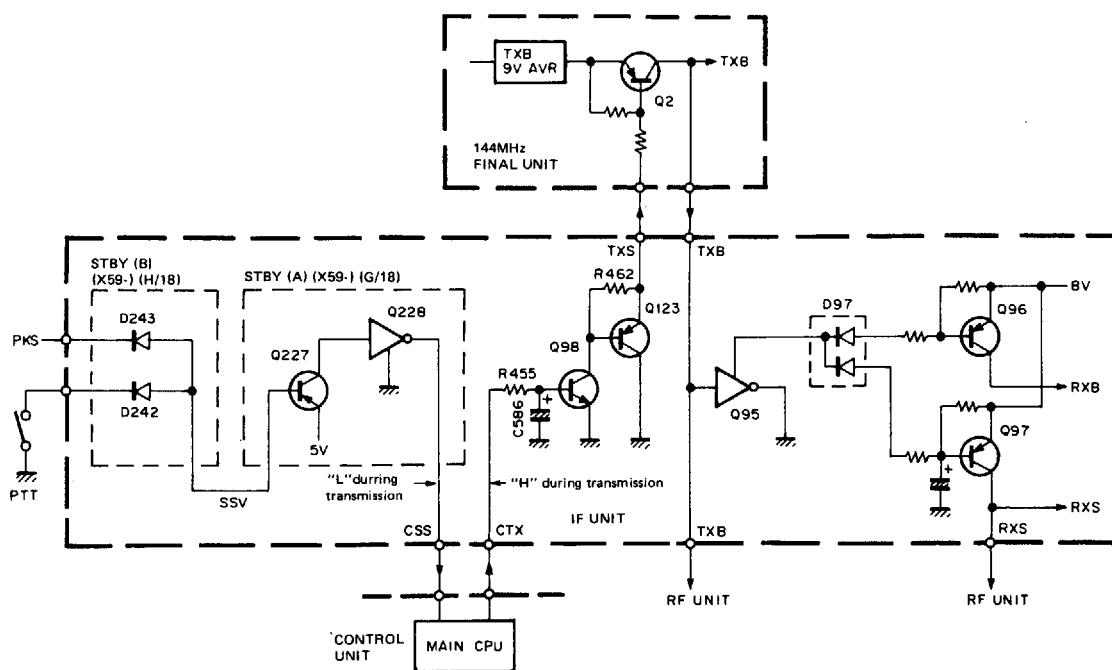


Fig. 8 Standby circuit

# 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 convertor 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.

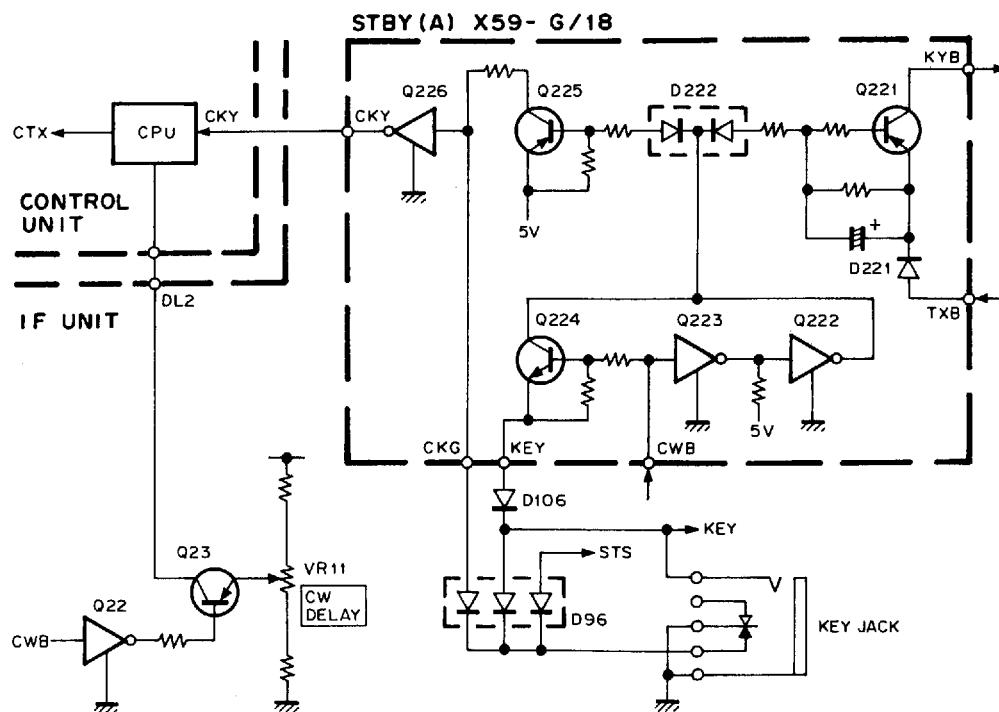


Fig. 9 Keying circuit

# 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.

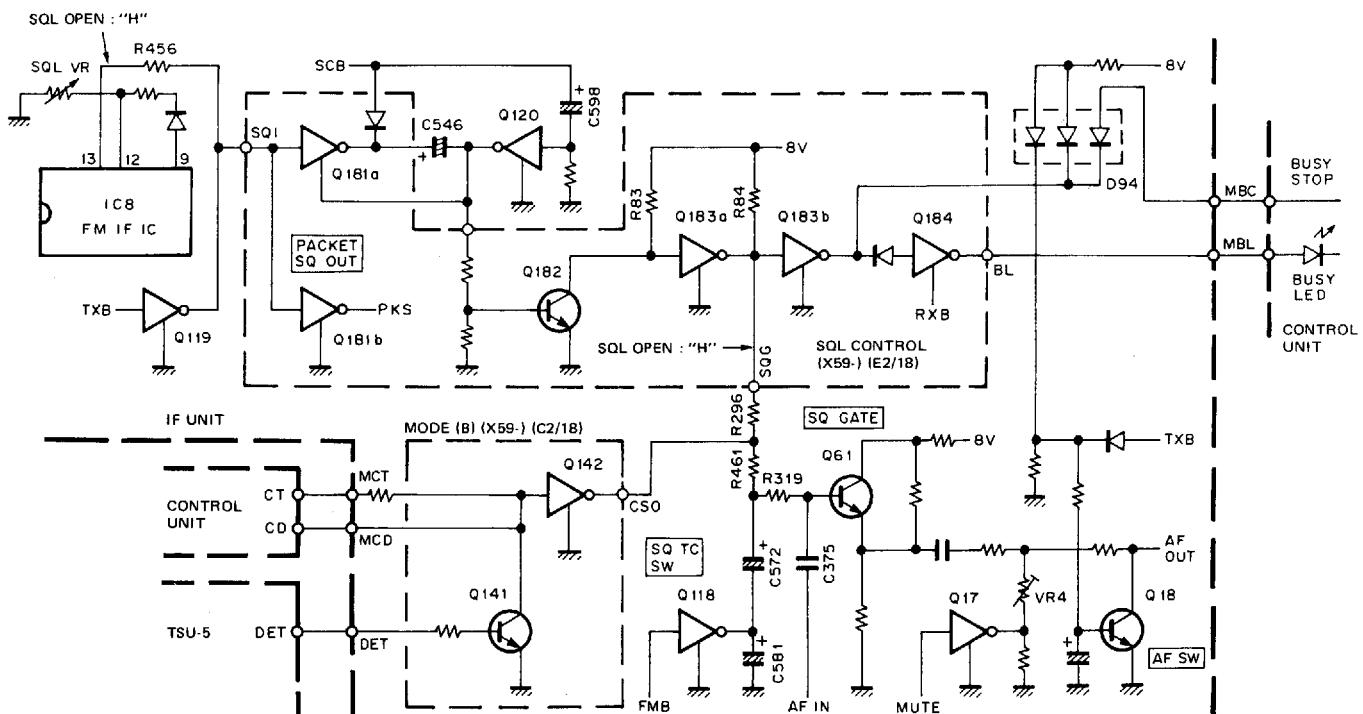


Fig. 10 Squelch circuit

# 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.

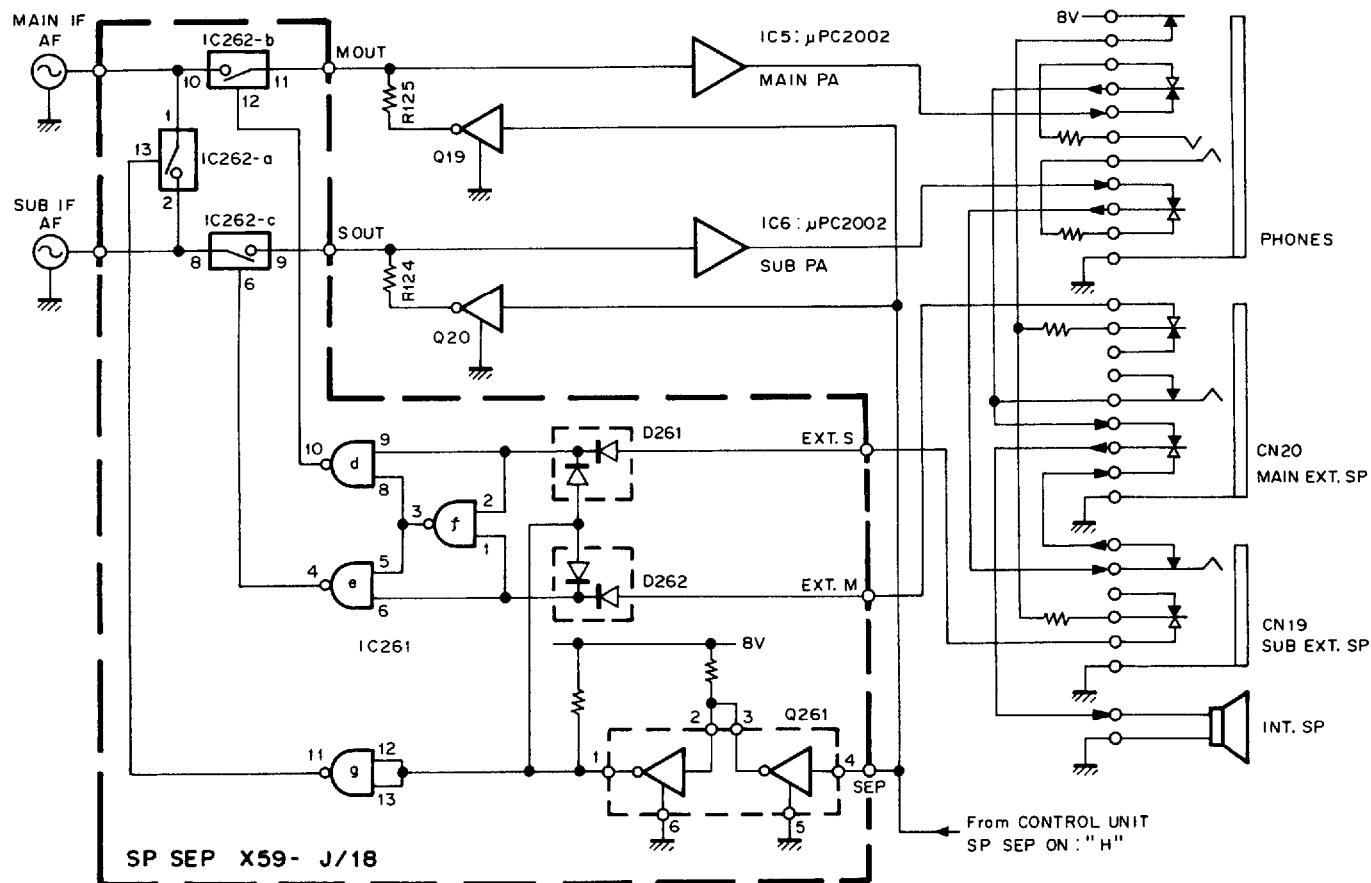


Fig. 11 Speaker separate circuit

# CIRCUIT DESCRIPTION

## Module Unit in the IF Unit

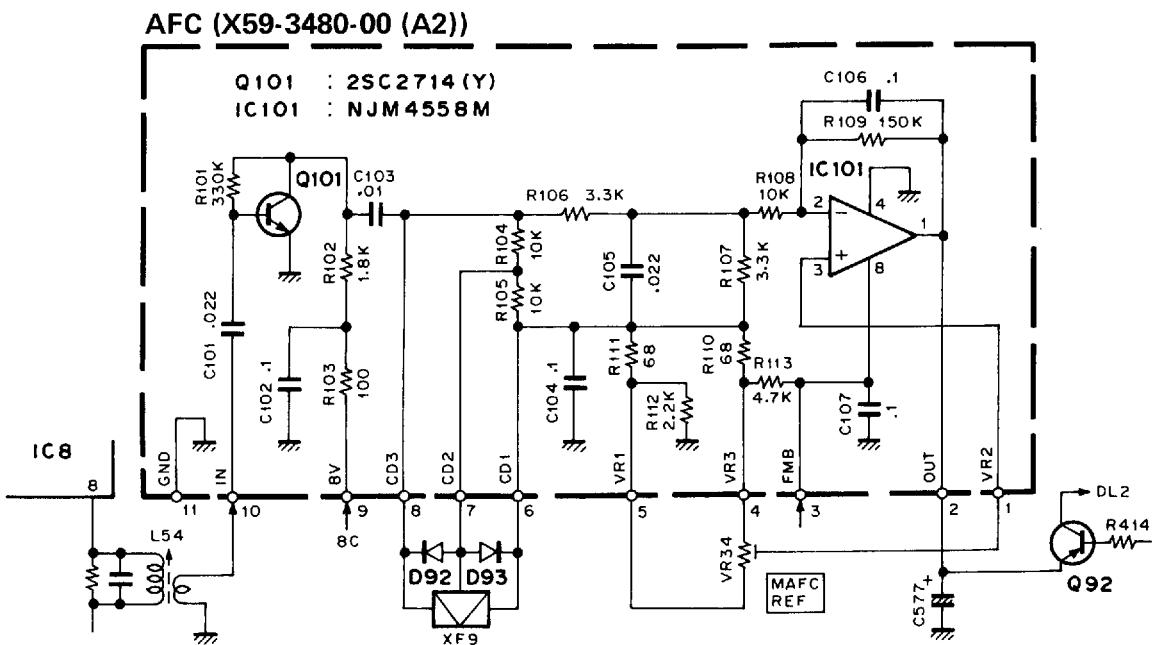
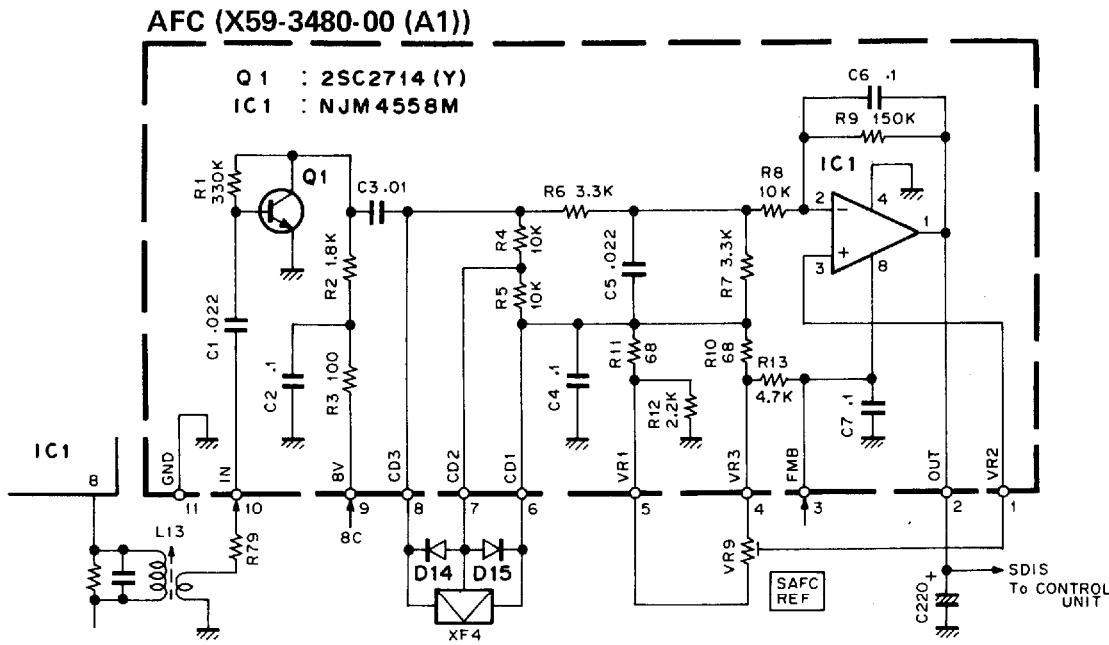
### • AFC (ALT) module

(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.



# TS-790A/E

## CIRCUIT DESCRIPTION

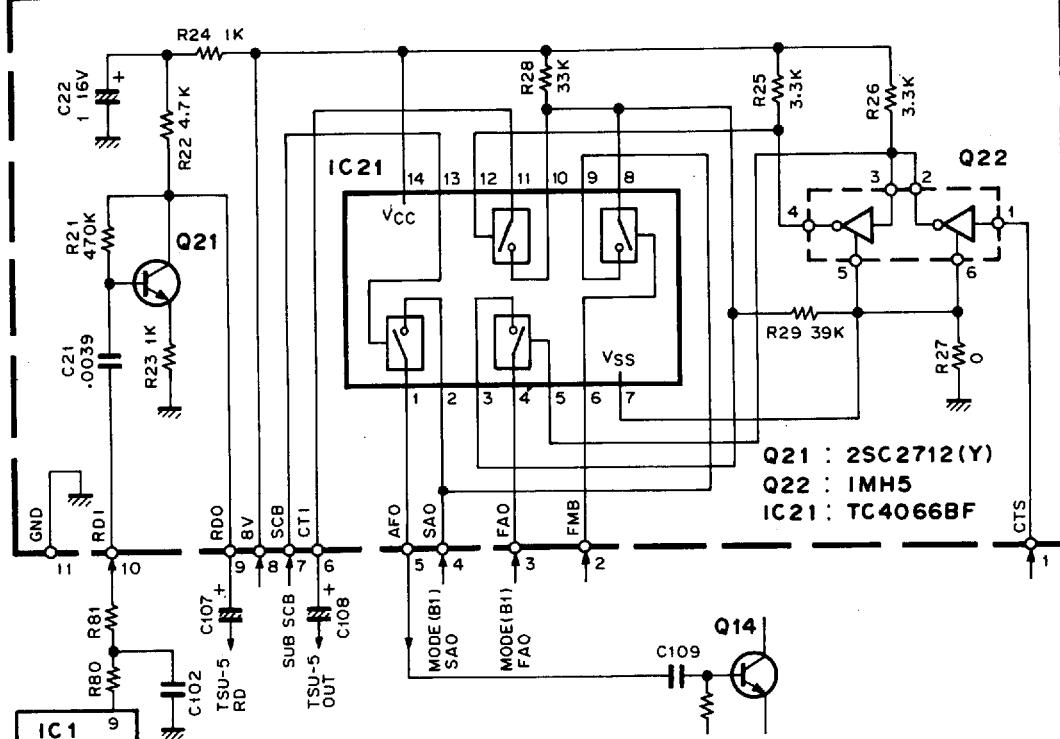
### • MODE (A) module

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

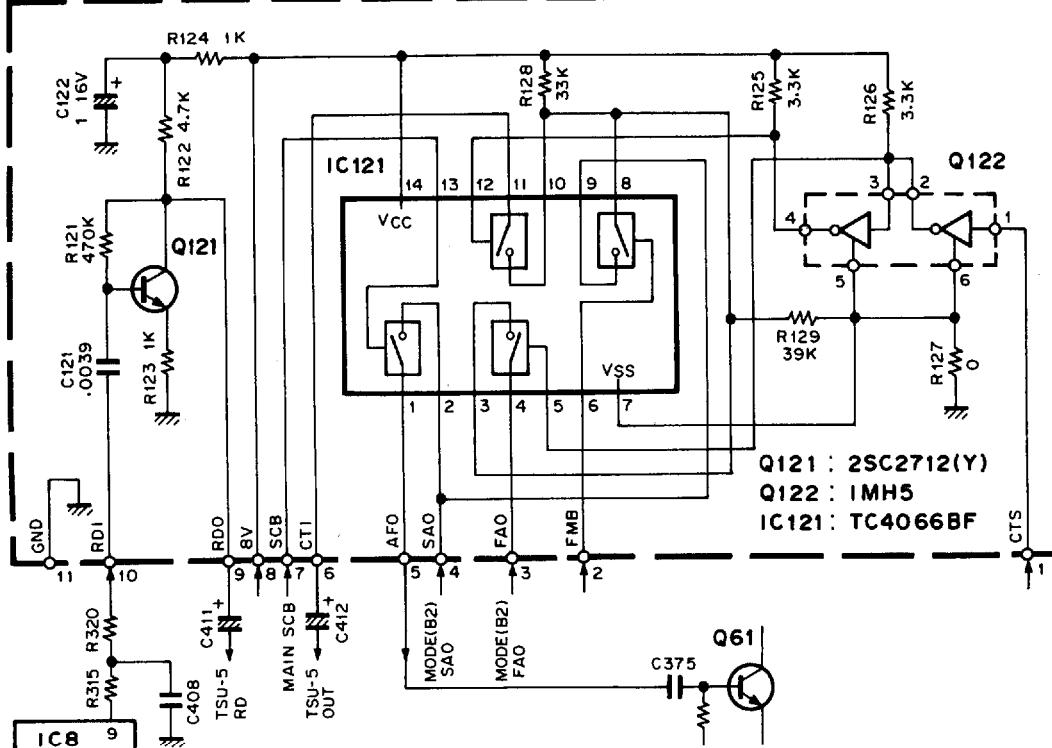
Output from the FM detector is amplified by Q21 and then sent to the tone detect pin in the optional CTCSS unit.

IC21 is used to switch the AF mode when the TS-790A/E is in SSB or FM mode. If the optional CTCSS unit is connected, Q22 can be used to switch the output from a HPF in the CTCSS unit to the FM AF line.

MODE (A) (X59-3480-00 (B1))



MODE (A) (X59-3480-00 (B2))



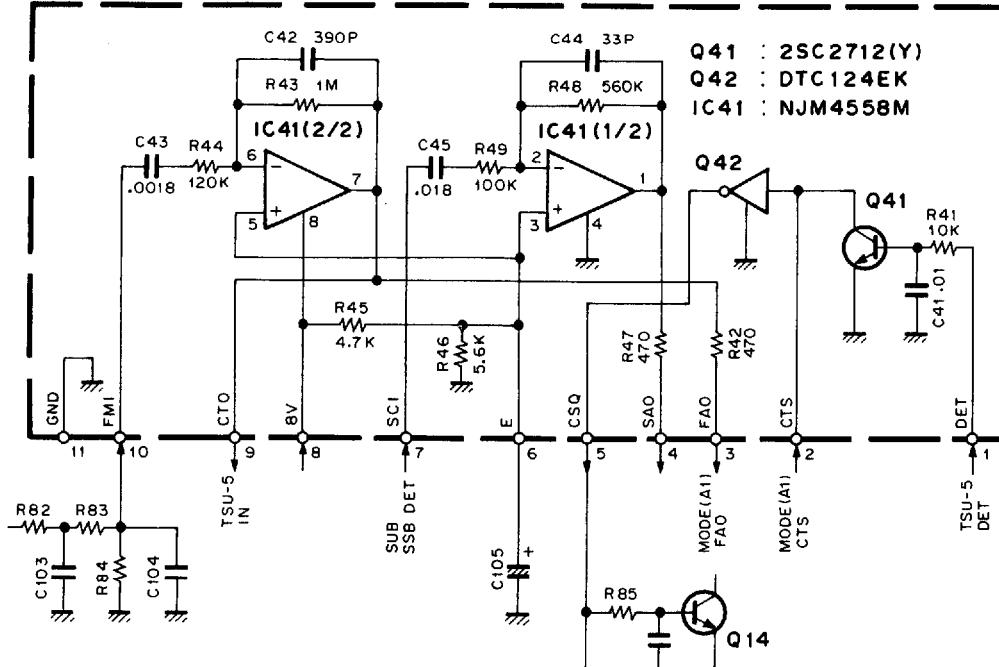
# CIRCUIT DESCRIPTION

## • MODE (B) module

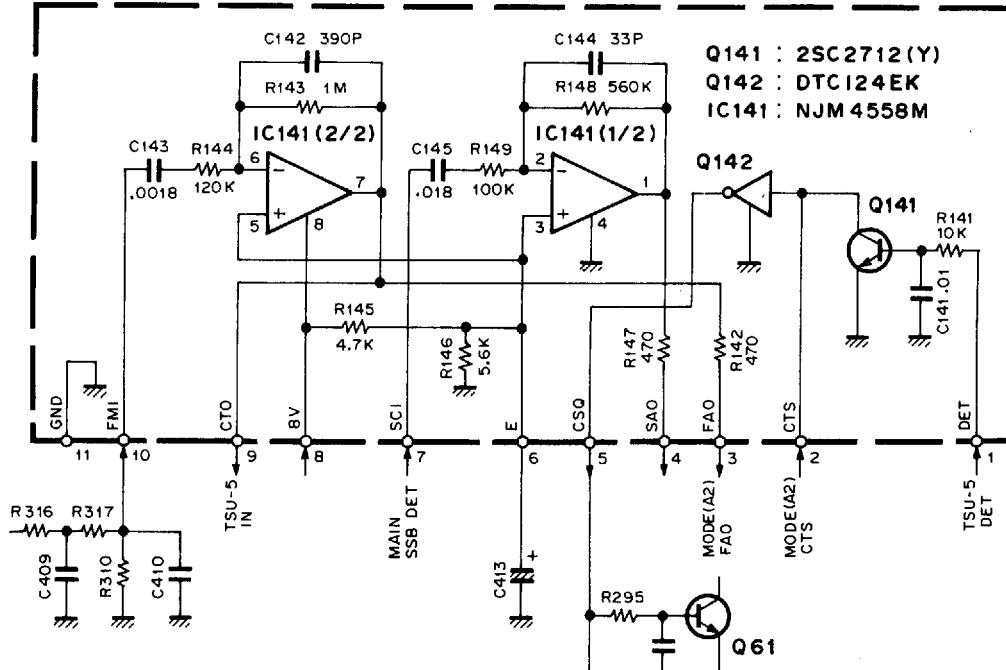
(The same circuit is used in the main and sub unit.)

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))



# TS-790A/E

## CIRCUIT DESCRIPTION

### • S-METER module

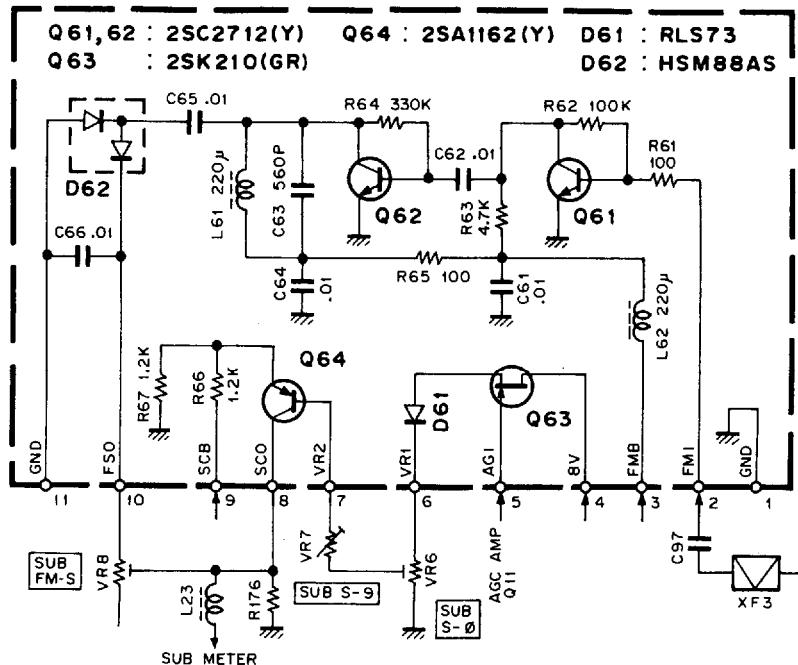
(The same circuit is used in the main and sub unit.)

Q61, Q62, and D26 form the FM S-meter circuit, which amplifies and detects a signal from the 455kHz filter.

Q43 and Q64 form an 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  $4.7\text{k}\Omega$  resistor. Voltage generated by the resistor is controlled and converted from analog to digital.

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



# CIRCUIT DESCRIPTION

## • SQL CONTROL module

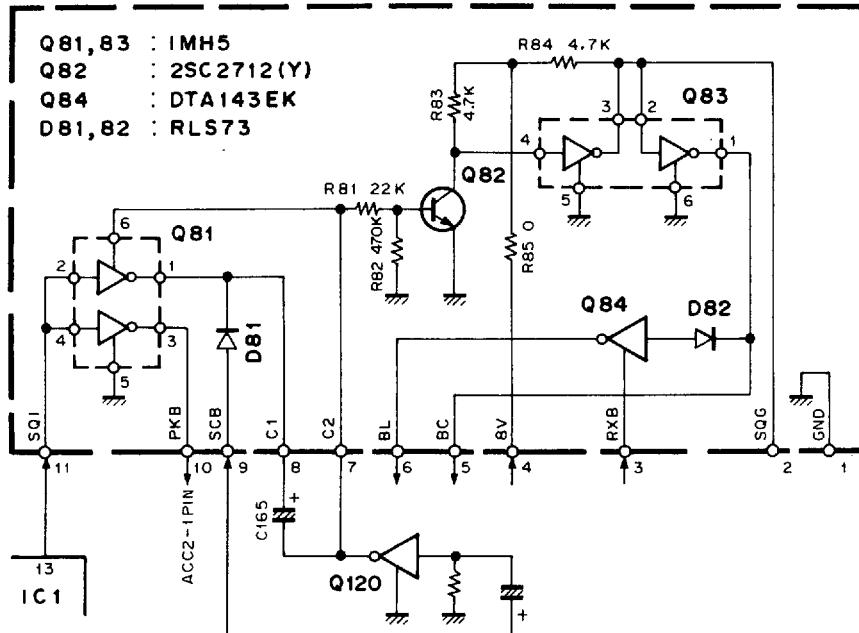
(The same circuit is used in the main and sub unit.)

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

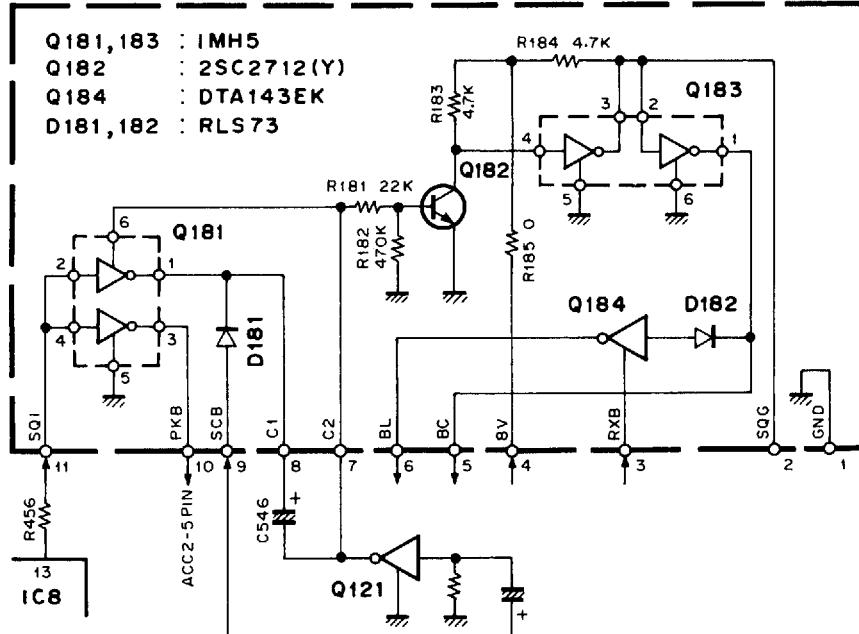
When the squelch is open, the signal is connected to ground.

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

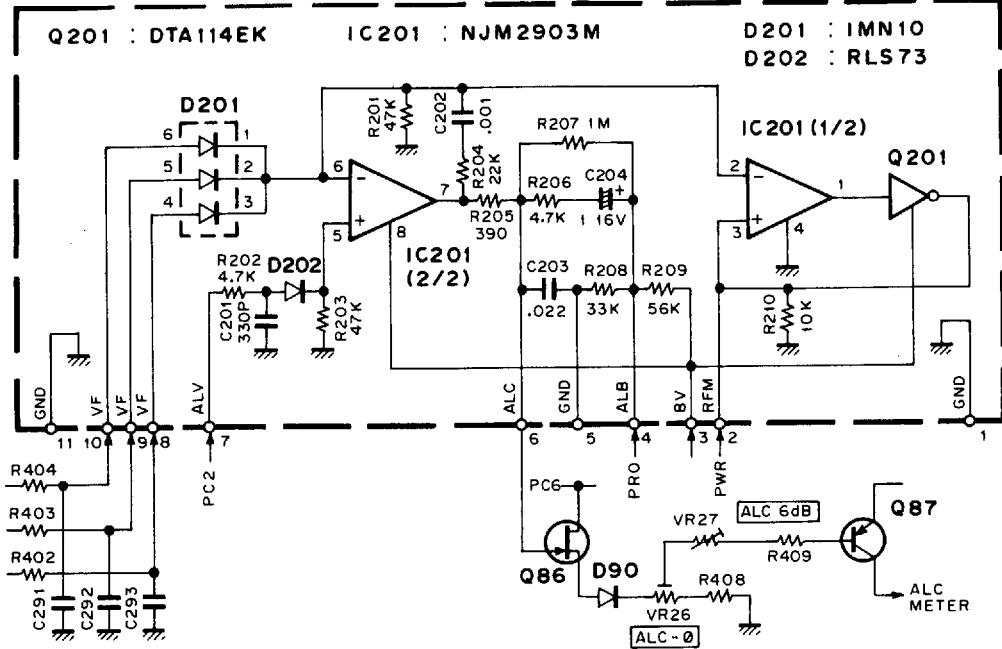
### • ALC module

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))



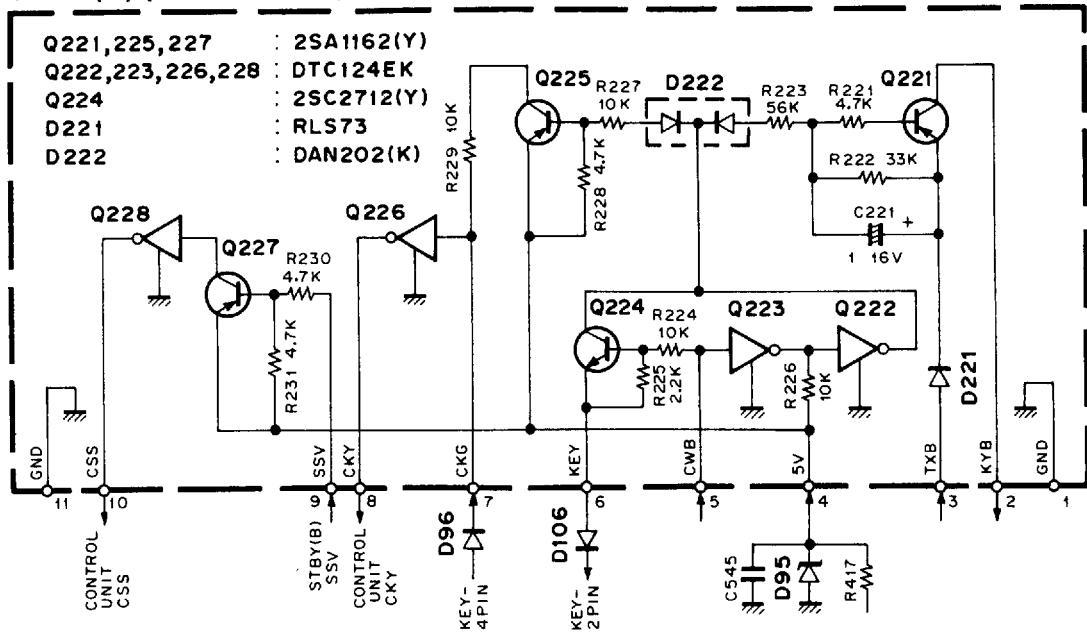
### • STBY (A) module

Q227 and Q228 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))



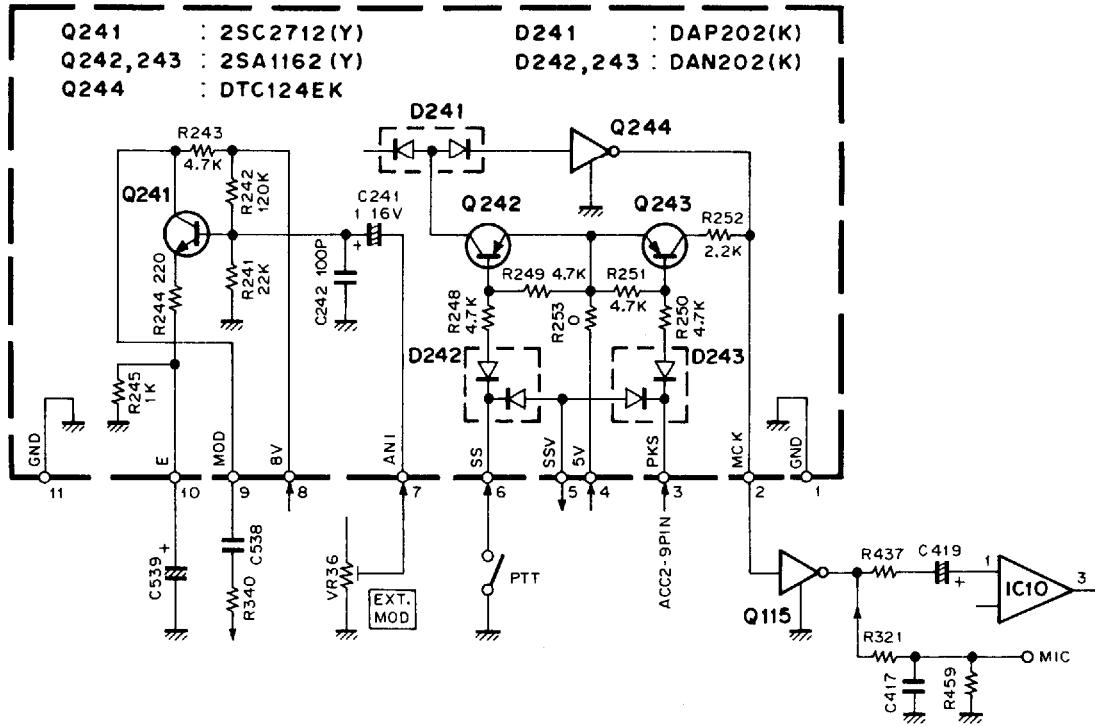
## CIRCUIT DESCRIPTION

- 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))**

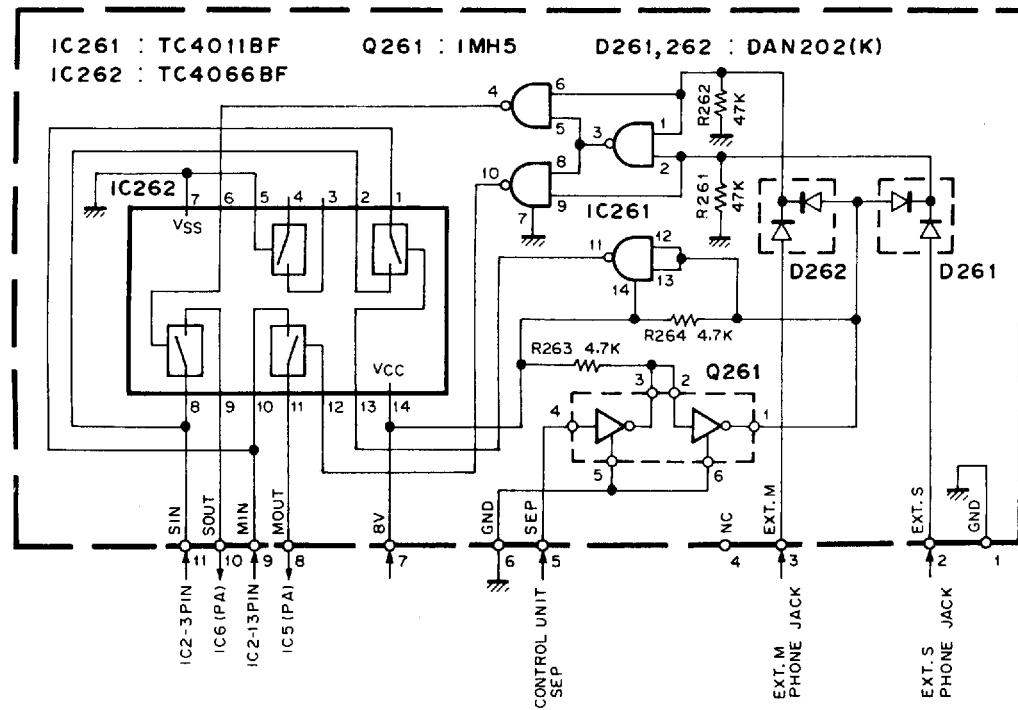


- SP SEP (Speaker separate) module

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))



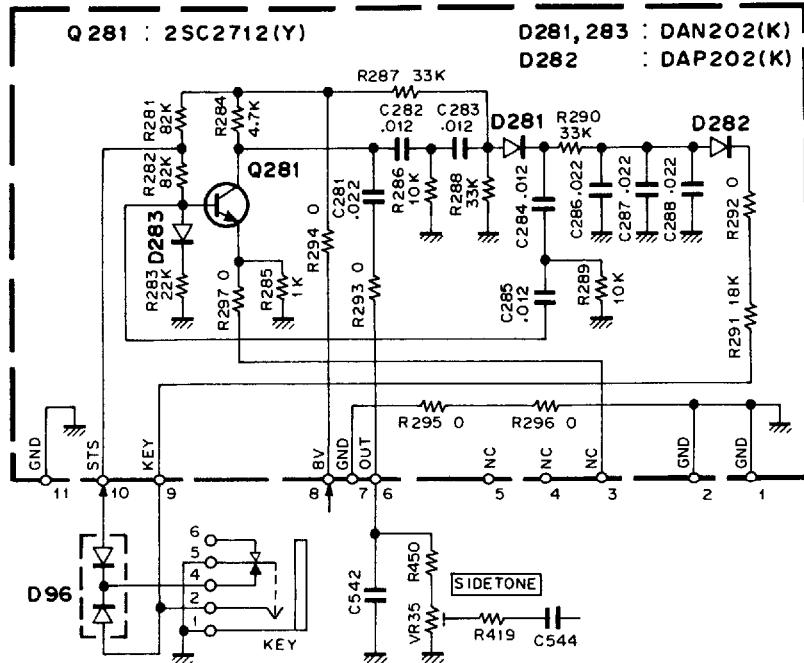
# TS-790A/E

## 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.

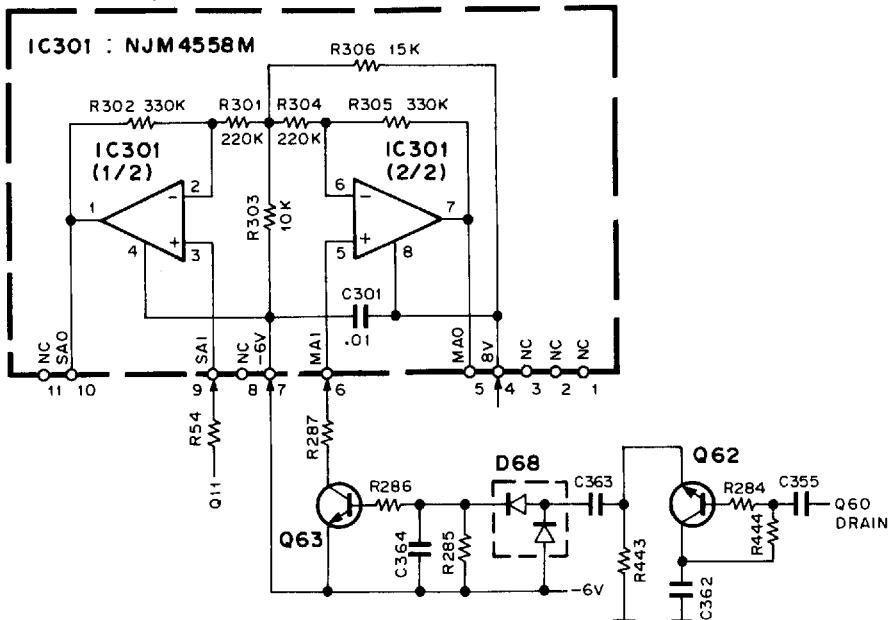
SIDE TONE (X59-3480-00 (K))



### • AGC AMP module

The AGC amplifier module generates negative AGC voltage.

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

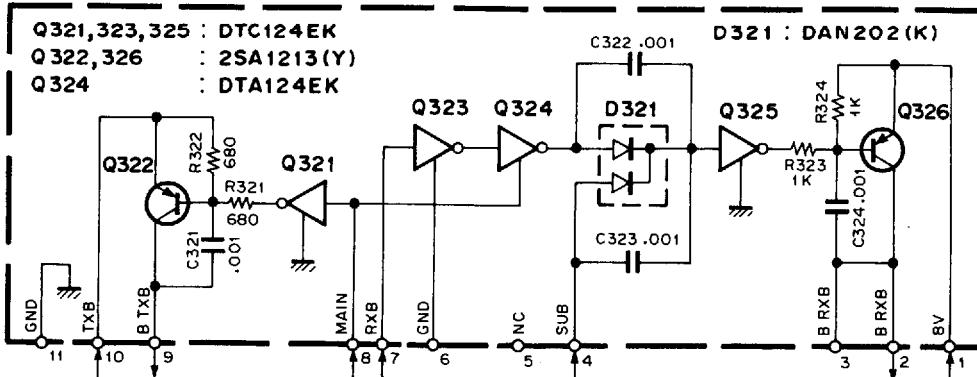


# CIRCUIT DESCRIPTION

## • 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.

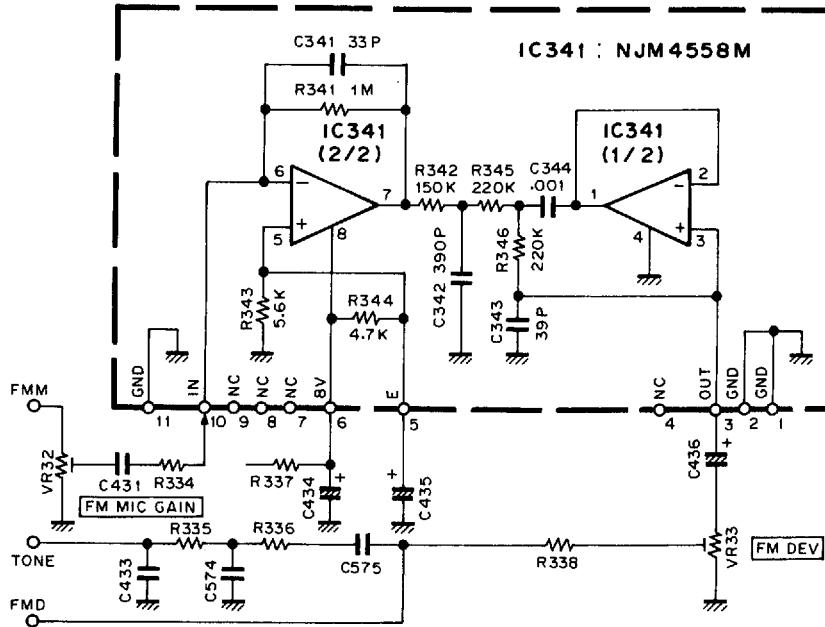
**BAND SW (X59-3480-00 (M))**



## • 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

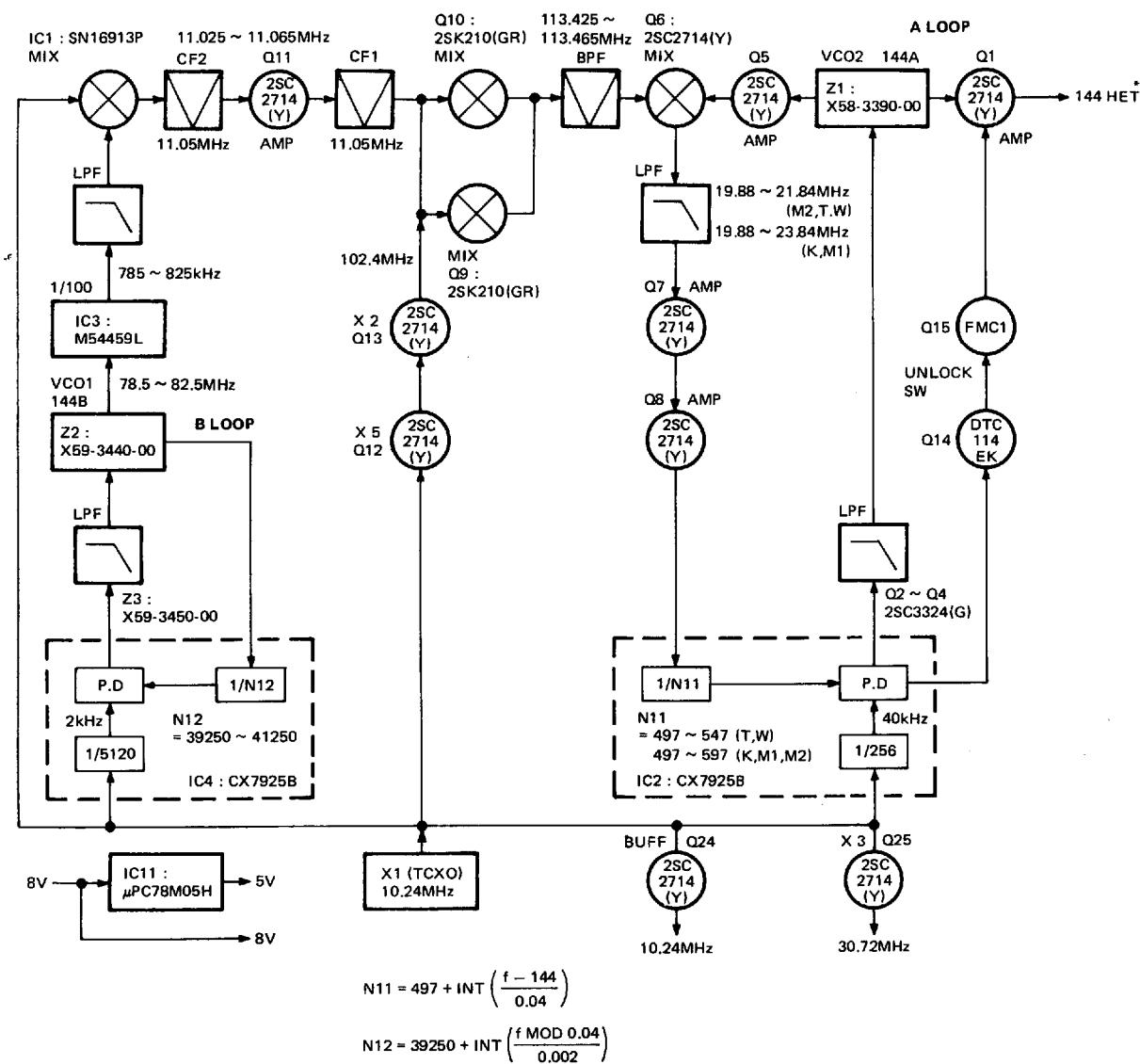
**Table 6**

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

# TS-790A/E

## 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.

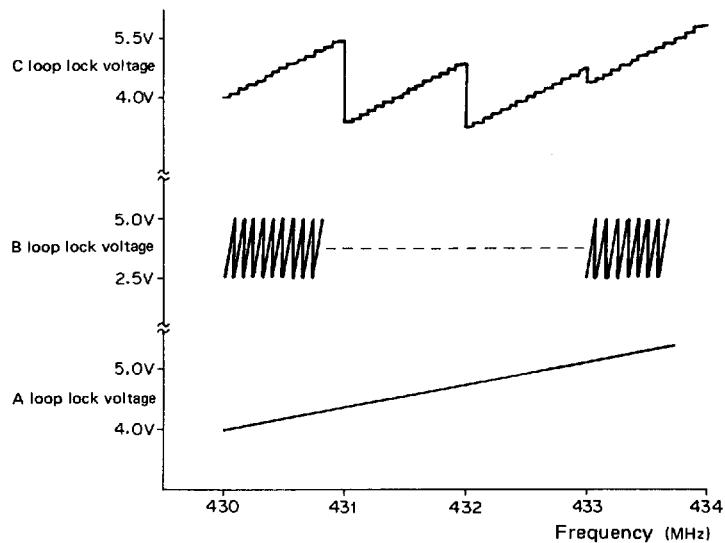
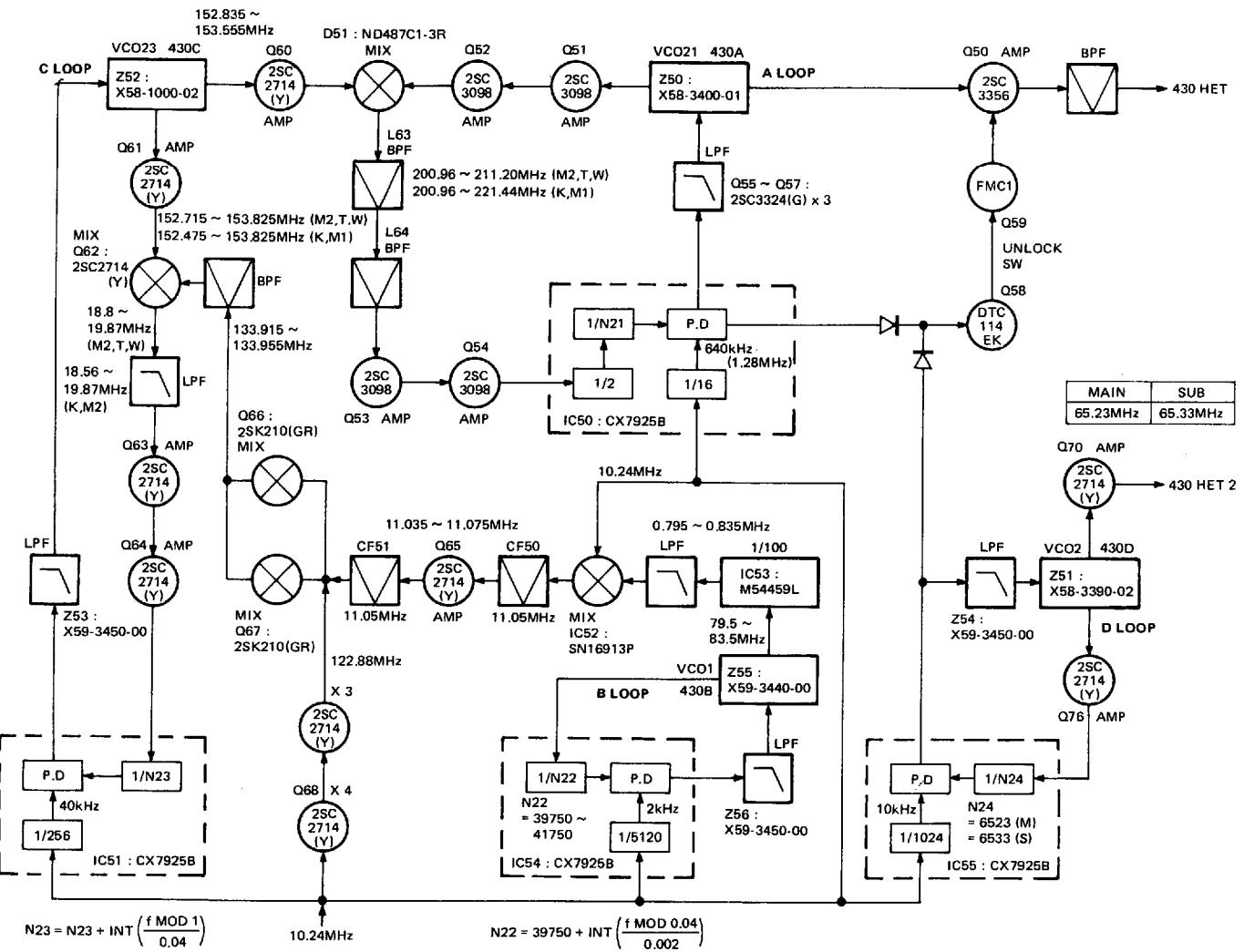


Fig. 14

## 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	



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

# TS-790A/E

## 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  $455\text{kHz}$  signal is mixed with  $10.24\text{MHz}$  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.

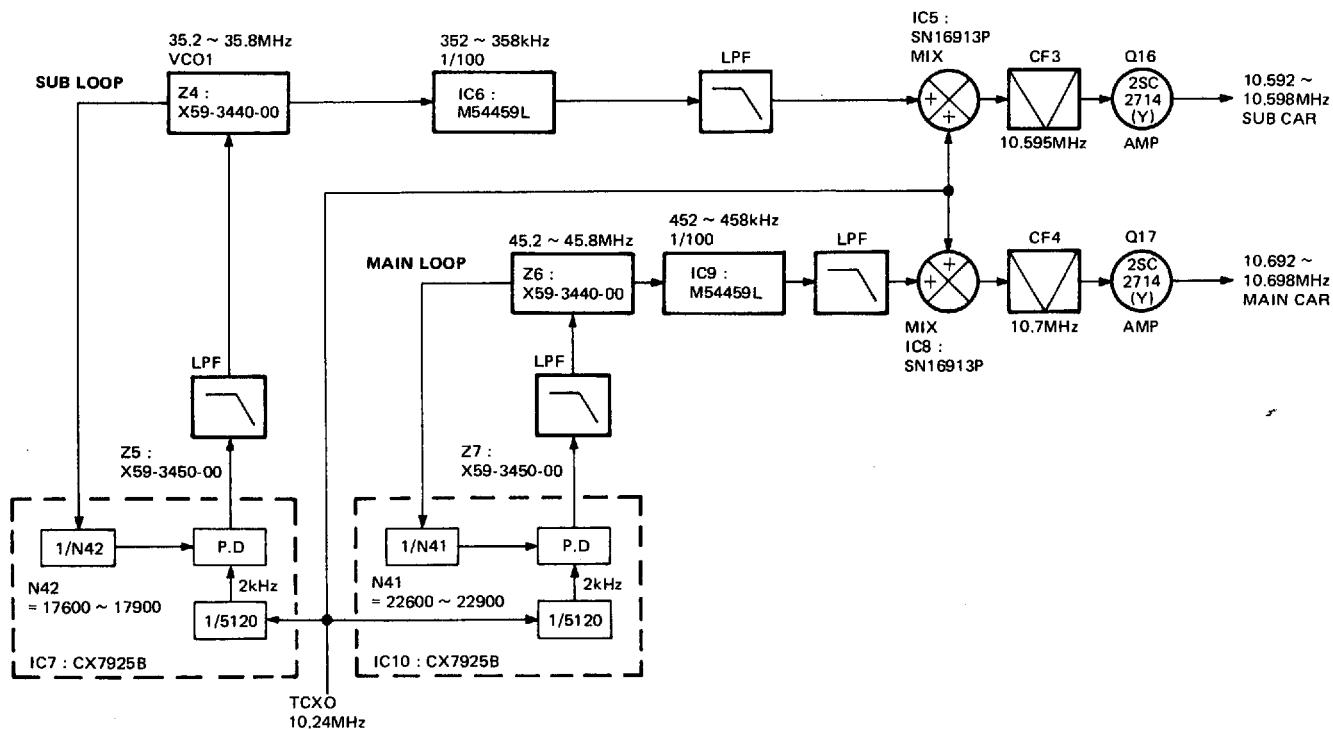


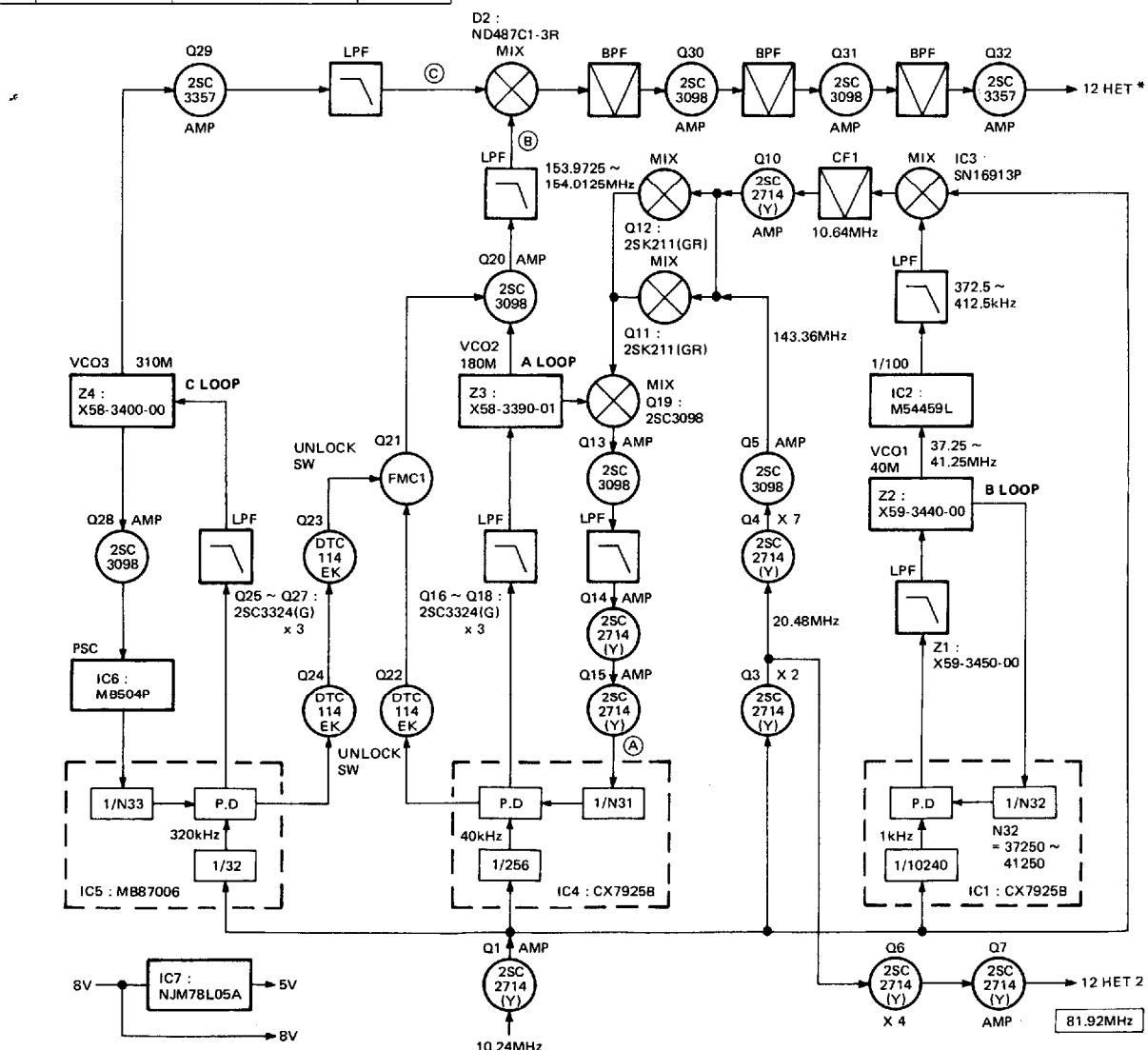
Fig. 16 CAR PLL block diagram

# 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	$519 + \text{INT} \left( \frac{f \text{ MOD } 10}{0.08} \right)$	
1270 ~ 1280	984	$564 + \text{INT} \left( \frac{f \text{ MOD } 10}{0.08} \right)$	
1280 ~ 1290	994	$609 + \text{INT} \left( \frac{f \text{ MOD } 10}{0.08} \right)$	$37250 + \text{INT} \left( \frac{f \text{ MOD } 0.08}{0.002} \right)$
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	966	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 ( $\mu$ 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 ( $\mu$ 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 convertor 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).

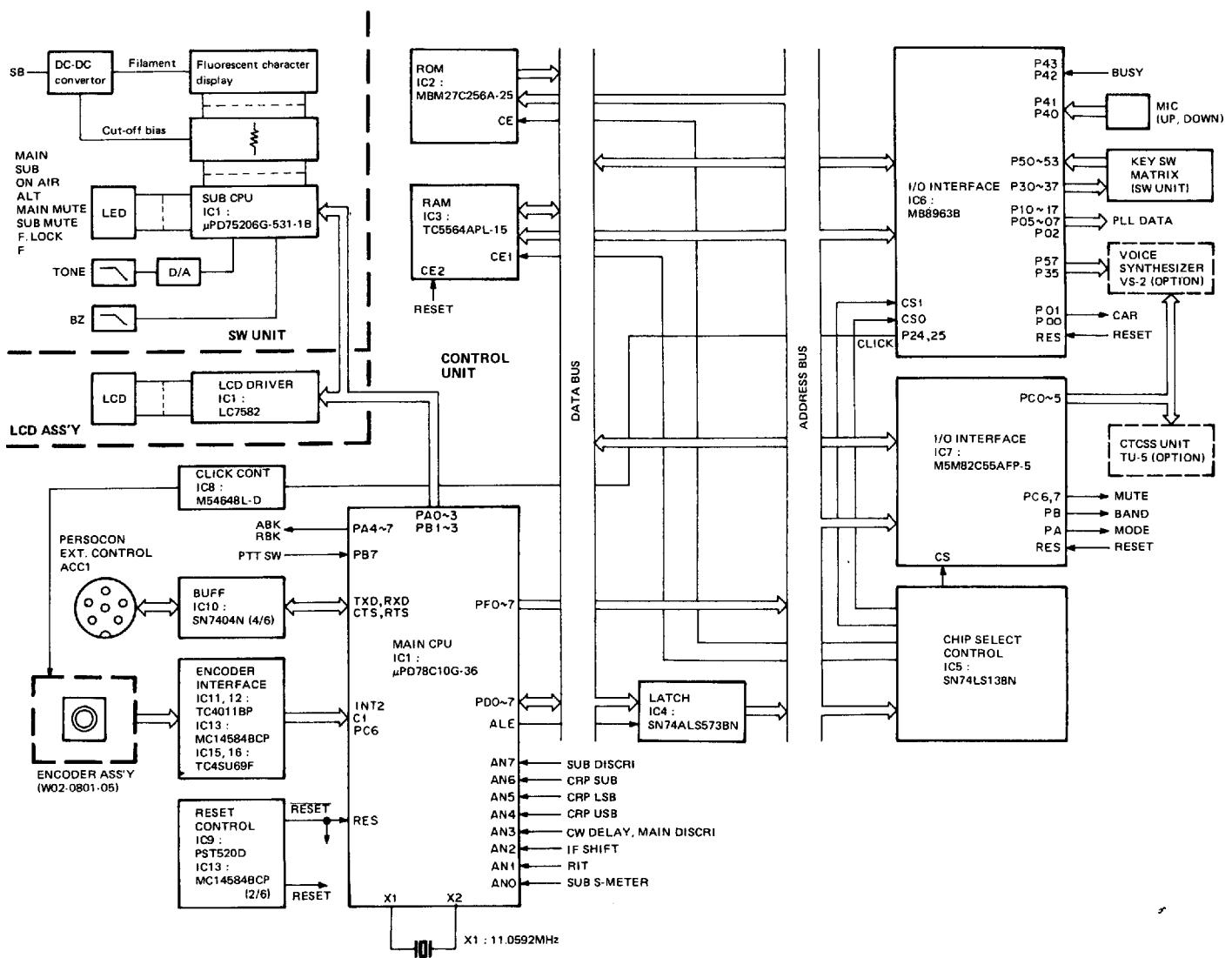


Fig. 17 Digital control block diagram

# 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.

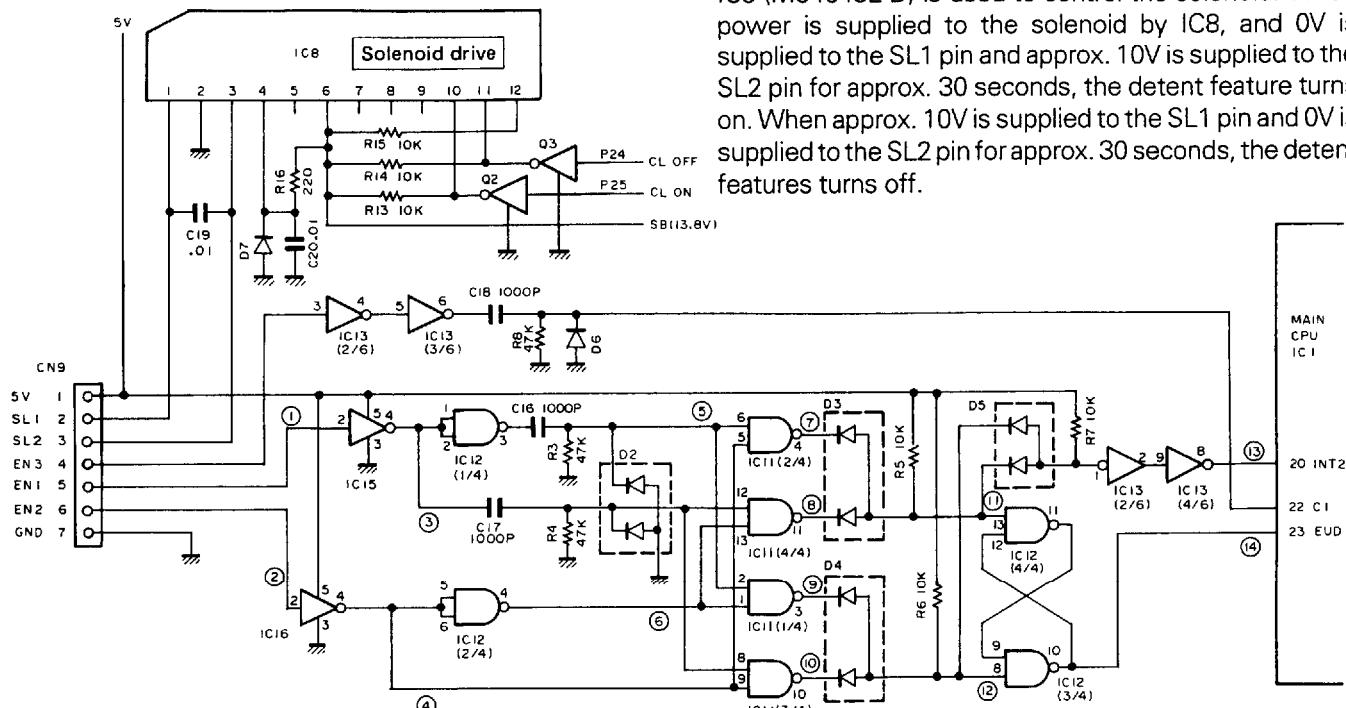


Fig. 18 Encoder waveform shaping, doubling, and solenoid drive circuit

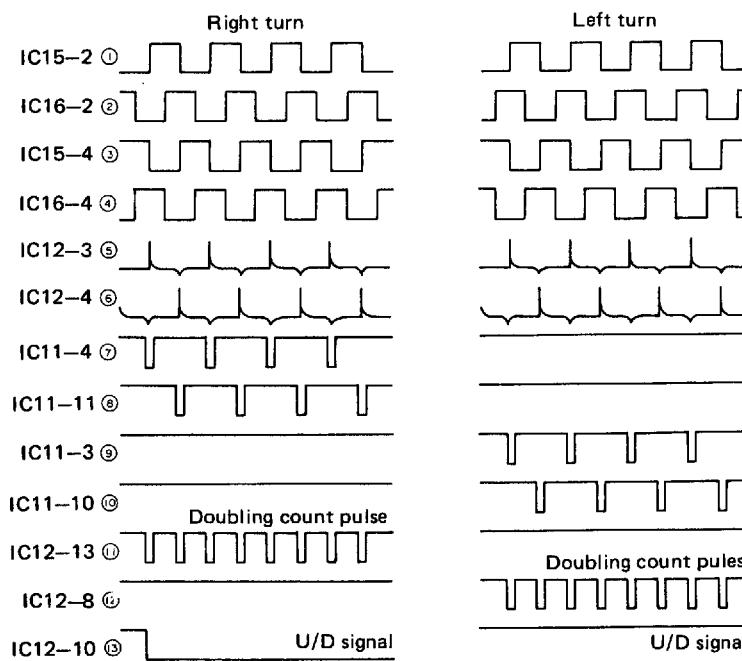


Fig. 19 Timing chart for doubling 250-pulse count signal

# TS-790A/E

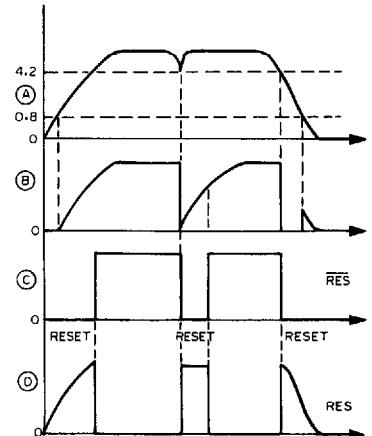
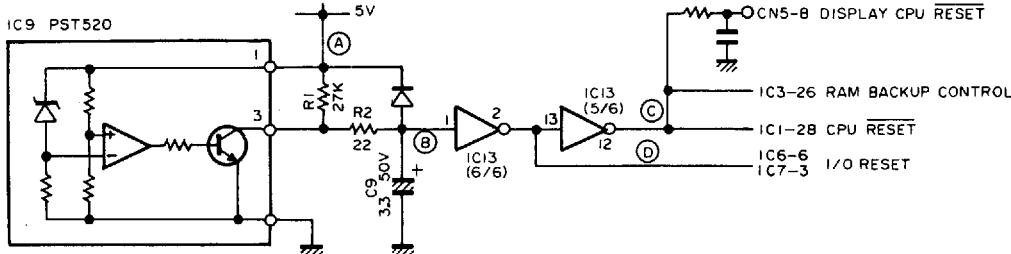
# CIRCUIT DESCRIPTION

- System reset circuit

IC9 (PST520) forms the system reset circuit. It monitors source voltage to check whether it is approx. 4.2V or less. If source voltage becomes lower than 4.2V, the circuit sends a reset signal to the main CPU and I/O ports, and generates a back-up of RAM. The TS-790A/E stops operation.

When the TS-790A/E power is turned on and the

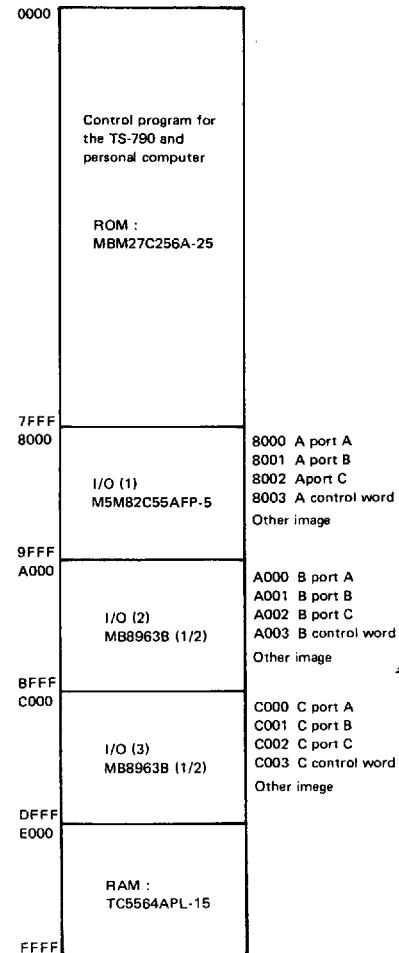
source voltage exceeds approx. 4.2V, the reset signal is cleared. Then, after a time constant determined by R1 and C9 elapses, the main CPU and I/O ports are initialized to start operation.



**Fig. 20 Reset circuit and timing chart for reset operation**

- Addressing control

PD0 to PD7 from the main CPU form an address and data bus multiplex port, and its PF0 to PF7 are A8 to A15 address signals. The signals, therefore, need to be separated into address and data signals. This is done by the D type latch IC4 (SN74ALS573BN). The A13 to A15 address signals are used as chip select signals by the address decoder IC5 (SN74LS138N) and sent to appropriate IC chips.



**Fig. 22 Memory map**

# CIRCUIT DESCRIPTION

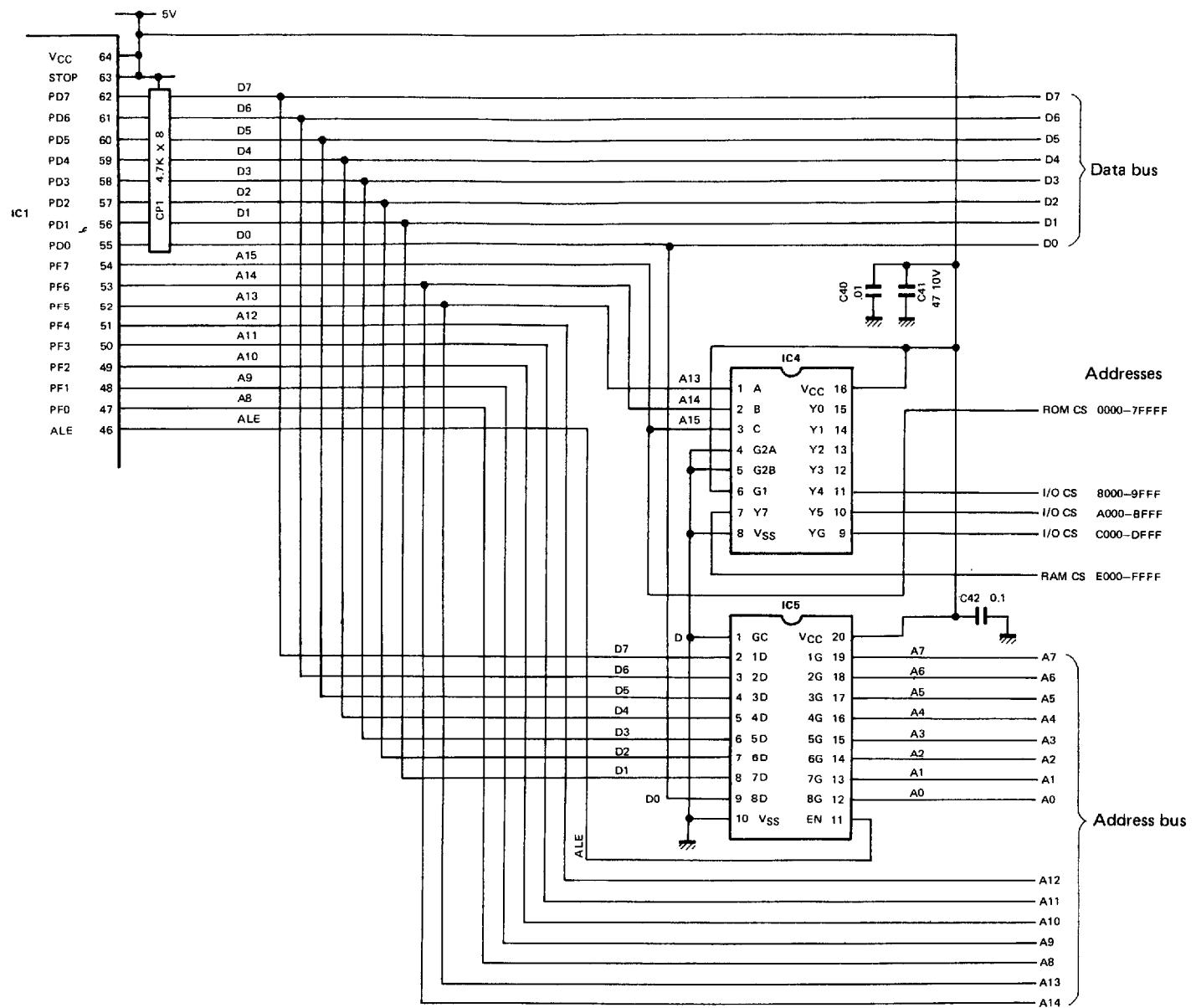


Fig. 21 Address and data separation and address decoder circuits

# TS-790A/E

## CIRCUIT DESCRIPTION

### • Analog signal input

The main CPU ( $\mu$ PD78C10G-36) contains an A/D converter to allows 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 ( $\mu$ 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 convertor

The DC-DC convertor 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.

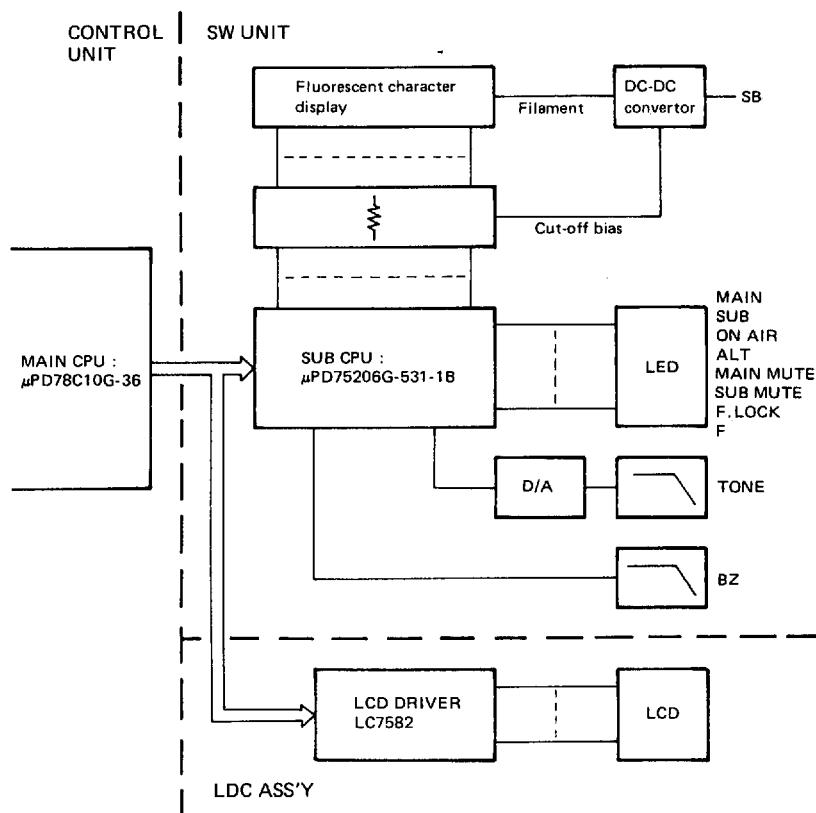


Fig. 23 Display block diagram

# CIRCUIT DESCRIPTION

## • Sub CPU

The sub CPU is a 4-bit single-chip microcomputer μPD75206G-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 synthesis for the repeat and CTCSS, and beep synthesis for the main and sub units. These operations are also controlled by serial data commands from the main CPU.

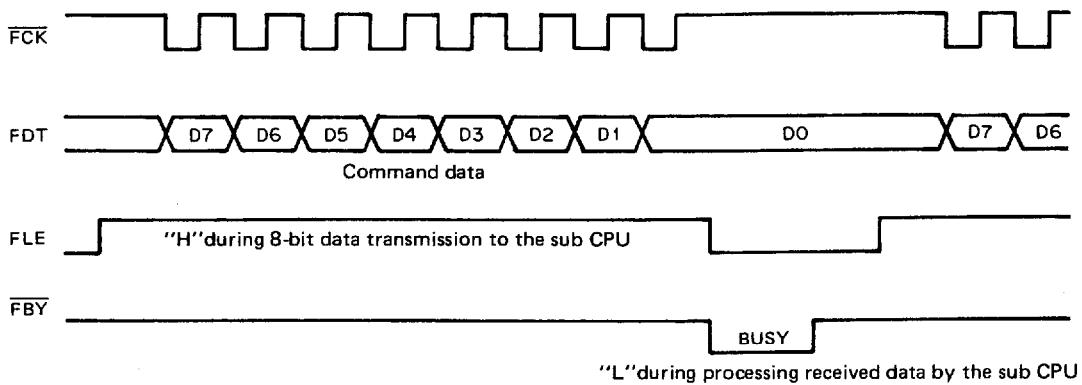
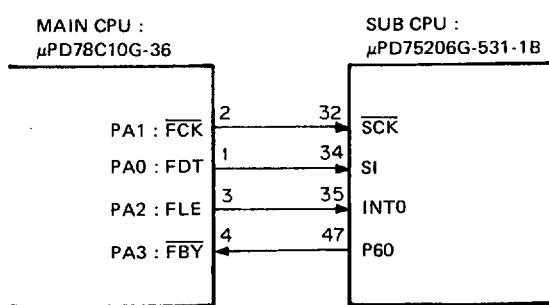


Fig. 24 Timing chart for serial data transmission

## • 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

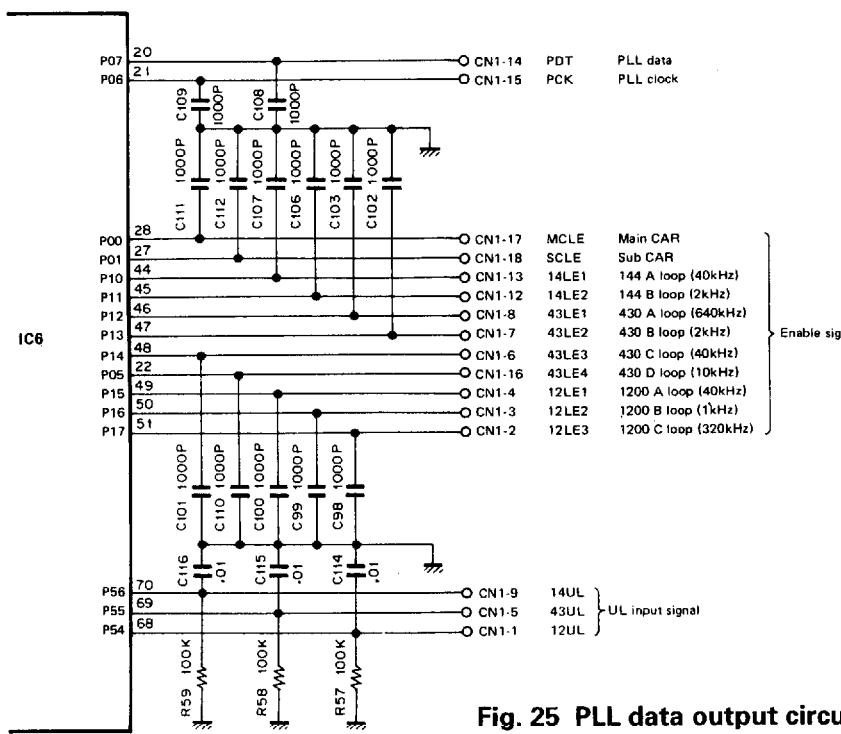
(when the TVI input pin is used)

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.

# TS-790A/E

## CIRCUIT DESCRIPTION

LOOP		VCO frequency (MHz)	Ref. (kHz)	Division ratio	PLL IC	CX7925B control data							Enable port name	Remarks
		Ref. division ratio	Input pin	P11	P12	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											14B1
	12B	78.5 ~ 82.5	2	31250 ~ 41250	CX7925B	FMI	L	H	144M power information	—	L	L	14LE2	~ 150M H
			5120											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											
1200M	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											
	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											



# 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.

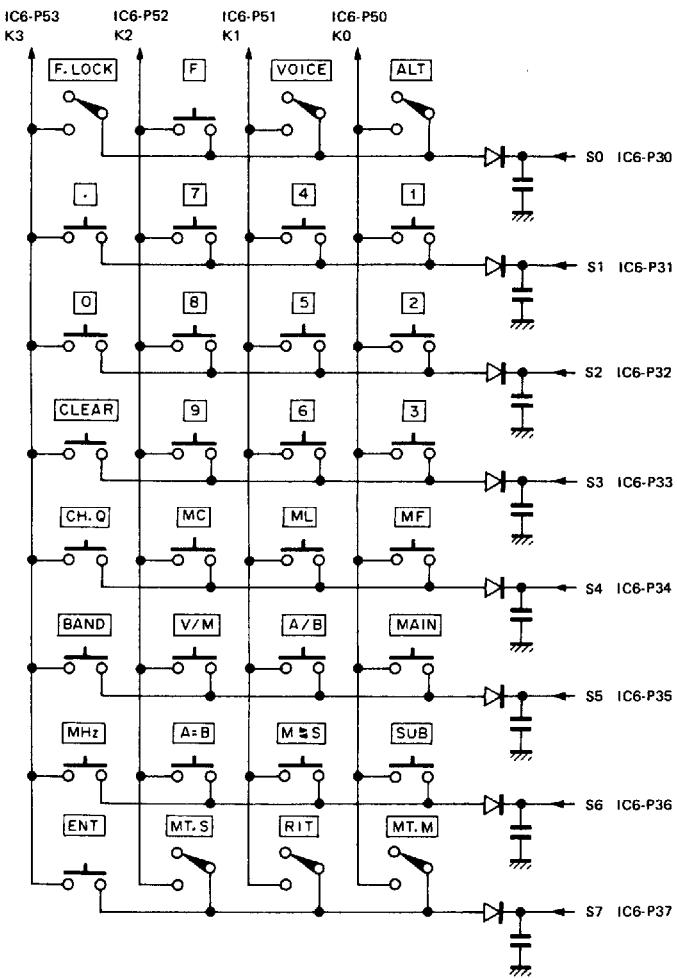


Fig. 26 Key scan matrix

## ● 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	Data output pin for CTCSS unit (TSU-5).
VDT	
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 :  $\mu$ PD78C10G-36 (IC1)

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

I/O INTERFACE : MB8963B (IC6)

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

I/O INTERFACE : M5M82C55AFP-5 (IC7)

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

Table 9 I/O maps

# CIRCUIT DESCRIPTION

## • Control unit I/O port functions

### 1. CPU : μPD78C10G-36 (IC1)

Port Name	Pin No.	Mane	Functions	I/O	Remarks
Port A	PA0	1	FDT	O	
	PA1	2	FCK	O	
	PA2	3	FLE	O	
	PA3	4	FBY	I	"L": Busy, "H": Sub CPU ready to receive
	PA4	5	MRBK	O	"L": Blanking
	PA5	6	SRBK	O	"H": Blanking
	PA6	7	MABK	O	"L": Blanking
	PA7	8	SABK	O	"H": Blanking
Port B	PB0	9	—	—	
	PB1	10	LCK	O	
	PB2	11	LLE	O	
	PB3	12	LRDY	O	"H": Display ON, "L": Display OFF
	PB4	13	SEP	O	"H": SP separate
	PB5	14	CRX	O	"H": Receive
	PB6	15	CTX	O	"H": Transmit
	PB7	16	CSS	I	PTT input, "L": Transmit
Port C	PC0	17	TXD	O	TTL level
	PC1	18	RXD	I	
	PC2	19	CTS	I	
	PC3	20	INT2	I	
	PC4	21	RTS	O	
	PC5	22	CI	I	
	PC6	23	EUD	I	
	PC7	24	CKY	I	
Control signals	PDO ~ PD7	55 ~ 62	AD0 ~ AD7	I/O	
	PF0 ~ PF7	47 ~ 54	A8 ~ A15	O	
	ALE	46	ALE	O	
	RD, WR	44, 45	RD, WR	O	
	AVCC	43	AVCC	I	
	AVREF	42	AVREF	I	
	AN7	41	SDIS	I	
	AN6	40	CRS	I	
	AN5	39	CRL	I	
	AN4	38	CRU	I	
	AN3	37	DLY	I	
	AN2	36	IFS	I	
	AN1	35	RIT	I	
	AN0	34	SSRM	I	
	AVss	33	AVss	—	
	X1, X2	30, 31	X1, X2	I	
	RES	28	RES	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	
	P01	27	SCLE	O	
	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	
	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	"L" : UT-10 available, "H" : Not available
	P57	71	120P	I	
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	"H" : Reset
	A0, A1	31, 32	A0, A1	I	Port select signals.
	CS0	29	CS0	I	"L" : P0x to P2x
	CS1	75	CS1	I	"L" : P3x to P5x

# CIRCUIT DESCRIPTION

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

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

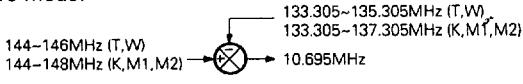
# TS-790A/E

## 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 carefull to ground lead of RF prove 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 carefull to ground lead of RF prove 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	 1240~1300MHz → 287.175MHz (MAIN) 287.075MHz (SUB)
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 ~ 506.4125MHz x 2 = 952.825 to ~ 1012.825MHz.
Q11	Receive buffer amplifier	952.825 ~ 1012.825MHz buffer amplifier.
Q12	3 frequency multiplication	12HET2 (81.92MHz) x 3 = 245.76MHz.
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	Limitter	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

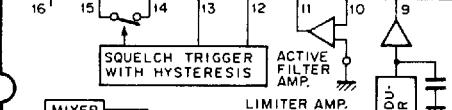
## **DESCRIPTION OF COMPONENTS**

<b>Component</b>	<b>Use/Function</b>	<b>Operation/Condition/Compatibility</b>
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**

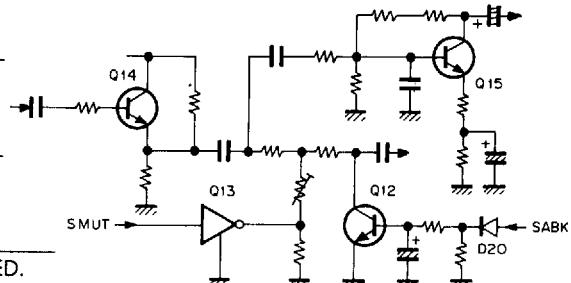
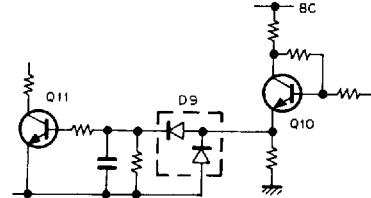
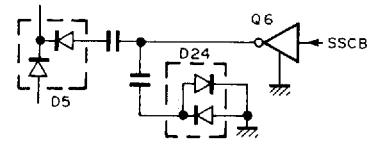
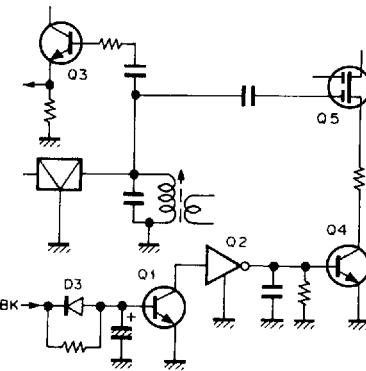
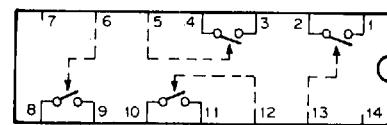
Component	Use/Function	Operation/Condition/Compatibility
IC1	Temperature detection	IC1 (1/2) : Transmitter output is down, IC1 (2/2) : Operate in cooling fan is working.
Q1	SWR protection control	Adjustable with VR2. Normally, base voltage is 0.3V and collector voltage is 3.0V in the transmit mode. When 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	Blanking : off.
Q5	Receive IF amplifier	Sub SSB, FM common IF 10.595MHz.
Q6	RF SW	SSB, CW receive mode : on, then the FM line is short-circuited.
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	Sub AF killer.
Q13	AF SW	Sub AF mute.
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.



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## 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 gate 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.

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## 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	Balanced 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	

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## DESCRIPTION OF COMPONENTS

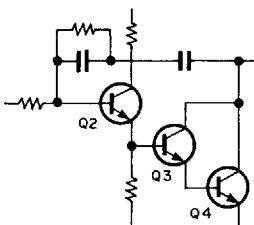
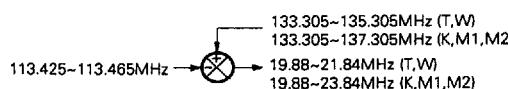
**COLLECTION MODULE (X59-3480-00) : This PC board located in the IF unit**

Component	Use/Function		Operation/Condition/Compatibility
(A1)	<b>(A2) AFC (ALT)</b>		
IC1	IC101	DC amplifier	Amplified to ceramic discriminator output.
Q1	Q101	IF amplifier	Amplified to 455kHz signal.
(B1)	<b>(B2) MODE (A)</b>		
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)	<b>(C2) MODE (B)</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)	<b>(D2) S METER</b>		
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)	<b>(E2) SQL CONTROL</b>		
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)	<b>ALC</b>		
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)	<b>STBY (A)</b>		
Q221	KYB SW		Supplied to keying voltage woth 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)	<b>STBY (B)</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)	<b>SP SEP</b>		
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)	<b>SIDE TONE</b>		
Q281	AF OSC		
D281	OSC SW		
D282	Current reversal prevention		
D283	Temperature compensation		

# DESCRIPTION OF COMPONENTS

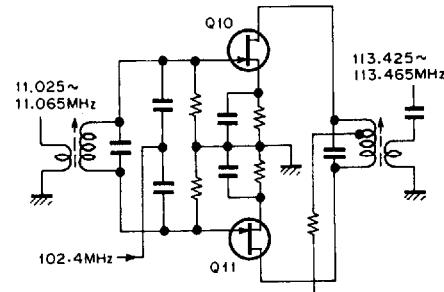
Component	Use/Function	Operation/Condition/Compatibility
<b>(L) AGC AMP</b>		
IC301	AGC amplifier	Operate in the SSB or CW mode.
<b>(M) BAND SW</b>		
Q321	DC SW	1.2GHz main band : on.
Q322	DC SW	On : apply to TXB voltage.
Q323	DC SW	Receive mode : on.
Q324	DC SW	1.2GHz main receive mode : "H".
Q325	DC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

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## 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 ( <b>M2, T, W</b> ), 354.075 ~ 374.075MHz ( <b>K, M1</b> ) 5 : Reference input 10.24MHz
IC51	C loop PLL IC	7 : VCO input 152.715 ~ 153.825MHz ( <b>M2, T, W</b> ), 152.475 ~ 153.825MHz ( <b>K, M1</b> ) 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 ( <b>M2, T, W</b> ), 354.075 ~ 374.075MHz ( <b>K, M1</b> )
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	<p>152.715~153.825MHz (M2,T,W) 152.475~153.825MHz (K,M1) → 18.8~19.87MHz (M2,T,W) 18.56~19.87MHz (K,M1)</p>
Q63, 64	RF amplifier	18.56 ~ 19.7MHz
Q65	RF amplifier	11.035 ~ 11.075MHz
Q66, 67	Mixer	<p>11.035~11.075MHz → 122.88MHz 122.88MHz → 133.915~133.955MHz</p>
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	<p>10.24MHz → 0.3725~0.4125MHz 0.3725~0.4125MHz → 10.6125~10.6525MHz</p>
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-scalor	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	<p>10.6125~10.6525MHz → 143.36MHz 143.36MHz → 153.9725~154.0125MHz</p>
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	<p>153.9725~154.0125MHz → Mixer → 16.52~31.12MHz</p>
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	<p>305.92~321.28MHz → Mixer → 476.4125~506.4125MHz (MAIN) 476.4625~506.4625MHz (SUB)</p>
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	Expande 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	

# TS-790A/E

## 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 $20 \cdot \log \left( \frac{E_1}{2 \cdot E_2} \right)$
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 $20 \cdot \log \left( \frac{E_1}{2 \cdot E_2} \right)$
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 $20 \cdot \log \left( \frac{E_1}{2 \cdot E_2} \right)$
Ripple	1.0dB or less
Spurious attenuation	38dB or more at 9 to 12MHz
Input and output impedance	330Ω

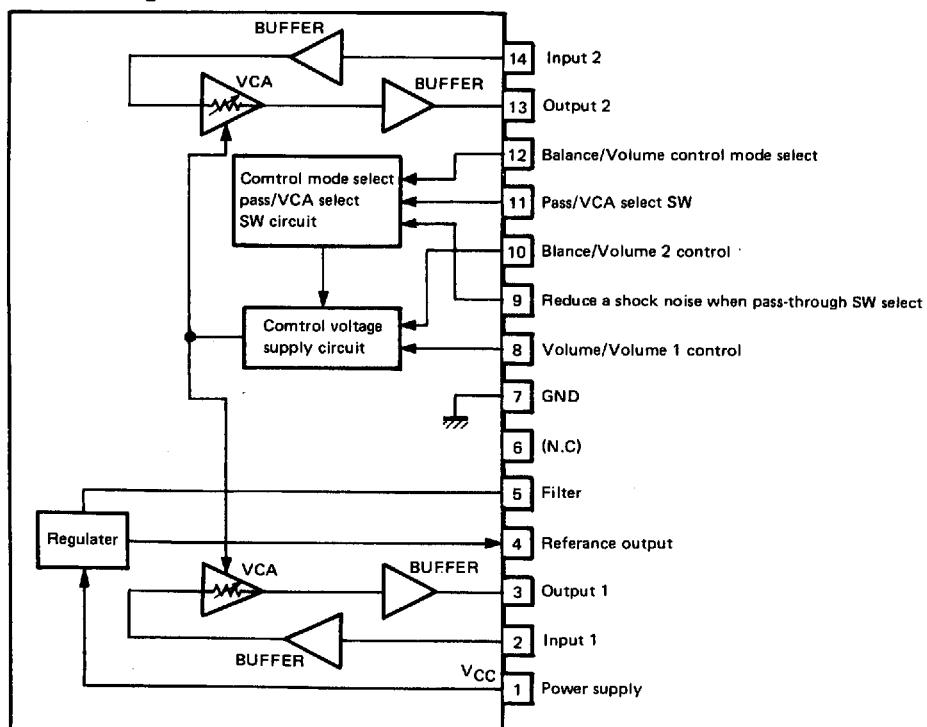
**CW crystal filter : L71-0283-15  
(IF unit XF7)**

### • 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



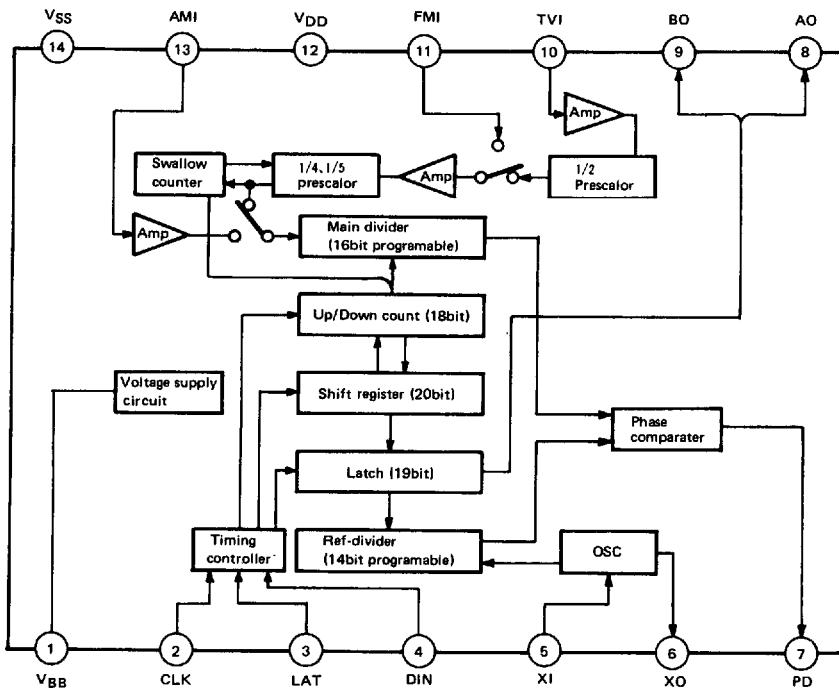
# SEMICONDUCTOR DATA

**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

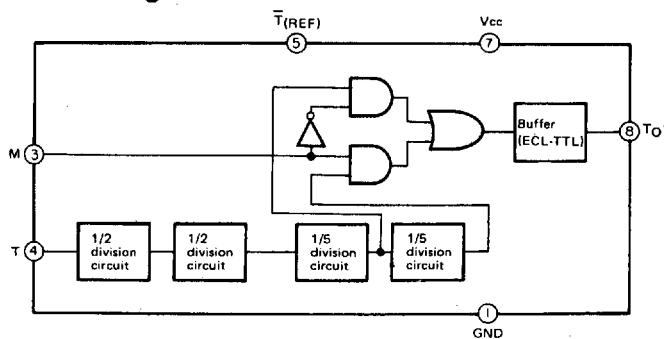
No.	Symbol	Description
1	V <sub>BB</sub>	PC board terminal (connect the 0.01μF capacitor to shortcircuit (GND)).
2	CLK	Clock input terminal of the 20 bit series input.
3	LAT	Latch signal input terminal of the shift register input and UP/DOWN clock input terminal.
4	DIN	Data input terminal and UP/DOWN 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 prescalor.
11	FMI	RF signal input terminal (Max. 150MHz or 180MHz).
12	V <sub>DD</sub>	Power supply terminal (+5V).
13	AMI	RF signal input terminal (Max. 40MHz or 50MHz).
14	V <sub>SS</sub>	GND terminal.

• Block diagram



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

• Block diagram

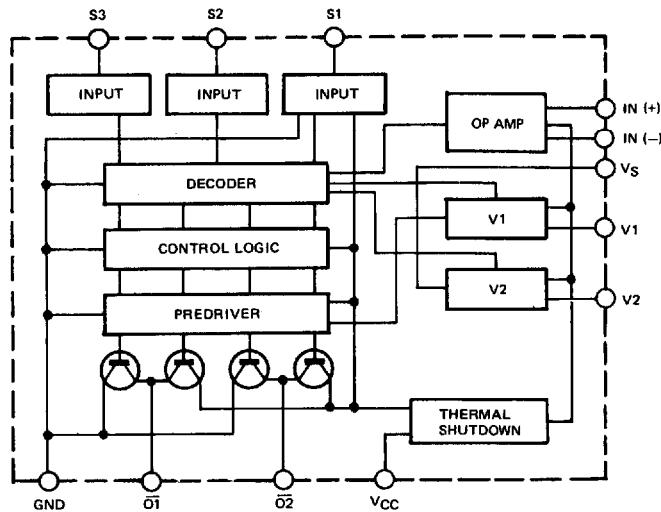


# TS-790A/E

## SEMICONDUCTOR DATA

### Solenoid drive : M54648L-D (Control unit IC8)

- Block diagram

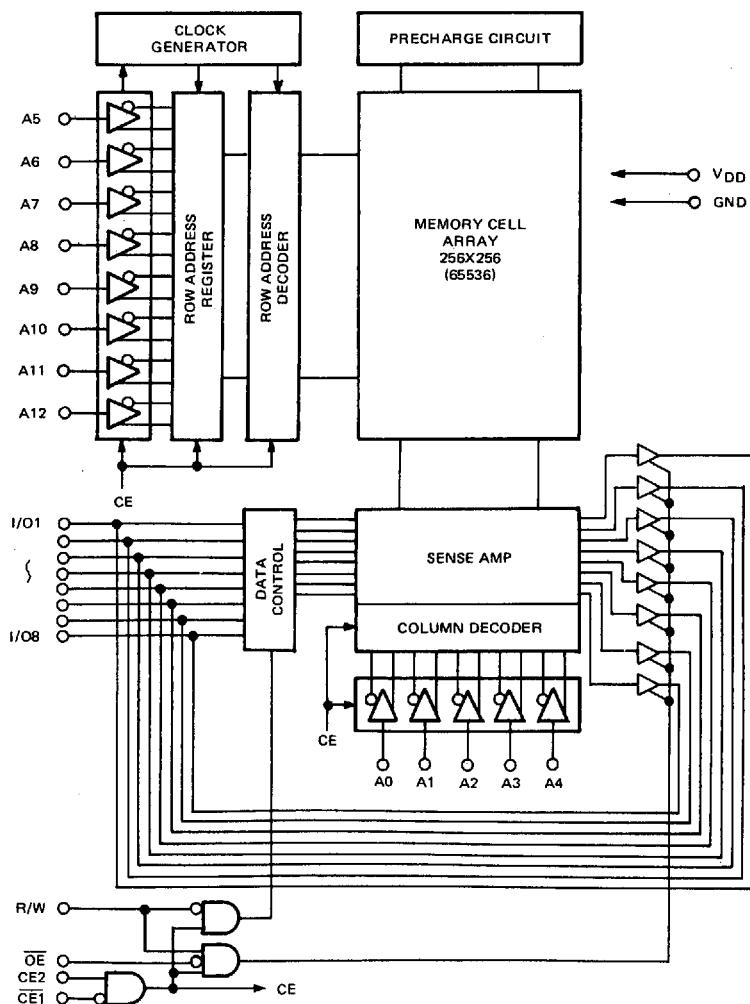


- Truth table

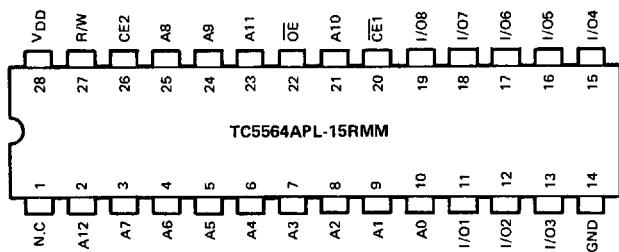
Input			Output		Vcc select circuit	Mode
L	L	L	"OFF" state	"OFF" state	—	STOP
L	L	H	H	L	Ope-amp. output	PLAY (+)
L	H	L	L	H	Ope-amp. output	PLAY (-)
L	H	H	H	L	V2	FF (2)
H	L	L	L	H	V2	REW (2)
H	L	H	H	L	V1	FF (1)
H	H	L	L	H	V1	REW (1)
H	H	H	L	L	VS	BRAKE

### RAM : TC5564APL-15 (Control unit IC3)

- Block diagram



- Terminal connection



- Operation mode

Operation mode	CE1	CE2	OE	R/W	I/O1 ~ I/O8	Power
Read	L	H	L	H	D OUT	IDDO
Write	L	H	*	L	D IN	IDDO
Output disable	*	*	H	*	High-Z	IDDO
Standby	H	*	*	*	High-Z	IDDS
	*	L	*	*	High-Z	IDDS

- Description of terminals

Name	Description
A0 ~ A12	Address input
R/W	Read/write control input
OE	Output enable input
CE1, CE2	Chip enable input
I/O1 ~ I/O8	Data input/output
VDD	Power supply terminal (+5V)
GND	Ground
NC	Not used

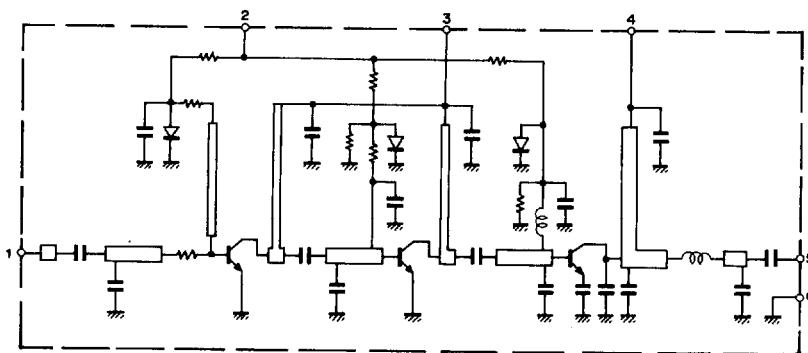
- Access time (MAX)

Item	Time
Access time	150ns
CE1 access time	150ns
CE2 access time	150ns
OE access time	70ns

# 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 ( $T_c = 25^\circ\text{C}$ )

Item	Symbol	Rating	Unit
Operating voltage	VCC	17	V
Current consumption	ICC	6	A
Base bias voltage	VBB	10	V
Operating case temperature	$T_c$ (op)	-30 ~ +110	$^\circ\text{C}$
Storage temperature	Tstg	-40 ~ +110	$^\circ\text{C}$

• Electrical characteristics ( $T_c = 25^\circ\text{C}$ )

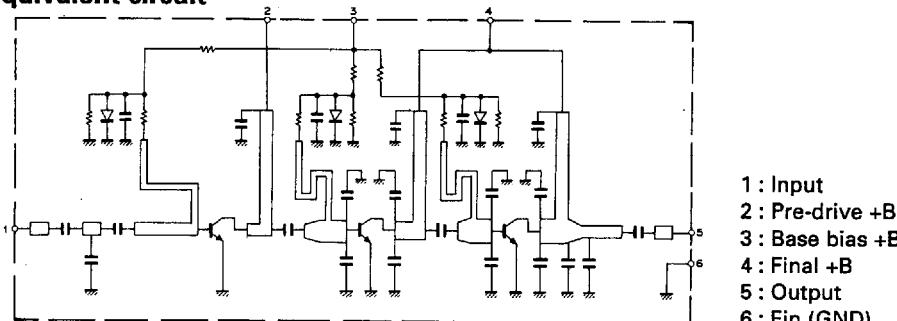
Item	Symbol	Condition	Rating			Unit
			MIN.	TYP.	MAX.	
Output power	Po	$V_{CC1} = V_{CC2} = 12.5\text{V}$ , $V_{BB} = 9\text{V}$ , $f = 430 \sim 440\text{MHz}$ , pin = 0.2W	18.5	19		W
	$\eta_T$		40	42		%
Power gain linearity	Gp	$V_{CC1} = V_{CC2} = 12.5\text{V}$ , $V_{BB} = 9\text{V}$ , $f = 430 \sim 440\text{MHz}$ , pin = 10dBm	21			dB

# TS-790A/E

## SEMICONDUCTOR DATA

### Power module : M57762 (1.2GHz final unit IC102)

- Equivalent circuit



- Max rating ( $T_c = 25^\circ\text{C}$ )

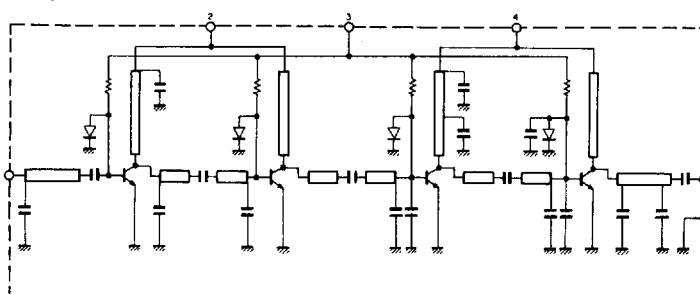
Item	Symbol	Condition	Rating	Unit
Operating voltage	Vcc		17	V
Base bias voltage	Vbb		10	V
Current consumption	Icc		8	A
Input power	Pin	$Z_g = Z_L = 50 \Omega, V_{cc} = 12.5V, V_{bb} = 9V$	2	W
Output power	Po	$Z_g = Z_L = 50\Omega$	25	W
Operating case temperature	Tc (op)		-30 ~ +110	°C
Storage temperature	Tstg		-40 ~ +110	°C

- Electrical characteristics ( $T_c = 25^\circ\text{C}$ )

Item	Symbol	Condition	Rating		
			MIN.	TYP.	MAX.
Output power	Po		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	$V_{cc} = 12.5V, V_{bb} = 9V, f = 1.24 \sim 1.3GHz, Pin = 10dBm, Z_g = Z_L = 50\Omega$	13		dB
3rd IMD		$V_{cc} = 12.5V, V_{bb} = 9V, f = 1.24 \sim 1.3GHz, \Delta f = 2kHz, Po \leq 14W PEP, Z_g = Z_L = 50\Omega$		20	dB
5th IMD				-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 ( $T_c = 25^\circ\text{C}$ )

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	$Z_g = Z_L = 50\Omega$	10	mW
Output power	Po		4	W
Operating case temperature	Tc (op)		-20 ~ +100	°C
Storage temperature	Tstg		-40 ~ +110	°C

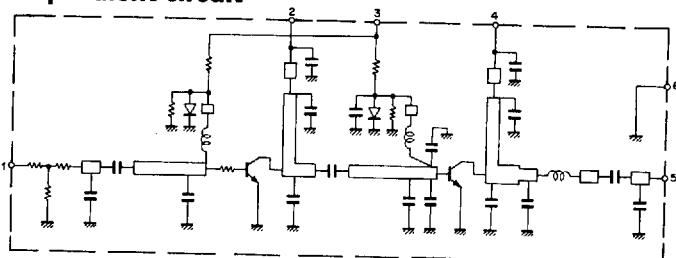
- Electrical characteristics ( $T_c = 25^\circ\text{C}$ )

Item	Symbol	Condition	Rating		
			MIN.	TYP.	MAX.
Output power	Po		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	$V_{cc} = 8V, V_{bb} = 8V, f = 1.24 \sim 1.3GHz, Pin = 0dBm, Z_g = Z_L = 50\Omega$	23	25	dB
3rd IMD	IMD3	$V_{cc} = 8V, V_{bb} = 8V, f = 1.24 \sim 1.3GHz, PEP \leq 1.6W, Z_g = Z_L = 50\Omega, \Delta f = 20kHz$		-23	dB
5th IMD	IMD5			-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 ( $T_c = 25^\circ\text{C}$ )

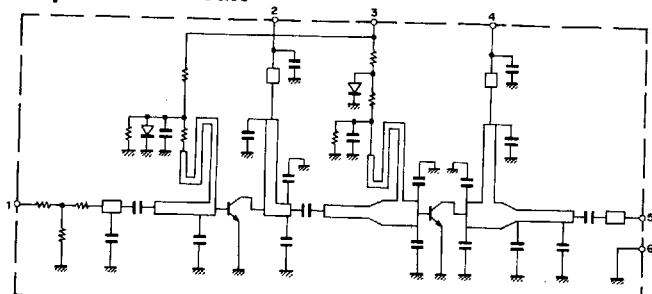
Item	Symbol	Condition	Rating	Unit
Operating voltage	Vcc		16	V
Base bias voltage	Vbb		10	V
Current consumption	Icc		24	A
Input power	Pin	$V_{cc1} \leq 12.5V, Z_G = 50\Omega$	0.8	W
Output power	Pout	$Z_L = 50\Omega$	78	W
Operating case temperature	Tc (op)		-30 ~ +110	°C
Storage temperature	Tstg		-40 ~ +110	°C

• Electrical characteristics ( $T_c = 25^\circ\text{C}$ )

Item	Symbol	Condition	Rating		
			MIN.	TYP.	MAX.
Output voltage	po		60	65	
Total efficiency	$\eta_T$		50	55	%
2nd transmission spurious		$V_{cc} = 12.5V, V_{bb} = 9V, f = 144 \sim 148\text{MHz},$ $Pin = 0.5\text{W}, Z_G = Z_L = 50\Omega$		-30	dB
3rd transmission spurious				-35	dB
Input SWR	pin			2.8	
Output SWR	pout			1.5	
3rd IMD	3rd. IMD	$V_{cc1} = V_{cc2} = 12.5V, V_{bb} = 9V, f = 144 \sim 148\text{MHz}$		-27	-25
5th IMD	5th. IMD	$Pin \leq 45\text{W PEP}, \Delta f = 2\text{kHz}, Z_G = Z_L = 50\Omega$		-35	-31
Power gain linearity	GPT	$V_{cc1} = V_{cc2} = 12.5V, V_{bb} = 9V, f = 144 \sim 148\text{MHz},$ $Pin = 10\text{mW}, Z_G = Z_L = 50\Omega$	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 ( $T_c = 25^\circ\text{C}$ )

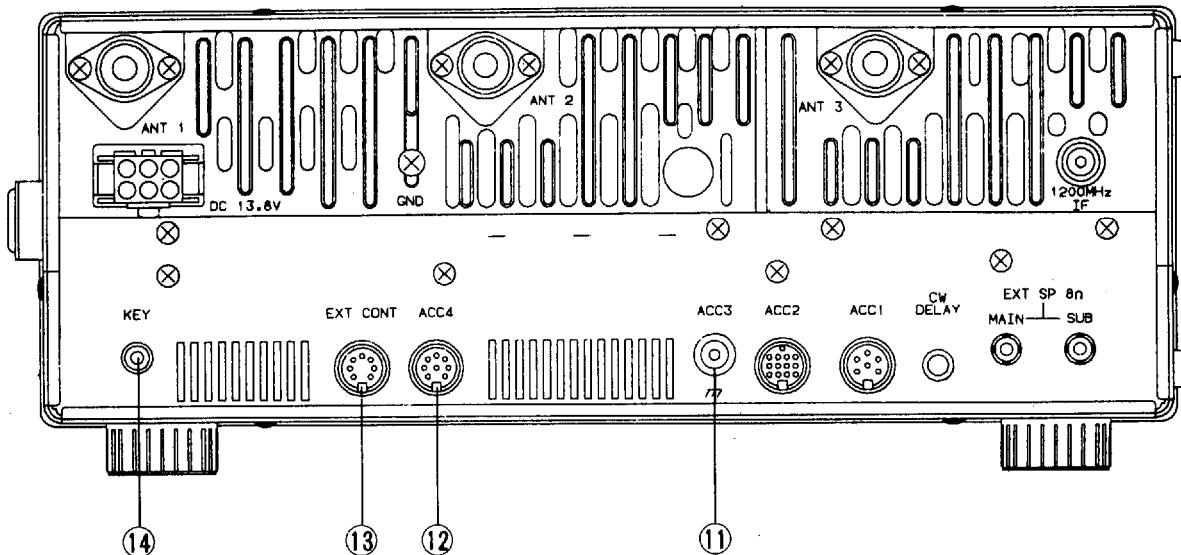
Item	Symbol	Condition	Rating	Unit
Operating voltage	Vcc		16	V
Base bias voltage	Vbb		10	V
Current consumption	Icc		25	A
Input power	Pin	$V_{cc1} \leq 12.5V, Z_G = 50\Omega$	14	W
Output power	Pout	$Z_L = 50\Omega$	78	W
Operating case temperature	Tc (op)		-30 ~ +110	°C
Storage temperature	Tstg		-40 ~ +110	°C

• Electrical characteristics ( $T_c = 25^\circ\text{C}$ )

Item	Symbol	Condition	Rating		
			MIN.	TYP.	MAX.
Output voltage	po		60	65	
Total efficiency	$\eta_T$		40	45	%
2nd transmission spurious		$V_{cc} = 12.5V, V_{bb} = 9V, f = 430 \sim 450\text{MHz},$ $Pin = 10\text{W}, Z_G = Z_L = 50\Omega$		-30	dB
3rd transmission spurious				-35	dB
Input SWR	pin			2.8	
Output SWR	pout			1.5	
3rd IMD	3rd. IMD	$V_{cc1} = V_{cc2} = 12.5V, V_{bb} = 9V, f = 430 \sim 450\text{MHz}$		-27	-25
5th IMD	5th. IMD	$Pin \leq 45\text{W PEP}, \Delta f = 2\text{kHz}, Z_G = Z_L = 50\Omega$		-35	-31
Power gain linearity	GPT	$V_{cc1} = V_{cc2} = 12.5V, V_{bb} = 9V, f = 430 \sim 450\text{MHz},$ $Pin = 100\text{mW}, Z_G = Z_L = 50\Omega$	7	9	dB

# TS-790A/E

## CONTROLS AND FUNCTIONS

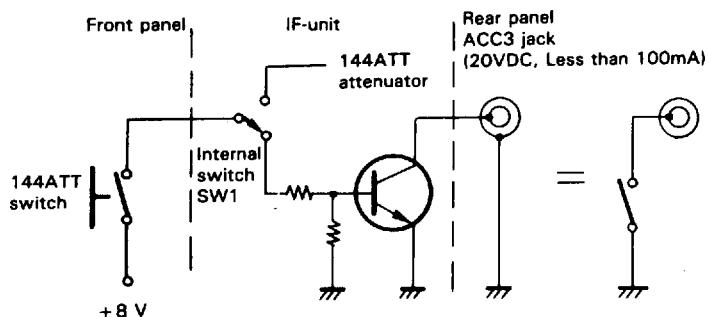
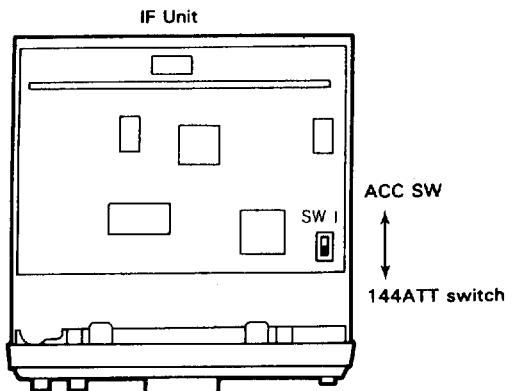


### (11) ACC 3 jack

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.



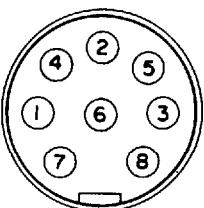
#### Caution:

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.



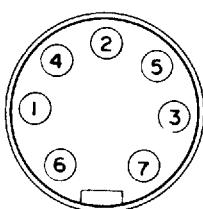
ACC4 View from the rear panel.

#### 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.



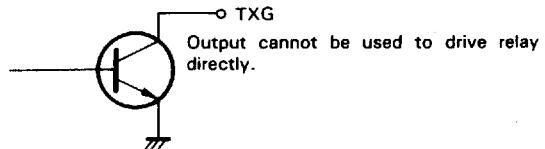
EXT CONT View from the rear panel.

#### EXT CONT pin assignments

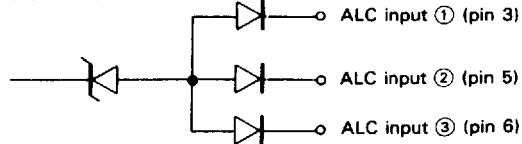
Pin number	Symbol	Use
1	43TXG	Grounded during transmission in 430 MHz band. Normally at high impedance. (Maximum permissible voltage 20 V, maximum permissible current 10 mA).
2	S S	External push to talk terminal transmission starts when grounded.
3	ALC	External ALC input ①. ALC threshold is about -6 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.

# TS-790A/E

## DATA COMMUNICATIONS

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

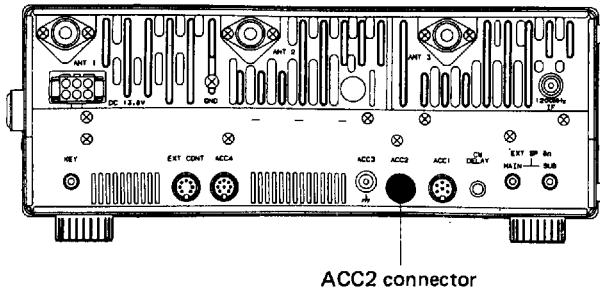
1. The Accessory 2 terminal has been provided for connection of Data communications devices. All necessary connections can be accomplished from the same connector.
2. When using AFSK (Audio Frequency Shift Keying) or modulating the signal with any form of audio tones you should select LSB or USB. If 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.

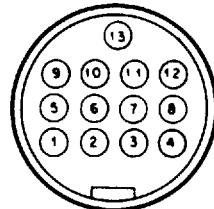
**ACC2 pin assignments**

Pin number	Symbol	Use
1	SAF	SUB receiver audio at a fixed level independent of AF control setting. Output voltage: 300 mV/47 kΩ 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).



ACC2 connector

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	SS	PTT terminal. Transmission begins when grounded. Use Pin 4 or 8 as chassis GND.



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

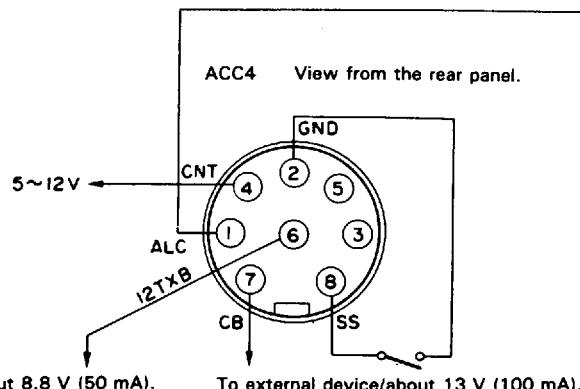
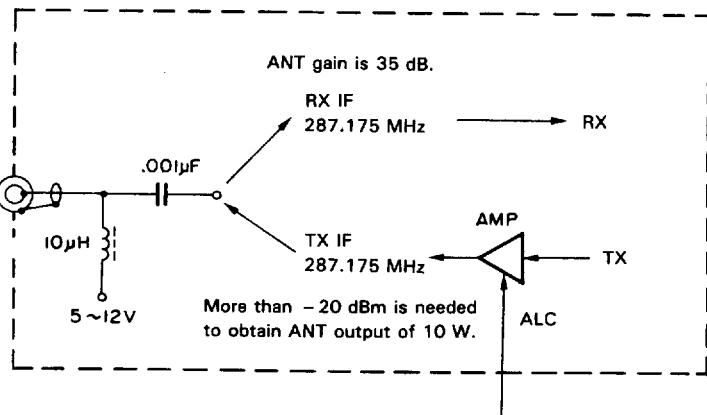
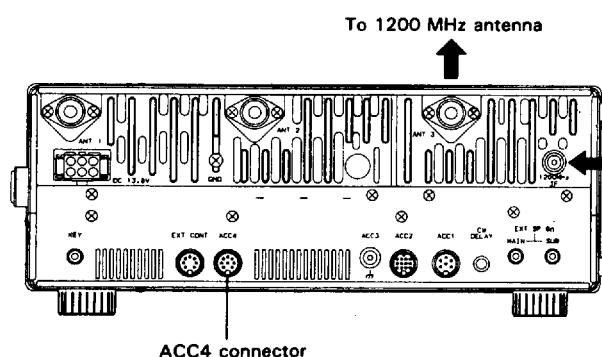
## 1200MHZ IF CONNECTOR AND ACC4 CONNECTOR

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.

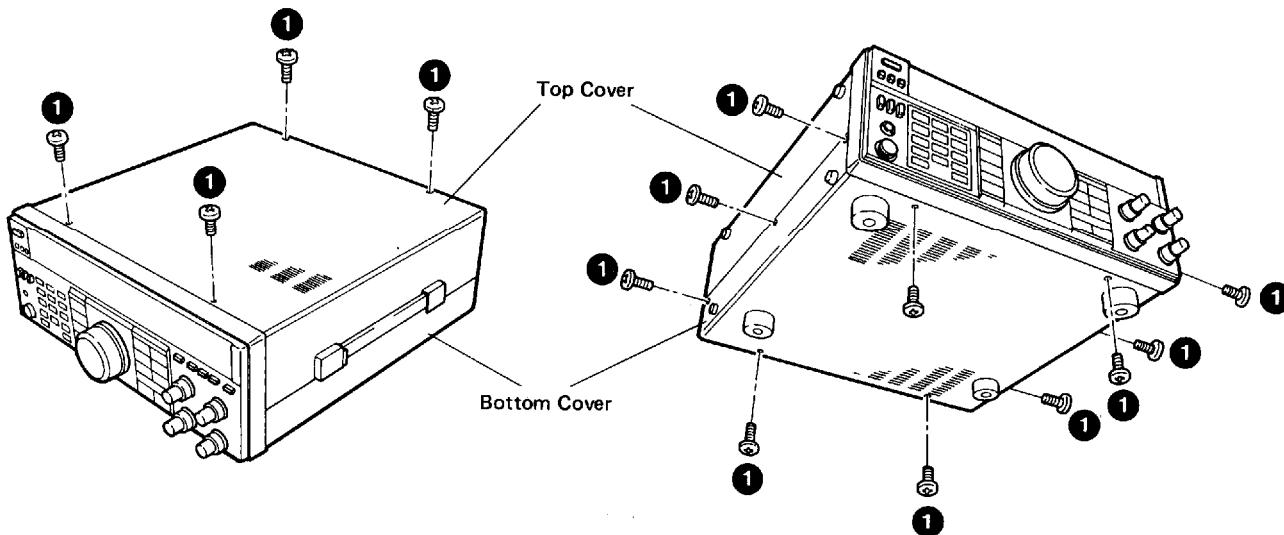
### Cautions:

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.

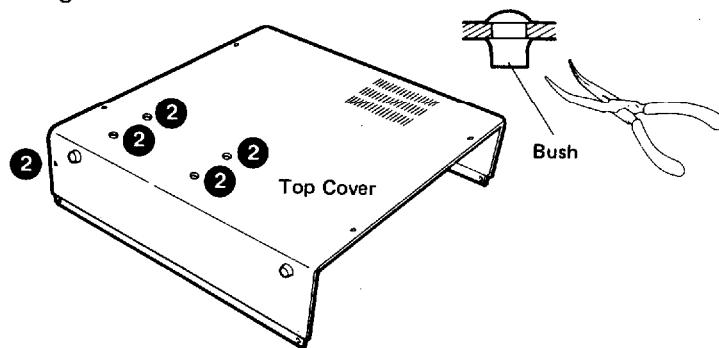


**UT-10 (OPTION) INSTALLATION**

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

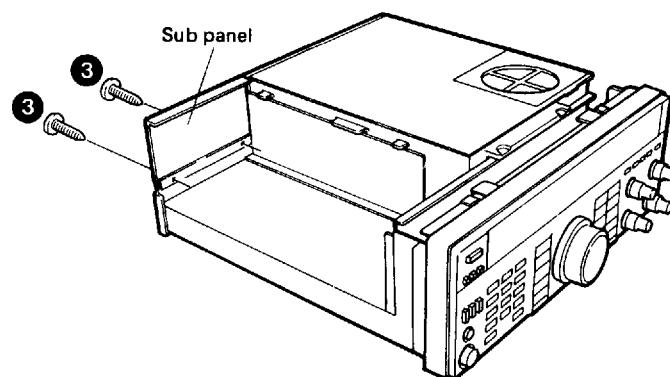


2. Remove the 5 bushings from the top cover using diagonal cutters ( ② ).



3. Remove the blind plate from the rear of the chassis ( ③ ).

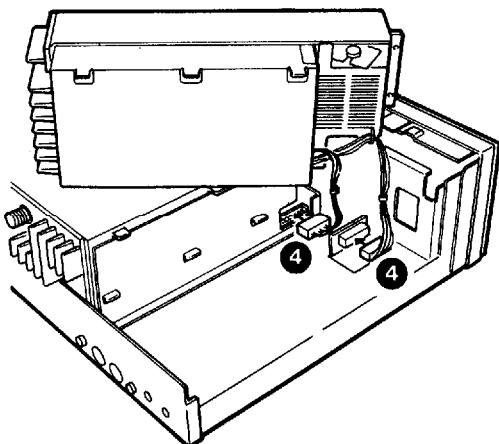
Keep the 2 screws removed for later use. They are not needed now.



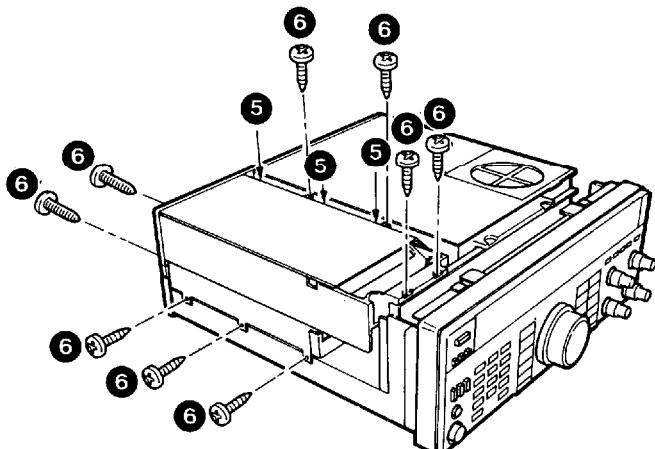
# TS-790A/E

## UT-10 (OPTION) INSTALLATION

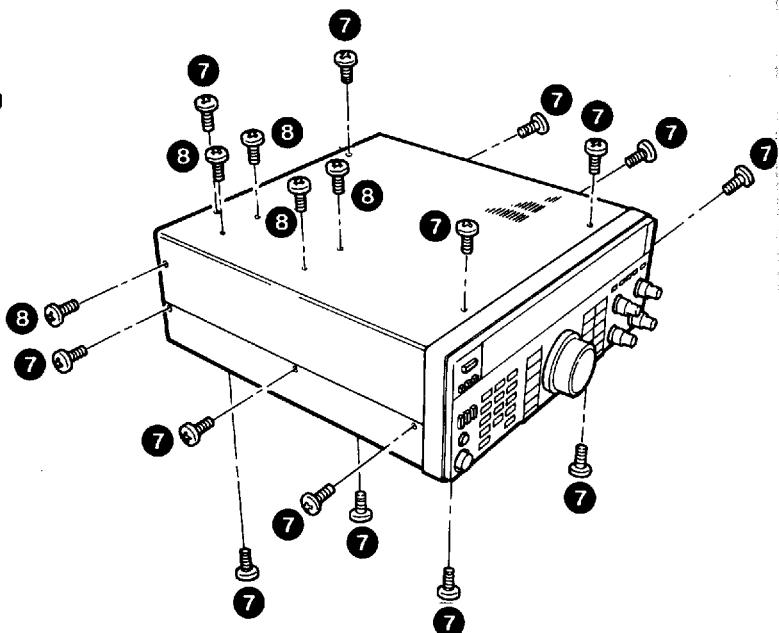
4. Attach the 18-pin connector and the 11-pin connector from the UT-10 (④).



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

: indicates safty critical components

E : Europe

K : USA

P : Canada

W : Europe

U : PX (Far East Hawaii)

T : England

M : Other Areas

UE : AAFES (Europe)

X : Australia

L : Northern Europe

Resistor value	Capacitor value
$22\Omega = 2\ 2\ 0$	$22\text{pF} = 2\ 2\ 0$
0.5Ω = 0R5	0.5pF = 0R5
1Ω = 010	1pF = 010
10Ω = 100	10pF = 100
100Ω = 101	100pF = 101
1000Ω = 1KΩ = 102	1000pF = 0.001μF = 102
10KΩ = 103	0.01μF = 103
100KΩ = 104	
1000KΩ = 1MΩ = 105	

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
<b>TS-790A/E</b>						
1	1A	*	A01-1045-01	METALLIC CABINET(UP SIDE)		
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	KM1M2 TW	
9	1D	*	B01-0663-02	PANEL ESCUTCHEON		
10	1D	*	B10-0700-03	FRONT GLASS		
11	1C	*	B11-0434-04	FILTER		
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)	KM1M2	
20	2B	*	B40-3774-14	MODEL NAME PLATE(TS-790E)	TW	
21	1D	*	B42-3314-04	LABEL (CASE UP SIDE)		
23	1C	*	B43-1095-14	BADGE (TS-790A)	KM1M2	
23	1C	*	B43-1096-14	BADGE (TS-790E)	TW	
-	-	*	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	K	
-	-	*	B46-0419-00	WARRANTY CARD	W	
-	-	*	B50-8254-00	INSTRUCTION MANUAL		
-	-	*	B50-8262-00	INSTRUCTION MANUAL		
-	-		C91-1075-05	CERAMIC 470PF K		
-	-		E07-0751-05	7P DIN PLUG		
-	-		E07-0852-15	8P MEAL PLUG		
-	-		E07-1351-05	13P PLUG		
-	-		E30-2065-25	DC CORD ASSY		
-	-		E04-0167-05	M TYPE RECEPTACLE(ANT)		
25	2F		E04-0170-05	N TYPE RECEPTACLE(ANT)	TW	
25	2F		E23-0015-04	GND LUG		
26	1F		E23-0616-04	GND LUG (ANT)		
27	2F	*	E31-3303-05	CONNECTING WIRE(430HET)		
-	-	*	E31-3407-05	CONNECTING WIRE(IF-CONT)		
-	-	*	E31-3408-05	CONNECTING WIRE(IF-CONT)		
-	-	*	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)	KM1M2	

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-		*	E31-3456-05	CONNECTING WIRE(GND LUG)		
-		*	E31-3487-05	CONNECTING WIRE(144HET)		
30	2E	*	F05-1531-05	FUSE (15A)		
31	2E	*	F05-2036-05	FUSE (20A)		
32	1F	*	F01-0956-11	HEAT SINK		
33	3F	*	F09-0420-05	FAN		
34	2B	*	F11-1079-12	SHIELDING COVER(FINAL)		
35	1D	*	F11-1080-02	SHIELDING COVER(RF)		
36	2B	*	F11-1081-03	SHIELDING COVER(PLL)		
37	2F	*	F15-0659-04	SHADE (FL)		
38	3D	*	F19-0655-03	BLIND PLATE (REAR PANEL)		
39	3D	*	F19-0709-05	HOLE BUSHING		
40	3D	*	F20-0559-14	INSULATING BOARD(VOLUME)		
41	3D	*	F20-0551-04	INSULATING BOARD(SUB PANEL)		
42	1B	*	G02-0584-04	FLAT SPRING (FINAL)		
43	1A	*	G11-0609-04	CUSHION		
44	1A, 3E	*	G13-0855-04	CUSHION (MIC)		
45	1D	*	G13-0676-04	FLAT SPRING (RF)		
46	3A	*	G13-0677-04	FLAT SPRING (CONT)		
47	1B	*	G13-0631-04	NON-WOVEN FABRIC(CASE UPSIDE)		
48	3A	*	G10-0656-04	FELT(SP)		
49	1E, 3F	*	G10-0676-04	NON-WOVEN FABRIC(CASE SIDE)		
50	1C	*	G10-0677-04	NON-WOVEN FABRIC(ESCUCHON)		
51	1D	*	G13-0840-04	CUSHION (CASE BOTTOM)		
52	1D	*	G13-0648-04	CUSHION (VCN COVER)		
53	1F	*	G13-0840-04	CUSHION (CASE BOTTOM)		
54	1E, 1F	*	G13-0847-04	CUSHION (FINAL, RF SHIELD)		
55	2E	*	G13-0859-04	CUSHION (14KEY)		
56	3B	*	G13-0860-04	CUSHION (MODE)		
-		*	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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# TS-790A/E

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67	2F		J50-0401-05 J13-0404-05 J61-0307-05	HINGE FUSE HOLDER 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	
73	2C	*	K27-3030-04	KNØB(BUTTON)	ALERT	
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 TAPTTIE SCR(PCB)		
K	1F, 2B		N87-3006-46	BRAZIER HEAD TAPTTIE SCR(SHIEL)		
L	2E, 2F		N87-3008-46	BRAZIER HEAD TAPTTIE SCR(ANT)		
M	3A, 3B		N87-4010-46	BRAZIER HEAD TAPTTIE SCR(FOOT)		
N	2F, 3F		N88-3006-46	FLAT HEAD TAPTTIE SCREW(HINGE)		
O	2B		N88-3008-46	FLAT HEAD TAPTTIE SCR(REAIRPANE)		
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	LQUID SPEAKER(FULL RANGE) MICROPHONE		
-						
IC1			LC7582	IC(LCD DRIVER)		
TH001	2E		STP41L	THERMISTER		
106	2D	*	W02-0801-05	ENCODER		
107	2C, 3D	*	X41-3050-00	SWITCH UNIT		
108	3E, 3F	*	X44-3060-00	RF UNIT	M2TW	
108	3E, 3F	*	X44-3060-11	RF UNIT	KM1	
110	2F	*	X45-3160-00	144MHZ FINAL UNIT		
111	2E	*	X45-3170-00	430MHZ FINAL UNIT		
112	3B	*	X48-3050-11	IF UNIT	KM1M2	
112	3B	*	X48-3050-61	IF UNIT	TW	
113	2A, 2B	*	X50-3080-00	PLL UNIT		
114	2A	*	X53-3120-11	CONTROL UNIT	K	
114	2A	*	X53-3120-21	CONTROL UNIT	M1	
114	2A	*	X53-3120-22	CONTROL UNIT	M2	
114	2A	*	X53-3120-61	CONTROL UNIT	TW	

## 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			CK73FB1HXXXK	CHIP C		K
C15 ,16			CK73FB1E103K	CHIP C	0.010UF	K
C17			CEO4NW1C100M	ELECTR0	10UF	16WV
C18			CK45F1H473Z	CERAMIC	0.047UF	Z
C19		*	CEO4EW1H470M	ELECTR0	47UF	50WV
C20		*	CK45F1H473Z	CERAMIC	0.047UF	Z
C21		*	CEO4EW1E221M	ELECTR0	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/SDL)	
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	BP METAL RECEPTACLE(MIC)		

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# TS-790A/E

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W6		*	E31-3422-05	CONNECTING WIRE(2P SUB GND)		
W7		*	E31-3423-05	CONNECTING WIRE(4P RIT.IFS)		
A2 ,3		*	G13-0862-04	CUSHION		
A7		*	G13-0903-04	CUSHION		
A4 ,6		*	J19-1427-03	HOLDER		
A5		*	J39-0431-04	SPACER		
L1		*	L40-1011-13	SMALL FIXED INDUCTOR (100UH)		
T1		*	L19-0366-05	BALUN TRANSFORMER (DC/DC)		
X1		*	L77-1333-05	CRYSTAL RESONATOR(4.194304MHZ)		
CP1			R90-0598-05	MULTI-COMP (10K~20K)		
R1 -7			RK73FB2AXXXJ	CHIP R J 1/10W		
R8			RD14BB2C680J	RD 68 J 1/6W		
R9 -11			RK73FB2AXXXJ	CHIP R J 1/10W		
R12			RD14BB2C680J	RD 68 J 1/6W		
R13 -34			RK73FB2AXXXJ	CHIP R J 1/10W		
R35 ,36			RD14BB2C2R2J	RD 2.2 J 1/6W		
R37			RD14BB2C223J	RD 22K J 1/6W		
R38 ,39		*	RD14CB2E101J	RD 100 J 1/4W		
R40 -64		*	RK73FB2AXXXJ	CHIP R J 1/10W		
R65		*	RS14DB2H470J	FL-PRQNF RS 47 J 1/2W		
R66 -69		*	RK73FB2AXXXJ	CHIP R J 1/10W		
VR1 ,2	3D	*	R19-9412-05	POTENTIOMETER 50K,10K(AF/SQL)		
VR3	3D	*	R24-9407-05	POTENTIOMETER 10K,50K(MIC/PWR)		
VR4	3D	*	R19-3425-05	POTENTIOMETER (10K,B)		
VR5		*	R12-1085-05	TRIMMING POT. (2.2K) RIT		
VR6		*	R12-1083-05	TRIMMING POT. (1K) IF SHIFT		
S1			S40-2441-15	PUSH SWITCH (F.LOCK)		
S2			S40-2440-15	PUSH SWITCH (144ATT)		
S3 ,4			S40-2441-15	PUSH SWITCH (ALT,VOICE)		
S5 ,6			S40-2440-15	PUSH SWITCH (PRQC,ALC/RF)		
S7 -9			S50-1412-05	SENSITIVE SW(OFFSET,TONE,CAL)		
S10 -12			S50-1426-05	SENSITIVE SW(AUTO,MAIN,SUB)		
S13 -15			S50-1412-05	SENSITIVE SW(SAT,CTCSS/ALERT)		
S16 -18			S50-1426-05	SENSITIVE SW(LSB/USB,A/B,M??S)		
S19 -22			S50-1412-05	SENSITIVE SW(F,REV,SPLIT,SCAN)		
S23 -25			S50-1426-05	SENSITIVE SW(CW/N,VFO/M,A=B)		
S26 -28			S50-1412-05	SENSITIVE SW(M?V,M.IN,CLEAR)		
S29 -31			S50-1426-05	SENSITIVE SW(CH.D,BAND,MHZ)		
S32			S50-1412-05	SENSITIVE SW(ENT)		
S33 -35			S40-2441-15	PUSH SW(MAIN/SUB MUTE,RIT)		
S36 ,37			S40-2440-15	PUSH SW(AGC,NB)		
A1		*	FIP14KM7	DISPLAY TUBE		
D1		*	RD9.1M-B2	CHIP ZENER DIODE		
D2		*	RD7.5M-B2	CHIP ZENER DIODE		
D4		*	RD43EB	CHIP ZENER DIODE		
D5		*	ISS81	CHIP DIODE		
D6		*	RD30EB2	CHIP ZENER DIODE		
D7		*	US1090	CHIP DIODE		
D8 -15		*	RL573	CHIP DIODE		
IC1		*	75206G-531-1B	IC(MICROPROCESSOR)		
Q1		*	2SC3668(Y)	TRANSISTOR		
Q2 -7			DTA143EK	DIGITAL TRANSISTOR		

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<b>RF UNIT (X44-3060-XX) -00 : TS-790A (M2), TS-790E -11 : TS-790 (K, M1)</b>								
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	ELECTRON	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			CK45F1H473Z	CERAMIC	0.047UF	Z		
C86 ,87			CK73FB1H102K	CHIP C	1000PF	K		
C88 ,89			C90-0817-05	ELECTRO	1000UF	16WV		
C90			CK73FB1H102K	CHIP C	1000PF	K		
C91			CE04EW1A470M	ELECTRO	47UF	10WV		
C92			CE04EW1C221M	ELECTRO	220UF	16WV		
C93			CK73FB1H102K	CHIP C	1000PF	K		
C94			CE04EW1A470M	ELECTRO	47UF	10WV		
C95 -99			CK73FB1HXXXX	CHIP C		K		
C100-102			CC73FCH1H020C	CHIP C	2.0PF	C		
C103-201			CK73FB1EXXXX	CHIP C		K		
C202			CC73FCH1H470J	CHIP C	47PF	J		
C204			CK73FB1H102K	CHIP C	1000PF	K		
C205			CK73EB1E473K	CHIP C	0.047UF	K		
C206			CC73FCH1H101J	CHIP C	100PF	J		
C207,208			CK73FB1H102K	CHIP C	1000PF	K		
C209			CC73FCH1H020C	CHIP C	2.0PF	C	KM1	
C209			CC73FCH1H1R5C	CHIP C	1.5PF	C	M2TW	
C210			CK73FB1H102K	CHIP C	1000PF	K		
C211			CC73FCH1H390J	CHIP C	39PF	J		
C212			CK73FB1H102K	CHIP C	1000PF	K		
C213			CC73FCH1H030C	CHIP C	3.0PF	C	KM1	
C214			CK73FB1H102K	CHIP C	1000PF	K		
C215			CC73FCH1H010C	CHIP C	1.0PF	C	M2TW	
C215			CC73FCH1H020C	CHIP C	2.0PF	C		
C216,217			CC73FCH1HXXXX	CHIP C		J		
C218-220			CK73FB1H102K	CHIP C	1000PF	K		
C221			CC73FCH1H180J	CHIP C	18PF	J		
C222			CC73FCH1H060D	CHIP C	6.0PF	D		
C223			CK73FB1H102K	CHIP C	1000PF	K		
C224			CK73FB1E103K	CHIP C	0.010UF	K		
C225			CK73FB1H102K	CHIP C	1000PF	K		
C226,227			CK73FB1E103K	CHIP C	0.010UF	K		
C228			CK73FB1H102K	CHIP C	1000PF	K		
C229			CC73FCH1H220J	CHIP C	22PF	J		
C230			CK73FB1E103K	CHIP C	0.010UF	K		
C231			CC73FCH1H010C	CHIP C	1.0PF	C		
C232			CK73FB1E103K	CHIP C	0.010UF	K		
C233			CK73FB1H102K	CHIP C	1000PF	K		
C234			CC73FCH1H220J	CHIP C	22PF	J		
C235			CK73FB1H102K	CHIP C	1000PF	K		
C236,237			CC73FCH1H220J	CHIP C	22PF	J		
C238			CK73FB1H102K	CHIP C	1000PF	K		
C239			CK73FB1E103K	CHIP C	0.010UF	K		
C241,242			CK73FB1H102K	CHIP C	1000PF	K		
C243			CC73FCH1H220J	CHIP C	22PF	J		
C244			CK73FB1H102K	CHIP C	1000PF	K		
C245			CC73FCH1H0R5C	CHIP C	0.5PF	C		
C246			CC73FCH1H100D	CHIP C	10PF	D		
C247			CK73FB1H102K	CHIP C	1000PF	K		
C248			CC73FCH1H050C	CHIP C	5.0PF	C		
C249			CK73FB1H102K	CHIP C	1000PF	K		
C250			CC73FCH1H020C	CHIP C	2.0PF	C		
C251			CK73FB1H102K	CHIP C	1000PF	K		
C252			CC73FCH1H010C	CHIP C	1.0PF	C		

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C253			CK73FB1H102K	CHIP C	1000PF	K		
C254-257			CC73FCH1HXXXJ	CHIP C		J		
C258-261			CC73FCH1H050C	CHIP C	5.0PF	C		
C262			CK73FB1H102K	CHIP C	1000PF	K		
C263			CC73FCH1H101J	CHIP C	100PF	J		
C264			CK73FB1H102K	CHIP C	1000PF	K		
C265			CC73FCH1H120J	CHIP C	12PF	J		
C266			CK73FB1H102K	CHIP C	1000PF	K		
C267			CK73FB1E103K	CHIP C	0.010UF	K		
C268			CC73FCH1H120J	CHIP C	12PF	J		
C269			CC73FCH1H101J	CHIP C	100PF	J		
C270			CK73FB1H102K	CHIP C	1000PF	K		
C271			CK73FB1E103K	CHIP C	0.010UF	K		
C272			CC73FCH1H010C	CHIP C	1.0PF	C		
C273			CC73FCH1H470J	CHIP C	47PF	J		
C274			CK73FB1E103K	CHIP C	0.010UF	K		
C275			CK73FB1H102K	CHIP C	1000PF	K		
C276-278			CC73FCH1H0R5C	CHIP C	0.5PF	C		
C279			CC73FCH1H470J	CHIP C	47PF	J		
C280			CK73FB1E103K	CHIP C	0.010UF	K		
C281			CC73FCH1H101J	CHIP C	100PF	J		
C282			CC73FCH1H100D	CHIP C	10PF	D		
C283			CK73FB1E103K	CHIP C	0.010UF	K		
C284			CK73FB1H102K	CHIP C	1000PF	K		
C285, 286			CC73FCH1HXXXJ	CHIP C		J		
C287			CK73FB1H331K	CHIP C	330PF	K		
C288			CK73FB1E103K	CHIP C	0.010UF	K		
C289			CC73FCH1H100D	CHIP C	10PF	D		
C290			CK73FB1E103K	CHIP C	0.010UF	K		
C291			CC73FRH1H120J	CHIP C	12PF	J		
C292, 293			CK73FB1E103K	CHIP C	0.010UF	K		
C294			CC73FCH1H470J	CHIP C	47PF	J		
C295, 296			CC73FCH1H100D	CHIP C	10PF	D		
C297			CK73FB1H102K	CHIP C	1000PF	K		
C298-301			CK73FB1E103K	CHIP C	0.010UF	K		
C302			CC73FCH1H120J	CHIP C	12PF	J		
C303			CC73FCH1H0R5C	CHIP C	0.5PF	C		
C304			CC73FCH1H101J	CHIP C	100PF	J		
C305			CK73FB1E103K	CHIP C	0.010UF	K		
C306-311			CK73FB1HXXXK	CHIP C		K		
C312			CC73FCH1H101J	CHIP C	100PF	J		
C313, 314			CK73FB1H331K	CHIP C	330PF	K		
C315			CC73FCH1H1D1J	CHIP C	100PF	J		
C316, 317			CK73FB1H331K	CHIP C	330PF	K		
C318			CC73FCH1H120J	CHIP C	12PF	J		
C319			CK73FB1H331K	CHIP C	330PF	K		
C320			CED4EW1H010M	ELECTRO	1.0UF	50WV		
C321			CK73FB1H102K	CHIP C	1000PF	K		
C322			CC73FCH1H330J	CHIP C	33PF	J		
C323			CK73FB1H331K	CHIP C	330PF	K		
C324			CC73FCH1H090D	CHIP C	9.0PF	D		
C325			CC73FCH1H050C	CHIP C	5.0PF	C		
C326-328			CK73FB1H102K	CHIP C	1000PF	K		
C329			CK73FB1E103K	CHIP C	0.010UF	K		
C330			CK73FB1H102K	CHIP C	1000PF	K		

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

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

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# TS-790A/E

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D3 -6 D7 -10 D11 -14 D15 -18 D19		*	1SV205 DAN235(K) 1SV205 RLS73 RLS135	CHIP VARI-CAP DIODE CHIP DIODE CHIP VARI-CAP DIODE CHIP DIODE CHIP DIODE		
D201-206 D207 D208-210 D211 D212,213			DAN235(K) RDS. 1M-B2 DAN235(K) RDS. 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 X59-3490-00	MODULE UNIT (BAND SW) MODULE UNIT (BAND SW)		

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<b>144MHz FINAL UNIT (X45-3160-00)</b>								
C1			C90-2039-05	ELECTR0	15UF	16WV		
C2			CK73FB1H102K	CHIP C	1000PF	K		
C3			CEO4EW1C101M	ELECTR0	100UF	16WV		
C4			CK73FB1H102K	CHIP C	1000PF	K		
C5			CEO4EW1C220M	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			CEO4EW1C221M	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			CEO4EW1C331M	ELECTR0	330UF	16WV		
C37			CK73FB1H103K	CHIP C	0.010UF	K		
C38			CK73FB1E223K	CHIP C	0.022UF	K		
C39			CEO4EW1C100M	ELECTR0	10UF	16WV		
C40 -50			CK73FB1HXXXX	CHIP C		K		
C51			CEO4CW1C100M	ELECTR0	10UF	16WV		
C52			CK73FB1H102K	CHIP C	1000PF	K		
C53			CEO4EW1C100M	ELECTR0	10UF	16WV		
C54 -59			CK73FB1HXXXX	CHIP C		K		
C60 -62			CC73FCH1HXXXX	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			L34-0823-05	VHF COIL (3T)		
L8			L40-3391-19	SMALL FIXED INDUCTOR (3.3MH)		
L9		*	L40-1092-19	SMALL FIXED INDUCTOR (1MH)		
L10			L34-0894-05	COIL (5T)		
L11			L34-0895-05	COIL (6T)		
L12			L34-1079-05	COIL (1.5T)		
R1			RD14BB2E151J	RD 150 J 1/4W		
R2 -4			RK73FB2AXXXJ	CHIP R J 1/10W		
R5			RS14DB2H151J	FL-PROOF RS 150 J 1/2W		
R6 -16			RK73FB2AXXXJ	CHIP R J 1/10W		
R17		*	RS14DB2H100J	FL-PROOF RS 10 J 1/2W		
R18 -31			RK73FB2AXXXJ	CHIP R		
R32			RD14CB2E271J	RD 270 J 1/10W		
R33		*	RS14KB2H271J	FL-PROOF RS 270 J 1/4W		
R34			RK73FB2A102J	CHIP R 1.0K J 1/2W		
R35			R92-0670-05	CHIP R 0 ΩHM J 1/10W		
R36			RK73FB2A272J	CHIP R 2.7K J 1/10W		
VR1 ,2		*	R12-3132-05	TRIMMING POT. 47K		
VR3		*	R12-0091-05	TRIMMING POT. 100		
VR4		*	R12-1083-05	TRIMMING POT. 1K		
W2			R92-0150-05	JUMPER REST 0 ΩHM		
W5			R92-0150-05	JUMPER REST 0 ΩHM		
D1			RLS73	CHIP DIODE		
D2			UM9401	DIODE		
D3			MI308	DIODE		
D4 ,5			HSM88AS	CHIP DIODE		
D6 ,7			RLS73	CHIP DIODE		
D8			RLZJ5.6B	CHIP ZENER DIODE(5.6V)		
D9			RLZJ7.5	CHIP ZENER DIODE(7.5V)		
D10 -14		*	RLS73	CHIP DIODE		
IC1			BA718	IC(OP AMP X2)		
Q1			2SC1947	TRANSISTOR		
Q2			2SA1213(Y)	CHIP TRANSISTOR		
Q3 ,4			2SA1307(Y)	TRANSISTOR		
Q5			2SA1162(Y)	CHIP TRANSISTOR		
Q6			2SC2712(Y)	CHIP TRANSISTOR		
Q7			2SC1815(Y)	TRANSISTOR		
Q8			2SA1162(Y)	CHIP TRANSISTOR		
Q9 -11			2SC2712(Y)	CHIP TRANSISTOR		
Q101		*	M67727	IC(POWER MODULE/144~148MHz)		
TH1			STP41L	THERMISTER		
<b>430MHz FUNAL UNIT (X45-3170-00)</b>						
C1			C90-2039-05	ELECTRO 15UF 16WV		
C2			CK73FB1H102K	CHIP C 1000PF K		
C3			CEO4EW1C101M	ELECTRO 100UF 16WV		
C4			CK73FB1H102K	CHIP C 1000PF K		
C5			CEO4EW1C220M	ELECTRO 22UF 16WV		
C6			CK73FB1H102K	CHIP C 1000PF K		
C7			CK45F1H473Z	CERAMIC 0.047UF Z		
C8			CEO4EW1C221M	ELECTRO 220UF 16WV		
C9 -14			CK73FB1H102K	CHIP C 1000PF K		
C15			CM73F2H100D	CHIP C 10PF D		
C16			CD45SL2H020C	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			CC73FCH1H0RSC	CHIP C	0.5PF	C		
C30 -37			CK73FB1HXXXK	CHIP C		K		
C38			CE04EW1C101M	ELECTRO	100UF	16WV		
C39			CK73FB1H102K	CHIP C	1000PF	K		
C40			C90-2039-05	ELECTRO	15UF	16WV		
C41			CK73FB1H102K	CHIP C	1000PF	K		
C42			CE04EW1C220M	ELECTRO	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			CK73FB1HXXXX	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			RS14DB2H1S1J	FL-PROOF RS	150	J 1/2W		
R2 -6			RK73FB2AXXXJ	CHIP R		J 1/10W		
R7			R92-0670-05	CHIP R	0 ΩHM			
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			UM9401	DIODE				
D3			MI308	DIODE				
D4 ,5			HSM88AS	CHIP DIODE				
D6 ,7			RLS73	CHIP DIODE				
D8			RLZJ7.5	CHIP ZENER DIODE				
IC1			BA718	IC(OP AMP X2)				
Q1			2SC2712(Y)	CHIP TRANSISTOR				
Q102			M57716	IC(POWER MODULE)				
Q103		*	M6772B	IC(POWER MODULE/430-450MHZ)				
<b>IF UNIT (X48-3050-XX) -11 : TS-790A -61 : TS-790E</b>								
C1 -12			CK73FB1H102K	CHIP C	1000PF	K		
C13 -33			CK73FB1EXXXX	CHIP C		K		
C34			CC73FCH1H040C	CHIP C	4.0PF	C		
C35			CC73FCH1H470J	CHIP C	47PF	J		
C36			CE04EW1H010M	ELECTRO	1.0UF	50WV		
C37 ,38			CK73FB1E103K	CHIP C	0.010UF	K		
C39			CK73FB1H102K	CHIP C	1000PF	K		
C40			CK73FB1E103K	CHIP C	0.010UF	K		
C41			CC73FSL1H101J	CHIP C	100PF	J		
C42 -44			CK73FB1E103K	CHIP C	0.010UF	K		
C45			CK73FB1H102K	CHIP C	1000PF	K		
C46 -51			CK73FB1E103K	CHIP C	0.010UF	K		
C52			CK73FB1H102K	CHIP C	1000PF	K		
C53 ,54			CK73FB1E103K	CHIP C	0.010UF	K		
C55			CC73FCH1H020C	CHIP C	2.0PF	C		
C56 -61			CK73FB1E103K	CHIP C	0.010UF	K		
C62			CC73FCH1H050C	CHIP C	5.0PF	C		
C63 -68			CK73FB1E103K	CHIP C	0.010UF	K		
C69			CC73FCH1H100D	CHIP C	10PF	D		
C70			CC73FCH1H220J	CHIP C	22PF	J		
C71 -73			CK73FB1E103K	CHIP C	0.010UF	K		
C74			CC73FSL1H221J	CHIP C	220PF	J		
C75			CE04EW1C220M	ELECTRO	22UF	16WV		
C76 -79			CK73FB1E103K	CHIP C	0.010UF	K		
C80			CC73FSL1H471J	CHIP C	470PF	J		
C81 -83			CK73FB1HXXXX	CHIP C		K		
C84			CK73FB1E103K	CHIP C	0.010UF	K		
C85			CE04CW1H010M	ELECTRO	1.0UF	50WV		
C86			CE04CW1V2R2M	ELECTRO	2.2UF	35WV		
C87			CK73FB1E223K	CHIP C	0.022UF	K		
C88			CC73FCH1H330J	CHIP C	33PF	J		
C89 ,90			CK73FB1H821K	CHIP C	820PF	K		
C91 -94			CC73FSL1HXXXJ	CHIP C		J		
C95			C90-2046-05	ELECTRO	22UF	10WV		
C96			CK73FB1E103K	CHIP C	0.010UF	K		
C97			CC73FCH1H060D	CHIP C	6.0PF	D		
C98 ,99			CK73FF1E104Z	CHIP C	0.10UF	Z		
C100			CC73FCH1H120J	CHIP C	12PF	J		
C101			CK73FB1H222K	CHIP C	2200PF	K		
C102			CK73FB1E103K	CHIP C	0.010UF	K		
C103			CK73FB1H102K	CHIP C	1000PF	K		
C104			CK73FB1H682K	CHIP C	6800PF	K		
C105, 106			CE04EW1C100M	ELECTRO	10UF	16WV		
C107, 108			CE04EW1H010M	ELECTRO	1.0UF	50WV		
C109			CK73FB1E103K	CHIP C	0.010UF	K		

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C110			CE04EW1C100M	ELECTRQ	10UF	16WV		
C111-113			CK73EB1E104K	CHIP C	0.10UF	K		
C114			CC73FSL1H101J	CHIP C	100PF	J		
C115			CE04EW1C100M	ELECTRQ	10UF	16WV		
C116			CE04EW1H010M	ELECTRQ	1.0UF	50WV		
C117			CE04EW1C100M	ELECTRQ	10UF	16WV		
C118-120			CK73EB1EXXXK	CHIP C		K		
C121			CC73FSL1H101J	CHIP C	100PF	J		
C122			CE04EW1C100M	ELECTRQ	10UF	16WV		
C123			CE04EW1H010M	ELECTRQ	1.0UF	50WV		
C124-126			CK73FB1H102K	CHIP C	1000PF	K		
C127			CK73FB1E223K	CHIP C	0.022UF	K		
C128			CE04EW1A102M	ELECTRQ	1000UF	10WV		
C129			CE04EW1H010M	ELECTRQ	1.0UF	50WV		
C130			CE04EW1E220M	ELECTRQ	22UF	25WV		
C131			CE04EW1H010M	ELECTRQ	1.0UF	50WV		
C132,133			CK73FB1H102K	CHIP C	1000PF	K		
C134			CK73FB1E103K	CHIP C	0.010UF	K		
C135			C90-2046-05	ELECTRQ	22UF	10WV		
C136			CK73FB1E103K	CHIP C	0.010UF	K		
C137			CE04EW1H010M	ELECTRQ	1.0UF	50WV		
C138			CE04EW1H4R7M	ELECTRQ	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	ELECTRQ	10UF	16WV		
C144,145			CK73FB1H682K	CHIP C	6800PF	K		
C146			CE04EW1C100M	ELECTRQ	10UF	16WV		
C147			CE04EW0J471M	ELECTRQ	470UF	6.3WV		
C148			CK73FB1E103K	CHIP C	0.010UF	K		
C149			CE04EW1C221M	ELECTRQ	220UF	16WV		
C150			CK73FF1E104Z	CHIP C	0.10UF	Z		
C151			CK73FB1E103K	CHIP C	0.010UF	K		
C152			CE04EW1C221M	ELECTRQ	220UF	16WV		
C153			CE04EW0J471M	ELECTRQ	470UF	6.3WV		
C154			CK73FB1E103K	CHIP C	0.010UF	K		
C155			CE04EW1C221M	ELECTRQ	220UF	16WV		
C156			CK73FF1E104Z	CHIP C	0.10UF	Z		
C157			CK73FB1E103K	CHIP C	0.010UF	K		
C158			CE04EW1C221M	ELECTRQ	220UF	16WV		
C159			CE04EW1H010M	ELECTRQ	1.0UF	50WV		
C160,161			CE04EW1C100M	ELECTRQ	10UF	16WV		
C162			CE04EW1H010M	ELECTRQ	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	ELECTRQ	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	ELECTRQ	1.0UF	50WV		
C186			CK73FB1E103K	CHIP C	0.010UF	K		
C187			CE04EW1C100M	ELECTRQ	10UF	16WV		
C188			CK73EB1E104K	CHIP C	0.10UF	K		
C189			CK73FB1E223K	CHIP C	0.022UF	K		

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# TS-790A/E

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C190-205		CK73FB1H102K	CHIP C 1000PF K		
C206,207		CK73FB1E103K	CHIP C 0.010UF K		
C208		CK73FB1H102K	CHIP C 1000PF K		
C209		CK73FB1E223K	CHIP C 0.022UF K		
C210,211		CK73FB1H102K	CHIP C 1000PF K		
C212		CK73FB1E103K	CHIP C 0.010UF K		
C213		CC73FCH1H270J	CHIP C 27PF J		
C214,215		CEO4EW1H010M	ELECTRO 1.0UF 50WV		
C216		CEO4EW1HR47M	ELECTRO 0.47UF 50WV		
C217		CEO4EW1H010M	ELECTRO 1.0UF 50WV		
C218,219		CK73EB1E104K	CHIP C 0.10UF K		
C220		CEO4EW1H010M	ELECTRO 1.0UF 50WV		
C221-223		CK73EB1EXXXK	CHIP C K		
C224-232		CC73FSL1H471J	CHIP C 470PF J		
C233		CK73FB1E103K	CHIP C 0.010UF K		
C251-290		CK73FB1HXXXX	CHIP C K		
C291-293		CC73FSL1H471J	CHIP C 470PF J		
C294		CK73FB1H102K	CHIP C 1000PF K		
C295		CK73FB1E103K	CHIP C 0.010UF K		
C296		CC73FCH1H020C	CHIP C 2.0PF C		
C297-300		CK73FB1E103K	CHIP C 0.010UF K		
C301		CC73FCH1H120J	CHIP C 12PF J		
C302,303		CK73FB1E103K	CHIP C 0.010UF K		
C304		CC73FCH1H020C	CHIP C 2.0PF C		
C305-308		CK73FB1E103K	CHIP C 0.010UF K		
C309		CC73FCH1H060D	CHIP C 6.0PF D		
C310		CC73FCH1H470J	CHIP C 47PF J		
C311,312		CK73FB1E103K	CHIP C 0.010UF K		
C313		CEO4EW1H010M	ELECTRO 1.0UF 50WV		
C314		CK73FB1H102K	CHIP C 1000PF K		
C315-320		CK73FB1E103K	CHIP C 0.010UF K		
C321		CC73FCH1H220J	CHIP C 22PF J		
C322-325		CK73FB1E103K	CHIP C 0.010UF K		
C326		CC73FCH1H100D	CHIP C 10PF D		
C327-335		CK73FB1E103K	CHIP C 0.010UF K		
C337-344		CK73FB1E103K	CHIP C 0.010UF K		
C345		CC73FCH1H030C	CHIP C 3.0PF C		
C346-350		CK73FB1E103K	CHIP C 0.010UF K		
C351		CC73FCH1H050C	CHIP C 5.0PF C		
C352-354		CK73FB1E103K	CHIP C 0.010UF K		
C355		CC73FCH1H100D	CHIP C 10PF D		
C356-363		CK73FB1E103K	CHIP C 0.010UF K		
C364		CC73FSL1H221J	CHIP C 220PF J		
C365		CEO4EW1C220M	ELECTRO 22UF 16WU		
C367		CEO4EW1C100M	ELECTRO 10UF 16WU		
C368		CK73FB1E103K	CHIP C 0.010UF K		
C369		CC73FSL1H101J	CHIP C 100PF J		
C370		CC73FCH1H220J	CHIP C 22PF J		
C371		CC73FSL1H471J	CHIP C 470PF J		
C372-374		CK73FB1HXXXX	CHIP C K		
C375		CK73FB1E103K	CHIP C 0.010UF K		
C376		CEO4EW1C100M	ELECTRO 10UF 16WU		
C377		CK73EB1E104K	CHIP C 0.10UF K		
C378		CEO4EW1C470M	ELECTRO 47UF 16WU		
C379		CK73FB1E103K	CHIP C 0.010UF K		

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C380		*	CK73FB1H682K	CHIP C	6800PF	K		
C381			CE04EW1H470M	ELECTRQ	47UF	50WV		
C382			CE04EW1H220M	ELECTRQ	22UF	50WV		
C383			CK73FB1H682K	CHIP C	6800PF	K		
C384			CK73FB1E103K	CHIP C	0.010UF	K		
C385			CE04EW1H220M	ELECTRQ	22UF	50WV		
C386			CE04EW1C331M	ELECTRQ	330UF	16WV		
C387-391			CK73FB1E103K	CHIP C	0.010UF	K		
C392			C90-2046-05	ELECTRQ	22UF	10WV		
C393, 394			CK73FB1E103K	CHIP C	0.010UF	K		
C395			CK73FF1E104Z	CHIP C	0.10UF	Z		
C396			CC73FCH1H060D	CHIP C	6.0PF	D		
C397			CC73FCH1H120J	CHIP C	12PF	J		
C398			CK73FF1E104Z	CHIP C	0.10UF	Z		
C399			CK73FB1H222K	CHIP C	2200PF	K		
C400			CC73FSL1H121J	CHIP C	120PF	J		
C401, 402			CK73FB1H821K	CHIP C	820PF	K		
C403			CC73FCH1H330J	CHIP C	33PF	J		
C404			CK73FB1H102K	CHIP C	1000PF	K		
C405			CK73FB1E223K	CHIP C	0.022UF	K		
C406			CE04CW1H010M	ELECTRQ	1.0UF	50WV		
C407			CE04CW1V2R2M	ELECTRQ	2.2UF	35WV		
C408			CK73FB1E103K	CHIP C	0.010UF	K		
C409, 410			CK73FB1HXXXX	CHIP C		K		
C411, 412			CE04EW1H010M	ELECTRQ	1.0UF	50WV		
C413			CE04CW1A100M	ELECTRQ	10UF	10WV		
C414			CE04EW1C100M	ELECTRQ	10UF	16WV		
C415			CK73FB1E103K	CHIP C	0.010UF	K		
C416			C90-2046-05	ELECTRQ	22UF	10WV		
C417, 418			CC73FSL1H101J	CHIP C	100PF	J		
C419			CE04EW1H010M	ELECTRQ	1.0UF	50WV		
C420			CK73FB1H222K	CHIP C	2200PF	K		
C421			CE04EW1H4R7M	ELECTRQ	4.7UF	50WV		
C422			CE04EW1C470M	ELECTRQ	47UF	16WV		
C423, 424			CE04EW1H010M	ELECTRQ	1.0UF	50WV		
C425			CE04EW1C100M	ELECTRQ	10UF	16WV		
C426			CE04EW1C470M	ELECTRQ	47UF	16WV		
C427			CE04EW1H4R7M	ELECTRQ	4.7UF	50WV		
C428			CK73FB1H102K	CHIP C	1000PF	K		
C429			CE04EW1H010M	ELECTRQ	1.0UF	50WV		
C430			CE04EW1C100M	ELECTRQ	10UF	16WV		
C431			CK73FB1E103K	CHIP C	0.010UF	K		
C432			CC73FSL1H471J	CHIP C	470PF	J	TW	
C433			CK73FB1H102K	CHIP C	1000PF	K		
C434, 435			CE04EW1C100M	ELECTRQ	10UF	16WV		
C436			CE04EW1H010M	ELECTRQ	1.0UF	50WV		
C437			CK73FB1E103K	CHIP C	0.010UF	K		
C438			CE04EW1H010M	ELECTRQ	1.0UF	50WV		
C439			CC73FSL1H101J	CHIP C	100PF	J		
C440			CE04EW1H010M	ELECTRQ	1.0UF	50WV		
C441, 442			CE04EW1C470M	ELECTRQ	47UF	16WV		
C443			CE04EW1H010M	ELECTRQ	1.0UF	50WV		
C444-448			CK73FB1HXXXX	CHIP C		K		
C449			CK73FB1H102K	CHIP C	1000PF	K		
C450-453			CK73FB1E103K	CHIP C	0.010UF	K		

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C454			CE04EW1C100M	ELECTRQ	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	ELECTRQ	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	ELECTRQ	4.7UF	50WV		
C496			CK73FB1E103K	CHIP C	0.010UF	K		
C497-508			CK73FB1H102K	CHIP C	1000PF	K		
C509			CE04EW1A101M	ELECTRQ	100UF	10WV		
C510			CK73FB1E103K	CHIP C	0.010UF	K		
C511			CE04EW1C100M	ELECTRQ	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	KM1M2	
C537			CE04EW1A101M	ELECTRQ	100UF	10WV		
C538			CK73EB1E104K	CHIP C	0.10UF	K		
C540-542			CK73FB1H102K	CHIP C	1000PF	K		
C543			CE04EW1C100M	ELECTRQ	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	ELECTRQ	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	ELECTRQ	47UF	16WV		
C561, 562			CK73FB1E103K	CHIP C	0.010UF	K		
C567			CE04EW1H4R7M	ELECTRQ	0.47UF	50WV		
C568			CE04EW1C100M	ELECTRQ	10UF	16WV		
C569			CE04EW1H4R7M	ELECTRQ	0.47UF	50WV		
C571			CE04EW1A101M	ELECTRQ	100UF	10WV		
C572			CE04EW1H010M	ELECTRQ	1.0UF	50WV		

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C573			CE04EW1HR47M	ELECTRO	0.47UF	50WV		
C574			CK73FB1E103K	CHIP C	0.010UF	K	KM1M2	
C575			CK73FB1H223K	CHIP C	0.022UF	K	KM1M2	
C577			CE04EW1H010M	ELECTRO	1.0UF	50WV		
C578			CK73FB1E223K	CHIP C	0.022UF	K		
C579			CK73FB1E103K	CHIP C	0.010UF	K		
C580-582			CE04EW1H010M	ELECTRO	1.0UF	50WV		
C583			CE04EW1C100M	ELECTRO	10UF	16WV		
C584,585			CK73EB1E104K	CHIP C	0.10UF	K		
C586,587			CS15E1VR47M	TANTAL	0.47UF	35WV		
C588,589			CE04EW1H4R7M	ELECTRO	4.7UF	50WV		
C590			CC73FSL1H101J	CHIP C	100PF	J		
C591			CK73FF1E104Z	CHIP C	0.10UF	Z		
C592-594			C91-0117-05	CERAMIC	0.01UF	K		
C595			CK73FB1E473M	CHIP C	0.047UF	M		
C596			CK73FB1E223K	CHIP C	0.022UF	K		
C597			CK45F1H473Z	CERAMIC	0.047UF	Z		
C598			CK73FB1E103K	CHIP C	0.010UF	K		
C599			CK73FF1E104Z	CHIP C	0.10UF	Z		
TC1			C05-0355-05	TRIMMING CAP 30PF				
TC2			C05-0348-05	TRIMMING CAP 6PF				
TC3			C05-0355-05	TRIMMING CAP 30PF				
CN1	*		E04-0154-05	RF COAXIAL CABLE RECEPTACLE				
CN2	*		E40-3239-05	PIN CONNECTOR (4P)				
CN3	*		E40-5036-05	FPC CONNECTOR (12P)				
CN4	*		E40-3243-05	PIN CONNECTOR (8P)				
CN5	*		E13-0166-05	PHONE JACK ACC3				
CN6	*		E06-0658-05	DIN RECEPTACLE (6P)ACC1				
CN7	*		E06-1352-05	DIN RECEPTACLE (13P)ACC2			KM1M2	
CN8	*		E31-3452-05	CONNECTING WIRE(7P)				
CN9	*		E40-5016-05	PIN CONNECTOR (2P)			KM1M2	
CN10,11	*		E40-3239-05	PIN CONNECTOR (4P)				
CN12,13			E40-3237-05	PIN CONNECTOR (2P)				
CN14			E40-3241-05	PIN CONNECTOR (6P)				
CN16			E40-3241-05	PIN CONNECTOR (6P)				
CN17			E40-3237-05	PIN CONNECTOR (2P)				
CN18			E04-0154-05	RF COAXIAL CABLE RECEPTACLE				
CN19,20	*		E11-0434-05	PHONE JACK EXT. S,EXT. M				
CN21	*		E40-5139-05	FPC CONNECTOR (24P)				
CN22			E40-3237-05	PIN CONNECTOR (2P)				
CN30			E40-3239-05	PIN CONNECTOR (4P)				
CN31			E40-3237-05	PIN CONNECTOR (2P)				
CN32			E40-3242-05	PIN CONNECTOR (7P)				
CN33			E04-0154-05	RF COAXIAL CABLE RECEPTACLE				
CN34			E40-3237-05	PIN CONNECTOR (2P)				
CN35			E40-3238-05	PIN CONNECTOR (3P)				
CN36			E40-3241-05	PIN CONNECTOR (6P)				
CN38			E06-0859-05	DIN RECEPTACLE (8P)ACC4				
CN39			E40-0211-05	PIN CONNECTOR (2P)				
CN40			E40-5016-05	PIN CONNECTOR (2P)				
CN41			E31-3238-05	CONNECTING WIRE(7P)				
CN42	*		E11-0433-05	PHONE JACK KEY				
CN43			E06-0752-05	DIN RECEPTACLE (7P)EXT. CONT				
CN44			E40-3242-05	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 ΩHM	
R80 -176			RK73FB2AXXXJ	CHIP R	J 1/10W	
R177			R92-0670-05	CHIP R	0 ΩHM	
R178-300			RK73FB2AXXXJ	CHIP R	J 1/10W	
R301,302			RD14BB2E471J	RD	47Ω	J 1/4W
R303-408			RK73FB2AXXXJ	CHIP R	J 1/10W	
R409			R92-0670-05	CHIP R	0 ΩHM	
R410-432			RK73FB2AXXXJ	CHIP R	J 1/10W	
R433			R92-0670-05	CHIP R	0 ΩHM	
R434-462			RK73FB2AXXXJ	CHIP R	J 1/10W	
R463-467			R92-0670-05	CHIP R	0 ΩHM	
R468			RD14BB2C103J	RD	10K	J 1/6W
R469,470			R92-0670-05	CHIP R	0 ΩHM	
R471,472			RK73FB2AXXXJ	CHIP R	J 1/10W	
VR1			R12-0432-05	TRIMMING POT. (500)		
VR2 -4			R12-2414-05	TRIMMING POT. (5K)		
VR5 ,6			R12-3447-05	TRIMMING POT. (10K)		
VR7			R12-7407-05	TRIMMING POT. (500K)		
VR8 -10			R12-4414-05	TRIMMING POT. (50K)		
VR11		*	R05-2402-05	POTENTIOMETER(5K)		
VR14-17			R12-2414-05	TRIMMING POT. (5K)		
VR18			R12-4414-05	TRIMMING POT. (50K)		
VR19			R12-3447-05	TRIMMING POT. (10K)		
VR20			R12-0432-05	TRIMMING POT. (500)		
VR21			R12-2414-05	TRIMMING POT. (5K)		
VR22			R12-1090-05	TRIMMING POT. (4.7K)		
VR23			R12-3133-05	TRIMMING POT. (47K)		
VR24			R12-6019-05	TRIMMING POT. (50K)		
VR25,26			R12-3127-05	TRIMMING POT. (10K)		
VR27			R12-6019-05	TRIMMING POT. (50K)		
VR28			R12-7407-05	TRIMMING POT. (500K)		
VR29			R12-2414-05	TRIMMING POT. (5K)		
VR30			R12-3447-05	TRIMMING POT. (10K)		
VR31			R12-0432-05	TRIMMING POT. (500)		
VR32			R12-2414-05	TRIMMING POT. (5K)		
VR33			R12-3447-05	TRIMMING POT. (10K)		
VR34			R12-4414-05	TRIMMING POT. (50K)		
VR35			R12-2414-05	TRIMMING POT. (5K)		
VR36			R12-3447-05	TRIMMING POT. (10K)		

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VR37 W1 ,2			R12-4414-05 R92-1061-05	TRIMMING POT. (50K) JUMPER REST 0 ΩHM		
SW1			S31-1411-05	SLIDE SWITCH (ATT-ACS)		
D1 D2 D3 ,4			RLS135 DAN235(K) RLS73	CHIP DIODE CHIP DIODE CHIP DIODE		
D5 D6			DAN235(K) RLS135	CHIP DIODE CHIP DIODE		
D7 -9 D10 ,11			HSM88AS RLS73	CHIP DIODE CHIP DIODE		
D12 D13 D14 ,15			DAN235(K) HSM88AS 1SS101	CHIP DIODE CHIP DIODE DIODE		
D16 D17 D18 ,19		*	IMN10 MTZ3.0JA HSM88AS	CHIP DIODE CHIP ZENER DIODE CHIP DIODE		
D20 D21			RLS73 HSM276S	CHIP DIODE CHIP DIODE		
D22 D23 D24 D25 D31			DAN202(K) 1SS226 RLS73 RLS135	CHIP DIODE CHIP DIODE CHIP DIODE CHIP DIODE		
D32 D33 -36 D37 D38 -41 D42			DAN235(K) RLS135 DAN235(K) RLS73 RLS135	CHIP DIODE CHIP DIODE CHIP DIODE CHIP DIODE CHIP DIODE		
D43 -46 D47 ,48 D49 D50 D51			DAN202(K) IMN10 RLS73 DAN202(K) RLS135	CHIP DIODE CHIP DIODE CHIP DIODE CHIP DIODE CHIP DIODE		
D52 D53 ,54 D55 -60 D61 D62			DAN202(K) HSM88AS RLS135 1SV128 DAN235(K)	CHIP DIODE CHIP DIODE CHIP DIODE CHIP DIODE CHIP DIODE		
D63 ,64 D65 D67 D68 D69 ,70			HSM88AS MTZ6.2JA RLS73 HSM88AS RLS135	CHIP DIODE CHIP ZENER DIODE CHIP DIODE CHIP DIODE CHIP DIODE		
D71 D72 D73 D74 D75			RLS73 HSM88AS 1N60 MTZ3.0JA DAN202(K)	CHIP DIODE CHIP DIODE DIODE CHIP ZENER DIODE CHIP DIODE		
D76 D77 D78 D79 ,80 D81			RLS73 RLS135 HSM88AS RLS135 1S2208	CHIP DIODE CHIP DIODE CHIP DIODE CHIP DIODE DIODE		

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D82			DAN202(K)	CHIP DIODE		
D83 -86			RLS135	CHIP DIODE		
D87			DAN202(K)	CHIP DIODE		
D88			RLS73	CHIP DIODE		
D89			MTZ5.1JA	CHIP ZENER DIODE		
D90			RLS73	CHIP DIODE		
D92 ,93			ISS101	DIODE		
D94			IMN10	CHIP DIODE		
D95			MTZ5.1JA	CHIP ZENER DIODE		
D96			IMN10	CHIP DIODE		
D97			DAN202(K)	CHIP DIODE		
D98 -100			IMN10	CHIP DIODE		
D101			MTZ9.1JA	CHIP ZENER DIODE		
D102,103			RLS73	CHIP DIODE		
D104			ISS226	CHIP DIODE		
D105			MTZ5.1JA	CHIP ZENER DIODE (5.1V)		
D106-108			RLS73	CHIP DIODE		
IC1		*	MC3357P	IC(LOW POWER FM IF)		
IC2		*	MS1131L	IC(AF VR)		
IC3		*	LA5010	IC(LOW SATURATION REGULATOR)		
IC4			TA7324P	IC(OP AMP) AF. MUTE		
IC5 ,6			UPC2002V	IC(OP AMP X2)AF PA		
IC7			UPC7808H	IC(VOLTAGE REGULATOR/ +8V)		
IC8			MC3357P	IC(LOW POWER FM IF)		
IC9			AN612	IC(BALANCE MODULATOR)		
IC10			UPC1158H2	IC(ALC AMP) MIC AMP		
IC11			UPC7808H	IC(VOLTAGE REGULATOR/ +8V)		
IC12,13			TC4066BP	IC(ANALOG/ DIGITAL SW)		
IC14		*	AN78L24	IC(VOLTAGE REGULATOR)		
Q1			2SC2712(Y)	CHIP TRANSISTOR		
Q2			DTC124EK	DIGITAL TRANSISTOR		
Q3			2SC2714(Y)	CHIP TRANSISTOR		
Q4			2SC2712(Y)	CHIP TRANSISTOR		
Q5			3SK131(M)	CHIP FET		
Q6			DTC124EK	DIGITAL TRANSISTOR		
Q7 -9			3SK131(M)	CHIP FET		
Q10 -12			2SC2712(Y)	CHIP TRANSISTOR		
Q13			DTC124EK	DIGITAL TRANSISTOR		
Q14 -16			2SC2712(Y)	CHIP TRANSISTOR		
Q17			DTC124EK	DIGITAL TRANSISTOR		
Q18			2SC2712(Y)	CHIP TRANSISTOR		
Q19 ,20			DTC124EK	DIGITAL TRANSISTOR		
Q21			2SC2712(Y)	CHIP TRANSISTOR		
Q22			DTC124EK	DIGITAL TRANSISTOR		
Q23			2SA1162(Y)	CHIP TRANSISTOR		
Q24			2SD1624S	CHIP TRANSISTOR		
Q25			FMU1	DIGITAL TRANSISTOR		
Q26			DTC124EK	DIGITAL TRANSISTOR		
Q27			DTC143TK	DIGITAL TRANSISTOR		
Q28			DTA124EK	DIGITAL TRANSISTOR		
Q29			FMU1	DIGITAL TRANSISTOR		
Q30			DTC124EK	DIGITAL TRANSISTOR		
Q31			DTC143TK	DIGITAL TRANSISTOR		
Q32			DTA124EK	DIGITAL TRANSISTOR		
Q33 -35			2SC2714(Y)	CHIP TRANSISTOR		

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Q36 ,37			2SC2712(Y) 2SK125-5	CHIP TRANSISTOR FET		
Q48			DTC124EK	DIGITAL TRANSISTOR		
Q49 ,50			2SC2026	TRANSISTOR		
Q51			2SC2712(Y)	CHIP TRANSISTOR		
Q52						
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	DIDITAL 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			112-301-2 112-501-2	THERMISTOR (300)				
Z1			W02-0808-05	DC-DC MODULE				
		*	X58-3410-00	SUB UNIT	(NB)			
		*	X59-3480-00	MODULE UNIT				
<b>PLL UNIT (X50-3080-00)</b>								
C1 ,2			CC73FCH1HXXXXJ	CHIP C			J	
C3 ,4			CK73FB1H102K	CHIP C	1000PF	K		
C5 ,6			CC73FCH1HXXXXJ	CHIP C			J	
C7			CK73FB1H102K	CHIP C	1000PF	K		
C8			CE04EW1A221M	ELECTRQ	220UF	10WV		
C9		*	C91-1102-05	FILM	0.10UF	J		
C10 ,11			CK73FB1H102K	CHIP C	1000PF	K		
C12			CE04EW1E101M	ELECTRQ	100UF	25WV		
C13			CG92M1H472K	MYLAR	4700PF	K		
C14			C91-1083-05	FILM	0.47UF	63WV		
C15 -17			CK73FB1H102K	CHIP C	1000PF	K		
C18			CE04EW1E101M	ELECTRQ	100UF	25WV		
C19			CC73FCH1H220J	CHIP C	22PF	J		
C20			CC73FSL1H101J	CHIP C	100PF	J		
C21 -23			CK73FB1HXXXXK	CHIP C		K		
C24 ,25			CC73FCH1H050C	CHIP C	5.0PF	C		
C26 -34			CK73FB1HXXXXK	CHIP C		K		
C35			CC73FSL1H101J	CHIP C	100PF	J		
C36 ,37			CK73FB1H102K	CHIP C	1000PF	K		
C38			CK73FB1E223K	CHIP C	0.022UF	K		
C39			CK73FB1H102K	CHIP C	1000PF	K		
C40			CK73FB1E223K	CHIP C	0.022UF	K		
C41			CK73FF1E104Z	CHIP C	0.10UF	Z		
C42			CK73FB1H102K	CHIP C	1000PF	K		
C43			CC73FCH1H0R5C	CHIP C	0.5PF	C		
C44			CC73FCH1H070D	CHIP C	7.0PF	D		
C45 -47			CK73FB1H103K	CHIP C	0.010UF	K		
C48 ,49			CC73FCH1H220J	CHIP C	22PF	J		
C50			CK73FB1E223K	CHIP C	0.022UF	K		
C51			CC73FCH1H470J	CHIP C	47PF	J		
C52 -55			CK73FB1H103K	CHIP C	0.010UF	K		
C56			CK73FB1E223K	CHIP C	0.022UF	K		
C57			CK73FB1H103K	CHIP C	0.010UF	K		
C58			CC73FCH1H080D	CHIP C	8.0PF	D		
C59			CK73FB1H103K	CHIP C	0.010UF	K		
C60			CC73FCH1H220J	CHIP C	22PF	J		
C61			CK73FB1H103K	CHIP C	0.010UF	K		
C62			CC73FCH1H0R5C	CHIP C	0.5PF	C		
C63			CC73FCH1H220J	CHIP C	22PF	J		
C64 ,65			CK73FB1HXXXXK	CHIP C		K		
C66			CC73FCH1H0R5C	CHIP C	0.5PF	C		
C67			CK73FB1H102K	CHIP C	1000PF	K		
C68			CK73FF1E104Z	CHIP C	0.10UF	Z		
C69			CK73FB1E223K	CHIP C	0.022UF	K		
C70			CE04EW1A470M	ELECTRQ	47UF	10WV		
C71			CK73FB1H102K	CHIP C	1000PF	K		
C72			CG92M1H333K	MYLAR	0.033UF	K		

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⚠ indicates safety critical components.

## PARTS LIST

\* New Parts

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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
C73			CE04EW1A470M	ELECTR0	4.7UF	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		
CB2			CK73FB1E223K	CHIP C	0.022UF	K		
CB3 -86			CK73FB1HXXXX	CHIP C		K		
CB7			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			CK73FB1HXXXX	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			CK73FB1HXXXX	CHIP C		K		
C132			CK73FB1E223K	CHIP C	0.022UF	K		
C133,134			CK73FB1HXXXX	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		CEO4EW1A470M	ELECTRQ	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		CEO4EW1A101M	ELECTRQ	100UF	10WV		
C210-213		CK73FB1HXXXK	CHIP C		K		
C214		CEO4EW1A101M	ELECTRQ	100UF	10WV		
C215-217		CEO4EW1A470M	ELECTRQ	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			CK73FB1H103K	CHIP C	0.010UF	K		
C271,272			CC73FCH1HXXXJ	CHIP C		J		
C273,274			CK73FB1H102K	CHIP C	1000PF	K		
C275			CC73FCH1H030C	CHIP C	3.0PF	C		
C276-278			CK73FB1H102K	CHIP C	1000PF	K		
C279			CK73FB1E223K	CHIP C	0.022UF	K		
C280			CK73FF1E104Z	CHIP C	0.10UF	Z		
C281			CK73FB1H102K	CHIP C	1000PF	K		
C282			CD92M1H102K	MYLAR	1000PF	K		
C283			C91-1083-05	FILM	0.47UF	63WV		
C284,285			CK73FB1H102K	CHIP C	1000PF	K		
C286			CE04EW1A221M	ELECTR0	220UF	10WV		
C287			CK73FB1H102K	CHIP C	1000PF	K		
C288		*	C91-1102-05	FILM	0.10UF	J		
C289			CE04EW1HR47M	ELECTR0	0.47UF	50WV		
C290,291			CK73FB1HXXXX	CHIP C				
C292			CE04EW1E101M	ELECTR0	100UF	25WV		
C293			CC73FCH1H390J	CHIP C	39PF	J		
C294,295			CK73FB1H102K	CHIP C	1000PF	K		
C296			CC73FCH1H030C	CHIP C	3.0PF	C		
C297,298			CK73FB1HXXXX	CHIP C				
C299			CE04EW1A221M	ELECTR0	220UF	10WV		
C300			CK73FB1H102K	CHIP C	1000PF	K		
C301			CD92M1H332K	MYLAR	3300PF	K		
C302			C91-1074-05	FILM	0.33UF	63WV		
C303			CE04EW1A470M	ELECTR0	47UF	10WV		
C304,305			CK73FB1H103K	CHIP C	0.010UF	K		
C306			CC73FCH1H030C	CHIP C	3.0PF	C		
C307,308			CK73FB1H102K	CHIP C	1000PF	K		
C309			CC73FCH1H020C	CHIP C	2.0PF	C		
C310			CK73FB1H102K	CHIP C	1000PF	K		
C311,312			CK73FB1E223K	CHIP C	0.022UF	K		
C313			CK73FB1H102K	CHIP C	1000PF	K		
C314-316			CC73FCH1HXXXXJ	CHIP C				
C317			CK73FB1E223K	CHIP C	0.022UF	J		
C318,319			CK73FB1HXXXX	CHIP C				
C320			CK73FB1E223K	CHIP C	0.022UF	K		
C321			CK73FB1H102K	CHIP C	1000PF	K		
C322			CK73FB1E223K	CHIP C	0.022UF	K		
C323			CE04EW1A470M	ELECTR0	47UF	10WV		
C324			CK73FB1H102K	CHIP C	1000PF	K		
C325			CK73FF1E104Z	CHIP C	0.10UF	Z		
C326			CK73FB1H103K	CHIP C	0.010UF	K		
C327			CK73FB1E223K	CHIP C	0.022UF	K		
C328-331			CK73FB1H103K	CHIP C	0.010UF	K		
C332			CC73FCH1H080D	CHIP C	8.0PF	D		
C333			CC73FCH1H470J	CHIP C	47PF	J		
C334			CK73FB1H103K	CHIP C	0.010UF	K		
C335,336			CC73FCH1H100D	CHIP C	10PF	D		
C337-339			CK73FB1HXXXX	CHIP C				
C340			CC73FCH1H070D	CHIP C	7.0PF	D		
C341,342			CC73FCH1HXXXD	CHIP C				
C343			CC73FCH1H150J	CHIP C	15PF	J		
C344			CK73FB1E223K	CHIP C	0.022UF	K		
C345,346			CC73FCH1HXXXC	CHIP C				

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C347, 348			CK73FB1H103K	CHIP C	0.010UF	K		
C349			CC73FCH1H0RSC	CHIP C	0.5PF	C		
C350			CC73FCH1H470J	CHIP C	47PF	J		
C351, 352			CK73FB1H102K	CHIP C	1000PF	K		
C353			CK73FB1E223K	CHIP C	0.022UF	K		
C354			CE04EW1A470M	ELECTRQ	47UF	10WV		
C355			CK73FF1E104Z	CHIP C	0.10UF	Z		
C356			CQ92M1H333K	MYLAR	0.033UF	K		
C357			CQ92M1H562K	MYLAR	5600PF	K		
C358			CE04EW1A470M	ELECTRQ	47UF	10WV		
C359, 360			CK73FB1HXXXXK	CHIP C		K		
C361			CC73FCH1H220J	CHIP C	22PF	J		
C362		*	CC73FUJ1H180J	CHIP C	18PF	J		
C363			CE04EW1A101M	ELECTRQ	100UF	10WV		
C364-366			CK73FB1HXXXXK	CHIP C		K		
C367			CK73FB1E223K	CHIP C	0.022UF	K		
C368-371			CK73FB1HXXXXK	CHIP C		K		
C372			CE04EW1A470M	ELECTRQ	47UF	10WV		
C373			CK73FB1E223K	CHIP C	0.022UF	K		
C374			CK73FF1E104Z	CHIP C	0.10UF	Z		
C375			CK73FB1H102K	CHIP C	1000PF	K		
C376			C91-1083-05	FILM	0.47UF	63WV		
C377			CQ92M1H472K	MYLAR	4700PF	K		
C378			CE04EW1A470M	ELECTRQ	47UF	10WV		
C379, 380			CK73FB1H103K	CHIP C	0.010UF	K		
C381		*	CC73FCH1H030C	CHIP C	3.0PF	C		
C382			CK73FB1H102K	CHIP C	1000PF	K		
C383			C91-1102-05	FILM	0.10UF	J		
C384			CK73FB1H102K	CHIP C	1000PF	K		
C385			CE04EW1A221M	ELECTRQ	220UF	10WV		
C386			CK73FB1H102K	CHIP C	1000PF	K		
C387			CC73FCH1H020C	CHIP C	2.0PF	C		
C388-391			CK73FB1HXXXXK	CHIP C		K		
C392			CC73FSL1H101J	CHIP C	100PF	J		
C393			CC73FCH1H100D	CHIP C	10PF	D		
C394			CK73FB1E223K	CHIP C	0.022UF	K		
C395			CK73FB1H103K	CHIP C	0.010UF	K		
C396			CE04EW1A101M	ELECTRQ	100UF	10WV		
C397-407			CK73FB1HXXXXK	CHIP C		K		
C408			CC73FCH1H100D	CHIP C	10PF	D		
C409			CC73FCH1H120J	CHIP C	12PF	J		
C410			CC73FCH1H030C	CHIP C	3.0PF	C		
C411, 412			CC73FCH1H100D	CHIP C	10PF	D		
C413-416			CC73FCH1HXXXXD	CHIP C		D		
C417			CE04EW1A470M	ELECTRQ	47UF	10WV		
C418			CC73FCH1H120J	CHIP C	12PF	J		
C419, 420			CC73FCH1H100D	CHIP C	10PF	D		
C421			CC73FCH1H050C	CHIP C	5.0PF	C		
C422			CC73FCH1H100D	CHIP C	10PF	D		
TC1			C05-0350-05	TRIMMING CAP (20P)				
TC50			C05-0349-05	TRIMMING CAP (10P)				
A11		*	E29-0440-14	TERMINAL	(GND)			
CN1		*	E40-5137-05	PIN CONNECTOR	(22P)			
CN2		*	E40-3308-05	PIN CONNECTOR	(11P)			

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# TS-790A/E

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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		*	L40-1001-19	SMALL FIXED INDUCTOR (10U)		
L67		*	L40-1582-19	SMALL FIXED INDUCTOR (0.15U)		
L68 ,69		*	L40-4771-19	SMALL FIXED INDUCTOR (4.7U)		
L70		*	L40-1001-19	SMALL FIXED INDUCTOR (10U)		
L71			L30-0281-15	IFT		
L72			L31-0313-05	COIL		
L73		*	L34-4091-05	TUNING COIL		
L74 ,75		*	L34-4092-05	TUNING COIL		
L76 ,77			L34-2041-05	TUNING COIL		
L78 ,79			L34-2044-05	TUNING COIL		
L80		*	L40-1001-19	SMALL FIXED INDUCTOR (10U)		
L81			L32-0676-05	OSCILLATING COIL		
L83		*	L40-1001-19	SMALL FIXED INDUCTOR (10U)		
L84			L34-2271-05	TUNING COIL		
L85		*	L40-1001-19	SMALL FIXED INDUCTOR (10U)		
L86 ,87			L40-1011-14	SMALL FIXED INDUCTOR (100U)		
L88			L34-1032-05	COIL (3.5T)		
L89			L34-1177-05	COIL (4.5T)		
L90			L34-1032-05	COIL (3.5T)		
L91 ,92			L40-2272-80	SMALL FIXED INDUCTOR (0.022U)		
X1		*	L77-1392-05	TCXO (10.24MHz)		
R1 -362			RK73FB2AXXJ	CHIP R J 1/10W		
D2			1SV164	CHIP VARI-CAP DIODE		
D3			1SV166	CHIP VARI-CAP DIODE		
D4			1SV164	CHIP VARI-CAP DIODE		
D5 -7			1SV166	CHIP VARI-CAP DIODE		
D50			1SS184	CHIP DIODE		
D51			ND487C1-3R	DIODE		
D52			1SS184	CHIP DIODE		
D53			1SV166	CHIP VARI-CAP DIODE		
IC1			SN16913P	IC(DUBLE BALANCED MIXERS)		
IC2		*	CX-7925B	IC(DIGITAL SELECT PLL)		
IC2			CX-7925B-1	IC(DIGITAL SELECT PLL)ER PLL		
IC3			M54459L	IC(PRE SCALER)		
IC4		*	CX-7925B	IC(DIGITAL SELECT PLL)		
IC4		*	CX-7925B-1	IC(DIGITAL SELECT PLL)ER PLL		
IC5			SN16913P	IC(DUBLE BALANCED MIXERS)		
IC6			M54459L	IC(PRE SCALER)		
IC7		*	CX-7925B	IC(DIGITAL SELECT PLL)		
IC7		*	CX-7925B-1	IC(DIGITAL SELECT PLL)ER PLL		
IC8			SN16913P	IC(DUBLE BALANCED MIXERS)		
IC9			M54459L	IC(PRE SCALER)		
IC10		*	CX-7925B	IC(DIGITAL SELECT PLL)		
IC10		*	CX-7925B-1	IC(DIGITAL SELECT PLL)ER PLL		
IC11			UPC78M05H	IC(VOLTAGE REGULATOR +5V)		
IC12		*	TC4581F	IC(AND GATE)		
IC50,51		*	CX-7925B	IC(DIGITAL SELECT PLL)		
IC50,51		*	CX-7925B-1	IC(DIGITAL SELECT PLL)ER PLL		
IC52			SN16913P	IC(DUBLE BALANCED MIXERS)		
IC53			M54459L	IC(PRE SCALER)		
IC54,55		*	CX-7925B	IC(DIGITAL SELECT PLL)		
IC54,55		*	CX-7925B-1	IC(DIGITAL SELECT PLL)ER PLL		
Q1			2SC2714(Y)	CHIP TRANSISTOR		

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# TS-790A/E

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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		CEO4EW1A470M C91-0119-05 CEO4EW1A470M C91-0119-05 CEO4EW1E221M	ELECTRO CERAMIC ELECTRO CERAMIC ELECTRO	47UF 0.047UF 47UF 0.047UF 220UF	10WV K 10WV K 25WV	
C6 C7 C8 C9 C10 ,11		C91-0119-05 CEO4EW1A470M CK73FB1E103K CEO4EW1H3R3M CC73FCH1H100D	CERAMIC ELECTRO CHIP C ELECTRO CHIP C	0.047UF 47UF 0.010UF 3.3UF 10PF	K 10WV K 50WV D	
C12 -14 C16 -18 C19 C20 C21		CK73FB1E103K CK73FB1H102K CK45F1H103Z CK73FB1E103K CEO4EW1A470M	CHIP C CHIP C CERAMIC CHIP C ELECTRO	0.010UF 1000PF 0.010UF 0.010UF 47UF	K K Z K 10WV	
C22 -28 C29		CK73FB1E103K C90-2058-05	CHIP C ELECTRO	0.010UF 47UF	K 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			CEO4EW1A470M	ELECTRN	47UF	10WV		
C42 ,43			CK73FF1E104Z	CHIP C	0.10UF	Z		
C44			C90-2041-05	ELECTRN	10UF	10WV		
C45			CK73FF1E104Z	CHIP C	0.10UF	Z		
C46			CEO4EW1A470M	ELECTRN	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			CK73FB1HXXXX	CHIP C		K		
C162-165			CK73FF1E104Z	CHIP C	0.10UF	Z		
C166-185			CK73FB1HXXXX	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	4.7KXB	J 1/4W		
R1 -78			RK73FB2AXXXJ	CHIP R		J 1/10W		
R79 ,80			R92-0670-05	CHIP R	0 ΩHM			
R81 -83			R92-0679-05	CHIP R	0 ΩHM			

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VR1 -3		*	R12-1090-05	TRIMMING POT. (4.7K)		
D1 -5			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	TW	
D22			ISS133	CHIP DIODE	KM1M2	
D23			ISS133	CHIP DIODE	M1TW	
D24			ISS133	CHIP DIODE	M1M2TW	
D29 ,30			ISS133	CHIP DIODE		
D32			ISS133	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		*	M5M82C55AFP-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		
<b>VCO (X58-1000-02)</b>						
C1			CC92M1H473K	MYLAR 0.047UF K		
C2			CK73FB1H102K	CHIP C 1000PF K		
C3			CC73FCH1H130J	CHIP C 13PF J		
C4 ,5			CC73FCH1HXXXD	CHIP C D		
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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<b>VCO (X58-3390-XX) -00 : 144A -02 : 430D</b>									
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					
<b>VCO (X58-3400-01)</b>									
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			CC73FCH1HXXXD	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			HSM2765	CHIP DIODE			
D2			RL573	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			
D1	-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	16WU		
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	16WU		
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	16WU		
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				
R27		R92-0670-05		CHIP R	0 ΩHM	J 1/10W		
R28 -84		RK73FB2AXXXJ		CHIP R				
R85		R92-0670-05		CHIP R	0 ΩHM	J 1/10W		
R101-126		RK73FB2AXXXJ		CHIP R				

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# TS-790A/E

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Ref. No. 参照番号	Address 位 置	New Parts 新 品	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
R127			R92-0670-05	CHIP R 0 ΩHM		
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 ΩHM		
R201-252			RK73FB2AXXXJ	CHIP R J 1/10W		
R253			R92-0670-05	CHIP R 0 ΩHM J 1/10W		
R261-291			RK73FB2AXXXJ	CHIP R J 1/10W		
R292-297			R92-0670-05	CHIP R 0 ΩHM J 1/10W		
R301-346			RK73FB2AXXXJ	CHIP R J 1/10W		
D61			RL573	CHIP DIODE		
D62			HSM88AS	CHIP DIODE		
D81 ,82			RL573	CHIP DIODE		
D161			RL573	CHIP DIODE		
D162			HSM88AS	CHIP DIODE		
D181,182		*	RL573	CHIP DIODE		
D201		*	IMN10	CHIP DIODE		
D202		*	RL573	CHIP DIODE		
D221		*	RL573	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			2SC2712(Y)	CHIP TRANSISTOR		
Q163			2SK210(GR)	CHIP FET		
Q164			2SA1162(Y)	CHIP TRANSISTOR		
Q181	*		IMH5	DIGITAL TRANSISTOR		
Q182			2SC2712(Y)	CHIP TRANSISTOR		
Q183	*		IMH5	DIGITAL TRANSISTOR		
Q184			DTA143EK	DIGITAL TRANSISTOR		
Q201			DTA114EK	DIGITAL TRANSISTOR		
Q221			2SA1162(Y)	CHIP TRANSISTOR		
Q222,223			DTC124EK	DIGITAL TRANSISTOR		
Q224			2SC2712(Y)	CHIP TRANSISTOR		
Q225			2SA1162(Y)	CHIP TRANSISTOR		
Q226			DTC124EK	DIGITAL TRANSISTOR		
Q227			2SA1162(Y)	CHIP TRANSISTOR		
Q228			DTC124EK	DIGITAL TRANSISTOR		
Q241			2SC2712(Y)	CHIP TRANSISTOR		
Q242,243			2SA1162(Y)	CHIP TRANSISTOR		
Q244			DTC124EK	DIGITAL TRANSISTOR		
Q261	*		IMH5	DIGITAL TRANSISTOR		
Q281			2SC2712(Y)	CHIP TRANSISTOR		
Q321			DTC124EK	DIGITAL TRANSISTOR		
Q322			2SA1213(Y)	CHIP TRANSISTOR		
Q323			DTC124EK	DIGITAL TRANSISTOR		
Q324			DTA124EK	DIGITAL TRANSISTOR		
Q325			DTC124EK	DIGITAL TRANSISTOR		
Q326			2SA1213(Y)	CHIP TRANSISTOR		
<b>BAND SW (X59-3490-00)</b>						
C1 -4			CK73FB1H102K E23-0471-05	CHIP C 1000PF TERMINAL (11P)	K	
R1 -4			RK73FB2AXXXJ	CHIP R	J 1/10W	
D1			DAN202(K)	CHIP DIODE		
Q1			2SA1213(Y)	CHIP TRANSISTOR		
Q2			DTC124EK	DIGITAL TRANSISTOR		
Q3			2SA1213(Y)	CHIP TRANSISTOR		
Q4			DTC124EK	DIGITAL TRANSISTOR		
Q5			DTA124EK	DIGITAL TRANSISTOR		
Q6			DTC124EK	DIGITAL TRANSISTOR		

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<b>UT-10 (OPTION)</b>						
-			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	ROUND HEAD MACHINE SCREW BRAZIER HEAD TAP TITE SCREW		
			X60-3040-21	COMPOSITE UNIT		
<b>RF UNIT (X44-3070-00)</b>						
C1 ,2			CC73FCH1HXXXXC	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	ELECTRQ	10UF	50WV
C8			CC73FCH1H100D	CHIP C	10PF	D
C9 -14			CC73FCH1HXXXXC	CHIP C	C	
C15			CC73FCH1H150J	CHIP C	15PF	J
C16			CC73FCH1H030C	CHIP C	3.0PF	C
C17 ,18			CC73FCH1HXXXXJ	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			CC73FCH1HXXXXC	CHIP C	C	
C26			CK73FB1H221K	CHIP C	220PF	K
C27			CK73EB1E473K	CHIP C	0.047UF	K
C28 ,29			CK73FB1H221K	CHIP C	220PF	K
C30			CC73FCH1H20J	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			CC73FCH1HXXXXJ	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			CK73FB1HXXXXK	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			CK73FCH1H150J	CHIP C	15PF	J		
C62			CK73FCH1H040C	CHIP C	4.0PF	C		
C63 ,64			CK73FCH1H120J	CHIP C	12PF	J		
C65			CK73FCH1H030C	CHIP C	3.0PF	C		
C66			CK73FCH1H100D	CHIP C	10PF	D		
C67 ,69			CK73FB1H221K	CHIP C	220PF	K		
C70 ,71			CK73FCH1HXXXC	CHIP C		C		
C72			CK73FCH1H330J	CHIP C	33PF	J		
C73			CK73FB1H103K	CHIP C	0.010UF	K		
C74 ,75			CK73FCH1H100D	CHIP C	10PF	D		
C76			CE04EW1A101M	ELECTRQ	100UF	10WV		
C77			CK73FCH1H100D	CHIP C	10PF	D		
C78 ,79			CK73FCH1HXXXC	CHIP C		C		
C80			CK73FCH1H070D	CHIP C	7.0PF	D		
C81			CK73FCH1H180J	CHIP C	18PF	J		
C82			CK73FCH1HR75C	CHIP C	0.75PF	C		
C83 ,85			CK73FCH1HXXXJ	CHIP C		J		
C86			CK73FCH1H010C	CHIP C	1.0PF	C		
C87 ,88			CK73FCH1HXXXJ	CHIP C		J		
C89 ,90			CK73FCH1HXXXC	CHIP C		C		
C91 ,92			CK73FCH1HXXXJ	CHIP C		J		
C94			CK73FB1H103K	CHIP C	0.010UF	K		
C95			CK73FCH1H100D	CHIP C	10PF	D		
C96			CK73FCH1H150J	CHIP C	15PF	J		
C97			CE04EW1H100M	ELECTRQ	10UF	50WV		
C98			CK73FCH1H180J	CHIP C	18PF	J		
C100			CK73FCH1H050C	CHIP C	5.0PF	C		
C101			CK73FCH1H150J	CHIP C	15PF	J		
C102			CK73FB1H221K	CHIP C	220PF	K		
C103,104			CK73FRH1H470J	CHIP C	47PF	J		
C106			CK73FB1H221K	CHIP C	220PF	K		
C107			CK73FCH1H100D	CHIP C	10PF	D		
C108			CK73FB1H222K	CHIP C	2200PF	K		
C109			CK73FRH1H070D	CHIP C	7.0PF	D		
C110			CK73FCH1H101J	CHIP C	100PF	J		
C111			CK73FRH1H080D	CHIP C	8.0PF	D		
C112			CK73FCH1H0R5C	CHIP C	0.5PF	C		
C113			CK73FRH1H080D	CHIP C	8.0PF	D		
C114			CK73FCH1H101J	CHIP C	100PF	J		
C115			CK73FRH1H070D	CHIP C	7.0PF	D		
C116			CK73FCH1H030C	CHIP C	3.0PF	C		
C117-119			CK73FB1H221K	CHIP C	220PF	K		
C120,121			CK73FCH1HXXXJ	CHIP C		J		
C122-125			CK73FCH1H100D	CHIP C	10PF	D		
C126			CK73FB1H221K	CHIP C	220PF	K		
C127			CK73FCH1H100D	CHIP C	10PF	D		
C128			CK73FB1H221K	CHIP C	220PF	K		
C129			CK73FCH1H100D	CHIP C	10PF	D		
C130			CK73FB1H221K	CHIP C	220PF	K		
C131			CK73FCH1H100D	CHIP C	10PF	D		
C132			CK73FB1H221K	CHIP C	220PF	K		
C133			CK73FCH1H100D	CHIP C	10PF	D		
C134			CK73FB1H221K	CHIP C	220PF	K		
C135			CK73FCH1H100D	CHIP C	10PF	D		

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C136,137 C138-141			CK73FB1HXXXX CK73FCH1H100D	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 EHSP 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 TRIODAL 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	TRIODAL 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		*	HSM276S	CHIP DIODE				
D11			1SV12B	CHIP DIODE				
D12 ,13		*	RLZJ5.6	CHIP ZENER DIODE (5.6V)				
D14 ,15		*	HSM276S	CHIP DIODE				
D16			RLS135	CHIP DIODE				
IC1		*	UPC1659G	IC(DRIVE IC)				
Q1			2SC4093	CHIP TRANSISTOR				
Q2 ,3			3SK184(R)	CHIP FET				
Q4			2SK125	FET				
Q5 -7			2SC2712(Y)	CHIP TRANSISTOR				
Q8 ,9			2SC4093	CHIP TRANSISTOR				
Q10			2SC3356	CHIP TRANSISTOR				
Q11			2SC3357	CHIP TRANSISTOR				
Q12			2SC3098	CHIP TRANSISTOR				
Q13			2SC3357	CHIP TRANSISTOR				
Q14			FMC3	DIGITAL TRANSISTOR				
<b>FINAL UNIT (X45-3150-00)</b>								
C1			CC73FCH1H1R5C	CHIP C	1.5PF	C		
C2 ,3			CK73FB1H102K	CHIP C	1000PF	K		
C4			CEO4EW1E470M	ELECTRO	47UF	25WV		
C5			CC73FCH1H100D	CHIP C	10PF	D		
C6			CEO4EW1E470M	ELECTRO	47UF	25WV		
C7			CK73FB1H102K	CHIP C	1000PF	K		
C8			CC73FCH1H100D	CHIP C	10PF	D		
C9			CEO4EW1E470M	ELECTRO	47UF	25WV		
C10 -12			CC73FCH1HXXXC	CHIP C	C			
C13			CK73FB1H102K	CHIP C	1000PF	K		
C14			CC73FCH1H100D	CHIP C	10PF	D		
C15			CEO4EW1E470M	ELECTRO	47UF	25WV		
C16			CK73FB1H102K	CHIP C	1000PF	K		
C17			CC73FCH1H100D	CHIP C	10PF	D		
C18			CEO4EW1E470M	ELECTRO	47UF	25WV		
C19			CK73FB1H102K	CHIP C	1000PF	K		
C20			CC73FCH1H100D	CHIP C	10PF	D		
C21 ,22			CEO4EW1E470M	ELECTRO	47UF	25WV		
C27 -30			CM73F2AXXXC	CHIP C	C			
C31			CM73F2A330J	CHIP C	33PF	J		
C32			CC73FCH1H010C	CHIP C	1.0PF	C		
C33 -35			CC73FCH1H100D	CHIP C	10PF	D		
C36			CC73FCH1H010C	CHIP C	1.0PF	C		
C37 -41			CC73FCH1HXXXD	CHIP C	D			
C42			CK73FB1H103K	CHIP C	0.010UF	K		
C43			CC73FCH1H100D	CHIP C	10PF	D		
C44			CC73FCH1H130J	CHIP C	13PF	J		
C45			CC73FCH1H050C	CHIP C	5.0PF	C		
C46			CC73FCH1H060D	CHIP C	6.0PF	D		
C47 ,48			CC73FCH1HXXXC	CHIP C	C			
C49			CC73FCH1H090D	CHIP C	9.0PF	D		
C50			CK73FB1H103K	CHIP C	0.010UF	K		
C51			CC73FCH1H100D	CHIP C	10PF	D		
C52			CC73FCH1H330J	CHIP C	33PF	J		
C53 ,54			CC73FCH1HXXXC	CHIP C	C			
C55			CC73FCH1H100D	CHIP C	10PF	D		
C56			CK73FB1H103K	CHIP C	0.010UF	K		

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C57			CC73FCH1H100D	CHIP C 10PF D		
C58			CK73FB1H103K	CHIP C 0.010UF K		
C59			CEO4EW1E470M	ELECTRN 47UF 25WV		
C60 -70			CC73FCH1HXXXXD	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 ,80			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 RD 270 J 1/10W		
R35			RD14CB2E271J			
VR1			R12-3132-05	TRIMMING POT. 47K J 1/4W		
K1			S51-1434-05	RELAY		
D1 ,2	*		HSM88ASR	CHIP DIODE		
D3	*		RL573	CHIP DIODE		
D4	*		HSM88ASR	CHIP DIODE		
D5	*		RLZJ4.3	ZENER DIODE (4.3V)		
D6	*		RL573	CHIP DIODE		
D7			RLZJ7.5	ZENER DIODE (7.5V)		
D8 ,9			RL573	CHIP DIODE		
IC1			BA718	IC(OP AMP X2)		
Q1			2SC2712(Y)	CHIP TRANSISTOR		
Q2			2SA1162(Y)	CHIP TRANSISTOR		

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Q3			MGF1502	FET				
Q5			2SC2712(Y)	CHIP TRANSISTOR				
Q101		*	M67715	IC(POWER MODULE/ 450-470MHZ)				
Q102		*	M57762	IC(POWER MODULE/ 1.24-1.3GHZ)				
TH1			STP41L	THERMISTOR (10K)				
<b>PLL UNIT (X50-3090-21)</b>								
C1 ,2			CK73FB1HXXXXK	CHIP C				
C3			CC73FCH1H020C	CHIP C	2.0PF	K		
C4			CK73FB1H223K	CHIP C	0.022UF	C		
C5			CC73FCH1H060D	CHIP C	6.0PF	D		
C6 ,7			CK73FB1HXXXXK	CHIP C		K		
C8			CC73FCH1H0R5C	CHIP C	0.5PF	C		
C9			CC73FCH1H180J	CHIP C	18PF	J		
C10 ,11			CK73FB1H103K	CHIP C	0.010UF	K		
C12			CC73FCH1H0R5C	CHIP C	0.5PF	C		
C13			CC73FCH1H100D	CHIP C	10PF	D		
C14 ,15			CK73FB1H102K	CHIP C	1000PF	K		
C16			CC73FCH1H120J	CHIP C	12PF			
C17 ,18			CK73FB1H103K	CHIP C	0.010UF	K		
C19			CC73FCH1H0R5C	CHIP C	0.5PF	C		
C20			CC73FCH1H120J	CHIP C	12PF	J		
C21 ,22			CK73FB1H103K	CHIP C	0.010UF	K		
C23 ,24			CC73FCH1H270J	CHIP C	27PF	J		
C25 ,27			CK73FB1HXXXXK	CHIP C		K		
C28			CE04EW1E470M	ELECTRO	47UF	25WV		
C29			CD92M1H473K	MYLAR	0.047UF	K		
C30			CD92M1H103K	MYLAR	0.010UF	K		
C31			CE04EW1E470M	ELECTRO	47UF	25WV		
C32			CK73FB1H222K	CHIP C	2200PF	K		
C33 ,34		*	CC73FUJ1HXXXXJ	CHIP C		J		
C35			CC73FCH1H470J	CHIP C	47PF	J		
C36			CK73FB1H102K	CHIP C	1000PF	K		
C37			CE04EW1E470M	ELECTRO	47UF	25WV		
C38 ,39			CK73FB1HXXXXK	CHIP C		K		
C40			CC73FCH1H330J	CHIP C	33PF	J		
C41 --44			CK73FB1HXXXXK	CHIP C		K		
C45			CE04EW1H4R7M	ELECTRO	4.7UF	50WV		
C46 ,47			CK73FB1HXXXXK	CHIP C		K		
C48			CC73FCH1H181J	CHIP C	180PF	J		
C49			CK73FB1H561K	CHIP C	560PF	K		
C50			CC73FCH1H820J	CHIP C	82PF	J		
C51			CK73FB1H331K	CHIP C	330PF	K		
C52 ,53			CC73FCH1HXXXXD	CHIP C		D		
C54			CK73FB1H223K	CHIP C	0.022UF	K		
C55			CC73FCH1H120J	CHIP C	12PF	J		
C56 ,60			CK73FB1HXXXXK	CHIP C		K		
C61			CC73FCH1H470J	CHIP C	47PF	J		
C62 ,64			CK73FB1HXXXXK	CHIP C		K		
C65 ,66			CC73FCH1H100D	CHIP C	10PF	D		
C67 ,70			CK73FB1HXXXXK	CHIP C		K		
C71			CC73FCH1H070D	CHIP C	7.0PF	D		
C72			CC73FCH1H030C	CHIP C	3.0PF	C		
C73 ,74			CK73FB1HXXXXK	CHIP C		K		
C75			CC73FCH1H150J	CHIP C	1.5PF	J		
C76			CK73FB1H102K	CHIP C	1000PF	K		

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# TS-790A/E

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C77 ,78			CC73FCH1HXXXJ	CHIP C		J		
C79 -88			CK73FB1HXXXX	CHIP C		K		
C89			CEO4EW1H4R7M	ELECTRQ	4.7UF	50WV		
C90			C91-1083-05	FILM	0.47UF	63WV		
C91			CG92M1H222K	MYLAR	2200PF	K		
C92		*	CK73FB1H103K	CHIP C	0.010UF	K		
C93		*	CEO4EW1E470M	ELECTRQ	47UF	25WV		
C94		*	C91-1102-05	FILM	0.10UF	J		
C95 ,96		*	CK73FB1H471K	CHIP C	470PF	K		
C97 ,98		*	CEO4EW1A101M	ELECTRQ	100UF	10WV		
C99			CC73FCH1H070D	CHIP C	7.0PF	D		
C100,101			CK73FB1H471K	CHIP C	470PF	K		
C102			CC73FCH1H050C	CHIP C	5.0PF	C		
C103			CK73FB1H103K	CHIP C	0.010UF	K		
C104			CC73FCH1H680J	CHIP C	68PF	J		
C105,106			CK73FB1H471K	CHIP C	470PF	K		
C107-110			CC73FCH1HXXXJ	CHIP C		J		
C111			CK73FB1H103K	CHIP C	0.010UF	K		
C112			CEO4EW1HR47M	ELECTRQ	0.47UF	50WV		
C113			CC73FCH1H101J	CHIP C	100PF	J		
C114			CK73FB1H102K	CHIP C	1000PF	K		
C115,116			CC73FCH1H151J	CHIP C	150PF	J		
C117			CK73FB1H223K	CHIP C	0.022UF	K		
C118			CEO4EW1H4R7M	ELECTRQ	4.7UF	50WV		
C119			C91-1083-05	FILM	0.47UF	63WV		
C120		*	CG92M1H102K	MYLAR	1000PF	K		
C121		*	CK73FB1H103K	CHIP C	0.010UF	K		
C122		*	CEO4EW1E470M	ELECTRQ	47UF	25WV		
C123		*	C91-1102-05	FILM	0.10UF	J		
C124,125		*	CC73FCH1H151J	CHIP C	150PF	J		
C126			CEO4EW1E470M	ELECTRQ	47UF	25WV		
C127			CC73FCH1H151J	CHIP C	150PF	J		
C128,129			CEO4EW1A101M	ELECTRQ	100UF	10WV		
C130-134			CC73FCH1HXXXJ	CHIP C		J		
C135,136			CK73FB1HXXXK	CHIP C		K		
C138-143			CC73FCH1H151J	CHIP C	150PF	J		
C144			CK73FB1H102K	CHIP C	1000PF	K		
C145,146			CC73FCH1H680J	CHIP C	68PF	J		
C147			CK73FB1H102K	CHIP C	1000PF	K		
C148,149			CC73FCH1H680J	CHIP C	68PF	J		
C150			CK73FB1H102K	CHIP C	1000PF	K		
C151,152			CC73FCH1H680J	CHIP C	68PF	J		
C153			CEO4EW1H4R7M	ELECTRQ	4.7UF	50WV		
C154			CC73FCH1H120J	CHIP C	12PF	J		
C155			CC73FCH1H060D	CHIP C	6.0PF	D		
C156,157			CK73FB1H103K	CHIP C	0.010UF	K		
C158			CEO4EW1H4R7M	ELECTRQ	4.7UF	50WV		
C159-161			CK73FB1H103K	CHIP C	0.010UF	K		
C162			CEO4EW1A101M	ELECTRQ	100UF	10WV		
C163-170			CC73FSL1H221J	CHIP C	220PF	J		
C172			CC73FCH1H470J	CHIP C	47PF	J		
C173			CC73FCH1H040C	CHIP C	4.0PF	C		
C174-176			CC73FCH1H100D	CHIP C	10PF	D		
CN1 ,2			E04-0154-05	RF COAXIAL CABLE RECEPTACLE				

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TP1 -7			E23-0512-05	TERMINAL		
TP9			E23-0512-05	TERMINAL		
TP11			E04-0154-05	RF COAXIAL CABLE RECEPTACLE		
W1		*	E31-3427-05	CONNECTING WIRE 11P		
A1			F11-0817-04	SHIELDING COVER		
A2			F11-0818-24	SHIELDING COVER		
A3			F10-1206-04	SHIELDING PLATE		
CF1			L72-0349-05	CERAMIC FILTER SFJ10.7MA-D		
L1 ,2			L30-0536-05	IFT 20MHZ		
L3 ,5			L34-0683-05	COIL 143/154MHZ		
L6 ,8		*	L34-4106-05	COIL 82MHZ		
L9			L34-1026-05	COIL 7.5T		
L10			L40-1001-14	SMALL FIXED INDUCTOR 10UH		
L11			L32-0198-05	OSCILLATING COIL 40MHZ		
L12			L40-1001-14	SMALL FIXED INDUCTOR 10UH		
L13			L40-1011-14	SMALL FIXED INDUCTOR 100UH		
L14 ,15			L40-2211-14	SMALL FIXED INDUCTOR 220UH		
L16			L31-0313-05	COIL 10.6MHZ		
L17			L40-1001-14	SMALL FIXED INDUCTOR 10UH		
L18		*	L34-4107-05	COIL 154MHZ		
L19 ,20			L34-0683-05	COIL 143/154MHZ		
L21 ,22			L40-1592-17	SMALL FIXED INDUCTOR 1.5UH		
L23 ,25			L40-1001-14	SMALL FIXED INDUCTOR 10UH		
L26 ,28			L34-1207-05	COIL 3.5T		
L29			L40-1001-14	SMALL FIXED INDUCTOR 10UH		
L30			L34-1079-05	COIL 1.5T		
L31			L40-1001-14	SMALL FIXED INDUCTOR 10UH		
L32 ,34			L34-1079-05	COIL 1.5T		
L35 ,36			L39-0441-05	TRIQUETRAL COIL		
L37		*	L79-0856-05	HELICAL BLOCK 491MHZ		
L38 ,39		*	L79-0857-05	HELICAL BLOCK 491MHZ		
L40			L34-1083-05	COIL 1T		
L41			L30-0281-15	IFT		
R1 -144			RK73FB2AXXXJ	CHIP R J 1/10W		
W2			R92-1061-05	JUMPER REST 0 OHM		
D1			1SV166	CHIP DIODE		
D2			ND487C1-3R	DIODE		
D3			RLS73	CHIP DIODE		
IC1			CX-7925B	IC(DIGITAL SELECT PLL)		
IC1			CX-7925B-1	IC(DIGITAL SELECT PLL)		
IC2			M54459L	IC(PRE SCALER)		
IC3			SN16913P	IC(DUBLE BALANCED MIXERS)		
IC4			CX-7925B	IC(DIGITAL SELECT PLL)		
IC4			CX-7925B-1	IC(DIGITAL SELECT PLL)		
ICS			MB87006A	IC(FREQ SYNTHESIZER PLL)		
IC6			MB504P	IC(MODULUS PRE SCALER)		
IC7			NJM78L05A	IC(VOLTAGE REGULATOR/ +5V)		
Q1 ,4			ZSC2714(Y)	CHIP TRANSISTOR		
Q5			ZSC3098	CHIP TRANSISTOR		
Q6 ,7			ZSC2714(Y)	CHIP TRANSISTOR		
Q8			DTC114EK	DIGITAL TRANSISTOR		
Q9 ,10			ZSC2714(Y)	CHIP TRANSISTOR		
Q11 ,12			ZSK210(GR)	CHIP FET		

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Q13			2SC3098	CHIP TRANSISTOR		
Q14 ,15			2SC2714(Y)	CHIP TRANSISTOR		
Q16 -18			2SC3324(G)	CHIP TRANSISTOR		
Q19 ,20			2SC3098	CHIP TRANSISTOR		
Q21			FMC1	DIGITAL TRANSISTOR		
Q22 -24			DTC114EK	DIGITAL TRANSISTOR		
Q25 -27			2SC3324(G)	CHIP TRANSISTOR		
Q28			2SC3098	CHIP TRANSISTOR		
Q29			2SC3357	CHIP TRANSISTOR		
Q30 ,31			2SC3098	CHIP TRANSISTOR		
Q30 ,31		*	2SC3356	CHIP TRANSISTOR		
Q32		*	2SC3357	CHIP TRANSISTOR		
Q33		*	2SA1213(Y)	CHIP TRANSISTOR		
Z1		*	X59-3450-00	MODULE UNIT		
Z2		*	X59-3440-00	MODULE UNIT	LPF	
Z3		*	X58-3390-01	SUB UNIT	40MHZ VCO	
Z4		*	X58-3400-00	SUB UNIT	180MHZ VCO	
					310MHZ VCO	

## VCO (X58-3390-01)

A7			B42-2437-04	SERIAL LABEL		
C1			CK73FB1H102K	CHIP C	1000PF	K
C2			CC73FSL1H101J	CHIP C	100PF	J
C3 ,4			CC73FCH1H120J	CHIP C	12PF	J
C5 ,6			CC73FCH1HXXXXD	CHIP C		D
C7			CC73FCH1H030C	CHIP C	3.0PF	C
C8 ,9			CK73FB1H102K	CHIP C	1000PF	K
C10			CC73FCH1H0R5C	CHIP C	0.5PF	C
C11			CK73FB1H102K	CHIP C	1000PF	K
C12			CC73FCH1H010C	CHIP C	1.0PF	C
TC1			C05-0348-05	TRIMMING CAP 6PF		
TP1-3			E23-0486-05	TERMINAL		
A1		*	F11-1085-04	SHIELDING CASE		
A2		*	F11-1086-04	SHIELDING COVER		
A6		*	G13-0904-04	CUSHION		
L1		*	L33-0690-05	CHOKE COIL 3.3UH		
L2		*	L34-2314-05	COIL (3-1/2)		
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 (X58-3400-00)

A7			B42-2437-04	SERIAL LABEL		
C1			CK73FB1H102K	CHIP C	1000PF	K
C2			CC73FSL1H101J	CHIP C	100PF	J
C3 ,4			CC73FCH1HXXXXD	CHIP C		D
C5			CC73FCH1H030C	CHIP C	3.0PF	C
C6 ,7			CC73FCH1HXXXXD	CHIP C		D
C8			CK73FB1H102K	CHIP C	1000PF	K
C9			CC73FCH1HR75C	CHIP C	0.75PF	C

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C10			CK73FB1H102K	CHIP C 1000PF K		
C11			CC73FSL1H101J	CHIP C 100PF J		
C12			CK73FB1H102K	CHIP C 1000PF K		
C13			CC73FCH1H010C	CHIP C 1.0PF C		
C14			CK73FB1H102K	CHIP C 1000PF K		
C15			CC73FSL1H101J	CHIP C 100PF J		
TC1			C05-034B-05	TRIMMING CAP 6PF		
TP1 -4			E23-0486-05	TERMINAL		
A1			F11-1085-04	SHIELDING CASE		
A2			F11-1086-04	SHIELDING COVER		
A6			G13-0904-04	CUSHION		
L1			L34-2314-05	COIL (3-1/2T)		
L2			L33-0663-05	CHOKE COIL 1UH		
L3 ,4		*	L40-1092-19	SMALL FIXED INDUCTOR 1UH		
A3 -5			N30-2604-41	PANHEAD		
R1 -6			RK73FB2AXXXJ	CHIP R J 1/10W		
D2			1SV164	CHIP VARI-CAP DIODE		
Q1			2SK508NV(K52)	CHIP FET		
Q2			2SC3356	CHIP TRANSISTOR		
<b>VCO (X59-3440-00)</b>						
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 100UH		
R1 -7			RK73FB2AXXXJ	CHIP R J 1/10W		
Q1			2SK210(GR)	CHIP FET		
Q2			2SC2714(Y)	CHIP TRANSISTOR		
<b>LPF (X59-3450-00)</b>						
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		
<b>COMPOSITE UNIT (X60-3040-21)</b>						
C1			B41-0649-04	CAUTION LABEL(SHIELDING COVER)		
			CK45F1H103Z	CERAMIC 0.010UF Z		
			E31-3301-05	CONNECTING WIRE(HET1,HET2)		
		*	E31-3428-25	CONNECTING WIRE		
		*	E31-3429-05	CONNECTING WIRE(FAN)		
J1	1H		E04-0170-05	N TYPE RECEPTACLE(ANT)		
		*	F11-1135-03	SHIELDING COVER(FINAL)		
		*	F10-1206-04	SHIELDING PLATE		
A1	2H		F01-0960-11	HEAT SINK		
A2	2G	*				

E: Scandinavia &amp; 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	BSS		
-			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		X50-3090-21	PLL UNIT		
Z2	2H	*	X44-3070-00	RF UNIT		
Z3	1H	*	X45-3150-00	FINAL UNIT		

E: Scandinavia &amp; Europe K: USA

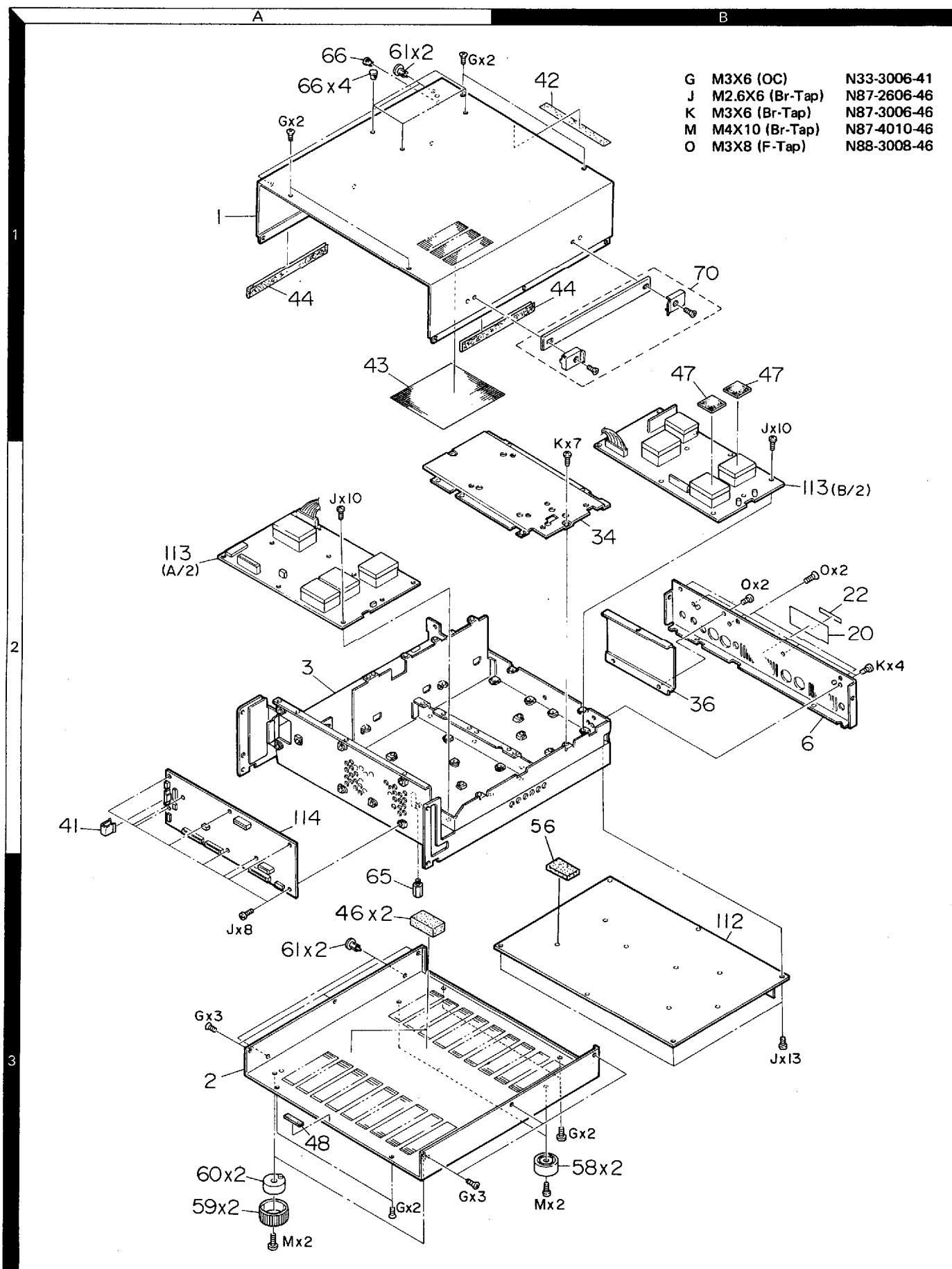
P: Canada W:Europe

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

UE : AAFES(Europe) X: Australia

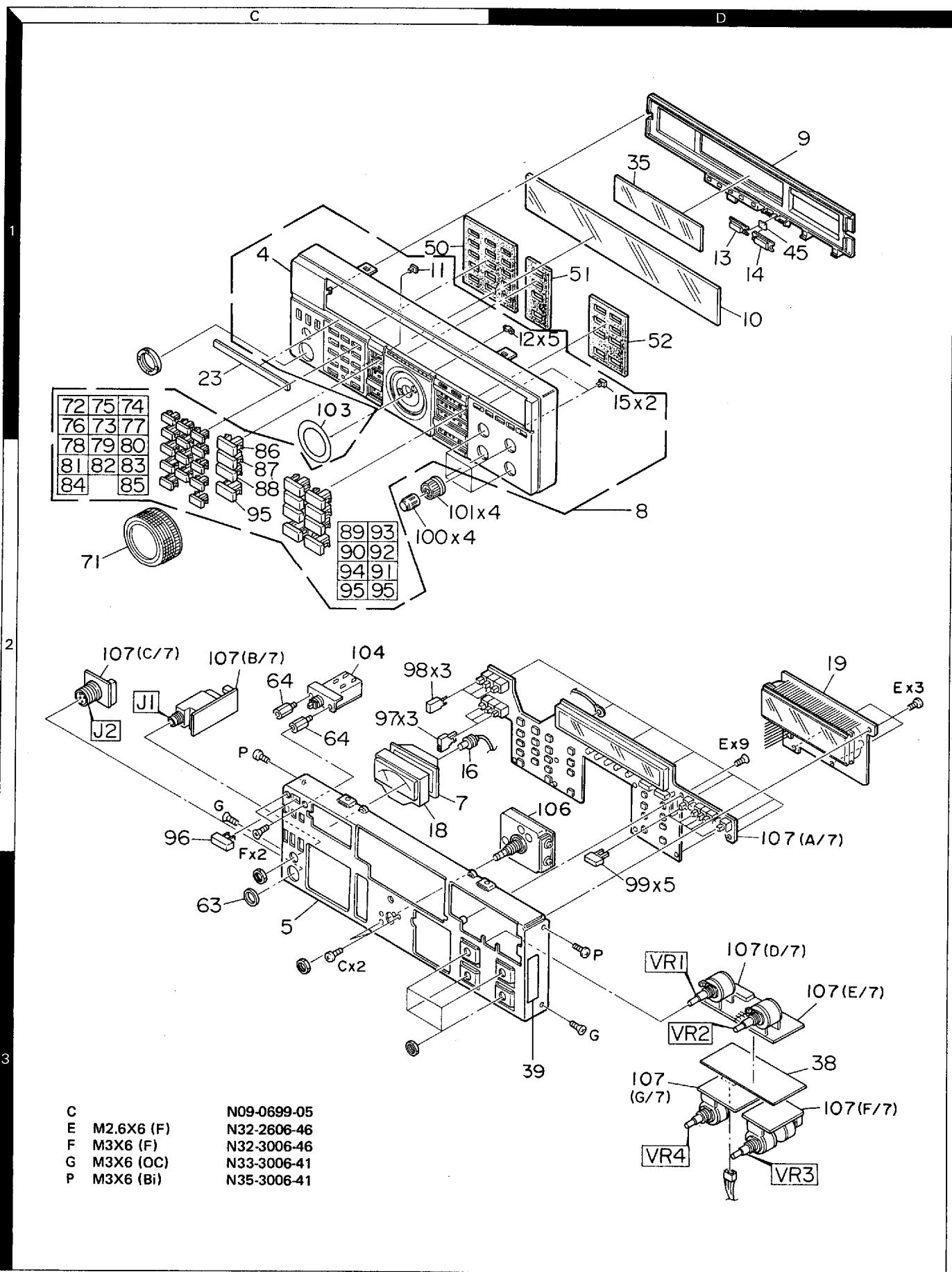
⚠ indicates safety critical components.

## DISASSEMBLY



IS-790A/E

# **DISASSEMBLY**

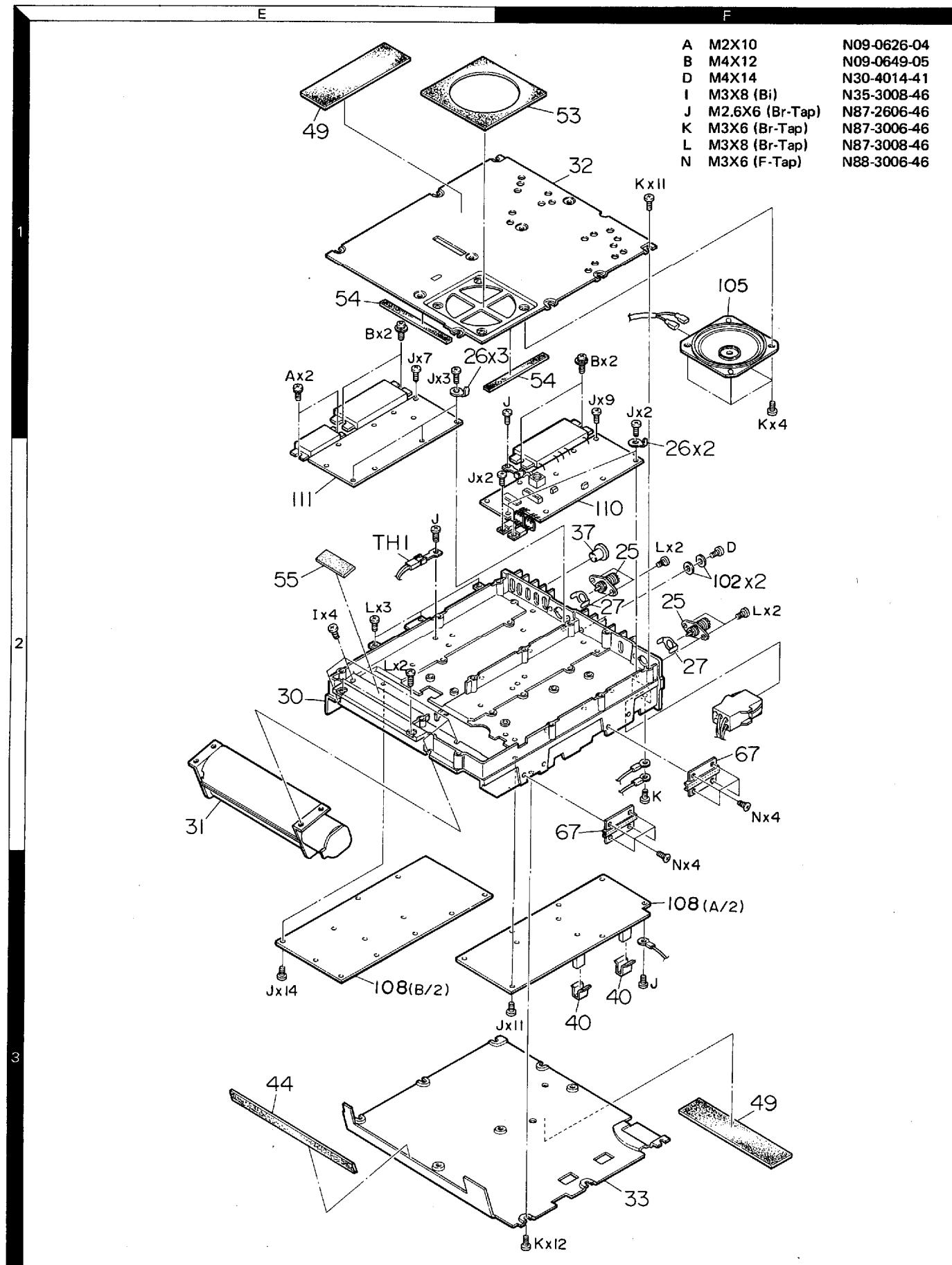


## DISASSEMBLY

E

F

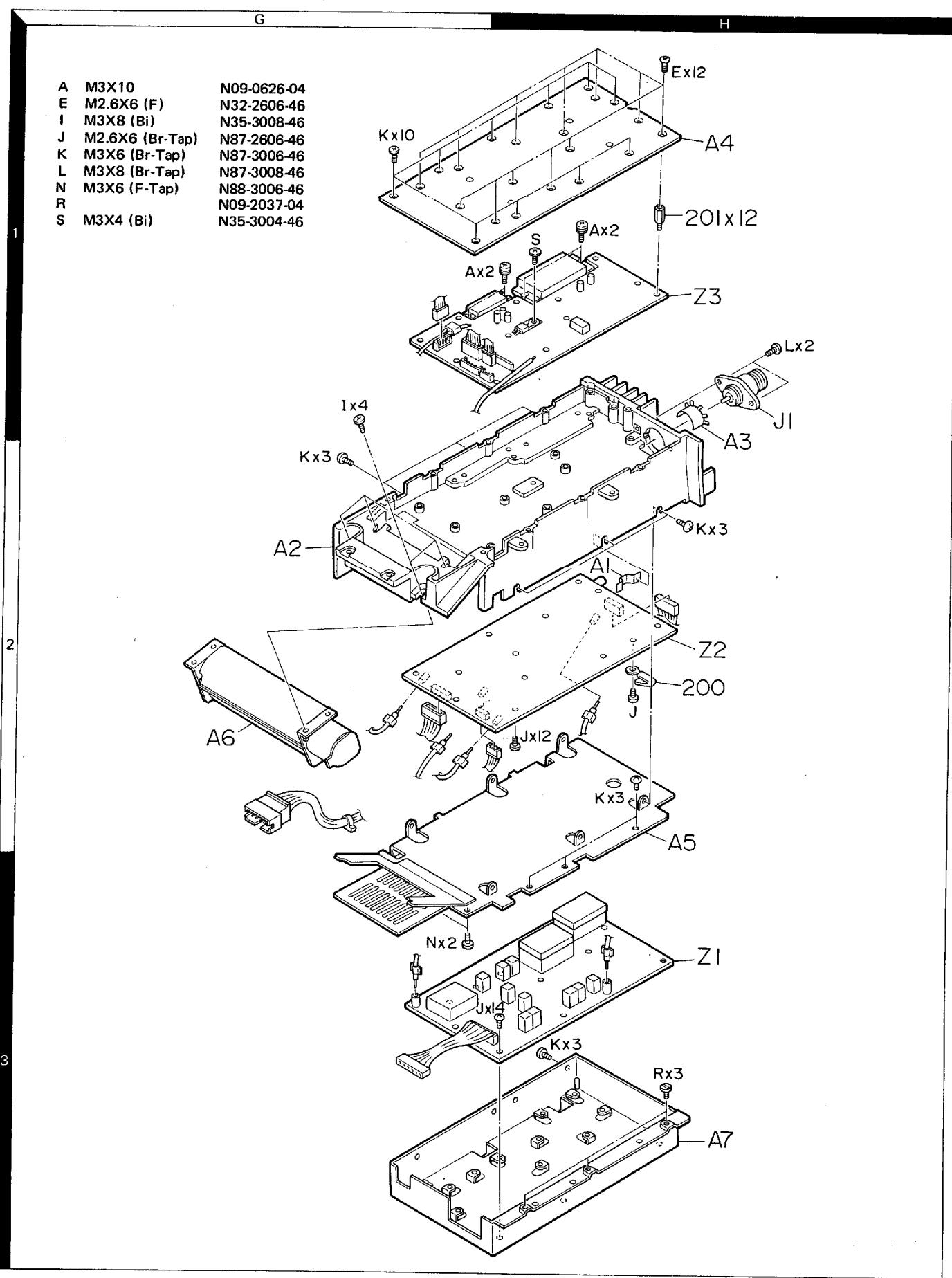
A	M2X10	N09-0626-04
B	M4X12	N09-0649-05
D	M4X14	N30-4014-41
I	M3X8 (Bi)	N35-3008-46
J	M2.6X6 (Br-Tap)	N87-2606-46
K	M3X6 (Br-Tap)	N87-3006-46
L	M3X8 (Br-Tap)	N87-3008-46
N	M3X6 (F-Tap)	N88-3006-46



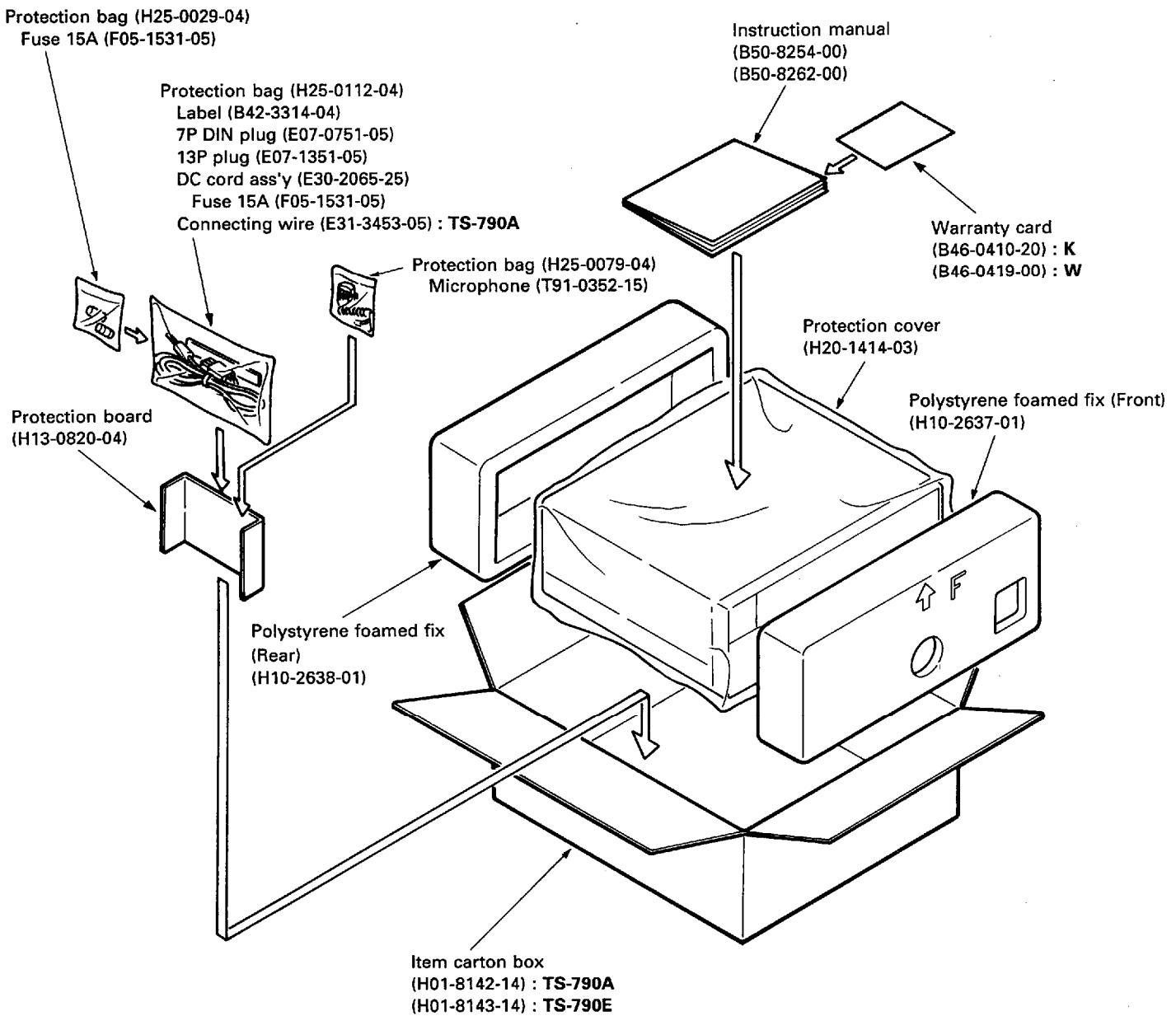
# IS-790A/E

## 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		N09-2037-04
S	M3X4 (Bi)	N35-3004-46



## PACKING



## ADJUSTMENT

## REQUIRED TEST EQUIPMENT

## 1. DC V.M and Tester

1) High input impedance

## 2. RF VTVM (RF V.M)

- 1) Input impedance : 1MΩ 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 : 1MΩ 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 : -20dBμ to 100dBμ

## 13. Dummy Load

- 1) 8Ω, 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

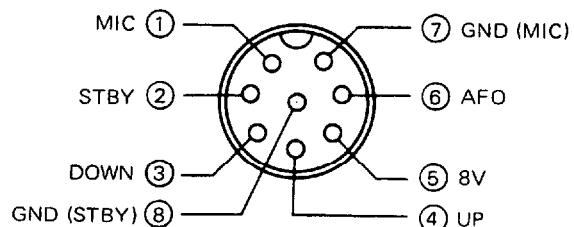


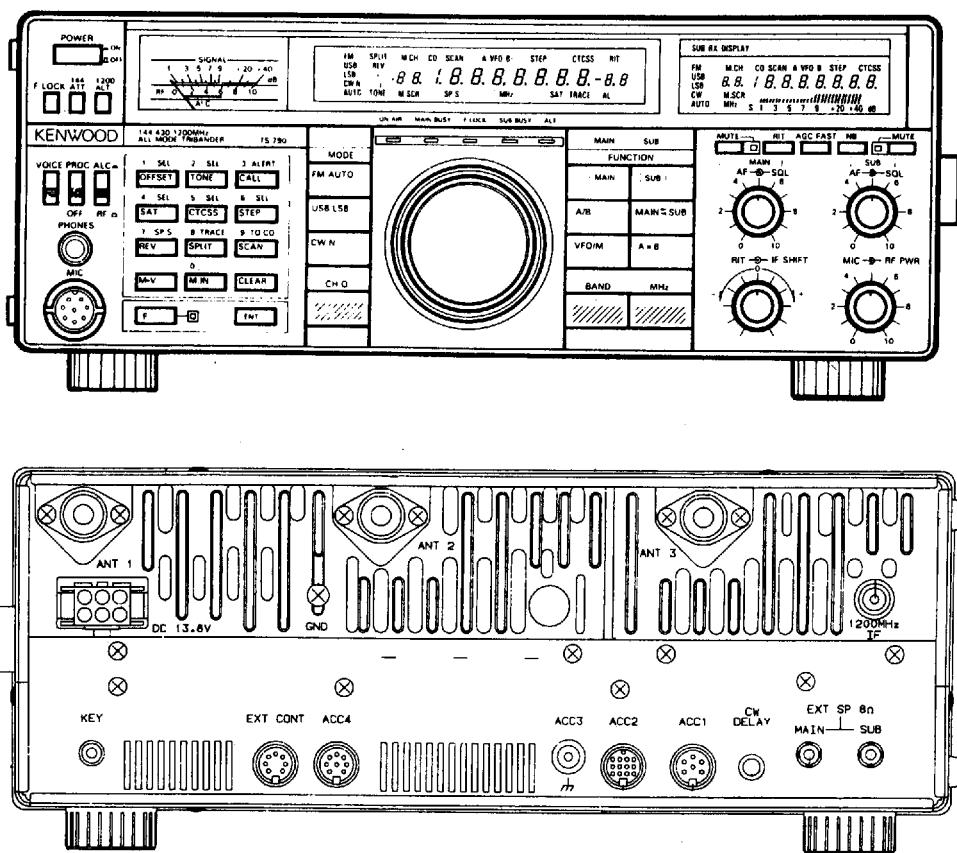
Fig. 27 MIC terminals (view from front panel side)

- 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



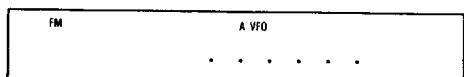
## COMMON ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Reset	1) Turn the POWER SW ON, holding the <b>A=B</b> SW down. Release the <b>A=B</b> SW and select MODE : FM.	<b>MAIN DISPLAY</b> FM A VFO 145.000 AUTO			<b>SUB DISPLAY</b> 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.
	2) FUNC : SUB MODE : USB			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		102.40000MHz	±10Hz
2. 10.24MHz	1) VFO : 145.000.0 MODE : FM	RF V.M		TP12		L37	Repeat for MAX.	0.08V or more.
3. 30.72MHz	1) VFO : 145.000.0 MODE : FM			CN3-1 (30.72)		L38		
4. 51.2MHz	1) VFO : 145.000.0 MODE : FM			TP6		L35	Repeat for MAX.	0.15V or more.
5. 102.4MHz	1) VFO : 145.000.0 MODE : FM			TP5		L36		
6. 11.025MHz	1) VFO : 145.020.0 MODE : FM			TP4		L13	Repeat for MAX.	
7. MAIN CAR VCO	1) FUNC : MAIN VFO : 145.000.0 MODE : USB 2) MODE : LSB	DVM		TP11		L14		
8. SUB CAR VCO	1) FUNC : SUB MODE : USB 2) MODE : LSB			TP9	144M PLL	L15	Repeat for MAX.	0.12V (-6dBm) or more.
9. MAIN CAR	1) FUNC : MAIN VFO : 145.000.0 MODE : USB			TP10		L16		0.3V (2.5dBm) or more.
10. SUB CAR	1) FUNC : SUB MODE : USB			TP8	144M PLL	L25	4.0V	±0.1V
11. B loop VCO	1) FUNC : MAIN VFO : 145.000.0 MODE : FM 2) VFO : 149.999.9	DVM		TP7		L27	MAX. Then adjust L27 to 3.6V.	±0.01V
12. A loop VCO	1) VFO : 144.000.0 MODE : FM 2) VFO : 145.999.9			TP2		L22	MAX.	0.3V or more.
13. 113MHz	1) FUNC : MAIN VFO : 145.020.0 MODE : FM	RF V.M		TP3	144M PLL	L17	2.5V	±0.1V
14. HET	1) VFO : 145.000.0 MODE : USB			TP1			Check	4.5 ~ 5.5V
15. UNLOCK	1) FUNC : MAIN VFO : 145.000.0	MAIN display				TC1	4.0V	±0.1V
							Check	4.7 ~ 5.3V
						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.
						TC1	MAX.	
					TP2		Connect the TP2 terminal in the 144M PLL unit to the ground.	Display should decimal point.



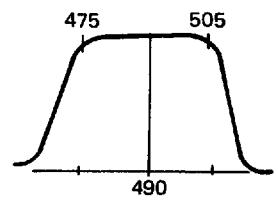
## ADJUSTMENT

## 430MHz PLL SYSTEM ADJUSTMENT

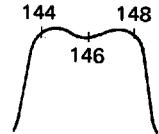
Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. 133MHz	1) FUNC : MAIN MAIN display : 433.020.0 MODE : FM	RF V.M	430M PLL	TP55	430M PLL	L72	Repeat for MAX.	0.08V (-9dBm) or more.
2. 40.96MHz	1) VFO : 433.000.0 MODE : FM					L76	Repeat for MAX.	
3. 122.88MHz	1) VFO : 433.000.0 MODE : FM					L77		
4. 153MHz	1) VFO : 433.020.0 MODE : FM					L78	Repeat for MAX.	0.20V (-1dBm) or more.
5. 11.025MHz	1) VFO : 433.020.0 MODE : FM					L79		
6. B loop VCO	1) VFO : 430.000.0 MODE : FM 2) VFO : 432.999.9		DVM	TP59	430M	L62	MAX.	0.07V (-10dBm) or more.
7. C loop VCO	1) VFO : 430.000.0 MODE : FM 2) VFO : 430.999.9					L71	Repeat for MAX.	0.25V or more.
8. A loop VCO	1) VFO : 430.000.0 MODE : FM 2) VFO : 439.999.9 <b>M2, T, W</b> VFO : 449.999.9 <b>K, M1</b>					L72		
9. D loop VCO	1) VFO : 430.000.0 MODE : FM 2) FUNC : SUB SUB display : 144MHz FUNC : MAIN					L81	2.5V	$\pm 0.1V$
							Check	4.5 ~ 5.5V
10. HET	1) VFO : 435.000.0 <b>M2, T, W</b> VFO : 440.000.0 <b>K, M1</b>	RF V.M	430M PLL	TP50	430M	TC1	4.0V	$\pm 0.1V$
11. HET2	1) VFO : 435.000.0 <b>M2, T, W</b> VFO : 440.000.0 <b>K, M1</b>					L84	MAX.	0.12V or more.
12. UNLOCK	1) HET1 VFO : 433.000.0 <b>M2, T, W</b> VFO : 440.000.0 <b>K, M1</b> 2) HET2 VFO : 433.000.0 <b>M2, T, W</b> VFO : 440.000.0 <b>K, M1</b>	MAIN display		TP61	430M	TC50	MAX.	
						TP51	Connect the TP51 or TP61 terminal in the 430M PLL unit to the ground.	Display should decimal point.
					TP60			

## 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 Tracking generator Spectrum analyzer	1.2G PLL TP1 TP3 TP2 TP5	L1 L2 L2, L6 L7, L8 L2, L3 L4, L5 L41, L16 L18, L19 L20	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				TP11 CN2 (12HET)	L37, L38 L39	Adjust balance for wave.	
2) VFO : 1280.000 MODE : FM	RF V.M				CN2 (12HET)		Check	0.3V or more.
6. B loop VCO	1) VFO : 1260.000.0 MODE : FM	DVM	TP4 TP7 TP9	1.2G PLL 1.2G VCO (Z3) 1.2G VCO (Z4)	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	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	TC1	8.0V	±0.3V
	2) VFO : 1260.000.0						Check	14.0 ~ 17.0V

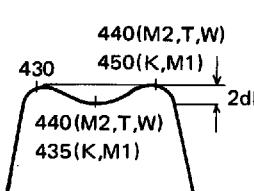
## 144MHz RECEIVER SYSTEM ADJUSTMENT

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	Tracking generator Spectrum analyzer	Rear panel 144M RF	ANT1 (144MHz) CN2 (TP)	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.						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 <b>T, W</b> VFO : 146.040.0 <b>K, M1, M2</b> 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 <b>T, W</b> SSG f : 146.040.0 <b>K, M1, M2</b> MOD : 1kHz DEV : 5kHz Output : 3.2 ~ 100μV (-103 ~ 73dBm)	SSG 8Ω dummy Oscilloscope AF V.M MAIN S-meter	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 <b>T, W</b> : 146.060.0 <b>K, M1, M2</b> MAIN AF : MIN SUB SQL : MIN SUB AF : 0.63V					L14	Repeat for MAX S-meter reading.	

## 430MHz RECEIVER SYSTEM ADJUSTMENT

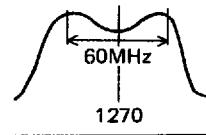
Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. RX helical	1) VFO : 435.040.0 <b>M2, T, W</b> VFO : 440.040.0 <b>K, M1</b> MODE : FM Disconnect the CN202 (43HET) on the 430M RF unit.  8mm Check that the L206 is about 8mm.	Tracking 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    430 440(M2,T,W) 450(K,M1) 435(K,M1) 2dB
	2) Sensitivity					L214 L215 L210	Repeat the adjustment in order of L214, L215 and L210. Repeat for MAX S-meter reading.	
	1) FUNC : MAIN VFO : 435.040.0 <b>M2, T, W</b> VFO : 440.040.0 <b>K, M1</b> 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 <b>M2, T, W</b> SSG f : 440.040.0 <b>K, M1</b> MOD : 1kHz DEV : 5kHz Output : 3.2 ~ 100μV (-103 ~ 73dBm)	SSG 8Ω dummy Oscilloscope AF V.M MAIN display	Rear panel	ANT2 (430MHz) EXT. SP (MAIN)	430M RF	L211 TC203 L208 L209	Repeat the adjustment in order of L211, TC203, L208 and L209. Repeat for MAX S-meter reading.	Waveform of oscilloscope 
	2) FUNC : SUB SUB VFO : 435.040.0 <b>M2, T, W</b> : 440.040.0 <b>K, M1</b> MAIN AF : MIN SUB SQL : MIN SUB AF : 0.63V					L212	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 : 5μV (-93dBm)	SSG  8Ω 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 ~ 10μV	SSG  8Ω dummy Oscilloscope AF V.M	Rear panel	ANT2 (430MHz) EXT. SP (MAIN)	430M RF	L228 L229 L234	Repeat for MAX.	
	2) VFO : 370.000.0 MODE : FM	f. counter	430M RF	CN211 (TP)		TC204	19.2000MHz	
5. 870MHz	1) FUNC : MAIN VFO : 870.000.0 MODE : FM SSG f : 870.000 MOD : 1kHz DEV : 3kHz Output : 0.5μV (-113dBm)	SSG  8Ω dummy Oscilloscope AF V.M		TP201  TP202 (GND)		L230 L231 L232 L217 L218 L219 L220	Repeat fpr 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 ± 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	1.2G RF	L6	Repeat for MAX.	12IF output : -30dBm or more.
	2) TP2 : Open						Check	
3. RIF	1) VFO : 1268.000.0 SSG output : 11μV (-86dBm)	SSG	Rear panel	ANT3 (1.2GHz)	1.2G RF	L9 L12	Set the S-meter "8 ~ 9 + 10dB"	

## ADJUSTMENT

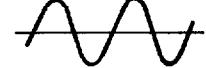
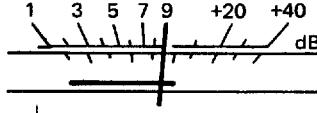
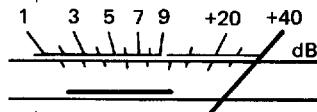
Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
4. IF	1) FUNC : MAIN VFO : 1295.000.0 SUB AF : MIN MODE : FM SSG f : 41.415 MOD : 1kHz DEV : 5kHz Output : 0.27μV (-58dBm)	SSG  8Ω dummy Oscilloscope AF V.M  MAIN S-meter	Rear panel	ANT3 (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  8Ω 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 ~ 100μV (-101 ~ -67dBm)	SSG  8Ω 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 adjustment in order of L41 and L42 (3 times).	
	1) VFO : 145.040.0 SSG f : 145.040 MOD : 1kHz DEV : 3kHz Output : 0.5mV (-53dBm) MAIN AF : 6.3V				L54	AF MAX.		
2. MAIN discr.	1) VFO : 145.040.0 SSG f : 145.040 MOD : 1kHz DEV : 3kHz Output : 0.5mV (-53dBm) MAIN AF : 6.3V	DC V.M	AFC module (A2)	2 pin (OUT)		VR34	2.5V	±0.05V
3. MAIN ALT center detection	1) VFO : 145.040.0 SSG f : 145.040 MOD : OFF Output : 5μV (-93dBm)				L43 L47 L48 L49 L50	Repeat for AF output MAX. Repeat the adjustment in order of L43 and L47 (3 times).		
	2) SSG output : 0.16μV (-125dBm)	SSG  8Ω dummy Oscilloscope AF V.M	Rear panel	ANT1 (144MHz)  EXT. SP (MAIN)			Check	10dB or more at SSG output 0.16μV (-125dBm).

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## ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
5. MAIN IF NB GAIN	1) SSG output : 10dB $\mu$	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 : 0.5 $\mu$ V (-103dBm)						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 : 0.18 $\mu$ V (-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 : 5 $\mu$ V (-93dBm) RIT VR : Center (12 o'clock)	Oscilloscope			SW (G7)	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-0 SSG RF : OFF	MAIN S-meter			IF	VR25	Set the S-meter to mechanical "0" point.	
	2) S-1 SSG RF : ON Output : 0.4 $\mu$ V (-115dBm)					VR22	Set the S-meter to "+1".	
	3) S-9 SSG output : 5 $\mu$ V (-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 : 12 $\mu$ V (-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 ~ 100 $\mu$ V (-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 discr.	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	
	5) SSG output : 4μV (-113dBm)	SUB S-meter			VR6	Set the SUB S-meter to S2.	S 1 3 5 7 9 +20 +40 dB	
	6) SSG output : 5μV (-93dBm)				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.		
					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	
16. SUB tight squelch sensitivity	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.	

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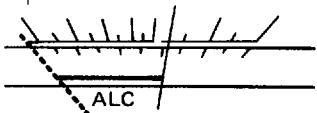
## ADJUSTMENT

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 : 0.18µV (-123dBm) After checked SUB SQL : MIN	SSG  8Ω dummy Oscilloscope AF V.M	Rear panel	ANT1 (144MHz)	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 : 50µV (-73dBm)					VR4	Set the AF output to 0.63V/8Ω 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					VR3	Set the AF output to 0.63V/8Ω 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 : 50Ω termination Disconnect the 14D and 43D coax. cable on the RF unit. STBY : SEND	RF V.M  f. counter	IF	CN35-2 (TIF)	IF	L62	MAX	50mVrms or more.
						TC2	10.6950MHz	±100Hz
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 (50Ω 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.

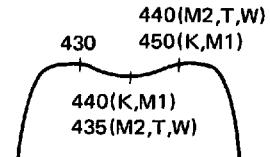
## ADJUSTMENT

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 connector on the 144M final unit. STBY : SEND	DC V.M (Tester)  Power meter	144M Final  Rear panel	TP1  ANT1 (144MHz)	144M Final  VR3	TC1 TC2 TC3 TC4	Repeat for MAX.	
	2) NULL						DC MIN.	
	3) Full power RF PWR VR : MAX						Check	53W or more.
	1) VFO : 144.980.0 T, W VFO : 145.980.0 K, M1, M2 MODE : FM RF PWR VR : MAX STBY : SEND						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.  ANT1 CM coupler TS-790 A/E Power meter Spectrum analyzer
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  MAIN S-meter	Rear panel	ANT1 (144MHz)	IF	VR26	Set the ALC meter to mechanical "0" point.	
	2) MIC input : AG 1kHz/2mV						Set the ALC meter to mechanical "0" point.	
	3) MIC input : AG 1kHz/4mV						ALC zone MAX.	

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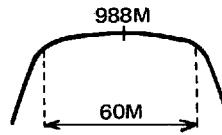
## ADJUSTMENT

### 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 <b>M2, T, W</b> VFO : 440.000.0 <b>K, M1</b> 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.	 430 440(M2,T,W) 450(K,M1) 440(K,M1) 435(M2,T,W)
2. DRIVE	1) VFO : 434.980.0 <b>M2, T, W</b> VFO : 439.980.0 <b>K, M1</b> 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	MAX		
					L236 L237 L238 L239	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 <b>M2, T, W</b> VFO : 439.980.0 <b>K, M1</b> MODE : FM 430M final unit VR1 and VR2 : MIN RF PWR VR : 40W STBY : SEND	Power meter DC V.M (Tester)	Rear panel 430M Final	ANT2 (430MHz) TP1 (TP)	430M Final	VR3	DC MIN.	
	2) RF PWR VR : MAX						Check	50W or more.
4. APC	1) VFO : 434.980.0 <b>M2, T, W</b> VFO : 439.980.0 <b>K, M1</b> 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 <b>M2, T, W</b> VFO : 439.980.0 <b>K, M1</b> 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 <b>M2, T, W</b> VFO : 439.980.0 <b>K, M1</b> MODE : USB RF PWR VR : MAX MIC VR : Center (12 o'clock) AG : 1.0kHz/5mV STBY : SEND	Power meter	Rear panel	ANT2 (430MHz)			Check	26.0 ~ 35.0W
	2) RF PWR VR : MIN							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 TP5	TP4	1.2G RF	L26	Adjust for the waveform perform shown on right.	988 ± 30MHz  988M 60M
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 $1270 \pm 30$ 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	

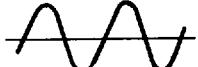
# TS-790A/E

## 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 <b>M2, T, W</b> VFO : 439.980.0 <b>K, M1</b> 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 <b>T, W</b> VFO : 145.980.0 <b>K, M1, M2</b> 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).	<p>Set the AG output to 1mVrms</p>
	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 PWER 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					Front panel	MIC VR	ALC zone for MAX.
	2) PROC SW : ON STBY : SEND					IF	VR37	ALC zone for MAX.
	3) MIC input : AG 1Hz/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 <b>M2, T, W</b> AG 1kHz/30mV <b>K, M1</b> TONE : OFF (check) STBY : SEND	Power meter CM coupler Linear detector or Modulation analyzer AG Oscilloscope	IF	VR33	$\pm 4.5\text{kHz}$	$\pm 0.1\text{kHz}$		
	2) MIC input AG 1kHz/2mV <b>M2, T, W</b> AG 1kHz/3mV <b>K, M1</b>						VR32	$\pm 3.0\text{kHz}$
	3) Check to item 1).							

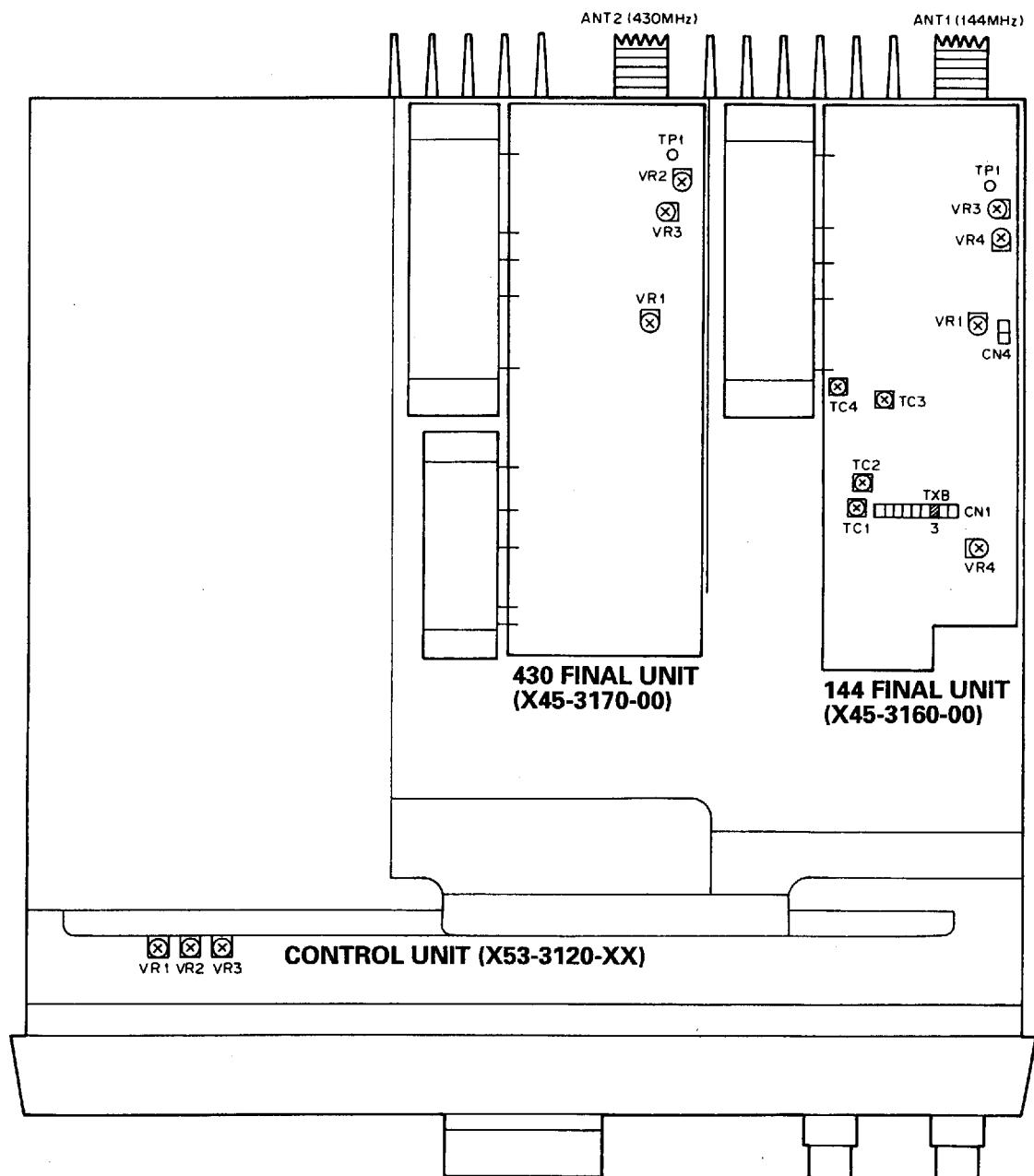
## ADJUSTMENT

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

# TS-790A/E

## ADJUSTMENT

### ADJUSTMENT POINT (UPPER)



**CONTROL UNIT (X53-3120-XX)**  
VR1 ~ 3 : Carrier point

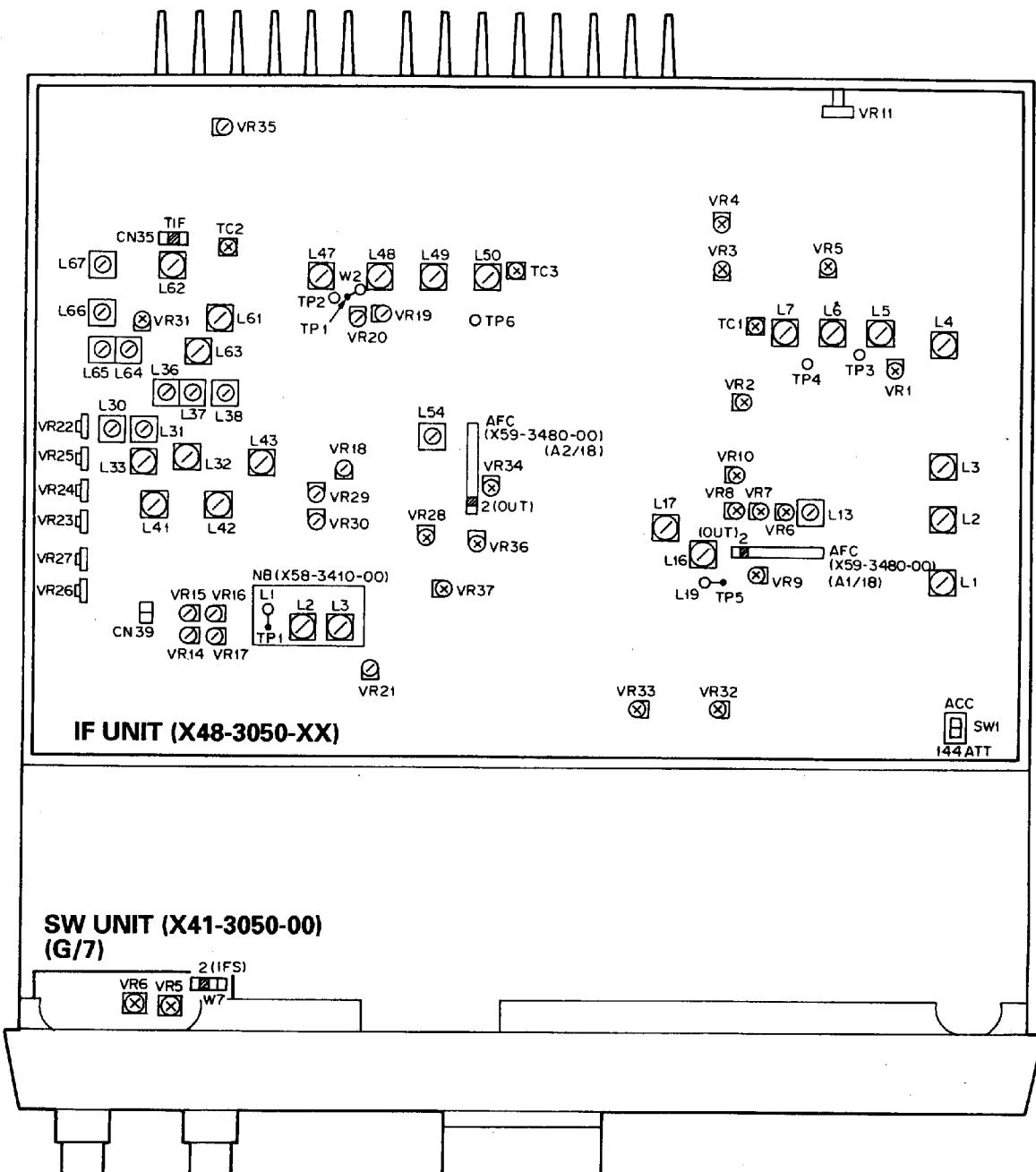
**FINAL UNIT (X45-3170-00) : 430MHz**  
VR1 : APC  
VR2 : Protection  
VR3 : POWER (NULL)

**FINAL UNIT (X45-3160-00) : 144MHz**  
VR1 : APC  
VR2 : Protection  
VR3 : POWER (NULL)  
VR4 : TXB (9T)  
TC1 ~ 4 : TX POWER



## ADJUSTMENT

## ADJUSTMENT POINT (LOWER)



## SWITCH UNIT (X41-3050-00)

VR5 : RIT  
VR6 : IF SHIFT

## IF UNIT (X48-3050-XX)

L1 ~ 3 : SUB common IF  
L4 ~ 7 : SUB IF GAIN (SSB, CW)  
L13 : SUB discri.  
L16, 17 : SUB NB GAIN  
L30 ~ 33 : 1.2GHz RX IF  
L36 ~ 38 : 30.72MHz level  
L41 ~ 43 : MAIN common IF  
L47 ~ 50 : MAIN IF GAIN (SSB, CW)  
L54 : MAIN discri.  
L61, 62 : FM OSC (TIF)  
L63 ~ 67 : 1.2GHz TX IF GAIN  
TC1 : SUB RX carrier balance  
TC2 : FM TX frequency  
TC3 : MAIN RX carrier balance  
VR1 : SUB tight squelch  
VR2 : SUB RB  
VR3 : SUB MUTE

## VR4 : MAIN MUTE

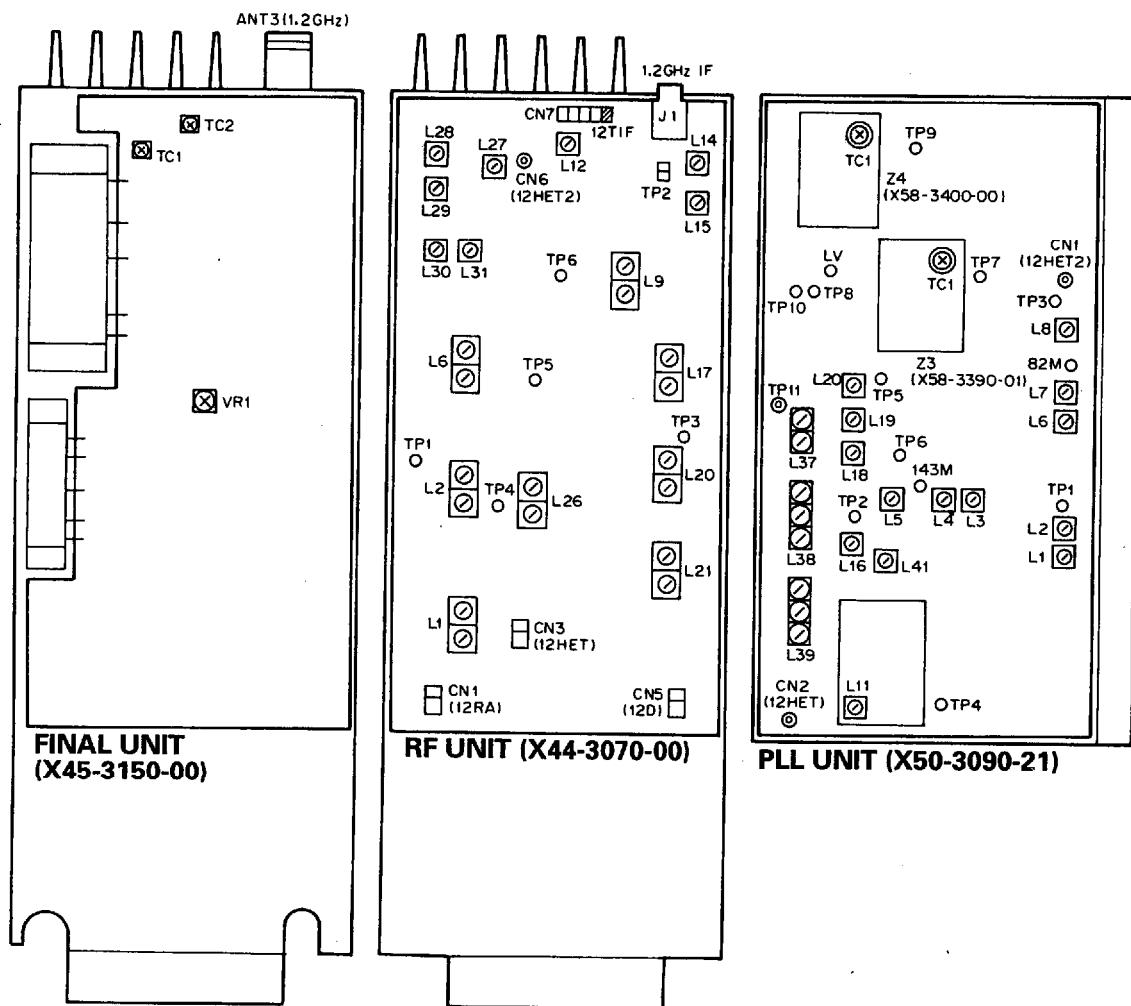
VR5 : BEEP level  
VR6 : SUB SSB S-Ø  
VR7 : SUB SSB S-9  
VR8 : SUB FM S-9  
VR9 : SUB ALT REF.  
VR10 : SUB IF GAIN (FM)  
VR11 : CW DELAY  
VR14 : 430MHz IF GAIN (SUB)  
VR15 : 1.2GHz IF GAON (SUB)  
VR16 : 1.2GHz IF GAIN (MAIN)  
VR17 : 430MHz IF GAIN (MAIN)  
VR18 : MAIN IF GAIN (FM)  
VR19 : RFG (2.5V)  
VR20 : MAIN tight squelch  
VR21 : MAIN RB  
VR22 : MAIN SSB S-1

## VR23 : MAIN FM S-9

VR24 : MAIN SSB S-9  
VR25 : MAIN SSB S-Ø  
VR26 : ALC Ø  
VR27 : ALC 6dB  
VR28 : CW level  
VR29, 30 : TX carrier balance  
VR31 : 1.2GHz TX IF spurious  
VR32 : FM MIC GAIN  
VR33 : FM DEV.  
VR34 : MAIN ALT REF.  
VR35 : SIDE TONE level  
VR36 : EXT. MOD  
VR37 : SSB processor  
NB (X58-3410-00)  
L2, 3 : MAIN IF NB GAIN

## ADJUSTMENT

## ADJUSTMENT POINT (UT-10) : OPTION



# TS-790A/E

## TERMINAL FUNCTIONS

Connector No.	Terminal No.	Terminal Name	Terminal Function
<b>SWITCH UNIT (X41-3050-00)</b>			
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
CN11	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)
	1	PHS	Headphone information
	2	8V	+8V
CN12	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
	1	8V	+8V
	2	RB	G2 (gate2) voltage of RX SSB IF amp. input
W6	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 ALC/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
	1	SB	+13.8V input
	2	GND	GND
W7	1	RIT	RIT output
	2	IFS	IF SHIFT output
	3	VRE	Control unit +8V
	4	SM	S-meter input voltage
CN5	1	GND	GND
	2	LAMP	Pilot lamp voltage
	3	LAMP	Pilot lamp GND
<b>RF UNIT (X44-3060-XX) (A/2) : 144MHz</b>			
CN1	14RA	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)

## TERMINAL FUNCTIONS

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)
<b>RF UNIT (X44-3060-XX) (B/2) : 430MHz</b>			
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)
<b>RF UNIT (X44-3070-00) : 1.2GHz</b>			
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)
<b>FINAL UNIT (X45-3150-00) : 1.2GHz</b>			
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
<b>FINAL UNIT (X45-3160-00) : 144MHz</b>			
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)

## TERMINAL FUNCTIONS

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
<b>FINAL UNIT (X45-3170-00) : 430MHz</b>			
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
<b>IF UNIT (X48-3050-XX)</b>			
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

Connector No.	Terminal No.	Terminal Name	Terminal Function
CN5		RCA	ACC3 (RCA)
CN6 (ACC1)	1	DGD	Personal 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)
		EXT. S	Connect the SUB EXT. SP jack
CN19		EXT. M	Connect the MAIN EXT. SP jack
CN20			

## TERMINAL FUNCTIONS

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 discri output signal
	20	DL1	CE break-in delay ref. voltage
	21	NC	Not used
	22	SDIS	SUB ALT discri 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
	2	IN	
	3	5C	MAIN CTCSS
	4	GND	
	5	DET	
	6	CTD	
	7	CTS	
CN41	1	CTC	Clock output
	2	RD	Tone detect AF output
	3	5C	+5V voltage output
	4	GND	to MAIN CTCSS
	5	DET	
	6	CTD	
	7	CTS	"H" level when tone detected
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

## TERMINAL FUNCTIONS

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	MN BG	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" Not used
	13	NC	
	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 of 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
<b>PLL UNIT (X50-3080-00) (B/2) : 430MHz</b>			
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

## TERMINAL FUNCTIONS

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
	2	SCK	Voice data clock } Option

Connector No.	Terminal No.	Terminal Name	Terminal Function
CN5	3	BSY	Utterance BUSY signal "H" : Utterance
	4	STR	Utterance start signal "H" : Start
	5	5C	DC power supply (+5V)
	6	GND	GND
CN6	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
	6	FLE	LCD indicator data output
	7	FBY	SUB CPU data enable signal for FL tube
	8	RES	Data BUSY signal for FL tube
	9	GND	SUB CPU reset signal for FL tube
	10	GND	"L" : Reset
	11	NC	GND
	12	LCK	GND
	13	MBL	Not used
	14	SBL	LCD indicator data clock
CN7	1	43W2	MAIN BUSY LED output
	2	43W1	SUB BUSY LED output
	3	14W	430MHz wide band signal (360MHz)
	4	14S	430MHz wide band signal (900MHz)
	5	14M	144MHz wide band signal
	6	43S	144MHz SUB band signal
	7	43M	430MHz MAIN band signal
	8	12S	430MHz SUB band signal
	9	12M	1.2GHz MAIN band signal
	10	CSS	1.2GHz SUB band signal
	11	CTX	STBY input "L" : SEND, "H" : REC
	12	CRX	TX indication "H" : TTL level when TX
	13	MABK	RX indication "H" : TTL level when RX
	14	MCT	MAIN AF blanking "H" : Blanking
	15	VDT	MAIN CTCSS ON/OFF "H" : CTCSS on
	16	VCK	CTCSS (TSU-5) data
	17	MEN	CTCSS (TSU-5) clock
	18	MBC	MAIN CTCSS (TSU-5) enable
	19	MBL	MAIN BUSY control "H" : BUSY
	20	MRBK	MAIN BUSY LED
	21	MCNB	MAIN RF blanking "L" : Blanking
	22	MCWB	MAIN CW-N mode signal
	23	MSSB	MAIN CW mode signal
	24	MFMB	MAIN SSB mode signal
	25	CKY	MAIN FM mode signal
	26	GND	Keying input "L" : Keying
CN8	1	GND	GND
	2	S7	Key matrix select output
	3	S6	"L" : Select
	4	S5	
	5	S4	
	6	K3	
	7	K2	
	8	K1	
	9	K0	
	10	S3	
	11	S2	
	12	S1	
	13	S0	
	14	MD	Key matrix input
	15	MU	
	16	GND	

# TS-790A/E

## 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