144/430 MHz, FM MULTI BANDER

TM-742 A/E

144/430/1200 MHz FM TRIBANDER

TM-942 A

SERVICE MANUAL

KENWOOD

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Photo is TM-942A

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TM-742 A/742 E/942 A

OVERVIEW

List of Destinations

Model	Destination	Destination code
TM-742A	North America	K
TM-742A	Canada	P
TM-742E	Europe	E
TM-742E	Europe	E2
TM-742E	Europe	E3
TM-742A	Other countries	M
TM-742A	Other countries	M2

Model	Destination	Destination code
TM-942A	North America	K
TM-942A	Canada	P
TM-942A	Other countries	M

Units for Each Model and Destination

Unit Name	Parts. No.	TM-742A/E							TM-942A			Band Units			
												UT-28S	UT-50S	UT-220S	UT-1200
		K	P	E	E2	E3	M	M2	K	P	M	M (50)	M (50)	K (50)	M (10)
Control Unit	X53-3460-11	o	o						o	o					
Control Unit	X53-3460-21						o				o				
Control Unit	X53-3460-22							o							
Control Unit	X53-3462-71			o		o									
Control Unit	X53-3462-72				o										
Display Unit	X54-3130-11	o	o	o	o	o	o	o	o	o	o				
28TX-RX	X57-3790-01											o			
50TX-RX	X57-3800-01												o		
144TX-RX	X57-3580-11								o	o	o				
144TX-RX	X57-3580-12	o	o	o	o	o	o	o							
220TX-RX	X57-3810-10													o	
440TX-RX	X57-3590-12	o	o								o				
430TX-RX	X57-3590-22						o	o							
430TX-RX	X57-3592-72			o	o	o			o	o					
1200TX-RX	X57-3600-11								o	o	o				o

BAND UNITS

Any of the following optional band units may be installed in the TM-742A/742E.
The same instructions apply for the Tri-Bander as for the Dual-bander.

	OPTIONAL BAND UNIT
TM-742A U.S.A. Version	UT-28S UT-50S UT-220S UT-1200
TM-742A	UT-28S UT-50S UT-1200
TM-742E	UT-28S UT-50S UT-1200

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ASB-1042

Service Bulletin

Amateur Radio Division

Subject: TM-642/742/942A Microprocessor Change **Date:** March 28, 1994

This bulletin supercedes ASB-1033.

Symptom:

Reports of problems with microprocessor lock-up when using S-meter squelch, problems with storage/recall of PL tone frequencies of 203.5 Hz. and/or 114.8 Hz., or problems with a lack of transmit on the UHF band modules during Remote operation can be corrected using the changes noted in this bulletin.

Notes:

1. All TM-642A transceivers work fine and do not require any changes.
2. TM-742/942's that exhibit any of these symptoms with serial numbers between 412XXXX and 509XXXX need only change IC1 on X53-3460-21 B/2.
3. TM-742/942's that exhibit any of these symptoms with serial numbers of 412XXXX and below must also change IC1 on X54-3130-11.
4. TM-742's with serial numbers of 509XXXX and greater have had these changes incorporated in production.
5. Some TM-742's and TM-942's below serial number 509XXXX have been returned to Japan for modification and have been placed back into "A Stock". If the unit that you have has a black dot on the box near the serial number it has already been modified and requires no further action.

Parts Required:

Qty	Description	Old Part No.	New Part No.	Circuit Description
1	Microprocessor	HD6433388A07F		
		or		
		HD6433388A14F	HD6433388A22F	IC1
1	Microprocessor	HD404719A26H	HD404719A32H	IC1

Caution: *This modification requires advanced surface mount soldering equipment that is rated for CMOS circuits. It also requires familiarity with advanced surface mount soldering techniques. If you do not have the proper equipment or knowledge do not attempt this modification yourself. Attempting to remove and replace either IC without the proper equipment and techniques can easiy damage the circuit boards and void your warranty. Seek qualified assistance from your closest Kenwood Service Center (Long Beach, CA, or Virginia Beach, VA).*

Time required for this modification is 90 minutes or less. **Service code A:**98 **B:**X53-346 B/2 **C:**IC1 **D:**91

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ASB-1040

Service Bulletin

Amateur Radio Division

Subject: TM-642/742/942A Microprocessor Change **Date:** February 10, 1994

Symptom:

Due to a recent rule change by the FCC it is no longer possible to supply transceviers, or provide replacement microprocessors that would allow a transceiver to receive in the 800 MHz band.

Corrective Action:

The microprocessor program of IC5 has been modified to prevent 800 MHz band reception. Production has been changed beginning with serial number lot 510XXXX. Units produced after this point will not be capable of 800 MHz reception.

Parts Required:

Qty	Description	Old Kenwood Part No.	New Kenwood Part No.
1	Microprocessor	HD6433388A22F	HD6433388A25F

Procedure:

When ordering a replacement microprocessor you will be supplied with the new version. Please make sure your customer understands the limitations of this new microprocessor.

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ASB-1033

Service Bulletin

Amateur Radio Division

Subject: TM-742/942A Microprocessor Change **Date:** November 29, 1993

Symptom:

Reports of problems with microprocessor lock-up when using S-meter squelch, problems with storage/recall of PL tone frequencies of 203.5 Hz. and/or 114.8 Hz., or problems with a lack of transmit on the UHF band modules during Remote operation can be corrected using the changes noted in this bulletin. Units that exhibit any of these symptoms with serial numbers between 412XXXX and 507XXXX need only change IC1 on X53-3460-21 B/2. Units that exhibit any of these symptoms with serial numbers of 412XXXX and below must also change IC1 on X54-3130-11. Units with serial numbers of 507XXXX and greater have had these changes incorporated in production.

Parts Required:

Qty	Description	Old Part No.	New Part No.	Circuit Description
1	Microprocessor	HD6433388A07F		
		or		
		HD6433388A14F	HD6433388A22F	IC1
1	Microprocessor	HD404719A26H	HD404719A32H	IC1

Caution: *This modification requires advanced surface mount soldering equipment that is rated for CMOS circuits. It also requires familiarity with advanced surface mount soldering techniques. If you do not have the proper equipment or knowledge do not attempt this modification yourself. Attempting to remove and replace either IC without the proper equipment and techniques can easiy damage the circuit boards and void your warranty. Seek qualified assistance from your closest Kenwood Service Center (Long Beach, CA, or Virginia Beach, VA).*

Time required for this modification is 90 minutes or less. **Service code A:**98 **B:**X53-346 B/2 **C:**IC1 **D:**91

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ASB-1029

Service Bulletin

Amateur Radio Division

Subject: TM-742/942 28 MHz/50 MHz RC TX Failure **Date:** June 29, 1993

Symptom:

During RC operation (Remote Control) the 28 MHz and 50 MHz modules do not transmit after a frequency within the affected band is entered from the microphone keypad. Pressing the PTT key will cause a beep to be sounded but the radio will not transmit. This error is a result of a programming error in two of the microprocessors.

Corrective Action:

Replace IC1 on the Control Unit X53-3460 B/2 and IC1 on the Display Unit X54-3130 A/3 to correct this symptom.

Parts Required:

Qty	Description	Kenwood Part No.	Circuit Description
1	Control Unit microprocessor	HD6433388A07F	IC1
1	Display Unit microprocessor	HD404719A32H	IC1

Note:

To activate the RC function after changing these two parts you need only press the RC key on the front panel of the radio. This method differs from the original method which required use of the "F" key and the "RC" key.

Caution: *This modification requires soldering equipment rated for CMOS type circuits. It also requires familiarity with surface mount soldering techniques. If you do not have the proper equipment or knowledge do not attempt this modification yourself. Seek qualified assistance.*

Time required for this modification is 1.5 hours or less. Service code A:84 B:X53-3460 B/2 C:IC1 D:91

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ATB-0004

Technical Bulletin

Amateur Radio Division

Subject: TM-742/942 Squelch Popping Noise **Date:** May 24, 1993

Control Unit (X53-3460 A/2)
Foil Side View

Control Unit (X53-3460 A/2)

Caution: *This modification requires soldering equipment rated for CMOS type circuits. It also requires familiarity with surface mount soldering techniques. If you do not have the proper equipment or knowledge do not attempt this modification yourself. Seek qualified assistance.*

Time required for this modification is 1 hour or less.

Service code A:09 B:X53-3460 A/2 C:ADD R D:91

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KENWOOD

ATB-0004

Technical Bulletin

Amateur Radio Division

Subject: TM-742/942 Squelch Popping Noise **Date:** May 24, 1993

Symptom:

Several TM-742/942 owners have complained of a popping noise when the squelch opens or closes, even when the volume is turned down.

Technician's Notes/Suggestions:

We have found that the following changes will reduce or eliminate this noise.

Parts Required:

Qty	Description	Kenwood Part No.	Circuit Description
3	470 K ohm Chip resistor.	RK73FB2A474J	R152, 153, 154
3	1 uF Chip capacitor	CK73FF1C105Z	NA

Procedure:

1. Carefully unsolder pins 4, 14, and 15 of IC-106 on the foil side of the Control Unit (X53-3460 A/2).
2. Gently lift up on the unsoldered pins of the IC and place a 1 uF chip capacitor as shown in the accompanying diagrams.
3. Solder the capacitors to the foil and to the pins of the IC.
   Note: If you do not have enough room to install the capacitors on pins 14 and 15 you will need to cut the circuit foil and install the capacitors in the alternate positions indicated in the diagram.
4. Install resistors R154 and R153 as shown.
5. Install resistor R152 on the component side of the board as shown in the diagram.

Caution: *This modification requires soldering equipment rated for CMOS type circuits. It also requires familiarity with surface mount soldering techniques. If you do not have the proper equipment or knowledge do not attempt this modification yourself. Seek qualified assistance.*

Time required for this modification is 1 hour or less. **Service code A:09 B:X53-3460 A/2 C:ADD R D:91**

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ASI-0002

Supplementary Info.

Amateur Radio Division

Subject: TM-742/942 Beyond Mars/CAP Mod. Guide **Date:** March 3, 1993

This modification is provided "as is," and is subject to change without notice. Kenwood U.S.A. Corporation makes no warranty of any kind with regard to this modification procedure, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Kenwood U.S.A. Corporation shall not be liable for any error or for incidental or consequential damage in connection with the furnishing, performance, or use of this modification procedure.

Procedure:

1. Detach the front panel from the main chassis.
2. Remove the bottom cover of the transcevier by removing the 4 screws on the bottom of the cover and loosening the 4 screws on the sides of the unit.
3. Orient the radio so the bottom is up and the front panel area is near your chest. Near the front panel area you will find a large board, this is the Control Unit.
4. Remove the chip resistors noted in the diagram below, and reinstall them as shown.

5. Reinstall the bottom cover of the transceiver, and reattach the front panel.
6. Reset the microprocessor. Press and hold the MR key while the power is switched on. Then release the MR key. This will erase all operator programmed data!
7. The frequency range after modification will be:

28 MHz Band:	RX:	18.0 thru 54.0 MHz
	TX:	26.0 thru 45.0 MHz
50 MHz Band:	RX:	40.0 thru 90.0 MHz
	TX:	46.0 thru 76.0 MHz
144 MHz Band:	TX:	136.0 thru 174.0 MHz.
220 MHz Band:	RX:	215.0 thru 260.0 MHz.
	TX:	215 .0thru 235.0 MHz.
440 MHz Band:	TX:	410.0 thru 470.0 MHz.
1.2 GHz Band:	RX/TX:	1100.0 thru 1400.0 MHz.

Please note that these are theoretical ranges only. Not all radio's will be capable of tuning the entire range.

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ASI-0001

Supplementary Info.

Amateur Radio Division

Subject: TM-742/942 Mars/CAP Modification Guide **Date:** February 23, 1993

This modification is provided "as is," and is subject to change without notice. Kenwood U.S.A. Corporation makes no warranty of any kind with regard to this modification procedure, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Kenwood U.S.A. Corporation shall not be liable for any error or for incidental or consequential damage in connection with the furnishing, performance, or use of this modification procedure.

Procedure:

1. Detach the front panel from the main chassis.
2. Remove the bottom cover of the transcevier by removing the 4 screws on the bottom of the cover and loosening the 4 screws on the sides of the unit.
3. Orient the radio so the bottom is up and the front panel area is near your chest. Near the front panel area you will find a large board, this is the Control Unit.
4. Remove the chip resistor noted in the diagram below, and reinstall it as shown.

5. Reinstall the bottom cover of the transceiver, and reattach the front panel.
6. Reset the microprocessor. Press and hold the MR key while the power is switched on. Then release the MR key. This will erase all operator programmed data!
7. The frequency range after modification will be:

144 MHz Band

RX: Unchanged 118 MHz thru 174 MHz.

TX: 142.000 MHz thru 152.000 MHz.

All other band modules will remain unchanged with this modification.

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CIRCUIT DESCRIPTION

UT-28S

28 TX-RX Unit Frequency Configuration

The 28 MHz unit incorporates a variable frequency oscillator (VFO), based on a phase-locked-loop (PLL) synthesizer system, that allows a channel step of 5, 10, 15, 20, or 25 kHz to be selected. The frequency in the receive signal channel is mixed with a first local oscillation frequency of 36.83-38.525 MHz to produce a first intermediate frequency (IF) of 8.83 MHz.

This frequency is then mixed with a second local oscillation frequency of 9.285 MHz to produce a second IF of 455 kHz. This is called a double-conversion system. The signal in the transmission channel is produced by direct oscillation, is frequency-divided by a PLL circuit, amplified by a linear amplifier, then transmitted.

Fig. 1 Frequency configuration

28 TX-RX Unit Receive Signal Channel

- **Outline**

The received signal from the antenna passes through a low-pass filter in the final transmission stage and then through a transmission/reception selection diode switch to the receiving front end. The signal then passes through an antenna matching coil and is amplified to high frequencies by a MOS field-effect transistor. The unwanted components of the signal are eliminated by a bandpass filter consisting of a three-stage variable capacitor. The resulting signal goes to the first mixer, is mixed with the first local signal from the PLL circuit, then converted to the first IF of 8.83 MHz. The unwanted near-by signal components are then eliminated by a two-stage MCF.

The first IF signal is amplified and input to FM IF HIC IC6 (KCD04). This signal is then mixed with the second local oscillation frequency of 9.285 MHz to produce the second IF signal of 455 kHz. The unwanted near-by signal components are then eliminated by an FM ceramic filter. The resulting signal is input to IC6 again, amplified to the second IF signal, and detected to produce an audio signal.

- **Signal-strength meter**

The signal-strength meter output voltage of FM IF HIC IC6 (KCD04) is supplied to the control unit.

Item	Rating
Center frequency (fo)	8830 kHz
Pass bandwidth	± 6 kHz or more at 3 dB
Attenuation bandwidth	± 20 kHz or less at 40 dB ±40 kHz or less at 60 dB
Guaranteed attenuation	70 dB or more within Fo ± 1 MHz (Spurious: 40 dB or more)
Ripple	1 dB or less
Insertion loss	2 dB or less
Terminating impedance	4.7 kΩ//0pF

Table 1 MCF (L71-0422-05) (28TX-RX unit XF1)

Item	Rating
Nominal center frequency	455KHz
6 dB bandwidth	± 6 kHz or more (from 455 kHz)
50 dB bandwidth	± 12.5 kHz or less (from 455 kHz)
Ripple (within ± 5 kHz of 455 kHz	3 dB or less
Insertion loss (at maximum output point)	6 dB or less
Guaranteed attenuation (within ± 100 kHz of 455 kHz)	35 dB or more
I/O matcing impedance	2.0kΩ

Table 2 Ceramic filter CFWM455F (L72-0372-05) (28TX-RX unit CF1)

CIRCUIT DESCRIPTION

- **Shift-register circuit**
  The ES, CK, and DT serial data from the control unit are sent to C1 (BU4094BF) to perform the control operation outlined in the following table:

Pin No.	Name	Function	Pin No.	Name	Function
1	Strobe	Enable input	9	Qs	
2	Data	Serial data input	10	Q's	
3	Clock	Clock input	11	Q8	TX/RX selection. High when TX is set.
4	Q1	TX/RX selection. Low when TX is set	12	Q7	ATT switching: High when ATT is on
5	Q2	TX power selection. Low when middle and low. "H" when high.	13	Q6	High for AM; low for FM; High for narrow; low for wide
6	Q3	TX power selection. Low when high and low. "H" when middle.	14	Q5	High when off band
7	Q4	Low when off band	15	OE	8V
8	Vss	GND	16	VDD	8V

Table 3

- **ATT circuit**
  If there is cross modulation, the ATT circuit operates to attenuate the received signal before it enters Q2 (FET for high-frequency amplification).

28 TX-RX Unit Transmit Signal Channel

- **Outline**
  In the transmission channel, the desired frequency is produced by direct oscillation, and is directly frequency modulated by means of a varicap diode.

- **Modulator circuit**
  The audio signal from the control unit is input to microphone amplifier HIC IC3 (KCA04). IC4 consists of a preemphasis circuit, amplifier, limiter, and splatter circuit that eliminates unwanted high-frequency components. The voltage-controlled oscillator (VFO) signal is directly frequency modulated by means of a varicap diode in the frequency modulator circuit.

- **Younger-stage circuit**
  The signal output from the VCO is input to drive circuit HIC IC16 (KCB16). The amplifier can obtain a stable drive output without adjustment because it has a large bandwidth. An APC circuit controls the collector voltage in the Younger final stage.

- **Power amplifier circuit**
  The drive signal is amplified to the specified level by a discrete transistor. Q2 performs class B amplification, and the collector output voltage is controlled by an APC circuit. Q202 amplifies the power by class C operation, improving the efficiency of the final stage.

Fig. 2 Power amplifier circuit

CIRCUIT DESCRIPTION

- **APC circuit**

The automatic transmission output control circuit (APC) detects and partially amplifies the power amplifier output with a diode, and controls the output control voltage. The control voltage is output in inverse proportion to the output, so the control voltage output is always constant. To protect the radio against excessive temperature rise, the high-power unit has a thermal switch. The high-power unit is automatically set to a low power by the thermal switch if it exceeds the specified temperature.

- **8T (8 V during transmission) and unlock signal**

The signal output from pin 4 of IC1 is high during reception, Q13 is turned on, and Q14 and Q11 are turned off. No voltage appears at the collector (8T) of Q11. Serial data is output from the control unit during transmission and input to shift register IC1. Pin 4 of IC1 is then made low. Therefore, Q13 is turned off, and 14 and Q11 are turned on. An 8 V voltage is applied to the collector (8T) of Q11.

If the PLL circuit is unlocked during transmission, the LD pin goes low, Q24 is turned off, Q13 is turned on, Q14 is turned off, Q11 for 8T switching control is turned off, and the 8T line does not operate.

Fig. 3

28 TX-RX Unit PLL Synthesizer

The VCO and PLL circuits are housed in a solid shielding case as a hybrid integrated circuit. Comparison frequencies are produced by dividing a 9.285 MHz reference oscillation frequency by 1857 to correspond to the 5, 10, 15, 20, and 25 kHz channel steps.

For 28 MHz, the relationship between f_{VCO} (RX) and each frequency division ratio is given by

$f_{VCO} = (28+8.83)=\{(nx64)+A\}xf_{osc}/R$

Where: f_{VCO}=VCO output frequency

n: Binary 10-bit programmable counter setting value

A: Binary 6-bit programmable counter setting value

f_{osc}: Reference oscillation frequency of 9.285 MHz

R: Binary 16-bit programmable counter setting value 1857

In this case, n is 155, and A is 6.

Fig. 4

Therefore, $f_{VCO}=\{(115x64)+6\}x9285/1857$
$=(7360+6)x5$
$=36.83$ MHz

The following table lists the pin functions of the PLL circuit:

Pin name	Function	Pin name	Function
5C	5V	MO	Modulation signal input
LD	Lock signal (2 V during locking)	9c	9v
NC	Unused	8CL	8 V (ripple filter)
XI XO	9.285 MHz crystal oscillation	ST	8 V during transmission; 0 V during reception
		CV	Lock voltage output
DP	Data input	E	GND
CP	Clock input	HT	HET output
EP	Enable input		

Table 4 PLL circuit pin functions

CIRCUIT DESCRIPTION

UT-50S

50 TX-RX Unit Frequency Configuration

The 50 MHz unit incorporates a variable frequency oscillator (VFO), based on a phase-locked-loop (PLL) synthesizer system, that allows a channel step of 5, 10, 15, 20, or 25 kHz to be selected. The frequency in the receive signal channel is mixed with a first local oscillation frequency of 60.595-64.590 MHz to produce a first intermediate frequency (IF) of 10.595 MHz. This frequency is then mixed with a second local oscillation frequency of 11.05 MHz to produce a second IF of 455 kHz. This is called a double-conversion system. The signal in the transmission channel is produced by direct oscillation, and is frequency-divided by a PLL circuit, amplified by a linear amplifier, then transmitted.

Fig. 5 Frequency Configuration

50 TX-RX Unit Receive Signal Channel

- **Outline**

The received signal by the antenna passes through a low-pass filter in the final transmission stage and then through a transmission/reception selection diode switch to the receiving front end. The signal then passes through an antenna matching coil and is amplified to high frequencies by a GaAs (gallium arsenide) field-effect transistor. The unwanted components of the signal are eliminated by a bandpass filter consisting of a three-stage variable capacitor. The resulting signal goes to the first mixer, is mixed with the first local signal from the PLL circuit, then converted to the first IF of 10.595 MHz. The unwanted near-by signal components are then eliminated by a two-stage MCF.

The first IF signal is amplified and input to FM IF HIC IC6 (KCD04). This signal is then mixed with the second local oscillation frequency of 11.05 MHz to produce the second IF signal of 455 kHz. The unwanted near-by signal components are then eliminated by an FM ceramic filter. The resulting signal is input to IC6 again, amplified to the second IF signal, and detected to produce an audio signal.

Item	Rating
Center frequency	10.595 MHz
Pass bandwidth	±6.5 kHz or more at 3 dB
Attenuation bandwidth	±23 kHz or less at 40 dB ±40 kHz or less at 60 dB
Guaranteed attenuation	70 dB or more within Fo ±1 MHz (Spurious: 40 dB or more)
Ripple	1 dB or less
Insertion loss	1.5 dB or less
Terminating impedance	2.9 kΩ//0pF

Table 5 MCF (L71-0421-05) (50TX-RX unit XF1)

Item	Rating
Nominal center frequency	455KHz
6 dB bandwidth	±6.0 kHz or more (from 455 kHz)
50 dB bandwidth	±12.5 kHz or less (from 455 kHz)
Ripple (within ±5 kHz of 3455 kHz)	3 dB or less
Insertion loss (at maximum output point)	6 dB or less
Guaranteed attenuation (within ±100 kHz of 455 kHz)	35 dB or more
Terminating impedance	2.0 kΩ

Table 6 Ceramic filter CFWM455F (L72-0372-05) (50TX-RX unit CF1)

CIRCUIT DESCRIPTION

- **Signal-strength meter**

The signal-strength meter output voltage of FM IF HIC IC6 (KCD04) is supplied to the control unit.

- **Shift-register circuit**

The ES, CK, and DT serial data from the control unit are sent to IC1 (BU4094BF) to perform the control operation outlined in the following table:

Pin No.	Name	Function	Pin No.	Name	Function
1	Strobe	Enable input	9	Qs	
2	Data	Serial data input	10	Q's	
3	Clock	Clock input	11	Q8	TX/RX selection. High when TX is set.
4	Q1	TX/RX selection. Low when TX is set	12	Q7	ATT switching: High when ATT is on
5	Q2	TX power selection. Low when middle and low. "H" when high.	13	Q6	High for AM; low for FM
6	Q3	TX power selection. Low when high and low. "H" when middle.	14	Q5	High when off band
7	Q4	Low when off band	15	OE	8V
8	Vss	GND	16	VDD	8V

Table 7

- **ATT circuit**

If there is cross modulation, the ATT circuit operates to attenuate the received signal before it enters Q2 (FET for high-frequency amplification).

50 TX-RX Unit Transmit Signal Channel

- **Outline**

In the transmission channel, the desired frequency is produced by direct oscillation, and is directly frequency modulated by means of a varicap diode.

- **Modulator circuit**

The audio signal from the control unit is input to microphone amplifier HIC IC3 (KCA04). IC4 consists of a preemphasis circuit, amplifier, limiter, and splatter circuit that eliminates unwanted high-frequency components. The voltage-controlled oscillator (VFO) signal is directly frequency modulated by means of a varicap diode in the frequency modulator circuit.

- **Younger-stage circuit**

The signal output from the VCO is input to drive circuit HIC IC4 (KCB18). The amplifier can obtain a stable drive output without adjustment because it has a large bandwidth. An APC circuit controls the collector voltage in the Younger final stage.

- **Power amplifier circuit**

The drive signal is amplified to the specified level by a discrete transistor. Q201 performs class B amplification, and the collector output voltage is controlled by an APC circuit. Q202 amplifies the power by class C operation, improving the efficiency of the final stage.

Fig. 6 Power amplifier circuit

CIRCUIT DESCRIPTION

- **APC circuit**

The automatic transmission output control circuit (APC) detects and partially amplifies the power amplifier output with a diode, and controls the output control voltage. The control voltage is output in inverse proportion to the output, so the control voltage output is always constant. To protect the radio against excessive temperature rise, the high-power unit has a thermal switch. The high-power unit is automatically set to a low power by the thermal switch if it exceeds the specified temperature.

- **LPF circuit**

The low-pass filter sets the pole to the second and third harmonics, and cuts the frequency, by having the polar Chebyshev characteristics. To cut high frequencies, a filter with Chebyshev characteristics is used before the antenna.

Fig. 7 LPF Circuit

- **8T (8 V during transmission) and unlock signal**

The signal output from pin 4 of IC1 is high during reception, Q13 is turned on, and Q14 and Q11 are turned off. No voltage appears at the collector (8T) of Q11. Serial data is output from the control unit during transmission and input to shift register IC1. Pin 4 of IC1 is then made low. Therefore, Q13 is turned off, Q14 and Q11 are turned on. An 8 V voltage is applied to the collector (8T) of Q11.

If the PLL circuit is unlocked during transmission, the LD pin goes low, Q24 is turned off, Q13 is turned on, Q14 is turned off, Q11 for 8T switching control is turned off, and the 8T line does not operate.

Fig. 8

CIRCUIT DESCRIPTION

- **50 TX-RX Unit PLL Synthesizer**

The VCO and PLL circuits are housed in a solid shielding case as a hybrid integrated circuit. Comparison frequencies are produced by dividing a 11.05 MHz reference oscillation frequency by 2210 to correspond to the 5, 10, 15, 20, and 25 kHz channel steps.

For 50 MHz, the relationship between f_{VCO} (RX) and each frequency division ratio is given by

$f_{VCO}=(50+10.595)=\{(nx64)+A\}xf_{osc}/R$

Where: f_{VCO}=VCO output frequency

n: Binary 10-bit programmable counter setting value

Fig. 9

A: Binary 6-bit programmable counter setting value

f_{osc}: Reference oscillation frequency of 11.05 MHz

R: Binary 16-bit programmable counter setting value

In this case, n is 189, and A is 23.

Therefore, f_{VCO} ={(189x64)+23}x11050/2210

=(12096+23)x5

= 60.595 MHz

The following table lists the pin functions of the PLL circuit:

Pin name	Function	Pin name	Function
5C	5V	MO	Modulation signal input
LD	Lock signal (2 V during locking)	9C	9V
NC	Unused	8CL	8 V (ripple filter)
XI XO	11.05 MHz crystal oscillation	ST	8 V during transmission; 0 V during reception
	Data input	CV	Lock voltage output
DP	Clock input	E	GND
CP	Enable input	HT	HET output
EP			

Table 8 PLL circuit pin functions

CIRCUIT DESCRIPTION

144 TX-RX Unit Frequency Configuration

The 144 MHz unit incorporates a digital variable-frequency oscillator (VFO) that can freely select a channel step of 5, 10, 12.5, 15, 20, or 25 kHz with a Phase-Locked-Loop (PLL) synthesizer system.

The frequency in the receive signal channel is mixed with a first local oscillation frequency of 133.300-137.295 MHz to produce a first intermediate frequency of 10.7 MHz. This frequency is then mixed with a second local oscillation frequency of 10.245 MHz to produce a second intermediate frequency of 455 kHz. This is called a double-conversion system.

The signal in the transmission channel is directly oscillated and frequency-divided by a PLL circuit, amplified by a straight amplifier, then transmitted.

Fig. 10 Frequency configuration

144 TX-RX Unit Receive Signal Channel

- **Outline**

For the 144 MHz unit,the received signal from an antenna is passed through a low-pass filter in the final transmission stage and sent through a transmission/reception selection diode switch to the receiving front end. The signal is then passed through an antenna matching coil and amplified to high frequencies by a GaAs (gallium arsenide) field-effect transistor. The unwanted components of the signal are eliminated by a bandpass filter consisting of a three-stage variable capacitor. The resultant signal is sent to the first mixer, mixed with the first local signal from a PLL circuit, then converted to a first intermediate frequency of 10.7 MHz. The unwanted near-by signal components are then eliminated by a two-stage MCF.

Item	Rating
Nominal center frequency (fo)	10.7MHz
Pass band width	±7.5kHz or less at 3dB
Attenuation band width	±25kHz or less at 40dB ±45kHz or less at 60dB
Ripple	1.0dB or less
Insertion loss	1.5dB or less
Guaranteed attenuation	70dB or more within ±1MHz (Spurious : 40dB or more at fo – fo + 500kHz) 80dB or more at fo – (900 – 920kHz)
Terminating impedance	3kΩ/0pF

Table 9 MCF (L71-0228-05) (144 TX-RX unit XF1)

Item	Rating
Nominal center frequency	455kHz ± 1kHz
6dB bandwidth	±6kHz or more (from 455kHz)
50dB bandwidth	±12.5kHz or less (from 455kHz)
Ripple (within ±4kHz of 455kHz)	3dB or less
Insertion loss	6dB or less
Guaranteed attenuation (within ±100kHz of 455kHz)	35dB or more
I/O matching impedance	2.0kΩ

Table 10 Ceramic filter CFWM455F (L72-0372-05) (144 TX-RX unit CF1)

CIRCUIT DESCRIPTION

144 TX-RX Unit Transmit Signal Channel

- **Outline**

In the transmission channel, the desired frequency is directly oscillated and directly frequency modulated by means of a varicap diode.

- **Modulator circuit**

The audio signal from the control unit is input to microphone amplifier HIC IC7 (KCA04). IC4 consists of a preemphasis circuit, amplifier, limiter, and splatter circuit that eliminate unwanted high-frequency components. The voltage-controlled oscillator (VCO) signal is directly frequency modulated by means of a varicap diode in the frequency modulator circuit.

- **Younger-stage circuit**

The signal output from the VCO is input to drive circuit HIC IC8 (KCB11). The amplifier can obtain a stable drive output without adjustment because it has a wide band. An APC circuit controls the collector voltage in the younger final stage.

- **Power amplifier circuit**

A drive signal is input to power module IC10 and amplified to the specified level.

- **APC circuit**

The automatic transmission output control circuit (APC) detects and partially amplifies the power module output with a diode and controls the output control voltage. The control voltage is output in inverse proportion to the output, so the control voltage output is always constant. To protect the set against excessive temperature rise, the high-power unit has a thermal switch. The high-power unit is automatically set to a low power by the thermal switch when it exceeds the specified temperature.

144 TX-RX Unit PLL Synthesizer

The VCO and PLL circuit are housed in a solid shielding case as a hybrid integrated circuit. Comparison frequencies of 6.25 kHz and 5 kHz are produced by dividing a 12.8 MHz reference oscillation frequency by 2048 and 2560 to correspond to 5, 10, 12.5, 15, 20, and 25 kHz channel steps.

For 144 MHz, the relationship between f_{VCO} (Rx) and each frequency division ratio is given by

$f_{VCO}=(144 - 10.7)= \{(n \times 128) + A\} \times f_{OSC} \div R$

Where: f_{VCO}= VCO output frequency

n : Binary 10-bit programmable counter setting value

A : Binary 7-bit programmable counter setting value

f_{OSC}: Reference oscillation frequency of 12.8 MHz

Fig. 12 IC11 KCH05

R: Binary 14-bit programmable counter setting value 2048

In this case, n is 208, and A is 36.

Therefore, $f_{VCO}= \{(208 \times 128) + 36\} \times 12800 / 2560$

$= \{26624 + 37\} \times 5$

$= 133300$ kHz = 133.300 MHz

The following table lists the pin functions of the PLL circuit:

Pin name	Function	Pin name	Function
5C	5V	MO	Modulation signal input
LD	Lock signal (on during lock)	10C	10V
NC	Unused	8CL	8V (ripple filter)
XI	12.8 MHz crystal oscillation	NC	Unused
XO		CV	Lock voltage output
DP	Data input	E	GND
CP	Clock input	HT	HET output
EP	Enable input		

Table 12

CIRCUIT DESCRIPTION

- **8T (8 V during transmission) and unlock signal**

A 0.7 V voltage is applied to the base of Q13 during reception, Q13 is set on, Q14 is set off, and Q11 is set off. No voltage appears at the collector (8T) of Q11. Serial data is output from the control unit during transmission and input to shift register IC1. Pin 4 of IC1 is then set low. Therefore, Q13 is changed from on to off, Q14 from off to on, and Q11 from off to on. An 8 V voltage is applied to the collector (8T) of Q11.

An unlock circuit is activated only during transmission. The LD signal output from the PLL circuit is ORed with the signal at pin 4 of IC1 using D11 as shown in the figure, so the LD signal is set high during unlock. Therefore, no voltage appears at the collector (8T) of Q11 and no transmission wave is output to the reception state.

Fig. 13

UT-220S

220 TX-RX Unit Frequency Configuration

The 220 MHz unit incorporates a variable frequency oscillator (VFO), based on a phase-locked-loop (PLL) synthesizer system, that allows a channel step of 5, 10, 12.5, 15, 20, or 25 kHz to be selected. The frequency in the receive signal channel is mixed with a first local oscillation frequency of 189.175-194.17 MHz to produce a first intermediate frequency (IF) of 30.825 MHz. This frequency is then mixed with a second local oscillation frequency of 30.37 MHz to produce a second IF of 455 kHz. This is called a double-conversion system. The signal in the transmission channel is produced by direct oscillation, and is frequency-divided by a PLL circuit, amplified by a linear amplifier, then transmitted.

Fig. 14 Frequency configuration

CIRCUIT DESCRIPTION

220 TX-RX Unit Receive Signal Channel

- **Outline**

The received signal from the antenna passes through a low-pass filter in the final transmission stage and then through a transmission/reception selection diode switch to the receiving front end. The signal then passes through an antenna matching coil and is amplified to high frequencies by a GaAs (gallium arsenide) field-effect transistor. The unwanted components of the signal are eliminated by a bandpass filter consisting of a three-stage variable capacitor. The resulting signal goes to the first mixer (GaAs field-effect transistor), is mixed with the first local signal from the PLL circuit, then converted to a first If of 30.825 MHz. The unwanted near-by signal components are then eliminated by a two-stage MCF.

The first IF signal is amplified and input to FM IF HIC IC5 (KCD04). This signal is then mixed with the second local oscillation frequency of 30.37 MHz to produce the second IF signal of 455 kHz. The unwanted near-by signal components are then eliminated by an FM ceramic filter. The resulting signal is input to IC5 again, amplified to the second IF signal, and detected to produce an audio signal.

Item	Rating
Center frequency (fo)	30,825 MHz
Pass bandwidth	± 7.5 kHz or more at 3 dB
Attenuation bandwidth	± 28 kHz or less at 40 dB
Guaranteed attenuation	60 dB or more within Fo ± 1 MHz (Spurious: 40 dB or more)
Ripple	1.5 dB or less
Insertion loss	3 dB or less
Terminating impedance	4.7 kΩ//0pF

Table 13 MCF (L71-0420-05) (220 TX-RX unit XF1)

Item	Rating
Nominal center frequency	455KHz
6 dB bandwidth	± 6 kHz or more (from 455 kHz)
50 dB bandwidth	± 12.5 kHz or less (from 455 kHz)
Ripple (within ± 5 kHz of 455 kHz)	3 dB or less
Insertion loss (at maximum output point)	6 dB or less
Guaranteed attenuation (within ± 100 kHz of 455 kHz)	35 dB or more
I/O matcing impedance	2.0kΩ

Table 14 Ceramic filter CFWM455F (L72-0372-05) (220TX-RX unit CF1)

- **Signal-strength meter**

The signal-strength meter output voltage of FM IF HIC IC5 (KCD04) is supplied to the control unit.

- **Shift-register circuit**

The ES, CK, and DT serial data from the control unit are sent toIC1 (BU4094BF) to perform the control operation outlined in the following table:

Pin No.	Name	Function
1	Strobe	Enable input
2	Data	Serial data input
3	Clock	Clock input
4	Q1	TX/RX selection. Low when TX is set.
5	Q2	TX power selection. Low when middle and low. High when high.
6	Q3	TX power selection. Low when high and low. High when middle.
7	Q4	
9	Q3	
10	Q3	
11	Q8	
12	Q7	
13	Q6	
14	Q5	
15	QE	8V

Table 15

CIRCUIT DESCRIPTION

220 TX-RX Unit Transmit Signal Channel

- **Outline**

In the transmission channel, the desired frequency is produced by direct oscillation, and is directly frequency modulated by means of a varicap diode.

- **Modulator circuit**

The audio signal from the control unit is input to microphone amplifier HIC IC7 (KCA04). IC4 consists of a preemphasis circuit, amplifier, limiter, and splatter circuit that eliminates unwanted high-frequency components. The voltage-controlled oscillator (VFO) signal is directly frequency modulated by means of a varicap diode in the frequency modulator circuit.

- **Younger-stage circuit**

The signal output from the VCO is input to drive circuit HIC IC8 (KCB15). The amplifier can obtain a stable drive output without adjustment because it has a large bandwidth. An APC circuit controls the collector voltage in the Younger final stage.

- **Power amplifier circuit**

The drive signal is input to power module IC10 and amplified to the specified level.

220 TX-RX Unit PLL Synthesizer

The VCO and PLL circuits are housed in a solid shielding case as a hybrid integrated circuit. Comparison frequencies are produced by dividing a 12.8 MHz reference oscillation frequency by 2248 and 2560 to correspond to the 5, 10, 12.5, 15, 20, and 25 kHz channel steps.

For 220 MHz, the relationship between f_{VCO} (RX) and each frequency division ratio is given by

$f_{VCO}=(220+30.825)=\{(n\times128)+A\}\times f_{osc}/R$

Where: f_{VCO}=VCO output frequency

n: Binary 10-bit programmable counter setting value

A: Binary 7-bit programmable counter setting value

f_{osc}: Reference oscillation frequency of 12.8 MHz

R: Binary 10-bit programmable counter setting value 2560

In this case, n is 295, and A is 75.

Therefore, f_{VCO} $=\{(295\times128)+75\}\times12800/2560$

$=(33760+75)\times5$

$= 189.175$ MHz

The following table lists the pin functions of the PLL circuit:

- **APC circuit**

The automatic transmission output control circuit (APC) detects and partially amplifies the power amplifier output with a diode and controls the output control voltage. The control voltage is output in inverse proportion to the output, so the control voltage output is always constant.

- **8T (8 V during transmission) and unlock signal**

A 0.7 V voltage is applied to the base of Q13 during reception, Q13 is turned on, and Q14 and Q11 are turned off. No voltage appears at the collector (8T) of Q11. Serial data is output from the control unit during transmission and input to shift register IC1. Pin 4 of IC1 is then made low. Therefore, Q13 is turned off, and Q14 and Q11 are turned on. An 8 V voltage is applied to the collector (8T) of Q11.

The unlock circuit is activated only during transmission. The LD pin signal output from the PLL circuit is ORed with the signal at pin 4 of IC1 using D11, as shown in the figure, so the LD signal is made high during unlock. Therefore, no voltage appears at the collector (8T) of Q11, and no transmission signal is output during reception.

Fig. 15

Pin name	Function	Pin name	Function
5C	5V	MO	Modulation signal input
LD	Lock signal (0 V during locking)	9C	9V
NC	Unused	8CL	8 V (ripple filter)
XI XO	12.8 MHz crystal oscillation	NC	
		CV	Lock voltage output
DP	Data input	E	GND
CP	Clock input	HT	HET output
EP	Enable input		

Table 16 PLL circuit pin functions

CIRCUIT DESCRIPTION

430 TX-RX Unit Frequency Configuration

The 430 MHz unit incorporates a digital variable-frequency oscillator (VFO) that can freely select a channel step of 5, 10, 12.5, 15, 20, or 25 kHz with a PLL synthesizer system. The frequency in the receive signal channel is mixed with a first local oscillation frequency of 451.6-461.595 MHz (459.6-471.595 MHz for K-models) to produce a first intermediate frequency of 21.6 MHz. The frequency is then mixed with a second local oscillation frequency of 21.145 MHz to produce a second intermediate frequency of 455 kHz. This is called a double-conversion system.

The signal in the transmission channel is directly oscillated and frequency-divided by a PLL circuit, amplified by a straight amplifier, then transmitted.

* The alphanumeric characters enclosed in parentheses are used for K-models.

Fig. 16 Frequency Configuration

430 TX-RX Unit Receive Signal Channel

- **Outline**

A 430 MHz band antenna input signal is passed through the antenna selection diode in the final stage and sent through a front-stage antenna matching coil to the high-frequency two-stage amplifier and helical block of a GaAs (gallium arsenide) FET and junction FET. The signal is then input to the first mixer. The first mixer input signal is mixed with the first local signal from the PLL circuit and converted to a first intermediate-frequency signal of 21.6 MHz. The unwanted near-by signal components are then eliminated by a two-stage MCF.

The first intermediate-frequency signal is amplified and input to FM IF HIC IC1 (KCD04). This signal is then mixed with a second local oscillation frequency of 21.145 kHz to produce a second intermediate frequency of 455 kHz. The unwanted near-by components of the intermediate-frequency signal are eliminated by an FM ceramic filter. The intermediate-frequency signal is input to IC1 again. The second intermediate-frequency signal is amplified and detected by IC1 to produce an audio signal.

- **Signal-strength meter**

The signal-strength meter output voltage of FM IF HIC IC1 (KCD04) is supplied to the control unit.

- **Shift-register circuit**

The ES, CK, and DT serial data from the control unit are sent to IC3 (BU4094BF) to perform the control operation outlined in the following table:

Pin No.	Name	Function	Pin No.	Name	Function
1	Strobe	Enable input	9	Q_s	
2	Data	Serial data input	10	Q'_s	
3	Clock	Clock input	11	Q8	
4	Q1	TX/RX selection. "L" when TX is set	12	Q7	
5	Q2	TX power selection. "L" when middle and low. "H" when high.	13	Q6	
6	Q3	TX power selection. "L" when high and low. "H" when middle.	14	Q5	
7	Q4		15	OE	8V
8	V_{ss}	GND	16	V_{DD}	8V

Table 17

CIRCUIT DESCRIPTION

430 TX-RX Unit Transmit Signal Channel

- **Outline**

In the transmission channel, the desired frequency is directly oscillated and directly frequency modulated by means of a varicap diode.

- **Modulator circuit**

The audio signal from the control unit is input to microphone amplifier HIC IC2 (KCA04). IC4 consists of a preemphasis circuit, amplifier, limiter, and splatter circuit that eliminate unwanted high-frequency components. The VCO signal is directly frequency modulated by a varicap diode in the frequency modulator circuit.

- **Younger-stage circuit**

The signal output from the VCO is input to drive circuit HIC IC6 (KCB14). The amplifier can obtain a stable drive output without adjustment because it has a wide band. An APC circuit controls the collector voltage in the younger final stage.

- **Power amplifier circuit**

A drive signal is input to power module IC7 and amplified to the specified level.

- **APC circuit**

The automatic transmission output control circuit (APC) detects and partially amplifies the power module output with a diode and controls the output control voltage. The control voltage is output in inverse proportion to the output, so the control voltage output is always constant. To protect the set against excessive temperature rise, the high-power unit has a thermal switch. The high-power unit is automatically set to a low power by the thermal switch when it exceeds the specified temperature.

430 TX-RX Unit PLL Synthesizer

The VCO and PLL circuit are housed in a solid shielding case as a hybrid integrated circuit. Comparison frequencies of 6.25 and 5 kHz are produced by dividing a 12.8 MHz reference oscillation frequency by 2048 and 2560 to correspond to 5, 10, 12.5, 15, 20, or 25 kHz channel steps.

For 430 MHz, the relationship between f_{VCO} (RX) and each frequency division ratio is given by

$f_{VCO} = (430 + 21.6) = \{(n \times 128) + A\} \times f_{OSC} \div R$

Where: f_{VCO} = VCO output frequency

n: Binary 10-bit programmable counter setting value

A: Binary 7-bit programmable counter setting value

f_{OSC} = Reference oscillation frequency of 12.8 MHz

R: Binary 14-bit programmable counter setting value

2560 (in 5, 10, 15,and 20 kHz steps)

2048 (in 12.5 and 25 kHz steps)

In 5, 10, 15, and 20 kHz steps, n is 705 and A is 80.

Therefore, $f_{VCO} = \{705 \times 128\} \times 12800 / 2560$

$= \{90240 + 80\} \times 5$

$= 451600$

$= 451.6$ MHz

See the 144 MHz band unit (X57-3580-00) for the function of each pin of IC10 in the PLL circuit.

- **8T (8 V during transmission) and unlock signal**

See the 144 TX/RX unit description on page 13. (The figure on the under indicates the 430 MHz unit.)

Fig. 17

CIRCUIT DESCRIPTION

TM-942A/UT-1200

1200 TX-RX Unit Frequency Configuration

The 1200 MHz unit incorporates a digital variable-frequency oscillator (VFO) that freely can select a channel step of 10, 12.5, 20,or 25 kHz with a PLL synthesizer system.

The frequency in the receive signal channel is mixed with a frequency of 1200.3 to 1240.20 MHz obtained when a first local oscillation frequency of 600.15 to 620.145 MHz is multiplied by 2 to produce a fist intermediate frequency of 59.7 MHz. This frequency is then mixed with a second local oscillation frequency of 59.245 MHz to produce a second intermediate frequency of 455 kHz. This is called a double-conversion system.

The signal in the transmission channel is oscillated and frequency-divided by a PLL circuit,then multiples the frequency of 630 to 649.995 MHz by two to produce a frequency of 1260 to 1299.99 MHz. This signal is amplified by a straight amplifier, then transmitted.

Fig. 18 Frequency Configuration

1200 TX-RX Unit Receive Signal Channel

- **Outline**

The received signal from an antenna is passed through a low-pass filter in the transmission final stage and sent through a transmission/reception selection diode switch to the receiving front end. The signal is then amplified to high frequencies by a microwave GaAs (gallium arsenide) FET and sent to a dielectric filter. The unwanted components of the signal are eliminated by a microwave transistor in another stage and the dielectric filter. The resultant signal is input to the first mixer. The front end block is matched by a microstrip line to ensure high sensitivity and high reliability. A GaAs FET is used in the first mixer to obtain a good two-signal characteristic. This signal is mixed with the first local signal from a PLL circuit by the first mixer and converted to a first intermediate frequency of 59.7 MHz. The unwanted near-by signal components are eliminated by a two-stage MCF. The resultant signal is produced as a first intermediate-frequency signal.

The first intermediate-frequency signal is amplified and input to FM IF HIC IC2 (KCD04). This signal is then mixed with a second local oscillation frequency of 59.245 kHz to produce a second intermediate frequency of 455 kHz. The intermediate-frequency signal is passed through a ceramic filter to obtain a sharp characteristic. The signal is then input to an HIC again, amplified, then demodulated and output from the HIC.

- **Signal-strength meter**

The signal-strength meter output voltage of FM IF HIC IC2 (KCD04) is supplied to the control unit.

- **Shift-register circuit**

The FS, CK, and DT serial data from the control unit are sent to IC5 (BU4094BF) to perform the control operation outlined in the following table:

CIRCUIT DESCRIPTION

Pin No.	Name	Function	Pin No.	Name	Function
1	Strobe	Enable input	9	Q_S	
2	Data	Serial data input	10	Q'_S	
3	Clock	Clock input	11	Q8	TX/RX selection. "L" when TX is set (Set low faster than Q1).
4	Q1	TX/RX selection. "L" when TX is set	12	Q7	ALT. "H" when on.
5	Q2	TX power selection. "L" when middle and low. "H" when high.	13	Q6	
6	Q3	TX power selection. "L" when high and low. "H" when middle.	14	Q5	
7	Q4		15	QE	8V
8	V_{SS}	GND	16	V_{DD}	8V

Table 18

1200 TX-RX Unit Transmit Signal Channel

- **Outline**

In the transmission channel, the desired frequency is oscillated by half and directly frequency modulated by means of a varicap diode.

- **Modulator circuit**

The audio signal from the control unit is input to microphone amplifier HIC IC4 (KCA04). IC4 consists of a preemphasis circuit, amplifier, limiter, and splatter circuit that eliminate unwanted high-frequency components. The VCO signal is directly frequency modulated by means of a varicap diode in the frequency modulator circuit.

- **Younger-stage circuit**

The signal output from the VCO is input to predrive circuit IC7 (KCB09). The amplifier can obtain a stable drive output without adjustment because it has a wide band.

- **Power amplifier circuit**

The signal amplified in the predrive stage is amplified again by drive circuit HIC IC8 (KCB10), then input to power module IC10 and amplified to the specified level.

- **APC circuit**

The automatic transmission output control circuit (APC) detects and partially amplifies the power module output with a diode and controls the output control voltage. The control voltage is output in inverse proportion to the output, so the control voltage output is always constant.

- **Antenna selection circuit**

Figure 19 shows the antenna selection circuit. The receiver circuit obtains a low insertion loss and isolation with a two-stage breaker circuit consisting of a λ/4 strip circuit.

The pin diode used as a switching device has a low junction capacitance. The high-frequency capacitance of the diode does not depend on the reverse bias voltage.

Figure 20 shows the equivalent circuit during transmission. A current flows through each diode using 8T. The impedance becomes very low. At that time, the receiver side uses a λ/4 strip circuit. Therefore, the impedance becomes very high when the receiver side is viewed from point (A). The voltage from a power module is transferred to the antenna.

Figure 21 shows the equivalent circuit during reception. The bias is switched off, so each diode is in a high-resistance state. The antenna and receiving circuit are connected by a strip line.

CIRCUIT DESCRIPTION

Fig. 19 Antenna Selection Circuit

Fig. 20 Equivalent Circuit during Transmission

Fig. 21 Equivalent Circuit during Reception

1200 TX-RX Unit PLL Synthesizer

The VCO and PLL circuit are housed in .2 solid shielding case as a hybrid integrated circuit. This reduces the electrical and mechanical influence and ensures frequency stability.

The VCO and PLL circuit double the higher harmonics by oscillating and locking a 600 MHz frequency to produce a 1200 MHz band frequency. Comparison frequencies of 5 kHz and 6.25 kHz are produced by dividing a 12.8 MHz frequency of the TCXD by 2560 and 2048 to correspond to 10, 12.5, 20, and 25 kHz channel steps.

The relationship between f_{VCO} (RX) and each frequency division is given by

f_{VCO} (RX) = (f_{RX} – 59.7) / 2 = {(n × 128) + A} × f_{OSC} ÷ R

Where: f_{VCO} (RX) = Previous output frequency that is multiplied by 2 during VCO reception

f_{RX} : Reception frequency

n : Binary 10-bit programmable counter setting value

A : Binary 7-bit programmable counter setting value

f_{OSC}: Reference oscillation frequency of 12.8 MHz (TXCO)

R : Binary 14-bit programmable reference counter setting value

2048 (in 12.5 and 25 kHz steps)

2560 (in 10 and 20 kHz steps)

For 1260 MHz,

f_{VCO}(RX) = (1260 – 59.7)

= {(n × 180) + A} × 12800 ÷ 2560

= 600.15 MHz

In this case, n is 937 and A is 94.

The same as for the 144 MHz unit except 8 V shown in the figure above.

Fig. 22 PLL pin description

Pin name	Function	Pin name	Function
5C	5V	MO	Modulation signal input
LD	Lock signal (on during lock)	9C	9V
NC	Unused	8CL	8V (ripple filter)
XI	12.8 MHz crystal oscillation	ST	0 V during transmission
80R		CV	Lock voltage
DP	Data input	E	GND
CP	Clock input	HT	HET output
EP	Enable input		

Table 19

CIRCUIT DESCRIPTION

- **Unlock circuit**

When a PLL circuit is unlocked during transmission, the LD pin of a IC11 set low and Q12 is set off. Q11 is then set on. The 8T line is not activated when 8T switching control circuit Q13 is set off.

Fig. 23 Unlock Circuit

- **Predrive circuit HIC (KCB09)**

The VCO output is amplified by Q22, then input to pre-drive circuit HIC IC7. An average 22 to 23 dBm output is obtained by inputting 0 dBm through three-stage (2SC4093 and 2SC3357 x 2) amplification. An alumina board and hybrid integrated circuit are used to ensure stable circuit operation.

- **Drive circuit HIC (KCB10)**

The VCO output is amplified by KCB09, then input to drive circuit HIC. An average 29 dBm output is obtained by inputting 20 dBm through one-stage (2SC3814) amplification. An integrated radiation plate and alumina board are used to attain a stable output against heating.

- **ALT (Automatic Frequency Locked Tuning) Circuit**

The block diagram of the ALT unit is shown in **Fig. 24**

The ALT system uses a portion of the second local oscillator signal, mixer, and the FM IF HIC: KCD04 module to form a feed-back circuit that is used to provide analog automatic frequency control.

When the first IF (59.7 MHz) changes due to a shift in the transmitter frequency a corresponding shift will occur in the second intermediate frequency. A portion of this second IF signal is detected. This correction voltage is amplified (NJM4558M) and is used to control D1 and D2 via analog switch MN4066BS. TP1 can be used to check the value of this control voltage. D1 and D2 are in series with the 59.245 MHz oscillator circuit and provide voltage control of this oscillator (VCXO, Voltage controlled oscillator). Therefore, fluctuations of the second IF cause a corresponding change in the second local oscillator circuit, which keeps the frequency of the second IF within the bandwidth of the IF filter. This system maintains close agreement between the transmit and receive frequency bandwidths. (In practice, the receiver frequency and transmit frequency are automatically maintained in close agreement.) The center voltage of the vari-cap diode is set by a voltage divider circuit. Stability of this voltage is maintained by a voltage follower circuit. When the ALT circuit is off, the control voltage applied to the vari-cap diode is switched to this fixed voltage divider circuit in order to set the second local oscillator frequency.

The control voltage for the vari-cap diode is subject to one additional voltage divider stage. During receive this DC signal is applied from the RM line to the microprocessor terminal PTH02 which turns on the tuning indicator light. Switching is performed by the 8R line.

The relationship between the input voltage on the PTH02 terminal and the tuning indicator, and the relationship between the RM voltage and the deviation during receive is shown in **Table 20** and **Fig. 25**

CIRCUIT DESCRIPTION

Fig. 24 Block diagram of the ALT unit

PTH02 input voltage	ALT indicator
0~1.48 V	Only ◁ turns ON
1.48~2.79 V	Both ◁ and ▷ turn OFF
2.79~5.0 V	Only ▷ turns ON

Table 20 Relationship between PTH02 input voltage and the T indicator

Fig. 25 Relationship between the RM voltage and deviation during receive

DIGITAL CONTROL UNIT

• OUTLINE

The digital control unit consists of the panel unit which comprises the keys, rotary encoder circuit and display circuit, as well as the control unit which comprises the reset backup circuit, the DTMF circuit, the microphone key input circuit, the dimmer circuit, etc.

• DATA COMMUNICATION CIRCUIT OF THE PANEL CONTROL UNIT

Figure 26 shows the data communication circuit of the panel control unit. So is the serial data output, SI is the serial data input, and an inverter is located between them to protect the ports of the microprocessor.

The data communication system is asynchronous, and a communication rate of 31250bps is realized.

Since the connection is checked once every 0.5 second by the microprocessor of the control unit side, the power turns OFF when the panel unit is removed.

Fig. 26

CLOCK IC

INITIALIZATION

• SYSTEM RESET

The POWER ON CLEAR function works automatically and all logics are initialized in this IC (S-3520CF) when the power is turned ON. The system is reset because the POWER ON CLEAR bit (D2 of the CNT2 register) is stuck at "1".

• SYSTEM RESET

All logics are initialized when the SYSCR bit is set to "1". When cancelling the reset, SCK falls down after the build-up of CS, as shown in Figure 27.

Fig. 27 Reset cancellation timing

CIRCUIT DESCRIPTION

• INITIAL SETTING

MODE SETTING REGISTER

The clock mode is selected by entering the address 1111 and data 0000 (Ordinary-mode/Clock-mode selection) from Sin. (Refer to DATA WRITE for the entry of data).

CONTROL REGISTER 1

Address 1101 and data 1001 (reference signal output waveform 1 Hz, 24-hour display system) is entered from Sin.

DATA CONTROL

• DATA READ

The read mode is set by sticking CS at "L" and WR at "H". The serial address is entered from Sin, at the leading edge of the upper 4 bits of the SCK clock. (The other 4 bits have nothing to do with this operation). When WR is fetched at the 8th leading edge of the SCK clock, the entered address and its data are outputted from Sout, synchronized with the leading edge of the SCK clock. (Figures 28, 29).

Fig. 28 Read timing

Fig. 29

• DATA WRITE

The WRITE mode is set by sticking CS to "L" and WR to "L". When the serial address and the data to be written (it is not necessary to write it in the counter) are entered from Sin, they are fetched at the leading edge of the SCK clock. When WR is fetched with the 8th leading edge fo the CSK clock, the following data is written in the entered address.

Counter: Increment of the data
Register: 4-bit data entered form Sin
Figure 30, 31 shows the writing timing.

Fig. 30 Counter write timing

Fig. 31 Register write timing

• EXAMPLE OF DATA WRITING

Example of counter writing.

Figure 32 shows the example which consists of writing the "minute" column.

Example of register writing.

Figure 33 shows the example which consists of writing in the control register 1.
(Refer to the reset backup circuit for the backup).

Fig. 32

Fig. 33

TM-742 A/742 E/942 A
CIRCUIT DESCRIPTION

PANEL UNIT

• KEY ROTARY ENCODER INPUT CIRCUIT

Each key of the panel unit is inputted in one port. Moreover, the rotary encoder is directly inputted in the microprocessor.

• DISPLAY CIRCUIT

The display circuit consists of two LCD dirvers located at the panel unit and their peripheral circuits (Figure 34), and all processings are carried out by the microcomputer located at the panel side.

The LCD features dynamic lighting up with 1/2 duty, and the lighting up contents are sent from the CPU (IC1: HD404719A26H) to the LCD by serial data transfer.

The LCD display consists of 158 segments.

• DESCRIPTION OF THE OPERATION

Normally, the CLOCK line is stuck at "L" and the DATA line is stuck at "H".

Since the shift register consists of 160 + 160 bits = 320 bits in series, it must be given 320 bit data every time.

For the ENABLE signal to be outputted, the DATA line is switched H/L 4 times at the point (A) (B), with the CLOCK line stuck at "H" after transmitting 320 bits for MSM5265,

Fig. 34 Display Circuit

• DIMMER CIRCUIT

The dimmer circuit changes the brightness of the lamps in 6 steps

Figure 35 shows the dimmer circuit, which is built into the IC114 (HIC).

A voltage changeable in 6 steps is outputted from the LB port through the combination of the various LB ports (Q1 to Q3) of the shift register. (Refer to the Shift Register Port Table for the logic).

The display does not light up when the power is turned OFF, because the LB line is switched by means of the LB switch: Q2.

• Control band LED lighting circuit

The LED brightness is changed by switching the current to one of two ports for each LED. It is changed in two steps corresponding to lamp dimmers d1, d2, and d3, d4.

Fig. 35 Dimmer Circuit

CIRCUIT DESCRIPTION

- **Squelch volume input**

The squelch volume for each band works by converting the voltage output by dividing 5 V applied to the variable resistor at the analog port of the microprocessor, and so reads the rotation angle. If the rotation angle changes, a command corresponding to the value is sent to the control unit.

CONTROL UNIT

• RESET BACKUP CIRCUIT

The "L" level pulse with duration of approximately 20ms is outputted by the RESET IC (IC12) and the RESET SW (Q5) when the power is turned ON. The CPU is reset by means of this pulse.

When the power is turned OFF, the voltage drop of the 13.8V line is detected, Q6 of the backup circuit turns OFF, Q9 turns ON, and the IRQ terminal is stuck at the "L" level. As a result, the CPU gets in the backup operation. At that time, the voltage VDD is supplied by BAI vis R24/D1. Moreover, the backup circuit is also connected to the clock IC: IC6 (S-3520CF) , and it gets in the access inhibit (backup) state when the "L" level is entered. Refer to the Port List for IC6.

Fig. 36 Reset Backup Circuit

• MICROPHONE/KEY INPUT CIRCUIT

The UP/DOWN keys and the function keys of the microphone are connected to the analog inputs of the microprocessor, and the various functions are operated by the voltage applied when the key is ON. (Figure 37)

Fig. 37 Microphone key input circuit

• SHIFT REGISTER

Processing of the dimmer, squelch and level functions is carried out by passing serial data from the microprocessor through the shift registers located in IC113 and IC114 (BU4094BF).

The dimmer and the squelch levels are set by 24-bit control, by using 3 shift registers.

The first 8 bits of the 24 bits are the dimmer level setting data (shift register C), and the remaining 16 bits are the squelch level setting data (shift registers A, B). (Figure 38)

CIRCUIT DESCRIPTION

Fig. 38

Fig. 39

The dimmer level setting is carried out by using 3 bits out of the 8 bits of the shift register. The remaining 5 bits (Q4 to Q8) are open ports, and they are stuck at "H" during data transmission. (Figure 39)

The squelch level is set by using the 16-bit data that follow the 8-bit data used for setting the dimmer level. (Figure 40)

Refer to the SHIFT REGISTER PORT SPECIFICATION LIST for the port specifications of each shift register.

Fig. 40

SHIFT REGISTER PORT SPECIFICATION LIST (VOL, SQ HIC) CONTROL UNIT (X53-346X-XX)

SHIFT REGISTER A 4094: BUILT INTO IC113

S. Reg Port	Pin No.	Port Data Name	SA VE	Bac kup	Function	Circuit Terminal name
Q1	4	PD_RDMUT			RD mute 0: ON 1: OFF	RD MUTE
Q2	5	PD_SQA0			BAND A squelch level adjustment (bit 0) 0: There is resistance 1: No resistance	
Q3	6	PD_SQA1			BAND A squelch level adjustment (bit 1) 0: There is resistance 1: No resistance	
Q4	7	PD_SQA2			BAND A squelch level adjustment (bit 2) 0: There is resistance 1: No resistance	
Q5	14	PD_SQA3			BAND A squelch level adjustment (bit, 3) 0: There is resistance 1: No resistance	
Q6	13	PD_SQA4			BAND A squelch level adjustment (bit 4) 0: There is resistance 1: No resistance	
Q7	12	PD_SQB0			BAND B squelch level adjustment (bit 0) 0: There is resistance 1: No resistance	
Q8	11	PD_SQB1			BAND B squelch level adjustment (bit 1) 0: There is resistance 1: No resistance	

CIRCUIT DESCRIPTION

Shfit registor B 4094

S. Reg Port	Pin No.	Port Data Name	SA VE	Bac kup	Function	Circuit Terminal name
Q1	4	PD__SQB2			Band B squelch level adjustment (bit 2) 0: There is resistance 1: No resistance	
Q2	5	PD__SQB3			BAND B squelch level adjustment (bit 3) 0: There is resistance 1: No resistance	
Q3	6	PD__SQB4			BAND B squelch level adjustment (bit 4) 0: There is resistance 1: No resistance	
Q4	7	PD__SQC0			BAND C squelch level adjustment (bit 0) 0: There is resistance 1: No resistance	
Q5	14	PD__SQC1			BAND C squelch level adjustment (bit 1) 0: There is resistance 1: No resistance	
Q6	13	PD__SQC2			BAND C squelch level adjustment (bit 2) 0: There is resistance 1: No resistance	
Q7	12	PD__SQC3			BAND C squelch level adjustment (bit 3) 0: There is resistance 1: No resistance	
Q8	11	PD__SQC4			BAND C squelch level adjustment (bit 4) 0: There is resistance 1: No resistance	

All bits are stuck at ''H'' (H'IF) when MONI ON.
Data coming from the panel are inverted when they enter the shift register.

CONTROL UNIT (X53-346X-XX)
SHIFT REGISTER C 4094: BUILT INTO IC114

S. Reg Port	Pin No.	Port Data Name	SA VE	Bac kup	Function	Circuit Terminal name
Q1	4	PD__			For dimmer level adjustment (Bit 0) Refer to the table below for the logic.	
Q2	5	PD__			For dimmer level adjustment (Bit 1) Refer to the table below for the logic.	
Q3	6	PD__			For dimmer level adjustment (Bit 2) Refer to the table below for the logic.	
Q4	7	PD__			Open port, the bit is stuck at ''1''	
Q5	14	PD__			↑	
Q6	13	PD__			↑	
Q7	12	PD__			↑	
Q8	11	PD__			↑	

Data coming from the panel are inverted when they enter the shift register.

Port logic versus dimmer level correspondence lit

Dimmer level	Q3 (bit 2)	Q2 (bit 1)	Q1 (bit 0)
d1	0	1	0
d2	0	1	1
d3	1	0	0
d4	1	0	1
d5	1	1	0
d6	1	1	1

TM-742 A/742 E/942 A

CIRCUIT DESCRIPTION

I/O PORT SPECIFICATION LIST

CONTROL UNIT (X53-346X-XX): IC1 (HD6433388A04F)

HD6433388A04F I/O PORT LIST: IC1

μCOM Port	Port Name	I/O	Pull up	Back up	Control	Circuit Terminal name
RES	P__RES	I			Reset terminal 0: Reset state 1: Ordinary state	
MD1	P__MD1	I			Operation mode (Mode 2) setting. Set to 1	
MD0	P__MD0	I			Operation mode (Mode 2) setting. Set to 0	
STBY		I			Set to 1	
P10 A0	P__A0	O		I	External RAM, I/O Expander Address	
P11 A1	P__A1	O	–	I	↑	
P12 A2	P__A2	O		I	↑	

CIRCUIT DESCRIPTION

HD6433388A04FI/O PORT LIST

μCOM Port	Port Name	I/O	Pull up	Back up	Contents	Circuit Terminal name
P13 A3	P_A3	O		I	External RAM Address	
P14 A4	P_A4	O		I	↑	
P15 A5	P_A5	O		I	↑	
P16 A6	P_A6	O		I	↑	
P17 A7	P_A7	O		I	↑	
P20 A8	P_A8	O		I	↑	
P21 A9	P_A9	O		I	↑	
P22 A10	P_A10	O		I	↑	
P23 A11	P_A11	O		I	↑	
P24 A12	P_A12	O		I	↑	
P25 A13	P_RAMCE2	O		I	External RAM CE2	CE2
P26 A14	P_RAMCE11	O		I	External RAM CE1 Input composing AND with P_RAMCE12	CE1
P27 A15	P_RAMCE12	O		I	External RAM CE1 Input composing AND with P_RAMCE11	↑
P30 D0	P_DAT0	I/O		I	External RAM, I/O Expander data	
P31 D1	P_DAT1	I/O		I	↑	
P32 D2	P_DAT2	I/O		I	↑	
P33 D3	P_DAT3	I/O		I	↑	

CIRCUIT DESCRIPTION

HD6433388A04F I/O PORT LIST

μCOM Port	Port Name	I/O	Pull up	Back up	Content		Circuit Terminal name
P34 D4	P_DAT4	I/O		I	External RAM, I/O Expander data		
P35 D5	P_DAT5	I/O		I	↑		
P36 D6	P_DAT6	I/O		I	↑		
P37 D7	P_DAT7	I/O		I	↑		
P40 TMC10	P_CKCS	O		I	Clock chip select S3520CF CS	0: Selected state 1: High impedance	
P41 TMO0	P_CKSOUT	I		I	Clock data input S3520CF SOUT		
P42 TMRI0	P_CKWR	O		I	Clock write select S3520CF WR	0: Write 1: Read	
P43 TMCI1	P_CKSIN	O		I	Clock data output/CTCSS Unit Data S3520CF SIN		
P44 TMO1	P_BEEP	O		I	"Beep" sound output terminal (Effect sound)	Stuck at the "L" level when there is no output of the "Beep" sound.	BZ
P45 TMRI0	P_PSW	O		I	Power switch.	0: Power ON 1: Power OFF	PSW
P46 PW0	P_TONE	O		I	Sub-tone		
P47 PW1	P_CKSCK	O		I	Clock synchronism signal output (S3520Cf SCK)/Serial→Parallel conversion (HD74HC165F)/CTCSS Unit Clock		
P50 TXD0	P_SO	O	●		Panel microprocessor SI		
P51 RXD0	P_SI	I	●		Panel microprocessor SO		
P52 SCK0	P_Q165	I			Parallel→Serial conversion (HD74HC165F) input Destination, repeater function provided/not-provided, FAN SW, etc.		
P60 FTC1	P_DTDA0	I/O		I	DTMF Data (D4/Q1)		
P61 FT0A	P_DTDA1	I/O		I	DTMF Data (D3/Q2)		

CIRCUIT DESCRIPTION

HD6433388A04F I/O PORT LIST

μCOM Port	Port Name	I/O	Pull up	Back up	Content	Circuit Terminal name
P62 FTIA	P_DTDA2	I/O		I	DTMF Data (D2/Q3)	
P63 FTIB	P_DTDA3	I/O		I	DTMF Data (D1/Q4)	
P64 FTIC	P_STD	I		I	DTMF detection (LC7385 StD) 0: No signal 1: Signal detected	DV
P65 FTID	P_DTSEL	O		I	DTSS unit switching 0: Detection output 1: MIC	DTSEL
P66 FTOB IRQ6	P_DTCE	O		I	DTMF tone generator TC35219 TOE 0: No output a: Tone output	CE
P67 IRQ7	P_DTOE	O		I	DTMF receiver LC7385 TOE 0: High impedance 1: Enable	EN
P70 AN0	P_DOWN	O	•	I	Mic. DOWN (Port shared with RXD1) MR, PF	
P71 AN1	P_UP	I	•	I	Mic. UP (Port shared with SCK1) CALL, VFO	
P72 AN2	P_ALTA	I		I	BAND Unit A ALT input	
P73 AN3	P_ALTB	I		I	BAND Unit B ALT input	
P74 AN4	P_ALTC	I		I	BAND Unit C ALT input	
P75 AN5	P_SMA	I		I	BAND Unit A S meter input	
P76 AN6	P_SMB	I		I	BAND Unit B S meter input	
P77 AN7	P_SMC	I		I	BAND Unit C S meter input	

CIRCUIT DESCRIPTION

HD6433388A04F I/O PORT LIST

μCOM Port	Port Name	I/O	Pull up	Back up	Content	Circuit Terminal name
P80	P__ET	O I	●	I	CTCSS Unit Enable conenection check 0: CONNECT 1: NO CONNECT	ET
P81	P__CTCSS	I		I	CTCSS DETECT 0. Tone coincidence 1: No tone coincidence	SD0
P82	P__MMUTE	O		I	Mic MUTE 0: MUTE OFF 0: MUTE ON	
P83	P__KBRD	I	▲	I	CONTROLLER CHECK 1 NEW KENWOOD BUS (RD)	KBRD
P84 TXD1 IRQ3	P__KBSO (P__PTT)	I/O	●	I	NEW KENWOOD BUS (SO) 0 Mic. PTT 1	KBSO
P85 RXD1 IRQ4	P__KBSI	I	●	I	NEW KENWOOD BUS (SI) 1 Shared with Mic. DOWN terminal (AN0)	KBSI
P86 SCK1 IRQ5	P__KBCK	I/O	●	I	NEW KENWOOD BUS (Clock) 1 Shared with Mic. UP terminal (AN1)	KBCK
P90 ADTRG IRQ2	P__RPTON	O		I	Operation of REPEATER 0: ON function 1: OFF	
P91 IRQ1	P__TPOUT	I		I	Clock reference signal input S-3520 TPout	
P92 IRQ0	P__VF	I		I	Power check 0: During backup 1: During operation	
P93 RD	P__RD	O		I	External RAM, I/O Expander read control signal 0: External read 1: Inhibit	
P94 WR	P__WR	O		I	Externla RAM, I/O Expander write control signal 0: External read 1: Inhibit	

△: Pull-up only when checked by software. (Care must be taken, because P__ET is stuck at "H" during check).
○: Pull-up only when stuck at "H", during input with software.
●: Pull-up with hardware.
▲: Pull-down with hardware.

CIRCUIT DESCRIPTION

I/O EXPANDER PORT SPECIFICATION LIST

CONTROL UNIT (X53-346X-XX)

CXD1095Q I/O PORT LIST IC101

Port	I/O	Backup	Content		Circuit terminal name
PA0	O		Operation unit switching of CTCSS	*1	CTC1
PA1			Operation unit switching of CTCSS	*1	CTC2
PA2			Detection output connection unit switching	*3	RD1
PA3			Detection output connection unit switching	*3	RD2
PA4	O		Operation unit switching of DTSS	*2	DTS1
PA5			Operation unit switching of DTSS	*2	DTS2
PA6			FAN ON/OFF	0: OFF 1: ON	FANSW
PA7			Power switch other than 5C	0: OFF 1: ON	PWS2
PB0	O		Volume, squelch HIC Data		VOLSQDA
PB1			Volume, squelch HIC Clock		VOLSQCK
PB2			Squelch Enable	0: No change 1: Data fetched in latch	SQES
PB3			Electronic volume 2 Enable. Data latch at (1→0)		VOLCSA
PB4	O		Electronic volume 1 Enable. Data latch at leading edge (1→0)		VOLCSB
PB5			BEEP MUTE BAND A 0: MUTE OFF 1: MUTE ON		MUTEA
PB6			BEEP MUTE BAND C 0: MUTE OFF 1: MUTE ON		MUTEC
PB7			BEEP MUTE BAND B 0: MUTE OFF 1: MUTE ON		MUTEB
PC0	I		BAND Unit A busy input	0: BUSY 1: CLOSE	SCA
PC1			BNAD Unit B Busy input	0: BUSY 1: CLOSE	SCB
PC2			BNAD Unit C Busy input	0: BUSY 1: CLOSE	SCC
PC4	I/O		BAND Unit A shift Register Enable		ESA
PC5			BAND Unit A PLL/Shift Register Data	*1	DTA
PC6			BAND Unit A PLL/Shift Register Clock	*1	CKA
PC7			BAND Unit A PLL Enable	*1	EPA
PD0	I/O		BAND Unit B Shift Register Enable		ESB
PD1			BAND Unit B PLL/Shift Register Data	*2	DTB
PD2			BAND Unit B PLL/Shift Register Clock	*2	CKB
PD3			BAND Unit B PLL Enable	*2	EPB
PD4	I/O		BAND Unit C Shift Register Enable		ESC
PD5			BAND Unit C PLL/Shift Register Data	*3	DTC
PD6			BAND Unit C PLL/Shift Register Clock	*3	CKC
PD7			BAND Unit C PLL Enable	*3	EPC

CIRCUIT DESCRIPTION

CXD1095Q I/O PORT LIST

Port	I/O	Backup	Content	Circuit terminal name
PE0	O		Shift Register (HD74HC165F) S/L terminal 0: Latch asynchronous with clock 1: Latch at loading edge of clock	LOAD165
PE1	O		AF MUTE BAND A 0: MUTE OFF 1: MUTE ON	
PE2	O		AF MUTE BAND B 0: MUTE OFF 1: MUTE ON	
PE3	O		AF MUTE BAND C 0: MUTE OFF 1: MUTE ON	

*1, *2, *3 Types of band units

BAND Unit	EP X	CK X	DT X	Unit No.	Number after conversion
No unit	0	0	0	0	0
28 MHz BAND	0	0	1	1	1
50 MHz BAND	0	1	1	3	2
144 MHz BAND	1	1	0	6	3
220 MHz BAND	0	1	0	2	4
430 MHz BAND	1	0	1	5	5
1200 MHz BAND	1	0	0	4	6

NOTE: X is A, B or C
The number after conversion is used on the program

*1, *2, *3

CTC2	CTC1	CTCSS opcration unit
DTS2	DTS1	DTSS operation unit
RD2	RD1	Detected output connection unit
0	0	A
0	1	B
1	X	C

CIRCUIT DESCRIPTION

TERMINAL LIST OF CLOCK IC (S-3520CF)
CONTROL UNIT (X53-346X-XX)

SERIAL TIME CLOCK (S-3520CF): IC6

Terminal No.	Name	Function	H8/337 connection terminal name
4	SCK	Synchronous signal input terminal of serial I/O 8 clocks/cycle	P47
5	Sin	Serial address/data input terminal Entry of address of counter or address/data of register/RAM.	P43
9	Sout	Serial address/data output terminal.	P41
6	WR	Write selection terminal. WR= "L": Write WR= "H": Read	P42
11	CS	Chip select terminal CS= "L": Selected state CS= "H": Sout gets at high impedance state	P40
10	PDW	System power supply leading edge check signal. Connected to power down detection circuit Stuck at "H" when PDW is not used Access disable irrespective of CS when fixed PSW= "L". (Sout, TPout get at high impedance state).	—
8	TPout	Reference signal output terminal, 1 Hz/1024Hz switching output.	P91

Control Unit (X53-346X-XX): IC6 (S-3520CF)

ADDRESS CORRESPONDENCE LIST

Address (A3 to A0)	Clock mode (MODE 0)
0000	1-second column counter
0001	10-second column counter
0010	1-minute column counter
0011	10-minute column counter
0100	1-hour column counter
0101	10-hour column counter
0110	Day (of the week) counter
0111	1-day column counter
1000	10-day column counter
1001	1-month column counter
1010	10-month column counter
1011	1-year column counter
1100	10-year column counter
1101	Control register 1
1110	Control register 2
1111	Mode setting register

The contents of the counter and the register can be read and rectified by handling the 4-bit address and data as a set. The addresses are allocated as shwon in the table below.

REGISTER CONTROL

• MODE SETTING REGISTER

Switches the clock mode and the SRAM mode, and resets the system.

MODE SETTING REGISTER (MODE, 1111)

D3	D2	D1	D0
SYSR	TEST	MS1	MS0
	0 fixed	Clock mode selected "00" entered	

SYSR is used to clear the counter and the register. The system is reset when it is stuck at "1", and gets at the ordinary mode when it is stuck at "0".

MS0 and MS1 are used to switch the mode. Since the clock mode is used this time, "0""0" is entered in these registers

CONTROL REGISTER 1 (CNT1, 1101)

D3	D2	D1	D0
TPS	30ADJ	CNTR	24/12
1			1

CIRCUIT DESCRIPTION

TPS is used to select the reference signal output waveform, 1 Hz is outputted when it is "1", and 1024Hz is outputted when it is "0", Since 1Hz output is selected this time, it is stuck at "1".

30ADJ is used to carry out ±30-second adjustment, and ±30-second adjustment is carried out when it is stuck at "1". The operation gets at the ordinary mode when it is stuck at "0".

CNTR is used to reset the counter. The operation gets in the reset mode when it is stuck at "1", and after that the content of the specified counter is reset. The operation gets at the ordinary mode when it is stuck at "0".

24/12 is used to switch the display mode. The 24-hour display mode is selected when it is stuck at "1", and the 12-hour display mode is selected when it is stuck at "0".

This time it is stuck at "1", because the 24-hour display mode is selected.

- **CONTROL REGISTER 2**

This is the flat used to detect the state when the operation is in the clock mode.

CONTROL REGISTER 2 (CNT2, 1110)

D3	D2	D1	D0
STA	DET	0	0

STA is used to check the end-around carry of the time and the calendar. It is stuck at "1" when end-around carry is in progress, and at "0" when there is no end-around carrry.

DET is used to check the power ON clear detection. It is stuck at "1" when power ON clear is detected, and at "0" in th ordinary mode.

LIST OF TERMINALS OF THE PARALLEL→SERIAL CONVERTER IC (PARALLEL IN, SERIAL OUT) CONTROL UNIT (X53-346X-XX)

8-bit Shift Register (HD74HC165F): IC7

Terminal No.	Name	Function	I/O Expander terminal name
1	S/L	Data shift/load selection terminal S/L= "L": Data entered in the 8 inputs (A to H) are stored in the various registers, asynchronously with the clock. S/L= "H": Successive shift operations are carried out at the leading edge of the various flip-flops.	PB5
2	CLOCK	Data shift synchronization signal input terminal	PB1
14	D (P_B3)	Parallel input terminal (bit 3). Destination data (bit 3) 0: Destination bit "0" 1: Destination bit "1"	
13	C (P_B2)	Parallel input terminal (bit 2). Destination data (bit 2) 0: Destination bit "0" 1: Destination bit "1"	
12	B (P_B1)	Parallel input terminal (bit 1). Destination data (bit 1) 0: Destination bit "0" 1: Destination bit "1"	
11	A (P_B0)	Parallel input terminal (bit 0). Destination data (bit 0) 0: Destination bit "0" 1: Destination bit "1"	
9	QH	Serial data output terminal	PC3
10	SI	Serial data input terminal	
6	H (P_RPT)	Parallel input terminal (bit 7). Existence of repeater function 0: No repeater function 1: Repeater function	–
5	G (P_FANDL I)	Parallel input terminal (bit 6). FAN delay time setting (bit 1) *1 The time is set in combination with terminal No.4.	

CIRCUIT DESCRIPTION

8-bit Shift Register (HD74HC165F): IC7

Terminal No.	Name	Function	I/O Expander terminal name
4	F (P_FANDL0)	Parallel inptu terminal (bit 5). FAN delay time setting (bit 0) *1 The time is set in combination with terminal No.5.	
3	E (P_MDFY)	Parallel input terminal (bit 4). Transmission remodeling data (bit 4) 0: Remodeling 1: No remodeling	

*1 FAN Delay Time setting input

FAN control	P_FANDL 1	P_FANDL 0
Permanently ON when POWER is ON	0	0
ON during transmission	0	1
ON during transmission +ON during 1 minute after and of transmission	1	0
ON during transmission +ON during 2 minutes after end of transmission	1	1

• **TIMING CHART**

CIRCUIT DESCRIPTION

I/O PORT SPECIFICATION LIST

DISPLAY UNIT (X54-3130-11): IC1 (HD404719A26H)

CIRCUIT DESCRIPTION

HD404719A26H I/O PORT LIST: IC1

PIN NO.	μ COM Port	Port name	I/O		Pull Up	Content
			PS ON	PS OFF		
1	RD_3/AN_7		I	I		GND (DONT USE)
2	AGND					GND
3	RESET		I	I	○ 5 M	RESET
4	OSC_1		I	I		4 MHz Xtal ①
5	OSC_2		O	O		4 MHx Xtal ②
6	GND					GND
7	CL_1		I	I		NC (V_{cc})
8	CL_2		O	O		NC (OPEN)
9	*TEST		I	I		5 V (5M)
10	V_{cc}					5 V (5M)
11	D_0	PD_0PSW	I	I		PSW L: ON
12	D_1	PD_0VFO	I	I		VFO
13	D_2	PD_0MR	I	I		MR
14	D_3	PD_0CALL	I	I		CALL
15	D_4	PD_0F	I	I		F
16	D_5	PD_0BELL	I	I		BELL
17	D_6	PD_0TONE	I	I		TONE
18	D_7	PD_0REV	I	I		REV
19	D_8	PD_0DTSS	I	I		DTSS
20	D_9	PD_0LOW	I	I		LOW
21	D_{10}	PD_0MUTE	I	I		MUTE
22	D_{11}	PD_0LINK	I	I		RC
23	D_{12}	PD_0MHZ	I	I		MHz
24	D_{13}	PD_0CSA	I	I		C SEL A
25	D_{14}	PD_0CSB	I	I		C SEL B
26	D_{15}	PD_0CSC	I	I		C SEL C
27	RO_0	PD_0BSA	I	I		B SEL A
28	RO_1	PD_0BSB	I	I		B SEL B
29	RO_2	PD_0BSC	I	I		B SEL C

CIRCUIT DESCRIPTION

HD404719A26H I/O PORT LIST: IC1

PIN NO.	μ COM Port	Port name	I/O		Pull Up	Content
			PS ON	PS OFF		
30	$R0_3/AN_7$		I	I		NC (Vcc)
31	RI_0		O	O(L)		CS LED A GRN ① *I
32	RI_1		O	O(L)		CS LED A GRN ② *I
33	RI_2		O	O(L)		CS LED A RED ① *I
34	RI_3		O	O(L)		CS LED A RED ② *I
35	$R2_0$		O	O(L)		CS LED B GRN ① *I
36	$R2_1$		O	O(L)		CS LED B GRN ② *I
37	$R2_2$		O	O(L)		CS LED B RED ① *I
38	$R2_3$		O	O(L)		CS LED B RED ② *I
39	$R3_0$		O	O(L)		CS LED C GRN ① *I
40	$R3_1$		O	O(L)		CS LED C GRN ② *I
41	$R3_2$		O	O(L)		CS LED C RED ① *I
42	$R3_3$		O	O(L)		CS LED C RED ② *I
43	$R4_0$		O	O(L)		Function LED L: ON H: OFF
44	$R4_1$		O	O(L)		NC (OPEN)
45	$R4_2$		—	O(L)		NC (Vcc)
46	$R4_3$		—	O(L)		NC (Vcc)
47	$R5_0$/Vdisp		I	I		NC (GND)
48	$R5_1$		I	I		NC (GND)
49	$R5_2$		I	I		NC (GND)
50	$R5_3$		I	I		NC (GND)
51	$R6_0$/COMP		O	I		DISPLAY CK
52	$R6_1$/Vref		O	I		DISPALY DT
53	$R6_2/TOE_1$		O	I		NC (OPEN)
54	$R6_3/TOE_2$		O	I		NC (OPEN)
55	$R7_0$/*INT_0		I	I		SI INT (↘Interruption)
56	$R7_1$/*INT_1		I	I	PULL DOWN	PS (↗Interruption)
57	$R7_2$/*INT_2		I	I		ENCODERDT

CIRCUIT DESCRIPTION

HD404719A26H I/O PORT LIST

PIN NO.	μ COM Port	Port name	I/O		Pull Up	Content
			PS ON	PS OFF		
58	$R7_3$/*INT_3		I	I		ENCODERCK (↖ ↘ Interruption)
59	$R8_0$/*INT_4		I	I		NC (GND)
60	$R8_1$/*INT_5		I	I		NC (GND)
61	$R8_2$/SO_1		O	O(H)		SO
62	$R8_3$/SI_1		I	I		SI
63	$R9_0$/*SCK_1		I	I		SCK
64	$R9_1$/*SCK_2		I	I		NC (GND)
65	$R9_2$/SI_2		I	I		NC (GND)
66	$R9_3$/SO_2		I	I		NC (GND)
67	RA_0/ICT_0		O	O(H)		CLK OUT
68	RA_1/ICT_1		I	I		NC (GND)
69	RA_2/TOG		I	I		NC (GND)
70	RA_3/BUZZ		I	I		NC (GND)
71	RB_0/TOC		I	I		NC (GND)
72	RB_1/TOB		I	I		NC (GND)
73	AV_{cc}					5 V (5 C)
74	RC_0/AN0		I	I		VOL A
75	RC_1/AN1		I	I		VOL B
76	RC_2/AN2		I	I		VOL C
77	RC_3/AN3		I	I		SQL A
78	RD_0/AN4		I	I		SQL B
79	RD_1/AN5		I	I		SQL C
80	RD_2/AN6		I	I		B VOLTAGE

o: Pull-up with the hardware
*: LOW active
*1: DIMMER control of the various LED of CSEL is carried out means of 2 ports. THe brightness is shown below.

Port	OFF	Dark	Bright
①	H	L	L
② –	H	H	L

CIRCUIT DESCRIPTION

LCD DRIVER (MSM5265) LIST
DISPLAY UNIT (X54-3130-11): IC201 No. 1

IC Pin No.	IC Pin Name	LCD SEG. COM1	LCD SEG. COM2	LCD Term. No.
				COM1
				COM2
30	S80	Ⓐ INPHON	Ⓐ REMOTO	1
29	S79	Ⓐ ON	Ⓐ TIMER	2
28	S78	Ⓐ OFF	Ⓐ ALRM	3
27	S77	Ⓐ TOT	Ⓐ ABC	4
26	S76	Ⓐ MUTE	Ⓐ APO	5
				6
25	S75	Ⓐ S7	Ⓐ S5	7
24	S74	Ⓐ ON AIR	Ⓐ BUSY	8
23	S73	Ⓐ L	Ⓐ SI	9
22	S72	Ⓐ M	Ⓐ S2	10
21	S71	Ⓐ 1-5-9	Ⓐ S3	11
20	S70	Ⓐ S6	Ⓐ S4	12
19	S69		Ⓐ BELL	13
18	S68	Ⓐ <	Ⓐ ALT	14
17	S67		Ⓐ IGbc	15
16	S66	Ⓐ L-	Ⓐ R-	16
15	S65	Ⓐ 100Ma	Ⓐ 100Mf	17
14	S64	Ⓐ 100Md	Ⓐ 100Me	18
13	S63	Ⓐ 100Mc		19
12	S62	Ⓐ 100Mb	Ⓐ 100Mg	20
11	S61	Ⓐ CONT	Ⓐ PTT	21
10	S60	Ⓐ 10Ma	Ⓐ 10Mf	22
9	S59	Ⓐ 10Md	Ⓐ 10Me	23
8	S58	Ⓐ 10Mc		24
7	S57	Ⓐ 10Mb	Ⓐ 10 Mg	25
6	S56	Ⓐ >	Ⓐ +	26
5	S55	Ⓐ T	Ⓐ C CSS	27

No. 2

IC Pin No.	IC Pin Name	LCD SEG. COM1	LCD SEG. COM2	LCD Term. No.
4	S54	Ⓐ IMa	Ⓐ IMf	28
3	S53	Ⓐ IMd	Ⓐ IMe	29
2	S52	Ⓐ IMc	Ⓐ IMdp	30
1	S51	Ⓐ IMb	Ⓐ IMg	31
100	S50	Ⓐ DTSS	Ⓐ REV	32
99	S49	Ⓐ 100Ka	Ⓐ 100Kf	33
98	S48	Ⓐ 100Kd	Ⓐ 100Ke	34
97	S47	Ⓐ 100Kc		35
96	S46	Ⓐ CLKdp	Ⓐ 100Kdp	36
95	S45	Ⓐ 100Kb	Ⓐ 100Kg	37
94	S44	Ⓐ Burst1	Ⓐ Burst2	38
93	S43	Ⓐ 10Ka	Ⓐ 10Kf	39
92	S42	Ⓐ 10Kd	Ⓐ 10Ke	40
91	S41	Ⓐ 10Kc	Ⓐ 10Kdp	41
90	S40	Ⓐ 10Kb	Ⓐ 10Kg	42
89	S39	Ⓐ ☆	Ⓐ F	43
88	S38	Ⓐ 1Ka	Ⓐ 1Kf	44
87	S37	Ⓐ 1Kd	Ⓐ 1Ke	45
86	S36	Ⓐ 1Kc	Ⓐ 05 K	46
85	S35	Ⓐ 1Kb	Ⓐ 1Kg	47
84	S34	Ⓐ +U	Ⓐ CO	48
83	S33	Ⓐ MRHa	Ⓐ MRHf	49
82	S32	Ⓐ MRHd	Ⓐ MRHe	50
81	S31	Ⓐ MRHc	Ⓐ LOCK	51
80	S30	Ⓐ MRHb	Ⓐ MRHg	52
79	S29	Ⓐ MRLa	Ⓐ MRLf	53
78	S28	Ⓐ MRLd	Ⓐ MRLe	54
77	S27	Ⓐ MRLc		55
76	S26	Ⓐ MRLb	Ⓐ MRLg	56
				57

CIRCUIT DESCRIPTION

No. 3

IC Pin No.	IC Pin Name	LCD SEG. COM1	LCD SEG. COM2	LCD Term.No.
75	S25	Ⓑ S7	Ⓑ S5	58
74	S24	Ⓑ ONAIR	Ⓑ BUSY	59
73	S23	Ⓑ L	Ⓑ SI	60
72	S22	Ⓑ M	Ⓑ S2	61
71	S21	Ⓑ 1-5-9	Ⓑ S3	62
70	S20	Ⓑ S6	Ⓑ S4	63
69	S19		Ⓑ BELL	64
68	S18	Ⓑ <	Ⓑ ALT	65
67	S17	Ⓑ IGa	Ⓑ IGf	66
66	S16	Ⓑ IGd	Ⓑ IGe	67
65	S15	Ⓑ IGc		68
64	S14	Ⓑ IGb	Ⓑ IGg	69
63	S13	Ⓑ L-	Ⓑ R-	70
62	S12	Ⓑ 100Ma	Ⓑ 100Mf	71
61	S11	Ⓑ 100Md	Ⓑ 100Me	72
60	S10	Ⓑ 100Mc		73
59	S9	Ⓑ 100Mb	Ⓑ 100Mg	74
58	S8	Ⓑ CONT	Ⓑ PTT	75
57	S7	Ⓑ 10Ma	Ⓑ 10Mf	76
56	S6	Ⓑ 10Md	Ⓑ 10Me	77
55	S5	Ⓑ 10Mc		78
54	S4	Ⓑ 10Mb	Ⓑ 10Mg	79
53	S3	Ⓑ >	Ⓑ +	80
52	S2	Ⓑ T	Ⓑ C CSs	81
51	S1	Ⓑ IMa	Ⓑ IMf	82
48	COM-A			
49	COM-B			

DISPLAY UNIT (X54-3130-11): IC202 No. 1

IC Pin No.	IC Pin Name	LCD SEG. COM1	LCD SEG. COM2	LCD Term.No.
				COM1
				COM2
30	S80	Ⓑ IMd	Ⓑ IMe	83
29	S79	Ⓑ IMc	Ⓑ IMdp	84
28	S78	Ⓑ IMb	Ⓑ IMg	85
27	S77	Ⓑ DTSS	Ⓑ REV	86
26	S76	Ⓑ 100Ka	Ⓑ 100Kf	87
25	S75	Ⓑ 100Kd	Ⓑ 100Ke	88
24	S74	Ⓑ 100Kc	Ⓑ 100Kdp	89
23	S73	Ⓑ CLKdp		90
22	S72	Ⓑ 100Kb	Ⓑ 100Kg	91
21	S71	Ⓑ Burst1	Ⓑ Burst2	92
20	S70	Ⓑ 10Ka	Ⓑ 10Kf	93
19	S69	Ⓑ 10Kd	Ⓑ 10Ke	94
18	S68	Ⓑ 10Kc	Ⓑ 10Kdp	95
17	S67	Ⓑ 10Kb	Ⓑ 10Kg	96
16	S66	Ⓑ ☆	Ⓑ F	97
15	S65	Ⓑ 1Ka	Ⓑ 1Kf	98
14	S64	Ⓑ 1Kd	Ⓑ 1Ke	99
13	S63	Ⓑ IKc	Ⓑ 05K	100
12	S62	Ⓑ 1Kb	Ⓑ 1Kg	101
11	S61	Ⓑ +U	Ⓑ CO	102
10	S60	Ⓑ MRHa	Ⓑ MRHf	103
9	S59	Ⓑ MRHd	Ⓑ MRHe	104
8	S58	Ⓑ MRHc	Ⓑ LOCK	105
7	S57	Ⓑ MRHb	Ⓑ MRHg	106
6	S56	Ⓑ MRLa	Ⓑ MRLf	107
5	S55	Ⓑ MRLd	Ⓑ MRLe	108

CIRCUIT DESCRIPTION

DISPLAY UNIT (X54-3130-11): IC202 No. 2

IC Pin No.	IC Pin Name	LCD SEG. COM1	LCD SEG. COM2	LCD Term. No.
4	S54	Ⓑ MRLc		109
3	S53	Ⓑ MRLb	Ⓑ MRLg	110
				111
2	S52	© S7	© S5	112
1	S51	© ONAIR	© BUSY	113
100	S50	© L	© S1	114
99	S49	© M	© S2	115
98	S48	© 1-5-9	© S3	116
97	S47	© S6	© S4	117
96	S46		© BELL	118
95	S45	© <	© ALT	119
94	S44		© 1Gbc	120
93	S43	© L-	© R-	121
92	S42	© 100Ma	© 100Mf	122
91	S41	© 100Md	© 100Me	123
90	S40	© 100Mc		124
89	S39	© 100Mb	© 100Mg	125
88	S38	© CONT	© PTT	126
87	S37	© 10Ma	© 10Mf	127
86	S36	© 10Md	© 10Me	128
85	S35	© 10Mc		129
84	S34	© 10Mb	© 10Mg	130
83	S33	© >	© +	131
82	S32	© T	© C CSS	132
81	S31	© 1Ma	© 1Mf	133
80	S30	© 1Md	© 1Me	134
79	S29	© 1Mc	© 1Mdp	135
78	S28	© 1Mb	© 1Mg	136
77	S27	© DTS	© REV	137
76	S26	© 100Ka	© 100Kf	138

No. 3

IC Pin No.	IC Pin Name	LCD SEG. COM1	LCD SEG. COM2	LCD Term. No.
75	S25	© 100Kb	© 100Ke	139
74	S24	© 100Kc	© 100Kdp	140
73	S23	© CLKdp		141
72	S22	© 100Kb	© 100Kg	142
71	S21	© Burst1	© Burst2	143
70	S20	© 10Ka	© 10Kf	144
69	S19	© 10Kd	© 10Ke	145
68	S18	© 10Kc	© 10Kdp	146
67	S17	© 10Kb	© 10Kg	147
66	S16	© ☆	© F	148
65	S15	© 1Ka	© 1Kf	149
64	S14	© 1Kd	© 1Ke	150
63	S13	© 1Kc	© 05K	151
62	S12	© 1Kb	© 1Kg	152
61	S11	© +U	© CO	153
60	S10	© MRHa	© MRHf	154
59	S9	© MRHd	© MRHe	155
58	S8	© MRHc	© LOCK	156
57	S7	© MRHb	© MRHg	157
56	S6	© MRLa	© MRLf	158
55	S5	© MRLd	© MRLe	159
54	S4	© MRLc		160
53	S3	© MRLb	© MRLg	161
52	S2			
51	S1			
48	COM-A			
49	COM-B			

CIRCUIT DESCRIPTION

• TONE OUTPUT

The TONE output is obtained by outputting, from CPU, the pulse corresponding to the preset tone, and by filtering it. (Figure 41)

Fig. 41

• INPUT/OUTPUT OF CTCSS (OPTION TSU-7)

Data to the CTDSS unit is outputted by P80, P47 and P43. Moreover, since P80 has also the function of checking the connection it becomes an input when the power is turned ON, and after checking the connection it becomes an output. CTCSS does not turn ON when there is no connection. Figure 42 shows the data transmission format, and Figure 44 shows the data configuration. The "L" level, obtained when the tone is detected from the CTCSS unit and its coincidence is confirmed, is entered in P81 of the microprocessor, and then the squelch is opened.

Each CTCSS unit is able to cope with 3 bands. This operation is executed by switching the low frequency signal outputted by the band unit. (Figure 43).

Fig. 42 CTCSS Data Transfer Format

Fig. 43

Tone frequency selection data of CTCSS FX365

	D0	D1	D2	D3	D4	D5
Example 88.5 Hz (DTMF unit)	L	H	H	H	L	L

Fig. 44 CTCSS Data Configuration

• INPUT/OUTPUT OF DTMF

Data to DTMF is outputted by P66, 67 and P60 to P63 of the microprocessor.

P60 to P63 are the data in the case of the encoder, and tones corresponding to each data are outputted from the TONE terminal) of IC10 (TCD35219F) while P66 is stuck at "H".

As for the decoder, the detected signals corresponding to each band are switched at IC108, 109, in the same way as in CTCSS, and after that it passes through the analog switch IC8 and is entered in the DTMF decoder IC11 (LC7385M). When an effective tone is detected, the terminal STD is stuck at "H", and P67 of the microprocessor is enabled. As a result, data are entered in P60 to P63, and the coincidence with the preset DTSS codes is checked by the microcomputer.

On the other hand, the input from the DTMF microphone is read and controlled by switching the input of IC11 by means of Q7 and the microprocessor. The ports of IC11 are shown in the following table.

• PLL data output

The PLL data is passed through I/O expander IC101 (CXD 1095Q) from the microcomputer and output to each band unit with EP, CK, and DT signals and three serial data items.

A PLL IC (M56760FP) is used in common with the 144 and 430 TX/RX units. Figure 45 shows the data configuration. Figure 46 and 47 shows the PLL data transfer format.

LIST OF PORTS OF IC11: LC7385M

Pin No.	Name	I/O	Function description
1	IN⁺	I	Non-inverted input of the input amplifier
2	IN⁻	I	Inverted input of the input amplifier
3	GS	O	Output of the output amplifier
4	V_{REF}	O	Reference voltage output of $V_{DD}/2$
5	B/H	I	Selects the output format of Q1 to Q4. Binary (2 of 8) code when stuck at "H". Hexadecimal code when stuck at "L".
6	PD	I	Operation switched to pweor down mode when stuck at "H".
7	OSC1	I	An osciallator circuit is composed by connecting a 3 569545MHz quartz oscillator between these terminals.
8	OSC2	O	
9	Vss		Power supply terminal, normally 0V
10	TOE	I	Controls the 3 state output of Q1 to Q4. Enabled when stuck at "H". High impedance when stuck at "L".
11	Q_1	O	3 state received data output
12	Q_2		
13	Q_3		
14	Q_4		
15	StD	O	Stuck at "H" when the connection time of the effective tone pari esceeds the preset time preset by the add-on CR.
16	ESt	O	Stuck at "H" when the effective tone pari is detected.
17	St/GT	I/O	The guard time is preset by connecting CR.
18	V_{DD}		Power supply terminal. Normally 5V.

Fig. 45 PLL Data Configuration

CIRCUIT DESCRIPTION

f_{REF} = 12800 ÷ (8 x Reference oscillation frequency division ratio)

Reference oscillation frequency division ratio = 16000 / f_{REF} (kHz)

5 kHz ..... P = 320
6.25 kHz ..... P = 256

Reference oscillation frequency division ratio

1	2	3	4	5	6	7	8	9	10	11	
0	0	0	0	0	0	1	0	1	0	0	(320)
0	0	0	0	0	0	0	0	1	0	0	(256)

17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	01 40 5 kHz
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	01 00 5.25 kHz

Special bit function

Bit	Name	H	L
D_A	Data latch selection	Reference	Comparison
D_B	SW2	H: OFF	L: ON
D_C	SW1	H: OFF	L: ON
D_D	POWER switch	OFF	ON
D_E	Test	Test	Normal

PLL data-to-bit relationship

ADD	BIT			
	0	1	2	3
1BH	1	2	3	4
1CH	5	6	7	8
1DH	9	10	11	12
1BH	13	14	15	16
1FH	17	–	–	–

Fig. 46 M56760 PLL DATA

1F	1E	1D	1C	1B	1A
–	6	10	14	18	1
–	7	11	15	19	2
–	8	12	16	20	3
5	9	13	17	21	4

1F	1E	1D	1C	1B	1A
–	2^{15}	2^{11}	2^7	2^3	D_D
–	2^{14}	2^{10}	2^6	2^2	D_C
–	2^{13}	2^9	2^5	2^1	D_B
2^{16}	2^{12}	2^8	2^4	2^0	D_A

For frequency division ratio setting

1F	1E	1D	1C	1B	1A
–	×	D_E	2^7	2^3	D_D
–	×	2^{10}	2^6	2^2	D_C
–	×	2^9	2^5	2^1	D_B
×	×	2^8	2^4	2^0	D_A

For comparison frequency

Data	State
D_E	
L	Normal
H	Test

Data	PLL
D_E	POWER switch
L	ON
H	OFF

Data		Output port	
D_H	D_C	SW2	SW1
L	L	ON	ON
H	L	OFF	ON
L	H	ON	OFF
H	H	OFF	OFF

Fig. 47 M56760 PLL DATA OUTPUT

CIRCUIT DESCRIPTION

The PLL and reference frequency-division ratio data input to the 1200 TX/RX unit are output from P21 (CK), P22 (DT), and P23 (EP1) of the CPU. The reference frequency-division ratio data (R) is output only when the power is switched on and when 10 and 12.5 kHz reference frequencies are changed.

Fig. 48 PLL Frequency-Division Ratio Data Transfer Format

Fig. 49 Reference Frequency-Division Ratio Data Transfer Format

Fig. 50 Data Configuration

CIRCUIT DESCRIPTION

AF SIGNAL SYSTEM

• OUTLINE

Signals coming from the detected signal RA of each band unit pass through the electronic potentiometer, are added at the mute circuit and buzzer circuit, and after passing through the speaker switching circuit they are outputted to the power amplifier and to the speakers.

Each band has an independent AF signal, and any arbitrary combination can be outputted through the speaker, depending on the position where the speaker jack is plugged.

• VOLUME/BUZZER CIRCUIT

The angles of the potentiometers of the various bands, that are located on the panel unit, are transformed to 5 bit data through A/D conversion executed by the microprocessor of the panel unit, and are sent to the microprocessor of the control unit. These data are outputted by the I/O expander: IC101 to IC112(HIC) as serial data.

The buzzer sound heard when the key is pressed is outputted from the IC(P44) of the control unit, MIXed with the DTMF monitor output, and is outputted to IC112.

IC112 carries out the LEVEL/MUTE processing of the audio signal in conformity with the received data, and after that the signal is outputted to the speaker changeover switch: IC106. (Figure 51).

The volume level is set for the speaker output and buzzer sound ("beep" sound) of each band, by using the 2 electronic potentiometers (MB87032) built into IC112.

The data have 28 bit composition, with 20 bits used to set the level. (The remaining 8 bits are used as commands and other applications).

The data are fetched at the trailing edge of the clock. (Figure 52).

Fig. 51

Fig. 52

CIRCUIT DESCRIPTION

• SPEAKER SWITCHING CIRCUIT

Four speaker jacks are provided in total, one in each band unit (rear) and one in the control unit (side).

As for the functions of the various terminals, the speaker jack of the band unit outputs the AF signal of the band in question when the speaker is connected.

The speaker jack of the control unit outputs the signal obtained by mixing the remaining AF signals. This signal is outputted by the internal speaker when there is no speaker connected to the speaker jack, Figure 53 shows the main circuit.

When there is nothing connected to the speaker jack, the signal is entered in the adder of IC103. The level of the adder does not change, irrespective of the number of signals (1 to 3) that are added.

For example, when one wants to mix the signals of speakers A and C of band B and to output the obtained result from the remaining speaker, it is possible to execute this operation by connecting with the jack of band B and the jack of the control unit.

Fig. 53

• SQUELCH CIRCUIT

Squelch can be preset at each band by means of the squelch potentiometer located in the panel unit. The squelch potentiometer signal is converted to 5 bit data through A/D conversion at the microprocessor of the panel unit.

Data are sent from the panel unit to the microprocessor of the control unit, and after data conversion they are sent as serial data from IC101 of the control unit to IC113 (HIC). (Refer to the SHIFT REGISTER section for the logic). D/A conversion is carried out at IC113 through the combination of the shift register and the analog switch, and the control voltage of IC110 is generated by the RDSQ terminal to carry out the control of the RD line. (Figure 54).

The setting of the squelch level turns the analog switch ON/OFF by means of the 5 bit data of the various bands (Refer to the LIST OF PORTS of the shift registers A and B).

Since a resistance is connected between the two terminals of the analog switch, the resistance value is changed by the combination of the ON/OFF states of the switches. The voltage level of the SQ output can be controlled as a result. (Figure 55)

Fig. 54

Fig. 55

CIRCUIT DESCRIPTION

Connector Connecting the Band Unit and Control Unit

- **Outline**

The pin assignments of the connector that connects the control unit and band unit are common in three bands. The band unit is also used to check which band unit is connected.

Fig. 56 Connector Connecting the Band Unit and Control Unit

Pin No.	Name	Function	Pin No.	Name	Function
1	E	GND	1	TO	67.0 to 250.3 Hz subtone output
2	B	13.8 V input	2	MO	Audio signal from microphone (including DTMF)
3	B		3	ME	Microphone ground
4	B		4	ES	Shift-register enable output
5	SP	AF signal is output when speaker jack is connected.	5	CK	Shift-register PLL clock
6	E	GND	6	DT	Shift-register PLL data
7	SPSW	Speaker jack connection and detection. "H" during connection.	7	EP	PLL enable
8	8C	8 V is output during the power-on sequence.	8	SC	"L" when squelch input is busy.
9	8C		9	SQ	50 k ohms when squelch D/A output is tight.
10	SB	13.8 V is output during the power-on sequence.	10	SM	Signal-strength meter voltage input
11	SC	5 V is output during the power-on sequence.	11	RA	Detection input (squelch circuit)
12	ALT	ALT voltage input	12	RD	Detection input (no squelch circuit)

Table 20 Pin functions (as viewed from the control unit)

- **Band retrieval**

Each band is retrieved through the EP, CK, and DT pins. Data is input for retrieval when the power is switched on and when the memory is cleared. Data is then output again.

The control unit is pulled down as shown in Figure 57. Therefore, the DT, CK, and EP pins are set low when no band unit is connected. Pins set high as listed in Table 21 are pulled up when any band unit is connected. The type of connected band unit is then judged.

Fig. 57 Retrieval System

BAND Unit	DT	CK	EP
No Unit	L	L	L
28	H	L	L
50	H	H	L
144	L	H	H
430	H	L	H
1200	L	L	H

Table 21 Band Retrieval

DESCRIPTION OF COMPONENTS

CONTROL UNIT (X53-346X-XX)

No. 1

Device number	Use, function	Operation, condition, interchangeability
IC1	Microprocessor	Refer to circuit description
IC2	SRAM memory	
IC3	6VAVR	3 terminal regulator
IC4	Address decoder	For chip selector (I/O expander)
IC5	Address decoder	For chip selector (SRAM)
IC6	Serial time clock	Refer to circuit description
IC7	Parallel → Serial converter IC	Refer to circuit description
IC8	Analog switch	For DTHF receiver
IC9	Low frequency amplifier-adder	Mic. amplifier DTMF modulation system adder
IC10	DTMF encoder	Refer to the circuit description
IC11	DTMF decoder	Refer to the circuit description
IC12	Reset IC	
IC13, 14	Serial data inverter buffer	For serial data
IC15	Analog switch	For switching during backup, (RD, WR)
IC16	Analog switch	For switching during backup (CK)
IC101	I/O expander	Refer to the circuit description
IC102	8V AVR	3 terminal regulator
IC103	Adder	For internal speaker. For level compensation
IC104, 105	Low frequency amplification	① Input (IC104-Band B, IC105-Common) ⑥ Output (IC104-Band B, IC105-Common) ⑦ 13.8V ④, ⑩, ⑫, GND ⑧ Output (IC104-Band C, IC105-Band A) ⑬ Input (IC104-Band C, IC105-Band A)

DESCRIPTION OF COMPONENTS

CONTROL UNIT (X53-346X-XX)

No. 2

Device number	Use, function	Operation, condition, interchangeability
IC106	Analog switch for speaker switching	④ Band C AF input ⑭ Band A AF input ⑮ Band B AF input ②Band B internal SP output, ⑤ Band C external SP output ⑫ Band A internal SP output ① Band B external SP output, ③ Band C external SP output ⑬ Band A external SP output ⑪ Band A switching input ⑩ Band B switching input ⑨ Band C switching input ⑨ to ⑪ Internal SP when stuck at "L"
IC108, 109	Analog switch	For CTCSS, DTSS, RD switching. (Refer to the circuit description)
IC110	Analog switch	For RD switching
IC112	HIC for electronic potentiometer	Refer to the circuit description
IC113	HIC for SQ	Refer to the circuit description
IC114	HIC for dimmer	Refer to the circuit description
Q1	Low frequency amplification	Mic. amplifier
Q2	Buffer amplifier	For mic. RD
Q3	For mic. line muting	Mic. muting during ON (During DTMF signal transmission)
Q4	5C switch	Switch for 5C line
Q5	Switch	For RESET
Q6, 9	Switch	Power detection circuit, for backup
Q7	Switch	For and dual and single tone switching of the DTMF signal
Q8	Mute switch	
Q10	Buffer amplifier	For DTMF
Q11	Switch	For controlling IC15-16 during backup
Q101, 102	SB system power switch	Q101, 102 are ON when power is ON, Q101, 102 are OFF when power is OFF
Q103, 104	Mute switch	Q103 instantaneously ON when POWER ON, Q104 instantaneously ON when POWER OFF.
Q105	Fan motor switch	Fan operates when switch is ON, fan does not operate when switch is OFF
Q106	Reset switch	For I/O expander resetting

DESCRIPTION OF COMPONENTS

CONTROL UNIT (X53-346X-XX)

No. 3

Device number	Use, function	Operation, condition, interchangeability
IC107, 108, 109	Mute switch	Q107 for band C, Q108 for band A, Q109 for band B
D1	Back flow prevention, lithium battery switching	Lithium battery OFF when power supply is connected.
D2	Voltage compensation	
D3	Back flow prevention	
D4	Surge protection	
D5	Reset detection	
D6	Back flow prevention	

DISPLAY UNIT (X54-3130-11)

No. 1

Device number	Use, function	Operation, condition, interchangeability
IC1	Microprocessor	Refer to circuit description
IC2	5V AVR, reset	
IC3, 4, 5, 6, 203, 206	Serial data inverter buffer	
IC201, 202	LCD driver	
IC204	Flip-flop	Enable generation circuit
IC205	5V AVR	For LCD driver, flip-flop, inverter
Q1	5V power switch	ON when Q3 is ON
Q2	5V power switch	ON when Q4 is ON
Q3	5V power switch	Turned ON by port DO of microcomputr when PS ON
Q4	5V power switch	ON when Q1 is ON
Q5	Reset switch	
Q101	LED switch for function	ON during function
D1	Back-flow prevention	
D2	Back-flow prevention	Prevention of back-flow when common terminal is connected by mistake with CN3.
D3, 4	LED for illumination	Green
D101,102,103 104, 105	LED for function	Red
D107,108,109, 110 111,112, 114	LED for illumination	Yellow

DESCRIPTION OF COMPONENTS

28TX-RX unit (X57-3790-01): UT-28S(M)

No. 1

Component	Use/Function	Operation/Condition/Compatibility
IC1	Shift register	See Circuit Description.
IC2	VCO, PLL	
IC3	Low-frequency amplifier, limiter	Microphone amplifier
IC4	28-MHz band transmission Drive	Operation during transmission 28 - 29.695 MHz ① Input ⑭ Output
IC5	APC	
IC6	Second local oscillator, mixer IF amplifier, detector Low-frequency amplifier Noise detector Squelch switch	① First IF input 8.83 MHz ③ Second local oscillator input 9.285 MHz ⑧ Squelch output, busy signal, 0 V while busy ⑩ Noise detection voltage output (DC) ⑪ Signal-strength meter output ⑫ Detection output ⑭ RD output ⑯ AF OUT
IC7	9V AVR	
IC8	Out-of-band reception Mixer, RF amplifier	① HET input 2 IF output ③ 8 V (8 V outside band; 0 V within band) ⑤ RF output ⑥ 8 V (8 V within band; 0 V outside band) ⑧ RF input
Q1	High-frequency amplifier	Operation during reception, 28-MHz band
Q2	First mixer	Operation during reception
Q3	First IF amplifier	Operation during reception 8.83 MHz
Q4	ATT switch	ON when ATT is ON
Q5	First mixer selection switch	OFF during out-of-band reception

DESCRIPTION OF COMPONENTS

No. 2

Component	Use/Function	Operation/Condition/Compatibility
Q6~7	In-band/out-of-band power switch	Q6 OFF, Q7 ON: In-band reception; Q6 ON, Q7 OFF: Out-of-band reception
Q8	Second local oscillator buffer	Operation during reception 9.285 MHz
Q9	Squelch hysterisis switch	ON while busy
Q10~Q14 Q24	Transmit/receive power switch Q10, Q12, Q13 OFF, Q11, Q14, Q24 ON: During transmission Q10, Q12, Q13, Q24 ON, Q11, Q14 OFF: During reception	
Q15~17	Inverter	
Q18	Modulation system mute	ON during reception
Q19	CV line buffer	
Q20	HET output amplifier	28-29.695 MHz: During transmission; 36.83-38.525 MHz: During reception
Q21	VCO 8V ripple filter	
Q22	Middle (not for 10 W), LOW Power switch	
Q23	APC control	Operation during transmission
Q25~Q26	AM/FM selection switch	Q25 and Q26 OFF: During FM reception Q25 and Q26 ON: During AM reception

DESCRIPTION OF COMPONENTS

No. 3

Component	Use/Function	Operation/Condition/Compatibility
Q27	Transmission band selection switch	ON: Narrow OFF: Wide
D1 ~ D2	ATT selection switch	D1 OFF and D2 ON: When ATT ON D1 ON and D2 OFF: When ATT OFF
D3 ~ D6	Varicap tuner	
D7	HET selection switch	
D8	Reverse-flow prevention	
D9	HET selection switch	
D10	Temperature compensation	APC
D11, D12	Antenna transmit/receive switch	ON: Transmit; OFF: Receive
D13, D14	Power detection	APC
D15	Reverse-power connection prevention	
D16	Reverse-flow prevention	
D17	Temperature compensation	

DESCRIPTION OF COMPONENTS

50 TX-RX Unit (X57-3800-01): UT-50S(M) **No. 1**

Component	Use/Function	Operation/Condition/Compatibility
IC1	Shift register	See Circuit Description.
IC2	VCO, PLL	
IC3	Low-frequency amplifier, limiter	Microphone amplifier
IC4	50 MHz band transmission Drive	Operation during transmission 50 - 53.995 MHz ① Input ⑫ Output
IC5	APC	
IC6	Second local oscillator, mixer IF amplifier, detector Low-frequency amplifier Noise detector Squelch switch	① First IF input 10.595 MHz ③ Second local oscillator input 11.05 MHz ⑨ Squelch output, busy signal, 0 V while busy ⑩ Noise detection voltage output (DC) ⑪ Signal-strength meter output ⑫ Detection output ⑭ RD output ⑮ AF OUT
IC7	9V AVR	
IC8	Out-of-band reception	① HET input 2 IF output ③ 8 V (8 V outside band; 0 V within band)
	Mixer, RF amplifier	⑤ RF output ⑥ 8 V (8 V within band; 0 V outside band) ⑧ RF input
Q1	High-frequency amplifier	Operation during reception, 50 MHz band
Q2	First mixer	Operation during reception
Q3	First IF amplifier	Operation during reception 10.595 MHz
Q4	ATT switch	ON when ATT is ON
Q5	First mixer selection switch	OFF during out-of-band reception

DESCRIPTION OF COMPONENTS

No. 2

Component	Use/Function	Operation/Condition/Compatibility
Q6~7	In-band/out-of-band power switch	Q6 OFF, Q7 ON: In-band reception; Q6 ON, Q7 OFF: Out-of-band reception
Q8	Second local oscillator buffer	Operation during reception 11.05 MHz
Q9	Squelch hysterisis switch	ON while busy
Q10~Q14 Q24	Transmit/receive power switch Q10, Q12, Q13 OFF, Q11, Q14, Q24 ON: During transmission Q10, Q12, Q13, Q24 ON, Q11, Q14 OFF: During reception	
Q15~17	Inverter	
Q18	Modulation system mute	ON during reception
Q19	CV line buffer	
Q20	HET output amplifier	50 - 53.995 MHz: During transmission; 60.595 - 64.590 MHz: During reception
Q21	VCO 8V ripple filter	
Q22	Middle (not for 10 W), LOW Power switch	
Q23	APC control	Operation during transmission
Q25~Q26	AM/FM selection switch	Q25 and Q26 OFF: During FM reception Q25 and Q26 ON: During AM reception

DESCRIPTION OF COMPONENTS

No. 3

Component	Use/Function	Operation/Condition/Compatibility
D1~D2	ATT selection switch	D1 OFF and D2 ON: When ATT ON D1 ON and D2 OFF: When ATT OFF
D3~D6	Varicap tuner	
D7	HET selection switch	
D8	Reverse-flow prevention	
D9	HET selection switch	
D10	Temperature compensation	
D11, D12	Antenna transmit/receive switch	APC
D13, D14	Power detection	ON: Transmit; OFF: Receive
D15	Reverse-power connection prevention	APC
D16	Reverse-flow prevention	
D17	Temperature compensation	

DESCRIPTION OF COMPONENTS

144TX-RX Unit (X57-3580-XX)

No. 1

Reference No.	Function	Description
IC1	Shift register	See the circuit description.
IC2	10V AVR	
IC5	Second local oscillation, mixer, IF amplification, detection, low-frequency amplification, noise amplification, noise detection, and squelch switching	① 10.7 MHz first IF input ③, ④ 10.245 MHz second local oscillation ⑨ 0 V when scan control and busy signals are busy. ⑩ Noise detection voltage output (DC) ⑪ Signal-strength meter output ⑫ Detection output ⑭ RD output ⑮ AF output
IC7	Low-frequency amplification and limiter	Microphone amplifier
IC8	144 MHz band transmission driver	Operation during transmission. 144 to 148-MHz band ⑭ Input ① Output
IC9	APC	
IC10	Power module	
IC11	VCO.PLL	
Q1	High-frequency amplification	Operation during reception. 144 MHz band
Q2	First mixer	Operation during reception
Q3	First IF amplification	Operation during reception. 10.7 MHz

DESCRIPTION OF COMPONENTS

No. 2

Reference No.	Function	Description
Q10 ~ Q14	Transmission and reception power selection	 (0 V during lock) (Q10, Q12, and Q13 are set "OFF" during transmission. Q11 and Q14 are set "ON" during transmission.) (Q10, Q12, and Q13 are set "ON" during reception. Q11 and Q14 are set "OFF" during reception.)
Q15, Q16, Q17	Inverter	
Q18	Modulation muting	ON during reception
Q19	CV line buffer	144 MHz band
Q20	PLL output amplification	
Q21	PLL 8 V ripple filter	
Q22	Middle/low POWER switch	Middle and low POWER switches are set ON when high.
Q23	APC control	Operation during transmission
Q24	Squelch hysteresis switch	OFF when busy
D1 ~ D7	Varicap diode tuning	
D11	Antireverse current	
D12	Antireverse current	
D13	PLL output switch	
D14	Temperature compensation	APC
D15, D16	Antenna transmission and reception selection	ON during transmission. OFF during reception.
D17, D18	Power detection	APC
D19	Power reverse connection protection	

DESCRIPTION OF COMPONENTS

220 TX-RX Unit (X57-3810-10): UT-220S(K)

No. 1

Component	Use/Function	Operation/Condition/Compatibility
IC1	Shift register	See Circuit Description.
IC2	9V AVR	
IC5	Second local oscillator, mixer IF amplifier, detector Low-frequency amplifier Noise detector Squelch switch	① First IF input 30.825 MHz ③ ④ Second local oscillator 30.37 MHz ⑨ Squelch output, busy signal, 0 V while busy ⑩ Noise detection voltage output (DC) ⑪ Signal-strength meter output ⑭ RD output ⑯ AF OUT
IC7	Low-frequency amplifier, limiter	Microphone amplifier
IC8	220-MHz band transmission Drive	Operation during transmission 220 - 224.995 MHz ① Input ⑫ Output
IC9	APC	
IC10	Power module	
IC11	VCO, PLL	
Q1	High-frequency amplifier	Operation during reception, 220 MHz band
Q2	First mixer	Operation during reception
Q3	First IF amplifier	Operation during reception 30.825 MHz

DESCRIPTION OF COMPONENTS

No. 2

Component	Use/Function	Operation/Condition/Compatibility
Q10~Q14	Transmit/receive power switch	 Q10, Q12, Q13 OFF, Q11, Q14 ON: During transmission Q10, Q12, Q13, ON, Q11, Q14 OFF: During reception
Q15~Q17	Inverter	
Q18	Modulation system mute	ON during reception
Q19	CV line buffer	
Q20	HET output amplifier	220 - 224.995 MHz: During transmission: 189.175 - 194.17 MHz: During reception
Q21	VCO 8V ripple filter	
Q22	Middle/low power switch	
Q23	APC control	Operation during transmission
Q24	Squelch hysterisis switch	ON while busy
D3, 5, 7, 20	Varicap tuner	
D11, 12	Reverse-flow prevention	
D13	HET selection switch	
D14	Temperature compensation	APC
D15, 16	Antenna transmit/receive switch	ON: Transmit; OFF: Receive
D17, 18	Power detection	
D19	Reverse-power connection prevention	

DESCRIPTION OF COMPONENTS

430 TX-RX Unit (X57-3590-XX) **No. 1**

Reference No.	Function	Description
IC1	Second local oscillation, mixer, IF amplification, detection, low-frequency amplification, noise amplification, noise detection, and squelch switching	① 21.6 MHz first IF input ③, ④ 21.145 MHz second local oscillation ⑨ 0 V when scan control and busy signals are busy. ⑩ Noise detection voltage output (DC) ⑪ Signal-strength meter output ⑫ Detection output ⑭ RD output ⑮ AF output
IC2	Low-frequency amplification and limiter	Microphone amplifier
IC3	Shift register	See the circuit description.
IC4	10V AVR	
IC5	APC	
IC6	430 MHz band transmission driver	① Output ⑮ Input
IC7	Power module	
IC10	VCO.PLL	
Q1, Q2	High-frequency amplification	Operation during reception
Q3	First mixer	Operation during reception
Q5	First IF amplification	Operation during reception. 21.6 MHz

DESCRIPTION OF COMPONENTS

No. 2

Reference No.	Function	Description
Q8~Q12	Transmission/reception power selection	 (Q8, Q9, and Q10 are set "OFF" during transmission. Q11 and Q12 are set "ON" during transmission.) (Q8, Q9, and Q10 are set "ON" during reception. Q11 and Q12 are set "OFF" during reception.)
Q13, Q14, Q15	Inverter	
Q16	Modulation muting	ON during reception
Q17	PLL 8 V ripple filter	
Q18	PLL output amplification	
Q19	Middle/low POWER switch	Middle and low POWER switches are ON when high.
Q20	APC control	Operation during transmission
Q21	Squelch hysteresis switch	OFF when busy
D1	Antenna switch	OFF during reception
D4	PLL output switch	
D5	Temperature compensation	APC
D6, D7	Antireverse current	
D8, D9	Antenna transmission/reception selection	ON during transmission
D10,D11	Power detection	APC
D12	Power reverse connection protection	
D13	Antireverse current	8T pulse rise is faster during transmission and reception.
D14	IF level limiter	–

DESCRIPTION OF COMPONENTS

1200TX-RX Unit (X57-3600-11): TM-942A, UT-1200 (M) **No. 1**

Reference No.	Function	Description
IC2	Second local oscillation, mixer, IF amplification, detection, low-frequency amplification, noise amplification, noise detection, and squelch switching	① 59.7 MHz first IF input ③, ④ 59.245 MHz second local oscillation ⑨ 0 V when scan control and busy signals are busy. ⑩ Noise detection voltage output (DC) ⑪ Signal-strength meter output ⑫ Detection output ⑭ RD output ⑮ AF output
IC3	ALT	② 8 V ③ "H" during ALT ⑩ Detection input (DC)
IC4	Low-frequency amplification and limiter	Microphone amplifier
IC5	Shift register	See the circuit description.
IC6	9V AVR	
IC7	Predrive	⑩ Input ① Output
IC8	Drive	① Output ⑧ Input
IC9	APC	
IC10	Power module	
IC11	VCO.PLL	
IC12	5V AVR	Three-terminal regulator
Q1, Q2	High-frequency amplification	Operation during reception
Q3	First mixer	Operation during reception
Q6	Receiving PLL output amplification	Operation during reception
Q7	First IF amplification	Operation during reception. 59.7 MHz

DESCRIPTION OF COMPONENTS

No. 2

Reference No.	Function	Description
Q8 ~ Q13	Transmission/reception power selection	 Q8, Q10, and Q11 (b) are set "OFF" during transmission. Q9, Q12, and Q13 are set "ON" during transmission. Q8, Q10, Q11 (b), and Q12 are set "ON" during reception. Q9, Q11 (a), and Q13 are set "OFF" during reception.
Q15, Q16, Q17	Inverter	
Q18	Modulation muting	ON during reception
Q19, Q20	8T voltage selection	OFF when low
Q21	PLL output amplification	
Q22	Transmitting PLL output amplification	Operation during transmission
Q23	8 V ripple filter	
Q24	APC control	Operation during transmission
Q25	Lower-power switch	ON when high
Q26	Squelch hysteresis switch	OFF when busy
Q28	Q1 POWER switch	ON during transmission
D3	IF level limiter	
D4, D17	Antireverse current	
D5, D15	Constant voltage circuit	
D6	Temperature compensation	APC
D7	Temperature compensation	Drive
D8	Overvoltage prevention	
D9	Power detection	APC
D10 ~ D13	Antenna switch	ON during transmission
D14	Power reverse connection protection	

TM-742 A/742 E/942 A

SEMICONDUCTOR DATA

Power Transistor 2SC3240(28 TX-RX Unit)

● Electrical characteristics

Item	Conditions	Maximum value
V_{CBO}		50V
V_{EBO}		5V
V_{CEO}	$R_{BE} = \infty$	20V
IC		25A
Pc	Tc = 25°C	270W
Tj		+175°C
Tstg		-55 ~ +175°C
Ta	25 ±3°C	

● External view

① Collector
② Base
③ Emitter
④ Emitter
⑤ Flange (Emitter)

Power Transistor MRF492 (50 TX-RX Unit)

● Electrical characteristics

Item	Conditions	Maximum value
V_{CBO}		36V
V_{EBO}		4.0V
V_{CEO}		18V
IC		20A
P_D	Tc = 25°C	250W
Tstg		-65 ~ +150°C

● External view

① Emitter
② Base
③ Emitter
④ Collector

SEMICONDUCTOR DATA

Power module S-AV17 (144 TX-RX UNIT)

● Equivalent circuit diagram

● External view

① Input terminal
② First power supply terminal
③ End power supply terminal
④ Output terminal
⑤ Fin (earth)

● Electrical characteristics

Item	Symbol	Tc (°C)	Conditions	Standard value			Unit
				Minimum	Standard	Maximum	
Frequency	f			144		148	MHz
Output power	Po	25	Vcc = 12.5V, Pin = 400mW, Zg = Zl = 50Ω			65	W
Combined effeciency	ηT	25	Same as above	45			%
Harmonics	HRM	25	Same as above		-30	-25	dB

Power module M57774 (220 TX-RX UNIT)

● Equivalent circuit diagram

● External view

① Input terminal
② First power supply terminal
③ End power supply terminal
④ Output terminal
⑤ Fin (earth)

● Electrical characteristics

Item	Symbol	Tc (°C)	Conditions	Standard value			Unit
				Minimum	Standard	Maximum	
Frequency	f			220		225	MHz
Output power	Po	25	Vcc = 12.5V, Pin = 0.3W, Zg = Zl = 50Ω	30	33	40	W
Combined effeciency	ηT	25	Same as above	43	48		%
Secondary spurious strength		25	Same as above			-30	dB
Tertiary spurious strength		25	Same as above			-35	dB

TM-742 A/742 E/942 A

SEMICONDUCTOR DATA

Power module M57788M(430 TX-RX UNIT)

● Equivalent circuit diagram

● External view

① Input terminal
② First power supply terminal
③ Driver power supply terminal
④ End power supply terminal
⑤ Output terminal
⑥ Fin (earth)

● Electrical characteristics

Item	Symbol	Tc (°C)	Conditions	Standard value			Unit
				Minimum	Standard	Maximum	
Frequency	f			430		450	MHz
Output power	Po	25	Vcc = 12.5V, Pin = 400mW, Zg = Zl = 50Ω	40	45		W
Combined effeciency	ηT	25	Same as above	40	45		%
Secondary spurious strength		25	Same as above			-30	dB
Tertiary spurious strength		25	Same as above			-30	dB

Power module M67711 (1200 TX-RX UNIT)

● Equivalent circuit diagram

● External view

① Input terminal
② First power supply terminal
③ Driver power supply terminal
④ End power supply terminal
⑤ Output terminal
⑥ Fin (earth)

● Electrical characteristics

Item	Symbol	Tc (°C)		Standard value			Unit
				Minimum	Standard	Maximum	
Frequency	f			1.24		1.3	GHz
Output power	Po	25	Vcc = 12.5 V, Vbb = 10 V Pin = 1 W, Zg = Z1 = 50Ω	16	17		W
Combined effeciency	ηT	25	Same as above	30	35		%
Secondary spurious strength		25	Same as above			-45	dB

PARTS LIST

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

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

• Capacitor value

0 1 0 = 1pF
1 0 0 = 10pF
1 0 1 = 100pF
1 0 2 = 1000pF = 0.001μF
1 0 3 = 0.01μF

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

• Temperature Coefficient

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

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

Example CC45TH = −470 ± 60 ppm/°C

• Tolerance

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

Less than 10 pF

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

• Rating voltage

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

• Chip capacitors

(EX) C C 7 3 F S L 1 H 0 0 0 J → Refer to the table above.
1 2 3 4 5 6 7
(Chip) (CH,RH,UJ,SL)

(EX) C K 7 3 F F 1 H 0 0 0 Z
1 2 3 4 5 6 7
(Chip) (B,F)

Dimension

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

RESISTORS

• Chip resistor (Carbon)

(EX) R D 7 3 E B 2 B 0 0 0 J
1 2 3 4 5 6 7
(Chip) (B,F)

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

Dimension

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

• Carbon resistor (Normal type)

R D 1 4 B B 2 C 0 0 0 J
1 2 3 4 5 6 7

Rating wattage

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

Dimension

TM-742 A/742 E/942 A

PARTS LIST

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TM-742

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
			TM-742			
1	1A	*	A01-2068-03	METALLIC CABINET(UPPER)		
2	3A	*	A01-2069-03	METALLIC CABINET(BOTTOM)		
3	2F	*	A13-1601-02	FREM		
4	2E	*	A62-0206-02	PANEL (BODY)		
5	3C	*	A62-0219-03	PANEL ASSY (LOWER)		
6	2C	*	A62-0221-03	PANEL ASSY (742A)	KPMM2	
6	2C	*	A62-0222-03	PANEL ASSY (742E)	EE2E3	
7	2D	*	A82-0012-02	BACK PANEL (UPPER)		
8	3D	*	A82-0013-02	BACK PANEL (LOWER)		
10	2D	*	B03-0577-04	DRESSING PLATE		
14	2D	*	B41-0696-04	CAUTION LABEL		
15	1A,1B		B42-2455-04	LABEL(M4x8 MAX)		
16	1B		B42-3343-04	LABEL(S/NO)		
-			B42-3394-04	LABEL(FCC)	KP	
18	1B		B42-3484-04	LABEL(SP,ANT)	KP	
18	1B		B42-3485-04	LABEL(SP,ANT)	EE2E3	
18	1B		B42-3485-04	LABEL(SP,ANT)	MM2	
19	2D	*	B42-3554-04	LABEL(M2.6x5 MAX)		
20	3J		B44-2163-04	UPC CODE LABEL(ITEM CARTON)		
-			B44-2165-04	UPC CODE LABEL(OUTER CARTON)		
22	1J		B46-0410-30	WARRANTY CARD	K	
22	1J		B46-0419-00	WARRANTY CARD	EE2E3	
22	1J		B46-0422-00	WARRANTY CARD	P	
23	1I,1J	*	B59-0466-00	SUB-INSTRUCTION MANUAL		
24	1J	*	B62-0287-10	INSTRUCTION MANUAL		
25	1J	*	B62-0288-00	INSTRUCTION MANUAL	MM2E3	
25	1J	*	B62-0289-00	INSTRUCTION MANUAL	EE2	
30	1I	*	B62-0345-00	INSTRUCTION MANUAL(FRANCE)	PMM2E3	
27	1B	*	B72-0504-04	MODEL NAME PLATE(TM-742A)	KP	
27	1B	*	B72-0505-04	MODEL NAME PLATE(TM-742A)	MM2	
27	1B	*	B72-0506-04	MODEL NAME PLATE(TM-742E)	EE2E3	
28	1E	*	D32-0417-04	STOPPER		
29	1A,2B		E23-0676-04	TERMINAL		
-			E30-3006-08	CURL CORD		
31	2I		E30-3034-05	DC CORD (ACSY)		
32	2A,2D	*	E30-3135-15	CONNECTING WIRE(COMMON-PANEL)		
33	2E		E37-0006-05	CONNECTING WIRE(SPEAKER)		
34	2F	*	E37-0325-05	FLAT CABLE(16P)		
35	2F	*	E37-0326-05	CONNECTING WIRE(FAN)		
36	3E	*	F01-0992-03	HEAT SINK(COMMON AVR,SP)		
37	3E	*	F01-0993-04	HEAT SINK		
38	1B		F07-1203-13	COVER(FAN)		
39	3D	*	F07-1232-04	COVER(PANEL··UPPER)		
40	1D,2E		F07-1345-04	COVER(PANEL··LOWER)		
-		*	F15-0679-04	SHADE PLATE(8 KEYS)		
42	2I		F51-0017-05	FUSE(15A·ACSY)		
-			F51-0018-05	FUSE(20A·DC CORD)		
44	1E		G01-0833-04	COMPRESSION SPRING		
-			G02-0505-05	LEAF SPRING (VOL KNOB)		
50	2E		G02-0716-04	FLAT SPRING(SPEAKER)		
51	1B		G10-0663-04	NON-WOVEN FABRIC(100X85)		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

PARTS LIST

* New Parts
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TM-742

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
52	1A,3A		G10-0686-04	NON-WOVEN FABRIC(130X5)		
53	1E,2F		G10-0700-04	NON-WOVEN FABRIC(60X10)		
54	1B		G10-0709-04	NON-TOVEN FABRIC(145X5)		
-		*	G10-0724-04	NON-WOVEN FABRIC(CASE)		
56	1D	*	G11-0680-03	SHEET(PANEL··UPPER)		
57	3D	*	G11-0681-13	SHEET(PANEL··LOWER)		
-		*	G11-0688-04	SHEET(CPU····50X25)		
-		*	G11-0690-14	SHEET(30X30··ENCODER)		
59	3B,2E		G53-0508-04	NON-WEVEN FABRIC(30X10)		
60	3I	*	H10-2696-12	POLYSTYRENE FORMED FIXTURE		
61	1I	*	H11-0856-24	PACKING FIXTURE	PMM2	
61	1I	*	H11-0856-24	PACKING FIXTURE	EE2E3	
47	1I	*	H11-0857-24	PACKING FIXTURE	PMM2	
47	1I	*	H11-0857-24	PACKING FIXTURE	EE2E3	
48	1J	*	H13-0861-04	PACKING FIXTURE	K	
62	3I	*	H13-0897-04	PROTECTION BOARD(150X30)		
-		*	H13-0901-04	PROTECTION BOARD(260X325)	PMM2	
-		*	H13-0901-04	PROTECTION BOARD(260X325)	EE2E3	
63	2I		H25-0029-04	PROTECTION BAG	KP	
64	2I		H25-0079-04	PROTECTION BAG(200X200)		
65	2J		H25-0723-04	PROTECTION BAG(230X400)		
49	1I		H25-0750-04	PROTECTION BAG(170X270)	PMM2	
49	1I		H25-0750-04	PROTECTION BAG(170X270)	EE2E3	
66	3J	*	H52-0370-04	ITEM CARTON BOX(TM-742A,440M)	KP	
66	3J	*	H52-0371-04	ITEM CARTON BOX(TM-742A,430M)	MM2	
66	3J	*	H52-0372-04	ITEM CARTON BOX(TM-742E)	EE2E3	
-		*	H62-0323-04	OUTER CARTON BOX(TM-742A)	KPMM2	
-		*	H62-0324-04	OUTER CARTON BOX(TM-742E)	EE2E3	
67	2I		J20-0319-24	MIC FOOK(ACSY)	KP	
68	1B		J21-4308-14	MOUNTING HARDWARE(FAN)		
69	1B,3B		J21-4352-03	MOUNTING HARDWARE		
70	1E	*	J21-4404-04	MOUNTING HARDWARE(RELEASE)		
71	2D	*	J21-4405-04	MOUNTING HARDWARE(PANEL)		
72	2J		J29-0454-03	WIRING BOARD (ACSY)		
73	1B		J42-0452-05	BUSHING		
86	3C	*	K29-4805-04	KNOB ENCODER		
87	3C	*	K29-4806-04	KNOB(BUTTON) MHZ		
89	3C	*	K29-4808-04	KNOB SQL		
90	3C	*	K29-4840-04	KNOB ASSY VOL		
-			L15-0310-25	LOW-FREQUENCY CHOKE COIL		
A	2A,2B		N09-2084-05	SCREW (PLUS TERMINAL)		
C	2B,3B		N30-3030-46	PAN HEAD MACHINE SCREW(UNIT)		
E	2A,2B		N32-2606-46	FLAT HEAD MACHINE SCREW(TX-RX)		
F	1A,1B		N33-2606-45	OVAL HEAD MACHINE SCREW(CASE)		
G	1B		N33-2614-45	OVAL HEAD MACHINE SCREW(FAN)		
H	1E		N35-2605-45	BINDING HEAD SCREW (PANEL)		
I	2I		N46-3010-46	PAN HEAD TAP SCREW (MIC HOOK)	KP	
J	2D,3D		N80-2006-45	PAN HEAD TAPTITE SCREW(PANEL)		
K	1D		N80-2008-45	PAN HEAD TAPTITE SCREW(PANEL)		
L	2A,2D	*	N80-2605-45	PAN HEAD TAPTITE SCREW(PANEL)		
M	1A,1B		N86-2606-45	SCREW (CASE)		
N	2F,3F		N87-2606-46	BRAZIER HEAD TAPTITE SCREW		
O	3E		N87-2608-46	BRAZIER HEAD TAPTITE SCREW		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

PARTS LIST

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TM-742
TM-942

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
			N89-2005-46	PAN HEAD TAP SCREW (RELEASE)		
P	3I		N99-0331-05	SCREW SET(ACSY)		
SP1	2E		T07-0286-05	SPEAKER		
FAN	1B		T42-0310-25	FAN MOTOR		
MIC	1I		T91-0396-05	MICROPHONE	MM2	
MIC	1I		T91-0397-05	MICROPHONE (DTMF)	KP	
MIC	1I		T91-0398-05	MICROPHONE	EE2E3	
92	2I		W01-0414-04	SPANNER(ACSY)		
93	3F	*	X53-3460-11	CONTROL UNIT	KP	
93	3F	*	X53-3460-21	CONTROL UNIT	M	
93	3F	*	X53-3460-22	CONTROL UNIT	M2	
93	3F	*	X53-3462-71	CONTROL UNIT	EE3	
93	3F	*	X53-3462-72	CONTROL UNIT	E2	
94	1D	*	X54-3130-11	DISPLAY UNIT		
95	2B		X57-3580-12	TX-RX UNIT(144M 50W)		
96	2B	*	X57-3590-12	TX-RX UNIT(440M 35W)	KP	
96	2B	*	X57-3590-22	TX-RX UNIT(430M 35W)	MM2	
96	2B		X57-3592-72	TX-RX UNIT(430M 35W)	EE2E3	
-			490-0160-05	SHEET (FRONT GLASS)		
-			490-0010-05	SHEET (FPC)		
TM-942						
1	1A	*	A01-2068-03	METALLIC CABINET(UPPER)		
2	3A	*	A01-2069-03	METALLIC CABINET(BOTTOM)		
3	2F	*	A13-1601-02	FRAME		
6	2C	*	A62-0197-03	PANEL ASSY (UPPER)		
4	2E	*	A62-0206-02	PANEL (BODY)		
5	3C	*	A62-0219-03	PANEL ASSY (LOWER)		
7	2D	*	A82-0012-02	BACK PANEL (UPPER)		
8	3D	*	A82-0013-02	BACK PANEL (LOWER)		
10	2D	*	B03-0577-04	DRESSING PLATE		
14	2D	*	B41-0696-04	CAUTION LABEL		
15	1A,1B		B42-2455-04	LABEL (M4×8 MAX)		
16	1B		B42-3343-04	LABEL (S/NO)		
-			B42-3394-14	LABEL (FCC)	KP	
18	1B		B42-3412-04	LABEL (SP.ANT)	M	
18	1B		B42-3440-04	LABEL (SP,ANT)	KP	
19	2D	*	B42-3554-04	LABEL (M2.6×5 MAX)		
20	3J		B44-2163-04	UPC CODE LABEL(ITEM CARTON)		
-			B44-2165-04	UPC CODE LABEL(OUTER CARTON)		
22	1J		B46-0410-30	WARRNTY CARD	K	
22	1J		B46-0422-00	WARRNTY CARD	P	
23	1I,1J	*	B59-0466-00	SUB INSTRUCTION MANUAL		
24	1I,1J	*	B62-0287-10	INSTRUCTION MANUAL		
25	1I	*	B62-0288-00	INSTRUCTION MANUAL	M	
30	1I	*	B62-0345-00	INSTRUCTION MANUAL(FRANCE)	MP	
27	1B	*	B72-0476-04	MODEL NAME PLATE (942A)	KP	
27	1B	*	B72-0477-04	MODEL NAME PLATE (942A)	M	
28	1E	*	D32-0417-04	STOPPER		
29	1A,2B		E23-0657-04	TERMINAL		
-			E30-3006-08	CURL CODE		
31	2I		E30-3034-05	DC CODE (ACSY)		
32	2A,2D	*	E30-3135-15	CONNECTING WIRE(PANEL)		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

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TM-942

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
33	2F		E37-0006-05	CONNECTING WIRE(SPEAKER)		
34	2F	*	E37-0325-05	FLAT CABLE (16P)		
35	2F	*	E37-0326-05	CONNECTING WIRE (FAN)		
36	3E	*	F01-0992-03	HEAT SINK (AVR,SP)		
37	3E	*	F01-0993-04	HEAT SINK		
38	1B		F07-1203-13	COVER (FAN)		
39	3D	*	F07-1232-04	COVER (PANEL··LOWER)		
40	1D,2E		F07-1345-04	COVER (PANEL··UPPER)		
42	2I		F51-0017-05	FUSE (15A··ACSY)		
-			F51-0018-05	FUSE (20A··DC CODE)		
44	1E		G01-0833-04	COMPRESSION SPRING		
-			G02-0505-05	LEAF SPRING (VOL KNOB)		
50	2E		G02-0716-04	FRAT SPRING (SPEAKER)		
51	1B		G10-0663-04	NON-WOVEN FABRRIC(100X85)		
52	1A,3A		G10-0686-04	NON-WOVEN FABRRIC(130X5)		
53	1E,2F		G10-0700-04	NON-WOVEN FABRRIC(60X10)		
56	1D	*	G11-0680-03	SHEET (PANEL··UPPER)		
57	3D	*	G11-0681-13	SHEET (PANEL··LOWER)		
-		*	G11-0688-04	SHEET (50x25··CPU)		
-		*	G11-0690-14	SHEET (30X20··ENCODER)		
59	3B,2E		G53-0508-04	NON-WOVEN FABRIC(30X10)		
60	3I	*	H10-2696-12	POLYSTYRENE FOAMED FIXTURE		
61	1I	*	H11-0856-24	PACKING FIXTURE	PM	
47	1I	*	H11-0857-24	PACKING FIXTURE	PM	
-		*	H13-0861-04	PROTECTION BOARD	K	
-		*	H13-0901-04	PROTECTION BOARD	PM	
62	3I	*	H13-0897-04	PROTECTION BOARD(150X30)		
63	2I		H25-0029-04	BAG	KP	
64	2I		H25-0079-04	BAG (200X200)		
65	3J		H25-0723-04	BAG (230X400)		
-			H25-0750-04	BAG (170X270)	PM	
66	3J	*	H52-0334-04	ITEM CARTON BOX(942A)	KP	
66	3J	*	H52-0335-04	ITEM CARTON BOX(942A)	M	
-		*	H62-0291-04	OUTER CARTON BOX		
67	2I		J20-0319-24	MIC FOOK (ACSY)	KP	
68	1B		J21-4308-14	MOUNTING HARDWAEE(FAN)		
70	1E	*	J21-4404-04	MOUNTING HARDWARE(RELEASE)		
71	2D	*	J21-4405-04	MOUNTING HARDWARE(PANEL)		
72	2J		J29-0454-03	WIRING BOARD(ACSY)		
73	3B		J69-0325-05	O RING (NUT)		
86	3C	*	K29-4805-04	KNOB (ENCODER)		
87	3C	*	K29-4806-04	KNOB (MHz)		
89	3C	*	K29-4808-04	KNOB (SQL)		
90	3C	*	K29-4840-04	KNOB ASSY (VOL)		
-			L15-0310-25	LOW-FREQENCY CHOKE COIL		
A	2A,2B		N09-2084-05	SCREW (PULS TERMINAL)		
B	3B		N10-2030-46	HEXAGON NUT(BAND UNIT)		
D	2B		N30-3040-46	PAN HEAD MACHIN SCREW		
E	2A,2B		N32-2606-46	FLAT HEAD MACHIN SCREW		
F	1A,1B		N33-2606-45	OVAL HEAD MACHIN SCREW		
G	1B		N33-2614-45	OVAL HEAD MACHIN SCREW		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

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TM-942
CONTROL UNIT (X53-3460-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
H	1E		N35-2605-45	BINDING HEAD MACHINE SCREW		
I	2I		N46-3010-46	PAN HEAD TAPPING SCREW	KP	
J	2D,3D		N80-2006-45	PAN HEAD TAPTITE SCREW(PANEL)		
K	1D		N80-2008-45	PAN HEAD TAPTITE SCREW(PANEL)		
L	2A,2D	*	N80-2605-45	PAN HEAD TAPTITE SCREW(PANEL)		
M	1A,1B		N86-2606-45	SCREW (CASE)		
N	3E,2F		N87-2606-46	BRAZIER HEAD TAPTITE SCREW		
Ø	3E		N87-2608-46	BRAZIER HEAD TAPTITE SCREW		
			N89-2005-46	PAN HEAD TAPTITE SCREW(RELEASE)		
P	3I		N99-0331-05	SCREW SET (ACSY)		
SP1	2E		T07-0268-05	LØUDSPEAKER(FULLRANGE)		
FAN	1B	*	T42-0310-25	FAN MØTØR		
MIC	1I		T91-0396-05	MICRØPHØNE	M	
MIC	1I		T91-0397-05	MICRØPHØNE	KP	
92	2I		W01-0414-04	SPANNER (ACSY)		
93	3F	*	X53-3460-11	CØNTRØL CIRCUIT UNIT	KP	
93	3F	*	X53-3460-21	CØNTRØL CIRCUIT UNIT	M	
94	1D,3D	*	X54-3130-11	DISPLAY UNIT		
95	2B		X57-3580-11	TX-RX UNIT (144MHZ 50W)		
96	2B		X57-3590-13	TX-RX UNIT (440MHZ 35W)	KP	
96	2B		X57-3590-23	TX-RX UNIT (430MHZ 35W)	M	
97	2B		X57-3600-11	TX-RX UNIT (1200MHZ 10W)		
CONTROL UNIT (X53-3460-XX)						
C1 -4			CK73FB1H102K	CHIP C 1000PF K		
C5			CK73FB1E104K	CHIP C 0.10UF K		
C6			CK73FF1C105Z	CHIP C 1.0UF Z		
C7			CK73FB1E223K	CHIP C 0.022UF K		
C8			CK73FB1H102K	CHIP C 1000PF K		
C9			CK73FB1E104K	CHIP C 0.10UF K		
C10			CK73FB1H102K	CHIP C 1000PF K		
C11			CK73FB1E104K	CHIP C 0.10UF K		
C12			CK73FB1H102K	CHIP C 1000PF K		
C13			CK73FF1C105Z	CHIP C 1.0UF Z		
C14			CK73FB1E104K	CHIP C 0.10UF K		
C15			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
C16 ,17			CC73FSL1H101J	CHIP C 100PF J		
C18			CK73FB1H472K	CHIP C 4700PF K		
C19			CC73FCH1H120J	CHIP C 12PF J		
C20			CK73FB1H123K	CHIP C 0.012UF K		
C21 ,22			CC73FCH1H220J	CHIP C 22PF J		
C23			CK73FB1H182K	CHIP C 1800PF K		
C24			CC73FCH1H151J	CHIP C 150PF J		
C25			CC73FSL1H101J	CHIP C 100PF J		
C26			CK73FB1H102K	CHIP C 1000PF K		
C27			CK73FF1C105Z	CHIP C 1.0UF Z		
C28			CK73FB1E223K	CHIP C 0.022UF K		
C29 ,30			CK73FF1C105Z	CHIP C 1.0UF Z		
C31			CE04EW1A221M	ELECTRØ 220UF 10WV		
C32 -34			CK73FB1H102K	CHIP C 1000PF K		
C35			CK73FB1E104K	CHIP C 0.10UF K		
C36			CC73FCH1H121J	CHIP C 120PF J		
C37			CC73FCH1H390J	CHIP C 39PF J		
C38			CC73FCH1H330J	CHIP C 33PF J		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

PARTS LIST

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

CONTROL UNIT (X53-3460-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
C39 -41			CK73FB1E103K	CHIP C 0.01UF K		
C42			CK73FB1H102K	CHIP C 1000PF K		
C43			CK73FB1E104K	CHIP C 0.10UF K		
C44			CK73FB1E103K	CHIP C 0.01UF K		
C45			CK73FB1H332K	CHIP C 3300PF K		
C46			CC73FSL1H101J	CHIP C 100PF J		
C47			CK73FB1E103K	CHIP C 0.01UF K		
C48			CK73FB1E223K	CHIP C 0.022UF K		
C49			CK73FB1E103K	CHIP C 0.01UF K		
C50 -52			CK73FB1H102K	CHIP C 1000PF K		
C53			CK73FB1E104K	CHIP C 0.10UF K		
C101			CK73FF1C105Z	CHIP C 1.0UF Z		
C102,103			CK73FB1H102K	CHIP C 1000PF K		
C104			CE04EW1C470M	ELECTRO 47UF 16WV		
C105			CK73FB1H102K	CHIP C 1000PF K		
C106			CE04EW1A470M	ELECTRO 47UF 10WV		
C107,108			CK73FB1E123K	CHIP C 0.012UF K		
C109			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
C110			CK73FB1H682K	CHIP C 6800PF K		
C111			CK73FF1C105Z	CHIP C 1.0UF Z		
C112			CK73FB1H102K	CHIP C 1000PF K		
C113			CK73FB1E103K	CHIP C 0.01UF K		
C114			CK73FB1H102K	CHIP C 1000PF K		
C115-117			CK73FB1E104K	CHIP C 0.10UF K		
C118			CK73FF1C105Z	CHIP C 1.0UF Z		
C119			CK73FB1H102K	CHIP C 1000PF K		
C120			CC73FSL1H101J	CHIP C 100PF J		
C121			CK73FB1H102K	CHIP C 1000PF K		
C122			CK73FB1E123K	CHIP C 0.012UF K		
C123			CK73FB1E104K	CHIP C 0.10UF K		
C124,125			CE04EW1A470M	ELECTRO 47UF 10WV		
C126			CE04EW1A471M	ELECTRO 470UF 10WV		
C127,128			CE04EW1A470M	ELECTRO 47UF 10WV		
C129			CE04EW1C101M	ELECTRO 100UF 16WV		
C130-133			CE04EW1A470M	ELECTRO 47UF 10WV		
C134			CE04EW1C101M	ELECTRO 100UF 16WV		
C135-137			CE04EW1A471M	ELECTRO 470UF 10WV		
C138			CE04EW1C470M	ELECTRO 47UF 16WV		
C139			CK73FF1C105Z	CHIP C 1.0UF Z		
C140,141			CK73FB1H102K	CHIP C 1000PF K		
C142			CK73FB1E223K	CHIP C 0.022UF K		
C143-145			CK73FB1E104K	CHIP C 0.10UF K		
C146,147			CK73FF1C105Z	CHIP C 1.0UF Z		
C148			C90-2167-05	ELECTROLYTIC CAPACITOR(LEAD)		
C149			CE04EW1A101M	ELECTRO 100UF 10WV		
C151-153			CC73FSL1H101J	CHIP C 100PF J		
C154			CE04EW1A471M	ELECTRO 470UF 10WV		
IC101			CXD1095Q			
CN1			E40-5425-05	PIN CONNECTOR FOR INSIDE		
CN2			E40-5224-05	PIN CONNECTOR FOR INSIDE		
CN3			E40-3246-05	PIN CONNECTOR FOR INSIDE		
CN4			E40-3248-05	PIN CONNECTOR FOR INSIDE		
CN5			E40-5343-05	PIN CONNECTOR FOR INSIDE		
CN101-106			E40-5452-05	PIN CONNECTOR FOR INSIDE		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

PARTS LIST

* New Parts
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Les articles non mentionnes dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

CONTROL UNIT (X53-3460-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
CN107			E40-5224-05	PIN CONNECTOR FOR INSIDE		
CN108			E40-5408-05	PIN CONNECTOR FOR INSIDE		
CN109			E40-3299-05	PIN CONNECTOR FOR INSIDE		
J1			E11-0448-05	PHONE JACK		
J2			E08-0876-05	RECTANGULAR RECEPTACLE		
W101		*	E37-0329-05	CONNECTING WIRE		
F101		*	F53-0095-05	FUSE(1.2A)		
		*	G11-0691-04	AUXILIARY PART		
			G13-1396-04	FORMED PLATE		
			J30-0563-05	SPACER		
IC102		*	L7808CV	RESONATOR		
L1			L92-0131-05	CORE		
X1		*	L77-1516-05	CRYSTAL RESONATOR		
X2			L77-1441-05	CRYSTAL RESONATOR		
X3			L78-0301-05	RESONATOR(3.5795MHZ)		
X4			L78-0089-05	RESONATOR(480KHZ)		
CP1 ,2		*	R90-0729-05	MULTIPLE COMPONENTS (C.R.L)		
CP3 ,4			R90-0727-05	MULTIPLE COMPONENTS (C.R.L)		
R1 -3			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R4 -6			RK73FB2A473J	CHIP R 47K J 1/10W		
R7			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R8			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R9			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R10			RK73FB2A154J	CHIP R 150K J 1/10W		
R11			RK73FB2A223J	CHIP R 22K J 1/10W		
R12			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R13			RK73FB2A332J	CHIP R 3.3K J 1/10W	KPMM2	
R13			RK73FB2A561J	CHIP R 560 J 1/10W	EE2E3	
R14			RK73FB2A392J	CHIP R 3.9K J 1/10W	KPMM2	
R14			RK73FB2A822J	CHIP R 8.2K J 1/10W	EE2E3	
R15			RK73FB2A183J	CHIP R 18K J 1/10W		
R16			RK73FB2A104J	CHIP R 100K J 1/10W		
R17			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R18			RK73FB2A221J	CHIP R 220 J 1/10W		
R19			RK73FB2A123J	CHIP R 12K J 1/10W		
R20			RK73FB2A823J	CHIP R 82K J 1/10W		
R21			RK73FB2A224J	CHIP R 220K J 1/10W		
R22			RK73FB2A184J	CHIP R 180K J 1/10W		
R23			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R24			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R25			RK73FB2A103J	CHIP R 10K J 1/10W		
R26			RK73FB2A473J	CHIP R 47K J 1/10W		
R27			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R28			RK73FB2A103J	CHIP R 10K J 1/10W		
R29 ,30			RK73FB2A474J	CHIP R 470K J 1/10W		
R31			RK73FB2A563J	CHIP R 56K J 1/10W		
R32			RK73FB2A474J	CHIP R 470K J 1/10W		
R33			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R34			RK73FB2A334J	CHIP R 330K J 1/10W		
R35			RK73FB2A684J	CHIP R 680K J 1/10W		
R36			RK73FB2A473J	CHIP R 47K J 1/10W		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

PARTS LIST

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CONTROL UNIT (X53-3460-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R37			RK73FB2A334J	CHIP R 330K J 1/10W		
R38			R92-0670-05	CHIP R 0 ΩHM		
R39			RK73FB2A101J	CHIP R 100 J 1/10W		
R40			RK73FB2A103J	CHIP R 10K J 1/10W		
R41			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R42			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R43			RK73FB2A394J	CHIP R 390K J 1/10W		
R44			RK73FB2A473J	CHIP R 47K J 1/10W		
R45			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R46			R92-1291-05	FIXED RESISTOR		
R47			RK73FB2A153J	CHIP R 15K J 1/10W		
R48			RK73FB2A333J	CHIP R 33K J 1/10W		
R49			RK73FB2A223J	CHIP R 22K J 1/10W		
R50			RK73FB2A474J	CHIP R 470K J 1/10W		
R51 -53			RK73FB2A473J	CHIP R 47K J 1/10W		
R54 -57			R92-0670-05	CHIP R 0 ΩHM		
R58			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R59			RK73FB2A103J	CHIP R 10K J 1/10W		
R60			RK73FB2A473J	CHIP R 47K J 1/10W	M2E2	
R61			RK73FB2A473J	CHIP R 47K J 1/10W	MM2	
R62			RK73FB2A473J	CHIP R 47K J 1/10W	EE2E3	
R64			RK73FB2A473J	CHIP R 47K J 1/10W	KPMM2	
R64			RK73FB2A473J	CHIP R 47K J 1/10W	EE3	
R65 ,66			RK73FB2A473J	CHIP R 47K J 1/10W		
R67			RK73FB2A473J	CHIP R 47K J 1/10W	KPMM2	
R67			RK73FB2A473J	CHIP R 47K J 1/10W	E2	
R68			RK73FB2A474J	CHIP R 470K J 1/10W		
R69			RK73FB2A121J	CHIP R 120 J 1/10W		
R70 ,71			RK73FB2A474J	CHIP R 470K J 1/10W		
R72			RK73FB2A682J	CHIP R 6.8K J 1/10W		
R73			RK73FB2A473J	CHIP R 47K J 1/10W	KPMEE2	
R74			RK73FB2A473J	CHIP R 47K J 1/10W	KP	
R74			RK73FB2A473J	CHIP R 47K J 1/10W	EE2E3	
R75			RK73FB2A473J	CHIP R 47K J 1/10W	KPMM2	
R76			RK73FB2A473J	CHIP R 47K J 1/10W		
R77			RK73FB2A473J	CHIP R 47K J 1/10W	E2	
R80			RK73FB2A473J	CHIP R 47K J 1/10W	EE3	
R81 ,82			RK73FB2A121J	CHIP R 120 J 1/10W		
R83			RK73FB2A102J	CHIP R 1K J 1/10W		
R101			RK73FB2A563J	CHIP R 56K J 1/10W		
R102-104			RK73FB2A223J	CHIP R 22K J 1/10W		
R105			RK73FB2A101J	CHIP R 100 J 1/10W		
R106,107			RK73FB2A332J	CHIP R 3.3K J 1/10W	EE2E3	
R108			RK73FB2A474J	CHIP R 470K J 1/10W		
R109			RK73FB2A183J	CHIP R 18K J 1/10W		
R110			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R111			R92-0685-05	CHIP R 22 J 1/2W		
R112-114			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R115			RK73FB2A183J	CHIP R 18K J 1/10W		
R116			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R117,118			RK73FB2A183J	CHIP R 18K J 1/10W		
R119			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R120			RK73FB2A103J	CHIP R 10K J 1/10W		
R121			R92-1215-05	CHIP R 470 J 1/2W		
R122-124			RK73FB2A103J	CHIP R 10K J 1/10W		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

PARTS LIST

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CONTROL UNIT (X53-3460-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R125-129			RK73FB2A104J	CHIP R 100K J 1/10W		
R130-133			RK73FB2A183J	CHIP R 18K J 1/10W		
R134			RK73FB2A4R7J	CHIP R 4.7 J 1/10W		
R135			RK73FB2A473J	CHIP R 47K J 1/10W		
R136,137			RK73FB2A101J	CHIP R 100 J 1/10W		
R138,139			RK73FB2A473J	CHIP R 47K J 1/10W		
R140,141			RK73FB2A101J	CHIP R 100 J 1/10W		
R142			RK73FB2A473J	CHIP R 47K J 1/10W		
R143-145			RK73FB2A4R7J	CHIP R 4.7 J 1/10W		
R146			RK73FB2A474J	CHIP R 470K J 1/10W		
R147,148			RK73FB2A183J	CHIP R 18K J 1/10W		
R149			RK73FB2A332J	CHIP R 3.3K J 1/10W	EE2E3	
R150			RK73FB2A474J	CHIP R 470K J 1/10W		
R151			RK73FB2A472J	CHIP R 4.7K J 1/10W		
D1			DAN202U	DIODE		
D2 -4			MA112	DIODE		
D5		*	DTZ9.1(A)	DIODE		
D6			MA112	DIODE		
D101-103			DA204U	DIODE		
IC1		*	HD6433388A04F	IC(CPU)		
IC2			LC3564PML-12	IC(8192 X8 RAM)		
IC3			TA78L06F	IC		
IC4		*	TC74HC133AF	IC		
IC5			TC74HC00AF	IC(2-INPUT NAND GATE)		
IC6			S-3520CF	IC		
IC7		*	HD74HC165FP	IC		
IC8			BU4066BF	IC(ANALOG SWITCH X4)		
IC9			NJM4558E	IC(OP AMP)		
IC10			TC35219F	IC		
IC11			LC7385M	IC(DTMF DECODER)		
IC12			PST7030MT	IC		
IC13,14			TC4S11F	IC(2 INPUT NAND GATE)		
IC15		*	TC4W66F	IC		
IC16			TC4S66F	IC(BILATERAL SWITCH)		
IC103			NJM4558E	IC(OP AMP)		
IC104,105			LA4446	IC(AF POWER AMP)		
IC106			BU4053BF	IC(ANALOG MULTIPLEXER)		
IC108,109			BU4053BF	IC(ANALOG MULTIPLEXER)		
IC110			TC4S66F	IC(BILATERAL SWITCH)		
IC112		*	KCC06	IC		
IC113		*	KCX04	IC		
IC114		*	KCC07	IC		
Q1			2SC3722K(S)	TRANSISTOR		
Q2			2SC4116(Y)	TRANSISTOR		
Q3			DTC114EU	DIGITAL TRANSISTOR		
Q4		*	2SB815(6,7)	TRANSISTOR		
Q5 ,6			2SC4116(Y)	TRANSISTOR		
Q7			DTC114EU	DIGITAL TRANSISTOR		
Q8			2SD1757K	TRANSISTOR		
Q9 ,10			2SC4116(Y)	TRANSISTOR		
Q11			DTA144EU	DIGITAL TRANSISTOR		
Q101			2SC4116(Y)	TRANSISTOR		
Q102			2SA1641(S,T)	TRANSISTOR		
Q103			DTC144EK	DIGITAL TRANSISTOR	–	

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

PARTS LIST

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CONTROL UNIT (X53-3460-XX)
DISPLAY UNIT (X54-3130-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
Q104			DTA144EK	DIGITAL TRANSISTOR		
Q105			DTD143EK	DIGITAL TRANSISTOR		
Q106			2SC4116(Y)	TRANSISTOR		
Q107-109			2SD1757K	TRANSISTOR		
BA1			W09-0573-05	LITHIUM BATTERY		
DISPLAY UNIT (X54-3130-XX)						
151	2D	*	B11-1070-04	FILTER(LCD)		
152	1C	*	B11-1071-04	FILTER(LCD)		
C1			CK73GB1H102K	CHIP C 1000PF K		
C2			C92-0004-05	ELECTRO 1.0UF 16WV		
C3			CK73GB1H102K	CHIP C 1000PF K		
C4			C92-0045-05	ELECTRO 22UF 6.3WV		
C5			CK73GB1H102K	CHIP C 1000PF K		
C6 ,7			CC73GSL1H101J	CHIP C 100PF J		
C8 ,9			CC73GCH1H330J	CHIP C 33PF J		
C10 -18			CK73GB1H102K	CHIP C 1000PF K		
C19 ,20			CK73GB1H472K	CHIP C 4700PF K		
C21 ,22			CK73GB1H102K	CHIP C 1000PF K		
C23			CK73GB1E103K	CHIP C 0.010UF K		
C101-103			CK73GB1H102K	CHIP C 1000PF K		
C201			CK73GB1H102K	CHIP C 1000PF K		
C202,203			CC73GSL1H101J	CHIP C 100PF J		
C204,205			CK73GB1E103K	CHIP C 0.010UF K		
C206-207			CK73GB1H102K	CHIP C 1000PF K		
C208			C92-0047-05	ELECTRO 47UF 6.3WV		
C209			CK73GB1E103K	CHIP C 0.010UF K		
		*	E29-1112-14	CONNECTOR&TERMINAL		
		*	E37-0309-05			
CN1			E40-3262-05	PIN CONNECTOR FOR INSIDE		
CN2		*	E40-5587-05	PIN CONNECTOR FOR INSIDE		
CN3			E40-3262-05	PIN CONNECTOR FOR INSIDE		
CN101		*	E40-5587-05	PIN CONNECTOR FOR INSIDE		
CN201			E40-3262-05	PIN CONNECTOR FOR INSIDE		
153	1C	*	G11-0688-04	AUXILIARY PART		
154	2C	*	J21-4409-03	MOUNTING HARDWARE(LCD)		
155	1C	*	J30-0563-05	SPACER		
X1		*	L77-1504-05	CRYSTAL RESONATOR(4MHZ)		
Q	3C,3D		N14-0552-05	NUT (ENC,VOL)		
CP1 -5			R90-0720-05	MULTI COMP 100K		
R1			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R2			RK73GB1J681J	CHIP R 680 J 1/16W		
R3			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R4			RK73GB1J681J	CHIP R 680 J 1/16W		
R5			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R6			RK73GB1J681J	CHIP R 680 J 1/16W		
R7			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R8			RK73GB1J681J	CHIP R 680 J 1/16W		
R9			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R10			RK73GB1J681J	CHIP R 680 J 1/16W		
R11			RK73GB1J102J	CHIP R 1.0K J 1/16W		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

PARTS LIST

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Teile ohne Parts No. werden nicht geliefert.

DISPLAY UNIT (X54-3130-XX)
144M TX-RX UNIT (X57-3580-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R12			RK73GB1J681J	CHIP R 680 J 1/16W		
R13			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R14 ,15			RK73GB1J103J	CHIP R 10K J 1/16W		
R16			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R17			RK73GB1J331J	CHIP R 330 J 1/16W		
R18			RK73GB1J473J	CHIP R 47K J 1/16W		
R19			RK73GB1J470J	CHIP R 47 J 1/16W		
R20			RK73GB1J100J	CHIP R 10 J 1/16W		
R21			RK73GB1J105J	CHIP R 1.0M J 1/16W		
R101			RK73FB2A561J	CHIP R 560 J 1/10W		
R102			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R103			RK73GB1J473J	CHIP R 47K J 1/16W		
R104			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R105			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R106			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R201-203		*	RK73GB1J3R3J	CHIP R 3.3 J 1/16W		
R204,205			RK73GB1J100J	CHIP R 10 J 1/16W		
R206			RK73GB1J105J	CHIP R 1.0M J 1/16W		
R207			RK73GB1J104J	CHIP R 100K J 1/16W		
R208,209			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R210			RK73GB1J223J	CHIP R 22K J 1/16W		
R211,212			RK73GB1J100J	CHIP R 10 J 1/16W		
VR1 -3		*	R23-9409-05	POTENTIOMETER		
S101-112			S70-0408-05	TACT SWITCH		
S113-115			S70-0409-15	TACT SWITCH		
		*	B38-0379-05	DISPLAY ASSY		
D1			MA112			
D2		*	MA720			
D3 ,4			B30-2025-05	LED		
D101-105		*	B30-2048-05	LED		
D107-112		*	B30-2053-05	LED		
D114		*	B30-2053-05	LED		
IC1		*	HD404719A26H	IC(CPU)		
IC2		*	L78LR05B-FA	IC		
IC3 -6			TC4S11F	IC(2 INPUT NAND GATE)		
IC201,202			MSM5265GS-V1K	IC(LCD DRIVER)		
IC203			TC4S11F	IC(2 INPUT NAND GATE)		
IC204		*	TC74HC73AF	IC		
IC205			NJM78L05UA	IC(VOLTAGE REGULATOR/ +5V)		
IC206			TC4S11F	IC(2 INPUT NAND GATE)		
PL1 -6			B30-0865-15	LAMP,LED		
Q1		*	2SA1745(6,7)			
Q2			2SB1119(S)			
Q3			DTC114EU	DIGITAL TRANSISTOR		
Q4 ,5			DTC144EU	DIGITAL TRANSISTOR		
Q101			DTC114EU	DIGITAL TRANSISTOR		
S1		*	W02-1744-05	FRONT END UNIT,ELECTRIC UNIT		
144M TX-RX UNIT (X57-3580-XX) -11: K -12: P, M						
200	2G		A10-1316-11	CHASSIS		
201	3G		B42-2437-04	LABEL(S/NO)		
C5			CC73FCH1H040C	CHIP C 4PF C		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

PARTS LIST

⋇ New Parts
Parts without Parts No. are not supplied.
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Telle ohne Parts No. werden nicht gellefert.

144M TX-RX UNIT (X57-3580-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格			Destination 仕向	Remarks 備考
C6			CK73FB1H102K	CHIP C	1000PF	K		
C7 -9			CK73FB1H102K	CHIP C	1000PF	K		
C10			CK73FB1E103K	CHIP C	0.01UF	K		
C11			CC73FCH1H0R5C	CHIP C	0.5PF	C		
C12			CC73FCH1H151J	CHIP C	150PF	J		
C13			CC73FCH1H030C	CHIP C	3PF	C		
C14			CC73FCH1H0R5C	CHIP C	0.5PF	C		
C15			CC73FCH1H150J	CHIP C	15PF	J		
C16			CC73FCH1H020C	CHIP C	2.0PF	C		
C18			CK73FB1H102K	CHIP C	1000PF	K		
C19			CC73FCH1H060D	CHIP C	6PF	D		
C20			CK73FB1H102K	CHIP C	1000PF	K		
C21			CC73FCH1H050C	CHIP C	5PF	C		
C22			CK73FB1E103K	CHIP C	0.01UF	K		
C23			CK73FB1H102K	CHIP C	1000PF	K		
C24			CK73FB1E103K	CHIP C	0.01UF	K		
C25			CC45SL2H020C	CERAMIC	2PF	C		
C26			CK73FB1H102K	CHIP C	1000PF	K		
C29			CK73FB1E103K	CHIP C	0.01UF	K		
C30			CC73FCH1H390J	CHIP C	39PF	J		
C31			CC73FCH1H101J	CHIP C	100PF	J		
C32			CK73FB1H102K	CHIP C	1000PF	K		
C33			CK73FB1E104K	CHIP C	0.10UF	K		
C34 ,35			CK73EF1C105Z	CHIP C	1.0UF	Z		
C36 ,37			CK73FB1E103K	CHIP C	0.01UF	K		
C39			CC73FCH1H010C	CHIP C	1PF	C		
C44 ,45			CE04NW1C470M	ELECTRO	47UF	16WV		
C46			C92-0504-05	CHIP TAN	0.68UF	20WV		
C47			CE04NW1C470M	ELECTRO	47UF	16WV		
C48			C92-0003-05	CHIP TAN	0.47UF	25WV		
C49			CE04NW1E100M	ELECTRO	10UF	25WV		
C50			CE04NW1C470M	ELECTRO	47UF	16WV		
C51 ,52			CK73FB1E103K	CHIP C	0.01UF	K		
C53 ,54			CK73FB1H102K	CHIP C	1000PF	K		
C55			CK73EF1C105Z	CHIP C	1.0UF	Z		
C56			CC73FUJ1H150J	CHIP C	15PF	J		
C57			CK73FB1H102K	CHIP C	1000PF	K		
C58			CC73FUJ1H220J	CHIP C	22PF	J		
C59 ,60			CK73FB1H102K	CHIP C	1000PF	K		
C61			CE04NW1C470M	ELECTRO	47UF	16WV		
C62			CK73FB1H102K	CHIP C	1000PF	K		
C63			CK73FB1E103K	CHIP C	0.01UF	K		
C64			CE04NW1E100M	ELECTRO	10UF	25WV		
C65			CE04NW1A330M	ELECTRO	33UF	10WV		
C66			CK73FB1E103K	CHIP C	0.01UF	K		
C67			CK73FB1H102K	CHIP C	1000PF	K		
C68			CC73FCH1H100D	CHIP C	10PF	D		
C69			CC73FCH1H100D	CHIP C	10PF	D		
C70			CK73FB1E103K	CHIP C	0.01UF	K		
C71 -73			CK73FB1H102K	CHIP C	1000PF	K		
C74			CK73FB1H223K	CHIP C	0.022UF	K		
C75			CE04NW1C101M	ELECTRO	100UF	16WV		
C76			CK73EF1C105Z	CHIP C	1.0UF	Z		
C77 ,78			CK73FB1H102K	CHIP C	1000PF	K		
C79			CK73EF1C105Z	CHIP C	1.0UF	Z		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

PARTS LIST

⁎ New Parts
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Teile ohne Parts No. werden nicht geliefert.

144M TX-RX UNIT (X57-3580-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
C80			CC73FCH1H050C	CHIP C 5PF C		
C81			CC45SL2H120J	CERAMIC 12PF J		
C82			CK73FB1H102K	CHIP C 1000PF K		
C83			CK45B2H102K	CERAMIC 1000PF K		
C84			CM73F2H330J	CHIP C 33PF J		
C85			CC73FCH1H220J	CHIP C 22PF J		
C86			CC73FCH1H0R5C	CHIP C 0.5PF C		
C87			CC73FCH1H020C	CHIP C 2.0PF C		
C88			CC45SL2H560J	CERAMIC 56PF J		
C89			CC45SL2H470J	CERAMIC 47PF J		
C90 -92			CK73FB1H102K	CHIP C 1000PF K		
C93			CC73FCH1H0R5C	CHIP C 0.5PF C		
C94			CM73F2H300J	CHIP C 30PF J		
C95			CC73FCH1H020C	CHIP C 2.0PF C		
C96			CK73FB1E103K	CHIP C 0.01UF K		
C98			CK73FB1H102K	CHIP C 1000PF K		
C99			CE04NW1E100M	ELECTRO 10UF 25WV		
C100			CK73FB1H102K	CHIP C 1000PF K		
C101			CE04NW1E100M	ELECTRO 10UF 25WV		
C103			CK73FB1H102K	CHIP C 1000PF K		
C104			CK73FB1E103K	CHIP C 0.01UF K		
C105			CK73FB1H223K	CHIP C 0.022UF K		
C110			CC73FCH1H030C	CHIP C 3PF C		
C111			CK73FB1E103K	CHIP C 0.01UF K		
C112			CE04NW1A221M	ELECTRO 220UF 10WV		
C113			CC73FCH1H100D	CHIP C 10PF D		
C114,115			CC73FSL1H101J	CHIP C 100PF J		
C116			CC73FCH1H080D	CHIP C 8PF D		
C119			CE04NW1E100M	ELECTRO 10UF 25WV		
C120-127			CC73FSL1H101J	CHIP C 100PF J		
C128,129			CK73FB1H102K	CHIP C 1000PF K		
C130			CE04EW1C102M	ELECTRO 1000UF 16WV		
TC1			C05-0345-05	TRIMMING CAP 10PF		
-			E22-0672-04	TERMINAL BOARD(-)		
-			E22-0673-04	TERMINAL BOARD(+)		
203	3H		E30-2145-15	ANT CABLE		
202	1H		E30-3007-05	DC POWER CORD		A
CN1 ,2			E40-5461-05	PIN CONNECTOR		
J1			E11-0442-05	PHONE JACK		B
J2			E23-0619-05	TERMINAL		B
J3			E23-0619-05	TERMINAL		A
-			F05-1531-05	FUSE		
205	2G		F10-1446-04	SHIELDING PLATE		
204	1G		F10-2010-03	SHIELDING COVER		
-			F10-2012-04	SHIELDING CASE(VCO-PLL)		
-			F20-1008-04	INSULATION SHEET(APC)		
208	1H		F51-0017-05	FUSE(15A)		A
209	3G		G02-0600-14	FLAT SPRING(THERMAL SW)		
-			G02-0705-04	FLAT SPRING		
-			G02-0715-04	LEAF SPRING(APC TR)		
-			G02-0718-04	FLAT SPRING(VCO)		
-			G09-0426-05	SPRING(DC CORD)		A
-			G11-0654-04	CUSHION(VCO)		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

PARTS LIST

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144M TX-RX UNIT (X57-3580-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
211	3G		G11-0655-04	CUSHION(CN1,CN2)		
215	3G		G11-0660-04	CUSHION(VCO)		
-			G11-0661-04	INSULATION SHEET(APC TR)		
-			G13-0841-04	FORMED PLATE(XTAL)		
-			G13-1325-04	FORMED PLATE(VCO)		
-			G13-1337-04	CUSHION(VCO)		
216	3G		G13-1349-04	CUSHION(VCO)		
214	1G		G53-0508-04	NON-WOVEN FABRIC		
-			J30-0564-05	SPACER		
CD1			L79-1013-05	FILTER		
CF1			L72-0372-05	CERAMIC FILTER(CFWM455F)		
L1 -4			L34-4252-05	COIL		
L5			L40-1582-19	SMALL FIXED INDUCTOR(0.15UH)		
L6			L34-4251-05	COIL(1ST IF)		
L8			L34-1185-05	COIL(2.5T)		
L10			L40-3382-19	SMALL FIXED INDUCTOR(0.33UH)		
L11			L34-1239-05	COIL(10.5T)		
L12			L34-0895-05	COIL(6T)		
L13			L34-0742-05	COIL(6T)		
L14			L34-0908-05	COIL(9.5T)		
L15 -17			L34-0499-05	COIL(4.5T)		
L19			L40-8272-48	SMALL FIXED INDUCTOR(82NH)		
L20			L40-1001-19	SMALL FIXED INDUCTOR(10UH)		
X1			L77-1405-05	CRYSTAL RESONATOR(12.8MHZ)		
X2			L77-1473-05	CRYSTAL RESONATOR(10.245MHZ)		
XF1			L71-0228-05	CRYSTAL FILTER(10.7MHZ)		
W			N09-2077-05	SCREW(MODULE)		
N			N87-2606-46	BRAZIER HEAD TAPTITE SCREW(ANT		
U			N88-2606-46	FLAT HEAD TAPTITE SCREW		
R4			RK73FB2A103J	CHIP R 10K J 1/10W		
R5			RK73FB2A333J	CHIP R 33K J 1/10W		
R6			RK73FB2A274J	CHIP R 270K J 1/10W		
R7			RK73FB2A101J	CHIP R 100 J 1/10W		
R8			RK73FB2A103J	CHIP R 10K J 1/10W		
R9			RK73FB2A101J	CHIP R 100 J 1/10W		
R10 -12			RK73FB2A103J	CHIP R 10K J 1/10W		
R13			RK73FB2A473J	CHIP R 47K J 1/10W		
R14			RK73FB2A104J	CHIP R 100K J 1/10W		
R15			RK73FB2A683J	CHIP R 68K J 1/10W		
R16			RK73FB2A823J	CHIP R 82K J 1/10W		
R17			R92-0670-05	CHIP R 0 OHM		
R18			RK73FB2A470J	CHIP R 47 J 1/10W		
R19			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R20			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R21			RK73FB2A471J	CHIP R 470 J 1/10W		
R22			RK73FB2A101J	CHIP R 100 J 1/10W		
R23			RK73FB2A103J	CHIP R 10K J 1/10W		
R24			RK73FB2A473J	CHIP R 47K J 1/10W		
R25			RK73FB2A103J	CHIP R 10K J 1/10W		
R30			R92-0670-05	CHIP R 0 OHM		
R31			RK73FB2A394J	CHIP R 390K J 1/10W		
R33 ,34			R92-0670-05	CHIP R 0 OHM		
R35			RK73FB2A222J	CHIP R 2.2K J 1/10W		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

PARTS LIST

⁎ New Parts
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144M TX-RX UNIT (X57-3580-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R36			RK73FB2A101J	CHIP R 100 J 1/10W		
R37			R92-0670-05	CHIP R 0 ΩHM		
R38			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R39 -41			RK73FB2A103J	CHIP R 10K J 1/10W		
R42			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R43			RK73FB2A223J	CHIP R 22K J 1/10W		
R44			RK73FB2A273J	CHIP R 27K J 1/10W		
R45			RK73FB2A473J	CHIP R 47K J 1/10W		
R46			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R47			R92-0670-05	CHIP R 0 ΩHM		
R49			RK73FB2A223J	CHIP R 22K J 1/10W		
R50			RK73FB2A124J	CHIP R 120K J 1/10W		
R52 -54			RK73FB2A473J	CHIP R 47K J 1/10W		
R55			RK73FB2A471J	CHIP R 470 J 1/10W		
R56			RK73FB2A104J	CHIP R 100K J 1/10W		
R57			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R58			RK73FB2A473J	CHIP R 47K J 1/10W		
R59			R92-0670-05	CHIP R 0 ΩHM		
R60			RK73FB2A103J	CHIP R 10K J 1/10W		
R61			RK73FB2A471J	CHIP R 470 J 1/10W		
R62			R92-0670-05	CHIP R 0 ΩHM		
R63 ,64			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R65 ,66			R92-0670-05	CHIP R 0 ΩHM		
R67			RK73FB2A122J	CHIP R 1.2K J 1/10W		
R68			RK73FB2A220J	CHIP R 22 J 1/10W		
R69			RK73FB2A470J	CHIP R 47 J 1/10W		
R71			R92-0670-05	CHIP R 0 ΩHM		
R73			RK73FB2A104J	CHIP R 100K J 1/10W		
R74			R92-0670-05	CHIP R 0 ΩHM		
R75			RK73FB2A103J	CHIP R 10K J 1/10W		
R76			R92-0670-05	CHIP R 0 ΩHM		
R78			R92-1213-05	CARBON 100 J 1/2W		
R79 ,80			RK73FB2A223J	CHIP R 22K J 1/10W		
R81			RK73FB2A471J	CHIP R 470 J 1/10W		
R82			R92-0685-05	CHIP R 22 J 1/2W		
R83			R92-0670-05	CHIP R 0 ΩHM		
R84 -86			R92-0670-05	CHIP R 0 ΩHM		
R89			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R90			RK73FB2A221J	CHIP R 220 J 1/10W		
R91			RK73FB2A473J	CHIP R 47K J 1/10W		
R92			R92-0679-05	CHIP R 0 ΩHM		
R93			RK73FB2A104J	CHIP R 100K J 1/10W		
R98 ,99			RK73FB2A103J	CHIP R 10K J 1/10W		
R101			RK73FB2A102J	CHIP R 1.0K J 1/10W		
VR1			R12-6429-05	TRIM POT. 100K		
VR2			R12-6427-05	TRIM POT. 47K		
VR3			R12-6423-05	TRIM POT. 10K		
VR4			R12-6423-05	TRIM POT. 10K		
TS1			S79-0401-05	THERMAL SWITCH(95°C)		
D1			1SV164	DIODE		
D2			1SV166	DIODE		
D3 ,4			1SV164	DIODE		
D5	-		1SV166 -	DIODE		
D6			1SV164	DIODE		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

PARTS LIST

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144M TX-RX UNIT (X57-3580-XX)
430/440M TX-RX UNIT (X57-3590-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
D7			1SV166	DIODE		
D11			1SS184	DIODE		
D12			1SS184	DIODE		
D13			DAN235(K)	DIODE		
D14			1SS181	DIODE		
D15			MI407	DIODE		
D16			MI308	DIODE		
D17 ,18			1SS226	DIODE		
D19			DSA3A1	DIODE		
IC1			BU4094BF	IC(SHIFT/STORE REGISTER)		
IC1			XRU4094BF	IC		
IC2			LA5010M	IC(LOW SATURATION REGULATOR)		
IC5			KCD04	IC(FM IF)		
IC6			KCD05	IC(AM IF)		
IC7			KCA04	IC(MIC AMPLIFIER)		
IC8			KCB11	IC(DRIVER)		
IC9			KCC04	IC(APC)		
IC10			S-AV17	IC(POWER MODULE FOR 144MHZ)		
IC11			KCH05	IC(144MHZ VCO PLL)		
Q1			3SK184(S)	FET		
Q2			3SK131(V12)	FET		
Q3			2SC2714(Y)	TRANSISTOR		
Q4			DTA114YK	DIGITAL TRANSISTOR		
Q5 ,6			DTC123JK	DIGITAL TRANSISTOR		
Q7			DTC143EK	DIGITAL TRANSISTOR		
Q10			2SA1362(Y)	TRANSISTOR		
Q11			2SB1119(S)	TRANSISTOR		
Q12			DTC144WK	DIGITAL TRANSISTOR		
Q13 ,14			2SC2712(Y)	TRANSISTOR		
Q15 -17			DTC144EK	DIGITAL TRANSISTOR		
Q18			2SD1757K	TRANSISTOR		
Q19			2SK208(Y)	FET		
Q20			2SC2714(Y)	TRANSISTOR		
Q21			2SC2712(Y)	TRANSISTOR		
Q22			FMG1	TRANSISTOR		
Q23			2SD1902R	TRANSISTOR		
Q24			2SJ106(GR)	FET		
430/440M TX-RX UNIT (X57-3590-XX) -11: K, P -21: M						
200	2G		A10-1316-01	CHASSIS		
201	3G		B42-2437-04	LABEL(S/NO)		
C1			CC73FCH1H030C	CHIP C 3PF C		
C2 -4			CK73FB1H102K	CHIP C 1000PF K		
C5			CC73FCH1H1R5C	CHIP C 1.5PF C		
C6			CC73FCH1H390J	CHIP C 39PF J		
C7			CK73FB1H102K	CHIP C 1000PF K		
C8			CK73FB1H102K	CHIP C 1000PF K		
C9			CC73FCH1H010C	CHIP C 1PF C	MM2	
C9			CC73FCH1H010C	CHIP C 1PF C	EE2E3	B
C9			CC73FCH1H020C	CHIP C 2PF C	KP	
C10			CC73FCH1H390J	CHIP C 39PF J		
C11			CK73FB1H102K	CHIP C 1000PF K		
C12			CK73FB1H102K	CHIP C 1000PF K		
C13 ,14			CK73FB1H102K	CHIP C 1000PF K		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

PARTS LIST

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430/440M TX-RX UNIT (X57-3590-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格			Destination 仕向	Remarks 備考
C15			CC73FCH1H050C	CHIP C	5PF	C		
C16 ,17			CK73FB1H102K	CHIP C	1000PF	K		
C18			CC73FCH1H060D	CHIP C	6PF	D		
C19 ,20			CK73FB1H102K	CHIP C	1000PF	K		
C21			CC73FCH1H560J	CHIP C	56PF	J	KP	
C21			CC73FCH1H330J	CHIP C	33PF	J	MM2	
C21			CC73FCH1H330J	CHIP C	33PF	J	EE2E3	B
C22			CC73FCH1H180J	CHIP C	18PF	J	KP	
C22			CC73FCH1H330J	CHIP C	33PF	J	MM2	
C22			CC73FCH1H330J	CHIP C	33PF	J	EE2E3	B
C23			CK73FB1H102K	CHIP C	1000PF	K		
C24			CE04NW1C470M	ELECTRO	47UF	16WV		
C25			CK73FB1H102K	CHIP C	1000PF	K		
C26			CK73FF1C105Z	CHIP C	1.0UF	Z		
C27			C92-0003-05	CHIP TAN	0.47UF	25WV		
C28 ,29			CK73FF1C105Z	CHIP C	1.0UF	Z		
C30			CK73FB1H102K	CHIP C	1000PF	K		
C31			CK73FB1H102K	CHIP C	1000PF	K		
C32			CE04NW1C470M	ELECTRO	47UF	16WV		
C33			C92-0504-05	CHIP TAN	0.68UF	20WV		
C34			CE04NW1C470M	ELECTRO	47UF	16WV		
C35			CK73FB1H102K	CHIP C	1000PF	K		
C36			CE04NW1C470M	ELECTRO	47UF	16WV		
C37			CK73FB1H102K	CHIP C	1000PF	K		
C38			CK73FB1H822K	CHIP C	8200PF	K		
C39			CK73FB1H102K	CHIP C	1000PF	K		
C40			CK73FF1C105Z	CHIP C	1.0UF	Z		
C41 ,42			CC73FUJ1H180J	CHIP C	18PF	J		
C43			CK73FB1H102K	CHIP C	1000PF	K		
C44			CC73FCH1H060D	CHIP C	6PF	D		
C45			CK73FB1H102K	CHIP C	1000PF	K		
C46			CC73FCH1H150J	CHIP C	15PF	J		
C47			CK73FB1H102K	CHIP C	1000PF	K		
C48			CE04NW1C101M	ELECTRO	100UF	16WV		
C49			CK73FB1H102K	CHIP C	1000PF	K		
C50			CE04NW1A330M	ELECTRO	33UF	10WV		
C51 ,52			CK73FB1H102K	CHIP C	1000PF	K		
C53			CE04NW1C101M	ELECTRO	100UF	16WV		
C54 -58			CK73FB1H102K	CHIP C	1000PF	K		
C60			CE04NW1C220M	ELECTRO	22UF	16WV		
C62			CK73FB1H102K	CHIP C	1000PF	K		
C64 ,65			CK73FB1H102K	CHIP C	1000PF	K		
C66			CM73F2H050D	CHIP C	5.0PF	D	KP	
C66			CM73F2H060D	CHIP C	6.0PF	D	MM2	
C66			CM73F2H060D	CHIP C	6.0PF	D	EE2E3	B
C67			CC73FCH1H070D	CHIP C	7PF	D		
C68			CC45SL2H150J	CERAMIC	15PF	J		
C69			CC45SL2H220J	CERAMIC	22PF	J		
C70			CC45SL2H220J	CERAMIC	22PF	J		
C71			CC73FCH1H0R5C	CHIP C	0.5PF	C		
C72			CC73FCH1H020C	CHIP C	2.0PF	C		
C73			CC45SL2H080D	CERAMIC	8.0PF	D		
C74			CC45SL2H100D	CERAMIC	10PF	D		
C75	–		CC73FCH1H0R5C	CHIP C	0.5PF	C		
C76			CC73FCH1H020C	CHIP C	2.0PF	C		

A: TM-742 K, P, M. M2, E, E2, E3
B: TM-942 K, P, M

PARTS LIST

× New Parts
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Teile ohne Parts No. werden nicht geliefert.

430/440M TX-RX UNIT (X57-3590-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
C77			CM73F2H060D	CHIP C 6.0PF D		
C78 -80			CK73FB1H102K	CHIP C 1000PF K		
C81			C90-2092-05	ELECTRO 10UF 16WV		
C82 -85			CC73FSL1H101J	CHIP C 100PF J		
C86			CK73FB1H102K	CHIP C 1000PF K		
C87			CK73FB1H333K	CHIP C 0.033UF K		
C88			CE04NW1A221M	ELECTRO 220UF 10WV		
C89 -91			CK73FB1H102K	CHIP C 1000PF K		
C92			CK73FB1H471K	CHIP C 470PF K		
C93			CE04NW1C470M	ELECTRO 47UF 16WV		
C94			CC73FCH1H030C	CHIP C 3PF C		
C96			CK73FB1H102K	CHIP C 1000PF K		
C97			CK73FB1E104K	CHIP C 0.10UF K		
C98			CC73FCH1H040C	CHIP C 4PF C		
C99			CC73FCH1H020C	CHIP C 2.0PF C		
C100			CC73FCH1H060D	CHIP C 6PF D	KP	
C100			CC73FCH1H070D	CHIP C 7PF D	MM2	
C100			CC73FCH1H070D	CHIP C 7PF D	EE2E3	B
C102			CE04NW1C100M	ELECTRO 10UF 16WV		
C103,104			CK73FB1H102K	CHIP C 1000PF K		
C105-110			CC73FSL1H101J	CHIP C 100PF J		
C111			CK73FB1H103K	CHIP C 0.010UF K		
C112			CK73FB1H102K	CHIP C 1000PF K		
C113			CC73FCH1H020C	CHIP C 2.0PF C		
C114			CK73FB1E223K	CHIP C 0.022UF K		
C115			CK73FB1H102K	CHIP C 1000PF K		
C118			CC73FCH1H150J	CHIP C 15PF J		
C21,22			CC73FCH1H330J	CHIP C 33PF J	EMM2	
TC1 ,2			C05-0346-05	TRIM CAP		
TC3			C05-0371-05	TRIM CAP 10PF		
-			E22-0672-04	TERMINAL BOARD(-)		B
-			E72-0406-04	TERMINAL BOARD(+)		
203	3H		E30-3009-15	ANT CABLE	KPMM2	
203	3H		E30-3010-15	ANT CABLE	EE2E3	B
202	1H		E30-3007-05	DC CABLE		B
CN1 ,2			E40-5461-05	PIN ASSY(12P)		
J1			E11-0442-05	PHONE JACK		
TP1			E04-0154-05	RF COAXIAL CABLE RECEPTACLE		
204	1G		F10-1444-03	SHIELDING PLATE		
205	2G		F10-1446-04	SHIELDING PLATE		
-			F10-1477-24	SHIELDING PLATE		
-			F10-2012-04	SHIELDING CASE(VCO-PLL)		
208	1H		F51-0017-05	FUSE(15A)		B
-			G02-0599-04	FLAT SPRING(DB TR)		
209	3H		G02-0600-14	FLAT SPRING(THERMAL SW)		
-			G02-0704-04	EARTH SPRING		
-			G02-0705-04	EARTH SPRING		
210	2G		G09-0426-05	SPRING(DC CORD)		B
211	3G		G11-0655-04	CUSHION(CN1,CN2)		
212	1G		G11-0656-14	CONDUCTIVE RUBBER(MCF)		
215	3G		G11-0660-04	CUSHION(VCO)		
-			G11-0661-04	INSULATION SHEET(DB TR)		
-			G13-0841-04	CUSHION(12.8MHZ XTAL)		
216	3G		G13-1319-04	CUSHION(VCO)		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

PARTS LIST

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430/440M TX-RX UNIT (X57-3590-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
213	3G		G13-1351-04	CUSHION(CNI,CN2)		
214	1G		G53-0508-04	CUSHION		
217	2H		J42-0471-04	DC CORD BUSHING		A
CD1			L79-1013-05	FILTER(455KHZ)		
CF1			L72-0372-05	CERAMIC FILTER(CFWM455F)		
L1			L40-1872-80	SMALL FIXED INDUCTOR(18NH)		
L2			L40-1572-48	SMALL FIXED INDUCTOR(15NH)		
L3			L79-1016-05	HERICAL BLOCK(440MHZ)		
L4			L79-1017-05	HERICAK BLOCK(435MHZ)	MM2	
L4			L79-1017-05	HERICAK BLOCK(435MHZ)	EE2E3	B
L4			L79-1018-05	HERICAL BLOCK(445MHZ)	KP	
L5			L40-2772-48	SMALL FIXED INDUCTOR(27NH)	KP	
L5			L40-3372-48	SMALL FIXED INDUCTOR(33NH)	MM2	
L5			L40-3372-48	SMALL FIXED INDUCTOR(33NH)	EE2E3	B
L6			L40-2272-48	SMALL FIXED INDUCTOR(22NH)		
L7			L34-4250-05	COIL		
L8			L40-2272-48	SMALL FIXED INDUCTOR(22NH)		
L9			L34-1238-05	COIL(9.5T)		
L10			L34-1185-05	COIL(2.5T)		
L11			L34-1032-05	COIL(3.5T)		
L12			L34-1226-05	COIL(1.5T)		
L13			L34-1238-05	COIL(9.5T)		
L14			L34-1226-05	COIL(1.5T)		
L15			L40-1872-48	SMALL FIXED INDUCTOR(18NH)		
L16			L40-1001-19	SMALL FIXED INDUCTOR(10UH)		
X1			L77-1445-05	CRYSTAL RESONATOR(21.145MHZ)		
X2			L77-1405-05	CRYSTAL RESONATOR(12.8MHZ)		
XF1			L71-0411-05	MCF(21.6MHZ)		
W			N09-2077-05	SCREW(MODULE)		
N			N87-2606-46	BRAZIER HEAD TAPTITE SCREW		
U			N88-2606-46	FLAT HEAD TAPTITE SCREW		
R2			RK73FB2A104J	CHIP R 100K J 1/10W		
R3			RK73FB2A333J	CHIP R 33K J 1/10W		
R4 ,5			RK73FB2A101J	CHIP R 100 J 1/10W		
R6			RK73FB2A470J	CHIP R 47 J 1/10W		
R7			RK73FB2A220J	CHIP R 22 J 1/10W		
R8			RK73FB2A471J	CHIP R 470 J 1/10W		
R10			RK73FB2A223J	CHIP R 22K J 1/10W		
R11			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R14 ,15			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R16			RK73FB2A221J	CHIP R 220 J 1/10W		
R18			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R19			RK73FB2A470J	CHIP R 47 J 1/10W		
R20			R92-0670-05	CHIP R 0 OHM		
R21			RK73FB2A122J	CHIP R 1.2K J 1/10W		
R22			RK73FB2A334J	CHIP R 330K J 1/10W		
R24			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R25			RK73FB2A471J	CHIP R 470 J 1/10W		
R26			RK73FB2A473J	CHIP R 47K J 1/10W		
R27			RK73FB2A223J	CHIP R 22K J 1/10W		
R28			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R29 -31			RK73FB2A103J	CHIP R 10K J 1/10W		
R32			RK73FB2A182J	CHIP R 1.8K J 1/10W		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

PARTS LIST

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430/440M TX-RX UNIT (X57-3590-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R33 -35			RK73FB2A473J	CHIP R 47K J 1/10W		
R36			RK73FB2A154J	CHIP R 150K J 1/10W		
R37			RK73FB2A273J	CHIP R 27K J 1/10W		
R38			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R40			RK73FB2A221J	CHIP R 220 J 1/10W		
R42			R92-0670-05	CHIP R 0 ØHM		
R43			RK73FB2A471J	CHIP R 470 J 1/10W		
R44			RK73FB2A103J	CHIP R 10K J 1/10W		
R45 ,46			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R47			RK73EB2B220J	CHIP R 22 J 1/8W		
R48			R92-0670-05	CHIP R 0 ØHM		
R49			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R51			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R52			RK73FB2A104J	CHIP R 100K J 1/10W		
R53			R92-0685-05	CHIP R 22 J 1/2W		
R55			R92-0670-05	CHIP R 0 ØHM		
R58			R92-0679-05	CHIP R 0 ØHM		
R59			R92-1214-05	CHIP R 120 J 1/2W		
R60 ,61			RK73FB2A103J	CHIP R 10K J 1/10W		
R62			RK73FB2A221J	CHIP R 220 J 1/10W		
R63			RK73FB2A473J	CHIP R 47K J 1/10W		
R64			RK73FB2A104J	CHIP R 100K J 1/10W		
R65			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R66			RK73FB2A473J	CHIP R 47K J 1/10W		
R67 ,68			RK73FB2A103J	CHIP R 10K J 1/10W		
R72			RK73FB2A102J	CHIP R 1K J 1/10W		
VR1			R12-6429-05	TRIMMING PØT.100K		
VR2			R12-6427-05	TRIM PØT. 47K		
VR3 ,4			R12-6423-05	TRIM PØT. 10K		
TS1			S59-0444-05	THERMAL SWITCH(90°C)		
D1			HSK277	DIØDE		
D2			1SV128	DIØDE		
D3			1SS184	DIØDE		
D4			MA862	DIØDE		
D5			1SS181	DIØDE		
D6			1SS184	DIØDE		
D7			1SS184	DIØDE		
D8			MI407	DIØDE		
D9			MI308	DIØDE		
D10 ,11			MA716	DIØDE		
D12			DSA3A1	DIØDE		
D13			1SS184	DIØDE		
D14			MA716	DIØDE		
D15			MA862	DIØDE		
IC1			KCD04	IC(FM IF)		
IC2			KCA04	IC(MIC AMPLIFIER)		
IC3			BU4094BF	IC(SHIFT/STØRE REGISTER)		
IC3			XRU4094BF	IC		
IC4			LA5010M	IC(LØW SATURATIØN REGULATØR)		
IC5			KCC04	IC(APC)		
IC6			KCB14	IC(DRIVER)		
IC7			M57788M	IC(PØWER MØDULE/ 430-450MHZ)		
IC8			KCB12	IC(400MHZ PRE AMPLIFIER)		
IC9			KCB13	IC(800MHZ FRØNT END)		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

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430/440M TX-RX UNIT (X57-3590-XX)
1200M TX-RX UNIT (X57-3600-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
IC10			KCH07	IC(430MHZ VCO PLL)		
Q1			3SK184(S)	FET		
Q2			2SK582	FET		
Q3			3SK184(S)	FET		
Q4			DTC114EK	DIGITAL TRANSISTOR		
Q5			2SC2714(Y)	TRANSISTOR		
Q6 ,7			FMA5	TRANSISTOR		
Q8			2SA1362(Y)	TRANSISTOR		
Q9			DTC144WK	DIGITAL TRANSISTOR		
Q10 ,11			2SC2712(Y)	TRANSISTOR		
Q12			2SB1119(S)	TRANSISTOR		
Q13 -15			DTC144EK	DIGITAL TRANSISTOR		
Q16			2SD1757K	TRANSISTOR		
Q17			2SC2712(Y)	TRANSISTOR		
Q18			2SC3123	TRANSISTOR		
Q19			FMG1	TRANSISTOR		
Q20			2SD1760(Q)	TRANSISTOR		
Q21			2SJ106(GR)	FET		
1200M TX-RX UNIT (X57-3600-11)						
200	2G		A10-1316-01	CHASSIS		
201	3G		B42-2437-04	LABEL(S/NO)		
C1			CC73FCH1H220J	CHIP C 22PF J		
C2 -5			CK73FB1H471K	CHIP C 470PF K		
C7			CC73FCH1H100D	CHIP C 10PF D		
C8			CC73FSL1H101J	CHIP C 100PF J		
C9			CC73FCH1H1R5B	CHIP C 1.5PF B		
C10 ,11			CC73FCH1H470J	CHIP C 47PF J		
C12			CK73FB1E103K	CHIP C 0.01UF K		
C13			CC73FCH1H1R5B	CHIP C 1.5PF B		
C14			CC73FSL1H101J	CHIP C 100PF J		
C15			CK73FB1H471K	CHIP C 470PF K		
C17			CC73FSL1H101J	CHIP C 100PF J		
C18			CC73FCH1H1R5B	CHIP C 1.5PF B		
C19			CE04NW1C470M	ELECTRO 47UF 16WV		
C21 ,22			CK73FB1H471K	CHIP C 470PF K		
C23			CC73FCH1H030C	CHIP C 3PF C		
C24			CC73FCH1H1R5C	CHIP C 1.5PF C		
C25			CK73FB1H102K	CHIP C 1000PF K		
C26			CK73FB1H471K	CHIP C 470PF K		
C27			CK73FB1E223K	CHIP C 0.022UF K		
C28			CC73FCH1H080D	CHIP C 8PF D		
C29			CK73FB1E103K	CHIP C 0.01UF K		
C30			CC73FCH1H030C	CHIP C 3PF C		
C31			CC73FSL1H101J	CHIP C 100PF J		
C32			CC73FCH1H030C	CHIP C 3PF C		
C33			CK73FB1H471K	CHIP C 470PF K		
C34			CK73FB1H472K	CHIP C 4700PF K		
C35			CK73FB1H102K	CHIP C 1000PF K		
C36			CC73FCH1H150J	CHIP C 15PF J		
C37			CC73FCH1H220J	CHIP C 22PF J		
C38 -41			CK73FB1E103K	CHIP C 0.01UF K		
C42			CE04NW1C470M	ELECTRO 47UF 16WV		
C43 ,44			CK73EF1C105Z	CHIP C 1.0UF Z		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

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1200M TX-RX UNIT (X57-3600-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格			Destination 仕向	Remarks 備考
C45			C92-0002-05	CHIP TAN	0.22UF	35WV		
C46			CK73FB1E104K	CHIP C	0.10UF	K		
C47			CK73FB1H471K	CHIP C	470PF	K		
C48			C92-0504-05	CHIP TAN	0.68UF	20WV		
C49			C92-0004-05	ELECTRO	1.0UF	16WV		
C50			CK73FB1E223K	CHIP C	0.022UF	K		
C51			CK73EF1C105Z	CHIP C	1.0UF	Z		
C52			CC73FCH1H030C	CHIP C	3PF	C		
C53			CK73FB1E473K	CHIP C	0.047UF	K		
C54			CE04NW1C470M	ELECTRO	47UF	16WV		
C55			CK73EF1C105Z	CHIP C	1.0UF	Z		
C56			CK73FB1E223K	CHIP C	0.022UF	K		
C57			CK73FB1H471K	CHIP C	470PF	K		
C58 ,59			CE04NW1C101M	ELECTRO	100UF	16WV		
C60			CK73FB1H471K	CHIP C	470PF	K		
C61			CE04NW1A330M	ELECTRO	33UF	10WV		
C62 ,63			CK73FB1E103K	CHIP C	0.01UF	K		
C64			CE04NW1C101M	ELECTRO	100UF	16WV		
C65			CC73GCH1H030C	CHIP C	3PF	C		
C66			CC73GCH1H101J	CHIP C	100PF	J		
C67 ,68			CC73GCH1H020C	CHIP C	2.0PF	C		
C69			CC73GCH1H101J	CHIP C	100PF	J		
C70			CC73GCH1H050C	CHIP C	5PF	C		
C71			CK73EF1C105Z	CHIP C	1.0UF	Z		
C72			CE04NW1E100M	ELECTRO	10UF	25WV		
C73 ,74			CK73FB1H471K	CHIP C	470PF	K		
C75			CK73GB1H471K	CHIP C	470PF	K		
C76			CK73FB1H471K	CHIP C	470PF	K		
C77			CK73FB1E103K	CHIP C	0.01UF	K		
C78 -80			CK73FB1H471K	CHIP C	470PF	K		
C81			CK73EF1C105Z	CHIP C	1.0UF	Z		
C82 -83			CK73FB1H471K	CHIP C	470PF	K		
C84			CK73FB1H471K	CHIP C	470PF	K		
C85			CE04NW1E100M	ELECTRO	10UF	25WV		
C86			CK73EF1C105Z	CHIP C	1.0UF	Z		
C87 ,88			CK73GB1H471K	CHIP C	470PF	K		
C89 ,90			CK73FB1H471K	CHIP C	470PF	K		
C91			CE04NW1C470M	ELECTRO	47UF	16WV		
C92			CC73FCH1H470J	CHIP C	47PF	J		
C93 ,94			CK73FB1H471K	CHIP C	470PF	K		
C95			CC73FCH1H010C	CHIP C	1PF	C		
C96			CC73FCH1H100D	CHIP C	10PF	D		
C97			CK73FB1H471K	CHIP C	470PF	K		
C98			CM73F2H470J	CHIP C	47PF	J		
C99			CC73FSL1H101J	CHIP C	100PF	J		
C100			CK73FB1E103K	CHIP C	0.01UF	K		
C101			CC73FCH1H080D	CHIP C	8PF	D		
C102-104			CK73FB1H471K	CHIP C	470PF	K		
C105			CC73FCH1HR75B	CHIP C	0.75PF	B		
C106			CK73FB1H471K	CHIP C	470PF	K		
C107			CC73FSL1H101J	CHIP C	100PF	J		
C108-110			CK73FB1H471K	CHIP C	470PF	K		
C111			CC73FSL1H101J	CHIP C	100PF	J		
C112			CK73FB1H471K	CHIP C	470PF	K		
C113			CK73FB1H102K	CHIP C	1000PF	K		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

PARTS LIST

× New Parts
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Teile ohne Parts No. werden nicht gellefert.

1200M TX-RX UNIT (X57-3600-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
C114-116			CK73FB1H471K	CHIP C 470PF K		
C117			CK73GB1H102K	CHIP C 1000PF K		
C118			CK73FB1E103K	CHIP C 0.01UF K		
C119			CC73FSL1H101J	CHIP C 100PF J		
C120			CC73FUJ1H221J	CHIP C 220PF J		
C123-125			CK73FB1H471K	CHIP C 470PF K		
C126-130			CK73FB1H471K	CHIP C 470PF K		
C131			CK73GB1H103K	CHIP C 0.01UF K		
C132			CK73GB1H471K	CHIP C 470PF K		
C133			CK73FB1E103K	CHIP C 0.01UF K		
C134-137			CK73FB1H471K	CHIP C 470PF K		
C138			CE04NW0J470M	ELECTRO 47UF 6.3WV		
C139			CC73FSL1H101J	CHIP C 100PF J		
C140			CK73FB1E104K	CHIP C 0.10UF K		
C141,142			CK73FB1H471K	CHIP C 470PF K		
C144,145			CC73FSL1H101J	CHIP C 100PF J		
C147-156			CC73GCH1H101J	CHIP C 100PF J		
C157			CK73GB1H102K	CHIP C 1000PF K		
C158			CK73FB1H102K	CHIP C 1000PF K		
C159			CC73FSL1H101J	CHIP C 100PF J		
-			E22-0672-04	TERMINAL BOARD(-)		
-			E22-0673-04	TERMINAL BOARD(+)		
-			E23-0467-05	TERMINAL		
203	3H		E30-3011-05	ANT. CABLE		
CN1 ,2			E40-5461-05	PIN CONNECTOR(12P)		
J1			E11-0442-05	PHONE JACK		
204	3H		F10-1444-03	SHIELDING COVER		
-			F10-1445-04	SHIELDING(VCO)		
205	2G		F10-1446-04	SHIELDING(MODULE)		
-			F10-1457-14	SHIELDING CASE		
207	1G		F10-1475-04	SHIELDING COVER(MODULE)		
-			G02-0599-04	FLAT SPRING(IC)		
-			G02-0706-04	FLAT SPRING(ANT)		
-			G11-0654-04	SHEET(VCO 30X20)		
211	3G		G11-0655-04	SHEET(CN1,CN2 55X8)		
215	3G		G11-0660-04	SHEET(VCO 25X10)		
-			G11-0661-04	INSULATION SHEEON		
-			G13-1319-04	FORMED PLATE		
214	1G		G53-0508-04	NON-WEVERN FABRIC		
217	2H		J42-0471-04	DC CORD BUSHING		
CD1			L79-1013-05	FILTER		
CF1			L72-0366-05	CERAMIC FILTER		
L1 ,2			L79-1015-05	FILTER		
L4			L34-4259-05	COIL		
L5			L71-0280-05	MCF		
L6			L34-2034-05	COIL(VXO)		
L7			L40-3982-19	SMALL FIXED INDUCTOR(0.39UH)		
L8			L40-5682-19	SMALL FIXED INDUCTOR(0.56UH)		
X1			L77-1375-05	CRYSTAL RESONATOR(59.245MHZ)		
X2			L77-1376-25	TCXO(12.8MHZ)		
W	2G		N09-2077-05	SCREW		
N			N87-2606-46	BRAZIER HEAD TAPTITE SCREW		
U			N88-2606-46	FLAT HEAD TAPTITE SCREW		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

PARTS LIST

* New Parts
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Teile ohne Parts No. werden nicht geliefert.

1200M TX-RX UNIT (X57-3600-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R1 ,2			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R4			RK73FB2A473J	CHIP R 47K J 1/10W		
R5			RK73GB1J473J	CHIP R 47K J 1/16W		
R6			RK73FB2A560J	CHIP R 56 J 1/10W		
R7			RK73FB2A221J	CHIP R 220 J 1/10W		
R9			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R10			RK73FB2A153J	CHIP R 15K J 1/10W		
R11			RK73FB2A471J	CHIP R 470 J 1/10W		
R13			R92-0670-05	CHIP R 0 ΩHM		
R14			RK73GB1J180J	CHIP R 18 J 1/16W		
R15			RK73FB2A101J	CHIP R 100 J 1/10W		
R16			RK73FB2A331J	CHIP R 330 J 1/10W		
R17			RK73FB2A100J	CHIP R 10 J 1/10W		
R19			RK73FB2A151J	CHIP R 150 J 1/10W		
R20			RK73FB2A101J	CHIP R 100 J 1/10W		
R21			R92-0670-05	CHIP R 0 ΩHM		
R22			RK73FB2A331J	CHIP R 330 J 1/10W		
R23			RK73FB2A224J	CHIP R 220K J 1/10W		
R24			RK73FB2A561J	CHIP R 560 J 1/10W		
R25			RK73FB2A103J	CHIP R 10K J 1/10W		
R26			RK73FB2A473J	CHIP R 47K J 1/10W		
R27			RK73FB2A471J	CHIP R 470 J 1/10W		
R29			R92-0670-05	CHIP R 0 ΩHM		
R30			RK73FB2A221J	CHIP R 220 J 1/10W		
R31			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R32			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R33			RK73FB2A334J	CHIP R 330K J 1/10W		
R34			RK73FB2A223J	CHIP R 22K J 1/10W		
R35			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R36 ,37			RK73FB2A103J	CHIP R 10K J 1/10W		
R38			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R39 -41			RK73FB2A103J	CHIP R 10K J 1/10W		
R42			RK73FB2A474J	CHIP R 470K J 1/10W		
R43 -45			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R46			RK73FB2A684J	CHIP R 680K J 1/10W		
R47			RK73FB2A823J	CHIP R 82K J 1/10W		
R48			RK73FB2A331J	CHIP R 330 J 1/10W		
R49			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R50			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R51			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R52			RK73FB2A560J	CHIP R 56 J 1/10W		
R53			RK73GB1J271J	CHIP R 270 J 1/16W		
R54			RK73GB1J103J	CHIP R 10K J 1/16W		
R55			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R56			RK73GB1J471J	CHIP R 470 J 1/16W		
R57			RK73FB2A100J	CHIP R 10 J 1/10W		
R58			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R59			RK73FB2A683J	CHIP R 68K J 1/10W		
R60			R92-0670-05	CHIP R 0 ΩHM		
R61 ,62			RK73FB2A220J	CHIP R 22 J 1/10W		
R63			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R64			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R65			RK73GB1J471J	CHIP R 470 J 1/16W		
R66 ,67			RK73FB2A180J	CHIP R 18 J 1/10W		
R68			R92-0670-05	CHIP R 0 ΩHM		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742A/742E/942A

PARTS LIST

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1200M TX-RX UNIT (X57-3600-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R69			RK73FB2A333J	CHIP R 33K J 1/10W		
R70			R92-1201-05	SILID 220 1/2W		
R71			R92-0670-05	CHIP R 0 ØHM		
R72			R92-1264-05	FIXED RESISTØR		
R73			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R74			R92-0700-05	CHIP R 180 1/2W		
R75			RK73FB2A470J	CHIP R 47 J 1/10W		
R76			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R77			R92-0670-05	CHIP R 0 ØHM		
R78			RK73GB1J271J	CHIP R 270 J 1/16W		
R79 ,80			RK73FB2A103J	CHIP R 10K J 1/10W		
R81			RK73FB2A471J	CHIP R 470 J 1/10W		
R82			R92-0670-05	CHIP R 0 ØHM		
R83			RK73FB2A4R7J	CHIP R 4.7 J 1/10W		
VR1			R12-6429-05	TRIMMING PØT.100K		
VR2			R12-6421-05	TRIM PØT. 4.7K		
VR3			R12-6427-05	TRIM PØT. 47K		
VR4			R12-6423-05	TRIM PØT. 10K		
VR5			R12-6427-05	TRIM PØT. 47K		
D1			MA862	DIØDE		
D3			MA716	DIØDE		
D4			1SS193	DIØDE		
D5			02CZ6.2(X,Y)	DIØDE		
D6			1SS193	DIØDE		
D7			1SS187	DIØDE		
D8			02CZ12(X,Y)	DIØDE		
D9			HSK151	DIØDE		
D10 -13			MI808	DIØDE		
D14			DSA3A1	DIØDE		
D15			02CZ3.6(Y,Z)	DIØDE		
D17			DAP202U	DIØDE		
D19			MI808	DIØDE		
IC2			KCD04	IC(FM IF)		
IC3			KCX03	IC(AUTØ LØCK TUNING(ALT))		
IC4			KCA04	IC(MIC AMPLIFIER)		
IC5			BU4094BF	IC(SHIFT/STØRE REGISTER)		
IC5			XRU4094BF	IC(SHIFT/STØRE REGISTER)		
IC6			LA5009M	IC(LØE SATURATIØN REGULATØR)		
IC7			KCB09	IC(1200MHZ PRE DRIVE)		
IC8			KCB10	IC(PØWER AMP)		
IC9			KCC04	IC(APC)		
IC10			M67711	IC(PØWER MØDULE/ 1.24-1.3BHZ)		
IC11			KCH03	IC(1.2GHz VCØ PLL)		
IC12			NJM78L05UA	IC(VØLTAGE REGULATØR/ +5V)		
IC12			RC78L05UA	IC		
Q1			MGF1502	IC		
Q2			2SC4095(R47.6)	TRANSISTØR		
Q3			3SK184(S)	FET		
Q6			2SC3356	TRANSISTØR		
Q7			2SC3120	TRANSISTØR		
Q8			2SA1362(Y)	TRANSISTØR		
Q9			2SB1302(S)	TRANSISTØR		
Q10			DTC144WK	DIGITAL TRANSISTØR		
Q11			FMW1	TRANSISTØR		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

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1200M TX-RX UNIT (X57-3600-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
Q12 ,13			2SC2712(Y)	TRANSISTOR		
Q15 -17			DTC144EU	DIGITAL TRANSISTOR		
Q18			2SD1757(K)	TRANSISTOR		
Q19			2SA1362(Y)	TRANSISTOR		
Q20			DTC124EK	DIGITAL TRANSISTOR		
Q21 ,22			2SC4226(R23,24)	TRANSISTOR		
Q23			2SC2712(Y)	TRANSISTOR		
Q24			2SD1760(Q)	TRANSISTOR		
Q25			FMG1	TRANSISTOR		
Q26			2SJ106(GR)	FET		
Q28			DTC114EK	DIGITAL TRANSISTOR		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

PARTS LIST

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28M TX-RX UNIT (X57-3790-01)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格			Destination 仕向	Remarks 備考
28M TX-RX UNIT (X57-3790-01)								
200	2G		A10-1325-11	CHASSIS				
201	3G		B42-2437-04	LABEL(S/NO,UNIT)				
C1			CC45SL2H181J	CERAMIC	180PF	J		
C2 ,3			CC45SL2H221J	CERAMIC	220PF	J		
C4			CC45SL2H271J	CERAMIC	270PF	J		
C5			CC45SL2H151J	CERAMIC	150PF	J		
C9			CK73GB1H103K	CHIP C	0.01UF	K		
C10			CK73FB1E103K	CHIP C	0.01UF	K		
C11 ,12			CK73GB1H103K	CHIP C	0.01UF	K		
C13			CK73FB1E103K	CHIP C	0.01UF	K		
C14 ,15			CK73GB1H103K	CHIP C	0.01UF	K		
C16			CK73FB1E103K	CHIP C	0.01UF	K		
C17			CC73GCH1H220J	CHIP C	22PF	J		
C18			CK73GB1H103K	CHIP C	0.01UF	K		
C19			CC73FCH1H030C	CHIP C	3PF	C		
C20			CK73GB1H103K	CHIP C	0.01UF	K		
C21 -24			CK73FB1E103K	CHIP C	0.01UF	K		
C25			CC73FSL1H101J	CHIP C	100PF	J		
C26			CK73FB1E103K	CHIP C	0.01UF	K		
C28			CE04NW1C470M	ELECTRO	47UF	16WV		
C29			CK73GB1H103K	CHIP C	0.01UF	K		
C30 ,31			CK73EF1C105Z	CHIP C	1.0UF	Z		
C32			C92-0003-05	CHIP TAN	0.47UF	25WV		
C33			CK73FB1E104K	CHIP C	0.10UF	K		
C34			C92-0504-05	CHIP TAN	0.68UF	20WV		
C35			CE04NW1C470M	ELECTRO	47UF	16WV		
C36			CK73FB1E103K	CHIP C	0.01UF	K		
C37			CC73GCH1H330J	CHIP C	33PF	J		
C38			CE04NW1C470M	ELECTRO	47UF	16WV		
C39			CK73FB1E103K	CHIP C	0.01UF	K		
C40			C92-0004-05	ELECTRO	1.0UF	16WV		
C41			CK73FB1E103K	CHIP C	0.01UF	K		
C42			CE04NW1E100M	ELECTRO	10UF	25WV		
C43 ,44			CK73FB1E103K	CHIP C	0.01UF	K		
C45			CK73FB1E103K	CHIP C	0.01UF	K		
C46			CE04NW1C470M	ELECTRO	47UF	16WV		
C47			CK73FB1E103K	CHIP C	0.01UF	K		
C48			CK73FB1H822K	CHIP C	8200PF	K		
C49			CK73FB1H102K	CHIP C	1000PF	K		
C50			CC73FCH1H270J	CHIP C	27PF	J		
C51			CC73FUJ1H100D	CHIP C	10PF	D		
C52			CK73EF1C105Z	CHIP C	1.0UF	Z		
C53			CK73FB1E103K	CHIP C	0.01UF	K		
C54			CK73FB1H102K	CHIP C	1000PF	K		
C55 -57			CK73FB1E103K	CHIP C	0.01UF	K		
C58			CE04NW1E100M	ELECTRO	10UF	25WV		
C59			CE04NW1A330M	ELECTRO	33UF	10WV		
C60			CK73FB1E103K	CHIP C	0.01UF	K		
C61			CE04NW1A221M	ELECTRO	220UF	10WV		
C62			CC73FCH1H030C	CHIP C	3PF	C		
C63			CK73FB1E103K	CHIP C	0.01UF	K		
C64			CK73FB1E103K	CHIP C	0.01UF	K		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

PARTS LIST

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28M TX-RX UNIT (X57-3790-01)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
C65			CC73FCH1H180J	CHIP C 18PF J		
C66			CK73FB1E103K	CHIP C 0.01UF K		
C67			CE04NW1C101M	ELECTRO 100UF 16WV		
C68 ,69			CK73FB1E103K	CHIP C 0.01UF K		
C70			CK73FB1H223K	CHIP C 0.022UF K		
C71			CK73FB1E103K	CHIP C 0.01UF K		
C72			CK73EF1C105Z	CHIP C 1.0UF Z		
C73			CE04NW1E100M	ELECTRO 10UF 25WV		
C74			CK73FB1E103K	CHIP C 0.01UF K		
C75			CK73EF1C105Z	CHIP C 1.0UF Z		
C76			CK73FB1H223K	CHIP C 0.022UF K		
C77			CK73FB1E103K	CHIP C 0.01UF K		
C79 ,80			CK73FB1E103K	CHIP C 0.01UF K		
C81			CK73FB1H102K	CHIP C 1000PF K		
C82			CE04NW1E330M	ELECTRO 33UF 25WV		
C83			CK73FB1E103K	CHIP C 0.01UF K		
C84			CM73F2H102J	CHIP C 1000PF J		
C85			CM73F2H271J	CHIP C 270PF J		
C86			C93-0509-05	CERAMIC 6800PF		
C87			CC73FCH1H330J	CHIP C 33PF J		
C88			C93-0509-05	CERAMIC 6800PF		
C89			CK73FB1E103K	CHIP C 0.01UF K		
C90			CC73FCH1H040C	CHIP C 4PF C		
C91			CC73FCH1H0R5C	CHIP C 0.5PF C		
C92 -96			CK73FB1E103K	CHIP C 0.01UF K		
C97			CC73FCH1H080C	CHIP C 8.0PF C		
C98			CC73FSL1H101J	CHIP C 100PF J		
C99			CC73FCH1H820J	CHIP C 82PF J		
C100			CK73FB1E103K	CHIP C 0.01UF K		
C101			CC73FCH1H0R5C	CHIP C 0.5PF C		
C102-111			CC73FSL1H101J	CHIP C 100PF J		
C112,113			CK73FB1E103K	CHIP C 0.01UF K		
C114			CK73GB1H103K	CHIP C 0.01UF K		
C115			CK73FB1E103K	CHIP C 0.01UF K		
C116			CK73FB1E103K	CHIP C 0.01UF K		
C117			CK73FB1H102K	CHIP C 1000PF K		
C118			CE04NW1E100M	ELECTRO 10UF 25WV		
C119			CK73FB1E103K	CHIP C 0.01UF K		
C120			CC73GCH1H680J	CHIP C 68PF J		
C121			CC73GCH1H151J	CHIP C 150PF J		
C122,123			CC73GCH1H151J	CHIP C 150PF J		
C124,125			CK73FB1E103K	CHIP C 0.01UF K		
C126			CK73GB1H102K	CHIP C 1000PF K		
C127			CK73FB1E103K	CHIP C 0.01UF K		
C129			CC73FCH1H560J	CHIP C 56PF J		
C133			CC73FCH1H680J	CHIP C 68PF J		
C137			CC73FCH1H040C	CHIP C 4PF C		
C138			CC73GCH1H181J	CHIP C 180PF J		
TC1			C05-0345-05	TRIMMING CAP 10PF		
-			E22-0673-04	TERMINAL BOARD(+)		
203	3H		E30-3009-15	ANT CABLE		
CN1 ,2			E40-5461-05	PIN ASSY(12P)		
J1			E11-0442-05	PHONE JACK		
TP2			E23-0465-05	TERMINAL(TP)		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

PARTS LIST

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28M TX-RX UNIT (X57-3790-01)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
205	2H		F10-2006-14	SHIELDING PLATE(FINAL)		
-			F10-2009-04	SHIELDING PLATE(L TYPE)		
204	1G		F10-2010-03	SHIELDING COVER		
-			F10-2012-04	SHIELDING CASE (VCO-PLL)		
-			F12-0421-04	CONDUCTIVE SHEET(25.4X43)		
-			F12-0422-04	CONDUCTIVE SHEET(25.4X15)		
-			F20-1008-04	INSULATING BOARD(APC)		
-			F20-1090-04	INSULATING BOARD(60X22)		
209	3G		G02-0600-14	FLAT SPRING(THERMAL SWITCH)		
-			G02-0715-04	FLAT SPRING(APC TR)		
-			G02-0718-04	FLAT SPRING(VCO)		
-			G02-0720-04	FLAT SPRING(FRONT)		
211	3G		G11-0655-04	CONDUCTIVE RUBBER(CN1,CN1 55X8		
-			G11-0661-04	INSULATING SHEET(APC TR)		
-			G13-0841-04	CUSHION(XTAL)		
-			G13-1319-04	CUSHION(VCO)		
216	3G		G13-1337-04	CUSHION(VCO)		
206	2H		J30-0583-14	SPACER(FINAL)		
217	2H		J42-0471-04	DC CORD BUSHING		
CD1			L79-1013-05	FILTER		
CF1			L72-0372-05	CERAMIC FILTER(CFWM455F)		
L1			L34-4283-05	COIL(7.5T)		
L2 -4			L34-4284-05	COIL(10.5T)		
L5			L34-4285-05	COIL(1ST IF)		
L6			L40-6891-19	SMALL FIXED INDUCTOR(6.8UH)		
L7			L40-1001-19	SMALL FIXED INDUCTOR(10UH)		
L8			L34-1355-05	COIL(10.5T)		
L9			L40-6882-19	SMALL FIXED INDUCTOR(0.68UH)		
L10			L40-3982-19	SMALL FIXED INDUCTOR(0.39UH)		
L11			L34-1361-05	COIL(4.5T)		
L12			L34-1354-05	COIL(8.5T)		
L13			L34-1352-05	COIL(8T)		
L14			L34-1363-05	COIL(2T)		
L15			L34-1351-05	COIL(7T)		
L16			L34-1364-05	COIL		
L17			L34-1356-05	COIL		
L18			L34-1355-05	COIL		
L19			L33-0741-05	CHOKE COIL		
L20 ,21			L34-1355-05	COIL(10.5T)		
L22 ,23			L40-5691-19	SMALL FIXED INDUCTOR(5.6UH)		
L24			L40-3982-19	SMALL FIXED INDUCTOR(0.39UH)		
L25			L40-1001-19	SMALL FIXED INDUCTOR(10UH)		
L27			L40-1892-19	SMALL FIXED INDUCTOR(1.8UH)		
X1			L77-1465-05	CRYSTAL RESONATOR(9.285MHZ)		
XF1			L71-0422-05	CRYSTAL FILTER(8.83MHZ)		
T	1H		N09-2179-05	SCREW(x3)		
N	2H,3G,3H		N87-2606-46	BRAZIER HEAD TAPTITE SCREW		
O	2H		N87-2608-46	BRAZIER HEAD TAPTITE SCREW		
U	1G,1H		N88-2606-46	FLAT HEAD TAPTITE SCREW		
R1			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R2			RK73FB2A103J	CHIP R 10K J 1/10W		
R3			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R4			RK73FB2A680J	CHIP R 68 J 1/10W		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

PARTS LIST

* New Parts
Parts without Parts No. are not supplied.
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Teile ohne Parts No. werden nicht gellefert.

28M TX-RX UNIT (X57-3790-01)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R5			RK73FB2A271J	CHIP R 270 J 1/10W		
R6			RK73FB2A680J	CHIP R 68 J 1/10W		
R7 ,8			RK73GB1J104J	CHIP R 100K J 1/16W		
R9			RK73GB1J682J	CHIP R 6.8K J 1/16W		
R10			RK73GB1J154J	CHIP R 150K J 1/16W		
R11			RK73GB1J470J	CHIP R 47 J 1/16W		
R12			RK73GB1J103J	CHIP R 10K J 1/16W		
R13 -15			RK73GB1J104J	CHIP R 100K J 1/16W		
R16			RK73GB1J100J	CHIP R 10 J 1/16W		
R17			RK73FB2A101J	CHIP R 100 J 1/10W		
R18			RK73FB2A473J	CHIP R 47K J 1/10W		
R19 ,20			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R21			RK73FB2A223J	CHIP R 22K J 1/10W		
R22			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R23			RK73FB2A101J	CHIP R 100 J 1/10W		
R24			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R25			RK73FB2A391J	CHIP R 390 J 1/10W		
R26			RK73FB2A563J	CHIP R 56K J 1/10W		
R27			RK73FB2A223J	CHIP R 22K J 1/10W		
R28			RK73FB2A331J	CHIP R 330 J 1/10W		
R29			RK73FB2A334J	CHIP R 330K J 1/10W		
R30			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R31			RK73FB2A274J	CHIP R 270K J 1/10W		
R32			RK73FB2A101J	CHIP R 100 J 1/10W		
R33			RK73FB2A221J	CHIP R 220 J 1/10W		
R34			RK73FB2A103J	CHIP R 10K J 1/10W		
R35			RK73FB2A104J	CHIP R 100K J 1/10W		
R36			RK73FB2A473J	CHIP R 47K J 1/10W		
R37			RK73FB2A471J	CHIP R 470 J 1/10W		
R38 ,39			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R40			RK73FB2A103J	CHIP R 10K J 1/10W		
R41			RK73FB2A474J	CHIP R 470K J 1/10W		
R42			RK73FB2A103J	CHIP R 10K J 1/10W		
R43			RK73FB2A223J	CHIP R 22K J 1/10W		
R44			RK73FB2A273J	CHIP R 27K J 1/10W		
R45			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R46 -48			RK73FB2A103J	CHIP R 10K J 1/10W		
R49			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R50			RK73FB2A184J	CHIP R 180K J 1/10W		
R51			RK73FB2A223J	CHIP R 22K J 1/10W		
R52			RK73FB2A103J	CHIP R 10K J 1/10W		
R53			RK73FB2A223J	CHIP R 22K J 1/10W		
R54 ,55			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R56 -58			RK73FB2A473J	CHIP R 47K J 1/10W		
R60			RK73FB2A471J	CHIP R 470 J 1/10W		
R61			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R62			RK73FB2A104J	CHIP R 100K J 1/10W		
R63			RK73FB2A103J	CHIP R 10K J 1/10W		
R64 ,65			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R66			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R67			RK73FB2A122J	CHIP R 1.2K J 1/10W		
R68			RK73FB2A220J	CHIP R 22 J 1/10W		
R69			R92-0670-05	CHIP R 0 OHM		
R70			RK73FB2A104J	CHIP R 100K J 1/10W		
R72			RK73FB2A221J	CHIP R 220 J 1/10W		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

PARTS LIST

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28M TX-RX UNIT (X57-3790-01)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R73			RK73FB2A220J	CHIP R 22 J 1/10W		
R74			RK73FB2A221J	CHIP R 220 J 1/10W		
R75			RK73FB2A470J	CHIP R 47 J 1/10W		
R77			R92-1213-05	CARBON 100 J 1/2W		
R78 ,79			RK73FB2A223J	CHIP R 22K J 1/10W		
R80			R92-0699-05	SOLID 10 1/2W		
R81			RK73FB2A103J	CHIP R 10K J 1/10W		
R82			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R83			RK73FB2A471J	CHIP R 470 J 1/10W		
R84			R92-1215-05	CHIP R 470 J 1/2W		
R85			RK73FB2A123J	CHIP R 12K J 1/10W		
R88			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R89 -92			R92-1252-05	CHIP R 0 OHM		
R93 ,94			R92-0670-05	CHIP R 0 OHM		
R95			R92-0679-05	CHIP R 0 OHM		
R96 -98			R92-0670-05	CHIP R 0 OHM		
R99			R92-1217-05	CHIP R 0		
R100-103			R92-0670-05	CHIP R 0 OHM		
R104			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R105,106			R92-0670-05	CHIP R 0 OHM		
R108			RK73FB2A681J	CHIP R 680 J 1/10W		
R111			R92-0670-05	CHIP R 0 OHM		
R115,116			R92-0670-05	CHIP R 0 OHM		
VR1			R12-6429-05	TRIMMING POT.100K		
VR2			R12-6427-05	TRIM POT. 47K		
VR3			R12-6421-05	TRIM POT. 4.7K		
VR4			R12-6423-05	TRIM POT. 10K		
TS1			S79-0401-05	THERMAL SWITCH(95°C)		
D1 ,2			MA77	DIODE		
D3 -6			1SV228	DIODE		
D7			DAN235(K)	DIODE		
D8			1SS184	DIODE		
D9			DAN235(K)	DIODE		
D10			1SS181	DIODE		
D11			UM9401	DIODE		
D12			MI308	DIODE		
D13 ,14			1SS226	DIODE		
D15			DSA3A1	DIODE		
D16 ,17			1SS184	DIODE		
IC1			BU4094BF	IC(SHIFT/STORE REGISTER)		
IC1			XRU4094BF	IC		
IC2			KCH09	IC(28MHZ PLL)PLL)		
IC3			KCA04	IC(MIC AMPLIFIER)		
IC4			KCB16	IC(DRIVE AMP (28-30MHZ))		
IC5			KCC04	IC(APC)		
IC6			KCD04	IC(FM IF)		
IC7			LA5009M	IC(LOE SATURATION REGULATOR)		
IC8			KCB17	IC(PRE AMP(50M BAND))		
IC9			KCD05	IC(AM IF)		
Q1			3SK179(L)	FET		
Q2			3SK131(V12)	FET		
Q3			2SC2714(Y)	TRANSISTOR		
Q4 ,5			DTC144EU	DIGITAL TRANSISTOR		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

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28M TX-RX UNIT (X57-3790-01)
28 SUB UNIT (X58-3840-01)
50 TX-RX UNIT (X57-3800-01)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
Q6 ,7			DTA114EK	DIGITAL TRANSISTOR		
Q8			2SC2714(Y)	TRANSISTOR		
Q9			2SJ106(GR)	FET		
Q10			2SA1362(Y)	TRANSISTOR		
Q11			2SB1119(S)	TRANSISTOR		
Q12			DTC144WK	DIGITAL TRANSISTOR		
Q13			FMW1	TRANSISTOR		
Q14			2SC2712(Y)	TRANSISTOR		
Q15 -17			DTC144EK	DIGITAL TRANSISTOR		
Q18			2SD1757(K)	TRANSISTOR		
Q19			2SK208(Y)	FET		
Q20			2SC2714(Y)	TRANSISTOR		
Q21			2SC2712(Y)	TRANSISTOR		
Q22			FMG1	TRANSISTOR		
Q23			2SD1902R	TRANSISTOR		
Q24			2SC2712(Y)	TRANSISTOR		
Q25			DTA114EK	DIGITAL TRANSISTOR		
Q26			DTC143EK	DIGITAL TRANSISTOR		
Q27			DTC144EK	DIGITAL TRANSISTOR		
Z1			X58-3840-01	SUB UNIT(28MHZ 50W)		
28 SUB UNIT (X58-3840-01)						
C201			CC73FCH1H471J	CHIP C 390PF J	SUB28	
C202,203			CK73FB1H152K	CHIP C 1500PF K	SUB28	
C204			CM73F2H241J	CHIP C 240PF J	SUB28	
L201			L34-1357-05	COIL (2T)	SUB28	
L202			L40-1001-19	SMALL FIXED INDUCTOR(10UH)	SUB28	
R201			R92-0686-05	CHIP R 33 J 1/2W	SUB28	
Q201			2SC1971	TRNSISTOR	SUB28	
Q202			2SC3240	TRNSISTOR	SUB28	
50 TX-RX UNIT (X57-3800-01)						
200	2G		A10-1325-11	CHASSIS		
201	3G		B42-2437-04	LABEL(S/NO,UNIT))		
C1			CC45SL2H750J	CERAMIC 75PF J		
C2			CC45SL2H560J	CERAMIC 56PF J		
C3			CC45SL2H680J	CERAMIC 68PF J		
C4			CC45SL2H101J	CERAMIC 100PF J		
C5			CC45SL2H680J	CERAMIC 68PF J		
C6			CC45SL2H120J	CERAMIC 12PF J		
C7			CC45SL2H150J	CERAMIC 15PF J		
C8			CC45SL2H030C	CERAMIC 3.0PF C		
C9			CK73GB1H103K	CHIP C 0.01UF K		
C10			CK73FB1E103K	CHIP C 0.01UF K		
C11 ,12			CK73GB1H103K	CHIP C 0.01UF K		
C13			CK73FB1E103K	CHIP C 0.01UF K		
C14 ,15			CK73GB1H103K	CHIP C 0.01UF K		
C16			CK73FB1E103K	CHIP C 0.01UF K		
C17			CC73GCH1H120J	CHIP C 12PF J		
C18			CK73GB1H103K	CHIP C 0.01UF K		
C19			CC73FCH1H060D	CHIP C 6PF D		
C20			CK73GB1H103K	CHIP C 0.01UF K		
C21 -24			CK73FB1E103K	CHIP C 0.01UF K		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

PARTS LIST

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50 TX-RX UNIT (X57-3800-01)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格			Destination 仕向	Remarks 備考
C25			CK73FB1H102K	CHIP C	1000PF	K		
C26			CK73FB1E103K	CHIP C	0.01UF	K		
C27			CC73FCH1H040C	CHIP C	4PF	C		
C28			CE04NW1C470M	ELECTRO	47UF	16WV		
C29			CK73GB1H103K	CHIP C	0.01UF	K		
C30 ,31			CK73EF1C105Z	CHIP C	1.0UF	Z		
C32			C92-0003-05	CHIP TAN	0.47UF	25WV		
C33			CK73FB1E104K	CHIP C	0.10UF	K		
C34			C92-0504-05	CHIP TAN	0.68UF	20WV		
C35			CE04NW1C470M	ELECTRO	47UF	16WV		
C36			CK73FB1E103K	CHIP C	0.01UF	K		
C37			CC73GCH1H100D	CHIP C	10PF	D		
C38			CE04NW1C470M	ELECTRO	47UF	16WV		
C39			CK73FB1E103K	CHIP C	0.01UF	K		
C40			C92-0004-05	ELECTRO	1.0UF	16WV		
C41			CK73FB1E103K	CHIP C	0.01UF	K		
C42			CE04NW1E100M	ELECTRO	10UF	25WV		
C43 ,44			CK73FB1E103K	CHIP C	0.01UF	K		
C45			CK73FB1E103K	CHIP C	0.01UF	K		
C46			CE04NW1C470M	ELECTRO	47UF	16WV		
C47 -49			CK73FB1E103K	CHIP C	0.01UF	K		
C50			CC73FCH1H270J	CHIP C	27PF	J		
C51			CC73FCH1H120J	CHIP C	12PF	J		
C52			CK73EF1C105Z	CHIP C	1.0UF	Z		
C53			CK73FB1E103K	CHIP C	0.01UF	K		
C54			CK73FB1H102K	CHIP C	1000PF	K		
C55 -57			CK73FB1E103K	CHIP C	0.01UF	K		
C58			CE04NW1E100M	ELECTRO	10UF	25WV		
C59			CE04NW1A330M	ELECTRO	33UF	10WV		
C60			CK73FB1E103K	CHIP C	0.01UF	K		
C61			CE04NW1A221M	ELECTRO	220UF	10WV		
C62			CC73FCH1H100D	CHIP C	10PF	D		
C63 ,64			CK73FB1E103K	CHIP C	0.01UF	K		
C65			CC73FCH1H150J	CHIP C	15PF	J		
C66			CK73FB1E103K	CHIP C	0.01UF	K		
C67			CE04NW1C101M	ELECTRO	100UF	16WV		
C68 ,69			CK73FB1E103K	CHIP C	0.01UF	K		
C70			CK73FB1E223K	CHIP C	0.022UF	K		
C71			CK73FB1E103K	CHIP C	0.01UF	K		
C72			CK73EF1C105Z	CHIP C	1.0UF	Z		
C73			CE04NW1E100M	ELECTRO	10UF	25WV		
C74			CK73FB1E103K	CHIP C	0.01UF	K		
C75			CK73EF1C105Z	CHIP C	1.0UF	Z		
C76			CK73FB1E223K	CHIP C	0.022UF	K		
C77			CK73FB1H681K	CHIP C	680PF	K		
C78			CC73FCH1H221J	CHIP C	220PF	J		
C79 ,80			CK73FB1E103K	CHIP C	0.01UF	K		
C81			CK73FB1H102K	CHIP C	1000PF	K		
C82			CE04NW1E330M	ELECTRO	33UF	25WV		
C83			CK73FB1E103K	CHIP C	0.01UF	K		
C84			CM73F2H391J	CHIP C	390PF	J		
C85			CM73F2H820J	CHIP C	82PF	J		
C86			C93-0509-05	CERAMIC	0.0068UF	J		
C87			CC73FCH1H390J -	CHIP C	39PF	J		
C88			C93-0509-05	CERAMIC	0.0068UF	J		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

PARTS LIST

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50 TX-RX UNIT (X57-3800-01)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
C89			CK73FB1E103K	CHIP C 0.01UF K		
C90			CC73FCH1H020C	CHIP C 2.0PF C		
C91			CC73FCH1H0R5C	CHIP C 0.5PF C		
C92 -96			CK73FB1E103K	CHIP C 0.01UF K		
C97			CC73FCH1H020C	CHIP C 2.0PF C		
C98 ,99			CC73FCH1H390J	CHIP C 39PF J		
C100			CK73FB1E103K	CHIP C 0.01UF K		
C101			CC73FCH1H0R5C	CHIP C 0.5PF C		
C102-111			CC73FSL1H101J	CHIP C 100PF J		
C112-113			CK73FB1E103K	CHIP C 0.01UF K		
C114			CK73GB1H103K	CHIP C 0.01UF K		
C115,116			CK73FB1E103K	CHIP C 0.01UF K		
C117			CK73FB1H102K	CHIP C 1000PF K		
C118			CE04NW1E100M	ELECTRO 10UF 25WV		
C119			CK73FB1E103K	CHIP C 0.01UF K		
C124,125			CK73FB1E103K	CHIP C 0.01UF K		
C126			CK73GB1H102K	CHIP C 1000PF K		
C127			CK73FB1E103K	CHIP C 0.01UF K		
C128			CC73GCH1H270J	CHIP C 27PF J		
C130,131			CC73FCH1H1R5C	CHIP C 1.5PF C		
C132			CC73FCH1H150J	CHIP C 15PF J		
C133			CC73FCH1H560J	CHIP C 56PF J		
C134			CC73GCH1H050C	CHIP C 5PF C		
C135			CC73FSL1H101J	CHIP C 100PF J		
C136			CK73FB1E104K	CHIP C 0.10UF K		
C138			CC73GCH1H151J	CHIP C 150PF J		
C139,140			CC73FCH1H470J	CHIP C 47PF J		
TC1			C05-0345-05	TRIMMING CAP.10PF		
-			E22-0673-04	TERMINAL(+)		
203	3H		E30-3009-15	ANT CABLE		
CN1 ,2			E40-5461-05	PIN ASSY(12P)		
J1			E11-0442-05	PHONE JACK		
TP2			E23-0465-05	TERMINAL(TP))		
205	2H		F10-2006-14	SHIELDING PLATE(FINAL)		
-			F10-2009-04	SHIELDING PLATE(L TYPE)		
204	1G		F10-2010-03	SHIELDING COVER		
-			F10-2012-04	SHIELDING CASE(VCO-PLL)		
-			F20-1008-04	INSULATING SHEET(APC)		
-			F20-1090-04	INSULATING SHEET(60X22)		
209	3G		G02-0600-14	FLAT SPRING(THERMAL SWITCH)		
-			G02-0705-04	FLAT SPRING(BPF COIL)		
-			G02-0715-04	FLAT SPRING(APC TR)		
-			G02-0718-04	FLAT SPLING(VCO)		
211	3G		G11-0655-04	CONDUCTIVE RUBBER(CN1,CN2 55X8		
-			G11-0661-04	INSULATING SHEET(APC TR)		
-			G13-0841-04	CUSHION(XTAL)		
-			G13-1319-04	CUSHION(VCO 22X15)		
216	3G		G13-1337-04	CUSHION(BPF COIL,VCO)		
214	1G		G53-0508-04	PACKING		
206	2H		J30-0583-14	SPACER(FINAL)		
217	2H		J42-0471-04	DC CORD BUSHING		
CD1			L79-1013-05	FILTER		
CF1			L72-0372-05	CERAMIC FILTER(CFWM455F)		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

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Teile ohne Parts No. werden nicht gellefert.

50 TX-RX UNIT (X57-3800-01)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
L1			L34-4281-05	COIL(YELLOW)		
L2 -4			L34-4283-05	COIL(WHITE)		
L5			L34-4251-05	COIL(1ST IF)		
L6			L40-1582-19	SMALL FIXED INDUCTOR(0.15UH)		
L7			L40-1001-19	SMALL FIXED INDUCTOR(10UH)		
L8			L34-1347-05	COIL (6.5T)		
L9			L40-4782-19	SMALL FIXED INDUCTOR(0.47UH)		
L10			L40-1882-19	SMALL FIXED INDUCTOR(0.18UH)		
L11			L34-1344-05	COIL (2.5T)		
L12			L34-1354-05	COIL (8.5T)		
L13			L34-1352-05	COIL (8T)		
L14			L34-1345-05	COIL (1T)		
L15			L34-1346-05	COIL (4T)		
L16			L34-1364-05	COIL (20.5T)		
L17			L34-1349-05	COIL (5.5T)		
L18			L34-1348-05	COIL (5.5T)		
L19			L33-0742-05	SMALL FIXED INDUCTOR(10UH)		
L20 ,21			L34-1347-05	COIL (6.5T)		
L25			L40-1001-19	SMALL FIXED INDUCTOR(10UH)		
L26			L40-1582-19	SMALL FIXED INDUCTOR(0.15UH)		
L27			L40-1592-19	SMALL FIXED INDUCTOR(0.15UH)		
L28			L40-2282-19	SMALL FIXED INDUCTOR(0.22UH)		
X1		*	L77-1464-15	CRYSTAL RESONATOR(11.05MHZ)		
XF1			L71-0421-05	CRYSTAL FILTER(10.595MHZ)		
T			N09-2179-05	SCREW (X3)		
N			N87-2606-46	BRAZIER HEAD TAPTITE SCREW		
O			N87-2608-46	BRAZIER HEAD TAPTITE SCREW		
U			N88-2606-46	FLAT HEAD TAPTITE SCREW		
R1			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R2			RK73FB2A103J	CHIP R 10K J 1/10W		
R3			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R4			RK73FB2A680J	CHIP R 68 J 1/10W		
R5			RK73FB2A271J	CHIP R 270 J 1/10W		
R6			RK73FB2A680J	CHIP R 68 J 1/10W		
R7 ,8			RK73GB1J104J	CHIP R 100K J 1/16W		
R9			RK73GB1J562J	CHIP R 5.6K J 1/16W		
R10			RK73GB1J154J	CHIP R 150K J 1/16W		
R11			RK73GB1J101J	CHIP R 100 J 1/16W		
R12			RK73GB1J103J	CHIP R 10K J 1/16W		
R13 -15			RK73GB1J104J	CHIP R 100K J 1/16W		
R16			RK73GB1J100J	CHIP R 10 J 1/16W		
R17			RK73FB2A101J	CHIP R 100 J 1/10W		
R18			RK73FB2A473J	CHIP R 47K J 1/10W		
R19 ,20			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R21			RK73FB2A223J	CHIP R 22K J 1/10W		
R22			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R23			RK73FB2A101J	CHIP R 100 J 1/10W		
R24			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R25			RK73FB2A391J	CHIP R 390 J 1/10W		
R26			RK73FB2A563J	CHIP R 56K J 1/10W		
R27			RK73FB2A223J	CHIP R 22K J 1/10W		
R28			RK73FB2A331J	CHIP R 330 J 1/10W		
R30			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R31			RK73FB2A274J	CHIP R 270K J 1/10W		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

PARTS LIST

⁎ New Parts
Parts without Parts No. are not supplied.
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Teile ohne Parts No. werden nicht geliefert.

50 TX-RX UNIT (X57-3800-01)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R32			RK73FB2A101J	CHIP R 100 J 1/10W		
R33			RK73FB2A221J	CHIP R 220 J 1/10W		
R34			RK73FB2A103J	CHIP R 10K J 1/10W		
R35			RK73FB2A334J	CHIP R 330K J 1/10W		
R36			RK73FB2A473J	CHIP R 47K J 1/10W		
R37			RK73FB2A471J	CHIP R 470 J 1/10W		
R38			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R40			RK73FB2A103J	CHIP R 10K J 1/10W		
R41			RK73FB2A474J	CHIP R 470K J 1/10W		
R42			RK73FB2A103J	CHIP R 10K J 1/10W		
R43			RK73FB2A223J	CHIP R 22K J 1/10W		
R44			RK73FB2A273J	CHIP R 27K J 1/10W		
R45			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R46 -48			RK73FB2A103J	CHIP R 10K J 1/10W		
R49			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R50			RK73FB2A154J	CHIP R 150K J 1/10W		
R51			RK73FB2A223J	CHIP R 22K J 1/10W		
R52			RK73FB2A103J	CHIP R 10K J 1/10W		
R53			RK73FB2A223J	CHIP R 22K J 1/10W		
R54 ,55			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R56 -58			RK73FB2A473J	CHIP R 47K J 1/10W		
R59 ,60			RK73FB2A470J	CHIP R 47 J 1/10W		
R61			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R62			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R63			RK73FB2A183J	CHIP R 18K J 1/10W		
R64 ,65			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R66			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R67			RK73FB2A122J	CHIP R 1.2K J 1/10W		
R68			RK73FB2A220J	CHIP R 22 J 1/10W		
R69			R92-0670-05	CHIP R 0 ΩHM		
R70			RK73FB2A104J	CHIP R 100K J 1/10W		
R72			RK73FB2A471J	CHIP R 470 J 1/10W		
R73			RK73FB2A120J	CHIP R 12 2 A		
R74			RK73FB2A471J	CHIP R 470 J 1/10W		
R75			RK73FB2A470J	CHIP R 47 J 1/10W		
R76			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R77			R92-1213-05	CARBΩN 100 J 1/2W		
R78 ,79			RK73FB2A223J	CHIP R 22K J 1/10W		
R80			R92-0685-05	CHIP R 22 J 1/2W		
R81			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R82			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R83			RK73FB2A471J	CHIP R 470 J 1/10W		
R84			R92-1215-05	CHIP R 470 J 1/2W		
R86			R92-1252-05	CHIP R 0 ΩHM		
R88			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R90			RK73GB1J105J	CHIP R 1.0M J 1/16W		
R93 ,94			R92-0670-05	CHIP R 0 ΩHM		
R95			R92-0679-05	CHIP R 0 ΩHM		
R96 -98			R92-0670-05	CHIP R 0 ΩHM		
R99			R92-1217-05	CHIP R 0		
R100-103			R92-0670-05	CHIP R 0 ΩHM		
R104			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R105,106			R92-0670-05	CHIP R 0 ΩHM		
R108			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R109			RK73GB1J473J	CHIP R 47K J 1/16W	-	

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

PARTS LIST

× New Parts
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50 TX-RX UNIT (X57-3800-01)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R110			RK73FB2A221J	CHIP R 220 J 1/10W		
R111			R92-0670-05	CHIP R 0 ΩHM		
R112-114			R92-1252-05	CHIP R 0 ΩHM		
VR1			R12-6429-05	TRIM PΩT. 100K		
VR2			R12-6427-05	TRIM PΩT. 47K		
VR3			R12-6421-05	TRIM PΩT. 4.7K		
VR4			R12-6423-05	TRIM PΩT. 10K		
TS1			S59-0444-05	THERMAL SWITCH(90°C)		
D1 ,2			MA77	DIΩDE		
D3 -6			1SV228	DIΩDE		
D7			DAN235(K)	DIΩDE		
D8			1SS184	DIΩDE		
D9			DAN235(K)	DIΩDE		
D10			1SS181	DIΩDE		
D11			MI407	DIΩDE		
D12			MI308	DIΩDE		
D13 ,14			1SS226	DIΩDE		
D15			DSA3A1	DIΩDE		
D16 ,17			1SS184	DIΩDE		
IC1			BU4094BF	IC(SHIFT/STΩRE REGISTER)		
IC1			XRU4094BF	IC		
IC2			KCH10	IC(50MHZ PLL)PLL)		
IC3			KCA04	IC(MIC AMPLIFIER)		
IC4			KCB18	IC(DRIVE AMP (50M BAND))		
IC5			KCC04	IC(APC)		
IC6			KCD04	IC(FM IF)DET)		
IC7			LA5010M	IC(LΩW SATURATIΩN REGULATΩR)		
IC8			KCB19	IC(PRE AMP) FRΩNT)		
IC9			KCD05	IC(AM IF)		
Q1			3SK184(S)	FET		
Q2			3SK131(V12)	FET		
Q3			2SC2714(Y)	TRANSISTΩR		
Q4			DTC144EK	DIGITAL TRANSISTΩR		
Q5			DTC144EU	DIGITAL TRANSISTΩR		
Q6 ,7			DTA114EK	DIGITAL TRANSISTΩR		
Q8			2SC2714(Y)	TRANSISTΩR		
Q9			2SJ106(GR)	FET		
Q10			2SA1362(Y)	TRANSISTΩR		
Q11			2SB1119(S)	TRANSISTΩR		
Q12			DTC144WK	DIGITAL TRNSISTΩR		
Q13			FMW1	TRNSISTΩR		
Q14			2SC2712(Y)	TRNSISTΩR		
Q15 -17			DTC144EK	DIGITAL TRNSISTΩR		
Q18			2SD1757K	TRNSISTΩR		
Q19			2SK208(Y)	FET		
Q20			2SC2714(Y)	TRNSISTΩR		
Q21			2SC2712(Y)	TRNSISTΩR		
Q22			FMG1	TRNSISTΩR		
Q23			2SD1902R	TRNSISTΩR		
Q24			2SC2712(Y)	TRNSISTΩR		
Q25			DTA114EK	DIGITAL TRNSISTΩR		
Q26			DTC143EK	DIGITAL TRNSISTΩR		
Z1			X58-3840-03	SUB UNIT(50M 50W)		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

PARTS LIST

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50 SUB UNIT (X58-3840-03)
220M TX-RX UNIT (X57-3810-10)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
50 SUB UNIT (X58-3840-03)						
C201			CC73FCH1H391J	CHIP C 390PF J	SUB50	
C202			CC73FCH1H221J	CHIP C 220PF J	SUB50	
C203			CK73FB1H471K	CHIP C 470PF K	SUB50	
C204			CM73F2H910J	CHIP C 91PF J	SUB50	
L201			L34-1357-05	COIL (2T)	SUB50	
L202			L40-1001-19	SMALL FIXED INDUCTOR(10UH)	SUB50	
Q201			2SC1972	TRNSISTOR	SUB50	
Q202			MRF492	TRNSISTOR	SUB50	
220M TX-RX UNIT (X57-3810-10)						
200	2G		A10-1316-11	CHASSIS		
201	3G		B42-2437-04	LABEL(S/NO,UNIT)		
C5			CC73FCH1H030C	CHIP C 3PF C		
C7 -9			CK73FB1H102K	CHIP C 1000PF K		
C10			CK73FB1E103K	CHIP C 0.01UF K		
C11			CC73FCH1H0R5C	CHIP C 0.5PF C		
C12			CC73FCH1H560J	CHIP C 56PF J		
C14			CC73FCH1H0R5C	CHIP C 0.5PF C		
C15			CC73FCH1H120J	CHIP C 12PF J		
C17			CC73FCH1H120J	CHIP C 12PF J		
C18			CK73FB1H102K	CHIP C 1000PF K		
C19			CC73FCH1H060D	CHIP C 6PF D		
C20			CK73FB1H102K	CHIP C 1000PF K		
C21			CC73FCH1H060D	CHIP C 6PF D		
C22			CK73FB1E103K	CHIP C 0.01UF K		
C24			CK73FB1E103K	CHIP C 0.01UF K		
C25			CC45SL2H030C	CERAMIC 3.0PF C		
C26			CK73FB1H102K	CHIP C 1000PF K		
C29			CK73FB1E103K	CHIP C 0.01UF K		
C30			CC73FCH1H150J	CHIP C 15PF J		
C31			CK73FB1H102K	CHIP C 1000PF K		
C33			CK73FB1E104K	CHIP C 0.10UF K		
C34 ,35			CK73EF1C105Z	CHIP C 1.0UF Z		
C36 ,37			CK73FB1E103K	CHIP C 0.01UF K		
C44 ,45			CE04NW1C470M	ELECTRO 47UF 16WV		
C46			C92-0504-05	CHIP TAN 0.68UF 20WV		
C47			CE04NW1C470M	ELECTRO 47UF 16WV		
C48			C92-0003-05	CHIP TAN 0.47UF 25WV		
C50			CE04NW1C470M	ELECTRO 47UF 16WV		
C51 ,52			CK73FB1E103K	CHIP C 0.01UF K		
C53 ,54			CK73FB1H102K	CHIP C 1000PF K		
C55			CK73EF1C105Z	CHIP C 1.0UF Z		
C56			CC73FUJ1H150J	CHIP C 15PF J		
C57			CK73FB1H102K	CHIP C 1000PF K		
C58			CC73FUJ1H200J	CHIP C 20PF J		
C59 ,60			CK73FB1H102K	CHIP C 1000PF K		
C61			CE04NW1C470M	ELECTRO 47UF 16WV		
C62			CK73FB1H102K	CHIP C 1000PF K		
C63			CK73FB1E103K	CHIP C 0.01UF K		
C64			CE04NW1E100M	ELECTRO 10UF 25WV		
C65			CE04NW1A330M	ELECTRO 33UF 10WV		
C66			CK73FB1E103K	CHIP C 0.01UF K		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

PARTS LIST

⋊ New Parts
Parts without Parts No. are not supplied.
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Teile ohne Parts No. werden nicht geliefert.

220M TX-RX UNIT (X57-3810-10)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格			Destination 仕向	Remarks 備考
C67			CK73FB1H102K	CHIP C	1000PF	K		
C68 ,69			CC73FCH1H100D	CHIP C	10PF	D		
C70			CK73FB1E103K	CHIP C	0.01UF	K		
C71 -73			CK73FB1H102K	CHIP C	1000PF	K		
C74			CK73FB1H223K	CHIP C	0.022UF	K		
C75			CE04NW1C101M	ELECTRO	100UF	16WV		
C76			CK73EF1C105Z	CHIP C	1.0UF	Z		
C77 ,78			CK73FB1H102K	CHIP C	1000PF	K		
C79			CK73EF1C105Z	CHIP C	1.0UF	Z		
C81			CC45SL2H180J	CERAMIC	18PF	J		
C82			CK73FB1H102K	CHIP C	1000PF	K		
C83			CK45B2H102K	CERAMIC	1000PF	K		
C84			CC45SL2H040C	CERAMIC	4.0PF	C		
C85			CC73FCH1H0R5C	CHIP C	0.5PF	C		
C86			CC73FCH1H0R5C	CHIP C	0.5PF	C		
C87			CC73FCH1H020C	CHIP C	2.0PF	C		
C88			CC45SL2H220J	CERAMIC	22PF	J		
C89			CC45SL2H180J	CERAMIC	18PF	J		
C90 -92			CK73FB1H102K	CHIP C	1000PF	K		
C93			CC73FCH1H0R5C	CHIP C	0.5PF	C		
C94			CM73F2H050D	CHIP C	5.0PF	D		
C95			CC73FCH1H020C	CHIP C	2.0PF	C		
C96			CK73FB1E103K	CHIP C	0.01UF	K		
C97			CC73FCH1H150J	CHIP C	15PF	J		
C98			CK73FB1H102K	CHIP C	1000PF	K		
C99			CE04NW1E100M	ELECTRO	10UF	25WV		
C100			CC73FCH1H010C	CHIP C	1PF	C		
C101			CE04NW1E100M	ELECTRO	10UF	25WV		
C102			CC73FCH1H470J	CHIP C	47PF	J		
C103			CK73FB1H102K	CHIP C	1000PF	K		
C104			CK73FB1E103K	CHIP C	0.01UF	K		
C105			CK73FB1H223K	CHIP C	0.022UF	K		
C106			CC73FCH1H470J	CHIP C	47PF	J		
C108			CC73FCH1H390J	CHIP C	39PF	J		
C109,110			CK73FB1H102K	CHIP C	1000PF	K		
C111			CK73FB1E103K	CHIP C	0.01UF	K		
C112			CE04NW1A221M	ELECTRO	220UF	10WV		
C113			CC73FSL1H100D	CHIP C	10PF	D		
C114,115			CC73FSL1H101J	CHIP C	100PF	J		
C116			CC73FCH1H060D	CHIP C	6PF	D		
C119			CE04NW1E100M	ELECTRO	10UF	25WV		
C120-127			CC73FSL1H101J	CHIP C	100PF	J		
C128,129			CK73FB1H102K	CHIP C	1000PF	K		
C130			CE04EW1C102M	ELECTRO	1000UF	16WV		
C131			CC73FCH1H070D	CHIP C	7PF	D		
C133			CC73FCH1H100D	CHIP C	10PF	D		
C134			CK73FB1E103K	CHIP C	0.01UF	K		
C135-137			CK73FB1H102K	CHIP C	1000PF	K		
C140			CC73FCH1H010C	CHIP C	1PF	C		
TC1			C05-0371-05	TRIM CAP		10PF		
203			E30-3009-15	ANT CABLE				
-	3H		E72-0406-04	TERMINAL BOARD(+)				
CN1 ,2			E40-5461-05	PIN ASSY(12P)				
J1			E11-0442-05	PHONE JACK				
J2			E23-0619-05	TERMINAL(TP)				

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

PARTS LIST

* New Parts
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220M TX-RX UNIT (X57-3810-10)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
205	2G		F10-1446-04	SHIELDING PLATE		
204	1G		F10-2010-03	SHIELDING COVER		
-			F10-2012-04	SHIELDING CASE (VCO-PLL)		
-			F20-1008-04	INSULATING SHEET(APC)		
209	3G		G02-0600-14	FLAT SPRING(THERMAL SWITCH)		
-			G02-0705-04	FLAT SPRING		
-			G02-0715-04	FLAT SPRING(APC TR)		
-			G02-0718-04	FLAT SPRING(VCO)		
211	3G		G11-0655-04	SHEET(CN1,CN2 55X8)		
212	1G		G11-0656-14	CONDUCTIVE RUBBER		
-			G11-0661-04	INSULATING SHEET(APC TR)		
-			G13-0841-04	CUSHION(XTAL)		
-			G13-1337-04	CUSHION(VCO)		
216	3G		G13-1349-04	CUSHION(VCO 22X7)		
213	3G		G13-1351-04	CUSHION(55X8)		
217	2H		J42-0471-04	DC CORD BUSHING		
CD1			L79-1013-05	FILTER		
CF1			L72-0372-05	CERAMIC FILTER(CFWM455F)		
L1 -4			L34-4279-05	COIL(1ST IF)		
L5			L40-1082-19	SMALL FIXED INDUCTOR(0.1UH)		
L6			L34-4280-05	COIL		
L10			L40-1582-19	SMALL FIXED INDUCTOR(0.15UH)		
L11			L34-1239-05	COIL		
L12			L34-1207-05	COIL		
L13			L34-1208-05	COIL		
L14			L34-0908-05	COIL		
L15 ,16			L34-0641-05	COIL		
L19			L40-8272-48	SMALL FIXED INDUCTOR(82NH)		
L20			L40-1001-19	SMALL FIXED INDUCTOR(10UH)		
L21			L40-1092-19	SMALL FIXED INDUCTOR(1UH)		
L22			L40-3372-48	SMALL FIXED INDUCTOR(33NH)		
X1			L77-1405-05	CRYSTAL RESONATOR(12.8MHZ)		
X2			L77-1463-05	CRYSTAL RESONATOR(30.37MHZ)		
XF1			L71-0420-05	CRYSTAL FILTER(30.825MHZ)		
W			N09-2077-05	SCREW(MODULE)		
N			N87-2606-46	BRAZIER HEAD TAPTITE SCREW		
U			N88-2606-46	FLAT HEAD TAPTITE SCREW		
R5			RK73FB2A333J	CHIP R 33K J 1/10W		
R6			RK73FB2A104J	CHIP R 100K J 1/10W		
R7			RK73FB2A101J	CHIP R 100 J 1/10W		
R8			RK73FB2A103J	CHIP R 10K J 1/10W		
R9			RK73FB2A101J	CHIP R 100 J 1/10W		
R10 -12			RK73FB2A104J	CHIP R 100K J 1/10W		
R13			RK73FB2A473J	CHIP R 47K J 1/10W		
R14			RK73FB2A103J	CHIP R 10K J 1/10W		
R18			RK73FB2A151J	CHIP R 150 J 1/10W		
R19			R92-0670-05	CHIP R 0 OHM		
R20			RK73FB2A122J	CHIP R 1.2K J 1/10W		
R21			RK73FB2A471J	CHIP R 470 J 1/10W		
R22			RK73FB2A101J	CHIP R 100 J 1/10W		
R23			RK73FB2A103J	CHIP R 10K J 1/10W		
R24			RK73FB2A473J	CHIP R 47K J 1/10W		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

PARTS LIST

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

220M TX-RX UNIT (X57-3810-10)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R25			RK73FB2A103J	CHIP R 10K J 1/10W		
R31			RK73FB2A394J	CHIP R 390K J 1/10W		
R32			RK73FB2A103J	CHIP R 10K J 1/10W		
R33 ,34			R92-0670-05	CHIP R 0 ΩHM		
R35			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R36			RK73FB2A101J	CHIP R 100 J 1/10W		
R37			R92-0670-05	CHIP R 0 ΩHM		
R38			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R39 -41			RK73FB2A103J	CHIP R 10K J 1/10W		
R42			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R43			RK73FB2A223J	CHIP R 22K J 1/10W		
R44			RK73FB2A273J	CHIP R 27K J 1/10W		
R45			RK73FB2A473J	CHIP R 47K J 1/10W		
R46			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R47			R92-0670-05	CHIP R 0 ΩHM		
R49			RK73FB2A223J	CHIP R 22K J 1/10W		
R50			RK73FB2A124J	CHIP R 120K J 1/10W		
R52 -54			RK73FB2A473J	CHIP R 47K J 1/10W		
R55			RK73FB2A471J	CHIP R 470 J 1/10W		
R56			RK73FB2A104J	CHIP R 100K J 1/10W		
R57			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R59			R92-0670-05	CHIP R 0 ΩHM		
R60			RK73FB2A103J	CHIP R 10K J 1/10W		
R61			RK73FB2A471J	CHIP R 470 J 1/10W		
R62			R92-0670-05	CHIP R 0 ΩHM		
R63 ,64			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R65 ,66			R92-0670-05	CHIP R 0 ΩHM		
R67			RK73FB2A122J	CHIP R 1.2K J 1/10W		
R68			RK73FB2A220J	CHIP R 22 J 1/10W		
R69			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R71			R92-0670-05	CHIP R 0 ΩHM		
R73			RK73FB2A104J	CHIP R 100K J 1/10W		
R74			R92-0679-05	CHIP R 0 ΩHM		
R75			RK73FB2A392J	CHIP R 3.9K J 1/10W		
R76 ,77			R92-0670-05	CHIP R 0 ΩHM		
R78			R92-1213-05	CARBΩN 100 J 1/2W		
R79 ,80			RK73FB2A223J	CHIP R 22K J 1/10W		
R81			RK73FB2A471J	CHIP R 470 J 1/10W		
R82			R92-0699-05	SΩLID 10 1/2W		
R83 -86			R92-0670-05	CHIP R 0 ΩHM		
R89			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R90			RK73FB2A221J	CHIP R 220 J 1/10W		
R91			RK73FB2A473J	CHIP R 47K J 1/10W		
R92 ,93			RK73FB2A104J	CHIP R 100K J 1/10W		
R98			RK73FB2A223J	CHIP R 22K J 1/10W		
R99			RK73FB2A103J	CHIP R 10K J 1/10W		
R100			R92-0670-05	CHIP R 0 ΩHM		
R101			RK73FB2A102J	CHIP R 1.0K J 1/10W		
VR1			R12-6429-05	TRIMMING PΩT. 100K		
VR2			R12-6427-05	TRIM PΩT. 47K		
VR3 ,4			R12-6423-05	TRIM PΩT. 10K		
TS1			S79-0401-05	THERMAL SWITCH(95°C)		
D3			1SV164	DIΩDE		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

PARTS LIST

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

220M TX-RX UNIT (X57-3810-10)
UT-28S

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
D5			1SV164	DIODE		
D7			1SV164	DIODE		
D11 ,12			1SS184	DIODE		
D13			DAN235(K)	DIODE		
D14			1SS181	DIODE		
D15			MI407	DIODE		
D16			MI308	DIODE		
D17 ,18			1SS226	DIODE		
D19			DSA3A1	DIODE		
D20			1SV164	DIODE		
IC1			BU4094BF	IC(SHIFT/STORE REGISTER)		
IC1			XRU4094BF	IC		
IC2			LA5009M	IC(LOE SATURATION REGULATOR)		
IC5			KCD04	IC(FM IF)		
IC7			KCA04	IC(MIC AMPLIFIER)		
IC8			KCB15	IC(DRIVE AMP (220M BAND))		
IC9			KCC04	IC(APC)		
IC10			M57774	IC(POWER MODULE/220-225MHZ)		
IC11			KCH08	IC(220 PLL-VCO)		
Q1 ,2			3SK184(S)	FET		
Q3			2SC2714(Y)	TRANSISTOR		
Q10			2SA1362(Y)	TRANSISTOR		
Q11			2SB1119S	TRANSISTOR		
Q12			DTC144WK	DIGITAL TRANSISTOR		
Q13 ,14			2SC2712(Y)	TRANSISTOR		
Q15 -17			DTC144EK	DIGITAL TRANSISTOR		
Q18			2SD1757(K)	TRANSISTOR		
Q19			2SK208(Y)	FET		
Q20			2SC2714(Y)	TRANSISTOR		
Q21			2SC2712(Y)	TRANSISTOR		
Q22			FMG1	TRANSISTOR		
Q23			2SD1902R	TRANSISTOR		
Q24			2SJ106(GR)	FET		
UT-28S						
300	1U		B41-0686-04	CAUTION LABEL(ADJUST)		
303	1T		B42-2437-04	LABEL(S/NO,UNIT)		
305	1T		B42-2454-04	LABEL(S/NO,ITEM CARTON BOX)		
309	2U		B42-3488-04	LABEL(FREQUENCY)		
311	1T		B62-0089-10	INSTRUCTION MANUAL		
313	2U		E23-0657-04	TERMINAL		
315	1U		G11-0665-04	SHEET(FAN CABLE)		
317	2T,1U		H10-2726-03	POLYSTYRENE FOAMED FIXTURE		
320	1T		H13-0855-04	PROTECTION BOARD		
322	2U		H25-0029-04	PROTECTION BAG(60X110)		
324	1T,1U		H25-0760-04	PROTECTION BAG(200X350)		
326	2T		H52-0130-04	ITEM CARTON BOX		
328	3T		H62-0110-04	OUTER PACKING CASE		
330	1U		J69-0325-05	O RING		
335	1U		N99-0355-15	SCREW SET		
340	1U,2T		X57-3790-01	TX-RX UNIT(28MHZ 50W)		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

PARTS LIST

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

UT-50S
UT-220S
UT-1200

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
UT-50S						
300	1U		B41-0686-04	CAUTION LABEL(ADJUST)		
303	1T		B42-2437-04	LABEL(S/NO,UNIT)		
305	1T		B42-2454-04	LABEL(S/NO,ITEM CARTON BOX)		
309	2U		B42-3488-04	LABEL(FREQUENCY)		
311	1T		B62-0089-10	INSTRUCTION MANUAL		
313	2U		E23-0657-04	TERMINAL		
315	1U		G11-0665-04	SHEET(FAN CABLE)		
317	1U,2T		H10-2726-03	POLYSTYRENE FOAMED FIXTURE		
320	1T		H13-0855-04	PROTECTION BOARD		
322	2U		H25-0029-04	PROTECTION BAG(60X10)		
324	1T,1U		H25-0760-04	PROTECTION BAG(200X350)		
326	2T		H52-0133-04	ITEM CARTON BOX		
328	3T		H62-0113-04	OUTER CARTON BOX		
330	1U		J69-0325-05	O RING		
335	1U		N99-0355-15	SCREW SET		
340	1U,2T		X57-3800-01	TX-RX UNIT(50M 50W)		
UT-220S						
300	1U		B41-0686-04	CAUTION LABEL(ADJUST)		
303	1T		B42-2437-04	LABEL(S/NO,UNIT)		
305	3T		B42-2454-04	LABEL(S/NO,ITEM CARTON BOX)		
309	2U		B42-3488-04	LABEL(FREQUENCY)		
311	1T		B62-0089-10	INSTRUCTION MANUAL		
313	2U		E23-0657-04	TERMINAL		
315	1U		G11-0665-04	SHEET(FAN CABLE)		
317	1U,2T		H10-2726-03	POLYSTYRENE FOAMED FIXTURE		
320	1T		H13-0855-04	PROTECTION BOARD		
322	2U		H25-0029-04	PROTECTION BAG(60X110)		
324	1T,1U		H25-0760-04	PROTECTION BAG(200X350)		
326	2T		H52-0136-04	ITEM CARTON BOX		
328	3T		H62-0116-04	OUTER PACKING CASE		
330	1U		J69-0325-05	O RING		
335	1U		N99-0355-15	SCREW SET		
340	1U,2T		X57-3810-10	TX-RXUNIT(220MHZ 25W)		
UT-1200						
300	1U		B41-0686-04	CAUTION LABEL(ADJUST)		
303	1T		B42-2437-04	LABEL(S/NO)		
305	1T		B42-2454-04	LABEL(S/NO.ITEM CARTON BOX)		
309	2U		B42-3488-04	LABEL(FREQUENCY)		
311	1T		B62-0089-10	INSTRUCTION MANUAL		
313	2U		E23-0657-04	TERMINAL		
315	1U		G11-0665-04	SHEET(FAN CABLE)		
317	1U,2T		H10-2726-03	POLYSTYRENE FOAMED FIXTURE		
320	1T		H13-0855-04	PROTECTION BOARD		
322	2U		H25-0029-04	PROTECTION BAG(60X110)		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

PARTS LIST

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

UT-1200

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
324	1T,1U		H25-0760-04	PROTECTION BAG(200X350)		
326	2T		H52-0112-04	ITEM CARTON BOX		
328	3T		H62-0101-04	OUTER CARTON BOX		
330	1U		J69-0325-05	O RING		
335	1U		N99-0355-15	SCREW SET		
340	1U,2T		X57-3600-11	TX-RX UNIT (1200MHz 10W)		

A: TM-742 K, P, M, M2, E, E2, E3
B: TM-942 K, P, M

TM-742 A/742 E/942 A

EXPLODED VIEW

A	Φ5.5 x 6	:	N09-2084-05
B	HEXAGON NUT	:	N10-2030-46
C	M3 x 30	:	N30-3030-46
D	M3 x 40	:	N30-3040-46
E	M2.6 x 6	:	N32-2606-46
F	M2.6 x 6 (OC)	:	N33-2606-45
G	M2.6 x 14	:	N33-2614-45
L	M2.6 x 5	:	N80-2605-45
M	M2.6 x 6	:	N86-2606-45

EXPLODED VIEW

TM-742 A/742 E/942 A

EXPLODED VIEW

EXPLODED VIEW

TX-RX UNIT

TM-742 A/742 E/942 A

PACKING (UNIT)

PACKING (OPTIONAL BAND UNIT)

TM-742 A/742 E/942 A

ADJUSTMENT

Required Test Equipment

1. Tester and DC V.M
   Use a tester with high input impedance.
2. RF VTVM (RF VM)
   Input impedance: 1 M ohms or more, 2 pF or less
   Voltage range: FS = 10 mV to 300 V
   Measurable frequency: 1,300 MHz (maximum)
3. Frequency counter (F counter)
   Input sensitivity: Approximately 50 mV
   Measurable frequency: 1,300 MHz or more
4. DC power supply
   Voltage: 10 to 17 V (variable)
   Current: 12 A or more
5. Power meter
   Power measurement ranges: 100 W, 50 W, and 15 W
   Input impedance: 50 ohms
   Measurable frequency: 1,300 HMz
6. AF vacuum voltmeter (AF VM)
   Input impedance: 1 M ohms or more
   Voltage range: FS= 1 mV to 30 V
   Measurable frequency: 50 Hz to 10 kHz
7. AF generator (AG)
   Output frequency: 100 Hz to 10 kHz
   Output voltage: 0.5 mV to 1 V
8. Linear detector
   Measurable frequency: 1,300 MHz
9. Spectrum analyzer
   Measurable frequency: 1,300 MHz
10. Directional coupler
11. Oscilloscope
    Use a high-sensitivity oscilloscope with horizontal input socket.
12. SSG
    Use an SSG that produces a frequency of 20 to 1,300 MHz with amplitude and frequency modulation.
    Output level: 0.1μV to 100 mV
13. Dummy resistor
    Use an 8-ohm resistor exceeding the rated value in each band.
14. Noise generator
    Use a noise generator whose output contains a high-frequency component of more than 1,300 MHz (near ignition noise).
15. Sweep generator
    Use a sweep generator that can sweep the 1,300 MHz band.
16. Tracking generator

Preparation

- Set controls to the position shown in Table 23 unless otherwise specified.

POWER SW	OFF
AF VOL VR	MIN
SQL VOL VR	MIN

Table 23

Fig. 55 Microphone Socket (on Front Panel)

- Use an insulated tool such as a plastic tool during adjustment (especially trimmer coil adjustment).
- For SSG protection, do not connect a microphone to the microphone socket during receiver block adjustment.
- Check that the power switch is off before the power cord is connected.
- The SSG output level is displayed at the release end.
- After setting the various controls as shown in Table 23, make sure that the indications of the display and the LEDs are as shown in Figure 56 when the POWER switch is turned ON while pushing the MR key.

Fig. 56

ADJUSTMENT

• 144 MHz Band (TM-742 A/E, TM-942A)

Common Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Lock voltage check	1. Frequency: 144.040MHz Receive	Digital voltmeter	TX-RX	TP2			Check the lock voltage.	1.8 ~ 3.0 V

The DC power supply must be set to the rated voltage.

Receiver Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Bandpass filter (BPF) adjustment	1. Frequency: 144.040MHz SSG output: 0 dBμ Modulation: 1 KHz Deviation: 3 KHz Receive	Digital voltmeter SSG			TX-RX	L1-4	Adjust so that the voltmeter reading is maximum.	Voltmeter reading is maximum.
2. Receive sensitivity check	1. Frequency: 144.040 MHz 145.940 MHz 147.940 MHz SSG output: -9 dBμ Modulation: 1 KHz Deviation: 3 KHz	Distortion meter Millivoltmeter Oscilloscope SSG	Rear panel	EXT.SP			Check	12 dB SINAD or more
	2. AM sensitivity (K and P models only) Frequency: 118.040 MHz SSG output: 25 dBμ Modulation: 1 KHz Deviation: 30%						Press the MHz key and check that the frequency is set to 118.040 with an encoder.	12 dB SINAD or more
	Press the MR key							
3. Distortion factor adjustment	1. Frequency: 145.040 MHz SSG output: 40 dBμ Modulation: 1 KHz Deviation: 3 KHz AF output: 4V/8 ohms	Distortion factor Oscilloscope SSG	Rear panel	EXT.SP	TX-RX	L6	Minimize the distortion factor.	5% or less
4. Signal strength meter adjustment	1. Frequency: 145.040 MHz SSG output: 22dBμ Modulation: 1 KHz Deviation: 3 KHz	SSG			TX-RX	VR1	Adjust so that all LEDs go on, then one LED goes off.	
	2 SSG output 23 dBμ MOD: 1 kHz DEV: 3 kHz						Adjust the SSG output so that all signal strength meter LEDs go on.	The SSG output is 20 ± 6 dBμ
5. Squelch check	1. Frequency: 146.040 MHz SSG output: Off Modulation: 1 KHz Deviation: 3 KHz	SSG	Rear panel	EXT.SP			Set the SQL control to the closing position	Control position 8:00-11:00 BUSY should go out
	2 SSG output: -14dBμ MOD: 1 kHz DEV: 3 kHz							Squelch should open, and BUSY should light up
							SQL control fully clockwise	Noise should disappear
	3. SSG output: −3 dBμ							Squelch should open

TM-742 A/742 E/942 A

ADJUSTMENT

Transmitter Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Power adjustment (check)	1. Maximum power check Frequency: 136.000 MHz 145.980 MHz 147.980 MHz Transmit	Powermeter Ammeter	Rear Panel	ANT	TX-RX	VR3	Check	57 W or more
	2. High-power adjustment Transmit				TX-RX	VR3	Adjust. 54W	46 to 59 W (11.5 A or less)
	3. Medium-power adjustment Transmit				TX-RX	VR4	Adjust. 12W	10 to 14 W
	4. Low-power check Transmit						Check	3 to 8 W
2. Deviation adjustment (check)	1. Frequency: 145.980 MHz AG: 1 kHz, 50 mV (K, P, M) 28 mV (E) Filter: 25 / 15K Transmit	DC detector Oscilloscope	Rear Panel	ANT	TX-RX	VR2	Adjust (in the higher + or − direction). 4.2 KHz	± 4.0 to 5.0 KHz
	2. Frequency: 145.980 MHz AG: 1 KHz, 5.0 mV (K, P, M) 2.8 mV (E) Transmit						Check	±2.2 to 3 6 kHz
3. Tone check	1. Frequency: 144.980 MHz Tone On Transmit	DC detector Oscilloscope	Rear Panel	ANT			Check	± 0.5 to 1.5 KHz
4. Protection check	1. Frequency: 147.980 MHz Antenna: open Transmit	Ammeter					Check	12.0 A or less
5. Frequency adjustment	1. Frequency: 145.980 MHz Transmit	Frequency counter Powermeter			TX-RX	TC1	145.980 MHz	± 100 Hz

Note: Use an adjustment tool with a ceramic or plastic tip 1.5 mm square for L1 through L4.

Fig. 57 144 MHz band adjustment: Component layout (upper view)

ADJUSTMENT

• 430/440 MHz Band (TM-742A/E, TM-942A, UT-440S)

Common Section adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Lock voltage check	1. Frequency: 468.000 MHz Receive	Digital voltmeter	TX-RX	TP2			Check the lock voltage.	7.5 ~ 9.1 V (K, P) 7.0 ~ 9.5 V (E, M)

Receiver Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Helical scanning adjustment	1. Frequency: 445.050 MHz (K and P) 435.050 MHz (E, M) Spectrum analyzer: Center of above frequency Tracking generator: Output: -30 dBm	Digital voltmeter Spectrum analyzer Tracking generator			TX-RX	TC1, TC2, L3, L4X3	 Adjust each frequency as shown in the figure.	
2. Receive sensitivity check	1. Frequency: 445.050 MHz (K and P) 435.050 MHz (E, M) SSG output: -9 dBμ Modulation: 1 KHz Deviation: 3 KHz	Distortion meter Millivoltmeter Oscilloscope SSG	Rear panel	EXT.SP			Check	12 dB·SINAD or more
3. Distortion factor adjustment	1. Frequency: 445.050 MHz (K and P) 435.050 MHz (E, M) SSG output: 40 dBμ Modulation: 1 KHz Deviation: 3 KHz AF output: 4 V/8 ohms	Distorition meter Oscilloscope SSG	Rear panel	EXT.SP	TX-RX	L7	Minimize the distortion factor.	5% or less
4. Signal strength meter adjustment (check)	1. Frequency: 445.050 MHz (K and P) 435.050 MHz (E, M) SSG output: 23 dBμ Modulation: 1 KHz Deviation: 3 KHz	SSG			TX-RX	VR1		Adjust so that all LEDs go on, then one LED goes off.
	2. SSG output: 24 dBμ						Adjust the SSG output so that all signal strength meter LEDs go on.	The SSG output is 20 ± 6 dBμ.
5. Squelch check	1. Frequency: 445.050 MHz (K and P) 435.050 MHz (E, M) SSG output: Off Modulation: 1 KHz Deviation: 3 KHz	SSG	Rear panel	EXT.SP			Set the SQL control to the closing position	Control position 8:00-11:00 BUSY should go out
	2. SSG output: -14 dBμ							Squelch should open, and BUSY should light up
							SQL control fully clockwise	Noise should disappear
	3. SGG output: −3 dBμ							Squelch should open

ADJUSTMENT

Transmitter Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Power adjustment (check)	1. Maximum power check Frequency: 445.000 MHz (K and P) 435.000 MHz (E, M) Transmit	Powermeter Ammeter	Rear panel	ANT	TX-RX	VR3	Check	38 W or more
	2. High power adjustment Frequency: 445.000 MHz (K and P) 435.000 MHz (E, M) Transmit				TX-RX	VR3	Adjust. 37W	31 to 42 W (10 A or less)
	3. Medium power adjustment Frequency: 445.000 MHz (K and P) 435.000 MHz (E, M) Transmit				TX-RX	VR4	Adjust. 13W	10 to 14 W
	4. Low power check Frequency: 445.000 MHz (K and P) 435.000 MHz (E, M) Transmit						Check	3 to 8 W
2. Deviation adjustment (check)	1. Frequency: 445.000 MHz (K and P) 435.000 MHz (E, M) AG: 1 kHz 50 mV (K, P M) 28 mV (E) Filter: 25 / 15K Transmit	DC detector Oscilloscope	Rear panel	ANT	TX-RX	VR2	Adjust (in the higher + or – direction). 4.2 KHz	± 4.0 to 5.0 KHz
	2. Frequency: 445.000 MHz (K and P) 435.000 MHz (E, M) AG: 1 KHz, 5.5 mV (K, P E, M) 2.8 mV (E) Transmit						Check	±2.2 to 3.6 kHz
3. Tone check	1. Frequency: 434.980 MHz (E, M) 448.200 MHz (K, P) Tone: On Transmit	DC detector Oscilloscope	Rear panel	ANT			Check	± 0.5 to 1.5 KHz
4. Protection check	1. Frequency: 449.980 MHz (K and P) 439.980 MHz (E, M) Antenna: Open Transmit	Ammeter					Check	10 A or less
5. Frequency adjustment	1. Frequency: 445.000 MHz (K and P) 435.000 MHz (E, M) Transmit	Frequency counter Powermeter			TX-RX	TC3	445.000 MHz K,P 435.000 MHz E, M, M2	± 500 Hz

1. The adjustment of the 430M BAND can be carried out by taking the 144M BAND unit out of the control unit.

Fig. 58 430 MHz band adjustment: Component layout (upper view)

ADJUSTMENT

• 1200 MHz Band (TM-942A, UT-1200)

Common Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Lock voltage check	1. Frequency: 1299.975 MHz Receive	Digital voltmeter	TX-RX	TP2	TX-RX IC11	TRIM-CAP.	Check the lock voltage.	6.1 ~ 6.9 V

Receiver Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. ALT adjustment	1. Frequency: 1270.100 MHz	Digital voltmeter SSG					Check the voltage.	AV
	2. The same as the above frequency. SSG: Off				TX-RX	VR2	Adjust so that the voltage is 0.1 V higher than above.	AV + 0.1 V
	3. The same as the above frequency. SSG output: 0 dBμ Modulation: 1 KHz Deviation: 3 KHz				TX-RX	L6	Check that the voltage is 0.2 V higher than above when ALT is on, then turn ALT off.	(A + 0.1) V + 0.2 V
2. Receive sensitivity check	1. Frequency: 1270.100 MHz SSG output: −9 dBμ Modulation: 1 KHz Deviation: 3 KHz	Distortion meter Millivoltmeter Oscilloscope SSG	Rear panel	EXT.SP			Check	12 dB SINAD or more
3. Distortion adjustment	1. Frequency: 1270.100 MHz SSG output: 40 dBμ Modulation: 1 KHz Deviation: 3 KHz AF output: 4 V/8 ohms	Distortion meter Oscilloscope SSG	Rear panel	EXT.SP	TX-RX	L4	Minimize the distortion factor.	5% or less
4. Signal strength meter adjustment (check)	1. Frequency: 1270.100 MHz SSG output: 24 dBμ Modulation: 1 KHz Deviation: 3 KHz	SSG			TX-RX	VR1		Adjust so that all LEDs go on, then one LED goes off.
	2. SSG output: 25 dBμ						Adjust the SSG output so that all signal strength meter LEDs go on.	The SSG output is 20 ± 6 dBμ.
5. Squelch check	1. Frequency: 1270.100 MHz SSG output: Off Modulation: 1 KHz Deviation: 3 KHz	SSG	Rear panel	EXT.SP			Set the SQL control to the closing position	Control position 8:00-11:00 BUSY should go out
	2. SSG output: -14 dBμ MOD: 1 kHz DEV. 3 kHz							Squelch should open, and BUSY should light up
							SQL control fully clockwise	Noise should disappear
	3. SSG output: −3 dBμ							Squelch should open

ADJUSTMENT

Transmitter Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Power adjustment	1. Maximum power check Frequency: 1270.000 MHz Transmit	Powermeter Ammeter	Rear panel	ANT	TX-RX	VR4	Check	11 W or more
	2. High-power adjustment Frequency: 1270.000 MHz Transmit				TX-RX	VR4	Adjust 10W	8 to 14 W (6.5 A or less)
							The fan runs when the PTT switch is pressed. (It continues for a while after the PTT switch is released, then stops.)	
	3. Low-power adjustment Frequency: 1270.000 MHz Transmit				TX-RX	VR5	Adjust 1 W	0.7 to 1.4 W
2. Deviation adjustment (check)	1. Frequency: 1270.000 MHz AG: 1kHz 50 mV (K, P M) 28 mV (E) Transmit	DC detector Oscilloscope	Rear panel	ANT	TX-RX	VR3	Adjust (in the higher + or – direction). 4.2 KHz	± 4.0 to 5.0 KHz
	2. Frequency: 1270.000 MHz AG: 1 KHz, 5.0 mV (K, P M) 2.8 mV (E) Transmit						Check	±2.2 to 3.6 kHz
3. Tone check	1. Frequency: 1279.98 MHz Tone: On Transmit	DC detector Oscilloscope	Rear panel	ANT			Check	± 0.5 to 1.5 KHz
4. Protection check	1. Frequency: 1240.000 MHz 1270.000 MHz 1299.980 MHz Antenna: Open Transmit	Ammeter					Check	8.5 A or less
5. Frequency check	1. Frequency: 1270.000 MHz Transmit	Frequency counter Powermeter					1270.000 MHz	± 1 KHz

Fig. 59 1200 MHz band adjustment: Component layout (upper view)

The adjustment of the 12000MHz BAND can be carried out by taking the 144MHz BAND and 430MHz BAND units out of the control unit and by installing the 1200MHz BAND at the position of the 430MHz BAND (central part). Cord with alligator clip should be used to connect the power supply. Take care for the clip not to short-circuit with the casing.

ADJUSTMENT

● 28 MHz Band (UT-28S)

Common Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Lock Voltage check	1. Frequency: 29.700MHz Receive	Digital voltmeter	TX-RX	TP3			Check the lock voltage	5.5 - 7.0 V

Receiver Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Band pass filter (BPF) adjustment	1. Frequency: 29.700MHz SSG output: 0 dBμ Modulation: 1KHz Deviation: 3 KHz Receive	Digital voltmeter SSG	Rear panel	ANT	TX-RX	L1-4	Adjust so that the voltmeter reading is maximum	voltmeter reading is maximum
2. Distortion factor adjustment	1. Frequency: 28.890MHz SSG output: 60 dBμ Modulation: 1KHz Diviation: 3KHz	Distortion meter Oscilloscope SSG	Rear panel	EXT.SP	TX-RX	L5	Minimize the distortion factor	5% or less
3. Receive sensitivity check	1. Frequency: 28.040MHz SSG output: -9 dBμ Modulation: 1KHz Deviation: 3 KHz	Distortion meter Millivoltmeter Oscilloscope SSG	Rear panel	EXT.SP			Check	12 dB SINAND or more
	2. Frequency: 29.700 MHz SSG output: -9 dBμ Modulation: 1KHz Deviation: 3 KHz		Rear panel	EXT.SP			Check	12 dB SINAND or more
	3. Frequency: 22.040 MHz SSG output: 20 dBμ Modulation: 1KHz Deviation: 3 KHz		Rear panel	EXT.SP			Check	12 dB SINAND or more
4. Signal strength meter adjustment	1. Frequency: 28.890 MHz SSG output: 24 dBμ Modulation: 1 KHz Deviation: 3 KHz	SSG			TX-RX	VR1	Adjust so that all LEDS go on, then one LED goes off.	
5. Signal strength meter check	2. Frequency: 28.890 MHz SSG output: 25 dBμ Modulation: 1 KHz Deviation: 3 KHz						Adjust the SSG output so that all signa strength meter LEDs go on.	The SSG output is 20 ± 6 dBμ
6. Squelch check	1. Frequency: 28.890 MHz SSG output: OFF	SSG	Rear panel	EXT.SP			Set the SQL control to the closing position	Control position 8:00-11:00 BUSY should go out
	2. Frequency: 28.890 MHz SSG output: -14 dBμ Modulation: 1 KHz Deviation: 3 KHz							Squelch should open, and BUSY should light up
							SQL control fully clockwise	Noise should disappear
	3. SSG. output: −3 dBμ							Squelch should open

ADJUSTMENT

Transmitter Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Maximum power check	1. Frequency: 28.850 MHz Transmit	Powermeter Ammeter	Rear panel	ANT	TX-RX	VR3	Check	52 W or more
2. High-power adjustment (check)	1. Frequency: 28.850 MHz Transmit				TX-RX	VR3	Adjust	50 W
	2. Frequency: 28.000 MHz Transmit						Check	44 W or more
	3. Frequency: 29.640 MHz Transmit						Check	44 W or more
3. Medium-power adjustment (check)	1. Frequency: 28.850 MHz Transmit	Powermeter	Rear panel	ANT	TX-RX	VR4	Adjust	11.5 W
	2. Frequency: 28.000 MHz Transmit						Check	9.5 W or more
	3. Frequency: 29.640 MHz Transmit						Check	9.5 W or more
4. Low-power check	1. Frequency: 28.850 MHz Transmit	Powermeter	Rear panel	ANT			Check	3.0 ~ 8.0 W
	2. Frequency: 28.000 MHz Transmit						Check	3.0 ~ 8.0 W
	3. Frequency: 29.640 MHz Transmit						Check	3.0 ~ 8.0 W
5. Deviation adjustment (check)	1. Frequency: 28.850 MHz AG: 1 kHz 50 mV (K, P M) 28 mV (E) Filter: 25 / 15K Transmit	DC detector Oscilloscope AG	Rear panel	ANT	TX-RX	VR2	Adjust 4.4 KHz	± 4.4 KHz ± 200 Hz
	2. Frequency: 28.050 MHz AG: 1 KHz, 5.0 mV (K, P M) 2.8 mV (E) Filter: 25 / 15K Transmit						Check	±2 2 to 3.6 kHz
6. Frequency adjustment	1. Frequency: 28.850 MHz Transmit	Frequency counter Powermeter	Rear panel	ANT	TX-RX	TC1	Adjust	28.850 MHz ± 20 Hz
7. Protection check	1. Frequency: 29.690 MHz Antenna: Open Transmit	Ammeter					Check	12A or less

Fig. 60 28 MHz Band adjustment: Component layout (upper view)

ADJUSTMENT

- **50 MHz Band (UT-50S)**

Common Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Lock Voltage check	1. Frequency: 54.000 MHz Receive	Digital voltmeter	TX-RX	TP3			Check the lock voltage	6.0 - 7.6 V

Receiver Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Bandpass filter (BPF) adjustment	1. Frequency: 52.040 MHz SSG output: 0 dBμ Modulation: 1 KHz Deviation: 3 KHz Receive	Digital voltmeter SSG	Rear panel	ANT	TX-RX	L1~4	Adjust to that the voltmeter reading is maximum	voltmeter reading is maximum
2. Distortion factor adjustment	1. Frequency: 52.040 MHz SSG output: 60 dBμ Modulation: 1 KHz Deviation: 3 KHz	Distortion meter Oscilloscope SSG	Rear panel	EXT.SP	TX-RX	L5	Minimize the distortion factor	5% or less
3. Receive sensitivity check	1. Frequency: 53.940 MHz SSG output: -9 dBμ Modulation: 1 KHz Deviation: 3 KHz	Distortion meter Millivoltmeter Oscilloscope SSG	Rear panel	EXT.SP			Check	12 dB SINAND or more
	2. Frequency: 50.040 MHz SSG output: -9 dBμ Modulation: 1 KHz Deviation: 3 KHz		Rear panel	EXT.SP			Check	12 dB SINAND or more
	3. Frequency: 40.040 MHz SSG output: 20 dBμ Modulation: 1 KHz Deviation: 3 KHz		Rear panel	EXT.SP			Check	12 dB SINAND or more
4. Signal strength meter adjustment	1. Frequency: 52.040 MHz SSG output: 24 dBμ Modulation: 1 KHz Deviation: 3 KHz	SSG			TX-RX	VR1	Adjust so that all LEDs go on, then one LED goes off.	
5. Signal strength meter check	2. Frequency: 52.040 MHz SSG output: 25 dBμ Modulation: 1 KHz Deviation: 3 KHz						Adjust the SSG output so that all signal strength meter LEDs go on.	The SSG output is 20 ± 6 dBμ
6. Squelch check	1. Frequency: 52.040 MHz SSG output: Off	SSG	Rear panel	EXT.SP			Set the SQL control to the closing position	Control position 8:00-11:00 BUSY should go out
	2. Frequency: 52.040 MHz SSG output: -14 dB Modulation: 1 KHz Deviation: 3 KHz							Squelch should open, and BUSY should light up
							SQL control fully clockwise	Noise should disappear
	3. SSG output: −3 dBμ							Squelch should open

ADJUSTMENT

Transmitter Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Maximum power check	1. Frequency: 52.000 MHz Transmit	Powermeter Ammeter	Rear Panel	ANT	TX-RX	VR3	Check	53W or more
2. High-power adjustment (check)	1. Frequency: 52.000 MHz Transmit				TX-RX	VR3	Adjust	51W
	2. Frequency: 50.000 MHz Transmit						Check	45W or more
	3. Frequency: 53.940 MHz Transmit						Check	45W or more
3. Medium-power adjustment (check)	1. Frequency: 52.000 MHz Transmit	Powermeter	Rear Panel	ANT	TX-RX	VR4	Adjust	11.5W
	2. Frequency: 50.000 MHz Transmit						Check	9.5W or more
	3. Frequency: 53.940 MHz Transmit						Check	9.5W or more
4. Low-power check	1. Frequency: 52.000 MHz Transmit	Powermeter	Rear Panel	ANT			Check	3.0 ~ 8.0W
	2. Frequency: 50.000 MHz Transmit						Check	3.0 ~ 8.0W
	3. Frequency: 53.940 MHz Transmit						Check	3.0 ~ 8.0W
5. Deviation adjustment (check)	1. Frequency: 52.000 MHz AG: 1KHz, 50 mV (K, P M) 28 mV (E) Filter: 25 / 15K Transmit	DC detector Oscilloscope AG	Rear Panel	ANT	TX-RX	VR2	Adjust 4.4 KHz	±4.4 KHz ± 200 Hz
	2. Frequency: 52.000 MHz AG: 1KHz, 5.0 mV (K,P M) 2.8 mV (E) Filter: 25 / 15K Transmit						Check	± 2.2 to 3.6 kHz
6. Frequency adjustment	1. Frequency: 52.000 MHz Transmit	Frequency counter Powermeter	Rear Panel	ANT	TX-RX	TC1	Adjust	52.000 MHz ± 20 Hz
7. Protection check	1. Frequency: 53.990MHz Antenna: Open Transmit	Ammeter					Check	12A or less.

Fig. 61 50 MHz BAND adjustment: Component layout (upper view)

ADJUSTMENT

● 220 MHz Band (UT-220S)

Common Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Lock voltage check	1. Frequency: 215.000 MHz Receive	Digital voltmeter	TX-RX	TP2			Check the lock voltage	1.2 ~ 2.6V

Receiver Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Bandpass filter (BPF) adjustment	1. Frequency: 222.540 MHz SSG output: 0dBμ Modulation: 1KHz Deviation: 3KHz Receive	Digital voltmeter SSG	Rear Panel	ANT.	TX-RX	L1~4	Voltmeter reading is maximum.	Voltmeter reading is maximum.
2. Distortion factor adjustment	1. Frequency: 222.540 MHz SSG output: 60dBμ Modulation: 1KHz Deviation: 3KHz	Distortion meter Oscilloscope SSG	Rear Panel	EXT. SP	TX-RX	L6	Minimize the distortion factor	5% or less
3. Receivie sensitivity check	1. Frequency: 222.540 MHz SSG output: -9dBμ Modulation: 1KHz Deviation: 3KHz	Distortion meter Millivoltmeter Oscilloscope SSG	Rear Panel	EXT. SP			Check	12dB SINAND or more
	2. Frequency: 215.040 MHz SSG output: 5dBμ Modulation: 1KHz Deviation: 3KHz		Rear panel	EXT. SP			Check	12dB SINAND or more
	3. Frequency: 229.980 MHz SSG output: -5dBμ Modulation: 1KHz Deviation: 3KHz		Rear panel	EXT. SP			Check	12dB SINAND or more
4. Signal strength meter adjustment	1. Frequency: 222.540 MHz SSG output: 21dBμ Modulation: 1KHz Deviation: 3KHz	SSG			TX-RX	VR1	Adjust so that all LEDs go on, then one LED goes off.	
5. Signal strength meter check	2. Frequency: 222.540 MHz SSG output: 22dBμ Modulation: 1KHz Deviation: 3KHz						Adjust the SSG output so that all signal strength meter LEDs go on.	The SSG output is 20 ± 6 dBμ
6. Squelch check	1. Frequency: 222.540 MHz SSG output: OFF	SSG	Rear Panel	EXT. SP			Set the SQL control to the closing position	Control position 8:00-11:00 BUSY should go out
	2. Frequency: 222.540 MHz SSG output: -14dB Modulation: 1KHz Deviation: 3KHz							Squelch should open, and BUSY should
							SQL control fully clockwise	Noise should disappear
	3. SSG output: −3 dBμ	–						Squelch should open

ADJUSTMENT

M)

Transmitter Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Maximum power check	1. Frequency: 222.500 MHz Transmit	Powermeter Ammeter	Rear Panel	ANT	TX-RX	VR3	Check	28W or more (reference)
2. High-power adjustment (check)	1. Frequency: 222.500 MHz Transmit				TX-RX	VR3	Adjust	26W
	2. Frequency: 222.000 MHz Transmit						Check	22W or more
	3. Frequency: 224.980 MHz Transmit						Check	22W or more
3. Medium-power adjustment (check)	1. Frequency: 222.540 MHz Transmit	Powermeter	Rear Panel	ANT	TX-RX	VR4	Adjust	11W
	2. Frequency: 222.000 MHz Transmit						Check	9W or more
	3. Frequency: 224.980 MHz Transmit						Check	9W or more
4. Low-power check	1. Frequency: 222.540 MHz Transmit	Powermeter	Rear Panel	ANT			Check	3.0 ~ 6.0W
	2. Frequency: 220.000 MHz Transmit						Check	3.0 ~ 8.0W
	3. Frequency: 222.980 MHz Transmit						Check	3.0 ~ 8.0W
5. Deviation adjustment (check)	1. Frequency: 222.500 MHz AG: 1 kHz, 50 mV Filter: 25 / 15K Transmit	DC detector Oscilloscope AG	Rear Panel	ANT	TX-RX	VR2	Adjust 4.4 KHz	±4.4KHz ± 200 Hz
	2. Frequency: 222.500 MHz AG: 1 kHz, 5.0 mV Filter: 25 / 15K Transmit						Check	± 2.2 to 3.6 KHz
6. Frequency adjustment	1. Frequency: 222.500 MHz Transmit	Frequency counter Powermeter	Rear Panel	ANT	TX-RX	TC1	Adjust	222.500 MHz ± 2KHz
7. Protection check	1. Frequency: 224.980 MHz Antenna: Open Transmit	Ammeter					Check	7.5A or less

Fig. 62 **220 MHz band adjustment: Component layout (upper view)**

CONTROL UNIT (X53-346X-XX) 0-11: 742A (K, P), 0-21: 742A (M), 0-22: 742A (M2), 2-71: 742E (E, E3)

Component side view

IC1:HD6433388A04F IC2:LC3564PML-12 IC3:TA78L06F IC4:TC74HC133AF IC5:TC74HC00AF IC6:S-3520CF IC7:HD74HC165PF IC8:BU4066BF IC9:103:NJM4558E IC10:TC35219F IC11:LC7385M
IC12:PST7030MT IC13,14:TC4S11F IC15:TC4W66F IC16,110:TC4S66F IC104,105:LA4446 IC106,108,109:BU4053BF IC112:KCC06 IC113:KCX04 IC114:KCC07
Q2,5,6,9,10,101,106:2SC4116(Y) Q3,7:DTC114EU Q4:2SB815(6,7) Q8,107–109:2SD1757K Q11:DTA144EU Q102:2SA1641(S,T) Q103:DTC144EK Q104:DTA144EK Q105:DTD143EK
D1:DAN202U D2–4,6:MA112 D5:DTZ9.1A D101–103:DA204U

HD6433388A03F

HD74HC165PF

A pattern

B pattern

TC74HC133AF

TC35219F

CONTROL UNIT (X53-346X-XX) 0-11: 742A (K, P), 0-21: 742A (M), 0-22: 742A (M2), 2-71: 742E (E, E3)

PC BOARD VIEW

Foil side view

IC1:HD404719A26H IC2:L78LR05BFA IC3–6,203,206:TC4S11F IC201,202:MSM5265GS-V1K IC204:TC74HC73AF IC205:NJM78L05UA
Q1:2SA1745(6,7) Q2:2SB1119(S) Q3,101:DTC114EU Q4,5:DTC144EU
D1:MA112 D2:MA720 D3,4:B30-2025-05 D101-105:B30-2048-05 D107–112,114:B30-2053-05

LC3564PML-12

DTA144EK
DTC114EK
DTC114EU
DTD143EK
2SB815
2SC4116
2SD1757K

TC4S11F
TC4S66F

L78LR05B-FA

CXD1095Q

BU4066BF
S-3520CF

A pattern

B pattern

C BOARD VIEW

IC1:HD404719A26H IC2:L78LR05B-FA IC3~6,203,206:TC4S11F IC201,202:MSM5265GS-V1K IC204:TC74HC73AF IC205:NJM78L05UA
Q1:2SA1745(6,7) Q2:2SB1119(S) Q3,101:DTC114EU Q4,5:DTC144EU
D1:MA112 D2:MA720 D3,4:B30-2025-05 D101-105:B30-2048-05 D107~112,114:B30-2053-05

564PML-12

A144EK
C114EK
C114EU
D143EK
B815
C4116
D1757K

C4S11F
C4S66F

D1095Q

L78LR05B-FA

DISPLAY UNIT (X54-3130-11) 742A: (K, P, M, M2) 742E: (E, E2, E3) 942A: (K, P, M)

Component side view

A pattern

B pattern

MSM5265GS-V1K

HD404719A26H

TC74HC73AF

2SA1745

2SB1119

DTA144EU
DTC114EU

IC1:HD404719A26H IC2:L78LR05B-FA IC3~6,203,206:TC4S11F IC201,202:MSM5265GS-V1K IC204:TC74HC73AF IC205:NJM78L05UA
Q1:2SA1745(6,7) Q2:2SB1119(S) Q3,101:DTC114EU Q4,5:DTC144EU
D1:MA112 D2:MA720 D3,4:B30-2025-05 D101-105:B30-2048-05 D107~112,114:B30-2053-05

DISPLAY UNIT (X54-3130-11) 742A: (K, P, M, M2) 742E: (E, E2, E3) 942A: (K, P, M)

Foil side view

NJM78L05UA

A pattern

B pattern

TC4S11F

Signal line ····· Control line —— Common DC line

SCHEMATIC DIAG

X53- B/2

IC101	CXD1095Q	Q101	2SC4116 (Y)
IC102	L7808CV	Q102	2SA1641 (S, T)
IC103	NJM4558E	Q103	DTC114EK
IC104, 105	LA4446	Q104	DTA144EK
IC106, 108, 109	BU4053BF	Q105	DTD143EK
IC110	TC4066F	Q106	2SC4116 (Y)
IC112	KCC06	Q107, 108, 109	2SD1757K
IC113	KCX04		
IC114	KCC07	D101–103	DA204U

X53-346X-XX

D : USED × : NOT USED

TYPE	ABB	UNIT	R13	R14	R60	R61	R62	R64	R73	R74	R75	R77
TM-742A, 942A	K, P	0–11	3.3K	3.9K	×	×	×	O	O	O	O	×
TM-742A, 942A	M	0–21	3.3K	3.9K	×	O	×	O	O	×	O	×
TM-742A	M2	0–22	3.9K	3.3K	O	O	×	O	×	×	O	×
TM-742E	E	2–71	560	8.2K	×	×	O	O	O	O	×	×
TM-742E	E2	2–72	560	8.2K	O	×	O	×	×	O	×	O

X53- A/2

IC1	HD6433388A04F	IC8	BU4066BF	Q1	2SC3722K (S)	D1	DAN202U
IC2	LC3564PML-12	IC9	NJM4558E	Q2, 5, 6, 9, 10	2SC4116 (Y)	D2, 3, 4, 6	MA112
IC3	TA78L06F	IC10	TC35219F	Q3, 7	DTC114EU	D5	DTZ9.1A
IC4	TC74HC133AP	IC11	LC7385M	Q4	2SB815 (6, 7)		
IC5	TC74HC00AF	IC12	PST7030MT	Q8	2SD1757K		
IC6	S-3520CF	IC13, 14	TC4511F	Q11	DTA144EU		
IC7	MD74HC165PF	IC15	TC4W66F				
		IC16	TC4S66F				

SCHEMATIC DIAGRAM

TM-742 A/742 E/942 A

1200M TX-RX UNIT (X57-3600-11): UT-1200 (M)

Component side view

IC2:KCD04 IC3:KCX03 IC4:KCA04 IC5:BU4094BF IC6:LA5009M IC7:KCB09 IC8:KCB10 IC9:KCC04 IC10:M67711 IC11:KCH02 IC12:NJM78L05UA
Q1:MGF1502 Q2:2SC4095(R47, 6) Q3:3SK184(S) Q5:FMA5 Q6:2SC3356 Q7:2SC3120 Q8, 19:2SA1362(Y) Q9:2SB1302S Q10:DTC144WK
Q11:FMW1 Q12, 13, 23:2SC2712(Y) Q15~17:DTC144EU Q18:2SD1757(K) Q20:DTC124EK Q21, 22:2SC4226(R23, 24) Q24:2SD1760(Q) Q25:FMG1 Q26:2SJ106(GR)
Q27:DTA114EK Q28:DTC114EK
D1:MA862 D3:MA716 D4, 6:1SS193 D5:02CZ6.2(X Y) D7:1SS187 D8:02CZ12(X Y) D9:HSK151 D10~13:MI808 D14:DSA3A1 D15:02CZ3.6(Y, Z)
D17:DAP202U D19:MI808

DTA114EK
DTC124EK
DTC144EU
DTC144WK
2SA1362
2SC2712
2SC3120
2SC3356
2SD1757K

FMG1
FMW1

- Connect A and B
- Connect A and C
- Connect A and D
- Connect B and C
- Connect B and D
- Connect A and B, C
- Connect A and B, D
- Connect A and C, D
- Connect B and C, D
- Connect A and B, C, D
- A Only
- B Only
- C Only
- No mark does not Connected

A pattern B pattern

PC BOARD VIEW

LA5009M

NJM78L05UA

3SK184

MGF1502

C pattern D pattern

P Q R S AO

D

nnected

C pattern D pattern

SCHEMATIC DIAGRAM

1200M TX-RX UNIT (X57-3600-00)

—— Signal line ····· Control line —— Common DC line

PC BOARD VIEW

430/440M TX-RX UNIT (X57-359X-XX) **0-12: 742A (K, P) 942A (M)** **0-22: 742A (M, M2)**
2-72: 742E (E, E2, E3) 942A (K, P)

Component side view

IC1:KCD04 IC2:KCA04 IC3:BU4094BF IC4:LA5010M IC5:KCC04 IC6:KCB14 IC7:M57788M IC8:KCB12 IC9:KCB13 IC10:KCH07
Q1, 3:3SK184(S) Q2:2SK582 Q4:DTC114EK Q5:2SC2714(Y) Q6, 7:FMA5 Q8:2SA1362(Y) Q9:DTC144WK Q10, 11, 17:2SC2712(Y) Q12:2SB1119S Q13~15:DTC144EK
Q16:2SD1757(K) Q18:2SC3123 Q19:FMG1 Q20:2SD1760(Q) Q21:2SJ106(GR)
D1:HSK277 D2:1SV128 D3, 6, 7, 13:1SS184 D4, 15:MA862 D5:1SS181 D8:MI407 D9:MI308 D10, 11, 14:MA716 D12:DSA3A1

DTA114EK
DTC144EK
DTC144WK
2SA1362
2SC2712
2SC2714
2SC3123
2SD1757K

FMG1

LA5010M

2SK125-3

3SK184

BU4094BFM57729

M57752

A pattern B pattern

430/440M TX-RX UNIT (X57-359X-XX) **0-12: 742A (K, P) 942A (M)** **0-22: 742A (M, M2)**
2-72: 742E (E, E2, E3) 942A (K, P)

Foil side view

IC1:KCD04 IC2:KCA04 IC3:BU4094BF IC4:LA5010M IC5:KCC04 IC6:KCB14 IC7:M57788M IC8:KCB12 IC9:KCB13 IC10:KCH07
Q1, 3:3SK184(S) Q2:2SK582 Q4:DTC114EK Q5:2SC2714(Y) Q6, 7:FMA5 Q8:2SA1362(Y) Q9:DTC144WK Q10, 11, 17:2SC2712(Y) Q12:2SB1119S Q13~15:DTC144EK
Q16:2SD1757(K) Q18:2SC3123 Q19:FMG1 Q20:2SD1760(Q) Q21:2SJ106(GR)
D1:HSK277 D2:1SV128 D3, 6, 7, 13:1SS184 D4, 15:MA862 D5:1SS181 D8:MI407 D9:MI308 D10, 11, 14:MA716 D12:DSA3A1

A pattern B pattern

SCHEMATIC DIAGRAM

430/440M TX-RX UNIT (X57-3590-XX)

(X57-3590-XX)

	*A	IC8,9	Q4	D2,3	R8,16	R9,12,13,17	C1,8,12,30,89,90,91	C9	C21	C22	C66	C95,116,117	C100	L5
0-11	NO	NO	NO	NO	NO	YES	NO	YES	56P	18P	5P	YES	6P	27n
0-21	NO	NO	NO	NO	NO	YES	NO	NO	33P	33P	6P	YES	7P	33n
2-71	NO	NO	NO	NO	NO	YES	NO	NO	33P	33P	6P	YES	7P	33n
0-12	YES	YES	YES	YES	YES	NO	YES	YES	56P	18P	5P	NO	6P	27n
0-22	YES	YES	YES	YES	YES	NO	YES	NO	33P	33P	6P	NO	7P	33n
2-72	YES	YES	YES	YES	YES	NO	YES	NO	33P	33P	6P	NO	7P	33n
0-13	NO	NO	NO	NO	YES	NO	YES	YES	56P	18P	5P	NO	6P	27n
2-73	NO	NO	NO	NO	NO	YES	NO	NO	33P	33P	6P	YES	7P	33n

PC BOARD VIEW

220M TX-RX UNIT (X57-3810-10)
Component side view

IC1:BU4094BF IC1:XRU4094BF IC2:LA5009M IC5:KCD04 IC7:KCA04 IC8:KCB15 IC9:KCC04 IC10:M57774 IC11:KCH08
Q1,2:3SK184(S) Q3:2SC2714(Y) Q10,Q20:2SA1362(Y) Q11:2SB1119S Q12:DTC144WK Q13,14,21:2SC2712(Y) Q15–17:DTC144EK Q18:2SD1757(K) Q19:2SK208(Y) Q22:FMG1 Q23:2SD1902R Q24:2SJ106(GR)
D3,D5,D7,D20:1SV164 D11,12:1SS184 D13:DAN235(K) D14:1SS181 D15:MI407 D16:MI308 D17,18:1SS226 D19:DSA3A1

A pattern B pattern

220M TX-RX UNIT (X57-3810-10)
Foil side view

IC1:BU4094BF IC1:XRU4094BF IC2:LA5009M IC5:KCD04 IC7:KCA04 IC8:KCB15 IC9:KCC04 IC10:M57774 IC11:KCH08
Q1,2:3SK184(S) Q3:2SC2714(Y) Q10,Q20:2SA1362(Y) Q11:2SB1119S Q12:DTC144WK Q13,14,21:2SC2712(Y) Q15–17:DTC144EK Q18:2SD1757(K) Q19:2SK208(Y) Q22:FMG1 Q23:2SD1902R Q24:2SJ106(GR)
D3,D5,D7,D20:1SV164 D11,12:1SS184 D13:DAN235(K) D14:1SS181 D15:MI407 D16:MI308 D17,18:1SS226 D19:DSA3A1

A pattern B pattern

SCHEMATIC DIAGRAM

220M TX-RX UNIT (X57-3810-XX)

PC BOARD VIEW

144M TX-RX UNIT (X57-3580-XX) 0-11: 942A 0-12: 742 A/E (K, P, E, E2, E3, M, M2)
Component side view

IC1:BU4094BF IC2:LA5010M IC5:KCD04 IC6:KCD05 IC7:KCA04 IC8:KCB11 IC9:KCC04 IC10:S-AV17 IC11:KCH05
Q1:3SK184(S) Q2:3SK131(V12) Q3, 8, 20:2SC2714(Y) Q4:DTA114YK Q5, 6:DTC123JK Q7:DTC143EK Q10:2SA1362(Y) Q11:2SB1119S Q12:DTC144WK
Q13, 14, 21:2SC2712(Y) Q15–17:DTC144EK Q18:2SD1757(K) Q19:2SK208(Y) Q22:FMG1 Q23:2SD1902R Q24:2SJ106(GR)
D1, 3, 4, 6:1SV164 D2, 5, 7:1SV166 D11, 12:1SS184 D13:DAN235(K) D14:1SS181 D15:MI407 D16:MI308 D17, 18:1SS226 D19:DSA3A1
D20:MA77

A pattern B pattern

144M TX-RX UNIT (X57-3580-XX) 0-11: 942A 0-12: 742 A/E (K, P, E, E2, E3, M, M2)
Foil side view

IC1:BU4094BF IC2:LA5010M IC5:KCD04 IC6:KCD05 IC7:KCA04 IC8:KCB11 IC9:KCC04 IC10:S-AV17 IC11:KCH05
Q1:3SK184(S) Q2:3SK131(V12) Q3, 8, 20:2SC2714(Y) Q4:DTA114YK Q5, 6:DTC123JK Q7:DTC143EK Q10:2SA1362(Y) Q11:2SB1119S Q12:DTC144WK
Q13, 14, 21:2SC2712(Y) Q15–17:DTC144EK Q18:2SD1757(K) Q19:2SK208(Y) Q22:FMG1 Q23:2SD1902R Q24:2SJ106(GR)
D1, 3, 4, 6:1SV164 D2, 5, 7:1SV166 D11, 12:1SS184 D13:DAN235(K) D14:1SS181 D15:MI407 D16:MI308 D17, 18:1SS226 D19:DSA3A1
D20:MA77

A pattern B pattern

SCHEMATIC DIAGRAM

144M TX-RX UNIT (X57-3580-XX)

PC BOARD VIEW

50M TX-RX UNIT (X57-3800-01)
Component side view

IC1:BU4094BF/XRU4094BF IC2:KCH10 IC3:KCA04:KCB18 IC5:KCC04 IC6:KCD04 IC7:LA5010M IC8:KCB19 IC9:KCD05
Q1:3SK184(S) Q2:3SK131(V12) Q3, 8, 20:2SC2714(Y) Q4, 15–17:DTC144EK Q5:DTC144EU Q6, 7, 25:DTA114K Q9:2SJ106(GR) Q10:2SA1362(Y) Q11:2SB1119S
Q12:DTC144WK Q13:FMW1 Q14, 21, 24:2SC2712(Y) Q18:2SD1757K Q19:2SK208(Y) Q22:FMG1 Q23:2SD1902R Q26:DTC143EK

A pattern B pattern

IC1:BU4094BF/XRU4094BF IC2:KCH10 IC3:KCA04:KCB18 IC5:KCC04 IC6:KCD04 IC7:LA5010M IC8:KCB19 IC9:KCD05
Q1:3SK184(S) Q2:3SK131(V12) Q3, 8, 20:2SC2714(Y) Q4, 15–17:DTC144EK Q5:DTC144EU Q6, 7, 25:DTA114K Q9:2SJ106(GR) Q10:2SA1362(Y) Q11:2SB1119S
Q12:DTC144WK Q13:FMW1 Q14, 21, 24:2SC2712(Y) Q18:2SD1757K Q19:2SK208(Y) Q22:FMG1 Q23:2SD1902R Q26:DTC143EK
D1, 2:MA77 D3–6:1SV228 D7, 9:DAN235(K) D8, 16, 17:1SS184 D10:1SS181 D11:MI308/MI407 D12:MI308 D13, 14:1SS226 D15:DSA3A1

50M TX-RX UNIT (X57-3800-01)
Foil side view

A pattern B pattern

SCHEMATIC DIAGRAM

50M TX-RX UNIT (X57-3800-XX)

PC BOARD VIEW

28M TX-RX UNIT (X57-3790-01)

Component side view

IC1:BU4094BF/XRU4094BF IC2:KCH09 IC3:KCA04 IC4:KCB16 IC5:KCC04 IC6:KCD04 IC7:LA5009M IC8:KCB17 IC9:KCD05
Q1:3SK179(L) Q2:3SK131(V12) Q3:2SC2714(Y) Q4:DTC144EK Q5:DTC144EU Q6,7:DTA114EK Q8:2SC2714(Y) Q9:2SJ106(GR) Q10:2SA1362(Y) Q11:2SB1119S
Q12:DTC114WK Q13:FMW1 Q14:2SC2712(Y) Q15~17:DTC144EK Q18:2SD1757(K) Q19:2SK208(Y) Q20:2SC2714(Y) Q21:2SC2712(Y) Q22:FMG1 Q23:2SD1902R
Q24:2SC2712(Y) Q25:DTA114EK Q26:DTC143EK Q27:DTC144EK
D1,2:MA77 D3~6:1SV228 D7,9:DAN235(K) D8:1SS184 D10:1SS181 D11:MI308/UM9401 D12:MI308 D13,14:1SS226 D15:DSA3A1 D16,17:1SS184

DTA114EK
DTC143EK
DTC144EK
DTC144EU
DTC144WK
2SA1362
2SC2712
2SC2714
2SD1757

FMG1
FMW1

LA5009M

2SK208

3SK179

A pattern B pattern

28M TX-RX UNIT (X57-3790-01)

Foil side view

A pattern B pattern

SCHEMATIC DIAGRAM

28M TX-RX UNIT (X57-3790-XX)

BLOCK DIAGRAM

BLOCK DIAGRAM

LEVEL DIAGRAM

RX section

1. SG input level for which a 12dB SINAD are obtained. Measured by connecting the SG to each point via a 0.01μF capacitor.
2. AF level obtained when the AF output level is adjusted for 0.63V/8Ω with the front panel AF VOL control. Measure with AF voltmeter connected to the speaker jack, receiving a 40dB EMF SSG signal modulated at 1KHz, DEV 3KHz.

TX section

1. AG is set so taht MIC input becomes 3kHz DEV at 1kHz MOD.
2. Transmitting frequency; 145.0MHz, 435.0MHz, 1280MHz, 28.0MHz, 50.0MHz, 220.0MHz.
3. HI/MID/LOW SW: HI
4. APC SW: OFF

BLOCK DIAGRAM

28M TX-RX UNIT (X57-3790-01)

TM-742 A/742 E/942 A

BLOCK DIAGRAM

50M TX-RX UNIT (X57-3800-01)

TSU-7(CTSS UNIT)

TSU-7 PC BOARD VIEW

TSU-7 PARTS LIST

Ref. No	Address	Rart	Rarts No.	Description	Desti-nation	Re-marks
TSU-7 (X52-3170-00)						
			G10-0692-04	CUTTION		
			H21-0704-04	CUTTION		
X1			L78-0062-05	STAL(1MHz)		
IC1			FX365LS	IC		
D1			DAN202U	DIODE		
CN1			E40-5341-05			
VR1			R12-6526-05	TRIM. POT. (47K)		
R1			RK73BG1J274J	CHIP R J 270K		
R2			RK73BG1J824J	CHIP R J 820K		
R4			RK73BF1J103J	CHIP R J 10K		
R5			RK73BG1J105J	CHIP R J 1M		
R6			RK73BG1J473J	CHIP R J 47K		
C1			CK73GB1H471K	CHIP C K 470pF		
C2			C92-0521-05	CHIP TAN 20WV		
C4-6			CK73FB1E104K	CHIP C K 0.1UF		
C7			CK73GB1H471K	CHIP C K 470pF		
C8. 9			CC73GCH1H221J	CHIP C J 220pF		

TM-742 A/742 E/942 A

TSU-7(CTCSS UNIT)

PC BOARD VIEWS

(Component side view)

(Foil side view)

: Component side pattern : Foil side pattern

CIRCUIT DIAGRAM

MC-45 (MULTI FUNCTION MICROPHONE)

EXTERNAL VIEW

PARTS LIST

Ref. No.	Address	New Parts	Parts No.	Description	Destination	Remarks
			A02-0896-08	CASE (FRONT)		
			A02-0900-08	CASE (REAR)		
			E30-3006-08	CURL CORD ASSY		
			G13-0933-08	CUSHION (UP,DWN)		
			K29-3165-08	KNOB PTT		
			K29-3168-08	KNOB UP		
			K29-3169-08	KNOB DWN		
			K29-3170-08	KNOB CALL,VFO, MR,PF		
			S59-1409-28	SWITCH ASSY UP,DWN		
S3-6			S40-1431-08	TACT SWITCH CALL,VFO, MR,PF		
S7,8			S40-1437-08	TACT SWITCH UP,DWN		
SW1			S50-1431-08	MICRO SWITCH LOCK		
SW2			S31-1422-08	SLIDE SWITCH LOCK		
			T91-0383-08	MICROPHONE ELEMENT		

SCHEMATIC DIAGRAM

TM-742 A/742 E/942 A

MC-45DM (MULTI FUNCTION MICROPHONE WITH AUTOPATCH)

EXTERNAL VIEW

PARTS LIST

Ref. No.	Address	New Parts	Parts No.	Description	Desti-nation	Re-marks
			A02-0898-08	CASE (FRONT)		
			A02-0901-08	CASE (REAR)		
			E30-3006-08	CURL CORD ASSY		
			G13-0933-08	CUSHION (UP,DWN)		
			K29-3165-08	KNOB PTT		
			K29-3167-08	KEY TOP DTMF		
			K29-3168-18	KNOB UP		
			K29-3169-18	KNOB DOWN		
			S59-1409-28	SWITCH ASSY UP,DWN		
S7,8			S40-1437-08	TACT SWITCH UP,DWN		
SW1			S50-1431-08	MICRO SWITCH PTT		
SW2			S31-1422-08	SLIDE SWITCH LOCK		
			T91-0393-08	MICROPHONE ELEMENT		

SCHEMATIC DIAGRAM

UT-28S/50S/UT-220S/1200 SPECIFICATION

			UT-28S	UT-50S	UT-220S	UT-1200
GENERAL	Frequency range (MHz)		28 ~ 29.7	50 ~ 54	220 ~ 225	1240 ~ 1300
	Mode		F3(FM)			
	Antenna impedance		50Ω			
	Operating temperature		-20°C ~+60°C			
	Power requirements		DC13.8V ±15% (11.7 ~ 15.8V)			
	Ground		Negative			
	Frequency stability		Less than ±10ppm			Less than ±3ppm
	Current drain	Transmit mode	Less than 11.5A		Less than 7.0A	Less than 6.5A
		Receiver mode	Less than 1.2A			
TRANSMITTER	Output Power	HI	50W		25W	10W
		MID	10W			-
		LOW	Approx 5W			1W
	Modulation		Reactance modulation			
	Spurious radiation		Less than -60dB (※)			Less than -50dB
	Maximum frequency deviation		±5kHz			
	Audio distortion (at 60% modulation)		Less than 3%			
	Microphone impedance		600Ω			
RECEIVER	Circuitry		Double conversion superheterodyne			
	Intermediate frequency 1st/2nd		8.83MHz	10.595MHz	30.825MHz/455kHz	59.7MHz
			455kHz			
	Sensitivity (12 dB SINAD)		Less than 0 16μV(-16dBμ)			
	Selectivity -6 dB		More than 10kHz	More than 12kHz		
	Selectivity -60 dB		Less than 24kHz			Less than 36kHz
	Squelch sensitivity		Less than 0.1μV(-20dBμ)			
	Output (5% distortion)		More than 2W(8Ω load)			
	External speaker impedance		8Ω			

Notes: 1. Circuit and ratings are subject to change without notice, due to advancements in technology.
2. Recommended duty cycle: 1 minute Transmit, 3 minutes Reception.

(※) Hi Power position: Less than -70dB

TM-742A/742E/942A

SPECIFICATIONS

			144 MHz Band	430/440 MHz Band	1200 MHz Band
GENERAL	Frequency range (MHz)		144 ~ 148	430 ~ 440/438 ~ 450	1240 ~ 1300
	Mode		F3E(FM)		
	Antenna impedance		50 Ω		
	Operating temperature		−20 °C ~ +60 °C (−4 °F ~ +140 °F)		
	Power requirements		13.8 VDC ± 15 % (11.7 ~ 15.8 V)		
	Ground		Negative		
	Current drain	Transmit mode	Less than 11.5 A	Less than 10.0 A	Less than 6.5 A
		Receiver mode	Less than 1.2 A	Less than 1.2 A	Less than 1.2 A
	Frequency stability		± 10 ppm		
	Dimensions (W x H x D)		150 x 50 x 175 mm		
	Weight		TM-742A/742E: 1.5 kg TM-942A: 1.8 kg		
TRANSMITTER	Output power	HI	50 W	35 W	10 W
		MID	10 W	10 W	—
		LOW	Approx. 5 W	Approx. 5 W	1 W
	Modulation		Reactance modulation		
	Spurious radiation		Less tna −60 dB		Less than − 50 dB
	Maximum frequency deviation		±5 kHz		
	Audio distortion (at 60% modulation)		Less than 3%		
	Microphone impedance		600 Ω		
RECEIVER	Circurity		Double conversion superheterodyne		
	Intermediate frequency	1st	10.7 MHz	21.6 MHz	59.7 MHz
		2nd	455 kHz		
	Sensitivity (12 dB SINAD)		Less than 0 16 μV (−10 dBμ) *		
	Selectivity −6 dB		More than 12 kHz		
	Selectivity −60 dB		Less than 24 kHz		Less than 36 kHz
	Squelch sensitivity		Less than 0.1 μV (−14 dBμ)		
	Output (5% distortion)		More than 2 W (8 Ω load)		
	External speaker impedance		8 Ω		

*1240 MHz to 1260 MHz Less than 0.22 μV (−7 dBμ)

Notes:
1. Circuit and ratings are subject to change without notice due to advancements in technology.
2 Recommended duty cycle: 1 minute Transmit, 3 minutes Reception.

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