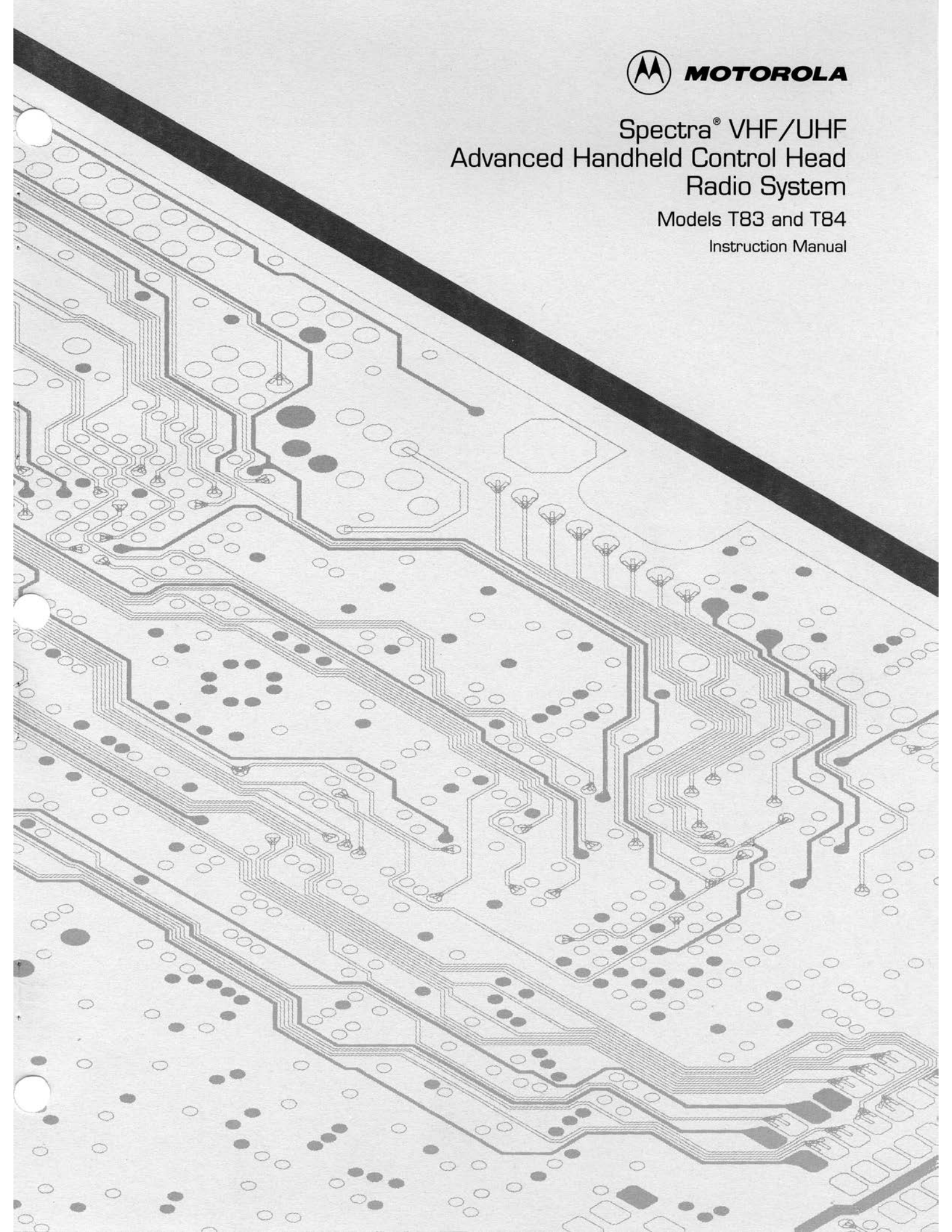# MOTOROLA

Spectra® VHF/UHF
Advanced Handheld Control Head
Radio System

Models T83 and T84

Instruction Manual

FOREWORD

1. Scope of Manual

This manual is intended for the use of experienced technicians familiar with this general type of equipment. In it you should be able to find all the information you will need for installing and servicing the equipment it covers. It is current as of the publication date.

2. Model and Kit Identification

Each Motorola product has an identifying model number stamped on its nameplate. In most cases, assemblies and kits that make up the product also have identifying kit numbers stamped on them. Schematics and circuit board diagrams for such kits show this same identifying number prominently in the lower left-hand or right-hand corner.

3. Service

Motorola's national service organization maintains one of the finest nation-wide installation and maintenance programs available to users of communication equipment. The administrative staff of this organization consists of national, area, and district service managers, all of whom are Motorola employees dedicated to giving our customers the best possible service. The organization has about 900 authorized Motorola Service Stations (MSS's) throughout the United States, each manned by one or more trained, FCC-licensed technicians.

Motorola selected each one of these independently owned and operated MSS's to service its customers. They offer Motorola maintenance either by the job (priced by time and material), or on a service contract at a fixed periodic fee. To buy a service contract for your Motorola equipment, contact your Motorola Service Representative or write to:

National Service Manager — Motorola Communications and Electronics, Inc.
1303 E. Algonquin Road, Schaumburg, Illinois 60196

4. Ordering Replacement Parts

When ordering replacement parts (components, kits, or chassis) or equipment information, include the complete identification number. If the component part number is not known, include in your order the number of the chassis or kit of which it is a part, and enough component description to identify the desired part.

In orders for crystal and channel elements, specify the crystal or channel element type number, crystal and carrier frequency, and the model number of the radio in which the part is used.

In orders for active filters, Vibrasender and Vibrasponder resonant reeds, specify type number and frequency, and identify the owner/operator of the communications system in which these items are to be used; also include any serial numbers stamped on the components being replaced.

COMPUTER SOFTWARE COPYRIGHTS

The Motorola equipment described in this manual may include copyrighted Motorola computer programs stored in semiconductor memories or other media. Laws in the United States and other countries preserve for Motorola certain exclusive rights for copyrighted computer programs, including the exclusive right to copy or reproduce in any form the copyrighted computer program. Accordingly, any copyrighted Motorola computer programs contained in the Motorola equipment described in this manual may not be copied or reproduced in any manner without the express permission of Motorola. Furthermore, the purchase of Motorola equipment shall not be deemed to grant either directly or by implication, estoppel, or otherwise, any license under the copyrights, patents or patent applications of Motorola, except for the normal nonexclusive, royalty free license to use that arises by operation of law in the sales of a product.

CAUTION

- Permanent (irrecoverable) damage may occur to radio EEPROM if power is interrupted during programming. If programming in vehicle, be sure ignition is not switched off during programming.

- **Do not attempt to transmit while the programming cable is connected!** Incorrect system operation will result with possible damage to the radio or corruption of unit programming.

- When setting a radio's device code (address) only one radio may be connected to the SIU. **Do not attempt to set the radio's device code with both radios connected to the SIU.** Irrecoverable damage to both radio EEPROMS may occur.

- When setting the scan priority for a mode in the Scan Configuration state and the Priority 1 selection (fast-blinking Pri-LED) is scrolled through, any other mode previously set to Priority 1 will be changed to a non-priority scan mode regardless of what priority is assigned to the current displayed mode. Scrolling through a Priority 2 selection does not delete another mode with the Priority 2 selection unless the current mode is left on Priority 2 and the mode is changed or the Scan Configuration is exited.

- DTMF capability is disabled when SECURENET is enabled. There is no sidetone and DTMF is not transmitted unless SECURENET is disabled. DTMF tones must be transmitted as a clear signal. Once communication is established, SECURENET may then be enabled.

- Grounding is absolutely essential for proper system operation. The SIU Box, ASN Box, and HHCH quick-disconnect cable must have their black wires connected to ground as stated in the INSTALLATION SECTION of this manual.

- The Siren/PA is associated only with the Primary Radio in a dual radio system.

INTRODUCTION
FOR OPTION W845ASSP
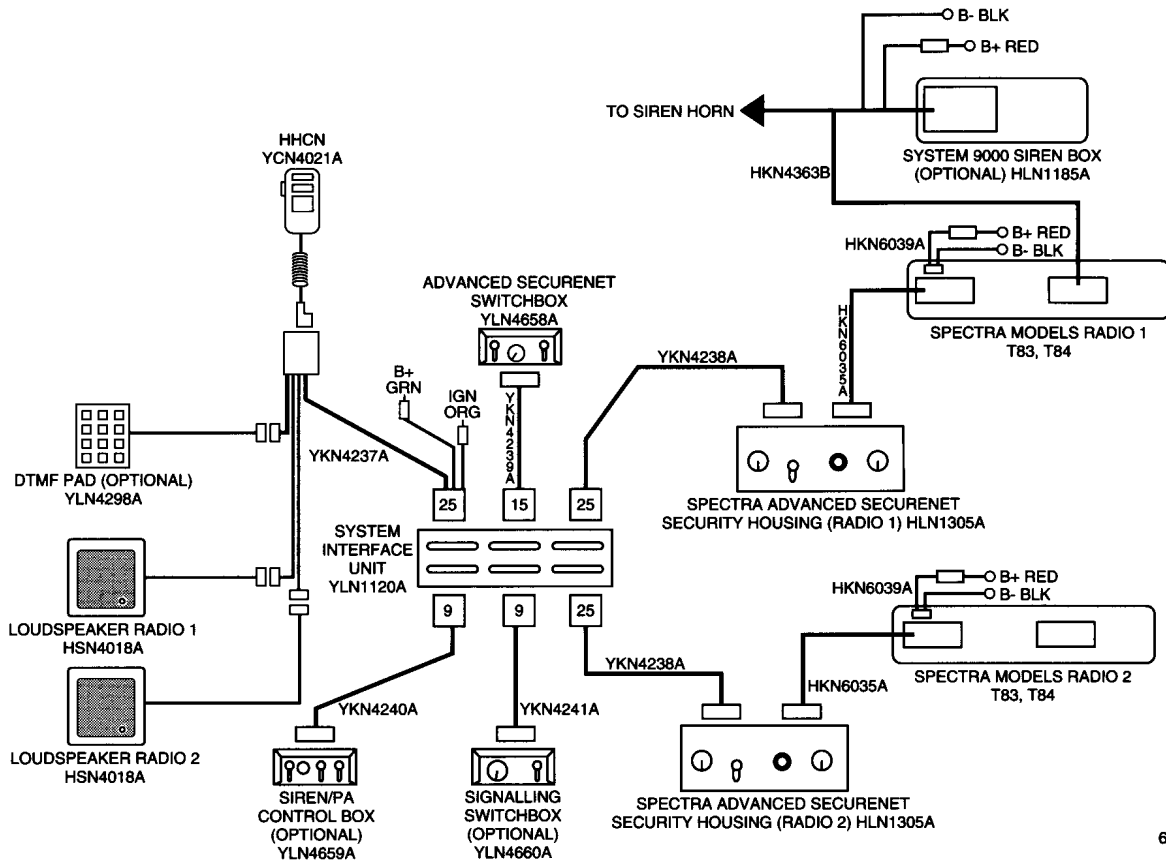
Figure 1. Dual System Cabling Diagram

I. GENERAL

The basic dual radio system contains two Spectra radios, two physical security housings, a Handheld Control Head (HHCH), a System Interface Unit (SIU), two speakers, a dual rotary Advanced SECURENET Switch Box, and all associated cabling. Added options include a System 9000 Siren/PA Box and the Siren/PA Control Box, a Signalling Switch Box to control MDC-1200 and/or singletone signalling, and a DTMF pad. For a single radio system, remove Radio 2, security housing two, speaker two, and all associated cabling from the basic dual radio system. The dual rotary Advanced Securenet Switch Box is replaced by a single rotary switch box. All the same options are available for the single radio system.

NOTE

The Systems 9000 Siren/PA Box contains room for two Systems 9000 option cards, but because of the architecture of the system, any option cards contained in this box can only be used with Radio 1.

II. DUAL RADIO SYSTEM FEATURES

The dual radio system includes the following features:

* Dual radio control from a single handheld control head.

* Advanced SECURENET for each radio.

* Separate speakers with individual volume control for each and dedicated to specific radios.

* Single-radio operation capability.

III. MODEL COMPLEMENT

The **W845ASSP** HHCH for Spectra option consists of the following:

KIT	DESCRIPTION
HLN4831A	Hardware
YCN4021A	HHCH for Systems 9000
YKN4237A	Cable, HHCH to SIU
YLN1120A	Interface Housing
YLN4663A	Hardware, Backend

The **W391BHSP** Security Housing option consists of the following kits:

KIT	DESCRIPTION
HKN6035A	Security to Radio Housing
HLN1305A	Security Housing
HLN4988A	Battery, Code Storage
HLN6177B	Option board
HVN4029A	SFWR Sec Single Key
YKN4238A	Cable, SIU to Security Housing

The **W968AKSP** ASN for Single Radio Systems option consists of the following kits:

KIT	DESCRIPTION
YKN4239A	Switchbox Cable
YLN4661A	Switchbox, Single Rotary
HVN4011A	ASN Multi Key Software

The **W968ALSP** ASN for Dual Radio Systems Secondary Radio option consists of the following kits:

KIT	DESCRIPTION
HVN4011A	ASN Multi Key Software

The **W224ACSP** Secondary Radio option consists of the following kits:

KIT	DESCRIPTION
	*

The **W968AMSP** ASN for Dual Radio Systems Primary Radio option consists of the following kits:

KIT	DESCRIPTION
HVN4011A	ASN Multi Key Software
YKN4239A	Switchbox Cable
YLN4658A	Switchbox, Dual Rotary

The **W269BASP** Siren option consists of the following kits:

KIT	DESCRIPTION
HKN4265A	Fuse Cable
HKN4363B	Siren Cable
HLN1185B	Siren Kit
YKN4240A	Siren Cable to SIU
YLN4659A	Siren Switch Box

The **W681BLSP** MDC Repeater Access option consists of the following kits:

KIT	DESCRIPTION
YKN4241A	Signalling Cable to SIU
YLN4660A	Switchbox, Signalling

The **W566AWSP** Singletone option consists of the following kits:

KIT	DESCRIPTION
YKN4241A	Signalling Cable to SIU
YLN4660A	Switchbox, Signalling

The **W998ARSP** Primary Radio option consists of the following kits:

KIT	DESCRIPTION
	*

The **W554AHSP** DTMF Keypad option consists of the following kits:
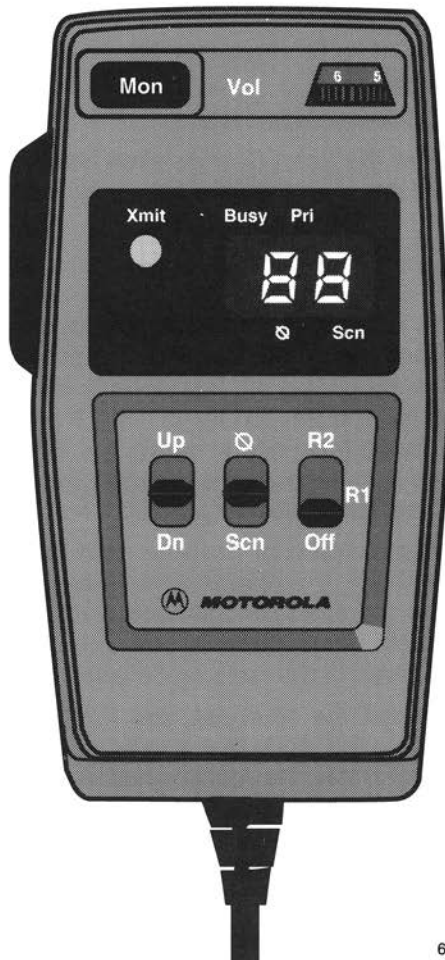
KIT	DESCRIPTION
YKN4298A	Keypad, DTMF

* Factory programming option. Contains no parts.

DUAL RADIO OPERATION
FOR OPTION W845ASSP

I. HANDHELD CONTROL HEAD *(See Figure 2)*

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Figure 2. Handheld Control Head

A. Displays

B. Two Seven-Segment LED's

These LED's normally indicate the mode number of the selected radio. The alpha-numeric display can display the digits 0-9 and letters A-H using upper and lower case. The alpha-numeric display can only display letters A-H. The LED'S are also used to momentarily indicate other radio status information such as monitor status, scan configuration modes and Advanced SECURENET Index. The display can be "blanked" (no LED's lit)/"unblanked" (LED's lit) by pressing the UP/DN toggle switch up and pressing the Ø/SCN toggle switch down simultaneously.

C. Four LED Decimal Points
(Busy, Pri, Ø, and Scan)

All of these displays pertain to the selected radio.

- **Busy LED-**Lights solid when the selected radio is receiving a clear signal. Busy LED blinks when the selected radio is receiving a private signal.

- **Pri LED-** Lights solid when the selected radio is in the scan mode and is receiving a non-priority signal.The LED blinks slowly when the selected radio is receiving a priority 2 scan signal, and it blinks rapidly when the selected radio is receiving a priority 1 scan signal. In the scan configuration state, the Pri LED lights solid to indicate radio modes on the non-priority operator selectable scan list, blinks slowly to indicate the priority 2 scan mode, and blinks rapidly to indicate the priority 1 scan mode. Note there is only one Priority 1 and one Priority 2 scan modes allowed on any scan list.

- **Ø LED-** Lights solid when private transmit is enabled for the selected radio and is not lit for clear transmit of the selected radio.

- **Scan LED-** Lights solid when scan is enabled for the selected radio. Scan LED blinks when the selected radio is in the scan configuration state.

D. XMIT LED (One Large LED)

This LED lights solid during any operator or option controlled transmission by the selected radio.

II. CONTROLS

A. Push-to-Talk (PTT) Button

Press this button to key (transmit) the selected radio. If public address is selected from the Siren/PA control box, press the push-to talk (PTT) button to activate the public address.

B. Monitor (Mon) Button

Momentarily press this button to enable or disable private-line (PL) for the selected radio. The HHCH momentarily displays the monitor status for the selected radio ("on" for monitor on/PL disabled, and "--" for monitor off/PL enabled). The unselected radio retains its last monitor state.

Press and hold the monitor button to enter the volume configuration state. A continuous tone is heard which can be used to set the volume using the volume knob. Exit the volume configuration mode by pressing the monitor button briefly.

The monitor button is also used to add or delete modes from the operator selectable scan list when the radio is in the scan configuration state (see paragraph F.).

From a cold start (i.e., the first time that power is applied to this system after installation in a vehicle), both radios default to a nominal default volume value with PL enabled. The nominal default volume value for each radio is preset via Radio Service Software (RSS).

C. Volume Knob

This knob controls the volume of the selected radio. The unselected radio retains its default volume setting and is discussed in paragraph B. In addition to the volume configuration state, the volume can also be set by simultaneously pressing the Up/Dn toggle switch up and the Ø/Scn toggle switch up, which unsquelches the radio. In order to re-squelch the radio back again, press the Up/Dn toggle switch in either direction.

The volume configuration state has a second important function. It is used to set the radio's default volume, which the radio reverts to whenever it is the unselected radio. The new default volume is stored for the radio whenever that radio exits the volume configuration state.

D. Up/Dn Toggle Switch
(momentary in each direction)

Use this switch to increment or decrement the radio mode of the selected radio. If the switch is held in the "Up" or "Dn" position for a few seconds, the radio accelerates its scroll through the radio modes in order to allow the user to get from one radio mode to another quickly.

Using RSS, any radio mode can be assigned a mode "name" to replace its numeric mode designation. For example, mode 1 can be named "A1", mode 9 can be named "b1", and mode 57 can be named "9H", etc. Note however, that different alphanumeric characters are only possible in upper or lower case and only letters A thru H are allowed. Even if mode names are used, the Up/Dn rocker switch still functions to increment or decrement the associated radio mode number.

In the scan configuration state (see paragraph F.), use this switch to review which modes are on the scan list.

E. Ø/Scan Toggle Switch
(momentary in each direction)

This switch is used in conjunction with the LED decimal points described in paragraph C. Move the switch momentarily up to enable Ø (coded) transmit on the selected radio (the Ø LED lights). The present index (either "i1" or "i2") should be briefly displayed on the handheld control head. Move the switch momentarily up a second time to disable Ø (the Ø LED turns off).

Move the switch momentarily down to enable SCAN selected radio (the Scan LED lights). Move the switch momentarily down a second time to disable scan (the scan LED turns off). A "bL" (blank list) is displayed on the control head if scan is enabled and no scan list has been programmed. The unselected radio is not affected by this toggle switch and retains its last selected state.

F. Scan Configuration State

To enter the Scan Configuration State, press and hold down the scan toggle switch until the scan LED blinks.

The scan configuration state allows the user to program or review the modes on the operator selectable scan list. Use the Up/Dn toggle switch to scroll up and down the scan list. If a mode is not on the list, the Pri LED is off. If a mode is on the non-priority scan list, the Pri LED lights solid. If a mode is the priority 2 mode (only one allowed), the Pri LED blinks slowly, and if the mode is the priority 1 mode (only one allowed), the Pri LED blinks rapidly.

If a radio mode is programmed for operator-selectable scan, the operator may change the scan list while in the scan configuration state. With operator-selectable scan, there is one unique list that is used regardless of the radio mode selected.

To change the scan list, use the Up/Dn toggle switch to go to the mode that is to be added or deleted from the list. Press the monitor button to change the scan status of that mode. Successive presses of the monitor button will allow you to set the mode to one of four possible scan states. These states, in sequence are: OFF, NON-PRIORITY, PRIORITY 2, and PRIORITY 1 (and then back to OFF). The Pri LED indicates which state the mode is in. A total of 16 modes (including priority 1 and priority 2) may be present in the operator selectable scan list. If the user attempts to add more than 16 modes the the list, an error tone will sound.

> **CAUTION**
> Scrolling past the PRIORITY 1 state (Pri LED blinks rapidly), will cause the previously selected Priority 1 mode to be changed to a non-priority mode.

If radio mode is programmed for internal scan, there is a unique scan list (Priority 1, Priority 2, and non-priority) for that radio mode, and the operator selectable scan list does not apply when scan is enabled. RSS is used to program/enable the internal scan list for a mode. While in the scan configuration state, only the operator selectable scan list may be programmed or reviewed. The operator may not change an internal scan list while in the scan configuration state of a radio mode with internal scan enabled.

To exit the scan configuration state, momentarily press the scan toggle switch. An alert tone sounds and the radio returns to the radio mode it was on before entering the scan configuration state.

G. R2/R1/OFF Toggle Switch (Three-Position Switch)

In the bottom position (OFF), the entire radio system is off. In the R1 position, both radios are on (receive), but the user may only transmit on Radio 1. In the R2 position, both radios are on (receive), but the user may only transmit on Radio 2. In a single radio system, the user may move this switch to R1 or R2 to turn the single radio on.

H. Advanced SECURENET (ASN) Switch Boxes
(See Figures 3 and 4)

In a single radio system, a "Single" ASN switch box is used to control the Advanced SECURENET features. In a dual radio system, a "Dual" ASN switch box is used to control the Advanced SECURENET features of both radios and has two rotary switches for the SECURENET key selection of each radio. Each of these switch boxes have toggle switches for Index and the Request key.
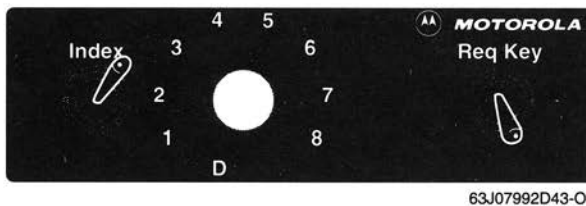
Figure 3. Single ASN Switch Box
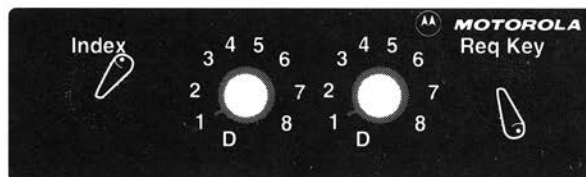
Figure 4. Dual ASN Switch Box

I. Index Switch (Momentary Up Switch)

Pull this switch momentarily up to change the index of the selected radio. Index 1/2 refers to the first or second bank of eight keys (i.e. keys 1-8 and keys 9-16) and is selected by the rotary switch (es) for each radio. The current index (i1 or i2) will be displayed momentarily on the HHCH. If the ASN option is programmed for a single index, operating the switch will not cause a change in the bank of keys selected, but will cause a change in the index (i1 or i2) displayed.

J. Key Switch (Nine-Position Rotary Switch)

In the "D" (default) position, the default SECURENET key for the associated radio's active mode is used. The default key for a mode is programmed by radio RSS. In positions 1 through 8, the corresponding key number is used instead of the default key. In a dual radio system, there are two key rotary switches to select the SECURENET key for each radio. The left and right rotary switches correspond to Radio 1 and 2 respectively.

K. Req Key Switch (Momentary Up Switch)

Pull this switch up momentarily to request that the selected radio be rekeyed via Over The Air Rekeying (OTAR).

L. Siren/PA Control Box *(See Figure 5)*

The Siren/PA control box contains the Siren On/Off switch, Record Audio Jack (for Radio 1 only), PA (Public Address) On/Off, and a siren select switch.

Figure 5. Siren/PA Control Box

M. Siren On/Off Switch (Three-Position Toggle Switch)

In the "Off" position, the siren is off. In the "on" position, the selected siren waveform sounds from the siren horn. This switch does not affect radio system operation. Note the Public Address feature overrides the siren and must be off to use the siren.

N. Record Audio Jack

Connect a tape recorder to this jack in order to record receptions for Radio 1. It is only possible to record the receptions of Radio 1. This jack will not connect to the audio of Radio 2.

> **CAUTION**
> To avoid damaging the tape recorder, make sure the volume level is at an acceptable level (neither too low or high).

O. Public Address On/Off Switch (Two-Position Toggle Switch)

In the "Off" position, the public address is off; the PTT button on the control head allows the operator to key the selected radio. In the "On" position, the public address is enabled; pressing the PTT button enables the public address feature and overrides the siren if it is also on. In the "On" position, the user cannot key the selected radio.

P. Yelp/Wail/Hi-Lo Switch (Three-Position Toggle Switch)

The corresponding siren waveform of Yelp, Wail, or Hi-Lo sounds when the siren is on.

III. TOUCH-TONE ENCODER

The optional YLN4298A ("PIPO") touch-tone encoder pad is used to key the selected radio and generate the appropriate DTMF tones. A potentiometer accessible on the bottom of the pad adjusts the DTMF deviation. The PA On/Off switch on the Siren/PA control box must be in the "Off" position

when using the touch-tone encoder. For user feedback, a 400Hz sidetone sounds in the radio speaker and the "XMIT" LED lights when the touch-tone encoder is in use. This sidetone is generated by the selected Spectra radio during the time that the touch-tone encoder keys that radio. A potentiometer internal to the touch-tone encoder adjusts the drop-out delay after a button on the pad is released.

If the DTMF option is in a system which also contains MDC repeater access, the sidetone may not sound immediately upon pressing the DTMF keypad. This is because the DTMF tones are gated to the radio system to allow the MDC repeater access message to go out first. If the sidetone is not heard immediately after pressing a DTMF button, continue holding that button down until the sidetone for the DTMF encoder sounds before pressing any other DTMF buttons.

IV. SINGLETONE ENCODER (See Figure 6)

The operator-selectable singletone encoder option is compatible with this radio system. Refer to the radio RSS and SIU RSS manuals for details on configuring signalling options.
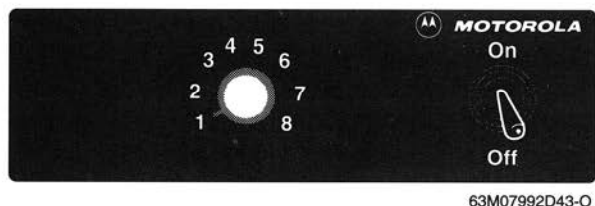

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Figure 6. Signalling Switch Box

First use RSS to configure the singletone option card for each radio in the system. Up to eight unique singletones can be programmed. The duration of the singletone is also programmable. If the MDC option is also going to be used, specify which radio mode will be used for singletone and which radio mode will be used for MDC signalling. A specific radio mode cannot use both singletone and MDC signalling.

To use the singletone option, select a radio for which the singletone option is enabled. Select the desired singletone using the rotary switch on the signalling switch box. Place the On/Off toggle switch on the signalling switch box in the "On" position. Press the PTT button on the handheld control head. The radio begins to transmit the singletone and a 800Hz sidetone sounds in the radio speaker. When the singletone sidetone ends, the user may begin speaking into the microphone.

V. MDC REPEATER ACCESS (See Figure 6)

The operator-selectable MDC Repeater Access option is compatible with this radio system. Refer to the Radio RSS and SIU RSS manuals for details on configuring signalling options.

First use RSS to configure the MDC-1200 option card for each radio in the system. Up to eight unique repeater access codes can be programmed for an option card. If the singletone option is also going to be used, specify which radio mode will be used for singletone and which radio mode will be used for MDC signalling. A specific radio mode cannot use both singletone and MDC signalling.

To use the repeater access option, select a radio for which the MDC-1200 option is enabled. Select the desired repeater access code using the rotary switch on the signalling switch box. Place the On/Off toggle switch on the signalling switch box in the "On" position. Press the PTT button on the HHCH. The radio will begin to transmit the repeater access code and a 1 kHz sidetone will sound in the radio's speaker. When the repeater access sidetone ends, the user may begin speaking into the microphone.

VI. AUDIO MUTE DURING TRANSMIT

When either radio is transmitting, the speaker audio from both radios and recorder audio from Radio 1 will be muted.

VII. INSTALLATION CONSIDERATIONS

Antenna location and mounting methods are critical to the optimum rf performance of a dual radio installation. See the Installation Section in this manual.

VIII. RADIO SERVICE SOFTWARE (RSS)

The system is programmed by connecting a Radio Interface Box (RIB) between an IBM compatible computer and the middle connector on the front of the Spectra radio.

The RSS will program, among other things, Advanced SECURENET parameters (indexing, default keys by mode, clear alert tone, and proper code detect), radio parameters (scan list by mode, frequency list, talkback scan, scan delays), siren parameters (PA volume level), singletone parameter, (frequencies, duration), MDC parameters (codes), default cold-start and warm start parameters, and others.
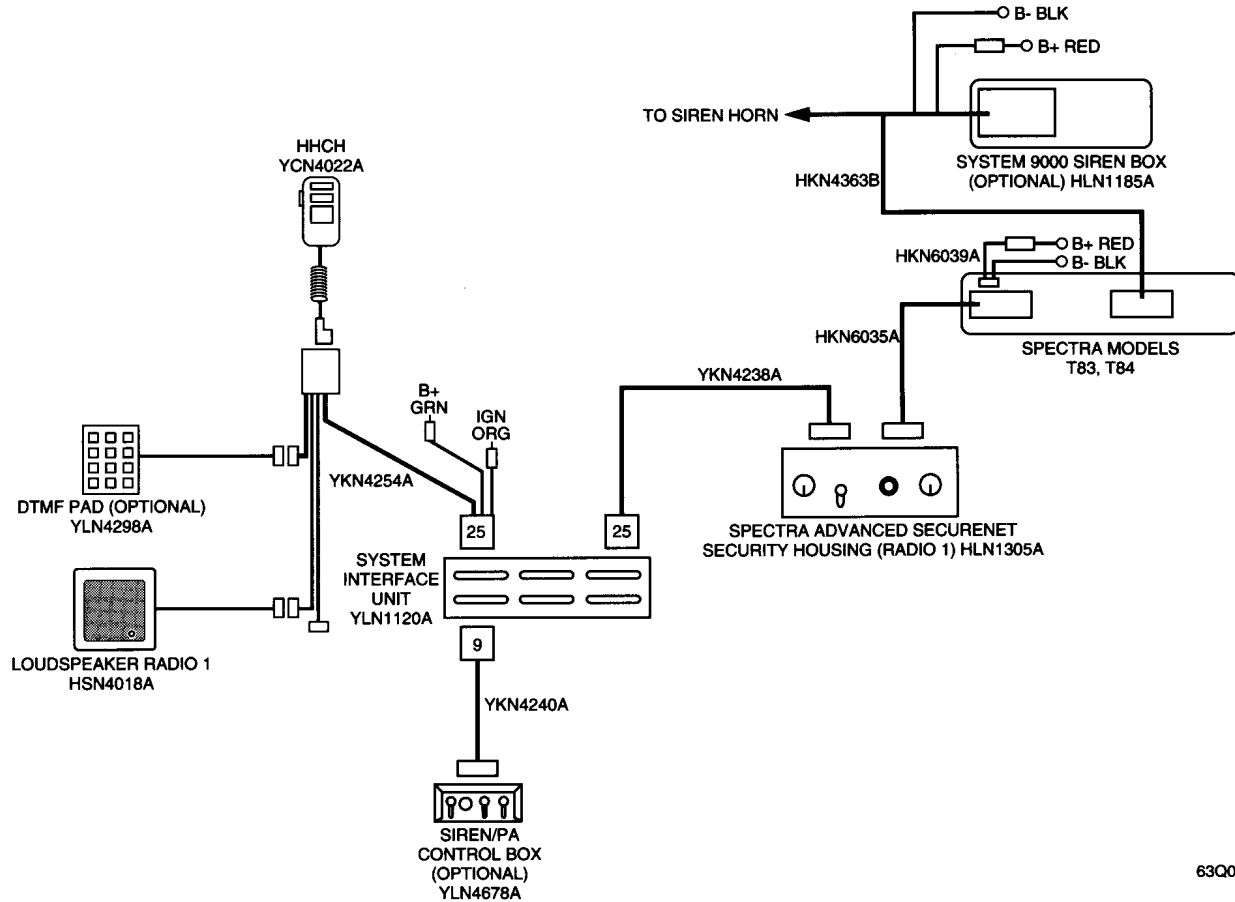
IX. SYSTEM INTERFACE UNIT (SIU)

The SIU contains the following seven connectors:

1. Radio 1 connector (25 pin male) and always connects to Radio 1 (Primary).

2. Radio 2 connector (25 pin male) and always connects to Radio 2 (Secondary).

3. Handheld control head connector (25 pin female) different than radio connectors and always connects to the handheld control head, optional touch-tone encoder and radio speaker(s).

4. Advanced SECURENET Switch Box Connector (15 pin male) and always connects to a Single or Dual Advanced SECURENET Switch Box.

5. Siren/PA Control Box Connector (9 pin female) and always connects to the Siren/PA Control Box for systems with the siren option.

6. Signalling Control Box Connector (9 pin male) and always connects to the Signalling Switch Box for systems with singletone and/or MDC signalling.

7. VIP Connector (15-pin female) - not used.

NOTE
System operation will be unpredictable if a radio programmed as "Primary" is connected to Radio 2, or a radio programmed as "Secondary" is connected to Radio 1.

Figure 7. Handheld Control Head System Cabling Diagram

I. GENERAL

The basic Handheld Control Head (HHCH) radio system contains one Spectra radio, a physical security housing, a HHCH, a System Interface Unit (SIU), one speaker, and all associated cabling. Added options include a System 9000 Siren/PA Box and the Siren/PA Control Box, and a DTMF pad.

II. HANDHELD CONTROL HEAD RADIO SYSTEM FEATURES

The radio system includes the following features:

*   Radio control from a single handheld control head.

*   Siren/PA capability.

*   Ergonomically compatible with prexisting systems.

III. MODEL COMPLEMENT

The **W845AUSP** HHCH for Spectra option consists of the following:

KIT	DESCRIPTION
HLN4831A	Hardware
YCN4022A	HHCH for Systems 9000
YKN4237A	Cable, HHCH to SIU
YLN1122A	Interface Housing
YLN4663A	Hardware, Backend

The **W391BHSP** Security Housing option consists of the following kits:

KIT	DESCRIPTION
HKN6035A	Security to Radio Housing
HLN1323A	Security Housing
HLN4988A	Battery, Code Storage
HLN6177C	Option board
HVN4029A	SFWR Sec Single Key
YKN4238A	Cable, SIU to Security Housing

The **W269BCSP** Siren option consists of the following kits:

KIT	DESCRIPTION
HKN4265A	Fuse Cable
HKN4363B	Siren Cable
HLN1185B	Siren Kit
YKN4240A	Siren Cable to SIU
YLN4678A	Siren Switch Box

The **W554AHSP** DTMF Keypad option consists of the following kits:

KIT	DESCRIPTION
YKN4298A	Keypad, DTMF

I. HANDHELD CONTROL HEAD FUNCTIONS

The handheld control head is a remote-control console for the Spectra radio, with a built-in microphone. This section describes the console controls and indicators, all of which can be seen in Figure 8.
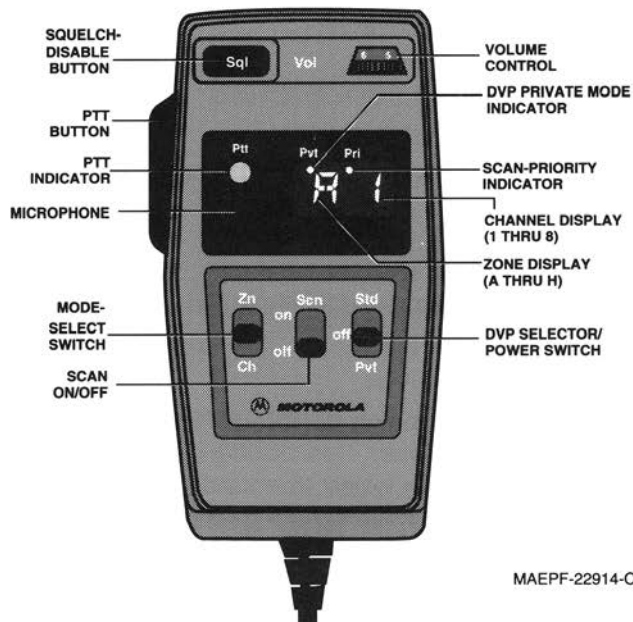

Figure 8. YCN4022A Handheld Control Head

II. SECURENET Selector Power Switch

When this switch is off (centered), the whole system (including SECURENET) is off. Moving the switch to the upper (Std) position turns the whole system (including SECURENET) on. The SECURENET system is in the standard (or clear) mode, and the radio transmits only standard non-coded messages.

Moving the switch to the lower (Pvt) position puts the SECURENET system in the private (or coded) mode. In this mode the radio receives both coded and clear messages.

There is a turn-off delay when moving the switch through "Off". This allows you to switch through the "Off position to either "Pvt" or "Std" without turning the system off. Changing the position of this switch when keyed up causes the radio to dekey and a no transmit tone sounds until the PTT is released.

III. SCAN ON/OFF SWITCH

The middle switch on the handheld control head controls scan. Move the switch to "On" to enable the radio's internal Channel Scan feature. The display may blank to indicate that there are no active channels on the scan list being received. Move the switch of "Off" to disable scan and to change radio modes. Note that the radio mode cannot be changed when the scan switch is in the "On" position.

IV. MODE SELECT SWITCH

The Zn/Ch switch controls the selected radio mode. Move the switch to "Zn" to increment through the radio zones (A, b, C, d, etc.) and to "Ch" increment through the radio channels (1, 2, 3, 4, 5, 6, 7, 8, 1, 2, 3, etc.). Changing the position of this switch when keyed up causes the radio to dekey and a no transmit tone sounds until PTT is released.

V. SQUELCH

The Sql button controls the squelch condition of the radio system. Press Sql once to unsquelch the radio to adjust its volume and listen for weak signals. Press Sql a second time to squelch the radio at its preset squelch setting.

The squelch disable function only operates in the carrier squelch mode (non-PL). If the radio is in the PL mode, push the squelch disable button and then turn the PL switch off to unmute the audio.

The set squelch threshold can be adjusted from the Radio Service Software (RSS).

VI. VOLUME CONTROL

This knob controls the loudness of received audio. Rotate the control to the left to reduce the volume, and rotate it to the right to increase the volume.

VII. PTT BUTTON

The push-to-talk (PTT) button on the side of the handheld control head controls the radio transmit of the radio system. Push this button to enable the transmitter; release it to disable the transmitter and allow the receiver to operate.

A continuous low frequency tone (no transmit tone) may sound to tell you the radio is not keyed up. This occurs for a few seconds if PTT is pressed immediately after switching from STANDBY to OPERATE, or immediately after a keyload from the KVL. This tone also sounds if PTT is pressed during a mode change or changing the Std/Pvt switch position while PTT is pressed.

VIII. PTT INDICATOR

The PTT indicator is a red LED that lights when transmission is active.

IX. SECURENET PRIVATE INDICATOR

The SECURENET private indicator is an LED (labeled Pvt) that lights when a SECURENET-coded message is being received.

X. SCAN PRIORITY INDICATOR

The scan priority indicator is an LED (labeled Pri) that lights when the radio receives a message on the scan priority channel. It operates only when the scan switch is on. It lights solid for a Priority 1 message and blinks for a Priority 2 message.

XI. ZONE INDICATOR

The zone group indicator is an alphabetical LED array that displays the zone group (A through H) selected by the operator.

XII. CHANNEL INDICATOR

The channel indicator is a numeric LED array that displays the mode (I through 8) selected by the operator.

XIII. SECURENET SECURITY HOUSING FUNCTIONS

A. Operate/Standby Switch

When the Operate/Standby switch is in the standby position, the radio transmits and receives only in the clear mode . No transmission or reception of encrypted data occurs. If an attempt is made to transmit private or standby mode, a key fail alert tone sounds and a silent carrier is transmitted. Move the operate/standby switch to the operate position to allow transmit and receive in both the clear and private modes. Pressing PTT immediately after switching from Standby to Operate causes a "no transmit" tone to sound and a delay in keying up the radio occurs.

The key for the Operate/Standby switch may be removed with the switch in either the operate or standby position, thus providing the user additional security.
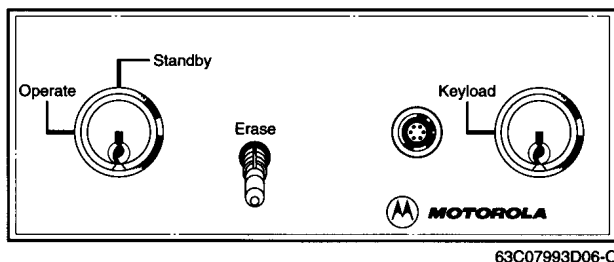

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Figure 9. Security Housing

B. Key Erase Switch

Momentarily raising this switch to the erase position, erases the key variable in the hybrid. Opening the security housing also causes the same key variable to be erased.

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C. Keyload Switch

The keyload switch allows a key variable to be loaded via the Key Variable Loader (KVL) into the SECURENET option card when the switch is in the keyload position.

The key for the keyload switch can only be removed when the switch is not in the keyload position. This discourages unauthorized loading of SECURENET key variables.

XIV. OPERATING PROCEDURES

XV. STANDARD (CLEAR) OPERATION

A. To Receive

1. Switch the SECURENET selector power switch on the control head to Std or Pvt.

2. Switch the PL switch on the Siren/PA Control box to the off position.

3. Push the squelch disable button on the control head one time. This disables the squelch system, allowing noise to sound in the speaker. Adjust the volume control for a comfortable listening level.

4. Push the squelch disable button again. This mutes the squelch noise.

5. Switch the PL switch on the Siren/PA control box to PL (if desired).

6. Use the Zn/Ch select switch on the control head to select the operating channel. Hold the switch up (on Zn) until the desired zone appears on the alphabetic LED array, then hold the switch down (on Ch) until the desired channel appears on the numeric LED array.

The radio now receives clear messages on this radio.

B. To Transmit

1. Switch the SECURENET selector power switch on the control head to Std, then complete Steps 2 through 6 of the receive procedure above (if you have not already done so).

2. Push the PTT button. The red PTT LED lights and a short tone from the speaker indicates that you are sending a non-coded message.

NOTE

The PTT clear alert tone is enabled from the Spectra radio service software.

3. Put the microphone window two to three inches from your mouth and speak clearly.

4. Release the PTT button when you have finished sending the message. This returns the radio to the receive mode.

NOTE

If you push the PTT button when the radio is in a mode programmed as a non-transmit channel (no transmit frequency), a steady tone sounds in the speaker to alert you to this condition. A steady tone also sounds in the speaker if the radio time-out-time (TOT) has expired.In this case, release the PTT button before transmitting again.

XVI. SECURENET (CODED) OPERATION

A. To Receive

1. Switch the SECURENET selector power switch on the handheld control to Pvt or Std.

2. Complete Steps 2 through 6 of the receive procedure, above.

NOTE

The PL on/off switch on the Siren/PA Control box controls the proper-code feature, which takes the place of PL/DPL during private transmissions. When this switch is on, an incoming private signal scrambled with the wrong key variable, mutes the audio. When the switch is off, such a signal causes noise at the speaker.

The radio now receives both private(coded) and standard (clear)messages.When the radio receives a private signal, the Pvt LED on the handheld control head lights. An optional Receive Clear Alert tone is available to indicate receiving a standard message.

B. To Transmit

1. Switch the SECURENET selector power switch on the control head to Pvt, then complete all the Steps of the receive procedure above (if you have not already done so).

2. Push the PTT button and the red PTT LED lights.

3. Put the microphone window two to three inches from your mouth and speak clearly.

4. At the end of the message, release the PTT button to return the radio to the receive mode.

NOTE

If you push the PTT button when the radio is in a mode programmed as a non-transmit channel (no transmit frequency), a steady tone sounds in the speaker to alert you to this condition. A steady tone also sounds in the speaker if the radio time-out-timer (TOT) has expired In this case, release the PTT button before transmitting again.

NOTE

If the SECURENET box does not have a key variable loaded, you hear a series of beeps when the PTT button is pressed. No microphone audio is transmitted. Pressing PTT immediately after switching from Standby to Operate or after key-load causes a "no transmit" tone to sound and a delay in keying up the radio occurs.

XVII. SCAN OPERATION

A. General

The Spectra W845AUSP radio may have up to sixty-four preprogrammed modes. Each mode has a transmit frequency and a receive frequency. Channel Scan lets the operator hear traffic that could be for him on any one of the receive frequencies programmed into any of the modes. It does this by monitoring each receive frequency in turn for ten milliseconds.

If Channel Scan finds a carrier on a frequency, it listens for 300 milliseconds - long enough to determine whether or not the signal is valid for its mode. Any signal is valid if the mode is programmed for carrier squelch. If the mode is programmed for PL or DPL, however, the signal must have the proper PL tone or DPL code in order to be valid, and Channel Scan determines whether or not it does. If the signal is not valid, Channel Scan goes on to check the next mode. If the signal is valid, Channel Scan unsquelches the audio an lets it be heard in the speaker. Scan operation is the same for both standard (clear) and private (coded) messages.

In its simplest form, Channel Scan cycles through all the programmed scan modes available in the radio, monitoring each one in turn for a short interval, starting with the first mode and going to the last mode,then starting at the first mode again. Upon finding a mode with a valid signal on it, Channel Scan stops scanning until traffic ceases on the mode's frequency. Then the scan resumes by checking the next mode .

One or two modes can be programmed as priority modes. If this is the case, Channel Scan checks the priority modes after it checks each non-priority channel. If the scan detects a valid signal on a non-priority mode, it stops on the mode, just as it would do if there were no priority modes. However, the scan then leaves the active mode every 300 milliseconds (one priority mode) or 350 milliseconds (two priority modes) to check for activity on the priority modes. If the scan detects a valid signal on a priority mode, it stops scanning and stays on that mode until activity on that mode ceases. Then it resumes scanning at the mode on which it was operating before the priority mode interrupted it.

B. Operating Modes

The Non-priority Scan (NP) sequence when no channel is active is NP1 (non-priority mode one), NP2, NP3,.NP1, NP2,NP3, ...etc. If any mode has an active frequency with the correct PL tone or DPL code, the scan stops on that mode. When the frequency becomes inactive, the scan resumes with the next mode. The scan stops for 0.3 seconds on any mode that is receiving a signal with the wrong PL tone or DPL code. It does not unmute the audio, however, unless the PL switch is off at the hang-up box.

The Single-Priority Scan sequence when no channel is active is NP1,PI,NP2,PI,NP3,PI, ...NP1,PI,NP2, ...etc.If the priority channel becomes active, the scan stops until the priority channel becomes inactive . The audio unmutes only if the proper PL tone or DPL code is present - or the PL switch is off at the hang-up box.

C. Siren/PA Control Box *(See Figure 10)*

The Siren/PA control box contains the Siren Wail/Off/Yelp switch, record audio jack, PA (Public Address) On/Off, and the PL On/Off switch.

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Figure 10. Siren/PA Control Box

D. Siren On/Off Switch (Three-Position Toggle Switch)

In the "Off" position, the siren is off. In the "Wail" or "Yelp" positions, the corresponding siren waveform of Yelp or Wail sounds when the siren is on. This switch does not affect radio system operation. Note the Public Address feature overrides the siren and must be off to use the siren.

E. Record Audio Jack

Connect a tape recorder to this jack in order to record receptions for the radio.

> ### CAUTION
> To avoid damaging the tape recorder, make sure the volume level is at an acceptable level (neither too low or high).

F. Public Address On/Off Switch (Two-Position Toggle Switch)

In the "Off" position, the public address is off; the PTT button on the control head allows the operator to key the selected radio. In the "On" position, the public address is enabled; pressing the PTT button enables the public address feature and overrides the siren if it is also on. In the "On" position, the user cannot key the selected radio.

G. PL On/Off Switch (Two Position Toggle Switch)

In the "Off" position the Rx PL (TPL or DPL) is not active, the radio is only carrier squelch. If the switch is "On", the radio must receive correct PL tone or DPL code.

XVIII. TOUCH-TONE ENCODER

The optional YLN4298A ("PIPO") touch-tone encoder pad is used to key the selected radio and generate the appropriate DTMF tones. A potentiometer accessible on the bottom of the pad adjusts the DTMF deviation. The PA On/Off switch on the Siren/PA control box must be in the "Off" position when using the touch-tone encoder. For user feedback, a 400Hz sidetone sounds in the radio speaker and the PTT LED lights when the touch-tone encoder is in use. This sidetone is generated by the selected Spectra radio during the time that the touch-tone encoder keys that radio. A potentiometer internal to the touch-tone encoder adjusts the drop-out delay after a button on the pad is released.

If the DTMF option is in a system which also contains MDC repeater access, the sidetone may not sound immediately upon pressing the DTMF keypad. This is because the DTMF tones are gated to the radio system to allow the MDC repeater access message to go out first. If the sidetone is not heard immediately after pressing a DTMF button, continue holding that button down until the sidetone for the DTMF encoder sounds before pressing any other DTMF buttons.

XVIX. INSTALLATION CONSIDERATIONS

Antenna location and mounting methods are critical to the optimum rf performance of a radio installation. See the Installation Section in this manual.

XX. RADIO SERVICE SOFTWARE (RSS)

The system is programmed by connecting a Radio Interface Box (RIB) between an IBM compatible computer and the middle connector on the front of the Spectra radio.

The RSS will program, among other things, Advanced SECURENET parameters (indexing, default keys by mode, clear alert tone, and proper code detect), radio parameters (scan list by mode, frequency list, talkback scan, scan delays), siren parameters (PA volume level), singletone parameter, (frequencies, duration), MDC parameters (codes), default cold-start and warm start parameters, and others.

XXI. SYSTEM INTERFACE UNIT (SIU)

The SIU contains the following seven connectors:

1. Radio 1 connector (25 pin male) and always connects to the Spectra radio.

2. Radio 2 connector (25 pin male) - not used.

3. Handheld control head connector (25 pin female) different than radio connectors and always connects to the handheld control head, optional touch-tone encoder and radio speaker(s).

4. Advanced SECURENET Switch Box Connector (15 pin male) - not used.

5. Siren/PA Control Box Connector (9 pin female) and always connects to the Siren/PA Control Box for systems with the siren option.

6. Signalling Control Box Connector (9 pin male) - not used.

7. VIP Connector (15-pin female) - not used.