Maintenance Manual

S-800 SERIES CONTROL UNIT COMBINATIONS

S-810 VEHICLE CONTROL UNIT

S-815 MOTORCYCLE CONTROL UNIT

ERICSSON

TABLE OF CONTENTS

NOTICE

This manual covers Ericsson and General Electric products manufactured and sold by Ericsson Inc.

NOTICE

Repairs to this equipment should be made only by an authorized service technician or facility designated by the supplier. Any repairs, alterations or substitution of recommended parts made by the user to this equipment not approved by the manufacturer could void the user's authority to operate the equipment in addition to the manufacturer's warranty.

NOTE

The software contained in this device is copyrighted by Ericsson Inc. Unpublished rights are reserved under the copyright laws of the United States.

SPECIFICATIONS*

Operating Temperature Range	-30°C to +60°C
Battery Polarity	Negative Ground
DC Input Power	
A+	13.8 Vdc, ± 20%
IGN-A+	13.8 Vdc, ± 20%
DC Output Power	
A+ SW	13.6 Vdc, ± 20%
TX-SW-IGN	13.6 Vdc, ± 20%
Maximum Battery A+ Current Drain	
Unit Off	10 mA dc
Maximum Input A+ Current Drain	
Without Radio	400 mA dc
With Radio	3.0 amp
IGN-A+	20 mA dc
Maximum Output Current Drain	
A+ SW	3.0 amp
TX-SW-IGN	20 mA dc
Logic Levels	
High (1)	4.0 +1.0 Vdc
Low (0)	0.5+0.5 Vdc
Rise Time	200 nsec
Fall Time	200 nsec
Horn Ring Input	
Power	13.8 Vdc ± 20%
Current	220 mA dc
Horn Ring Output	
Power	13.6 Vdc ± 20%
Current	220 mA dc
Light Relay Drivers	
Minimum Current Sink	200 mA dc
Headset Audio Response	Per EIA-204
PA Audio Response	Per EIA-204

* These specifications are intended primarily for the use of the serviceman. See the appropriate Specifications Sheet for the complete specifications.

DESCRIPTION

The S-810 & S-8I5 Control Unit is a highly functional, ruggedly constructed control unit for use in vehicular or motorcycle applications. The Control Unit is contained in a two piece cast aluminum, weather resistant housing.

The control unit contains three printed circuit boards: a Keypad Board, a Processor Board and an I/O Board. All external connections to the control unit are made to jacks on the back of the unit. A plastic cap mounts over the cable connections to maintain the weather proof capability. The weather proof microphone plug is secured to the microphone jack by a captive retaining screw.

All controls are front mounted, pushbuttons, which' are backlighted for night time visibility. The indicators are Light Emitting Diodes (LEDs) and a Liquid Crystal Display (LCD). An electrolumenescent (EL) panel provides backlighting for the LCD.

A photo detector provides a light/dark level indication for controlling the LEDs and EL panel intensity for operation in both bright or low light conditions.

CONTROLS & INDICATORS

There are 25 pushbutton controls on the control unit keypad for the vehicular control unit, and 15 pushbutton controls on the motorcycle keypad. Both the vehicle and motorcycle units are shown in Figures 1 and 2. The name and function of each of the pushbutton, are shown in Figure 3.

PWR

The PWR control is a push-push switch that turns the entire radio/siren/light system on and off.

MODE ▲ & ▼

MODE select allows selection of up to 64 pairs of frequencies called MODES. Each pair consists of a "C" transmit and receive frequency and a "S" transmit and receive frequency. The **MODE** select also works in conjunction with DIV. Each press of the **MODE** ▲ or **MODE** ▼ button causes an increment or decrement of the selection with wrap around at each end of the list. If a **MODE** button is pressed for more than a second, the display ramps through the selections at a 3 Hz rate.

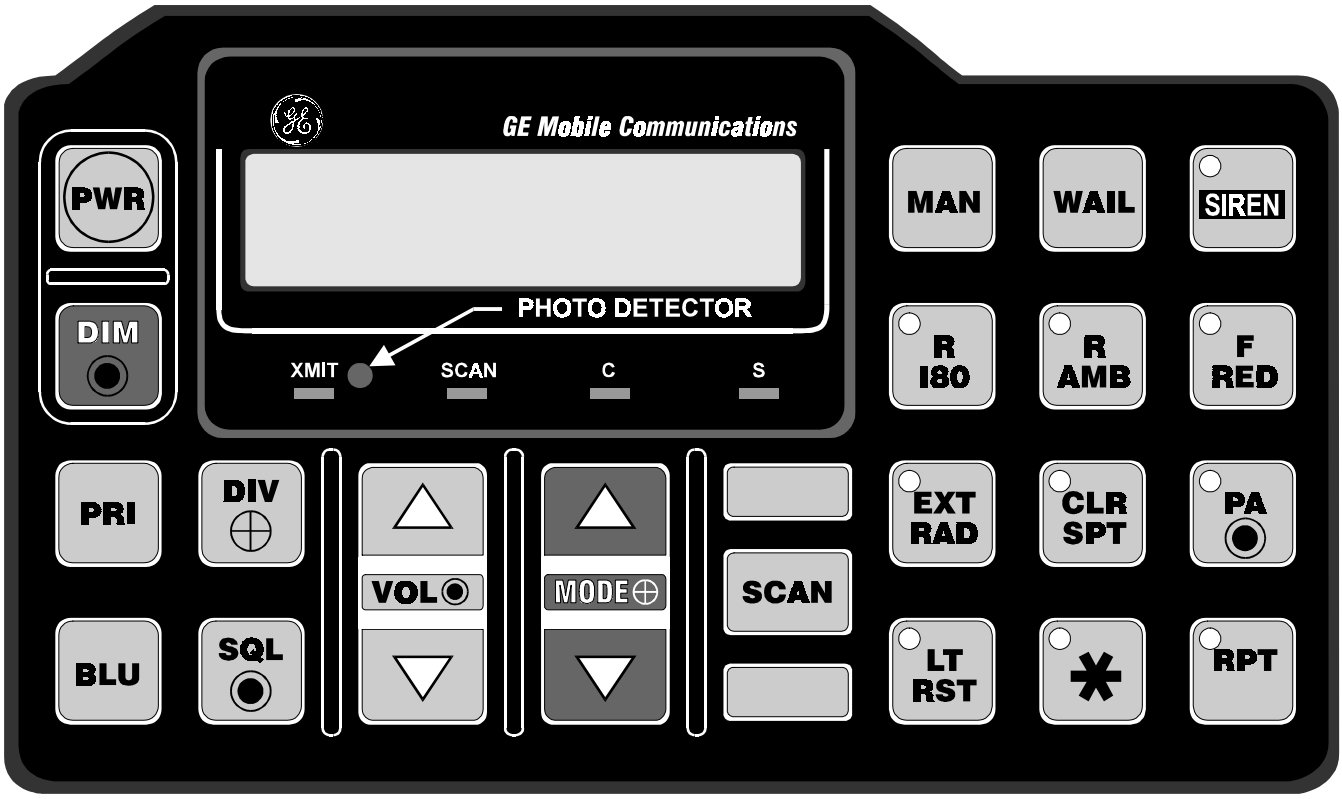


Figure 1 - Vehicle Control Unit

Each **MODE** selection has an ASCII name (up to 5 characters) displayed in the first five digits of the LCD, and a default division Channel Guard ASCII name (up to 3 characters if present) displayed in the last three digits of the LCD. For example:

GRN NOR	(mode=green and default division=north)
BLU SOU	(mode=blue and default division=south)
RED	(mode=red and default division=none)

There are two special MODES called **PRI**mary and **BLU**e that can be accessed quickly (without another download) by use of the PRI and BLU buttons. For example, downloading of the GRN mode to the radio consists of the following channels:

"C"	GRN tx & rx	(selected mode)
"S"	GRN tx & rx	
"C"	PRI tx & rx	(PRImary mode)
"S"	PRI tx & rx	
"C"	BLU tx & rx	(BLUe mode)
"S"	BLU tx & rx	

Once a **MODE** selection is made, the control unit downloads the radio information to the mobile radio. This takes approximately 1.7 seconds. During the downloading process, the unit does not respond to any key action.

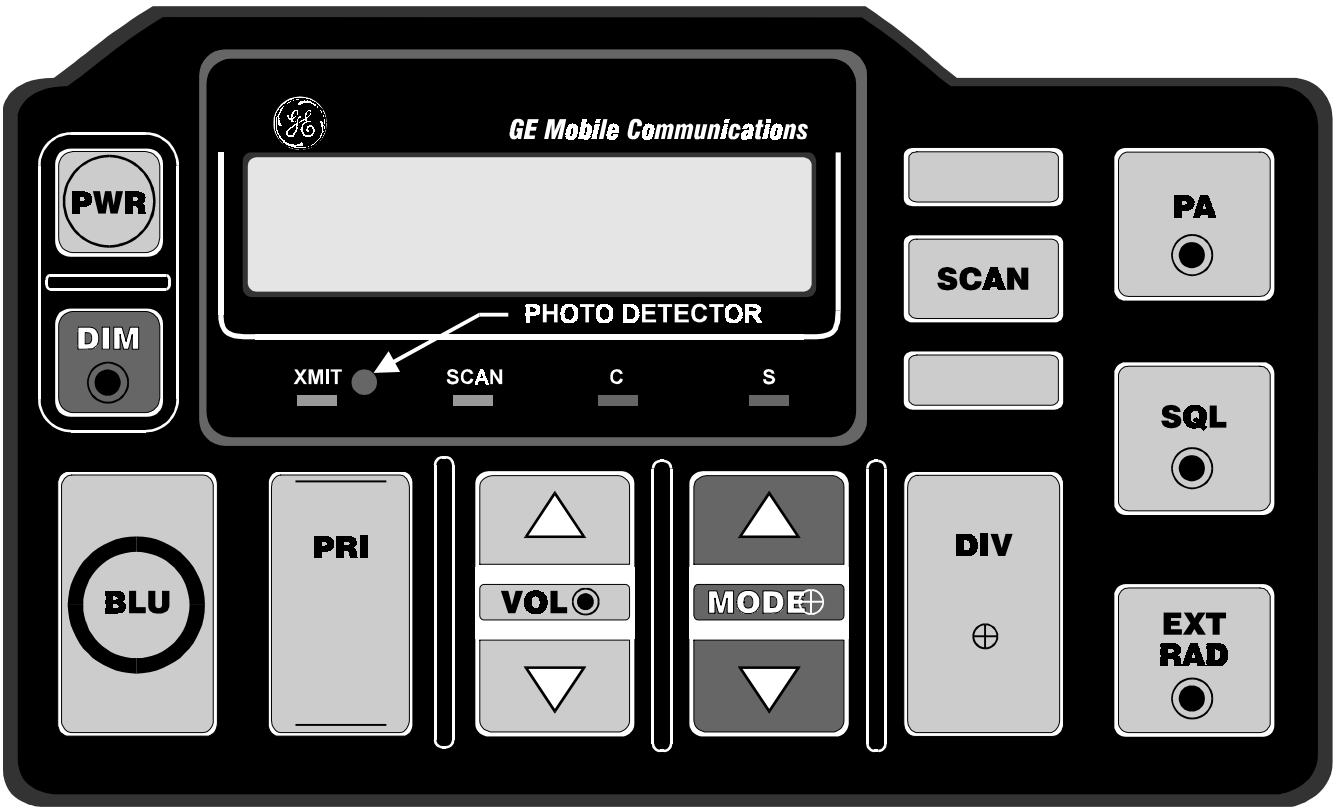


Figure 2 - Motorcycle Control Unit

Switch Name	Mobile Function	Motorcycle Function
PWR	Y	Y
DIM	Y	Y
PRI	Y	Y
BLU	Y	Y
DIV	Y	Y
SQL	Y	Y
VOL▲	Y	Y
VOL▼	Y	Y
MODE▲	Y	Y
MODE▼	Y	Y
- - - - -	Y	Y
SCAN	Y	Y
- - - - - - - -	Y	Y
MAN	Y	N
R180	Y	N
LTRST	Y	N
RPT	Y	N
WAIL	Y	N
RAMB	Y	N
CLRSPT	Y	N
PA	Y	Y
SIREN	Y	N
F RED	Y	N
*	Y	N
EXTRAD	Y	Y

Figure 3 - Pushbutton Controls

VOL▲ & ▼

Pressing the VOLume select allows selection of up to 16 levels of audio. Depressing a **VOL** button for the first time causes the display to show "**VOL xx**" where xx represents volume level one to sixteen. If a **VOL** button is held depressed for more than one second, the volume level ramps at a 3 Hz rate and stops at maximum and minimum levels. The squelch function works in conjunction with the **VOL** buttons.

If there is no carrier activity ("C" & "S" LED's off), then an audio beep will sound (in the radio speaker and not in the SIREN/PA speaker) to indicate the relative volume level. The first press of **VOL** will not increment or decrement the volume, but sound a beep at the present level. Additional pushes or ramping, increments or decrements the volume setting while the **VOL** display is active.

A background three second timer automatically returns the display to MODES after the last VOL button action. However, if the operator wishes to return immediately, depressing either the MODE▲ or MODE ▼ buttons will return the display to the selected mode (does not increment or decrement the mode selection).

SQL

Pressing the **SQ**uelch select allows selection of up to 8 levels of squelch threshold. Depressing the SQ button causes the display to show "**SQ xx**", where xx represents level one to eight. After selecting the SQ function, the squelch level may be increased or decreased by using the VOL control.

Level one is open squelch. Level two or three is threshold squelch, and level eight is tight squelch. If the VRS is enabled, squelch will not adjust below level four to prevent transmission of receiver noise.

In the event the operator fails to press the **SQ** button a second time, a background 3 second timer automatically establishes the SQ selection (at the last level selected) and returns the display to the **MODE** selection, and the volume keys to the volume function.

PRI

PRImary select allows the selection of the primary mode from anywhere (super ramp function). The personality prom programming assigns which mode is the PRImary mode, This is the mode for the area of operation.

BLU

BLUe select allows the selection of the blue mode from anywhere (super ramp function). The personality prom programming assigns which mode is the **BLU** mode. This is the mode for statewide communications.

DIV

DIVision select allows the selection of up to 10 Channel Guard tones (and an 11th position for OFF) that over ride the default division Channel Guard code (if present) for the selected mode.

Depressing the **DIV** button causes the display to show "**DIV xxx**", where xxx represents the ASCII for one of the Channel Guard codes or OFF (where OFF turns off the DlV selection and returns to the default Channel Guard). The Channel Guard codes may be ramped up and down using the **MODE** buttons. The ramping action will stop at the top and bottom of the list. Each selection will display its ASCII name (up to 3 characters) in the last three digits of the LCD. For example:

GRN SOU	(mode=green and selected division=south)

BLU NOR	(mode=blue and selected division=north)
RED	(mode=red and selected division=off and default division=none)

Once the selection is made, depressing the **DIV** button again establishes the selection by downloading the information to the radio, returns to the "MODE DlV" display, and returns the **MODE** select buttons to the mode function.

In the event the operator fails to press the **DIV** button a second time, a background 3 second timer automatically establishes the DIV selection (at the last division selected) and returns the display and the **MODE** buttons to the MODE function.

The selected **DIV** code will hold its value even if the mode is charged (includes **PRI** and **BLU**). In order to return to the default Channel Guard code, the operator must use **DIV** and select OFF.

DIM

The **DIM**mer select allows selection of up to 5 levels of brightness (full bright, off, and four between). The first press of DIM causes the display to show "DIM xxx", where x represents the light level 1 through 5, and enables the VOL buttons to ramp through these selections. Pressing the **DIM** button a second time establishes the selection and returns the VOL buttons to volume selection. The dim ramping function stops at the top and bottom of the list.

In the event the operator fails to press the **DIM** button a second time, a background 3 second timer automatically establishes the last **DIM** selection and returns the display to the **MODE** selection and the VOL buttons to the VOLUME function.

SCAN

The **SCAN** pushbutton is a push-push switch that enables or disables scan operation. When scan is disabled, the "C" channel for the selected MODE is enabled. When scan is enabled (SCAN LED on), the "C" & "S" channels, for the selected MODE, are searched for carrier and Channel Guard activity as listed:

"C"	P1 channel
"S"	non priority channel

In order to meet CHP special timing for Channel Guard scan on the priority channels, GE proprietary scan timing and Channel Guard decode timing are employed.

SPARES (- and -)

There are two spare buttons, one above and one below the SCAN button.

RPT

The **RPT** button is a push-push switch that enables or disables the Vehicular Repeater. When enabled, the button indicator LED will flash at a 2 Hz rate and a beep tone will sound through the radio speaker (not the SIREN/PA speaker) every two (2) seconds. Scan is enabled automatically during VRS operation. Any PTT stops the scan during transmit and enables scan after the PTT ends. When the VRS is in the non priority condition and selects VRS "C" or "S" line, scan is stopped and the appropriate C or S channel is monitored for repeat activity.

There are separate VRS PTT, VRS "C", and VRS "S" signals:

VRS "S"	VRS "C"	PTT	DESCRIPTION
1	0	0	tx on "C"
0	1	0	tx on "S"
1	1	1	rx on "C" & "S" - scan enabled
1	0	0	rx on "C"
0	1	0	rx on "S"

SIREN

The **SIREN** button is a push-push switch that is the master enable or disable button for the siren functions. When enabled, the **SIREN** button LED flashes at a 2 Hz rate and either the MAN or WAIL siren functions becomes available. Either the MAN, WAIL, and/or the horn ring must be activated in order to produce a siren function. The MAN and WAIL functions are interlocked as follows (depressing one turns off the other):

MAN	WAIL
off	off
on	off
off	on

MAN

MANual is a push-push switch that enables or disables the manual siren. The "horn ring" (also a push-push function) controls the siren output such that the siren is in the "CONSTANT WAIL" mode when the SIREN function is enabled. When enabled and the horn ring as activated, the WAIL control line goes low for the time the horn ring stays activated.

WAIL

WAIL is a push-push switch that enables or disables the WAIL siren. When enabled, the siren is enabled in the "OSCILLATING WAIL" mode. The "horn ring" (also a push-push function) will change the siren output from WAIL to the YELP mode. When enabled in the constant wail mode, the WAIL control line is low. When enabled to the yelp mode, the WAIL and TAPII control lines are both low.

R 180

R 180 is a push-push button that enables and disables an optional relay for the **R 180** lamp. **R 180** is remembered by the control unit when power is removed.

R AMB

R AMB is a triple function pushbutton that enables a customer provided relay that controls the rear warning lamps.

- On the first push, the rear amber and the rear blue warning lamps are enabled.
- On the second push, the rear red and the rear blue warning lamps are enabled.
- On the third push, both are disabled.

When enabled, the **R AMB** button LED flashes at a 2 Hz rate.

F RED

F RED is a triple function pushbutton that enables an optional relay which controls the front red and wig wag lamps.

- On the first push, the front red warning lamps are enabled.
- On the second push, the front red and wig wag lamps are enabled.
- On the third push, both are disabled.

When enabled, the **F RED** button LED flashes at a 2 Hz rate.

CLR SPT

CLR SPT is a push-push button that enables and disables a customer provided relay for the right side clear spotlight. When enabled, the **CLR SPT** button LED flashes at a 2Hz rate.

SPARE*

The * button on the vehicle unit is a spare push-push button.

PA

The **PA** (Public Address) button is a push-push button that enables and disables the public address function. When enabled, the button LED flashes at a 2 Hz rate. Incoming calls are still heard on the radio speaker (not the SIREN/PA speaker) until the "C" mic PTT is pressed. The "S" PTT activates the radio transmitter. When either mic PTT is pressed, the receive audio is disabled, and the mic audio is routed to the SIREN/PA amplifier and its external speaker. The **PA** volume control (16 levels) is ramped by the VOLume buttons, and the PA volume level is remembered by the control unit. The PA volume control is adjusted by first selecting the PA function and then pressing the PTT button. The VOL ▲ or ▼. PA is not compatible with VRS and EXT RAD operation.

EXTRAD

EXTernal **RAD**io is a push-push button that enables or disables the radio audio going to the PA amplifier and external speaker. When enabled, the **EXT RAD** button LED flashes at a 2 Hz rate. The **VOL**ume buttons ramp the radio audio to the amplifier/external speaker, and the **EXT RAD** volume level is remembered by the control unit The internal speaker remalns active at half the EXT RAD VOL setting. EXT RAD is not compatible with VRS and PA operation.

LT RST

LT RST is a pushbutton that resets all light control functions.

XMIT (LED)

The **XMIT** red LED will light anytime the mobile is in the transmit mode (includes VRS TX also).

SCAN (LED)

The **SCAN** green LED will light anytime the scan function is enabled.

C (LED)

The **C** yellow LED will light anytime the "**C**" channel is receiving a signal strong enough to open the squelch circuit. It will also light anytime the mic PTT button is pressed in the upward position or the VRS is selecting and receiving the "C" channel.

S (LED)

The **S** green LED will light anytime the "**S**" channel is receiving a signal strong enough to open the squelch circuit. It will also light anytime the mic PTT button is pressed in the downward position or the VRS is selecting and receiving the "S" channel.

CIRCUIT DESCRIPTION

DISPLAY PANEL

The display panel consists of a display board and keyboard for either vehicular or motorcycle applications. The panel includes the keyboard pushbutton controls, LCD display, LED indicators, the photo detector, and electroluminescent (EL) panel for backlighting the LCD display.

KEYBOARD

The keyboard provides the operator interface to the control unit and radio. The vehicle keyboard is equipped with 25 pushbutton controls. The motorcycle control unit is equipped with 15 pushbutton controls. The Keypad board is connected to the processor board by means of a 20-pin, inline connector.

No functions are assigned to the pushbuttons directly above and below the SCAN button. These functions are labeled - (above the SCAN KEY), and - - (below the SCAN key) in the following Table.

Functions for both the vehicle and motorcycle keyboards are shown in Table 1.

LED DISPLAY

The LED display indicates the operational status of the radio system. A total of 14 LED's are used in the vehicle version of the control unit, while 4 LED's are used on the motorcycle version of the control unit.

The vehicle version employs 4 static LED's and 10 flashing LED's. The motorcycle version employs 4 static LED's only. The 4 static LED's in both the vehicle and motorcycle units are XMIT, SCAN, C, and S.

The 10 flashing LED's in the vehicle version are CLR SPT,PA,EXTRAD, * (SPARE),FRED, SIREN, R AMB,LT RST, R 180, and RPT.

Switch Name	Mobile Function	Motorcycle Function
PWR	Y	Y
DIM	Y	Y
PRI	Y	Y
BLU	Y	Y
DIV	Y	Y
SQL	Y	Y
VOL▲	Y	Y
VOL▼	Y	Y
MODE▲	Y	Y
MODE▼	Y	Y
-	Y	Y
SCAN	Y	Y
- -	Y	Y
MAN	Y	N
R180	Y	N
LTRST	Y	N
RPT	Y	N
WAIL	Y	N
RAMB	Y	N
CLRSPT	Y	N
PA	Y	Y
SIREN	Y	N
F RED	Y	N
*	Y	N
EXTRAD	Y	Y

Table 1 - Pushbutton Identification

LCD DISPLAY

The LCD display is an eight character, alphanumeric display utilizing I 8-segment digits. All of the characters available for the display are shown in Table 2.

PHOTO DETECTOR

The photo detector is used to give a light/dark level indication to the control unit. The information derived from the photo detector is used to dim the LED's in low light conditions, and to automatically turn the electroluminescent (EL) panel on and off.

EL PANEL

The EL panel provides the backlighting on the front panel assembly. The backlighting illuminates the LCD display and the keyboard buttons.

PROCESSOR BOARD

The processor board contains the control unit microcontroller which provides the intelligent interface to the keyboard boards and the I/O board. An EPROM contains the program memory (software) for the microcomputer, and an EEPROM contains the control unit and radio system personalty and frequency information. Refer to LBI-38726 for additional information.

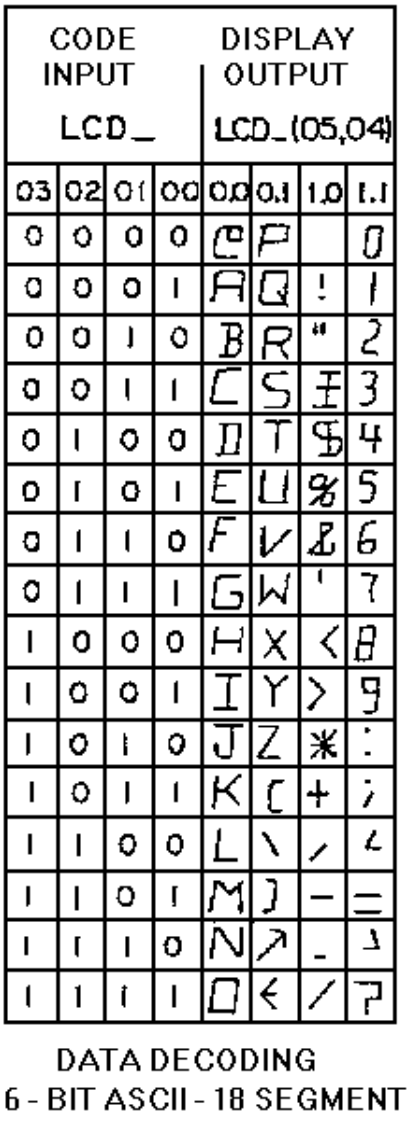


Table 2 - LCD 18 - Segment Digit Characters

I/O BOARD

In addition to providing the interface to the control unit processor board, the I/O board also interfaces to the following radio system components:

- RANGR mobile radio
- Vehicular repeater
- Siren/PA unit
- Mobile Light unit

The I/O board memory-mapped registers are written to by the processor board. A total of five registers control radio system operation in addition to the direct control from the display panel keyboard.

The first register controls the steering of microphone audio, Channel Guard tone, and GESTAR signalling to the radio transmitter. Control is also provided to steer the received radio audio or volume setting tone to the radio speaker. This register also steers the received radio audio and microphone audio to the external PA untyt. Also included is the control of the EEPOT's for level setting (volume and squelch).

The second register controls the routing of the horn ring current drive to the horn return relay for sounding of the horn on the vehicle or motorcycle. This register also provides the hookswitch or monitor output function which routes the received radio audio to the speaker prior to radio transmission. The external PA push to talk control is also provided to enable audio to the external PA unit.

The third register is used to generate the ltyght relay controls. These controls are R 180, R RED, WIG WAG, CLR SPT,F RED, and R AMB.

The fourth register controls various radio functions including radio speaker mute, radio push to talk, and squelch disable. Also provided are external PA control including TAPII and WAIL select lines. Control of the vehicular repeater is accomplished via an enable line to the VRS unit.

The final register is used to generate 4 of the 5 frequency select lines to the mobile radio as well as the radio reset and the radio store lines.

A digitally controlled potentiometer (EEPOT) on the 1/0 board is used to adjust the level of audio (received radio audio or microphone audio) to the speaker or external PA unit. A second EEPOT is used to adjust the squelch level to the mobile radio for variable squelch operation.

An audio amplifier is used to drive the audio to the external PA unit or the headset (in a motorcycle unit).

The 1/0 board also contains the 5-volt regulator that is used to supply logic and audio power to the remainder of the control unit. The 1/0 board provides heat sinking for the 5 volt regulator. The regulator also generates a power up reset to the hardware registers on the 1/0 board, and to the microcomputer on the processor board.

The 1/0 board contains a relay that is used to switch the battery power to the switch power line. The control for the power relay comes from the processor board.

Jumpers J2 l, J22, J23, J24, J25, and J27 are provided on the 1/0 board to configure the control unit either for vehicle operation, or for motorcycle operation. A jumper configuration chart is shown in Table 3.

SHORTING PLUG	VEHICLE POSITION	MOTORCYCLE POSITION
P21	1 & 2	
P22	1 & 2	
P23	1 & 2	2 & 3
P24	1 & 2	2 & 3
P25	1 & 2	2 & 3
P26	1 & 2	1 & 2
P27	1 & 2	2 & 3
P28	1 & 2	1 & 2

Table 3 - I/O Board Jumper Configuration

NOTE

Jumper J26 is used in a dual control unit option. This option is not supported on the CHP radio system.

Jumper J28 is used to configure the A+ IGN power to be derived from A+SW power.

Table 4 shows the relay control functions present at J5 when in the vehicle mode of operation.

J5 PIN	VEHICLE LIGHT DRIVER
1	F RED
2	CLR SPT
3	R 180
4	WIG WAG
5	R RED
6	R AMB

Table 4 - Vehicle Light Controls

In the motorcycle mode of operation, control functions present at J5 are shown in Table 5.

J5 PIN	MOTORCYCLE FUNCTION
1	MIC LO
2	MIC HI
3	C PTT
4	S PTT
5	GND
6	HD SET (PA) AUDIO

Table 5- Motorcycle Control Functions

POWER DISTRIBUTION

Power requirements for the S-800 control unit include A+ and A+-SW-IGN.

Control unit A+ is the continuous battery power. This power input may be connected through the ignition switch of the vehicle or motorcycle. This power supply normally goes to the power relay. A+ power is input to the relay control flip-flop on the processor board used to turn energize the coil of the relay through the Darlington driver on the I/O board.

The A+SW power is the switched A+ power which enables the control unit to be turned on and off. The A+SW power is generated from the A+ power through the power relay.

A+-SW-IGN is the switched power from the car battery to the control unit derived from the ignition switch of the vehicle or motorcycle.

TX-SW-IGN receives power from A+-SW-IGN whenever the control unit is turned on. TX-SW-IGN is applied to the radio controller to prevent transmissions if power is not applied to this line.

If the vehicle ignition is turned off, the control unit turned on, and RPT activated, then power is applied to the TXSW-IGN to allow the mobile to repeat.

Control unit grounds are GND (logic ground and limited Channel Guard ground), VOL/SQ-LO (radio received audio ground), and MIC-LO (microphone audio ground).

CONNECTOR J1 PIN	SIGNAL NAME	INPUT (I)/ OUTPUT (O)	ANALOG (A)/ DIGITAL (D)	LEVEL VOLTS
1	A+	I	A	13.8
2	A+ IGN	I	A	0, 13.8
3	HORN RING	I	D	13.8, FLOAT AT 200 MA
4	HORN RET	O	D	13.6, FLOAT AT 200 MA
5	CG DIS IN	I	D	0, FLOAT
6	GESTAR	I	D	0, FLOAT
7				
8				
9	GND	I	A	0
10	SPKR 2	O	A	6.25 (Vrms) AT 10W
11	SPKR 1	O	A	6.25 (Vrms) AT 10W

Table 6 - J1 Power and Ignition Connections

CONNECTOR J2 PIN	SIGNAL NAME	INPUT (I)/ OUTPUT (O)	ANALOG (A)/ DIGITAL (D)	LEVEL VOLTS
1	SQ ARM	O	A	0 - 0.300 (Vrms)
2	VOL/SQ LO	I	A	0
3	PA AUDIO	O	A	0 - 0.800 (Vrms)
4	VOL/SQ HI	I	A	0 - 0.300 (Vrms)
5	VOL ARM	O	A	0 - 0.300 (Vrms)
6	PA PTT	I	D	0, FLOAT
7	CNTRL A-	I	D	0, FLOAT
8	FB 1	O	D	TTL
9	FB 2	O	D	TTL
10	CAS	I	D	0, 9.0
11	A+SW	O	A	13.6
12	CD DIS OUT	O	D	0, FLOAT
13	TX SW A+	O	A	0, 13.6
14	RAD PTT	O	D	0, FLOAT
15	MIC LO	I	A	0
16	MIC HI	I	A	020 - .070 (Vrms)
17	SPKR 1	I	A	6.25 (Vrms) AT 10W
18	SPKR 2	I	A	6.25 (Vrms) AT 10W
19	GND	O	A	0

Table 7 - J2 Radio Control Connections

CONNECTOR J3 PIN	SIGNAL NAME	INPUT (I)/ OUTPUT (O)	ANALOG (A)/ DIGITAL (D)	LEVEL VOLTS
1	SQ DIS	O	D	0, FLOAT
2	TAPII	O	D	0, FLOAT
3	WAIL	O	D	0, FLOAT
4	CU RESET	I	D	0, FLOAT
5	GND	I	A	0
6	LIM CG HI	I	D	TTL
7	VRS PTT	I	D	0, 13.8
8	VRS EN	O	D	0, 13.8
9	RAD RESET	O	D	0, FLOAT
10	VRS EN	O	D	0, FLOAT
11	EE WR EN	I	D	0, FLOAT
12	RX MUTE	O	D	0, FLOAT
13	S SEL	I	D	0, FLOAT
14	ADV CHANGE	O	D	TTL
15	C SEL	I	D	0, FLOAT
16	STORE	O	D	TTL
17	FB 3	O	D	TTL
18	FB 4	O	D	TTL
19	FB 5	O	D	TTL

Table 8 - J3 Radio Control Connections

CONNECTOR J4 PIN	SIGNAL NAME	INPUT (I)/ OUTPUT (O)	ANALOG (A)/ DIGITAL (D)	LEVEL VOLTS
1	C PTT	I	D	0, FLOAT
2	S PTT	I	D	0, FLOAT
3	A+SW	O	A	13.8
4	MIC HI	I	A	.020 - .070 (Vrms)
5	SPKR 1	O	A	6.25 (Vrms) AT 10W
6	CG DIS IN	I	D	0, FLOAT
7	SPKR 2	O	A	6.25 (Vrms) AT 10W
8	GND	I	A	0

Table 9 - J4 Microphone Jack Connections

CONNECTOR J5 PIN (VEHICLE)	SIGNAL NAME	INPUT (I)/ OUTPUT (O)	ANALOG (A)/ DIGITAL (D)	LEVEL VOLTS
1	F-RED	O	D	0, FLOAT
2	CLR-SPT	O	D	0, FLOAT
3	R 180	O	D	0, FLOAT
4	WIG-WAG	O	D	0, FLOAT
5	R-RED	O	D	0, FLOAT
6	R-AMB	O	D	0, FLOAT
7	GND	I	A	0
8	---	---	---	---

Table 10 - J5 Vehicle Auxiliary Connections

CONNECTOR J5 PIN (MOTORCYCLE)	SIGNAL NAME	INPUT (I)/ OUTPUT (O)	ANALOG (A)/ DIGITAL (D)	LEVEL VOLTS
1	MIC-LO	I	A	0
2	MIC-PRE	I	A	.003 - .010 (Vrms)
3	C PTT	I	D	0, FLOAT
4	S PTT	I	D	0, FLOAT
5	GND	I	A	0
6	HD SET AUDIO	O	A	0 - 3 (Vrms)
7	GND	I	A	0
8	---	---	---	---

Table 11 - J5 Auxiliary Motorcycle Connections

PROGRAMMING

The control unit contains an EEPROM for personality programming and storage of remembered parameters.

Programming the S-800 control unit is accomplished using the special PC programming software. Power is supplied by the standard ignition cable.

FAST SQUELCH ADJUST

1. Enable scan by pressing the SCAN switch on the control panel. The SCAN indicator will light.
2. Turn FAST Squelch Adjust control fully counterclockwise. Refer to the Outline Diagram for location.
3. Select a non-priority channel and apply a strong on channel frequency (1000 uVolts) to the radio.
4. Turn Squelch Adjust control clockwise until scan be- comes erratic, then turn counterclockwise approximately 1/8 turn.

CONNECTOR INTERFACE

All control unit external interfaces are made through cable connectors J1 , J2, J3, J4, and J5 located at the back of the control unit.

The cables interface directly to the control unit I/O board where control, signal, and power lines are filtered, buffered, and protected. The cables are routed and strained relieved through the molded plastic back cap.

Connector J1 is the control unit power connector. Connectors J2 and J3 provide the mobile radio interface. Also, vehicular repeater connections are made to connector J3, as well as programming connections for the PC programmer.

Connector J4 provides the microphone interface. Connector J5 provides the light relay controls for the vehicle version. J5 also provides the headset interface for the motorcycle version.

Tables 6 through 11 list all connectors, pins, signal names, input or output to/from the control unit, analog or digital input/output, and standard input/output voltage levels that are used in the S-800 vehicle or motorcycle control unit.

Note that a power input of 13.8 volts is to be applied to the unit in the following tables unless otherwise specified. Also note that a FLOAT reading may need to be pulled up to 13.8 volts in order to measure this level reliably.

The connectors at the back of the control unit are as follows:

J1 POWER AND IGNITION CONNECTOR

J2 RADIO CONTROL CONNECTOR 1

J3 RADIO CONTROL CONNECTOR 2

J4 MICROPHONE CONNECTOR

J5 AUXILIARY CONNECTOR

KEYBOARD SELF TEST

The self test procedures contained in this section provide a quick check of all of the keyboard functions.The Self Test includes a test of all pushbuttons, both static and flashing LED's, all segments of the display panel, the EL panel and the photo detector. The tests should be helpful in quickly locating keyboard failures as well as an aid in troubleshooting.

TEST REQUIREMENTS

l. Make sure the control unit is connected to a 13.8 Vdc supply.

2. Turn the control unit on by pressing the PWR pushbutton.

NOTE

The test mode may be terminated at any point by pressing the DIM and ADD pushbuttons simultaneously on the front of the control unit. The software will go into a wait state and allow the watchdog timer to expire and reset the control unit.

TEST PROCEDURE

Put the control unit in the test mode by simultane- ously pressing both the DIM and ADD pushbuttons. The control unit will now exercise a series of keyboard tests in typically less than one minute. Active user interaction is necessary for some of these tests. The test procedure and order of keyboard test functions is as follows:

NOTE

To prevent accidentally leaving the control unit in test mode, a 30 second timer is restarted each time a key is pressed. If this timer ever expires, the control unit will automatically leave the test mode.

a) Control Unit software version number is displayed on the eight character LCD display as

REV X

Where X is an alpha character (A - O)

This display lasts until a key is pushed or timer expires.

b) The control unit will display stars in all LCD digit positions as follows.

****

This display lasts until a key is pushed or timer expires.

c) The control unit will display "zeros" in all LCD digit positions as follows.

00000000

This display lasts until a key is pushed or timer expires.

d) The control unit will turn on the XMIT LED with the LCD display showing the following.

XMIT LED

This test lasts until a key is pushed or timer expires.

e) The control unit will turn on the SCAN LED with the LCD display showing the following.

SCAN LED

This test lasts until a key is pushed or timer expires.

f) The control unit will turn on the C LED with the LCD display showing the following.

C LED

This test lasts until a key is pushed or timer expires.

g) The control unit will turn on the S LED with the LCD display showing the following.

S LED

This test lasts until a key is pushed or timer expires.

h) The control unit will blink on the EL panel with the LCD display showing the following.

EL PANEL

This test lasts until a key is pushed or timer expires.

i) The control unit will display either of the following.

PHOTO L

or

PHOTO D

The display shown indicates whether the photo detector of the front panel detects either a high ambient light level (L for light) or a low ambient light level (D for dark).

This test lasts until a key is pushed or timer expires.

j) The control unit will display the following.

PUSH KEY

This display will last until a key is pushed. Push each key on the keyboard one key at a time. The LED indicator will light, and the key function will appear on the LCD display until the next key is pushed or the timer expires.

SYSTEM TEST PROCEDURES

The test procedures provide the following tests to be performed on the S-810 or S-815 Control Unit.

- Power and continuity checks
- Keyboard functional test
- Processor board functional test
- I/O board functional test
- Digital signal loopback test
- Audio signal loopback test
- Power control test

During the test procedures, the power cable is the only cable that needs to be connected to the control unit at all times. The various test cables are used as directed to exercise the digital and audio loopback tests necessary for the complete hardware component testing of the control unit.

Except for the power continuity tests, all of the tests are performed through the intelligent test software, CHPSMON, embedded as part of the operational code of the microcomputer located on the processor board.

TEST EQUIPMENT

The test equipment necessary for the test procedures included standard test equipment along with the test cables as required. The standard test equipment is listed as follows.

- CHP Automatic Tester
- Power Supply, variable 0 to 16 volts, 500 ma
- Volt-Ohm Meter, 0 - 50 volts, 0 - 500 ma, 0 - 1 Megohm
- Oscilloscope, 50 MHz bandwidth
- Dumb Terminal (RS-232C compatible)
- Controlled Light Source
- Audio Signal Generator
- Distortion Analyzer

POWER CONTINUITY TEST

Preliminary tests to be performed on the control unit are power and ground continuity testing. All supply inputs and outputs are checked to ensure that no shorts exit between power and ground inputs prior to test.

In addition to the power supply lines, certain other signals are capable of carrying a substantial current. These signals are also to be checked for continuity. Power points and connector pin designations to be checked are listed in Table 12.

The power continuity test is described in Table 13. All ground lines (GND, LIM CG LO, MIC LO, and VOL/SQ LO) are to be tied together for the control unit test procedures.

TERMINAL SETUP AND CONFIGURATION

The dumb terminal is to be interfaced to the CHP Automatic Tester in order to exercise the CHPSMON test software. The dumb terminal is interfaced to the control unit through connectors PI through P5.

CHP AUTOMATIC TESTER

The CHP automatic Tester permits the testing of any one board of the CHP control unit when used with any two known functional remaining boards of the control unit The Automatic Tester consists of a bank of relays which enable the control unit to perform a series of digital and analog loopback tests to verify electrical operation of the unit.

Complete information for using the Automatic Tester is contained in the Appendix.

SIGNAL	I/O BOARD PIN NUMBERS
A+	J1-1
A+SW	J2-11
GND	J1-1 J1-8 J2-19 J3-5 J4-8 J5-7
A+-IGN	J1-2
TX-SW-IGN	J2-13
HORN-RING	J1-3
HORN-RET	J1-4
SPKR1	J1-11 J2-17 J4-5
SPKR2	J1-10 J2-18 J4-7
CONNJ5-1	J5-1
CONNJ5-2	J5-2
CONNJ5-3	J5-3
CONNJ5-4	J5-4
CONNJ5-5	J5-5
CONNJ5-6	J5-6

Table 12 - Power and High Current Signal Lines

A)	NO POWER APPLIED TO I/O BOARD
B)	VERIFY THAT NONE OF THE LISTED POINTS ARE SHORTEDTO ONE ANOTHER A+, A+SW, GND, A+-IGN, TX-SW-IGN, HORN-RING,HORN-RET, SPKR1, SPKR2, CONNJ5-1, CONNJ5-2,CONNJ5-3, CONNJ5-4, CONNJ5-5, CONNJ5-6
C)	VERIFY THAT ALL CONNECTIONS OF A+ ARE SHORTED
D)	VERIFY THAT ALL CONNECTIONS OF GND ARE SHORTED
E)	VERIFY THAT ALL CONNECTIONS OF SPKR1 ARE SHORTED
F)	VERIFY THAT ALL CONNECTIONS OF SPKR2 ARE SHORTED

Table 13 - Power Continuity Test

APPENDIX FOR CHP AUTOMATIC TESTER

This appendix contains the information required to operate the CHP Automatic Tester. The Automatic Tester is used to exercise the digital and audio Ioopback tests required for the complete hardware component testing of the control unit.

The CHP Automatic Tester test checks any one board of the CHP vehicle or motorcycle control unit when used with any two known functional remaining control unit boards. The boards include the keypad board, the processor board and the I/0 (Input/Output) board.

TEST MODES

OPERATOR INITIATED MODES

User initiated test modes of operation include the following:

- The revision letter display,
- The LED display test,
- The LCD display test,
- The photodetector test, and
- The key closure test.

To enter the test mode, the operator simultaneously presses both the DIM and (-) buttons. To exit the test mode, simultaneously press both the DIM and (-) buttons again. A flowchart of the test modes is shown in Figure l.

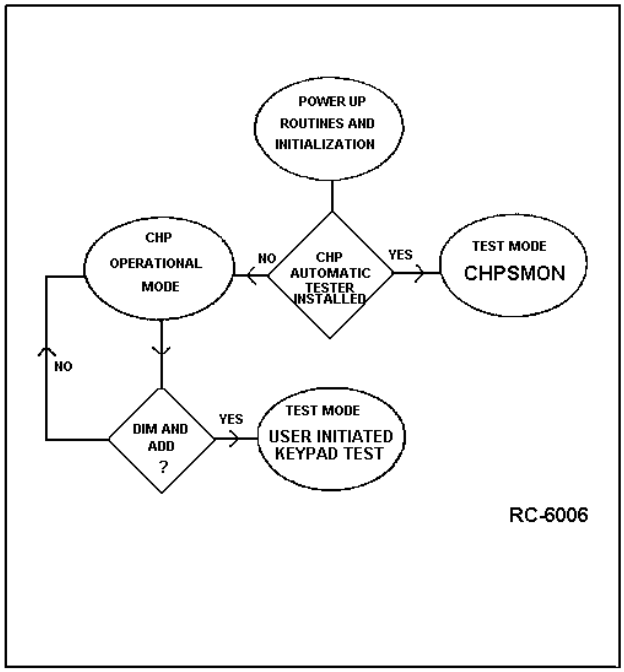


Figure 1 - Flowchart of Test Modes

CHPSMON TEST MODES

A dumb terminal must be interfaced to the control unit in order to exercise the CHPSMON test software. The CHPSMON test modes incIude the following:

- Keypad level tests,
- Processor board level tests,
- I/0 board level tests, and
- CHP control unit tests.

The CHPSMON test mode is entered by connecting the automatic tester. To exit the test mode, turn off the power, reset the dumb terminal, and disconnect the Automatic Tester.

Some of the features of the CHPSMON include a variable baud rate (19.2k, 9600, 4800, 3600, 2400 or 1200), 7 serial data bits with 1 bit odd parity, full duplex operation, no handshaking, and ASCII characters, 0-9, A-Z, (SPACE), -, = , (ESC), (CTRL-Z) (Backspace), and (DEL).

CHP AUTOMATIC TESTER COMMANDS AND TEST DESCRIPTION

CHP AUTOMATIC TESTER COMMANDS

The CHP automatic tester is used in order to test any one board of the CHP Control Unit with the two known functional remaining boards of the Control Unit. The CHP Automatic Tester consists of a bank of relays which en able the CHP Control Unit to perform a series of digital and analog loopback tests to verify electrical operation of the unit.Connections to the CHP Automatic Tester are the five cables which plug directly to the CHP Control Unit (on the I/0 Board), one cable for the dumb terminal interface, and one cable for the 13.8 nominal power supply input.

There are four commands that are executed via CHPSMON to perform the automatic testing of the individual boards of the CHP Control Unit. the commands are:

1. TEST V (or M) - Performs Keypad and I/0 related tests
2. TSTK V (or M) - Performs Keypad related tests
3. TSTI V (or M) - Performs I/0 related tests

4. TSTP V (or M) - Performs Processor related tests

The Keypad Board test requires the TSTK command. The I/0 Board test requires the TSTI command. The Processor Board requires the TSTP command, and the CHP Control Unit requires the TEST command.

- The keypad board test performs the following:
- Cycling of the LED
- Cycling of a character on the LCD (* or 0)
- Photo detector test via * (for light) or O (for dark) on the LCD
- EL panel blinking at a rate of one complete LED cycle sampling of the buttons

The I/0 board test performs a series of loopback tests and displays failures. The failure test numbers are used via the lookup sheets, that are part of the CHP Automatic Tester, to determine the nature of the failure.

The processor board and the CHP control unit perform both the keypad tests and the I/0 tests. In addition, the software revision and EPROM checksum are displayed.

The CHP Automatic Tester displays the test failures to the CHPSMON terminal. A description of the CHP tests follow. The CHP automatic tester uses the signal lines TAPII, WAIL, and VRS EN to activated certain relay paths which perform the analog and digital loopback of the signals to the control unit.

CHP AUTOMATIC TESTER SETUP

The CHP Control Unit is mated to the CHP Automatic Tester via the cable labeled J1 through J5 on the tester. The CHP Automatic Tester receives input power from the 13.8 Volt nominal supply source on connectorJ11. The CHPSMON dumb terminal mates with the tester on connectorJ10 1 via an RS-232C null modem cable. A simplified test setup is shown in Figure 2.

When powered up, the CHP Control Unit detects that the CHP Automatic Tester is plugged in the unit. The criterion used to determine this is via the CPTT, SPTT, and CG DIS IN lines being grounded at a reset or power up of the control unit.

Grounding the CPTT and SPTT lines enables the control unit to go to the CHPSMON test mode. The additional requirement of CG DIS IN being grounded enables the control unit to perform an autobaud function where it will lock onto the proper baud rate of the terminal as determined by decoding the carriage return character from the dumb terminal. The permissible baud rates are 19.2 k, 9600, 4800, 3600, 2400, and 1200.

If CG DIS IN is not grounded, the default baud rate is 9600.

The user may be requested to turn the fast squelch pot until the SCAN LED on the front panel just turns on. The SCAN LED gives an indication of the state of the fast squelch detect line. The audio paths set up are such that the 7000 Hz squarewave generated on STORE is routed to MIC HI, through the analog switch, U2B, to TONE, through the analog switch, U2A, through the audio EEPOT, U3, through the analog switch, U2C, to the PA amplifier, Ul3, on PA AUDIO to VOL/SQ HI, through the fast squelch pot, R9, and finally to the fast squelch detect circuitry on the processor. Although no test number is assigned to this procedure, the fast squelch adjust pot is adjusted to the specified level.

TEST 1 The audio paths are set up such that the 7000 Hz squarewave gene rated on STORE is routed to MIC HI, through the analog switch, U2B, to TONE, through the analog switch, U2A, through the audio EEPOT, U3, through the analog switch, U2C, to the PA amplifier, U13, on PA AUDIO to VOL/SQ HI, through the fast squelch pot, R9, and finally to the fast squelch detect circuitry on the processor. This test checks the fast squelch detect attack time to the specified timing.

TEST 2 The analog switch, U2C, is set up to disconnect the VOL ARM audio to the PA amplifier, U13. This test checks the disabling of audio routing via the VOL/MIC control line and also checks the fast squelch detect decay time to the specified timing.

TEST 3 The analog switch, U2A, is set up to disconnect the audio on TONE to be passed to the audio EEPOT, U3. This test checks the disabling of audio routing via the GESTAR/VOL control line.

TEST 4 The analog switch, U2B, is set up to disconnect the audio on MIC HI from being passed to TONE. Also, the audio on VOL ARM is steered away from the PA amplifier, U13.

This test checks the disabling of audio routing via the PA/MIC and VOL/MIC control lines and also checks the negligible signal generated on PA AUDIO through the analog switch, U2B, and capacitor C19.

TEST 5 Reserved

TEST 6 Reserved

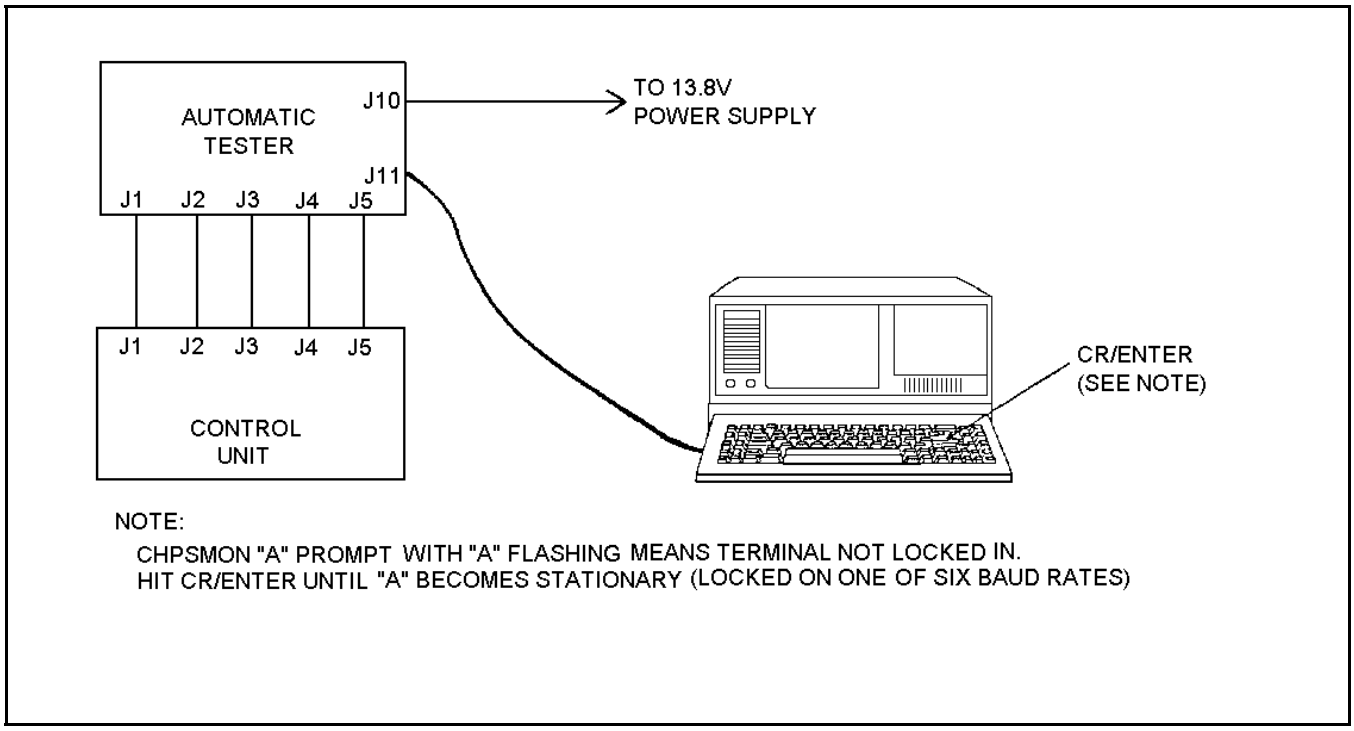


Figure 2 - Simplified Test Setup

TEST 7 The FB1 line is routed to the S SEL input. This test checks the low state of this connection.

TEST 8 The FB1 line is routed to the S SEL input. This test checks the high state of this connection.

TEST 9 The FB2 line is routed to the C SEL input. This test checks the low state of this connection.

TEST 10 The FB2 line is routed to the C SEL input. This test checks the high state of this connection.

TEST 11 Reserved

TEST 12 Reserved

TEST 13 The FB4 line is routed to the VRS PTT input. This test checks the low state of this connection.

TEST 14 The FB4 line is routed to the VRS PTT input. This test checks the high state of this connection.

TEST 15 The CG DIS OUT line is routed to the EE WR EN input. This Iine is held open to disable writing to the fixed area of the EEPROM.

The storage area of the EEPROM is checked by writing the complement of the byte presently contained at addresses E000, E001, E002, E004, E008, E010, E020, E040, E080. The original values are restored after the test.

TEST 16 The CG DIS OUT line is routed to the EE WR EN input. This line is held open to disable writing to the fixed area of the EEPROM. The fixed area of the EEPROM is checked by attempting to write the complement of the byte presently contained at addresses E100, E200, E400. The test checks to verify that the write was not successful. The original values are left after the test.

TEST 17 The CG DIS OUT line is routed to the EE WR EN input. This line is held low to enable writing to the fixed area of the EEPROM. The fixed area of the EEPROM is checked by attempting to write the complement of the byte presently contained at addresses E100, E200, E400. The test checks to verify that the write was successful. The original values are left after the test.

TEST 18 The audio paths are set up such that the 7000 Hz squarewave generated on STORE is routed to VOL/SQ HI, and through the fast squelch pot, R9, to the fast squelch detect circuitry on the processor board. This test verifies the initial state of the fast squelch idle detect after the specified decay time.

TEST 19 The audio paths are set up such that the 7000 Hz squarewave generated on STORE is routed to VOL/SQ HI, and through the fast squelch pot, R9, to the fast squelch detect circuitry on the processor board. This test verifies the state of the fast squelch detect after a long attack time.

TEST 20 The audio paths are set up such that the 7000 Hz squarewave generated on STORE is routed to VOL/SQ HI, and through the squelch EEPOT, U4, to the LIM CG input. After a long squarewave train, the LIM CG input is checked for a low.

TEST 21 The audio paths are set up such that the 7000 Hz squarewave generated on STORE is routed to VOL/SQ HI, and through the squelch EEPOT, U4, to the LIM CG input. After a long squarewave train, the LIM CG input is checked for a high.

TEST 22 The RAD PTT line is routed to the S SEL input. This test cheeks the low state of this connection.

TEST 23 The RAD PTT line is routed to the S SEL input. This test checks the high state of this connection.

TEST 24 The PA PTT line is routed to the C SEL input. This test checks the e low state of this connection.

TEST 25 The PA PTT line is routed to the C SEL input. This test checks the high state of this connection.

TEST 26 Reserved

TEST 27 Reserved

TEST 28 The SQ DIS line is routed to the VRS PTT input. This test checks the low state of this connection.

TEST 29 The SQ DIS line is routed to the VRS PTT input. This test checks the high state of this connection.

TEST 30 The audio paths are set up such that the 7000 Hz squarewave generated on STORE is routed to VOL/SQ HI, and through the audio EEPOT, U3, to the LIM CG input. After a long squarewave train, the LIM CG input is checked for a low.

TEST 31 The audio paths are set up such that the 7000 Hz squarewave generated on STORE s routed to VOL/SQ HI. and through the audio EEPOT, U3, to the LIM CG input. After a long squarewave train, the LIM CG input is checked for a high.

TEST 32 Reserved

TEST 33 Reserved

TEST 34 Reserved

TEST 35 Reserved

TEST 36 The RX MUTE line is routed to the CAS input. This test checks the low state of this connection.

TEST 37 The RX MUTE line is routed to the CAS input. This test checks the high state of this connection.

TEST 38 The audio paths set up are such that the simulated 7000 Hz squarewave on TONE is routed through the analog switch, U2A, through the audio EEPOT, U3, through the analog switch, U2C, through the PA amplifier, U13, through the coupling capacitor, C19, through the analog switch, U2B, to MIC HI which is connected to VOL/SQ HI, through the fast squelch pot, R9, and finally to the fast squelch detect circuitry on the processor board.

This test checks fast squelch detect idle state after a long time using the most significant bit of TONE only.

TEST 39 The audio paths set up are such that the simulated 7000 Hz squarewave on TONE is routed through the analog switch, U2A, through the audio EEPOT, U3, through the analog switch, U2C, through the PA amplifier, U13, through the coupling capacitor, C19, through the analog switch, U2B, to MIC HI which is connected to VOL/SQ HI, through the fast squelch pot, R9, and finally to the fast squelch detect circuitry on the processor board.

This test checks fast squelch detect attack state after a long time using the most significant bit of TONE only.

TEST 40 The audio paths set up are such that the simulated 7000 Hz squarewave on TONE is routed through the analog switch, U2A, through the audio EEPOT, U3, through the analog switch, U2C, through the PA amplifier, U13, through the coupling capacitor, C19, through the analog switch, U2B, to MIC HI which is connected to VOL/SQ HI, through the fast squelch pot, R9, and finally to the fast squelch detect circuitry on the processor board.

This test checks fast squelch detect idle state after a long time using the both significant bits of TONE.

TEST 41 The audio paths set up are such that the simulated 7000 Hz squarewave on TONE is routed through the analog switch, U2A, through the audio EEPOT, U3, through the analog switch, U2C, through the PA amplifier, U13, through the coupling capacitor, C19, through the analog switch, U2B, to MIC HI which is connected to VOL/SQ HI, through the fast squelch pot, R9, and finally to the fast squelch detect circuitry on the processor board.

This test checks fast squelch detect attack state after a long time using the both significant bits of TONE.

TEST 42 The FB1 line is routed to the S PTT input. This test checks the low state of this connection.

TEST 43 The FB1 line is routed to the S PTT input. This test checks the high state of this connection.

TEST 44 The FB2 line is routed to the C PTT input. This test checks the low state of this connection.

TEST 45 The FB2 line is routed to the C PTT input. This test checks the high state of this connection.

TEST 46 The CG DIS OUT line is routed to the CG DIS IN input. This test checks the low state of this connection.

TEST 47 The CG DIS OUT line is routed to the CG DIS IN input. This test checks the high state of this connection.

TEST 48 The FB3 line is routed to the HORN RING input. This test checks the low state of this connection.

TEST 49 The FB3 line is routed to the HORN RING input. This test checks the high state of this connection.

TEST 50 The FB3 line is routed to the HORN RING input which is enabled to be passed to the HORN RET, and is routed to the LIM CG input.

This test checks the low state of this connection (HORNRET and LIM CG).

TEST 51 The FB3 line is routed to the HORN RING input which is enabled to be passed to the HORN RET, and is routed to the LIM CG input.

This test checks the high state of this connection (HORN RET and LIM CG).

TEST 52 The FB3 line (which is high) is routed to the HORN RING input.

The HORN DIS signal is used to enable/disable the routing of HORN RING to HORN RET.

This test checks the disable function for HORN DIS.

TEST 53 The FB3 line (which is high) is routed to the HORN RING input.

The HORN DIS signal is used to enable/disable the routing of HORN RING to HORN RET.

This test checks the enable function for HORN DIS.

TEST 54 The RADIO RES line is routed to the GESTAR input. This test checks the low state of this connection.

TEST 55 The RADIO RES line is routed to the GESTAR input. This test checks the high state of this connection.

****** VEHICLE UNIT ONLY *****

Tests 56 through 67 pertain to the Vehicle version of the Control Unit.

TEST 56 The CLR SPT line is routed to the S PTT input. This test checks the low state of this connection.

TEST 57 The CLR SPT line is routed to the S PTT input. This test checks the high state of this connection.

TEST 58 The F RED line is routed to the C PTT input. This test checks the low state of this connection.

TEST 59 The F RED line is routed to the C PTT input. This test checks the high state of this connection.

TEST 60 The R 180 line is routed to the CG DIS IN input. This test checks the low state of this connection.

TEST 61 The R 180 line is routed to the CG DIS IN input. This test checks the high state of this connection.

TEST 62 The R RED line is routed to the S PTT input. This test checks the low state of this connection.

TEST 63 The R RED line is routed to the S PTT input. This test checks the high state of this connection.

TEST 64 The WIG WAG line is routed to the C PTT input. This test checks the low state of this connection.

TEST 65 The WIG WAG line is routed to the C PTT input. This test checks the high state of this connection.

TEST 66 The R AMB line is routed to the CG DIS IN input. This test checks the low state of this connection.

TEST 67 The R AMB line is routed to the CG DIS IN input. This test checks the high state of this connection.

****** MOTORCYCLE UNIT ONLY *****

Tests 68 through 75 pertain to the M otorcycle version of the Control Unit.

TEST 68 The audio paths set up are such that the simulated 7000 Hz squarewave on TONE is routed through the analog switch, U2A, through the audio EEPOT, U3, through the analog switch, U2C, through the PA amplifier, U13, to HD SET AUDIO which is connected to VOL/SQ HI, through the fast squelch pot, R9, and finally to the fast squelch detect circuitry on the processor board.

This test checks the fast squelch idle state after a long time using both bits of TONE.

TEST 69 The audio paths set up are such that the simulated 7000 Hz squarewave on TONE is routed through the analog switch, U2A, through the audio EEPOT, U3, through the analog switch, U2C, through the PA amplifier, U13, to HD SET AUDIO which is connected to VOL/SQ HI, through the fast squelch pot, R9, and finally to the fast squelch detect circuitry on the processor board.

This test checks the fast squelch attack state after a long time using both bits of TONE.

TEST 70 The audio paths set up are such that the simulated 7000 Hz squarewave on FB1 is routed to MIC PRE HI, to MIC HI, through the analog switch U2A, through the audio EEPOT U3, through the analog switch U2C, the the PA amplifier U13, to VOL/SQ HI, through the fast squelch pot, R9, and finally to the fast squelch detect circuitry on the processor board.

This test checks the fast squelch idle state after a long time using both bits of TONE.

TEST 71 The audio paths set up are such that the simulated 7000 Hz squarewave on FB1 is routed to MIC PRE HI, to MIC HI, through the analog switch U2A, through the audio EEPOT U3, through the analog switch U2C, the PA amplifier U13, to VOL/SQ HI, through the fast squelch pot, R9, and finally to the fast squelch detect circuitry on the processor board.

This test checks the fast squelch attack state after a long time using both bits of TONE.

TEST 72 Reserved

TEST 73 Reserved

TEST 74 Reserved

TEST 75 Reserved

FREQUENCY RESPONSE AND DISTORTION

The CHP Automatic Tester also provides the measurement of audio frequency response and distortion measurements via the audio input and output tests jacks. A group of CHPSMON commands set up the audio paths in the CHP Control Unit and the CHP Automatic Tester to enable these measurements to be performed.

The command "MIC 25" sets up the audio paths so that the MIC HI (or MIC PRE HI) audio path can be checked for frequency response and distortion.

The command "VOL 25" sets up the audio paths so that the VOL/SQ HI audio path can be checked for frequency response and distortion.

TEST CONFIGURATION

To measure the audio frequency response and distortion of the MIC HI, MIC PRE HI, and VOL/SQ HI paths, the proper loading on the audio test points must be included on the CHP Control Unit.

The MIC HI input is generated from a low impedance audio oscillator with the impedance and audio level depicted below.

The MIC PRE HI input is generated from a low impedance audio oscillator with the impedance and audio level shown below.

The VOL/SQ HI input is generated from a low impedance audio oscillator with the impedance and audio level depicted below.

The VOL ARM output, the SQ ARM output and the PA AUDIO output are all measured with a high impedance rms meter at the impedance shown below.

The HDSET AUDIO output is measured with a high impedance rms meter at the impedance depicted below. This test impedance must be removed for the other audio tests.

The CHPSMON test mode of operation is to be used in order to set up the different audio paths and EEPOT levels for the individual frequency response tests.

Tables 1 through 3 show the test conditions and expected outputs in tabular form.

TEST CONDITION	CHPSMON COMMAND	TEST LOAD	OUTPUT POINT	FREQ. (HZ)	OUTPUT (MVOLTS REMS)
MIC HI @ 1 V RMS 300 TO 3000 HZ	MICL 99		VOL ARM SQ ARM	300 TO 3 KHZ	1000 1000 (±15%)
	MIC 4	4.7K TO GND ON PA AUDIO	PA AUDIO	300 1000 3000	860 460 170 (±15%)
		16 OHM TO GND ON HD. AUD.	HDSET AUDIO	300 1000 3000	950 820 310 (±15%)

NOTE:
ALL TEST LOADS ± 1% RESISTORS
MEASUREMENTS MADE WITH HIGH IMPEDANCE PROBES (> 100 K)
INPUT TEST SIGNALS HAVE DC BIAS OF 4 VOLTS (±5%)
DISTORTION LESS THAN 1%

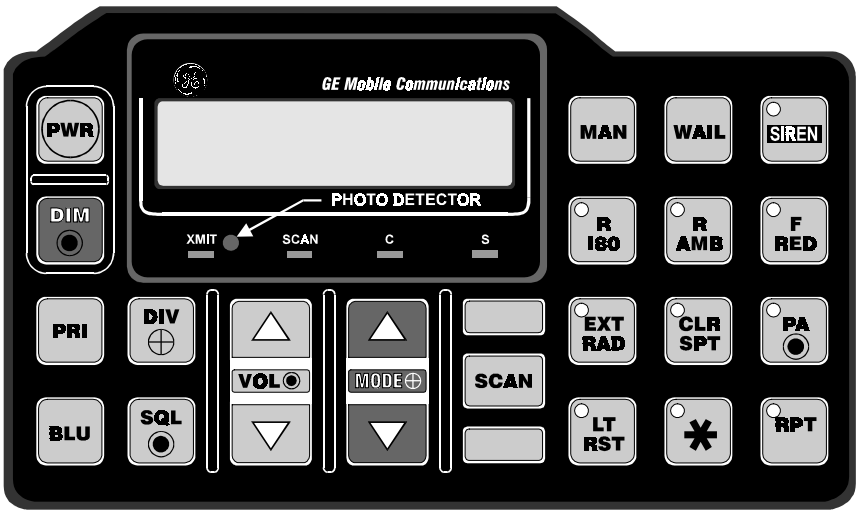
Table 1 - MIC HI AUDIO FREQUENCY RESPONSE

TEST CONDITION	CHPSMON COMMAND	TEST LOAD	OUTPUT POINT	FREQ. (HZ)	OUTPUT (MVOLTS REMS)
VOL/SQ HI @ 1 V RMS 300 TO 3000 HZ	VOLL 99		VOL ARM SQ ARM	300 TO 3 KHZ	1000 1000 (±15%)
	VOL 4	4.7K TO GND ON PA AUDIO	PA AUDIO	300 1000 3000	900 480 180 (±15%)
		16 OHM TO GND ON HD. AUD.	HDSET AUDIO	300 1000 3000	1000 860 330 (±15%)
NOTE: ALL TEST LOADS ± 1% RESISTORS MEASUREMENTS MADE WITH HIGH IMPEDANCE PROBES (> 100 K) INPUT TEST SIGNALS HAVE DC BIAS OF 4 VOLTS (±5%) MEASUREMENTS TAKEN AT 25 DEGREES C DISTORTION LESS THAN 1%					

Table 2 - VOL/SQ HI AUDIO FREQUENCY RESPONSE

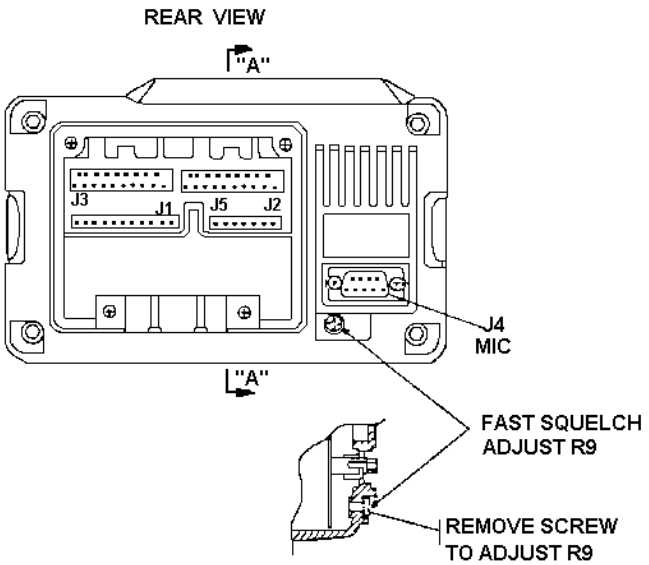
TEST CONDITION	CHPSMON COMMAND	TEST LOAD	OUTPUT POINT	FREQ. (HZ)	OUTPUT (MVOLTS REMS)
MIC PRE HI @ 10MV RMS 300 TO 3000 HZ	MICL 99		VOL ARM SQ ARM	300 TO 3 KHZ	75 80 (±25%)
	MIC 20	4.7K TO GND ON PA AUDIO 600 OHM TO 8V ON MIC HI	PA AUDIO	300 1000 3000	240 140 50 (±40%)
		16 OHM TO GND ON HD. AUD. 600 OHM TO 8V ON MIC HI	HDSET AUDIO	300 1000 3000	150 120 80 (±40%)
NOTE: ALL TEST LOADS ± 1% RESISTORS MEASUREMENTS MADE WITH HIGH IMPEDANCE PROBES (> 100 K) INPUT TEST SIGNALS HAVE DC BIAS OF 4 VOLTS (±5%) MEASUREMENTS TAKEN AT 25 DEGREES C DISTORTION LESS THAN 1%					

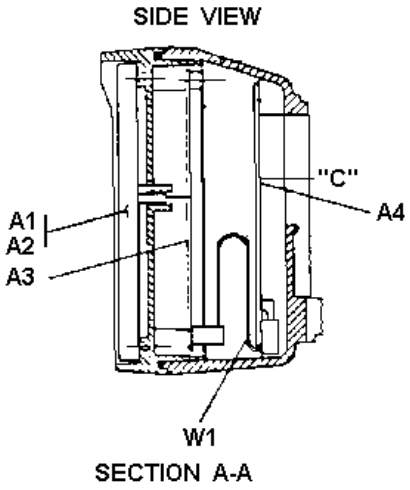
Table 3 - MIC PRE HI AUDIO FREQUENCY RESPONSE

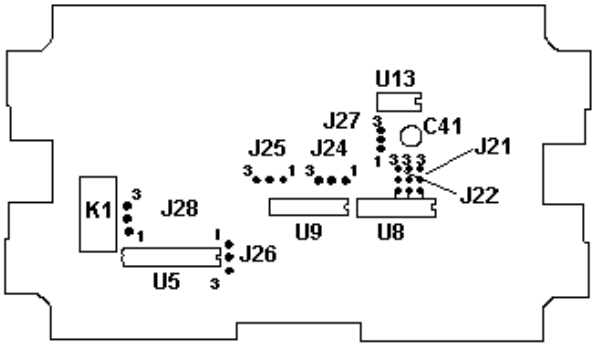


P21-28 INSTALLATION CHART	
PLUG	VEHICULAR OPERATION
P21	J21-18.2
P22	J22-18.2
P23	J23-18.2
P24	J24-18.2
P25	J25-18.2
P26	J26-18.2
P27	J27-18.2
P28	J28-18.2

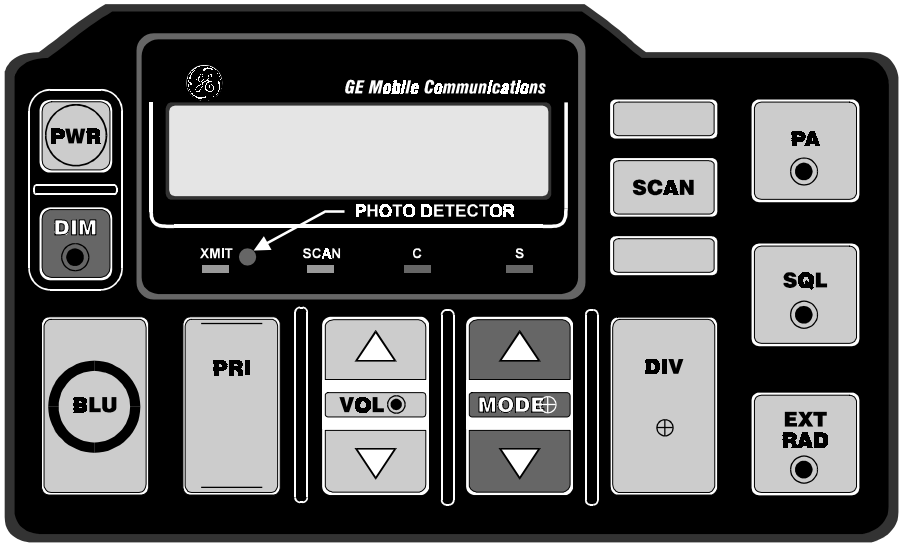
NOTE: SEE VIEW AT "C" I/0 BOARD FOR LOCATION OF J21 THRU J28







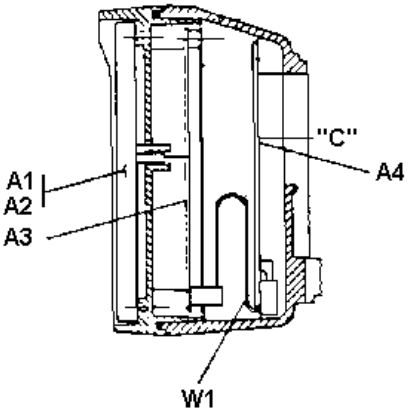
VEHICULAR CONTROL UNIT



P21-28 INSTALLATION CHART	
PLUG	VEHICULAR OPERATION
P21	J21-28.3
P22	J22-28.3
P23	J23-28.3
P24	J24-28.3
P25	J25-28.3
P26	J26-18.2
P27	J27-28.3
P28	J28-18.2

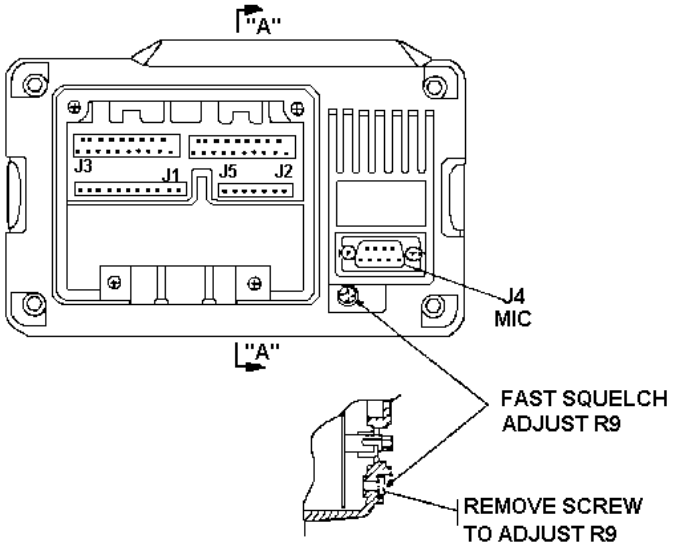
NOTE: SEE VIEW AT "C" I/0 BOARD FOR LOCATION OF J21 THRU J28

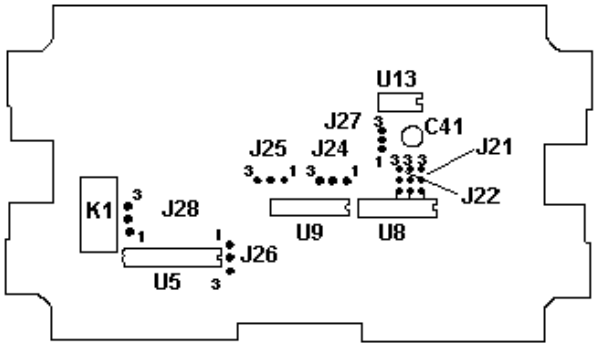
SIDE VIEW



SECTION A-A

REAR VIEW





I/O BOARD
VIEW AT "C"

MOTORCYCLE CONTROL UNIT

PARTS LIST

CONTROL UNIT
19D901146G1 VEHICLE
19D901146G2 MOTORCYCLE
Issue 4

SYMBOL	PART NO.	DESCRIPTION
A1	19D902913G1	Display Panel, Vehicular. (For Parts List refer to the applicable maintenance manual).
A2	19D902913G2	Display Panel, Motorcycle. (For Parts List refer to the applicable maintenance manual).
A3	19D902865G4	Processor Board. (For Parts List refer to the applicable maintenance manual).
A4	19D902058G1	Input/Output Board, Vehicular. (For Parts List refer to the applicable maintenance manual).
A4	19D902058G3	Input/Output Board, Motorcycle. (For Parts List refer to the applicable maintenance manual).
		- - - - - - - - - PLUGS - - - - - - - - -
P21 thru P28	19A702104P2	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
		- - - - - - - - - CABLES - - - - - - - - -
W1	19B801253P3	Cable Assembly.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B801256G1	Front Cover.
	19C851661G1	Rear Housing.
	N170P13006B6	Screw, Cap: No. 6 (.138) - 32 x 3/8. (Secures A1 & A2).
	19C851656G1	Shield. (Mounts to frame).
	344A3916P408	Screw, Torx: No. 4 (.112) - 40 x .50. (Secures shield).
	N404P11B6	Lockwasher; internal: No. 4. (Secures shield).
	344A3916P506	Screw, Torx: No. 6 - 32 x 3/8. (Secures A4).
	N404P13B6	Lockwasher; internal tooth: No. 6. (Secures A4).
	19B209727P46	Screwlock: female, sim to Amp 205818-2.
	N404P11B6	Lockwasher; internal: No. 4. (Secures shield).
	19J706880P5	Washer. (Secures cover).
	N97P15003	Screw: No. 10 (.190) - 32 x 5/8. (Secures cover).
	N171P16010	Screw: No. 10 - 32 x 5/8. (Secures cover).
	19A701365P6	Washer: No. 10. (Secures cover).
	79C337624P1	Guide, connector.
	344A3743P1	Insulator.

* COMPONENTS, ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PARTS LIST
LBI-38205
ASSOCIATED ASSEMBLIES

SYMBOL	PART NO.	DESCRIPTION
		POWER CONTROL CABLE 19D438371G1
		- - - - - - FUSES - - - - - -
F1	7484390P1	Cartridge, quick blow: 15 amps at 250v; sim to Bussmann ABC10.
		- - - - - - - PLUGS - - - - - - -
P1		Connector. Includes:
	19C850508P1	Cover.
	19D900037P1	Shell.
	19D900015P1	Housing.
P2	19B226516G1	Connector.
P3	19B226516G2	Connector.
P4		Connector. Includes:
	19D413039P1	Cover.
	19D413039P2	Cover.
	19C311409P1	Receptacle, phenolic: 28 contacts.
	19C311411G1	Screw assembly.
P5		Connector. Includes:
	19A142950P40	Connector plug, 28 pin.
	19A142950P41	Cable clamp.
	19A142950P42	Terminal.
		- - - - - - - FUSE HOLDER - - - - - - -
XF1	19A149451P2	Fuse holder, 15 amps, 32 volts: sim to Bussman Type HHB.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B800513P4	Gasket. (Used with P1).
	7139880P20	Cable, special purpose, 34 conductors with overall shield.
	7142878G1	Loop clamp.
	19A701077P1	Clip. (Used with P1).
	19A701488P4	Retaining ring. (Used with P1).
	19A705055P1	Thumbscrew. (Used with P1).
	19A701312P6	Flatwasher: 1.7 - 1.85 ID. (Used with P1).
	N404P11C6	Lockwasher, internal: No. 4. (Used to secure cables to P1).
	7141225P2	Hex nut: No. 4 - 40. (Used to secure cables to P1).
	N80P9018C6	Machine screw, panhead: No. 4 - 40 x 1 1/8. (Used to secure cables to P1).
	19A701507P606	Screw, thread forming: M3.5 - 1.27 x 9.60. (Used with P1).
	19A701507P608	Screw, thread forming: No. 3.5 - 1.27 x 12.7. (Used with P1).
	19B800629P1	Solderless terminal: wire range No. 8 AWG; sim to AMP 2 - 331461-2.
	7139880P23	Cable, special purpose, 11 conductors.
	19D413039P1	Connector cover. (Used with P4).
	19D413039P2	Connector cover. (Used with P4).
	N210P9C6	Hex nut, steel: No. 4 - 40. (Used with P4).
	N86P902036	Machine screw: No. 4 - 40 x 1 1/4. (Used with P4).
	7139880P22	Cable, special purpose, 7 conductors.
	19B209268P1	Solderless terminal: wire range No. 16 - 22 AWG; sim to AMP 2 - 326861-1.
	7150186P107	Spacer: No. 6 x 1/4. (Used with P1).
	19B800629P6	Solderless terminal: wire range No. 14 - 16 AWG; sim to AMP 42751-2.
	19A149468P1	Gasket. (Used with P5).
	19C336968P1	Connector clamp. (Used with P4).
	19C336968P2	Connector clamp. (Used with P4).
		POWER/CONTROL CABLE (Motorcycle) 19D438372G2
		- - - - - - - PLUGS - - - - - - -
P1		Connector. Includes:
	19C850508P1	Cover.
	19D900037P1	Shell.
	19D900015P1	Housing.
P2	19B226516G1	Connector.
P3	19B226516G2	Connector.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B800513P1	Gasket. (Used with P1).
	7139880P24	Cable, special purpose, 34 conductors with overall shield.
	19A701077P1	Clip. (Used with P1).
	19A701488P4	Retaining ring. (Used with P1).
	19A705055P1	Thumbscrew. (Used with P1).

* COMPONENTS, ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	PART NO.	DESCRIPTION
	19A701312P6	Flatwasher: 1.7 - 1.85 ID. (Used with P1).
	19A700032P5	Lockwasher, internal tooth: No. 3.
	19A700034P5	Hex nut, steel: M3.5 x .6.
	19A700031P425	Machine screw, No. M3-0.5 x 25.
	19A701507P606	Screw, thread forming: M3.5 - 1.27 x 9.60.
	19A701507P608	Screw, thread forming: No. 3.5 - 1.27 x 12.7.
	19B800629P1	Solderless terminal.
	5490407P28	Rubber, grommet.
	19A116781P3	Contact, electrical: wire range No. 16 - 20 AWG; sim to Molex 08 - 50 - 0105.
	19A116781P4	Contact, electrical: wire range No. 22 - 26 AWG; sim to Molex 08 - 50 - 0107.
	19A142950P35	Fuseholder.
	19A142950P36	Fuse, 20 amp, 125 volt.
	19B800629P6	Solderless terminal: wire range No. 14 - 16 AWG; sim to AMP 42751-2.
		HEADSET CABLE ASSEMBLY 19B235014G1
		- - - - - - - - - PLUGS - - - - - - - - -
P1	19A116659P20	Shell.
P2	19B235015P2	Jack, telephone, four connector: sim to Nexus J101.
		- - - - - - - - - CABLES - - - - - - - - -
W1 thru W3		Cable, Beldon 9770. (Available as part of 19B235014G1 only).
		FUSED CONNECTOR ASSEMBLY 19B235013G1 (Vehicle) 19B235013G2 (Motorcycle)
		- - - - - - - PLUGS - - - - - - -
P1	19A116659P143	Shell.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B235012G1	Fused lead, approximately 53 inches. (Used with Group 1).
	19B235012G3	Fused lead, approximately 53 inches. (Used with Group 1).
	19A149427G1	Cable, approximately 53 inches. (Used with Group 1).
	19B235012G2	Fused lead, approximately 39 inches. (Used with Group 2).
	19B235012G4	Fused lead, approximately 39 inches. (Used with Group 2).
	19A149427G2	Cable, approximately 39 inches. (Used with Group 2).
	19A134268P3	Conduit, nonmetallic: sim to CO-OPERATIVE IND. INC. C-11000-20. (Used with Groups 1 & 2).
	19B209519P1	Polarity tab. (Used with P1).
	19A129414G4	Cable, approximately 39 inches. (Used with Groups 1 & 2).
	19A116781P4	Contact, electrical: wire range No. 22 - 26 AWG; sim to Molex 08 - 50 - 0107. (Used with P1 & W3).
	5490407P2	Grommet. (Used with P2).
	19A134268P3	Conduit, nonmetallic: sim to CO-OPERATIVE IND. INC. C-11000-20. (Used with W1 - W3).
	19B209519P1	Polarity tab. (Used with P1).
		LIGHT CABLE ASSEMBLY 19A149425G1
		- - - - - - - PLUGS - - - - - - -
P1	19A116659P20	Shell.
		- - - - - - - - - CABLES - - - - - - - - -
W1		Cable, Beldon 9423. (Available as part of 19A149425G1 only).

SYMBOL	PART NO.	DESCRIPTION
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A116781P4	Contact, electrical: wire range No. 22 - 26 AWG; sim to Molex 08 - 50 - 0107. (Used with P1 & W3).
	19A134268P3	Conduit, nonmetallic: sim to CO-OPERATIVE IND. INC. C-11000-20. (Used with W1).
	19B209519P1	Polarity tab. (Used with P1).
		MICROPHONE 19B801499P4
		MICROPHONE MOUNTING KIT 7141414G2
	N193P1408B6	Tap screw: No. 8 - 18 x 1/2.
	4031457G1	Bracket.
	4031457G1	Spring.
	19A116773P105	Tap screw, phillips POZIDRIV: No. 7 - 19 x 5/16.
		CONTROL HEAD OFFSET SUPPORT 19B801514G1
	19B801513P1	Support.
	19B232947P2	Nut, adjustable.
		HARDWARE KIT 19A705137G1
	N187P21014B1	Machine screw, hex head: No. 1/4 - 20 x 7/8.
	19A115409P3	Lock washer, tooth: sim to Shakeproof Co. 4814 - 14 - 02.
	N710P1612B17	Tap screw, hex head: No. 10 - 16 x 7/8.
	N710P1612B17	Tap screw, hex head: No. 10 - 16 x 1 1/2.
	N710P1612B17	Cap screw, stainless steel: No. 10 - 32 x 5/8.
		REAR CAP ASSEMBLY 19B801262G1
	19D438177P1	Cable cover.
	19A701381P6	Rubber seal, round.
		18 WATT SPEAKER (4 Ohms) 19B235025P1

ASSOCIATED ASSEMBLIES

Ericsson Inc.
Private Radio Systems
Mountain View Road
Lynchburg, Virginia 24502
1-800-528-7711 (Outside USA, 804-528-7711)

Printed in U.S.A.