

LBI-38518A

Maintenance Manual

FRONT COVER
TEST ACCESSORY KIT
19D902562

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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.

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DESCRIPTION

The Front Cover Test Accessory kit is used to test the MPA or MTL Personal Radio Front Cover Assembly.

The accessory kit enables you to test or troubleshoot the LCD Board, the Keypad Flex or the Control Board. By using the MPA/MTL Test Program you can perform operational testing of the LCD Display, both in or out of circuit, or the Keypad Flex circuit without the Control Board. Using the Controller Extender permits operation of the Control Board outside the front cover and provides a convenient means of testing the Volume Control or microphone.

The Front Cover Test Accessory Kit includes the following items:

- SPK9010** • Front Cover Test Cable, 19D902562P5
- LCD Extender Plate, and Clamp, 19D902562P1
- LCD Test Cable, 19D902562P2
- MPA/MTL Test Program Diskette, 19D902562P6
- SPK9011** • Adapter Board, 19D902562P3
- Controller Extender, 19D902562P4

EQUIPMENT REQUIRED

The support equipment listed below may be needed when using the Front Cover Test Accessory Kit:

1. Service manual for radio under test.
2. DC Power Supply (7.5 volts, 3 Amps minimum).
3. Oscilloscope with 1 Megohm probe.
4. Voltmeter with 1 Megohm input impedance.
5. IBM PC or compatible with at least 256K RAM and parallel printer output port.
6. Dummy Battery K19/A4WX01543.

PREPARATION FOR USE

We recommend upon receipt of your diskette, that you copy the original MPA/MTL Test Software Diskette to another diskette or fixed disk and store the original in a safe place. This will protect you against the possibility of your original MPA/MTL Test Software Diskette being lost or destroyed. Instructions for copying the diskette are contained in the section titled "Software Backup."

Preparing for the MPA/MTL Display and Front Cover Tests requires disassembly of the radio. Disassembly procedures are contained in the radio's maintenance manual.

CAUTION

The Control Board, LCD Display, and Keypad Flex may be damaged by electrostatic discharge (ESD). Use proper grounding procedures when handling these assemblies.

With the Front Cover Assembly removed from the radio, prepare for testing by using the setup procedures for LCD Testing, Front Cover and Display Testing, or extending the Control Board.

To start the test sequence, load the program "MPATEST.EXE." The program starts by requesting printer port selection followed by the Test Mode Menu. As long as the program remains in residence, quitting the Display and Front Cover/Keypad tests returns control to the Test Mode Menu. If you quit while in the Test Mode Menu, the program returns control to the DOS and must be restarted to continue testing.

PROGRAM INITIALIZATION

MPATEST prompts the operator to select a port each time it is started.

Selecting a Printer Port

The MPATEST program uses a parallel printer port (parallel out) to send instructions to the front cover or LCD display under test. The parallel printer connector on most PC-compatibles is a female DB25 connector. If the computer uses a different type connector, an adapter cable will be required. The printer ports on lap-top and desktop computers with built-in printer ports are usually identified on the case. Printer ports on plug-in cards often are not. Up to three parallel printer ports may be installed in PC-compatibles, although most only have one port. Consult your computer instruction manual or option card for assistance in identifying the printer port(s).

If the printer port(s) are connected to printers, temporarily disconnect the printer cable from one of the ports to use MPATEST. Disable any printer manager or spooler programs that use the port, and reboot the computer before using MPATEST. You may wish to consult your computer dealer to see if an additional printer port can be installed in the computer. Installing an extension cable may also make the task of switching cables a little easier.

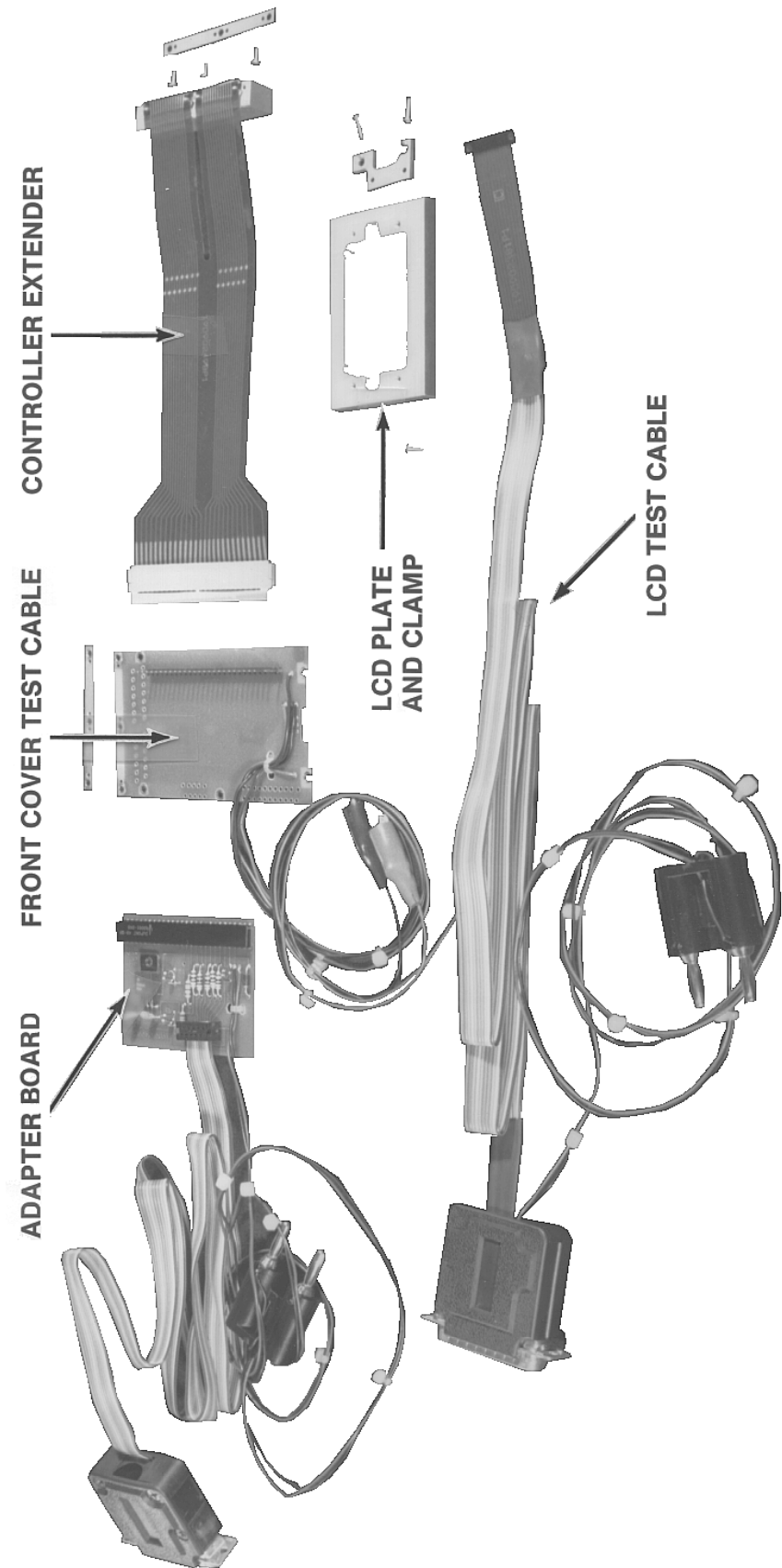


Figure 1 - Front Cover Test Accessory Kit

Since any one of three PC-compatible printer ports may be used, the port selection menu lists the three ports and identifies the computer ports available on your computer. The display includes port address and DOS LPT number to aid in identifying the port, as shown in Figure 2.

Selection of the port is made by pressing the letter (A, B, or C) corresponding to the printer port used, or press Q to quit MPATEST and return to DOS.

NOTE

MPATEST uses features of the computer's ROM BIOS to identify available printer ports. Although unlikely, MPATEST may not display available ports, or may find unsupported non-standard port addresses. Unsupported ports will display as

UNSUPPORTED PRINTER PORT DETECTED, DOS LPT x.

If any of the three standard ports is installed, but not listed as available, it may still be selected by pressing its letter.

Selecting a Test Mode

After selecting a printer port, the Test Mode Menu appears on the computer screen. (See Figure 3.)

Start the test procedure by selecting the letter representing the desired test.

D - TEST DISPLAY

Press "D" to test a LCD Board removed from the Front Cover. After selecting "D", the MPA Display Test menu appears.

NOTE

Be sure to use "D" to test a LCD board removed from the front cover and "F" to test the LCD display while installed in the front cover and connected to the keypad flex. The test commands are identical, but the LCD display must be controlled differently, and will not work if the wrong test mode is chosen.

MPA/MTL DISPLAY AND FRONT COVER TEST V1.0
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PRESS LETTER TO SELECT PRINTER PORT

A - MONOCHROME ADAPTER (3BC HEX)
 B - FIRST PRINTER/MULTIFUNCTION ADAPTER (378 HEX)
 C - SECOND PRINTER/MULTIFUNCTION ADAPTER (278 HEX)
 Q - QUIT TEST - RETURN TO DOS

AVAILABLE PRINTER PORTS -

A - MONOCHROME ADAPTER (3BC HEX), DOS LPT 1
 B - FIRST PRINTER/MULTIFUNCTION ADAPTER (378 HEX), DOS LPT 2

Figure 2 - Typical Port Selection Menu

F - TEST FRONT COVER OR KEYPAD

Press "F" to test the LCD display and Keypad Flex circuit while installed in the Front Cover Assembly. This test requires using the Adapter Board and Front Cover Test Cable. After selecting "F", the MPA/MTL Display and Front Cover Test menu appears.

Q - QUIT TEST - RETURN TO DOS

Press "Q" to quit the MPATEST program and return to DOS.

DISKETTE HANDLING

While working with your diskette you may want to consider the following handling procedures:

- A. Always store your diskette in its envelope.
- B. Insert the diskette into the drive carefully.
- C. Use only felt tipped pens to write on diskette labels.
- D. Store your diskette at a comfortable room temperature.
- E. Refrain from touching the recording surface.
- F. Do not bend the diskette.

G. Do not allow any form of liquid to come in contact with the diskette surface.

H. Keep diskette away from magnetic force fields as found in electronic equipment.

If you follow these very simple common sense guidelines you will receive long service from your diskette.

LCD BOARD TESTING

Testing a LCD Board involves removing the board from the front cover and performing the MPA Display Test procedure via the computer terminal. The MPA Display Test menu allows you to test the LCD display segments or the LED backlight. Test selection is made by pressing the letter preceding the test description. Each test (except LED test) sends a serial data message to the LCD board, causing the LCD to display a unique test pattern. The LED test sends a signal to the LED switch, located on the LCD board, lighting the two display backlights.

NOTE

The first message sent to the display after power on may not appear correctly, due to power-on glitches. If this occurs, repeat the test.

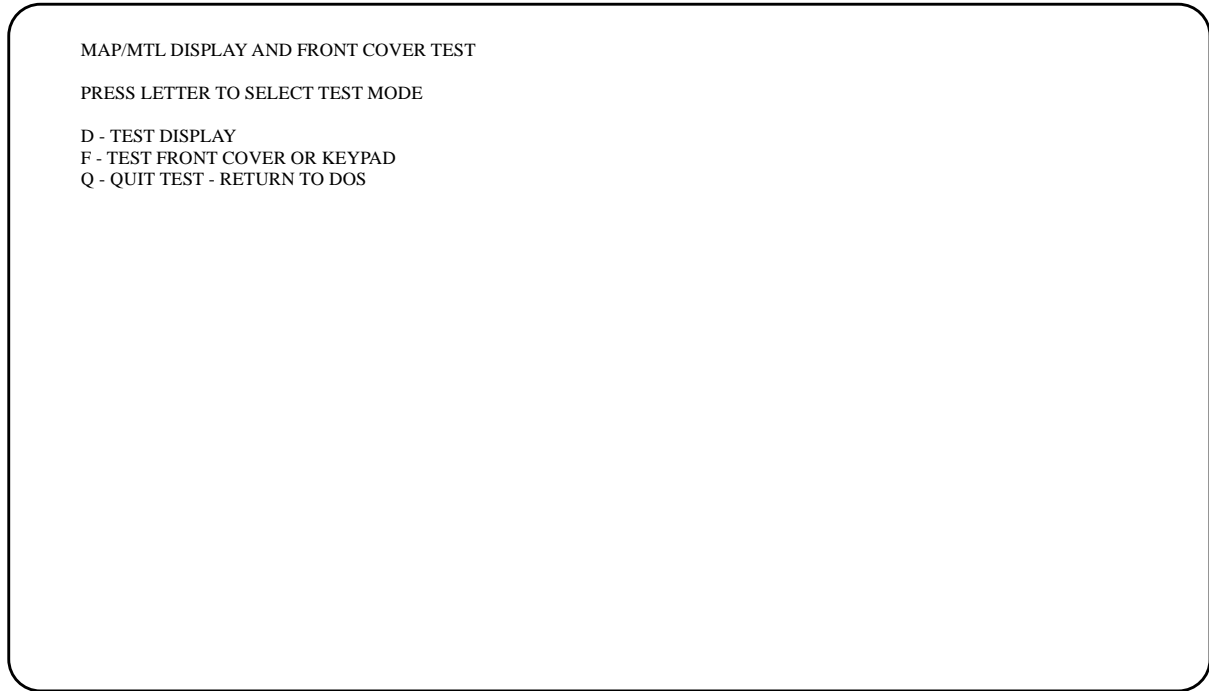


Figure 3 - Test Mode Menu

SETUP

Setup to test the LCD board using the following procedure. Instructions for the removal of Front Cover components are contained in the radio's maintenance manual. Figure 4 shows a LCD Board prepared for testing.

1. Remove the control board, shield casting, LCD clamp and radio top bezel. Remove the nuts retaining the volume and channel controls and slide the controls out of the front casting to expose the LCD board.
2. Remove the LCD board and mount it in the plate, using screws removed in step 1. Attach LCD Test Cable to LCD board using clamp provided.

CAUTION

Avoid touching the LCD Board Zebra connector J10/P10. Body oils and/or dirt may contaminate the contacts causing intermittent LCD operation.

3. Plug the DB25 connector from the Front Cover Test Cable into the computer's parallel printer port connector.
4. Observing polarity, connect the dual banana plug to the DC Power Supply. The red wire side goes to the power supply positive terminal and the black wire side goes to the power supply negative terminal.

CAUTION

Be certain supply voltage and polarity are correct or the circuit under test, and possibly the computer, will be damaged.

5. Adjust the Power Supply for an output voltage of 7.5 ±0.1 volts.
6. The LCD is ready for testing.
7. Perform program initialization if not previously accomplished. Begin testing by selecting "D" from the Test Mode Menu.
8. Test the LCD using the menu selections in the MPA Display Test Menu.
9. On completion of testing, reinstall LCD Board in front cover using procedures contained in radio's maintenance manual. If LCD Board is to be stored for later use, place board in an approved anti-static bag and store in a suitable location.

MPA DISPLAY TEST

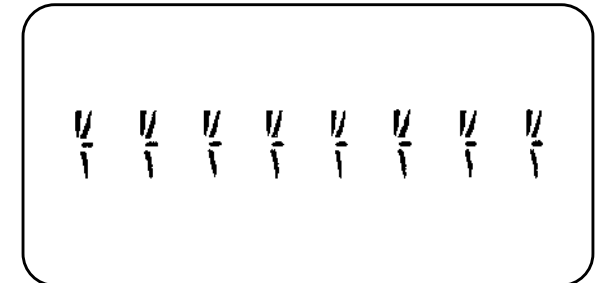
The MPA Display Test Menu, Figure 5, provides four LCD Board test options. Begin testing the LCD Board by pressing the letter corresponding to the test description.

B - DISPLAY BIT PATTERN TEST

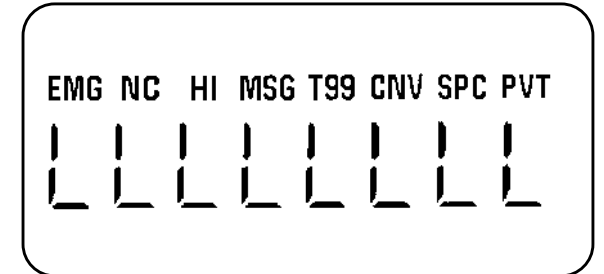
This test checks segment driver outputs and segment isolation. The computer generated serial data and control bytes are sent to the LCD controller. The controller then sends the four common plane signals and the segment on or off signals as indicated by each step. Each of the four steps display a unique pattern, testing the on and off condition of all segments.

Pressing "B" starts the test at step 1. After verifying the display segments, press any key to proceed to the next step.

1. Step 1 drives segments S0, S4, S8, S12, S16, S20, S24, and S28 with an ON waveform for all four common planes. Other segments are driven with an OFF waveform. It produces the following pattern:



2. Step 2 drives segments S1, S5, S9, S13, S17, S21, S25, and S29 with an ON waveform for all four common planes. Other segments are driven with an OFF waveform. It produces the following pattern:



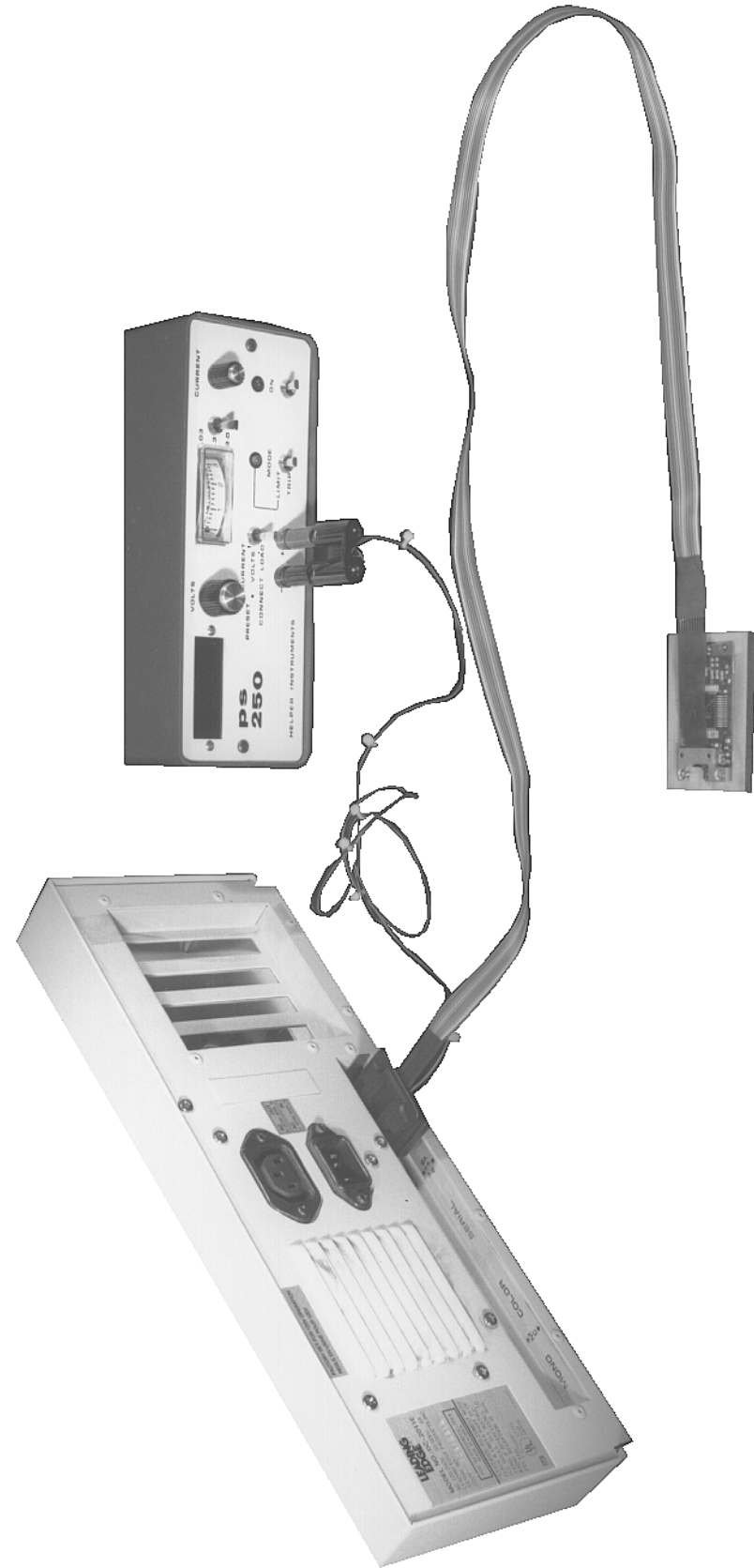


Figure 4 - LCD Board Test Setup

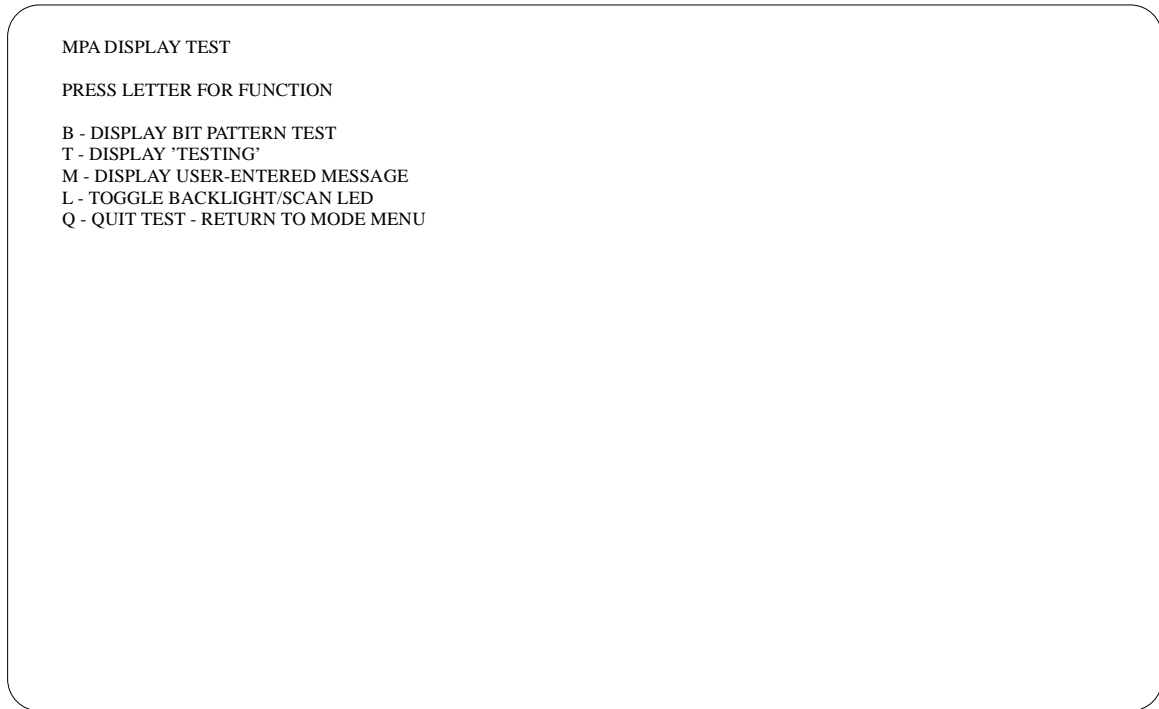
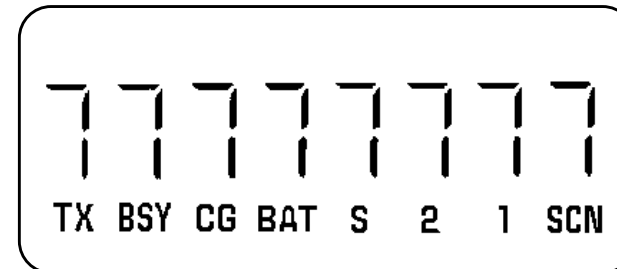
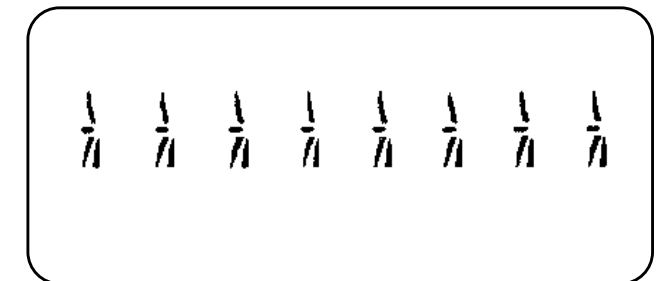


Figure 5 - MPA Display Test Menu

- Step 3 drives segments S2, S6, S10, S14, S18, S22, S26, and S30 with an ON waveform for all four common planes. Other segments are driven with an OFF waveform. It produces the following pattern:



- Step 4 drives segments S3, S7, S11, S15, S19, S23, S27, and S31 with an ON waveform for all four common planes. Other segments are driven with an OFF waveform. It produces the following pattern:



T - SEND 'TESTING'

This test serially sends the fixed message "TESTING" to the LCD display. It is convenient as a quick go/no-go test.

Pressing "T" selects this test, displaying the message "TESTING" momentarily on the computer screen. The message "TESTING" is displayed on the LCD until another test is selected.

M - DISPLAY USER ENTERED MESSAGE

This test allows the technician to send an 8-character message to the LCD Display.

Pressing "M" initiates the test and sends the following message prompt to the computer screen.

TYPE CHARS TO SEND, THEN ENTER > _

Respond to the prompt by typing up to 8 characters and pressing the Enter key. If entering less than 8 characters, they will be displayed starting with the left-most LCD digit. Use the Backspace key to correct typing errors. The LCD will continue to display the message until another test is selected.

NOTE

The LCD cannot display lowercase letters. They are translated to uppercase by MPATEST.

Some PC special symbols may appear as blanks on the LCD.

L - TOGGLE LED BACKLIGHT

This test toggles the LED backlight on and off. This is done by controlling the **DISPLIGHT** signal sent to the LCD board.

Pressing "L" initiates the test, displaying the backlight status message on the computer screen. To exit this test, press one of the other menu options.

NOTE

An initial depression of the "L" key may be required to synchronize the backlight and status message.

Q - QUIT TEST - RETURN TO MAIN MENU

Pressing "Q" returns you to the Test Mode Select menu.

KEYPAD AND FRONT COVER TESTING

This procedure allows you to test both the LCD and Keypad Flex circuits while installed in the front cover. It also provides convenient test points for testing the Volume Control and Microphone

The LCD test (MPA radios only) checks out the operation of the LCD display by initializing the flex serial-to-parallel shift register. This sends computer generated serial data and control bytes, **DISPC/D**, to the LCD controller. The controller then sends four common plane signals and the segment on or off signals to the LCD display. This checks the segment driver outputs and segment isolation.

The Backlight/Scan LED test checks the LCD backlighting (MPA only), Keypad backlighting, and SCAN LED (MTL only). Selecting this test initializes the flex serial-to-parallel shift register. On command from the computer, the register sends the **DISPLIGHT** signal turning on the display board's transistor switch. Turning on the switch lights the backlight LEDs and provides the **LED DRIVE** voltage to the keypad flex LEDs and the MTL radio SCAN LED.

NOTE

The first message sent to the display after power on may not appear correctly, due to power-on glitches. Send the message a second time if this occurs.

SETUP

Prior to starting the MPA/MTL Display and Front Cover Test, the Adapter Board and Front Cover Test Cable must be installed (see Figure 6). Use the following instructions in preparing the Front Cover Assembly for the test:

1. Remove the control board from the front cover using the procedures outlined in the radio's maintenance manual.
2. Carefully install the Adapter Board by first connecting P3 and then inserting the Adapter Board into the radio Front Cover.
3. Insure the Adapter Board's contact strip is properly seated against P4 and P1 on the Keypad Flex. Put the clamp bar in place and secure the Adapter Board to the front cover using the screws removed in step 1.
4. Secure the Adapter Board power terminals, H1 and H2, to the front cover using screws removed in step 1.
5. Install the Front Cover Test Cable observing the orientation of the J1 pin 2 key.
6. Plug in the DB25 connector from the Front Cover Test Cable into the computer's parallel printer port connector.
7. Observing polarity, connect the dual banana plug to the DC Power Supply. The red wire side goes to the power supply positive terminal and the black wire side goes to the power supply negative terminal.
8. Adjust the Power Supply for an output voltage of 7.5 \pm 0.1 volts.

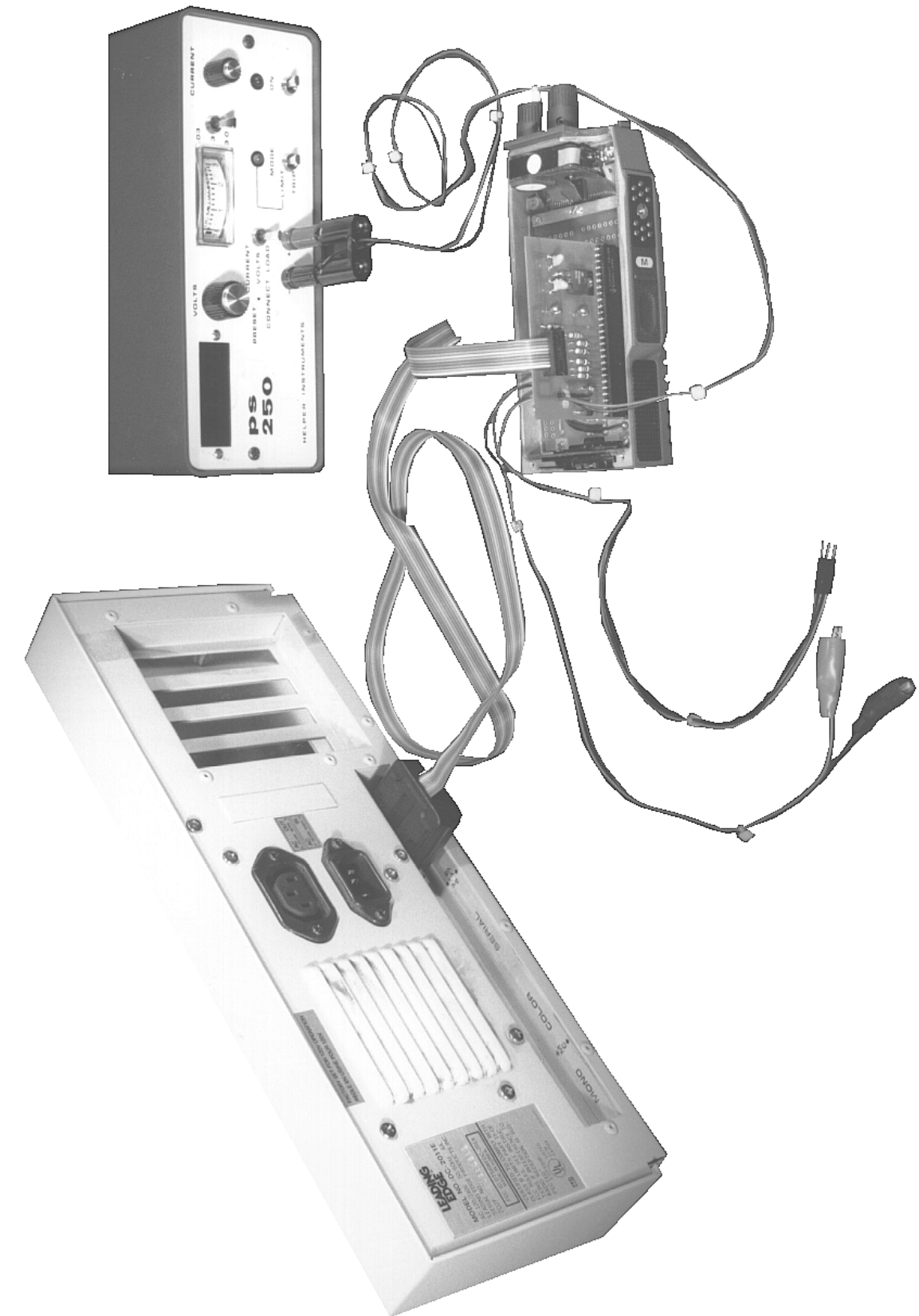


Figure 6 - MPA/MTL Display and Front Cover Test Setup

CAUTION

Be certain supply voltage and polarity are correct or the circuit under test, and possibly the computer, will be damaged.

- Begin the test by pressing "F" on the MODE MENU. The computer displays the MPA/MTL Front Cover/Keyboard test menu, providing five test functions. Simply press the letter preceding each test function to start the test.

MPA/MTL FRONT COVER/KEYBOARD TEST

The MPA Front Cover/Keypad Test Menu, Figure 7, provides five options for testing the Front Cover Assembly. Begin testing the LCD Board, Backlights, or Keypad by pressing the letter corresponding to the test description.

B - DISPLAY BIT PATTERN TEST

This test checks segment driver outputs and segment isolation. The computer generated serial data and control bytes are sent to the LCD controller. The controller then sends the four common plane signals and the segment on or off signals as indicated by each step. Each of the four steps display a unique pattern, testing the on and off condition of all segments.

MPA/MTL FRONT COVER/KEYPAD TEST

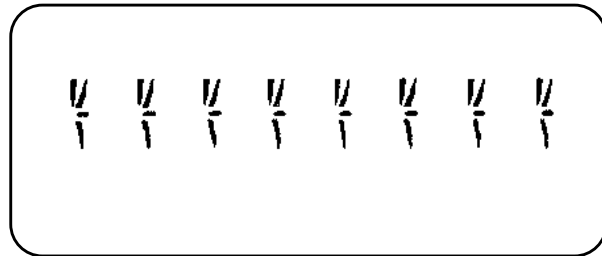
PRESS LETTER FOR FUNCTION

B - DISPLAY BIT PATTERN TEST
 T - DISPLAY 'TESTING'
 M - DISPLAY USER-ENTERED MESSAGE
 L - TOGGLE BACKLIGHT/SCAN LED
 K - TEST KEYPAD
 Q - QUIT TEST - RETURN TO MODE MENU

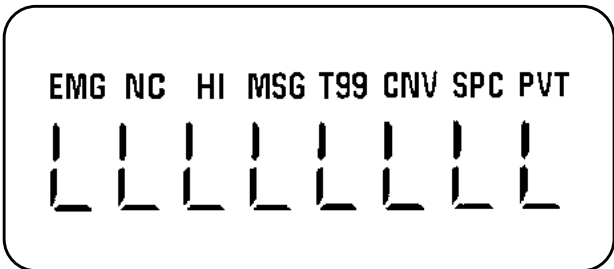
Figure 7 - MPA/MTL Front Cover/Keypad Test Menu

Pressing "B" starts the test at step 1. After verifying the display segments, press any key to proceed to the next step.

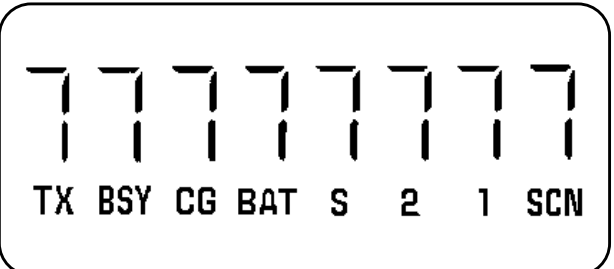
- Step 1 drives segments S0, S4, S8, S12, S16, S20, S24, and S28 with an ON waveform for all four common planes. Other segments are driven with an OFF waveform. It produces the following pattern:



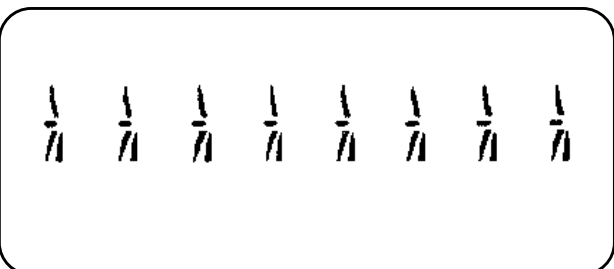
- Step 2 drives segments S1, S5, S9, S13, S17, S21, S25, and S29 with an ON waveform for all four common planes. Other segments are driven with an OFF waveform. It produces the following pattern:



- Step 3 drives segments S2, S6, S10, S14, S18, S22, S26, and S30 with an ON waveform for all four common planes. Other segments are driven with an OFF waveform. It produces the following pattern:



- Step 4 drives segments S3, S7, S11, S15, S19, S23, S27, and S31 with an ON waveform for all four common planes. Other segments are driven with an OFF waveform. It produces the following pattern:



T - SEND 'TESTING'

This test serially sends the fixed message "TESTING" to the LCD display. It is convenient as a quick go/no-go test.

Pressing "T" selects this test, displaying the message "TESTING" momentarily on the computer screen. The message "TESTING" is displayed on the LCD until another test is selected.

M - DISPLAY USER ENTERED MESSAGE

This test allows the technician to send an 8-character message to the LCD Display.

Pressing "M" initiates the test and sends the following message prompt to the computer screen.

TYPE CHARS TO SEND, THEN ENTER >_

Respond to the prompt by typing up to 8 characters and pressing the Enter key. If entering less than 8 characters, they will be displayed starting with the left-most LCD digit. Use the Backspace key to correct typing errors. The LCD will continue to display the message until another test is selected.

NOTE

The LCD cannot display lowercase letters. They are translated to uppercase by MPATEST. Some PC special symbols may appear as blanks on the LCD.

L - TOGGLE BACKLIGHT/SCAN LED

This test toggles the LCD backlight (MPA only), on and off. This is done by controlling the **DISP LIGHT** signal sent to the LCD board.

Pressing "L" initiates the test, displaying the backlight status message on the computer screen. To exit this test, press one of to other menu options.

NOTE

An initial depression of the "L" key may be required to synchronize the backlight and status message.

K - TEST KEYPAD

This test performs repeated scans of the keypad and displays the results of key presses and/or switch S1 settings. During initialization the computer programming identifies the type of radio and displays this information in the header above the table.

The test clocks 8 bits to the serial-to-parallel shift register, setting one of the column lines (C0-C3) to logic 0, and strobes SR ENA to latch the data. It then strobes SR STB to latch the 8 row lines (R0-R7) into the parallel-to-serial shift register, and shifts the data out of the shift register. The data is displayed on the screen. At the same time, the serial-to-parallel shift register is loaded with new data, setting the next column to logic 0. The process continues until all four columns are scanned; then it repeats.

Pressing "K" initiates the test. The computer displays a table similar to the tables on the Keypad Flex schematic. The header above the table indicates the type of radio being tested. Ensure the header indicates one of the following:

DISPLAYLESS FRONT COVER - For MTL radios.

SELECT FRONT COVER - For Select radios.

SCAN FRONT COVER - For Scan radios.

SYSTEM FRONT COVER - For System radios.

Failure to properly identify the radio under test may indicate a discrepancy in the Keypad Flex circuit.

The test is now ready to respond to key presses or Control Knob settings.

Keypad Testing

Press each individual key observing the computer indication. The correct responses to individual key presses are shown in Table 1. Dashes indicate possible responses to multiple undefined key presses and blanks indicate non responsive positions.

NOTE

For SCAN and SYSTEM radio with alternate keypad labeling, the computer continues to indicate MENU, SEL, EXIT, and SCAN when keys S2, S3, S4 and S5 are pressed.

Rotate the Channel Rotary Switch (S1) through its 16 positions, observing the computer responses and compare them with the indications listed in Table 2.

To exit this test and return to the MPA/MTL Front Cover/Keypad Test menu, press any computer key.

Q - QUIT TEST - RETURN TO MAIN MENU

Pressing "Q" returns you to the Test Mode Select menu.

Table 1 - Response To Key Press

KEYBOARD SCAN TEST - DISPLAYLESS FRONT COVER*

	R7	R6	R5	R4	R3	R2	R1	R0
C0	MENU	SEL	SCAN	EMER	-----	-----	MON	PTT
C1	1	2	4	5	7	8	*	0
C2	-----	3	EXIT	6	-----	9	-----	#
C3	-----	-----						

* - Header depends on radio type.

VOLUME CONTROL TESTING

With the Adapter Board and Front Cover Test Cable installed, test points for testing the Volume Control are provided. The Volume Control testing is done by measuring the voltage on the Volume Control wiper with respect to ground, using test points labeled VOL and GND.

1. Install Adapter Board and Front Cover Test Cable as described in setup steps 1 through 8.
2. Connect the VOM positive lead to the test point labelled VOL and the common lead to ground (GND) on the Adapter Board.
3. Rotate the Volume Control to minimum (CCW), VOM should read less than 0.5 Vdc.
4. Rotate the Volume Control to maximum (CW), the VOM must indicate at least 4.5 Vdc.
5. Rotate the Volume Control between minimum and maximum, the voltage indicated on the VOM should change linearly between the extremes.

MICROPHONE TESTING

Use the Front Cover Test Cable circuit board test point labeled MIC to check the radio's microphone.

1. Install Adapter Board and Front Cover Test Cable as described in setup steps 1 through 8.
2. Connect VOM positive lead to MIC test point and common lead to ground.

3. VOM should measure approximately 2.3 Vdc.
4. "Average" speech should produce approximately 100 mV P-P, when measured with an oscilloscope.

EXTENDING CONTROL BOARD

The Adapter Board and Controller Extender permits operation of the Control Board outside the front cover. To use the extender prepare the radio as follows:

Table 2 - Channel Rotary Switch Response

Switch Position	Row Number			
	3	2	1	0
1				
2				R0
3			R1	R0
4			R1	
5		R2	R1	
6		R2	R1	R0
7		R2		R0
8		R2		
9	R3	R2		
10	R3	R2		R0
11	R3	R2	R1	R0
12	R3	R2	R1	
13	R3		R1	
14	R3		R1	R0
15	R3			R0
16	R3			

1. Remove the Control Board from the Front Cover using the procedure contained in the radio's maintenance manual.
2. Carefully install the Adapter Board by first connecting P3 and then inserting the Adapter Board into the radio Front Cover.
3. Insure the Adapter Board's contact strip is properly seated against P4 and P1 on the Keypad Flex. Put the clamp bar in place and secure the Adapter Board to the front cover using the screws removed in step 1.
4. Secure the Adapter Board power terminals, H1 and H2, to the front cover using screws removed in step 1.
5. Connect the Dummy Battery to the Front Cover Assembly.
6. Secure the Controller Extender to the Control Board using block and clamp bar provided.
7. Plug the other end of the Controller Extender into the mating plug on the Adapter Board, observing connector key orientation.
8. Plug the three-pin speaker extender into J3 of the Control Board.

CAUTION

The speaker connector on the control board is not polarized. Be sure to install cable with the red wire in pin 1. Pin 1 is nearest U9.

9. Connect the RED alligator clip to H1 and the BLACK alligator clip to H2 on the Control Board.

CAUTION

Use caution to connect the alligator clips properly and avoid contact with adjacent components. Damage to the control board will occur if improperly connected.

10. Observing polarity, connect the Dummy Battery power supply cable to the DC Power Supply. The red wire goes to the power supply positive terminal and the black wire goes to the power supply negative terminal.
11. Adjust the Power Supply for an output voltage of 7.5 ±0.1 volt.
12. On completion of testing, remove Adapter Board and Controller Extender. Reinstall Control Board following procedures contained in the radio's maintenance manual.

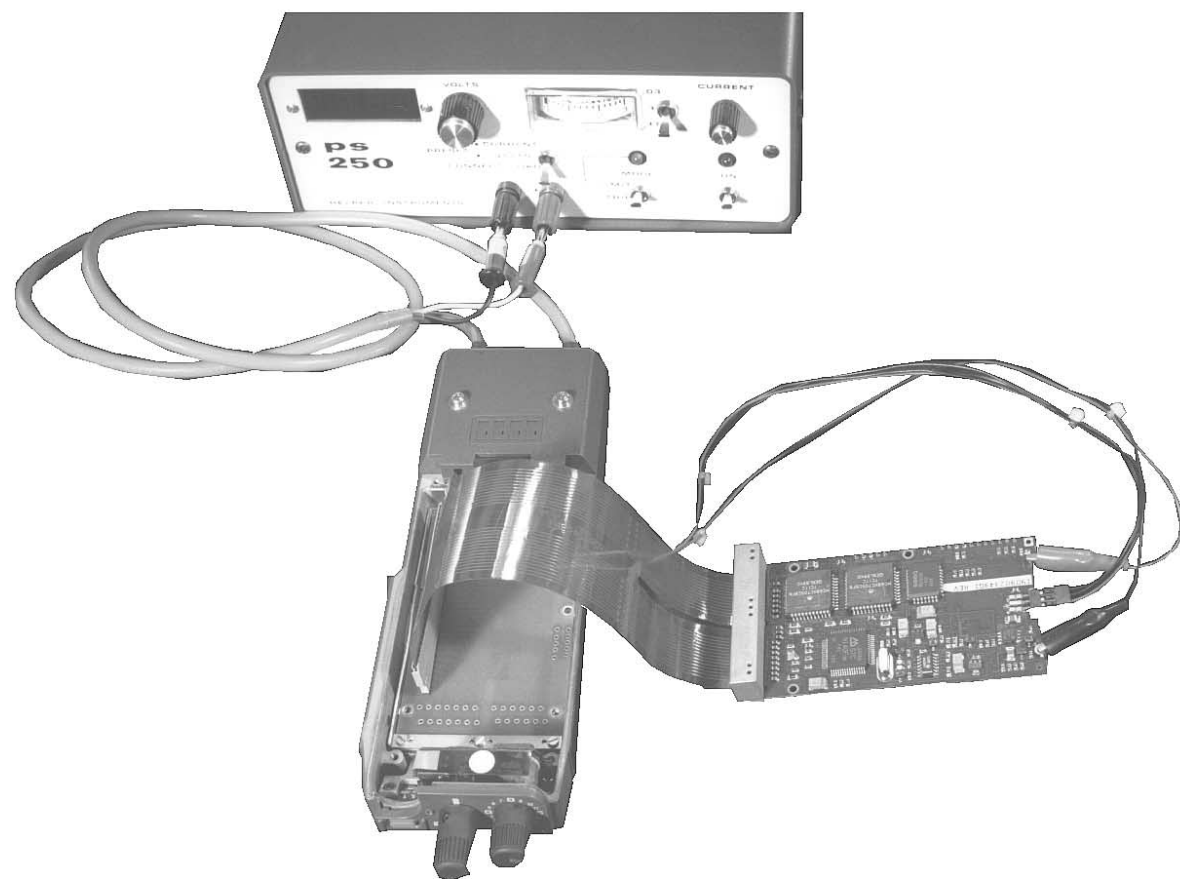


Figure 8 - Extending Control Board

SOFTWARE BACKUP

The MPA/MTL Test Software is provided to you on a double sided double density 5-1/4 inch diskette. As this diskette is very sensitive and fragile it should be handled with extreme care and stored in a secure area.

Use the following procedure applicable to your system; single disk drive, dual disk drives, or hard (fixed) drive system.

SINGLE DISKETTE SYSTEM

If you have identified your system as a single diskette system, a personal computer with only one diskette drive, you want to follow the procedures below. You should be aware that you are required to exchange diskettes during the copy operation so be fully attentive to prompts appearing on your screen.

For this operation you need your DOS diskette, one blank

diskette identified as the "working copy", and your MPA/MTL Test Software Diskette.

Prior to executing any operations with either your DOS diskette or MPA/MTL Test Software diskette, insure that write-protect tabs cover the notches of these diskettes. When the write-protect notch is covered, you cannot change the contents of this diskette.

First insert your DOS diskette into the drive and turn on the power. To speed up the process press the return key twice to eliminate date and time presentations and prompts. A> appears. Now, type:

FORMAT
then press <Enter>

The presentation on your screen prompts you to insert a new diskette into the drive. At this time remove the DOS Diskette and insert the blank diskette into the drive, and press

<Enter>

At this point DOS formats the blank working copy. There may be displays or presentation which appear on the screen to represent what is occurring. Each personal computer system is different in this respect. The important thing to note is that when the working copy diskette has been formatted the screen inquires if you wish to format another. Simply, answer by striking the letter N on the keyboard. A> appears.

Now, insert the MPA/MTL Test Software Diskette into the drive and type:

DISKCOPY
now press <Enter>

The system reacts by reading the MPATEST.EXE program file into memory and then writing it to a formatted diskette. During the operation be attentive to the display as you are prompted, possibly several times, to exchange original and "working copy" diskettes in the diskette drive. Upon completion of the copy operation on the screen appears the following:

Copy Complete
Copy another (Y/N)?

At this time remove the original MPA/MTL Test Software Diskette and store it in a safe place. The working copy diskette is now ready and available for your MPA or MTL front cover testing.

DUAL DISKETTE SYSTEM

If you have identified your system to be the two diskette system, that is, it provides for two diskette drives, then you want to be familiar with the procedures.

To make a working copy of MPA/MTL Test Software you need your DOS diskette, one blank diskette and your MPA/MTL Test Software original diskette.

First, insert your DOS diskette into drive A and turn the power on. If the power is on then follow the procedures to boot your particular personal computer system.

Insert your blank working copy diskette into drive B. When the A> prompt appears on the screen, type

FORMAT B:
and then press <Enter>

You are then prompted to press any key. So, simply press any letter on the keyboard.

At this point, DOS formats the blank working copy. Various types of information pertaining to the operation appears on the screen relevant to the operation being executed. You are not required to initiate any action until the format sequence has been completed. When the personal computer system has completed

the format for your files, it queries if you wish to format another. Now, simply, type the letter N.

You may now remove the DOS diskette from Drive A and insert the original MPA/MTL Test Software Diskette into Drive A. The blank working copy diskette remains in Drive B now contains DOS and has been formatted to accept the MPATEST.EXE program. A> appears. Your next step is to type:

DISKCOPY A: B:
then press <Enter>

The personal computer system reacts by copying all files from MPA/MTL Test Software Diskette to the working copy diskette in Drive B. Upon completion remove the MPA/MTL Test Software Diskette from Drive A and store it in a safe place.

FIXED OR HARD DISK SYSTEM

If you are operating with a fixed or hard disk system, a drive enclosed within the framework of the personal computer, then your actions are a little simpler than using systems with one or two diskette drives. First, you want to create a sub-directory for your MPA/MTL Test Software. If you are confused about the use of directories, you might want to refer to your DOS reference manual. Essentially, it is a guidepost for the system to locate and retrieve the MPA/MTL Test Software, as well as, other programs for your use.

To begin, you create the sub-directory. When the C:\ prompt appears on your screen, insert the MPA/MTL Test Software Diskette into drive A. Then type:

MKDIR C:\MPATEST and press <Enter>

Then type:

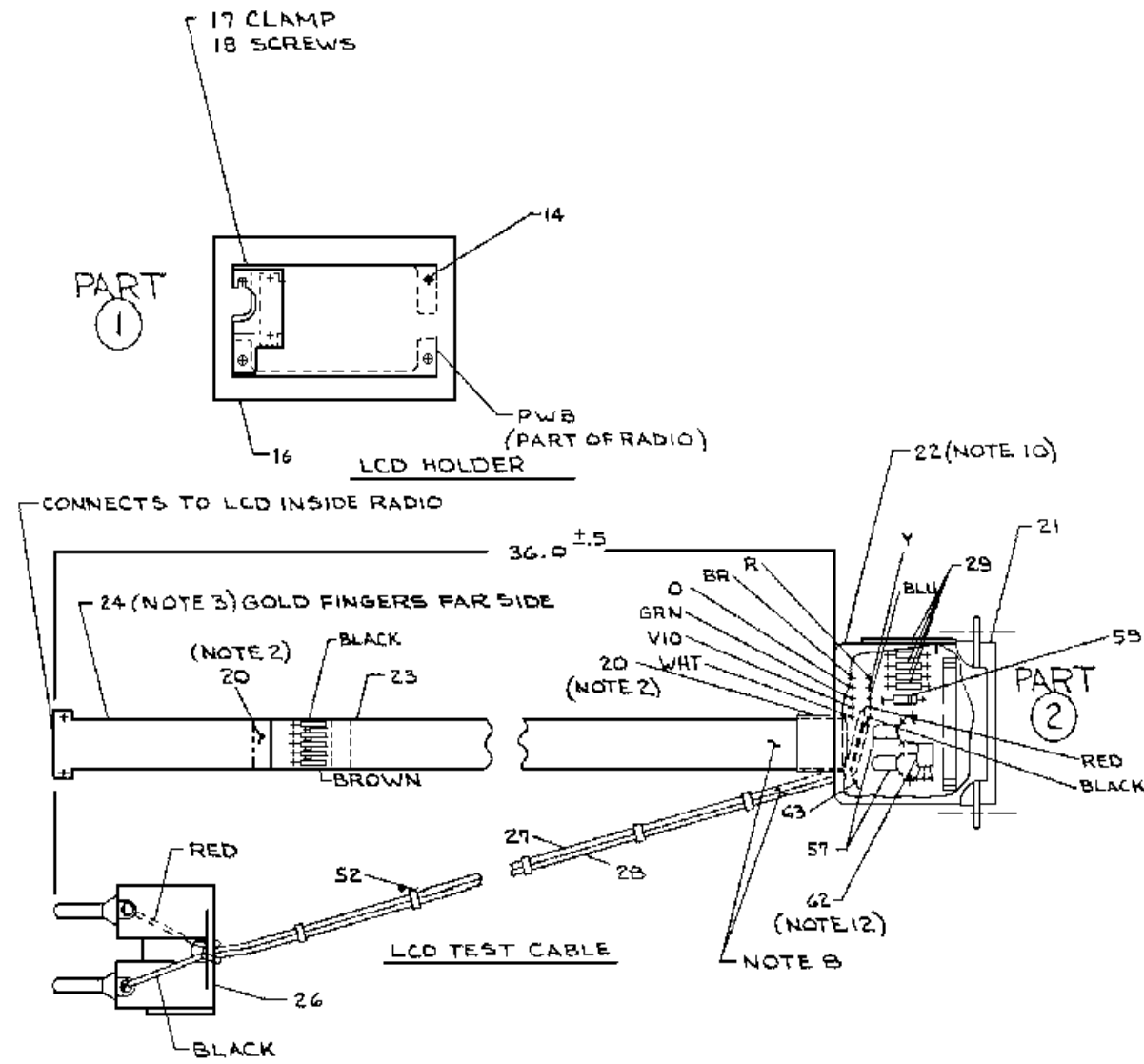
COPY A:*. * C:\MPATEST and press <Enter>

Execution of copy task begins and the personal computer displays the file names as they are copied into memory.

Once the PC programming software is located on the fixed disk, a path must be devised. This is accomplished by typing the following:

PATH=C:\MPATEST and press <Enter>

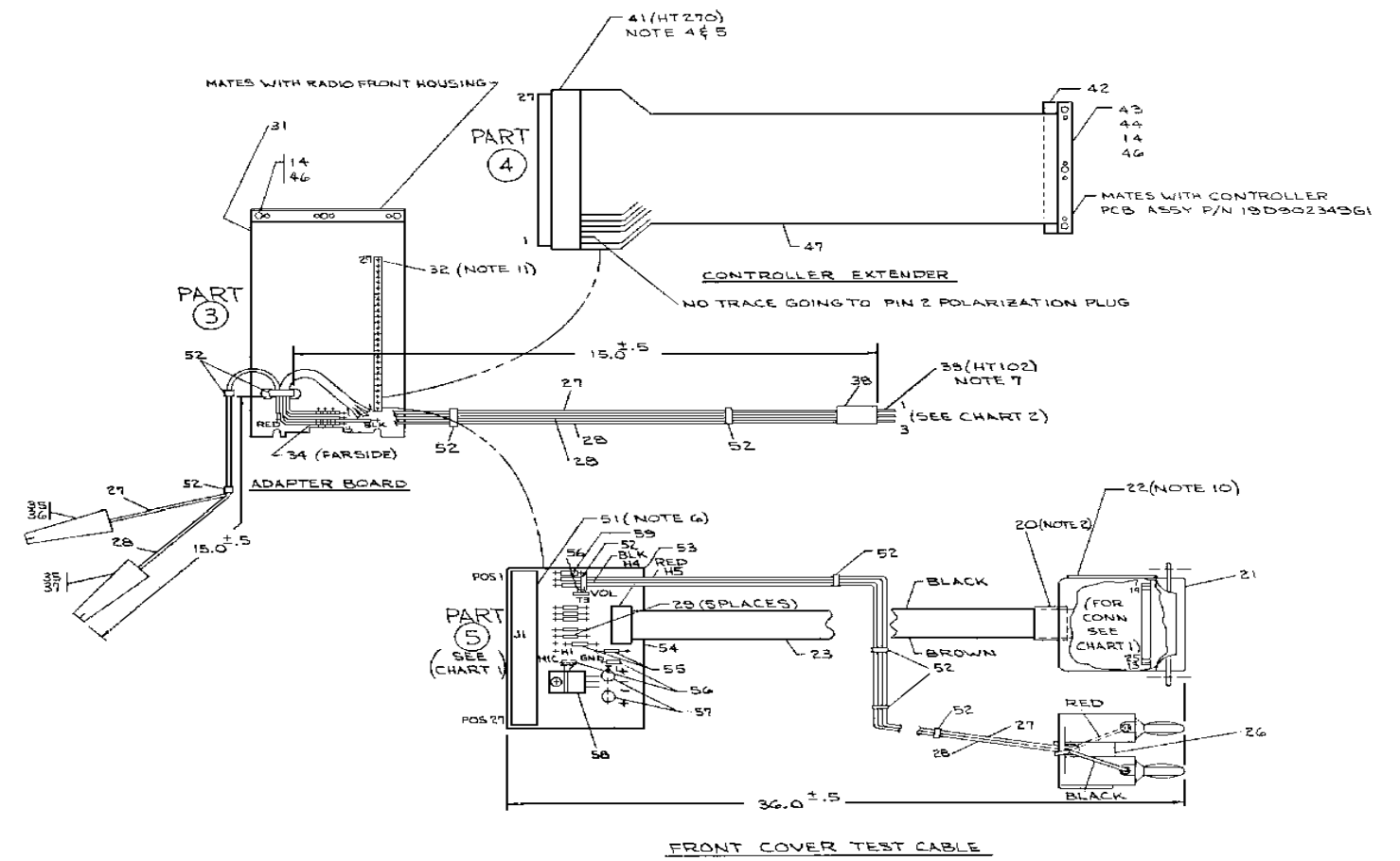
You now remove the original MPA/MTL Test Software Diskette from the diskette drive and store it in safe secure place. Your working copy is now held on the hard disk ready for you to call at any time.



PART 6 CONSISTS OF FILE "MPATEST.EXE" FROM 344A3065 ON 5 1/4 INCH DSDD MS-DOS FORMAT FLOPPY DISK.

NOTE: SPK 9010 MPATEST EXERCISER KIT CONSISTS OF PARTS 1, 2, 5 AND 6

SPK 9011 MPATEST ACCESSORY KIT CONSISTS OF PARTS 3 AND 4

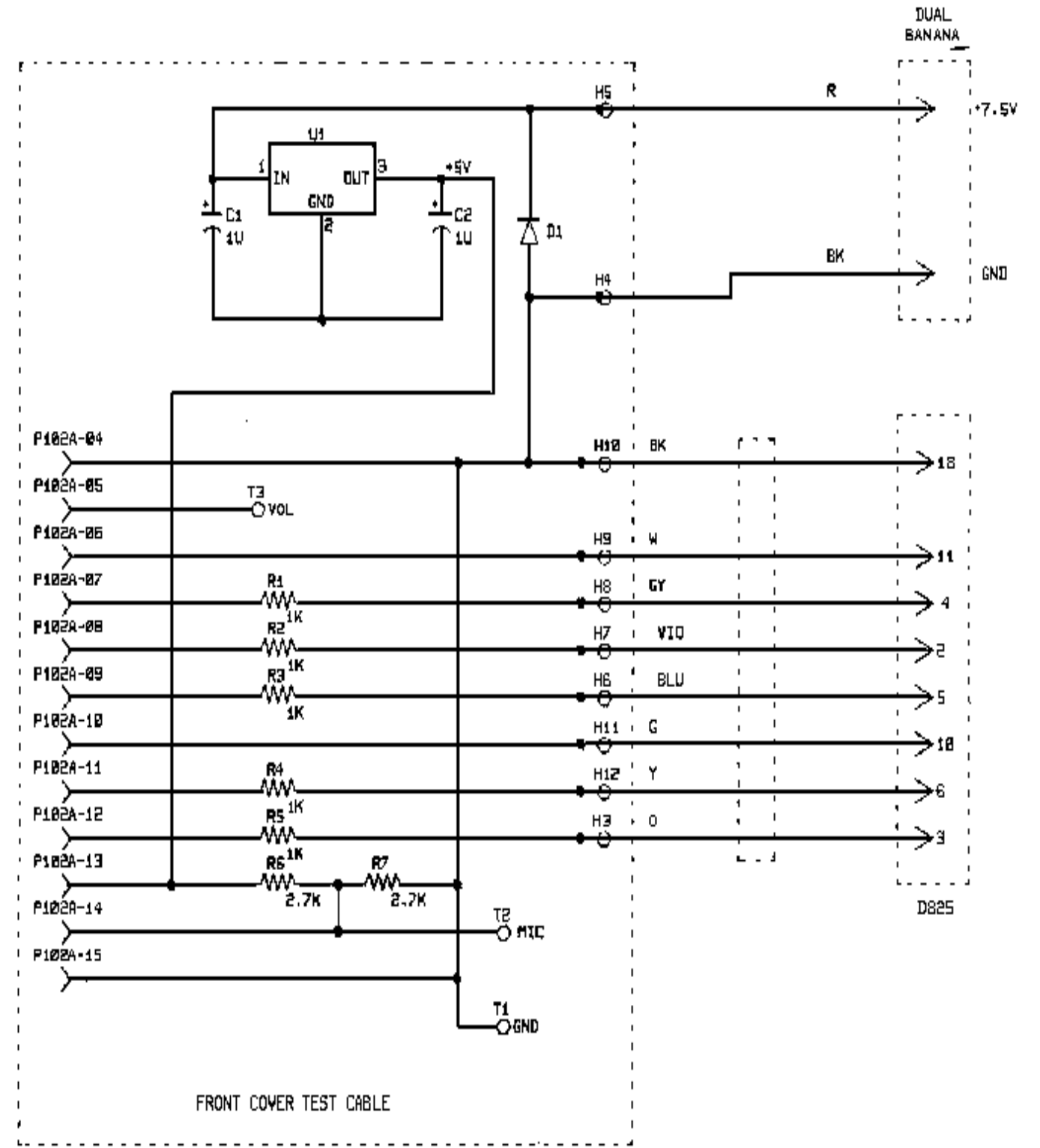
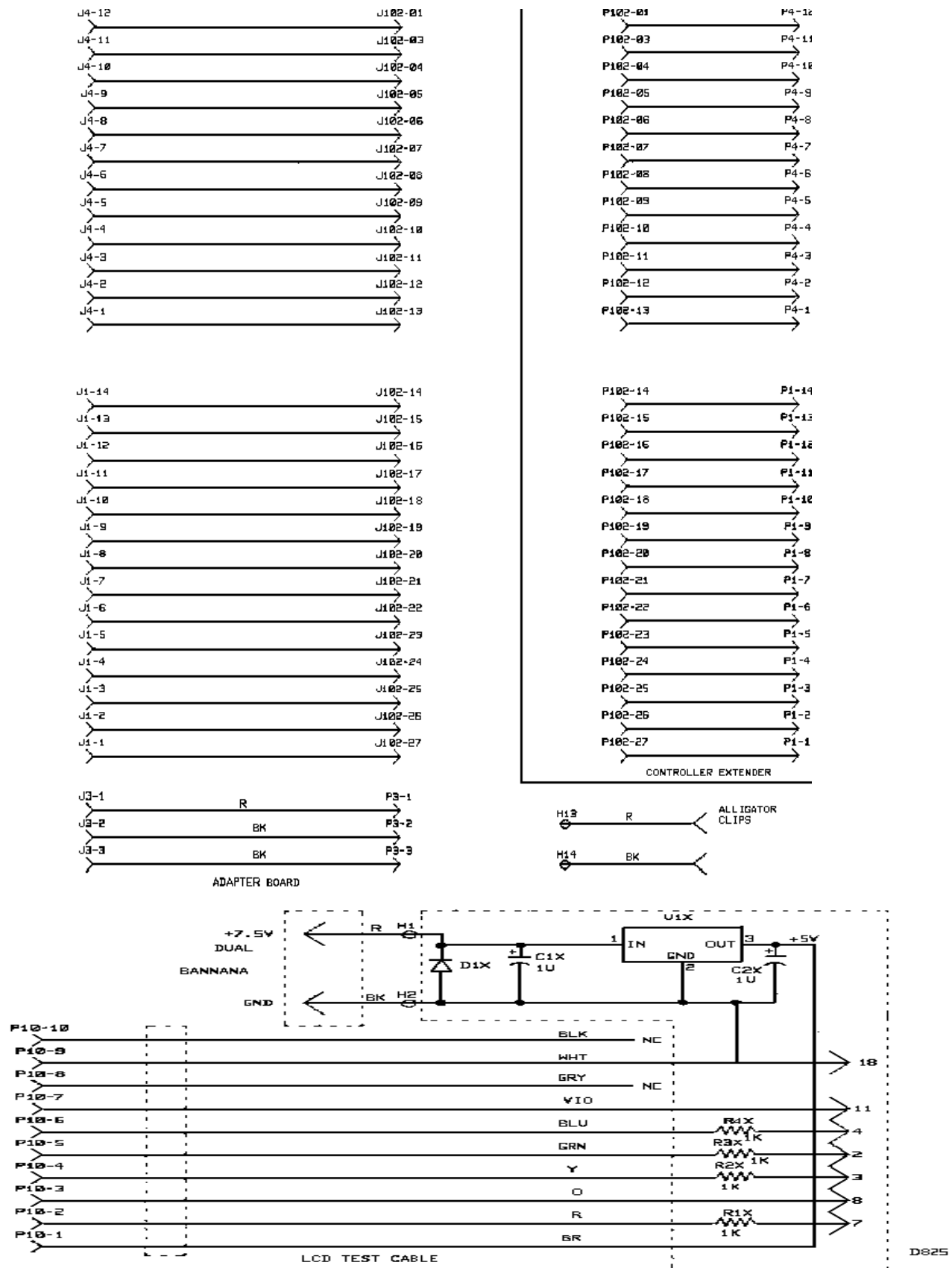


CONNECTIONS CHART 1

RIBBON CABLE	TO SUB PIN
BLACK	18
WHITE	11
GREY	4
PURPLE	2
BLUE	5
GREEN	10
YELLOW	6
ORANGE	3
RED	LET HANG
BROWN	LET HANG

CONNECTIONS CHART 2

FROM ITEM 38	TO ITEM 31	WITH WIRE
PIN 1	HOLE 1	ITEM 27 RED
PIN 2	HOLE 2	ITEM 28 BLACK
PIN 3	HOLE 3	ITEM 28 BLACK



TEST ACCESSORIES
19D902562
ISSUE 1

SYMBOL	PART NO.	DESCRIPTION
		LCD HOLDER 19D902562P1
14	19A70570IP105	Screws. (Quantity 2).
16	19C337393P1	LCD test block.
17	19C337128P1	Clamp.
18	19A705940P108	Screws. (Quantity 2).
		LCD TEST CABLE 19D902562P2
20	19A700136P8	Heat shrink tubing
21		25 Pin D Sub; sim to Amp 747912-2
22	19B209727P1	Backshell.
23		10 cond ribbon cable; sim to Spectra Strip 135-2801-010.
24	19D902381P1	1/2 flex.
26	A4032773P1	Banana plug, double.
27	19A11587IP34#24	Red 22-24 AWG stranded wire.
28	19A11587IP30#24	Black 22-24 AWG stranded wire.
29	H212CRP210C	Resistors. (Quantity 4).
52	19J706152P5	Tie strap. (Quantity 5).
57	19A701534P4	Capacitor. (Quantity 2).
59	T324AP1041	Diode.
62	19A704971P1	Voltage regulator.
63	19D902688P1	Board.
		ADAPTER BOARD 19D902562P3
14	19A70570IP105	Screws. (Quantity 3).
27	19A11587IP34#24	Red 22-24 AWG stranded wire.
28	19A11587IP30#24	Black 22-24 AWG stranded wire.
31	19D902369P1	Test Board
32		Male pin header (remove position 2); sim to Dupont 38000-127 and 63500-127
34	19A702517P5	Female contact. (Quantity 3).
35		Alligator strip; sim to Mueller (Newark) 28F528 Type 30.
36		Red vinyl insulator; sim to Mueller (Newark) 28F472 Type 30.
37		Black vinyl insulator; sim to Mueller (Newark) 28F473 Type 32.
38		Conn housing, sim to Dupont 65039-034.
39		Terminal, hand tool 102, sim to Dupont 48116-000.
46	19D902507P2	Strap.
52	19J706152P5	Tie strap (Quantity 5).
		CONTROLLER EXTENDER 19D902562P4
14	19A70570IP105	Screws. (Quantity 3).
41		Clincher conn & polarization plug; sim to Dupont 65801-056 and 65762-001.
42	19D902507P1	Block.

SYMBOL	PART NO.	DESCRIPTION
43	19B235140P1	Pad.
44	19B235140P2	Pad.
46	19D902507P2	Strap.
47	19D902498P1	Flex.
		FRONT COVER TEST CABLE 19D902562P5
20	19A700136P8	Heat shrink tubing.
21		25 Pin D Sub; sim to Amp 747912-2.
22	19B209727P1	Backshell.
23		10 cond ribbon cable; sim to Spectra Strip 135-2801-010.
26	A4032773P1	Banana plug, double.
27	19A11587IP34#24	Red 22 - 24 AWG stranded wire.
28	19A11587IP30#24	Black 22 - 24 AWG stranded wire.
29	H212CRP210C	Resistors. (Quantity 5).
51		Card connector; sim to Dupont 66945-027 & 65754-001.
52	19J706152P5	Tie strap (Quantity 5).
53		Dip plug; sim to Amp 746610-1
54	19D902499P1	Printed wire board.
55	H212CRP227C	Resistors. (Quantity 2).
56	19A134552P1	Test points. (Quantity 3).
57	19A701534P4	Capacitors. (Quantity 2).
58	299A6459P8635	Voltage regulator.
59	T324AP1041	Diode.

* COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES