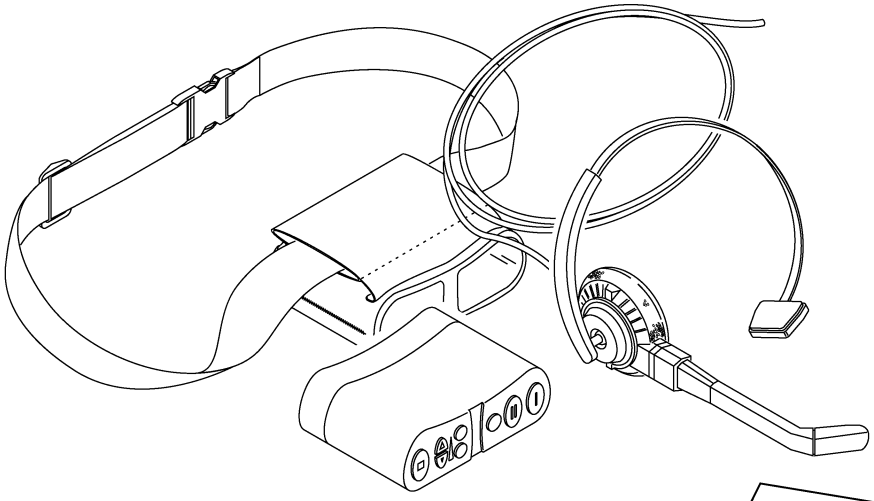
3M

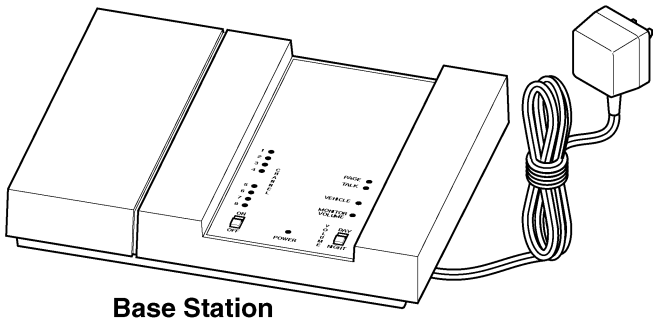
Belt Pack Intercom System

Model C860

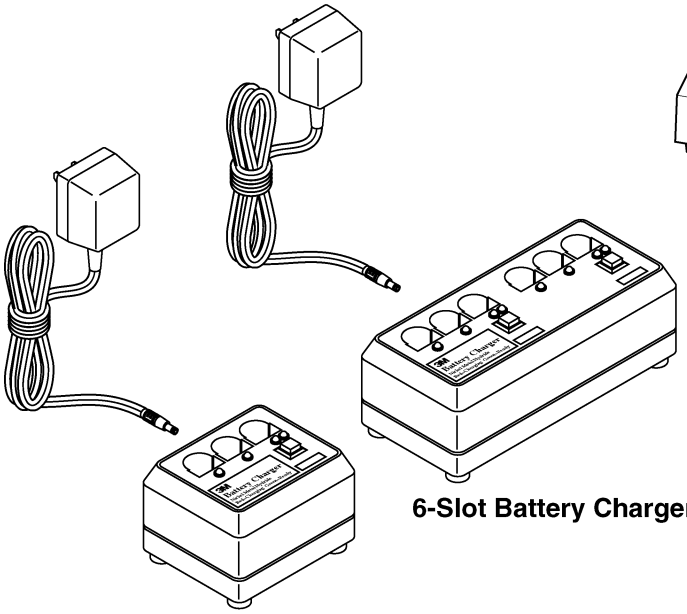
Operating Instructions



Headset & Belt Pack

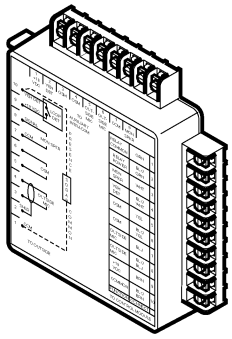


Base Station



6-Slot Battery Charger

3-Slot Battery Charger



Interconnect Module

SP-331A

Intended Use

The 3M Belt Pack Intercom System, Model C860, is designed to provide 2-way radio-frequency audio communication in quick service drive-through restaurants and convenience stores.

Misuse of the Model C860 could result in poor performance and/or undesired operation.

FCC Information

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

(Blank Page)

Introduction

The 3M Model C860 Belt Pack Intercom System is a wireless intercom system designed for high reliability, compactness, and ease of service.

The system can be programmed to operate on any one of eight different radio channels to provide high-quality audio performance and reduce the possibility of interference between neighboring wireless systems.

System Configurations

The system can be configured in one of five ways depending on the number of menu signs (lanes) at the facility and the type of communication desired.

Single-Lane Standard Communication System

The *single-lane standard communication system* provides standard communication (talk *or* listen) for facilities that have one menu sign.

The system consists of one base station and one or more belt packs and battery chargers.

Single-Lane Duplex Communication System

The *single-lane duplex communication system* provides duplex communication (simultaneous talk and listen) for facilities that have one menu sign.

The system consists of one base station and one or more belt packs and battery chargers.

Dual-Lane Standard Communication System

The *dual-lane standard communication system* provides standard communication (talk *or* listen) for facilities that have two menu signs.

The system consists of two independent systems - one dedicated to menu sign 1 and the other dedicated to menu sign 2. The belt packs are programmed to work with one system or the other and are labeled accordingly (1 or 2).

Dual-Lane Duplex Communication System

The *dual-lane duplex communication system* provides duplex communication (simultaneous talk *and* listen) for facilities that have two menu signs.

The system consists of two independent systems - one dedicated to menu sign 1 and the other dedicated to menu sign 2. The belt packs are programmed to work with one system or the other and are labeled accordingly (1 or 2).

Cross-Lane Communication System

The *cross-lane communication system* provides duplex communication (simultaneous talk *and* listen) for facilities that have two menu signs.

The system consists of two duplex systems that are connected to a cross-lane module. The belt packs are programmed for either lane 1 or lane 2.

During *off-peak* hours, the cross-lane module can be turned ON to link the two systems and enable one operator to simultaneously talk *and* listen to customers at menu sign 1 or menu sign 2 or with other headset operators.

During *peak* hours, the cross-lane module can be turned OFF to separate the systems and enable menu sign 1 operators to talk to customers at menu sign 1, and menu sign 2 operators to talk to customers at menu sign 2.

System Components

The number of system components and the procedures necessary to operate them vary depending on the system configuration. However, three components are common to all system configurations.

Base Station

The base station is the interface between the customer and the belt pack worn by the operator. See Figure 1.

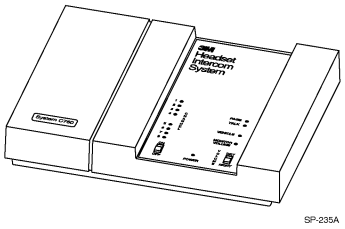


Figure 1. Base Station

Headset and Belt Pack

The belt pack is used by the operator to communicate with customers and with other store personnel who are wearing belt packs.

The headset is connected by a communications cable to the battery-powered belt pack. See Figure 2.

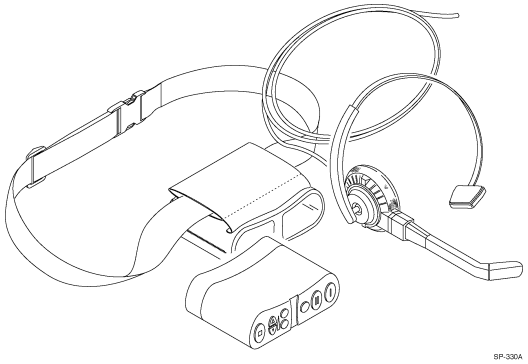


Figure 2. Headset and Belt Pack

Battery Charger

The battery charger charges batteries in approximately 1.5 to 2 hours. The charger is available in 3-slot and 6-slot versions. See Figure 3.

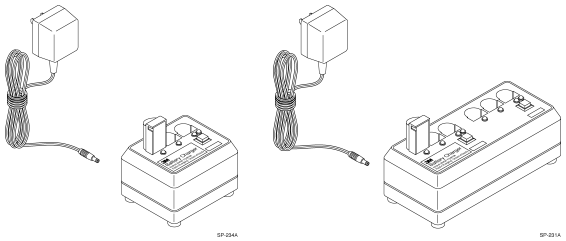


Figure 3. 3-Slot and 6-Slot Battery Chargers

Base Station

The base station controls and indicators are shown below.

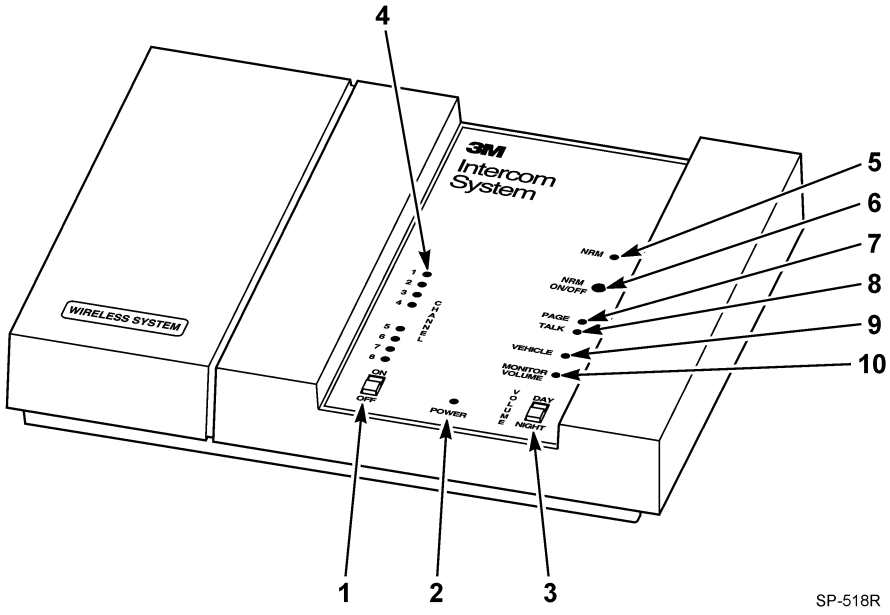


Figure 4. Base Station Controls and Indicators

1 ON/OFF Switch

The ON/OFF switch controls power to the base station.

2 POWER Indicator

This indicator lights when the ON/OFF switch is in the ON position.

✓ Note

If for some reason the C860 headset system does not operate and the system includes an optional wired backup system, turn off the C860 Base Station to enable the backup system.

3 VOLUME DAY/NIGHT Switch

With the switch in the DAY position, the volume of the menu sign speaker is increased for daytime operation. With the switch in the NIGHT position, the volume of the menu sign speaker is decreased for nighttime operation. (Sound travels further and more efficiently at night.)

4 Channel Indicators

These indicators light to show which of the 8 channels is selected.

5 NRM Indicator

This indicator blinks when the Noise Reduction Module is switched on.

6 NRM On/Off Button

This button turns the optional Noise Reduction Module on or off.

7 Page Indicator

This indicator lights when headset Page communications occur.

8 Talk Indicator

This indicator lights when headset–to–menu sign "Talk" communications occur.

9 Vehicle Indicator

This indicator lights when a vehicle is detected at the menu sign.

10 Monitor Volume Access

This access hole allows for adjusting the volume of the optional monitor speaker.

Headset and Belt Pack

The controls on the belt pack are shown below.

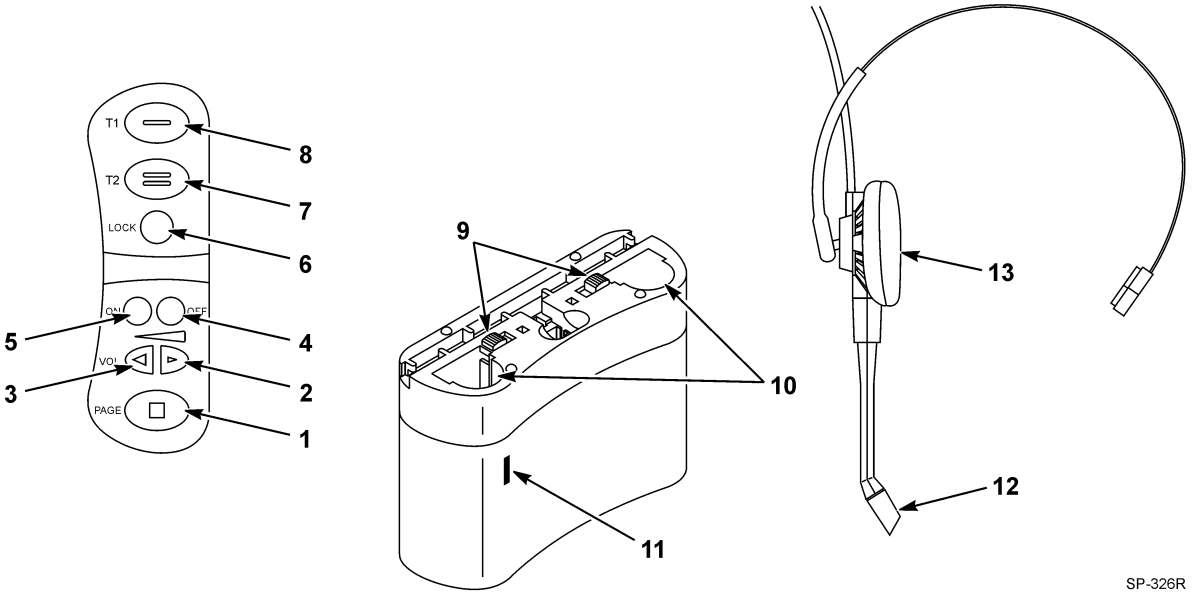


Figure 5. Controls

1	**Page Switch**	Press and hold the **P**age switch to talk to internal personnel without being heard by the customer. Release the switch to listen.
2	**Volume Down◀ Control**	Press the volume down ◀ control to decrease the volume. When either volume control is pressed, the headset emits a short tone to indicate the new volume level. There are 15 different volume levels from minimum to maximum. If the headset volume is at its maximum level, a low, continuous tone sounds when the volume up ▶ control is pressed. A low, continuous tone also occurs when the volume reaches minimum level and the volume down ◀ control is pressed. Note that even when set to its lowest level, headset volume is not turned completely off.
3	**Volume Up ▶ Control**	Press the volume up ▶ control to increase the volume in the headset earpiece.
4	**ON Switch**	Press the ON switch to turn on the belt pack.
5	**OFF Switch**	Press the OFF switch to turn off the belt pack.
6	**Talk Lock Switch (Hands Free)**	For duplex systems where hands free operation is desired, press the talk lock switch once to talk and listen to the customer. This enables hands-free operation.
7	**T2 (Talk Lane 2) Switch**	For dual-lane systems, press and hold the **T2 (Talk Lane 2)** switch to talk to the customer at the menu sign in lane 2. Release the switch to listen. For single-lane systems, both switches operate identically.

8	**T1 (Talk Lane 1) Switch**	Press and hold the **T1 (Talk Lane 1)** switch to talk to the customer in lane 1. Release the switch to listen.
9	**Battery Release**	Push the battery release toward the center of the unit to release the battery.
10	**Battery**	This rechargeable battery provides power to the control unit.
11	**Programming Jack**	This jack accepts the programming cable from the base station to allow the belt pack to be programmed to the same radio channel as the base station.
12	**Microphone**	The microphone sends the operator's voice to the customer and/or other headset operators.
13	**Earphone/Earpad**	The *earphone* is a speaker that broadcasts the voice from the customer or other headset operators. The replaceable *earpad* covers the earphone and cushions the operator's ear to provide comfort.

Battery Chargers

The 3-slot and 6-slot battery charger controls are shown below.

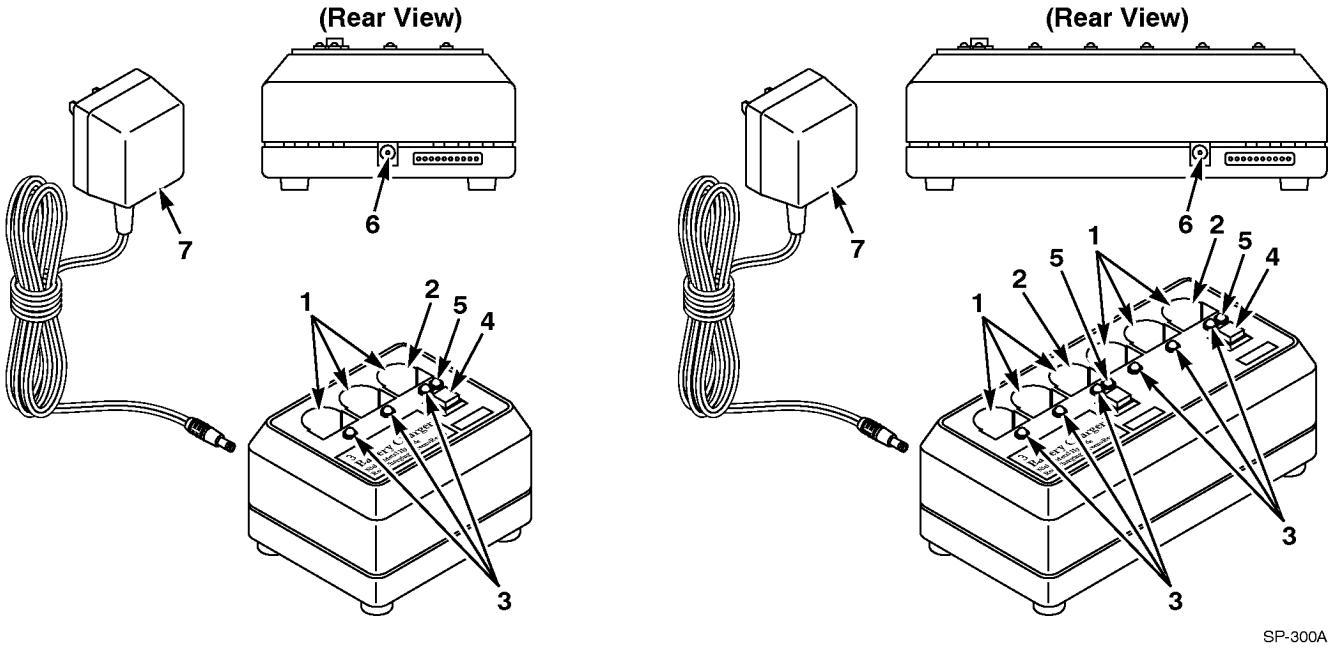


Figure 6.

1	**Charging Slots**	The charging slots hold batteries during the recharging cycle.
2	**Conditioning and/or Charging Slot**	This dual-function slot holds a battery during conditioning and recharging cycles. This slot functions as a conditioning slot when the conditioning button is pressed.
3	**Charging Status Indicators**	The charging status indicators light RED, GREEN, or ORANGE to indicate charging status: RED indicates the battery is being charged. GREEN to indicate the battery is fully charged. ORANGE to indicate the battery is defective.
4	**Conditioning Button**	Press the conditioning button to condition a battery that is inserted in the conditioning/charging slot. The button must be pressed within 2 seconds of inserting the battery.
5	**Conditioning Status Indicator**	The conditioning status indicator lights YELLOW to indicate the battery in the conditioning slot is being conditioned.
6	**Power Supply Jack**	This jack accepts the plug from the power supply cord.
7	**Power Supply**	The power supply provides power to the battery charger.

Introduction

Checking the Headset for Proper Fit

To prepare the headset for use, you will need to check the headset for proper fit.

To ensure effective operation and comfort:

- Adjust the headband width by gently bending the headband.
- Position the ear pad and microphone.

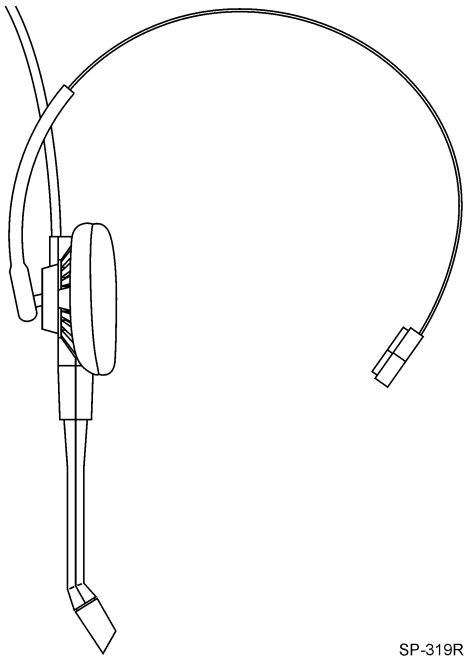


Figure 7. Headband Size

Positioning the Microphone

Position the microphone so that its tip is near the corner of your mouth. See Figure 8.

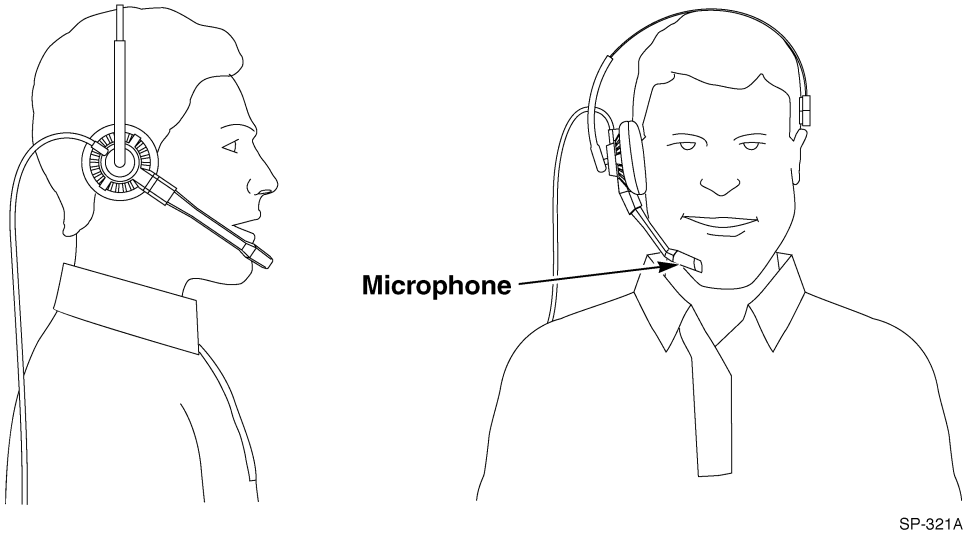


Figure 8.

Connecting the Headset to the Belt Pack

To connect the headset to the belt pack:

1. Insert the communications plug at the end of the headset cable into the modular jack in the bottom of the belt pack. See Figure 9.
2. Press the cable into the cable channel on the bottom of the belt pack. See Figure 9.
   - Direct the cable toward the Page button to wear the belt pack on the right hip.
   - Direct the cable toward the Talk Lane 1 button to wear the belt pack on the left hip.

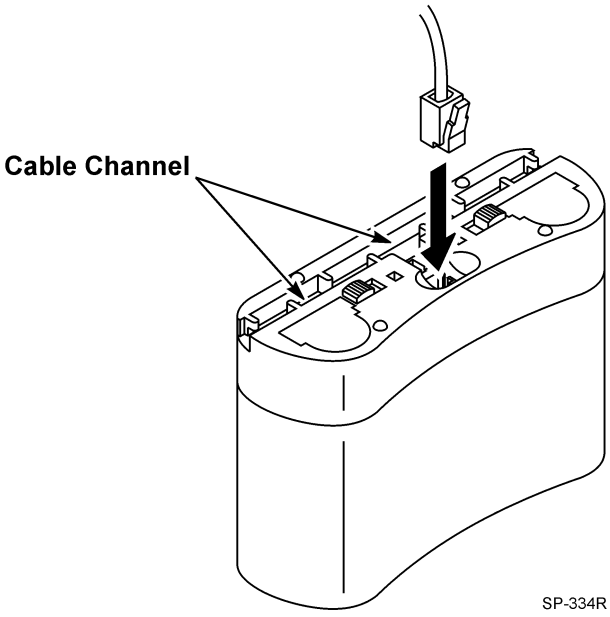


Figure 9. Connecting the Headset to the Belt Pack

Installing the Belt Pack

To install the belt pack into the belt pack:

1. Open the flap at the bottom of the belt pack.
2. Insert the belt pack face up (so that the controls are accessible through the openings on the belt pack top). See Figure 10.
3. Extend the headset cable as follows:
   - Toward the Page button to wear the unit on the right hip.
   - Toward the Talk Lane 1 button to wear the unit on the left hip.
4. Close the flap.

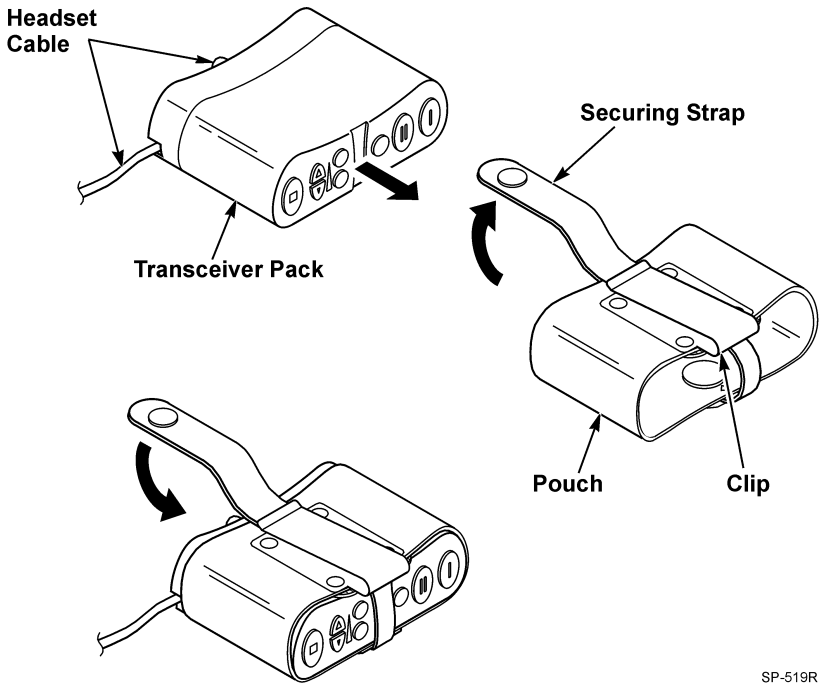


Figure 10. Installing the Belt Pack

Wearing the Belt Pack

The belt pack can be worn on either hip.

To wear the belt pack on the left hip, slide the belt through the belt holder slot until the buckle of the belt is at the front of the body and the unit is on the left hip. See Figure 11.

To wear the belt pack on the right hip, slide the belt through the belt holder slot until the buckle of the belt is at the front of the body and the unit is on the right hip. See Figure 11.

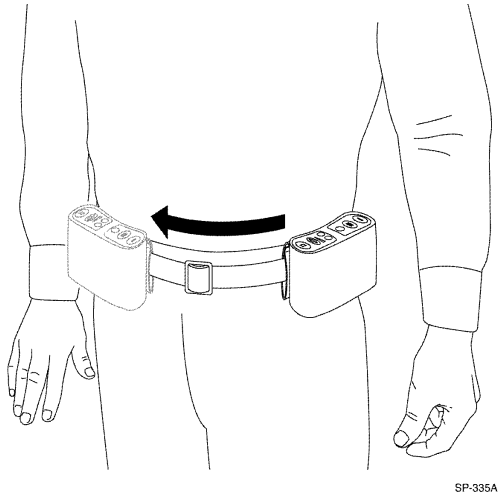


Figure 11.

System Startup

System startup includes turning on the base station and each belt pack that will be used.

Turning On the Base Station

To turn on the base station:

1. Slide the power ON/OFF switch to the ON position. Check to see that the POWER indicator lights.
2. Slide the VOLUME switch to the desired position (DAY or NIGHT).

Turning On the Belt Pack

To turn on the belt pack, press the ON switch located on the belt pack. A single tone will sound in the headset to indicate the unit has been turned on.

Operating Modes

The system has several operating modes. The number of available operating modes depends on the system configuration (*single-lane vs. dual-lane, standard communication vs. duplex communication, etc.*).

Standby Mode

In the standby mode, the belt pack is on and waiting to receive communication from the customer or other headset operators. This mode is available with all system configurations.

Talk/Listen Mode

Use the talk/listen mode to talk to the customer. This mode is available with all system configurations.

Single-Lane Standard *or* Duplex Communication Systems

1. A *single beep* alert tone sounds in the headset at 2-second intervals when the system detects a customer (vehicle) at the menu sign.
2. When you hear the alert tone, press and hold T1 *or* T2 to talk to the customer at the menu sign. Release T1 *or* T2 to listen.

Dual-Lane Standard *or* Duplex Communication Systems

In dual-lane systems, some belt packs are programmed to communicate with Lane 1 and others are programmed to communicate with Lane 2.

1. An alert tone sounds in the headset when the system detects a customer (vehicle) at the menu sign:
   - The alert tone for Lane 1 headsets is a single beep that repeats at 2-second intervals.
   - The alert tone for Lane 2 headsets is a double beep that repeats at 2-second intervals.
2. When you hear the *single beep* alert tone, press and hold T1 and talk to the customer. Release T1 to listen.

   When you hear the *double beep* alert tone, press and hold T2 to talk to the customer. Release T2 to listen.

Cross-Lane Communication Systems

Communication During Peak Hours

During peak hours, the cross-lane module is turned *off* and the system functions like a dual-lane duplex system. Some belt packs are programmed to communicate with Lane 1 and others are programmed to communicate with Lane 2.

Communication During Off-Peak Hours

During off-peak hours, the cross-lane module is turned *on* to enable a single operator to communicate with customers in either lane (1 *or* 2).

1. An alert tone sounds in the headset when the system detects a customer (vehicle) at the menu sign:
   - The alert tone for Lane 1 belt packs is a single beep that repeats at 2-second intervals.
   - The alert tone for Lane 2 belt packs is a double beep that repeats at 2-second intervals.
2. When you hear the *single beep* alert tone, press and hold T1 and talk to the customer at menu sign 1. Release T1 to listen.

   When you hear the *double beep* alert tone, press and hold T2 to talk to the customer at the menu sign 2. Release T2 to listen.

Talk Lock Mode ("Hands Free")

Use this mode to operate "hands free." The talk lock mode is only available with duplex system configurations.

In this mode, the belt pack automatically switches from standby to talk/listen when a customer is detected. The belt pack automatically switches back to standby when the customer leaves.

✓ Note

"Hands free" operation (talk lock mode) prevents all other headset operators from talking. "Hands free" will not work in cross-lane mode.

To use the talk lock mode, press the talk lock switch on the belt pack. To return to normal operation, press T1 or P.

Page Mode

Use this mode to talk to other operators who are wearing headsets without being heard by the customer at the menu sign. This mode is available with all system configurations.

To page another operator, press and hold the page switch while speaking. Release the page switch to listen.

✓ Note

If you are **not** a menu sign operator, do not use the page mode while the menu sign operator is communicating. Doing so may interrupt or prevent communication between the menu sign operator and the customer.

Page Monitor Mode

Use this mode to listen for pages from other operators (without hearing the communication to and from the customer). This feature is convenient for managers who only want to hear page communication. This mode is available with all system configurations.

To use the page monitor mode:

1. Turn the belt pack OFF. See Figure 12.

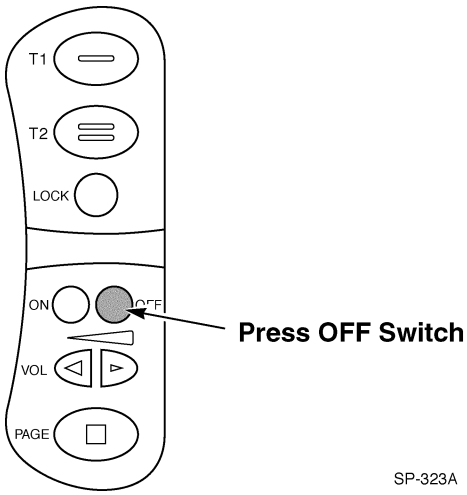


Figure 12. OFF Switch

2. Press and hold the page button while pressing and holding the ON button, up to 5 seconds, until audible tones are heard. This locks the belt pack in the page monitor mode. See Figure 13.

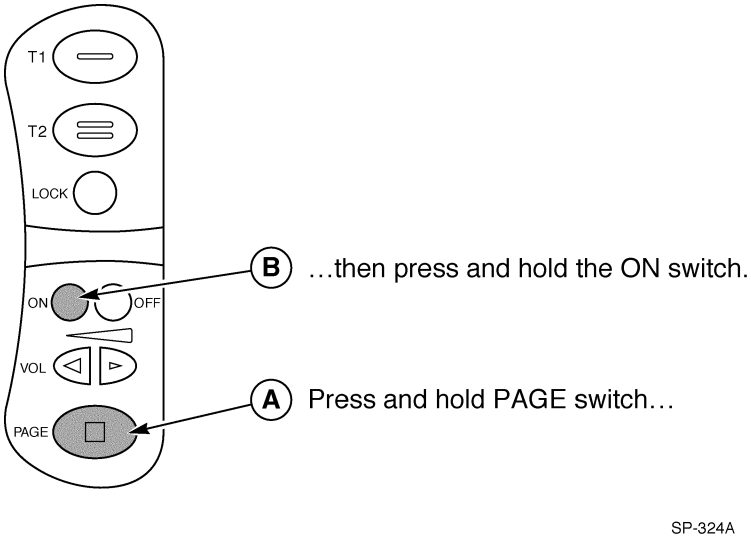


Figure 13. Page Switch and OFF Switch

To respond to a page, press P (page switch).

To return to normal operation:

1. Turn the belt pack OFF.
2. Turn the belt pack ON.

Special Considerations

When using the talk/listen mode or the page mode, keep the following things in mind:

- Communication between the operator and the customer may be heard by several people.
- Only one operator can talk at a time.
- In the talk/listen mode, communication **from the belt pack** is heard by customers and other operators who are wearing headsets.

Belt Pack

Replacing the Battery

When the battery voltage is too low, the headset sounds a short, low-volume tone at seven-second intervals to alert the operator to install a fully charged battery. The "battery voltage low tone" continues for two minutes after which the belt pack turns off automatically to prevent damage to the batteries.

✓ Note

When installing a battery, make sure it is fully charged. It is important to remember that an *unused* C860 battery loses five percent of its charge per week. If a battery has not been used for several weeks, make sure to charge prior to use.

To replace the battery:

1. Push the battery release to release the battery. See Figure 14.
2. Remove the discharged battery from the belt pack.
3. Insert a ***fully charged battery*** in the unit. Make sure the battery is fully inserted (battery release clicks). See Figure 14.

✓ Note

The C860 can operate on one battery or two. Using two batteries doubles the operating time between charges.

If two batteries are used, both must be recharged at the same time.

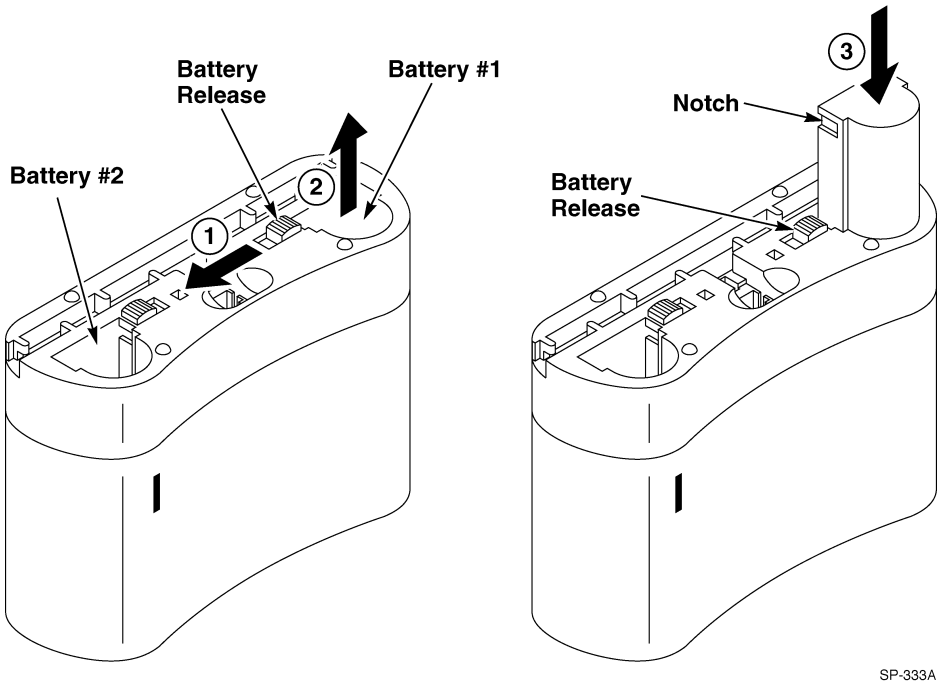


Figure 14.

Replacing the Headset Pad

To replace the headset pad, remove the worn/damaged ear pad from the ear cup and replace it with a new pad.

Battery Charger

Location

The battery charger should be placed on a flat surface such as a desktop or table in a clean, dry environment, or an optional wall mount unit may be used.

Cleaning the Contacts

If the indicators fail to light during charger operation, clean the contacts using an alcohol-moistened cotton swab.

Batteries

Care, Handling and Storage

Avoid dropping batteries. Do not carry batteries in your pockets or leave them in hot, damp or dirty places.

⚠ Caution

Be careful not to short the battery contacts together.

Battery Voltage Low Tone

When the battery voltage becomes too low, a short, low-volume tone sounds in the headset at seven-second intervals to alert the operator to replace with a fully charged battery.

The "battery voltage low tone" continues for two minutes after which the headset turns off automatically to prevent damage to the batteries.

Charging Batteries

To charge a battery, insert the battery in one of the charging slots as shown in Figure 15.

- The indicator lights RED to indicate the battery is charging.
- The indicator lights GREEN to indicate the battery is fully charged.
- The indicator lights ORANGE to indicate the battery is defective.

✓ Note

Discharged batteries require 1-1/2 to 2 hours to charge.

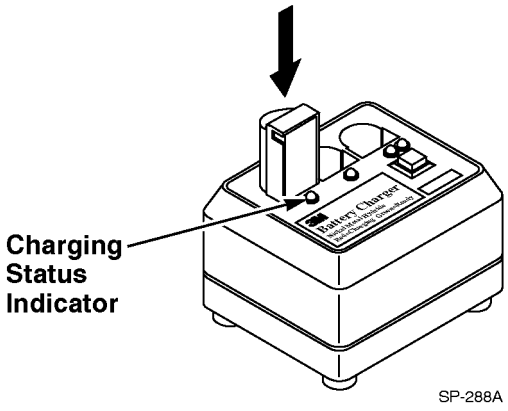


Figure 15.

To condition a battery:

1. Insert the battery in the charging/conditioning slot as shown in Figure 16.
2. Press the conditioning button within 2 seconds after inserting the battery. The indicator lights YELLOW to indicate the battery is being conditioned.
3. When the conditioning cycle ends, the Conditioning Status Indicator will glow green.

✓ Note

Conditioning leaves the battery in a charged state.

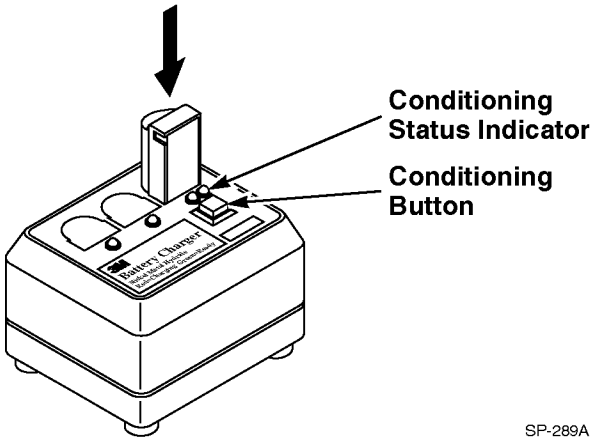


Figure 16.

Disposing of Batteries

To help protect the environment, C860 rechargeable batteries which have reached the end of their useful life should be disposed of in accordance with local requirements.

Making Sure Batteries are Ready for Use

Follow these tips to make sure batteries are always ready for use:

- Have at least one extra battery for each belt pack. This helps ensure that a fully charged battery is always available.
- Recharge a low battery as soon as it is removed from the belt pack.
- Keep the battery contacts clean: both those on the battery and those in the belt pack. To clean the contacts, use an alcohol-moistened cotton swab.
- Remember that a battery recharge takes approximately 1-1/2 to 2 hours.
- Avoid removing and reinserting batteries while they are charging (charging status indicator is RED).
- Remember that batteries discharge fastest during Talk and Page operation. Avoid unnecessary communications.

Important Information about C860 Rechargeable Batteries

Keep the following information in mind as you operate the system and as you establish operating procedures:

- Avoid shorting across the battery contacts with metal items. Never carry a battery in a pocket or place it in a drawer where it can accidentally be shorted by keys, coins etc.

- Have adequate charging capacity for the number of belt packs in your system. One battery charger will handle up to three belt packs. Use of more than three belt packs requires an additional battery charger.
- Batteries perform best at moderate temperatures. Extremes of heat and cold reduce their performance.

Programming the Belt Pack for Cross-Lane Operation

The belt packs are factory programmed for single-lane operation to enable the operator to press either T1 or T2 to communicate with lane 1.

For cross-lane systems, the belt packs must also be programmed to enable communication with either lane 1 *or* lane 2. With the cross-lane module turned ON, the lane 1 **or** lane 2 operators can press T1 to talk to lane 1 customers **or** T2 to talk to lane 2 customers.

To program the belt pack for dual-lane cross-lane operation:

- While pressing and holding *both* the T1 and T2 switches on the belt pack, turn the unit ON. Hold all three switches for at least 5 seconds. See Figure 17.
- Audible tones will be heard in the headset earpiece, indicating that the belt pack is programmed for dual-lane cross-lane operation.

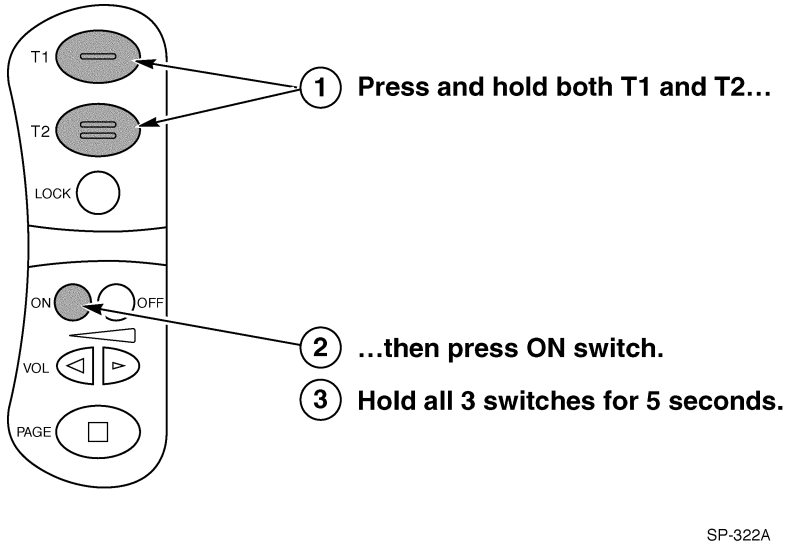


Figure 17.

Reprogramming

If you no longer need the dual-lane cross-lane feature, reprogram the belt pack by repeating the above procedure.

Changing Channels if Interference is Heard

The C860 system is capable of operating on any one of eight different channels. If messages etc. from a different transmitter are heard in the headset or monitor speaker, or if you are told that your store's messages are being heard elsewhere, interference is occurring. You can correct either type of interference by changing the base station operating channel. To do this:

1. Pull outward on the right side of the base station half-cover and then lift and remove the cover. See Figure 18.

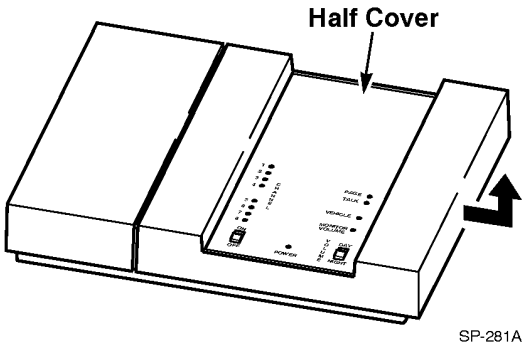


Figure 18.

2. With the base station turned on, press and release the Channel Select switch once. (This advances the system to the next channel.) One of the red indicators (1-8) will light, indicating the newly selected channel.

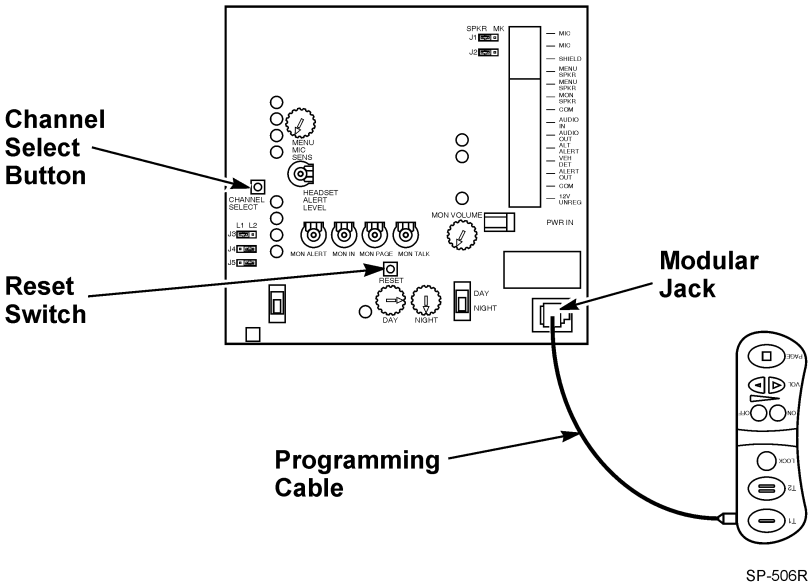


Figure 19.

3. Press the RESET switch to "read" the new channel selection into the microprocessor.

✓ Note

When two systems are used in a cross-lane application, both base stations must be set to the same channel, but different lane settings.

4. With the belt pack turned ON, plug one end of the programming cable into the belt pack programming jack. See Figure 19.
5. Plug the other end of the programming cable into the base station programming jack. See Figure 19.
6. Audible tones will be heard in the headset earpiece, indicating that programming is complete.
7. Repeat Steps 1 through 6 to program the rest of the belt packs.

The belt pack is now programmed to the same channel as the base station. If interference continues to occur, repeat the channel programming procedure. After seven channel changes, the original channel will again be encountered. If none of the channels is interference-free, contact your local 3M InTouch Products dealer.

Changing the Day/Night Switch Setting

Outdoors, sound travels best at night when air temperatures are cooler and background noise is reduced. To allow you to reduce the volume of the menu sign speaker to a lower, pre-set nighttime level, the base station has a VOLUME DAY/NIGHT switch. See Figure 20.

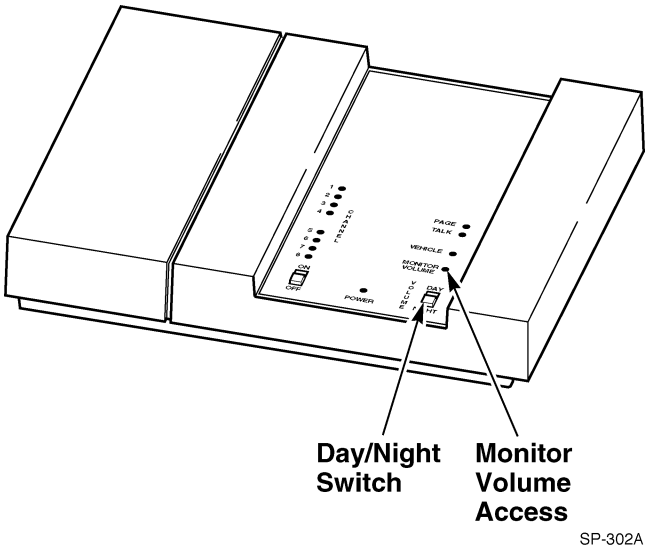


Figure 20.

Normally, the VOLUME DAY/NIGHT switch is always left in the DAY position.

However, if local ordinances require quieter nighttime operation of the menu sign, move the VOLUME DAY/NIGHT switch to the NIGHT position.

Adjusting the Monitor Speaker Volume

If the system has an optional monitor speaker, adjust its volume using the following procedure:

1. With the base station turned ON, insert a small straight-blade screwdriver into the MONITOR VOLUME access hole. See Figure 20.
2. Turn the volume control clockwise to increase the volume or counterclockwise to decrease it.

Introduction

To use the following troubleshooting guide, locate the problem in the left column and look for the problem's possible causes and corrections in the middle and right columns. Possible causes are listed in the order in which they are most likely to happen. Check for possible causes in the given sequence to help isolate the problem.

System Troubleshooting

Problem	Possible Cause	Correction
No communications. One or more headsets hear static.	The base station is not ON.	Turn the base station ON. Make sure that the power transformer is plugged into the wall outlet and into the base station power receptacle. If the red power light does not come on, check for power at the wall outlet. If power is OK, call for authorized service.
	Base station and belt packs not programmed to same channel.	Reprogram base station and/or belt packs.
	The base station is defective.	Call for authorized service.
A single belt pack is dead. No communication to or from customer. No communications to or from other belt packs (PAGE or TALK functions). No static is heard.	The belt pack is not turned on.	Turn the belt pack on.
	The battery is discharged.	Replace the battery with a fully charged one.
	The headset is unplugged or defective.	Call for authorized service.
Belt packs do not go into standby (silence) when the vehicle leaves the menu sign.	This is normal when an "air switch" type of vehicle detector is in use.	Momentarily press the PAGE switch to return to standby.
	There is a large metal object over the loop in the driveway (if a loop is used).	Remove the metal object.
	Defective vehicle detector.	Call for authorized service.
The monitor speaker does not operate.	The base station internal monitor volume control is turned too low.	Increase the monitor speaker volume setting. (Store manager only.)

Problem	Possible Cause	Correction
No vehicle alert tone in headset.	The vehicle detector module is not plugged into the power outlet.	Plug the vehicle detector module into the power outlet.
	The internal base station alert tone volume control is set too low.	Call for authorized service.
	Defective base station or vehicle detector module.	Call for authorized service.
No communication to or from the customer when using the backup intercom.	The base station is not turned OFF.	Turn the base station OFF.
	No power to the backup intercom.	Turn the backup intercom ON and/or plug its power transformer into the wall outlet.
	The volume controls on the backup intercom are turned too low.	Turn the volume controls up to increase volume.
	Defective backup intercom.	Call for authorized service.
"Low battery" tones are heard in headset despite newly charged battery.	Dirty contacts on the battery, belt pack, or in the battery charger.	Clean the battery contacts with alcohol.
	Defective battery.	Replace the battery.
	Defective belt pack.	Call for authorized service.
No TALK or LISTEN with known good belt pack.	System problem.	Call for authorized service.
Low volume from belt pack to customer and other headsets.	Headset microphone not positioned properly beside operator's mouth.	Reposition microphone (see Checking the Headset for Proper Fit in Section 3).
Audio "cuts out" or is interrupted when talking to customer or other headsets.	Interference.	Change channels and reprogram the belt packs.
	Belt pack is too far from the base station (out of range).	Move closer to the base station.
	Defective belt pack or base station.	Call for authorized service.
No transmit to menu sign or other transceivers when TALK switch is pressed. PAGE communications OK.	Defective TALK switch or defective base station.	Call for authorized service.

Problem	Possible Cause	Correction
Short repeating tone at seven-second intervals heard in headset, and then belt pack turns off after two minutes.	This is normal operation when the battery voltage becomes too low.	Recharge battery.
	Dirty battery contacts.	Clean battery contacts with alcohol.

Battery and Battery Charger Troubleshooting

Problem	Possible Cause	Correction
Battery does not charge when plugged into the battery charger.	Either the battery contacts or the contacts in the battery charger have a dirt/grease buildup.	Clean battery/battery charger contacts with alcohol and cotton swab.
	Defective battery.	Try a known good battery.
	Defective battery charger.	Call for authorized service.
Short battery life.	Battery is/was not fully charged.	Recharge battery.
	Dirty battery contacts.	Clean battery contacts with alcohol.
	Battery needs to be reconditioned.	Recondition battery.
LED does not turn red when a battery is plugged into the battery charger.	Dirty contacts on battery or in battery charger.	Clean battery/battery charger contacts with alcohol.
	Battery charger not plugged in.	Check that the battery charger transformer is plugged in and connected to a “live” outlet.
	Defective battery.	Try a known good battery.
	Defective battery charger.	Call for authorized service.

Service

C860 system service needs can be fulfilled by your local 3M InTouch Products dealer. If special service assistance or information is needed, please call **1-800-328-0033**.

E.S.S., Inc.
203 McMillin Street, Nashville TN 37203
Phone: 615-340-9033 Fax: 615-340-9642
www.essnashville.com

Food Services Trade Department
3M Center
St. Paul, MN 55144-1000

Printed in U.S.A.

78-6912-0692-0 Rev. B