



Modification Information (MOD)

For

***TK-2170/ TK-3170/
TK-3173***

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K

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Revision history

Date	Description
July 1, 2005	Revised 20-pin connector Table.

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1 TERMINAL FUNCTIONS

This section describes input and output terminals of the transceiver.

1.1 20-pin Connector

The 20-pin connector is located on the main PCB of the transceiver. External devices, such as an optional board, can be connected to this connector.

Table 1-1 Signal specifications of 20-pin connector

CN60 Pin No.	CN60 Name	Solder pad name	Accessory	I/O	Pin name of the accessory terminal	Specifications	
						Condition	Value
1	GND	G	Scrambler	-	Ground	-	Vss
			ANI	-	A-		
2	SSB	SB	Scrambler	O	Power	Output voltage/7 mA load	DC(Battery terminal) ±0.5 V/ 150 mA maximum
			ANI	O	A+		
3	AUX1	A1	Scrambler	O	B1	Load >100kΩ	(Low) Vss to 0.4 V (High) Vdd minus 0.8 V to Vdd
			ANI	I	AUX I/O		
4	AUX2	A2	Scrambler	O	B2	Load >100kΩ	(Low) Vss to 0.4 V (High) Vdd minus 0.8 V to Vdd
			ANI	O	Chan Busy		
5	RXD2	RXD	Scrambler	-	-	Load >100kΩ	(Low) Vss to 0.4 V (High) Vdd minus 0.8 V to Vdd
			ANI	I	Aud Inhib		
6	AUX3	A3	Scrambler	O	B4	Load >100kΩ	(Low) Vss to 0.4 V (High) Vdd minus 0.8 V to Vdd
			ANI	I	KEY		
7	AUX4	A4	Scrambler	O	B8	Load >100kΩ	(Low) Vss to 0.4 V (High) Vdd minus 0.8 V to Vdd
			ANI	O	PTT		
8	AUX5	A5	Scrambler	O	PTT	Load >100kΩ	(Low) Vss to 0.4 V (High) Vdd minus 0.8 V to Vdd
			ANI	O	Emergency		
9	TXD2	TXD	Scrambler	I	ECHO PTT	Load >100kΩ	(Low) Vss to 0.4 V (High) Vdd minus 0.8 V to Vdd
			ANI	O	Man-down		
10	TA1	TA1	Scrambler	-	-	Input sensitivity/ impedance (1 kHz standard deviation)	310 mV rms ±50 mV @ 22kΩ Load
			ANI	I	Data Out		
11	5C	5C	Scrambler	-	-	Output voltage/ 10 mA load	5.0 V ±0.5 V/ 50 mA maximum
			ANI	-	-		
12	MIC O	MIC_O	Scrambler	O	TX IN	Output voltage/ impedance (1 kHz 15 mV rms MIC input)	60 mV rms ±20 mV @ 2.2kΩ Load
			ANI	-	-		
13	TA2	DATAO	Scrambler	-	-	Input sensitivity/ impedance (1 kHz standard deviation)	310 V rms ±50 mV @ 22kΩ Load
			ANI	-	-		
14	DEO	DEO	Scrambler	-	-	Output voltage/ impedance (1 kHz standard modulation)	400 mV rms ±50 mV @ 2.2kΩ Load
			ANI	-	-		
15	ALT2	-	Scrambler	-	-	-	-
			ANI	-	-		
16	ALT1	ALT	Scrambler	-	-	Input sensitivity/impedance (1 kHz rated AF power/ Volume MAX position)	140 mV rms ±50 mV @ 22kΩ Load
			ANI	-	Sidetone		
17	MIC I	MIC_I	Scrambler	I	TX OUT	Input sensitivity/ impedance (1 kHz standard deviation)	500 mV rms ±100 mV @ 22kΩ Load
			ANI	-	-		

1 TERMINAL FUNCTIONS

CN60 Pin No.	CN60 Name	Solder pad name	Accessory	I/O	Pin name of the accessory terminal	Specifications	
						Condition	Value
18	RA O	RA_O	Scrambler	O	RX IN	Output voltage/ impedance (1 kHz standard modulation)	200 mV ±50 mV @ 2.2kΩ Load
			ANI	-	-		
19	RA I	RA_I	Scrambler	I	RX OUT	Input sensitivity/ impedance (1 kHz rated AF power/ Volume MAX position)	150 mV ±50 mV @ 22kΩ Load
			ANI	-	-		
20	AUX6	A6	Scrambler	O	Scramble	Load >100kΩ	(Low) Vss to 0.4 V (High) Vdd minus 0.8 V to Vdd
			ANI	I	Tone Ctl		

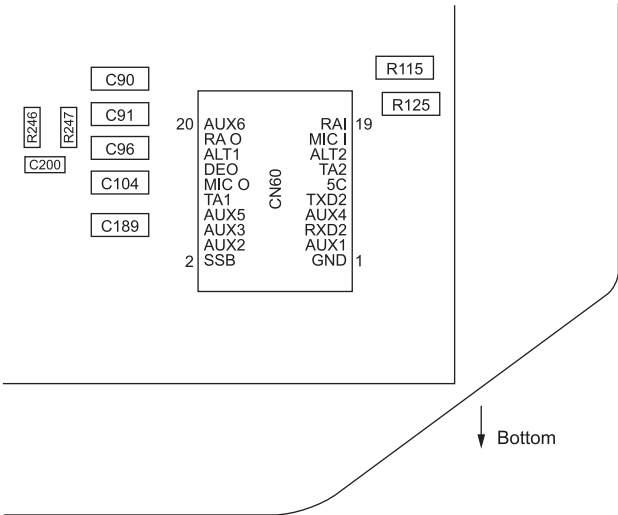


Figure 1-1 20-pin Connector Pin Assignment

1.2 Solder Pad Connection

The following Solder Pad Connections are available on the PCB to interface to the accessory devices, such as a Man-down Tilt Switch.

Table 1-2 Signal specifications of Solder Pad Connection

Solder pad name	Function	Specifications	
		Condition	Value
SBP_M	Speaker Mute	Load >100kΩ	(Low) Vss to 0.4 V (High) Vdd minus 0.8 V to Vdd
RSSI	RSSI Output	Load >100kΩ	(Low) Vss to 0.4 V (High) Vdd minus 0.8 V to Vdd
LSDFO	LSDIN Output	Load >100kΩ	(Low) Vss to 0.4V (High) Vdd minus 0.8 V to Vdd
MDSW	Man-down Switch	Load >100kΩ	(Low) Vss to 0.4V (High) Vdd minus 0.8 V to Vdd

2. CONNECTING THIRD PARTY OPTIONAL DEVICES

2.1 Voice Scrambler Board (SC20-460)

Various optional boards, such as a Voice Scrambler board, can be installed in the transceiver. This section describes how to install the Transcrypt SC20-460 in the transceiver.

■ Required Items to Install the Voice Scrambler Board

- Transceiver
- SC20-460
- Cloth sheet (G10-0795-04)

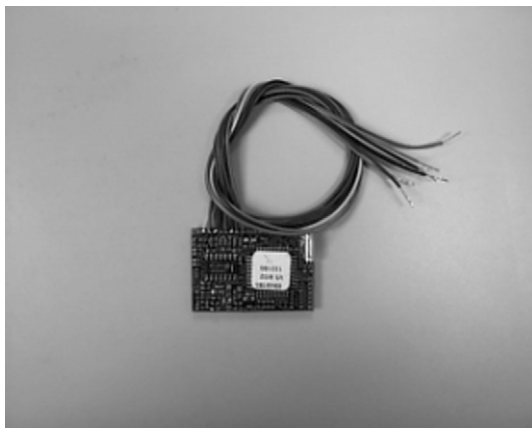


WARNING

TURN OFF THE TRANSCEIVER AND REMOVE THE BATTERY PACK BEFORE INSTALLING THE VOICE SCRAMBLER BOARD.

2.1.1 Configuring and Modifying the SC20-460 Board

1. Prepare the SC20-460 board.



2. Modify the SC20-460 board and change the receive audio input method.

Generally on the Voice Scrambler board, receive audio signals enter the board before de-emphasizing the signal.

Configuration of the software for the Voice Scrambler board must be changed to allow for the receive audio signals entering the board after de-emphasizing the signal.

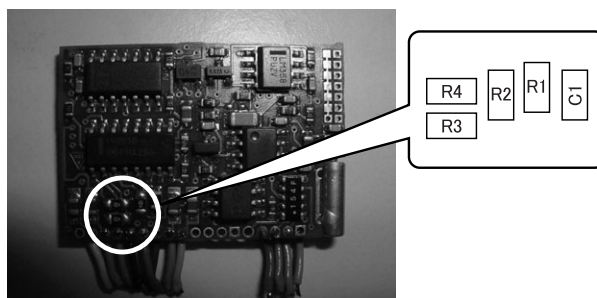
- Change the RX (De-emphasis) of M1 (Miscellaneous parameters #1) from 0 to 1.

Note:

- ◆ TR30-3066/ TR30-3061 is required to change the SC20-460 board configuration.
- ◆ Perform this required modification to avoid problems such as low-level audio signals or too loud and distorted voice signals being emitted from the speaker.
- ◆ Refer to the SC20-460 board's instruction manual for details.

3. Change the time constant in conjunction with the transmit audio level and receive audio level.
 - Replace R1 with a 39k Ω component, R3 with a 330k Ω component and C1 with a 1000pF component in conjunction with the receive audio level.
 - Replace R2 with a 39k Ω component in conjunction with the transmit audio level.

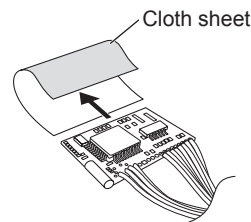
Before Modification	After Modification
R1, R3: 100k Ω , C1: 0.3 μ F (SC20-460 board default)	R1: 39k Ω , R3: 330k Ω , C1: 1000pF
R2, R4: 100k Ω (SC20-460 board default)	R2, R4: 39k Ω



Note:

- ◆ Perform this required modification to avoid problems such as low-level audio signals or too loud and distorted voice signals being emitted from the speaker.
- ◆ Refer to the SC20-460 board's instruction manual for details.

4. Wrap the SC20-460 board with the cloth sheet.



5. Cut the SC20-460 cable to approximately 3/4" (20 mm) in length.

2 CONNECTING THIRD PARTY OPTIONAL DEVICES

2.1.2 Installing the SC20-460 Board in the Transceiver

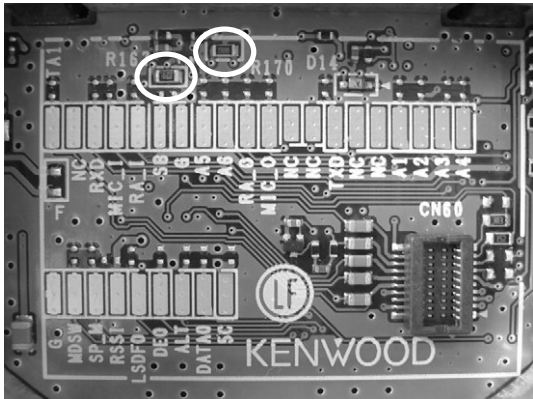
1. Remove 2 screws (M2.6) from the optional board cover.



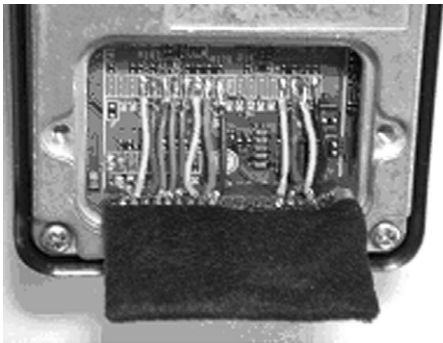
2. Remove the optional board cover.



3. Remove jumpers R167 and R170.



4. Connect the SC20-460 board to the TX-RX PCB (X57-7000-xx or X57-7010-xx) by soldering the wires. Connect the SC20-460 board to the transceiver as shown in the following figure.



SC20-460		Terminal name
12	TX OUT	TA1
11	RX OUT	NC
10	+V	RXD
9	Ground	MIC_I
8	PTT	RA_I
7	SCRAMBLE	SB
6	RX IN	G
5	TX IN	A5
4	EMERGENCY	A6
3	INDICATOR	RA_O
2	ECHO PTT	MIC_O
1	T/R	NC
E	IRQ	NC
D	Binary Code 1	TXD
C	Binary Code 2	NC
B	Binary Code 4	A1
A	Binary Code 8	A2
		A3
		A4

Figure 2-1 Connecting the SC20-460

- Note:**
- ◆ The connector for the scrambler board is located near the soldering portion of the TX-RX PCB (X57-7000-xx or X57-7010-xx). The connector can be removed if it is difficult to solder the wires.
 - ◆ The TXD port is not controlled. TK-2170/ TK-3170/ TK-3173 firmware will be available soon that will control ECHO PTT of the SC20-460 connected to the TXD port.

5. Install the SC20-460 board in the chassis.
6. Reinstall the optional board cover and screws.

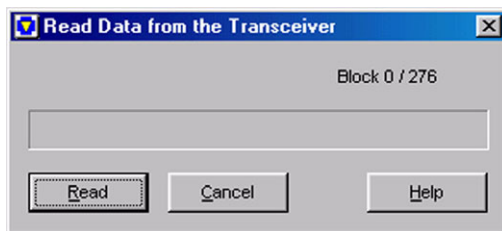
2.1.3 Configuration Using KPG-101D

Configure the Voice Scrambler information in the transceiver by using KPG-101D after installing the Voice Scrambler.

Follow the procedure below to configure the Voice Scrambler information in the transceiver.

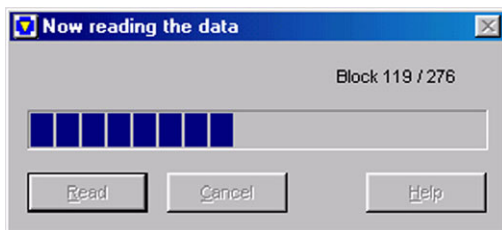
1. Run KPG-101D.
2. Select "Read Data from the Transceiver" from the **Program** pulldown menu. Click the "🖥️" icon on the toolbar.

The **Read Data from the Transceiver** window appears on the display.



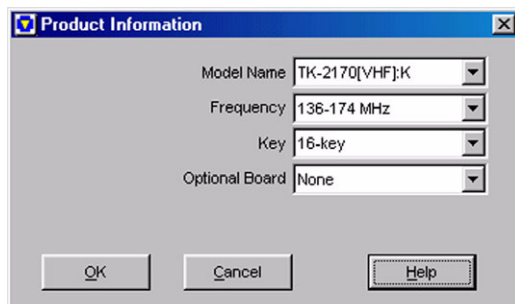
3. Click the "Read" button.

The PC starts reading configuration data from the transceiver.



4. Select "Product Information" from the **Model** pulldown menu.

The **Product Information** window appears on the display.



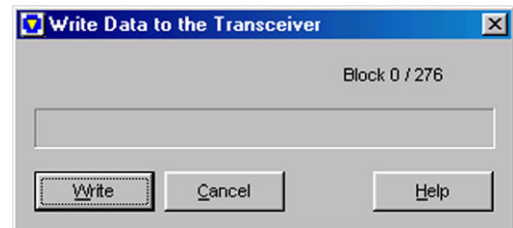
5. Select "Voice Scrambler" from the **Optional Board** dropdown list.

Configure Scrambler Setting for each channel. Refer to FPRG 6.4.20 Voice Scrambler and 6.6.15 Voice Scrambler for instructions to configure the scrambler.

Assign the **Scrambler** key to a function key in the **Key Assignment** window. Refer to FPRG 6.8 Key Assignment for the details of configuration.

6. Select "Write Data to the Transceiver" from the **Program** pulldown menu. Click the "🖥️" icon on the toolbar.

The **Write Data to the Transceiver** window appears.



7. Click the "Write" button.

Configuration data containing the Voice Scrambler information will be written to the transceiver.

2.2 Voice Scrambler Board (KW21)

This section describes how to install the Transcript KW21 in the transceiver.

Contact Transcript for details of KW21.

■ Required Items to Install the SmarTrunk Board

- Transceiver
- KW21
- Cushions in the package
- 3M Scotch Brand Tape 4016 (1/16" thick 1" (1.59 mm thick 25.4 mm))



WARNING

TURN OFF THE TRANSCEIVER AND REMOVE THE BATTERY PACK BEFORE INSTALLING THE KW21 BOARD.

2.2.1 Installing the KW21 Board in the Transceiver

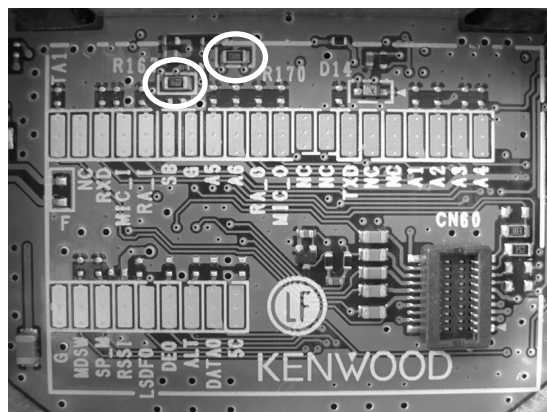
1. Remove 2 screws (M2.6) from the optional board cover.



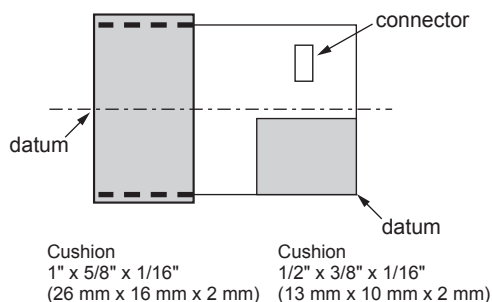
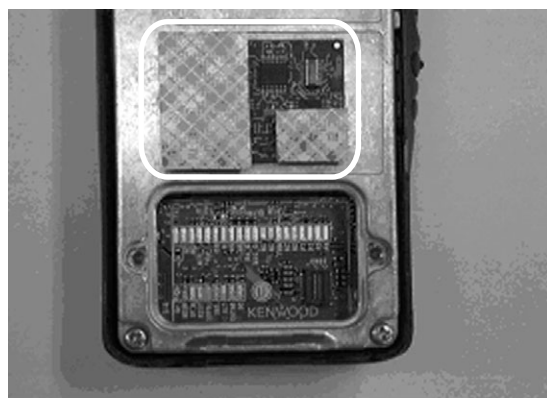
2. Remove the optional board cover.



3. Remove jumpers R167 and R170.

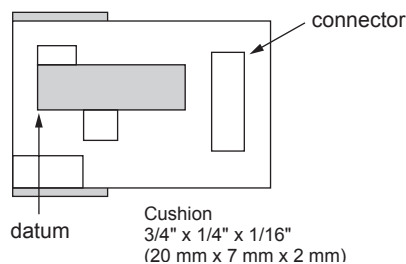
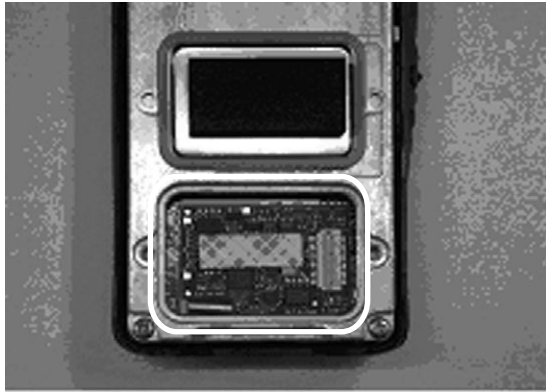


4. Cut the 3M Scotch Brand Tape 4016 (1/16" thick 1" (1.59 mm thick 25.4 mm)) to 1" x 5/8" (26 mm x 16 mm) (1 piece) and 1/2" x 3/8" (13 mm x 10 mm) (1 piece).
5. Attach the divided 3M Scotch Brand Tape 4016 (1/16" thick 1" (1.59 mm thick 25.4 mm)) along the corner or side of the PCB.



6. Peel off the protective sheet on the 3M Scotch Brand Tape 4016 (1/16" thick 1" (1.59 mm thick 25.4 mm)) and insert the KW21 connector into the 20-pin connector on the transceiver.
7. Cut the 3M Scotch Brand Tape 4016 (1/16" thick 1" (1.59 mm thick 25.4 mm)) to 3/4" x 1/4" (20 mm x 7 mm) (1 piece).

8. Attach the divided 3M Scotch Brand Tape 4016 (1/16" thick 1" (1.59 mm thick 25.4 mm)) as shown in the figure.



Note:

- ◆ Attach the divided 3M Scotch Brand Tape 4016 (1/16" thick 1" (1.59 mm thick 25.4 mm)) along the line so as not to fasten the 2 parts together.
 - ◆ The TXD port is not controlled currently. TK-2170/ TK-3170/ TK-3173 firmware will be available soon that will control ECHO PTT of the KW21 connected to the TXD port.
9. Reinstall the optional board cover and screws.

2.2.2 Configuration Using KPG-101D

Refer to [2.1.3 Configuration Using KPG-101D on page 5](#) how to configure KPG-101D.

2.3 ANI Board

An ANI board can be installed in the transceiver. This section describes how to install the Cimarron QE-2 in the transceiver.

■ Required Items to Install the QE-2 Board

- Transceiver
- QE-2
- Cloth sheet (G10-0795-04)

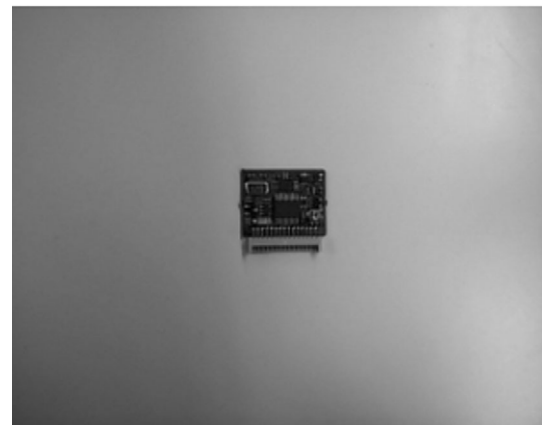


WARNING

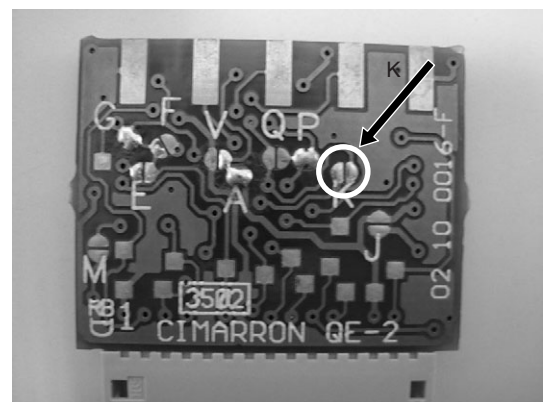
TURN OFF THE TRANSCEIVER AND REMOVE THE BATTERY PACK BEFORE INSTALLING THE QE-2 BOARD.

2.3.1 Configuring and Modifying the QE-2 Board

1. Prepare the QE-2 board.

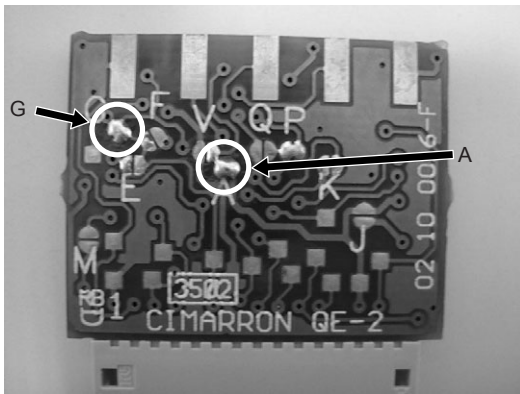


2. Modify and configure the QE-2 board.
- Heat and suck the solder from K.

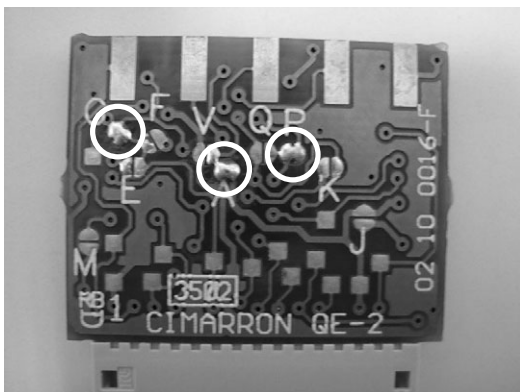


2 CONNECTING THIRD PARTY OPTIONAL DEVICES

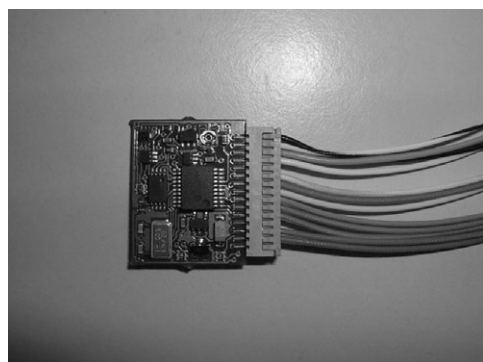
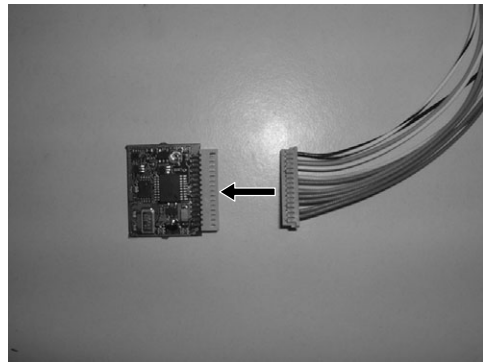
- Solder the gap of G and A.



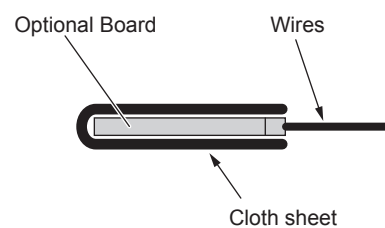
- Confirm that G, A, and P are soldered (bridged).



3. Connect the supplied cable to the QE-2 board.



4. Wrap the QE-2 board with the cloth sheet.



5. Cut the QE-2 cable to approximately 2" (50 mm) in length.

2.3.2 Installing the QE-2 Board in the Transceiver

1. Remove 2 screws (M2.6) from the optional board cover.



2. Remove the optional board cover.



3. Connect the QE-2 board to the TX-RX PCB (X57-7000-xx or X57-7010-xx) by soldering the wires. Connect the QE-2 board to the transceiver as shown in the following figure.

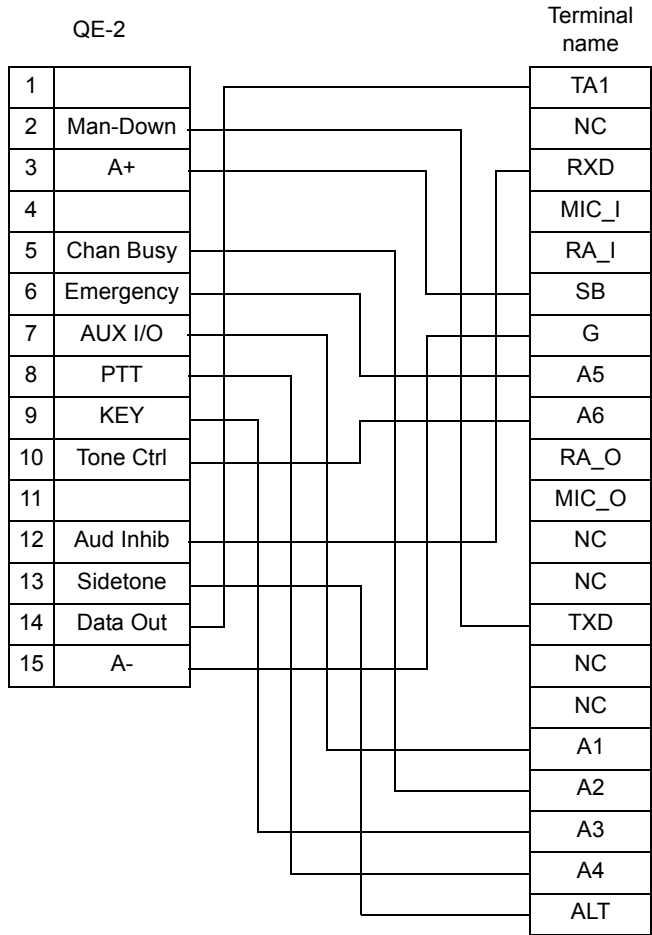
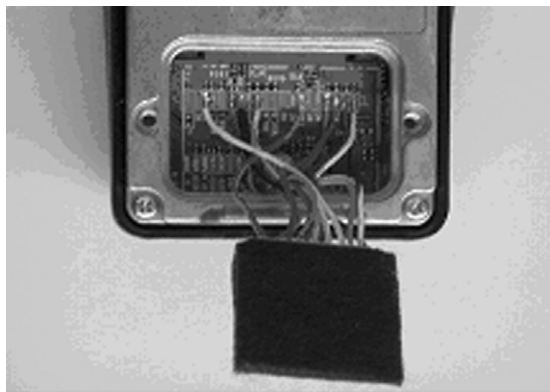
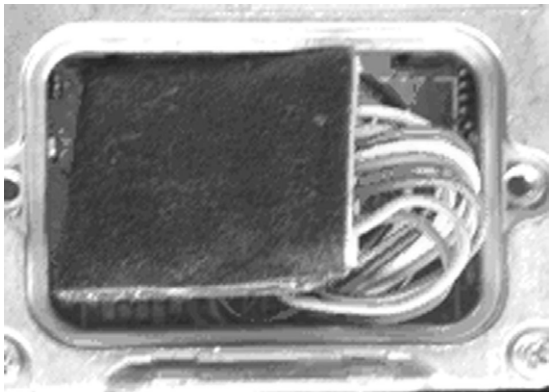


Figure 2-2 Connecting the QE-2 Board

- Note:** The connector for the Scrambler Board is located near the soldering portion of the TX-RX PCB (X57-7000-xx or X57-7010-xx). The connector must be removed if soldering is difficult.
4. Install the QE-2 board in the chassis.



5. Reinstall the optional board cover and screws.

2 CONNECTING THIRD PARTY OPTIONAL DEVICES

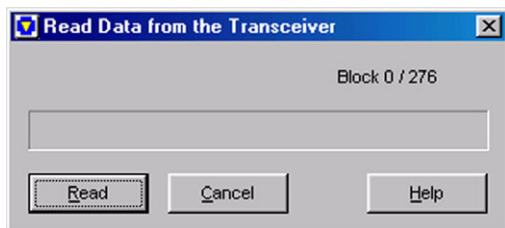
2.3.3 Configuration Using KPG-101D

Configure the ANI Board information by using KPG-101D after installing the ANI Board in the transceiver.

Follow the procedure below to configure the ANI Board information in the transceiver.

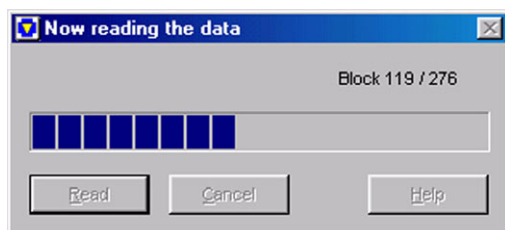
1. Run KPG-101D.
2. Select "Read Data from the Transceiver" from the **Program** pulldown menu. Click the "🖨️" icon on the toolbar.

The **Read Data from the Transceiver** window appears.



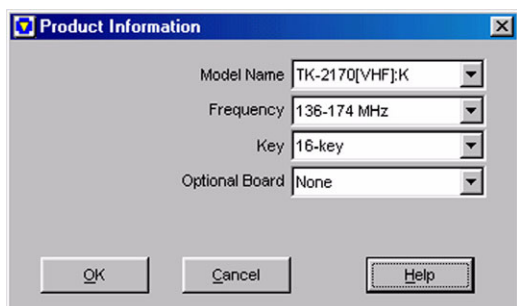
3. Click the "Read" button.

The PC starts reading configuration data from the transceiver by using KPG-101D.



4. Select "Product Information" from the **Model** pulldown menu.

The **Product Information** window appears.

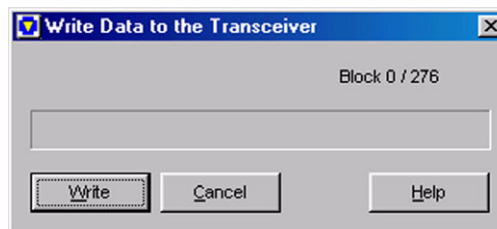


5. Select "ANI Board" from the **Optional Board** dropdown list.

Refer to the ANI Board's instruction manual for instructions on how to configure the ANI Board.

6. Select "Write Data to the Transceiver" from the **Program** pulldown menu. Click the "🖨️" icon on the toolbar.

The **Write Data to the Transceiver** window appears.



7. Click the "Write" button.

Configuration data containing the ANI Board information will be written to the transceiver.

2.4 Connecting the Man-down Tilt Switch for Emergency Use

The Man-down tilt switch can be installed in the transceiver. This section describes how to install the Cimarron CAE-3 in the transceiver.

■ Required Items to Install the Man-down Tilt Switch

- Transceiver
- CAE-3
- Cloth sheet (G10-0795-04)



WARNING

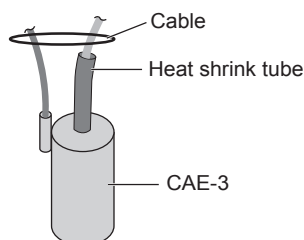
TURN OFF THE TRANSCEIVER AND REMOVE THE BATTERY PACK BEFORE INSTALLING THE MAN-DOWN TILT SWITCH.

2.4.1 Configuring and Modifying the Man-down Tilt Switch

1. Prepare the Man-down tilt switch.



2. Solder the cable at the position shown in the figure.



2.4.2 Installing the Man-down Tilt Switch in the Transceiver

The Man-down tilt switch can be installed in the transceiver. Refer to [2.5 Using CAE-3 with Another Optional Board on page 13](#) when using a Scrambler Board and ANI Board with the Man-down tilt switch.

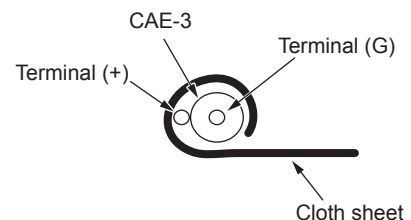
1. Remove 2 screws (M2.6) from the optional board cover.



2. Remove the optional board cover.



3. Cut the cloth sheet to 1-3/8" x 3/4" (35 mm x 20 mm).
4. Wrap the Man-down tilt switch with the cloth sheet as illustrated.



2 CONNECTING THIRD PARTY OPTIONAL DEVICES

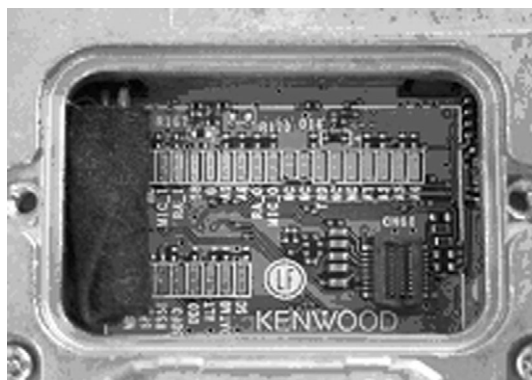
5. Connect the Man-down tilt switch to the TX-RX PCB (X57-7000-xx or X57-7010-xx) by soldering.

Connect the outside wire of the Man-down tilt switch to "MDSW" and the center wire to "G".



6. Viewing from the top, install the Man-down tilt switch on the left side of the compartment.

The Man-down tilt switch must be installed with the head downward.



7. Reinstall the optional board cover and screws.

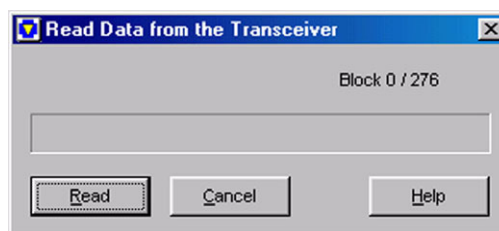
2.4.3 Configuration Using KPG-101D

Configure the Man-down tilt switch information in the transceiver by using KPG-101D after installing the Man-down tilt switch.

Follow the procedure below to configure the Man-down tilt switch information in the transceiver.

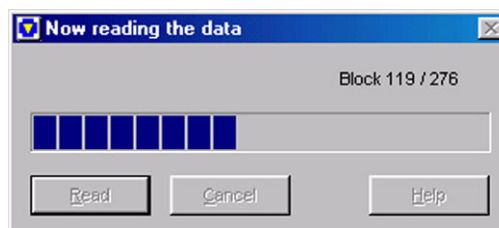
1. Run KPG-101D.
2. Select "Read Data from the Transceiver" from the **Program** pulldown menu. Click the "🖥️" icon on the toolbar.

The **Read Data from the Transceiver** window appears.



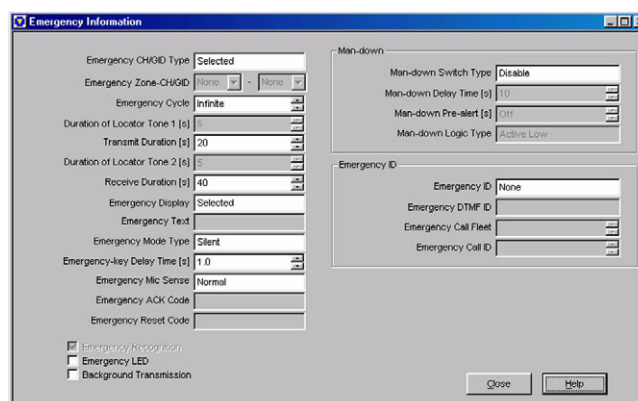
3. Click the "Read" button.

The PC starts reading configuration data from the transceiver by using KPG-101D.



4. Select "Emergency Information" from the **Edit** pulldown menu.

The **Emergency Information** window appears.

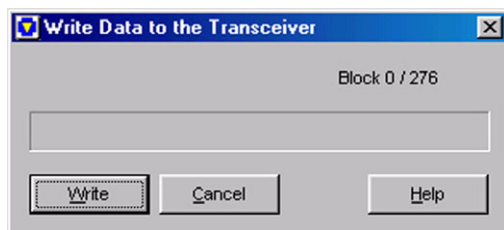


5. Configure the Man-down tilt switch.

Refer to FPRG 6.14 Emergency Information for the details of configuration.

6. Select "Write Data to the Transceiver" from the **Program** pulldown menu. Click the "🖨️" icon on the toolbar.

The **Write Data to the Transceiver** window appears.



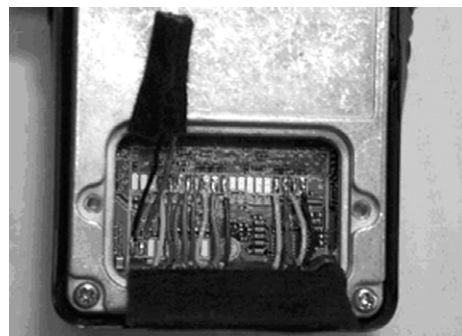
7. Click the "Write" button.

Configuration data containing the Man-down tilt switch information will be written to the transceiver.

2.5 Using CAE-3 with Another Optional Board

2.5.1 CAE-3 and Scrambler Board (SC20-460)

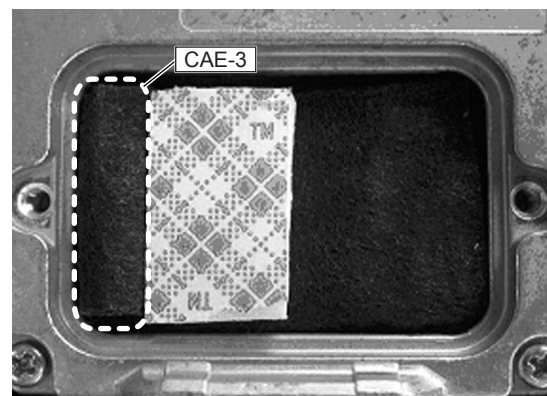
1. Install the CAE-3 and Scrambler Board (SC20-460) as shown in the figure.



2. Viewing from the top, install the Scrambler Board (SC20-460) in the chassis to the left side of the compartment.

The Man-down tilt switch must be installed with the head downward.

3. Cut out the 3M Scotch Brand Tape 4008 (1/8" thick 1" (3.2 mm thick 25.4 mm)) to 3/4" x 1/2" (20 mm x 12 mm) (1 piece) and attach the tape along the right side of CAE-3.



Note: The protective sheet should not be peeled off.

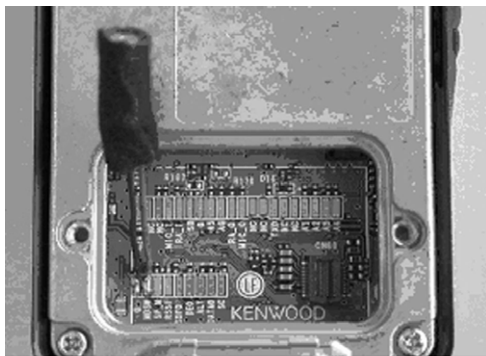
2 CONNECTING THIRD PARTY OPTIONAL DEVICES

4. Remove the cushion from the optional board and install the cushion on the chassis.



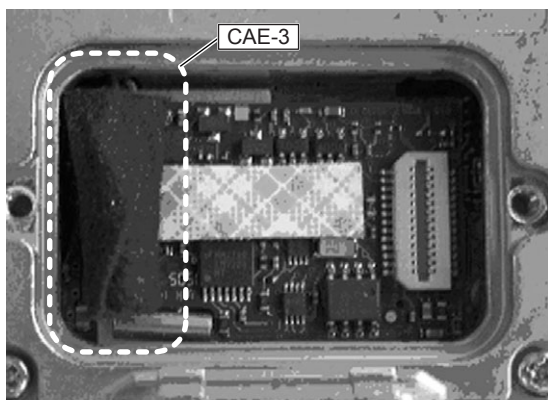
2.5.2 Using CAE-3 with Scrambler Board (KW21)

1. Connect the CAE-3 to the TX-RX PCB (X57-7000-xx or X57-7010-xx) by soldering.
Connect the outside wire of the CAE-3 to "MDSW" and the center wire to "G".

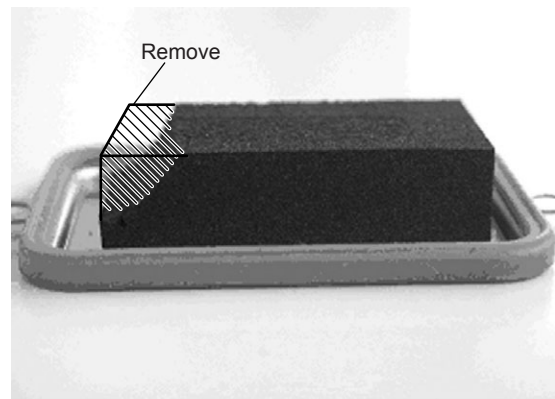


2. Install the Scrambler Board (KW21) in the transceiver.
3. Viewing from the top, install the CAE-3 on the KW21 and to the left side of the compartment.

The Man-down tilt switch must be installed with the head downward.



4. Cut off the cushion on the optional board as shown in the figure and install the cushion on the chassis to fix the CAE-3 in the cut-off compartment.

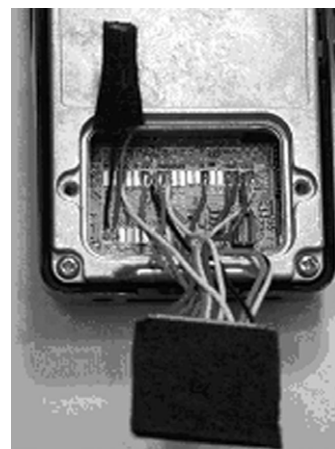


Note:

- ◆ No special tool is required to cut off the cushion. Use any preferred cutting tools. However, the cushion must be cut off to avoid the excessive pressure to the CAE-3.
- ◆ The cushion is necessary to maintain a reliable connection to the connector. Therefore, the cushion should not be removed.

2.5.3 CAE-3 and QE-2

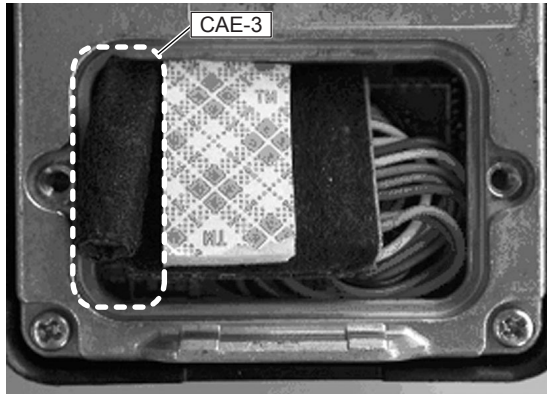
1. Install the CAE-3 and QE-2 as shown in the figure.



2. Viewing from the top, install the QE-2 in the chassis and CAE-3 to the left side of the compartment.

The Man-down tilt switch must be installed with the head downward.

3. Cut out the 3M Scotch Brand Tape 4008 (1/8" thick 1" (3.2 mm thick 25.4 mm)) to 3/4" x 1/2" (20 mm x 12 mm) (1 piece) and attach the tape to line up with the right side of CAE-3.



Note: The protective sheet should not be peeled off.

4. Remove the cushion from the optional board and install the cushion on the chassis.



