VHF FM TRANSCEIVER

TK-2260EX

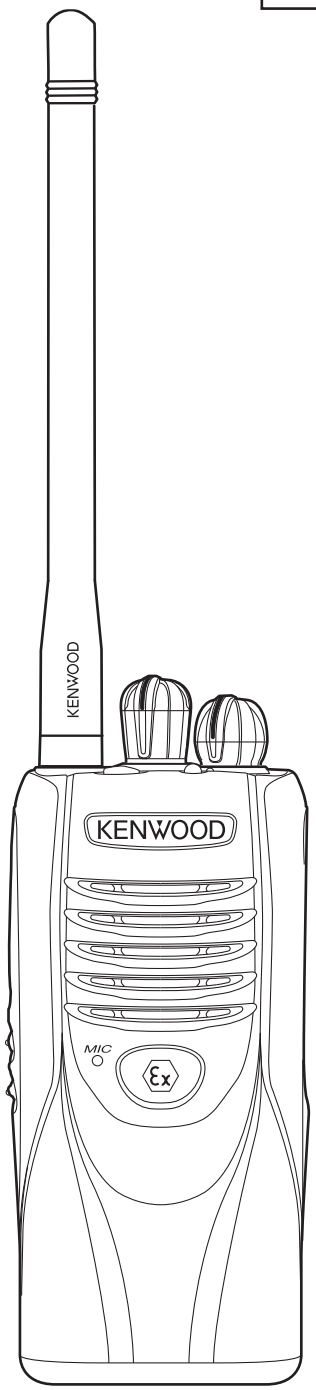
SERVICE MANUAL

KENWOOD

Kenwood Corporation

B51-8899-00 (K) PDF

Do not attempt to repair the transceiver or accessories. This may impair and therefore void the intrinsic safety rating. ATEX/ IECEx approved product may be repaired only by an ATEX/ IECEx approved, Kenwood designated Authorized Service Center.



CONTENTS

This product complies with the RoHS directive for the European market.

LF

This product uses Lead Free solder.

Disclaimer

While every precaution has been taken in the preparation of this manual, Kenwood assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained herein. Kenwood reserves the right to make changes to any products herein at any time for improvement purposes.

GENERAL

INTRODUCTION

SCOPE OF THIS MANUAL

This manual is intended for use by experienced technicians familiar with similar types of commercial grade communications equipment. It contains all required service information for the equipment and is current as of the publication date. Changes which may occur after publication are covered by either Service Bulletins or Manual Revisions. These are issued as required.

ORDERING REPLACEMENT PARTS

When ordering replacement parts.
Please refer to pages 5 and 6.

PERSONAL SAFETY

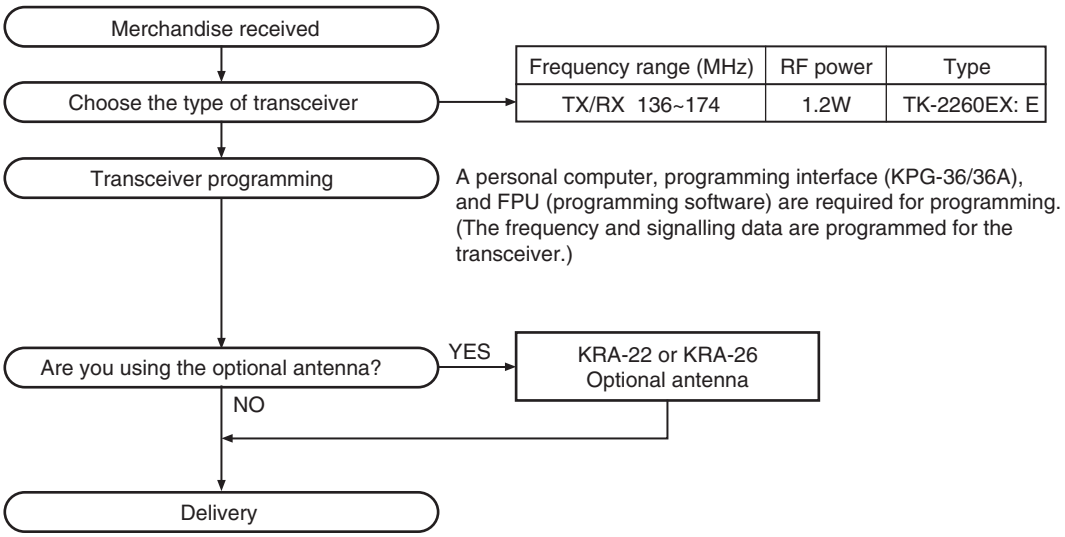
The following precautions are recommended for personal safety:

- DO NOT transmit until all RF connectors are verified secure and any open connectors are properly terminated.
- SHUT OFF and DO NOT operate this equipment near electrical blasting caps or in an explosive atmosphere.
- This equipment should be serviced by a qualified technician only.

SERVICE

Do not attempt to repair the transceiver or accessories. This may impair and therefore void the intrinsic safety rating. ATEX/ IECEx approved product may be repaired only by an ATEX/ IECEx approved, Kenwood designated Authorized Service Center.

SYSTEM SET-UP



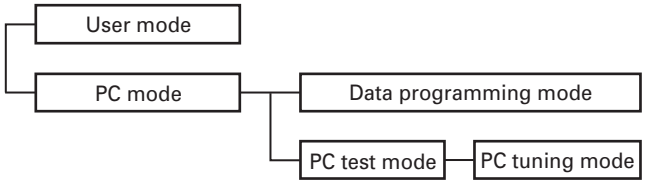
Frequency range (MHz)	RF power	Type
TX/RX 136~174	1.2W	TK-2260EX: E

A personal computer, programming interface (KPG-36/36A), and FPU (programming software) are required for programming. (The frequency and signalling data are programmed for the transceiver.)

KRA-22 or KRA-26
Optional antenna

REALIGNMENT

1. Modes



Mode	Function
User mode	For normal use.
PC mode	Used for communication between the transceiver and PC.
Data programming mode	Used to read and write frequency data and other features to and from the transceiver.
PC test mode	Used to check the transceiver using the PC. This feature is included in the FPU.

2. How to Enter Each Mode

Mode	Operation
User mode	Power ON
PC mode	Received commands from PC

3. PC Mode

3-1. Preface

The transceiver is programmed by using a personal computer, a programming interface (KPG-36/36A, USB adapter (KCT-53U)) and FPU (programming software).

The programming software can be used with a PC. Figure 1 shows the setup of a PC for programming.

3-2. Connection Procedure

1. Connect the transceiver to the personal computer with the interface cable and USB adapter (when the interface cable is KPG-36A, the KCT-53U can be used).

Note:

- You must install the KCT-53U driver in the computer to use the USB adapter (KCT-53U).
- When using the USB adapter (KCT-53U) for the first time, plug the KCT-53U into a USB port on the computer with the computer power ON.

2. When the POWER is switched on, user mode can be entered immediately. When the PC sends a command, the transceiver enters PC mode.
   When data is read from the transceiver, the red LED lights.
   When data is written to the transceiver, the green LED lights.

REALIGNMENT

Note:

- The data stored in the personal computer must match Model Name and Model Type when it is written into EE-PROM.
- Do not press the [PTT] key during data transmission or reception.

3-3. KPG-36/KPG-36A Description (PC programming interface cable: Option)

The KPG-36/36A is required to interface the transceiver with the computer. It has a circuit in its D-sub connector (KPG-36: 25-pin, KPG-36A: 9-pin) case that converts the RS-232C logic level to the TTL level.

The KPG-36/36A connects the SP/MIC connector of the transceiver to the RS-232C serial port of the computer.

3-4. KCT-53U Description (USB adapter: Option)

The KCT-53U is a cable which connects the KPG-36A to a USB port on a computer.

When using the KCT-53U, install the supplied CD-ROM (with driver software) in the computer. The KCT-53U driver runs under Windows 2000 or XP or Vista(32bit).

3-5. FPU (Programming Software) Description

The FPU is the programming software for the transceiver supplied on a CD-ROM. This software runs under Windows 2000 or XP or Vista(32bit).

The software on this disk allows a user to program the transceiver via Programming interface cable (KPG-36/36A).

3-6. Programming with PC

If data is transferred to the transceiver from a PC with the FPU, the data for each set can be modified.

Data can be programmed into the EEPROM in RS-232C format via the SP/MIC Connector.

In this mode the PTT line operate as TXD and RXD data lines respectively.

List of FPU for transceiver

Model	Type	FPU
TK-2260EX	E	KPG-123D

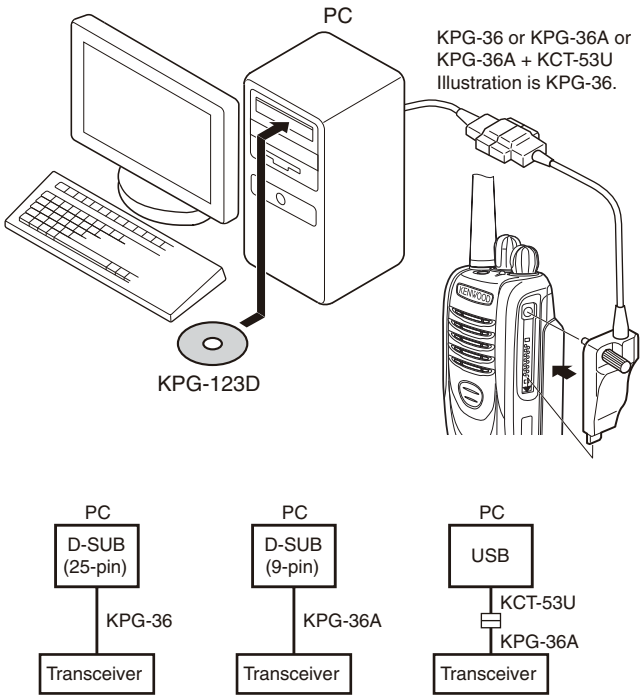
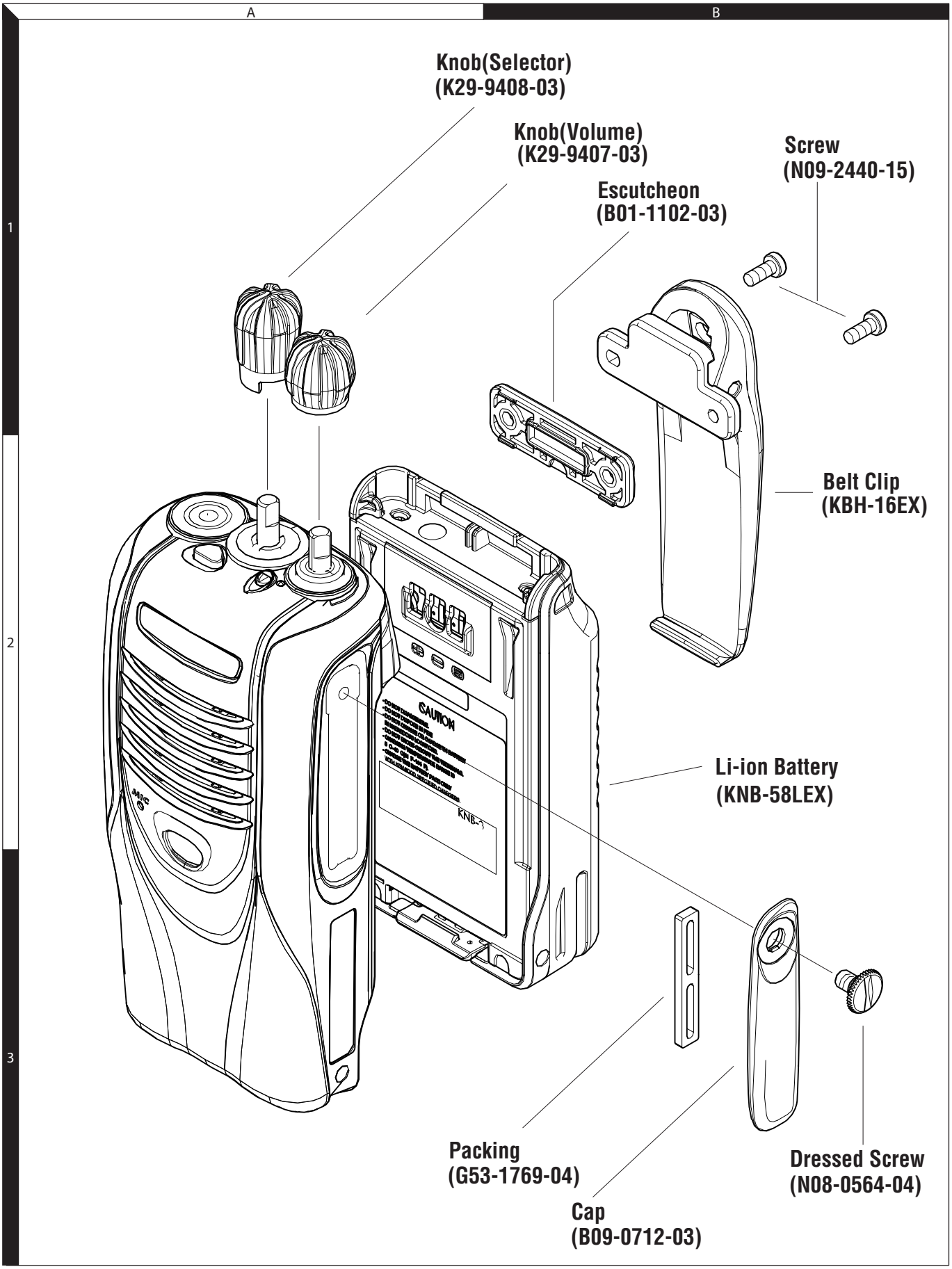
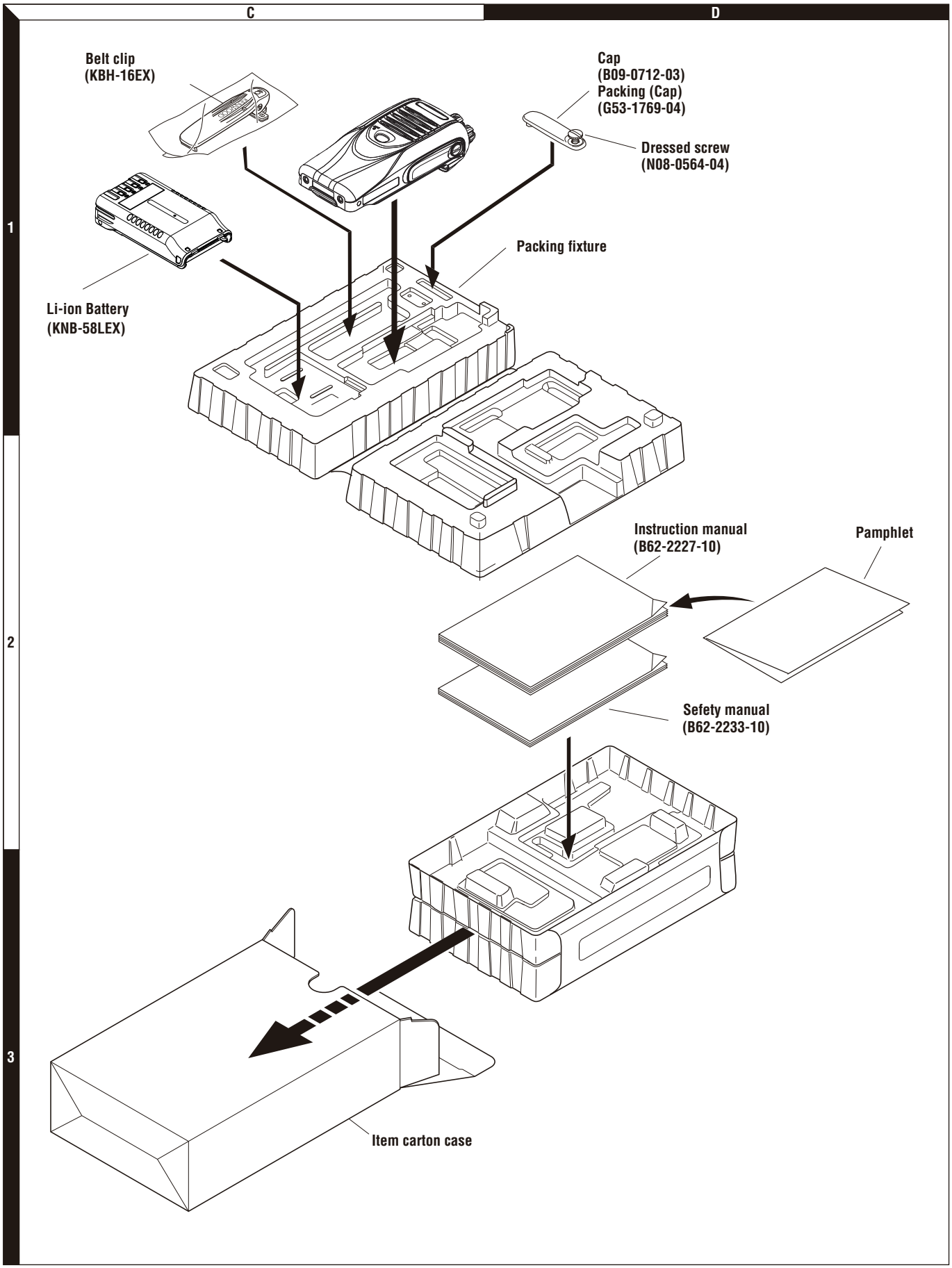


Fig. 1

EXPLODED VIEW



PACKING


C
D
1
2
3
Belt clip
(KBH-16EX)
Cap
(B09-0712-03)
Packing (Cap)
(G53-1769-04)
Dressed screw
(N08-0564-04)
Packing fixture
Li-ion Battery
(KNB-58LEX)
Instruction manual
(B62-2227-10)
Pamphlet
Sefety manual
(B62-2233-10)
Item carton case

ADJUSTMENT

Test Equipment Required for Alignment

Test Equipment	Major Specifications	
1. Standard Signal Generator (SSG)	Frequency Range Modulation Output	136 to 520MHz Frequency modulation and external modulation –127dBm/0.1µV to greater than –47dBm/1mV
2. RF Power Meter	Input Impedance Operation Frequency Measurement Range	50Ω 136 to 520MHz Vicinity of 10W
3. Deviation Meter	Frequency Range	136 to 520MHz
4. Digital Volt Meter (DVM)	Measuring Range Input Impedance	10mV to 10V DC High input impedance for minimum circuit loading
5. Oscilloscope		DC through 30MHz
6. High Sensitivity Frequency Counter	Frequency Range Frequency Stability	10Hz to 1000MHz 0.2ppm or less
7. DC Ammeter		5A
8. AF Volt Meter (AF VTVM)	Frequency Range Voltage Range	50Hz to 10kHz 1mV to 10V
9. Audio Generator (AG)	Frequency Range Output	50Hz to 5kHz or more 0 to 1V
10. Distortion Meter	Capability Input Level	3% or less at 1kHz 50mV to 10Vrms
11. Spectrum Analyzer	Measuring Range	DC to 1GHz or more
12. Tracking Generator	Center frequency Output Voltage	50kHz to 600MHz 100mV or more
13. 16Ω Dummy Load		Approx. 16Ω, 3W
14. Regulated Power Supply		5V to 10V, approx. 3A Useful if ammeter equipped

■Antenna connector adapter

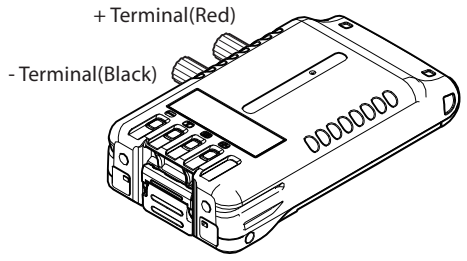
The antenna connector of this transceiver uses an SMA terminal.

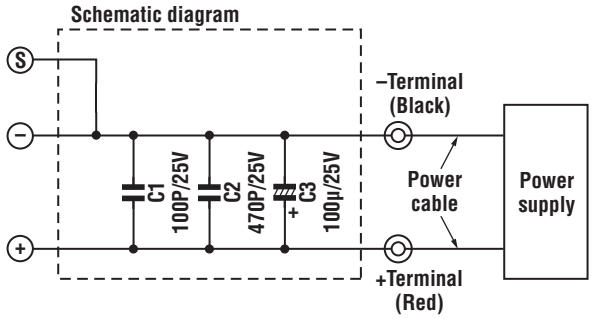
Use an antenna connector adapter [SMA(f) – BNC(f) or SMA(f) – N(f)] for adjustment. (The adapter is not provided as an option, so buy a commercially-available one.)

■ Battery Jig (W05-1547-00)

Connect the power cable properly between the battery jig installed in the transceiver and the power supply, and be sure output voltage and the power supply polarity prior to switching the power supply ON, otherwise over voltage and reverse connection may damage the transceiver, or the power supply or both.

Note: When using the battery jig, you must measure the voltage at the terminals of the battery jig. Otherwise, a slight voltage drop may occur within the power cable, between the power supply and the battery jig, especially while the transceiver transmits.





ADJUSTMENT

Frequency and Signaling

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

■ Frequency (MHz)

Channel No.	RX Frequency	TX Frequency
1	155.050	155.100
2	136.050	136.100
3	173.950	173.900
4	155.000	155.000
5	155.200	155.200
6	155.400	155.400
7~16	-	-

■ Signaling

Signaling No.	RX	TX
1	None	None
2	None	100Hz Square Wave
3	QT 67.0Hz	QT 67.0Hz
4	QT 151.4Hz	QT 151.4Hz
5	QT 210.7Hz	QT 210.7Hz
6	QT 254.1Hz	QT 254.1Hz
7	DQT D023N	DQT D023N
8	DQT D754I	DQT D754I
9	DTMF 159D	DTMF 159D
10	None	DTMF tone9
11	-	-
12	None	Single Tone:1000Hz
13	None	MSK
14	MSK Code	MSK Code

Preparations for Tuning the Transceiver

Before attempting to tune the transceiver, connect the unit to a suitable power supply.

Whenever the transmitter is tuned, the unit must be connected to a suitable dummy load (i.e. power meter).

The speaker output connector must be terminated with a 16Ω dummy load and connected to an AC voltmeter and an audio distortion meter or a SINAD measurement meter at all times during tuning.

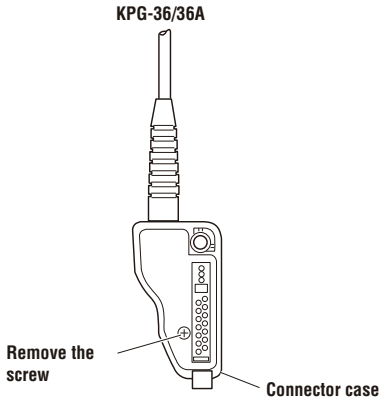
■ List of FPU for transceiver

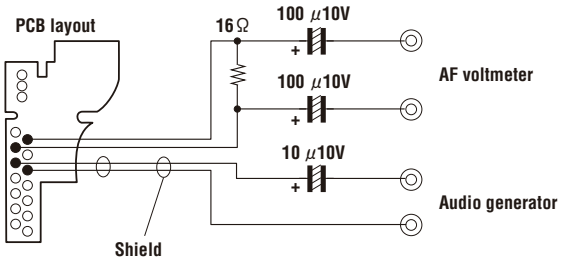
Model	Type	FPU
TK-2260EX	E	KPG-123D

• PC tuning

Connect the wires to the PCB in the connector case of interface cable.

For output the wires out of the connector case, need to process the connector case.





ADJUSTMENT

Common Section

Item	Condition	Measurement		Adjustment		Specifications / Remarks
		Test equipment	Terminal	Parts	Method	
1. Setting	1) BATT terminal votage: 7.5V 2) SSG standard modulation [Wide 5k] MOD: 1kHz, DEV: 3kHz [Wide 4k] MOD: 1kHz, DEV: 2.4kHz [Narrow] MOD: 1kHz, DEV: 1.5kHz			FPU		
2. Receive Assist	1) TEST CH: Low, Low', Center, High', High (5 points)	Power meter DVM	ANT	FPU	2.35V	±0.5V
3. Transmit Assist	2) TEST CH: Low, Low', Center, High', High (5 points) PTT: ON				2.35V	±0.5V

Transmitter Section

Item	Condition	Measurement		Adjustment		Specifications / Remarks
		Test equipment	Terminal	Parts	Method	
1. Frequency Adjust	1) CH: High PTT: ON	f. counter	ANT	FPU	173.900MHz	±50Hz
2. RF High Power	1) TEST CH: Low, Low', Center, High', High (5 points) BATT terminal voltage: 7.5V PTT: ON	Power meter Ammeter				1.2W±0.05W 1.0A or less
3. Maximum Fine Deviation [Wide 5k]	1) TEST CH:Center, Low, High (3 points) AG: 1kHz/150mV Deviation meter filter LPF: 15kHz, HPF: OFF PTT: ON	Power meter Deviation meter Oscilloscope AG AF VTVM	ANT SP/MIC connector		4.2kHz (According to the larger +, –)	±100Hz
[Wide 4k]	2) TEST CH: Center PTT: ON				3.4kHz (According to the larger +, –)	±100Hz
[Narrow]	3) TEST CH: Center PTT: ON				2.1kHz (According to the larger +, –)	±100Hz
4. VOX1 Writing	1) TEST CH: Center AG: 1kHz/60mV	Power meter Deviation meter Oscilloscope AG AF VTVM	ANT		Write	
5. VOX10 Writing	1) TEST CH: Center AG: 1kHz/4mV				Write	
6. DQT TCXO Balance Writing [Wide 5k]	1) TEST CH: Center, Low, High (3 points)				Write	230hex
[Wide 4k]	2) TEST CH: Center					
[Narrow]	3) TEST CH: Center					
7. DQT VCO Balance [Wide 5k]	1) TEST CH: Center, Low, High (3 points) Deviation meter filter LPF: 3kHz, HPF: OFF PTT: ON				Make the demodulation wave into square waves.	
[Wide 4k]	2) TEST CH: Center PTT: ON					
[Narrow]	3) TEST CH: Center PTT: ON					

ADJUSTMENT

Item	Condition	Measurement		Adjustment		Specifications / Remarks
		Test equipment	Terminal	Parts	Method	
8. QT Fine Deviation [Wide 5k]	1) TEST CH: Center, Low, High (3 points) Deviation meter filter LPF: 3kHz, HPF: OFF PTT: ON	Power meter Deviation meter Oscilloscope AG AF VTVM	ANT SP/MIC connector	FPU	0.80kHz	±40Hz
[Wide 4k]	2) TEST CH: Center PTT: ON				0.60kHz	±40Hz
[Narrow]	3) TEST CH: Center PTT: ON				0.40kHz	±40Hz
9. DQT Fine Deviation [Wide 5k]	1) TEST CH: Center, Low, High (3 points) Deviation meter filter LPF: 3kHz, HPF: OFF PTT: ON				0.75kHz	±40Hz
[Wide 4k]	2) TEST CH: Center PTT: ON				0.60kHz	±40Hz
[Narrow]	3) TEST CH: Center PTT: ON				0.35kHz	±40Hz
10. Single Tone Fine Deviation [Wide 5k]	1) TEST CH: Center , Low, High (3 points) Deviation meter filter LPF: 15kHz, HPF: OFF PTT: ON				3.0kHz	±100Hz
[Wide 4k]	2) TEST CH: Center PTT: ON				2.4kHz	±100Hz
[Narrow]	3) TEST CH: Center PTT: ON				1.5kHz	±100Hz
11. DTMF Fine Deviation [Wide 5k]	1) TEST CH: Center , Low, High (3 points) Deviation meter filter LPF: 15kHz, HPF: OFF PTT: ON				3.0kHz	±100Hz
[Wide 4k]	2) TEST CH: Center PTT: ON				2.4kHz	±100Hz
[Narrow]	3) TEST CH: Center PTT: ON				1.5kHz	±100Hz
12. MSK Fine Deviation [Wide 5k]	1) TEST CH: Center, Low, High (3 points) Deviation meter filter LPF: 15kHz, HPF: OFF PTT: ON				3.0kHz	±100Hz
[Wide 4k]	2) TEST CH: Center PTT: ON				2.4kHz	±100Hz
[Narrow]	3) TEST CH: Center PTT: ON				1.5kHz	±100Hz
13. Battery Warning Level Writing	1) BATT terminal voltage: 5.9V PTT: ON	SSG DVM	ANT BATT termina		Write	BATT terminal voltage: 5.9V

Receiver Section

Item	Condition	Measurement		Adjustment		Specifications / Remarks
		Test equipment	Terminal	Parts	Method	
1. Sensitivity Check [Wide 5k]	1) TEST CH: Low, Low', Center, High', High (5 points SSG output : –118dBm (0.28 μ V) SSG MOD: 3.0kHz	SSG DVM Oscilloscope AF VTVM	ANT SP/MIC connector	FPU	Check	12dB SINAD or more
[Wide 4k]	2) TEST CH: Center SSG output : –117dBm (0.32 μ V) SSG MOD: 2.4kHz					
[Narrow]	3) TEST CH: Center SSG output : –115dBm (0.4 μ V) SSG MOD: 1.5kHz					
2. Squelch Open Writing [Wide 5k]	1) TEST CH: Center SSG output : 12dB SINAD –1dB level SSG MOD: 3.0kHz	SSG DVM Oscilloscope AF VTVM	ANT SP/MIC connector	FPU	Write	Squelch open
[Wide 4k]	2) TEST CH: Center SSG output :12dB SINAD –1dB level SSG MOD: 2.4kHz					
[Narrow]	3) TEST CH: Center SSG output : 12dB SINAD –1dB level SSG MOD: 1.5kHz					
3. Squelch Tight Writing [Wide 5k] Writing	1) TEST CH: Center, Low, High (3 points) SSG output : 12dB SINAD +4.5dB level SSG MOD: 3.0kHz					
[Wide 4k]	2) TEST CH:Center SSG output :12dB SINAD +4.5dB level SSG MOD: 2.4kHz					
[Narrow]	3) TEST CH:Center SSG output : 12dB SINAD +4.5dB level SSG MOD: 1.5kHz					
4. Low RSSI Writing [Wide 5k]	1) TEST CH: Center, Low, High (3 points) SSG output : –121dBm (0.2 μ V)		ANT		Write	
[Wide 4k]	2) TEST CH: Center SSG output : –121dBm (0.2 μ V)					
[Narrow]	3) TEST CH: Center SSG output : –121dBm (0.2 μ V)					

Item	Condition	Measurement		Adjustment		Specifications / Remarks
		Test equipment	Terminal	Parts	Method	
5. High RSSI Writing [Wide 5k]	1) TEST CH: Center, SSG output : –70dBm (70.8 µ V)	SG DVM Oscilloscope AF VTVM	ANT	FPU	Write	
[Wide 4k]	2) TEST CH: Center SSG output : –70dBm (70.8 µ V)					
[Narrow]	3) TEST CH: Center SSG output : –70dBm (70.8 µ V)					

OPTION

KNB-58LEX (Li-ion BATTERY)

■Specification

Voltage..... 7.4V
Battery capacity..... 1,880mAh(min)

■External View

SPECIFICATIONS

General

Frequency Range	136~174MHz
Number of Channels	Max. 16
Channel Spacing	25kHz (Wide 5k) / 20kHz (Wide 4k) / 12.5kHz (Narrow)
PLL Channel Stepping	2.5kHz, 5kHz, 6.25kHz, 7.5kHz
Operating Voltage	DC 6.0V to 8.4V
Battery Life	More than 18 hours save off (5-5-90 duty cycle with KNB-58LEX battery)
Operating Temperature Range	–20°C to +50°C
Frequency Stability	±3.0ppm (–20°C to +50°C)
Dimensions and Weight (Dimensions not including protrusions)	
Radio Only	279g
With KNB-58L (1880mAh battery)	61.8 W x 128.3 H x 49.5 D mm 484g
Carrent Drain	RX:250mA TX:1.0A

Receiver (Measurements made per EN standard)

Sensitivity:emf	
EIA 12dB SINAD	0.25µV(-6dBµV)(Wide 5k/4k) / 0.32µV(-4dBµV) (Narrow)
EN 20dB SINAD	0.32µV(-4dBµV) (Wide 5k/4k) / 0.36µV(-3dBµV)(Narrow)
Adjacent Channel Selectivity	70dB (Wide 5k/4k) / 62dB (Narrow)
Intermodulation Distortion	65dB
Spurious Response	70dB
Audio Output	400mW/16Ω
Audio Distortion	Less than 10%

Transmitter (Measurements made per EN standard)

RF Power Output	1.2W
Modulation Limiting	±5.0kHz at 25kHz, ±4.0kHz at 20kHz, ±2.5kHz at 12.5kHz
Spurious Response	–36dBm (≤1GHz), –30dBm (>1GHz)
FM Hum & Noise	45dB (Wide 5k) / 43dB (Wide 4k / Narrow)
Modulation Distortion	5%typ
Modulation	16K0F3E,14K0F3E,8K50F3E 14K0F2D,12K0F2D,7K50F2D

Kenwood Corporation

2967-3, Ishikawa-machi, Hachioji-shi, Tokyo, 192-8525 Japan

Kenwood U.S.A. Corporation

P.O. BOX 22745, 2201 East Dominguez Street, Long Beach, CA 90801-5745, U.S.A.

Kenwood Electronics Canada Inc.

6070 Kestrel Road, Mississauga, Ontario, Canada L5T 1S8

Kenwood Electronics Deutschland GmbH

Rembrücker Str. 15, 63150 Heusenstamm, Germany

Kenwood Electronics Belgium N.V.

Leuvensesteenweg 248 J, 1800 Vilvoorde, Belgium

Kenwood Electronics France S.A.

L' Etoile Paris Nord 2, 50 Allée des Impressionnistes, Bp 58416 Villepinte, 95944 Roissy Ch De Gaulle Cedex

Kenwood Electronics UK Limited

KENWOOD House, Dwight Road, Watford, Herts., WD18 9EB United Kingdom

Kenwood Electronics Europe B.V.

Amsterdamseweg 37, 1422 AC Uithoorn, The Netherlands

Kenwood Electronics Italia S.p.A.

Via G. Sirtori, 7/9 20129 Milano, Italy

Kenwood Ibérica, S.A.

Bolivia, 239-08020 Barcelona, Spain

Kenwood Electronics Australia Pty. Ltd.

Talavera Business Park Building A, 4 Talavera Road, North Ryde NSW 2113 Australia

Kenwood Electronics (Hong Kong) Ltd.

Unit 3712-3724, Level 37, Tower one Metroplaza, 223 Hing Fong Road, Kwai Fong, N.T., Hong Kong

Kenwood Electronics Singapore Pte Ltd

1 Ang Mo Kio Street 63, Singapore 569110