MOTOROLA
Land Mobile Products Sector

Mobile Workstation 520™

Land Mobile Products Sector
16 Kremenetski Street, Tel Aviv 67899

Owner's Manual

Printed in Israel, May, 1998

68P02950C60-B

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EPS – 48759 – O

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The FCC Requires that manuals pertaining to Class A and Class B computing devices must contain warnings about possible interference with local residential radio and TV reception. This warning reads as follows:

NOTE: This equipment has been tested and found to comply with limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial or residential environment. This equipment generates, uses, and can radiate radio frequency energy and, it not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

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GlidePoint is a registered trademark of Cirque Corporation
Elo is a trademark of Elo TouchSystems, Inc.

Contents

Land Mobile Products Sector
1301 E. Algonquin Road, Schaumburg, IL 60196

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Related Documents

The following manuals provide additional information:

- *Mobile Workstation 520™ Quick Reference Card*, 68P02950C99
- *Mobile Workstation 520™ Vehicle Installation Manual*, 68P02951C30
- *Mobile Workstation 520™ Application Developer's Guide*, 68P02950C70
- *Radio Service Software, User's Guide*, RVN4146

Safe Handling Instructions

FCC Compliance Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Notational Conventions

Throughout the text in this publication, you will notice the use of warnings, cautions, and notes. These notations are used to emphasize that safety hazards exist, and care must be taken and observed.

Warning

Warning

Indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.

Caution

Indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury. CAUTION may also be used to alert against unsafe practices and property-damage-only accident hazards.

Note

An operational procedure, practice, or condition, etc., which it is essential to emphasize.

Safe and Efficient Operation of Motorola Two Way Radios

Scope

This document provides information and instructions for the safe and efficient operation of Motorola Portable and Mobile Two Way Radios.

The information provided in this document supersedes the general safety information contained in user guides published prior to 1st January 1998. For information regarding radio use in a hazardous atmosphere please refer to the Factory Mutual (FM) Approval Manual Supplement or Instruction Card, which is included with radio models that offer this capability.

Exposure to Radio Frequency Energy

National and International Standards and Guidelines

Your Motorola two-way Radio, which generates and radiates radio frequency (RF) electromagnetic energy (EME) is designed to comply with the following National and International Standards and Guidelines regarding exposure of human beings to radio frequency electromagnetic energy:

- Federal Communications Commission
  Report and Order No. FCC 96-326
  (August 1996)
- American National Standards Institute
  (C95-1-1992)
- National Council on Radiation Protection and Measurements
  (NCRP - 1986)
- International Commission on Non-Ionizing Radiation Protection
  (ICNRP - 1986)
- European Committee for Electrotechnical Standardization
  (CENELEC)
  - Env. 50166 - 1 1995E - Human Exposure to Electromagnetic Fields Low Frequency (0 Hz to 10kHz)

– Env. 50166 - 2 1995E - Human Exposure to Electromagnetic Fields High Frequency (10kHz to 300Ghz)
– Proceedings of SC211/8 1996 - Safety Considerations for Human Exposure to E.M.Fs from Mobile Telecommunications Equipment (M.T.E.) in the Frequency Range 30MHz - 6GHz (E.M.F - Electromagnetic Fields)

To assure optimal radio performance and that human exposure to radio frequency electromagnetic energy is within the guidelines set forth in the above standards, always adhere to the following procedures:

Portable Radio Operation and EME Exposure

MAN WITH RADIO

- When transmitting with a portable radio, hold the radio in a vertical position with its microphone 1 to 2 inches (2.5 to 5.0 centimeters) away from your mouth. Keep antenna at least 1 inch (2.5 centimeters) from your head and body.
- If you wear a portable two-way radio on your body, ensure that the antenna is at least 1 inch (2.5 centimeters) from your body when transmitting.

Electromagnetic Interference/Compatibility

Note

Nearly every electronic device is susceptible to electromagnetic interference (EMI) if inadequately shielded, designed or otherwise configured for electromagnetic compatibility.

- To avoid electromagnetic interference and/or compatibility conflicts, turn off your radio in any facility where posted notices instruct you to do so. Hospitals or health care facilities may be using equipment that is sensitive to external RF energy.
- When instructed to do so, turn off your radio when on board an aircraft. Any use of a radio must be in accordance with airline regulations or crew instructions.

Operational Warnings

For Vehicles with an Air Bag

- Do not place a portable radio in the area over an air bag or in the air bag deployment area. Air bags inflate with great force. If a portable radio is placed in the air bag deployment area and the air bag inflates, the radio may be propelled with great force and cause serious injury to occupants of the vehicle.

Potentially Explosive Atmospheres

- Turn off your two-way radio when you are in any area with a potentially explosive atmosphere, unless it is a radio type especially qualified for use in such areas (for example, Factory Mutual Approved). Sparks in a potentially explosive atmosphere can cause an explosion or fire resulting in bodily injury or even death.

Batteries

- Do not replace or charge batteries in a potentially explosive atmosphere. Contact sparking may occur while installing or removing batteries and cause an explosion.

Blasting Caps and Areas

- To avoid possible interference with blasting operations, turn off your radio when you are near electrical blasting caps, in a blasting area, or in areas posted: “Turn off two-way radio”. Obey all signs and instructions.

Operational Cautions

Damaged Antennas

- Do not use any portable two-way radio that has a damaged antenna. If a damaged antenna comes into contact with your skin, a minor burn can result.

Batteries

- All batteries can cause property damage and/or bodily injury such as burns if a conductive material such as jewelry, keys, or beaded chains touch exposed terminals. The conductive material may

complete an electrical circuit (short circuit) and become quite hot. Exercise care in handling any charged battery, particularly when placing it inside a pocket, purse, or other container with metal objects.

Mobile Radio Operation and EME Exposure

To assure optimal radio performance and that human exposure to radio frequency electromagnetic energy is within the guidelines referenced earlier in this document, always adhere to the following procedures:

- Transmit only when people inside and outside the vehicle are at least the minimum distance away from a properly installed, externally-mounted antenna.

Table 1 below lists the minimum distance for several different ranges of rated radio power.

Table 1
Rated Power versus Distance

Rated Power of Vehicle-Installed Mobile Two-Way Radio	Minimum Distance from Transmitting Antenna
7 - 15 Watts	1 Foot (30.5 Centimeters)
16 - 50 Watts	2 Feet (61 Centimeters)
More Than 50 Watts	3 Feet (91.5 Centimeters)

Mobile Antenna Installation

Install the vehicle antenna external to the vehicle and in accordance with:

a) The requirements of the antenna manufacturer/supplier

b) Instructions in the Radio Installation Manual

Control Station Operation

When radio equipment is used to operate as a control station, it is important that the antenna be installed outside the building and away from places where people may be in close proximity.

Note

Refer to Table 1 for rated power and minimum distance values for transmitting antennas.

Safety Concerns Regarding Exposure to High-Power RF Signals

English Statement

"The long-term characteristics or the possible physiological effects of Radio Frequency Electromagnetic fields have not been investigated by UL."

French Statement

"Les caractéristiques à long terme ou les effets physiologiques éventuels des champs électromagnétiques des Fréquences Radio n'ont pas été examinés par UL."

Equipment Handling Cautionary Statement

Caution

Do not proceed beyond the CAUTION symbol until the indicated conditions are fully understood and met.

Introducing the MW-520

The Mobile Workstation 520™ combines the power of a desktop computer with the flexibility required in the mobile environment. Its powerful processor can handle applications with local databases and detailed graphical images, including fingerprints, mugshots, and maps.

The integrated radio-modem provides access to your data system without the need for a separate, external radio-modem.

The workstation can be easily mounted even in dual airbag-equipped vehicles, to permit safe and comfortable user operation. The backlit display controls and uplit keyboard provide increased visibility and the removable keyboard offers improved usability.

Hardware Features

The MW-520 consists of three separate interconnected components: processor, display unit, and keyboard. Standard hardware features include:

Feature	Description
Processor	• An Intel® Pentium® 120-MHz or Pentium® MMX™ 166-MHz microprocessor (option V560). • VGA controller with 1 MB video RAM, operating with the LCD. • Power management complying to APM 1.2 spec and Windows® compatible. Supports standard power management modes, such as suspend and resume.
Memory	• 8 MB of internal memory, expandable up to 64 MB. • Basic model: 10 MB flash disk of mass storage memory. • Upgrade option V525: 1.4 GB fixed hard disk. • External memory is available through two Type II PCMCIA slots, with support for Type II or Type III cards.

Feature	Description
Peripherals	• 2 standard serial COM ports and one parallel port to which you can connect optional system components such as: modem, printer, etc. • Upgrade option V184: 2 additional standard serial COM ports. • Upgrade option V311: touchscreen for color display.
Modem	• A compact, internal radio modem provides automatic data communication links to central dispatching and other mobile workstations.
Display	• 9.4”, 640 x 480, VGA monochrome LCD. • Upgrade option V557: 10.4”, 640 x 480, VGA color, active matrix LCD. • Screen contrast and brightness are manually adjustable. • Display backlight may be turned off.
Sound	• Internal speaker - 0.5W • External speaker - 5W • Volume is adjustable from the display unit.
Keyboard	• 84-key QWERTY keyboard with 12 dedicated function keys. • Numeric keypad operations are available through special key combinations. • Includes the GlidePoint® high performance pointing device. • Keyboard illumination is provided.

Software Features

The MW-520 operations are controlled by system board firmware (programs permanently stored in ROM), an operating system, and device drivers. The software is already installed in your system. Software features include:

- MS-DOS® and Windows® 3.11
- Microsoft Windows 95.
- Microsoft Windows NT® 4.0.
- Flash ROM that enables you to update the BIOS from a PCMCIA card.

Power Features

- 12 V external vehicle battery.
- Backup battery that maintains the system configuration and time.
- Ignition sensitivity.

Power Management Features

- Idle mode: Lower the CPU speed to reduce power consumption.
- Suspend mode: Shut down system components to reduce power consumption.

Processor Overview

The following figures show a front and rear view of the processor unit:

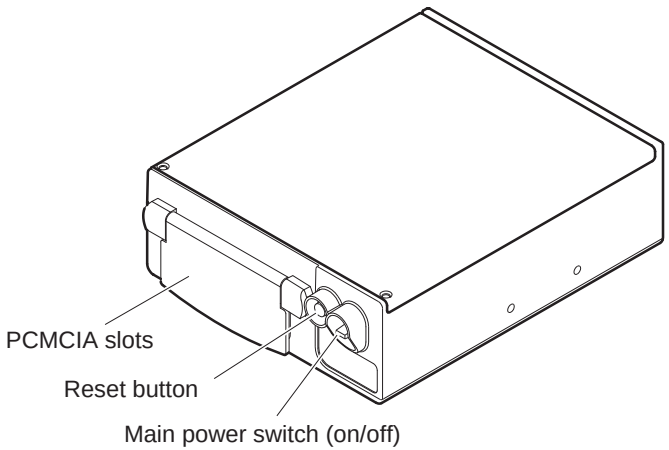


Figure 1
Processor - Front View

The main power switch, the reset button and the PCMCIA slot are located on the front panel of the processor.

Main Power Switch	Connects/disconnects the terminal power supply from the vehicle's battery. To save battery power, when you leave the vehicle unattended for more than 12 hours, turn off the main power switch.
Reset Button	Generates a hardware reset.
PCMCIA Slot	The MW-520 features a slot for installing two PCMCIA Type II cards or one PCMCIA Type III card. A cover protects the PCMCIA slot against severe environment conditions. For detailed information on the slot and how to insert and remove PCMCIA cards, see "Using PCMCIA Cards" on page 45.

Caution Turning off the Main Power Switch, or pressing the Reset button when the MW-520 is running under Windows 95/ Windows NT, may seriously damage your operating system or your hard disk.

The rear panel of the processor shows the following connectors:

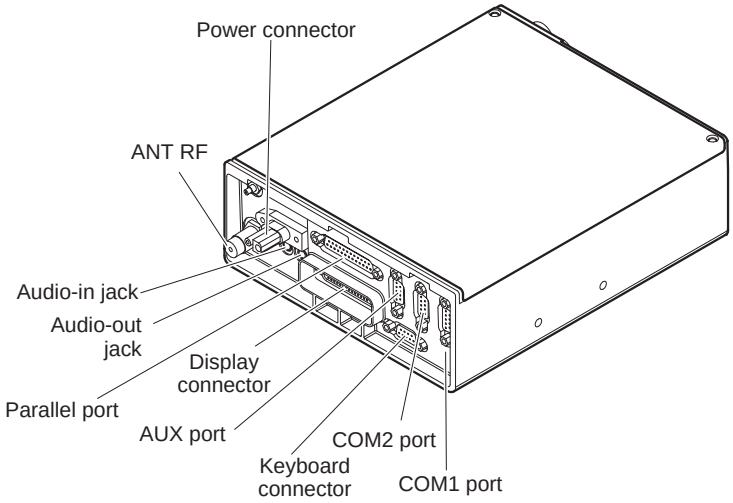


Figure 2
Processor - Rear View

Connector	Description
Parallel port	DB-25 female connector for printer. Plugging in a parallel printer requires an off-the-shelf cable.
Power connector	DC connector for vehicle. Requires a standard Motorola power cable (FKN4567) with fuse.
ANT RF	Mini-UHF antenna connector.
Audio-in jack	Microphone jack: one microphone jack that allows you to attach an external microphone so you can record sound, limited to certain microphones approved by Motorola.
Audio-out jack	Speaker jack: one speaker jack that allows you to attach an 8 Ohms, 5W speaker, in parallel to the internal speaker.
Display connector	DB-44 female connector for the display unit. Requires the Motorola cable part no: 3002132C45 (4 feet).
Keyboard connector	DB-9 female keyboard connector for connection of the keyboard.
COM1 port	DB-9 RS-232 male connector. Requires an off-the-shelf cable, depending on the selected accessory (Motorola VRM 600, printer).
COM2 port	Same as COM1.
AUX port	DB-9 female connector. Allows you to attach an external VGA monitor. Requires a specific adapter and is limited to certain VGA monitors approved by Motorola.

Display Unit Overview

Monochrome LCD

The following figure shows the front view of the monochrome LCD unit:

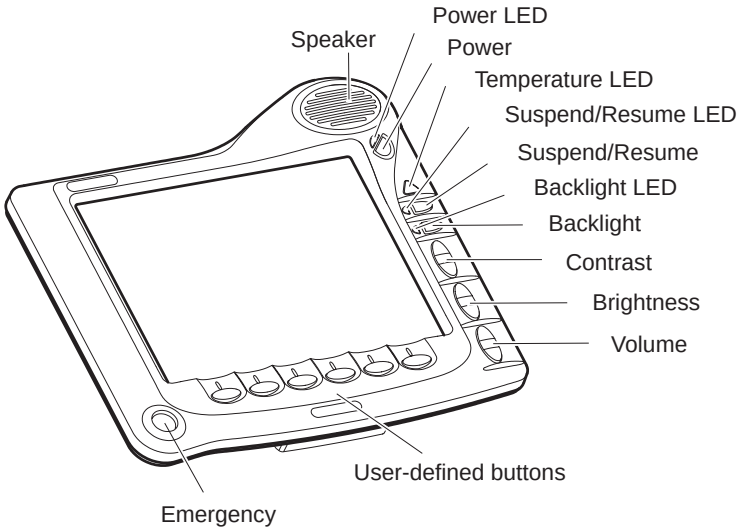


Figure 3
The Monochrome LCD Unit

Color Display (Option V557)

The following figure shows the front view of the color display unit:

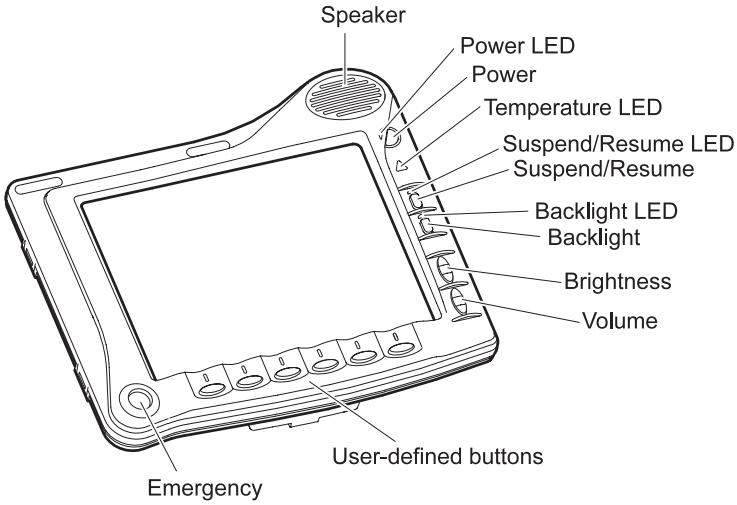


Figure 4
The Color Display Unit

Note

The color LCD does not support CGA modes 0,1,4,5, and 13. If any application compels the LCD into one of these modes, the screen will turn white.

Touchscreen (Option V311)

This option is easy to use, rugged and speedy. The resistive touchscreen is sealed against moisture and dirt and can be operated with gloved hands. For detailed information on the touchscreen calibration, see "Calibrating the Touchscreen" on page 51.

Buttons

The display unit comprises the following buttons:

Button	Press...
Power	To turn the MW-520 on or off.
Suspend/ Resume	To toggle the MW-520 between suspend and resume mode. When in suspend mode, the display and computer sections are turned off. The workstation enters a power saving mode while keeping the radio powered on. When the MW-520 resumes, it returns to the state it was prior to suspend (previous display, LED indications, etc.).
Backlight	To toggle between backlight on and off. Set the desired backlight brightness, using the Brightness button.
Contrast *(for monochrome display only)*	The upper arrow to increase or the lower arrow to decrease the on-screen contrast level.
Brightness	The upper arrow to increase or the lower arrow to decrease the on-screen light level. There are 32 continuous linear brightness levels. You can control the brightness, only if the backlight is turned on (Backlight LED is off).
Volume	The upper arrow to increase or the lower arrow to decrease the speaker's volume level.
User-defined	Carry out specific functions, depending on specific user application.
Emergency	To send an emergency message to the RF host computer. (This key's functionality depends on its definition in each user system and the active application.)

Indicators

The indicator LEDs located on the display unit show the MW-520 status, as described in the following table:

LED	Description	
Power (green)	On: Blinking: Off:	System is on. The vehicle battery is discharged. System is off, or the terminal is in suspend mode.
Temperature (red)	Blinking:	Processor or display unit temperature is out of range. For more information refer to "Powering On in Extreme Temperature Conditions" on page 18.
Suspend/ Resume (green)	On:	System is in suspend mode.
Backlight (green)	On: Blinking: Off:	LCD backlight is off. Ignore this information. LCD backlight is on.

Upon power-up, the display backlight is turned off, but the Backlight LED is on.

1. Press once to turn the backlight on, then the LED will be off.
2. Press twice to increase the backlight illumination.

Next press returns the display to its initial state.

Speaker

The speaker is used for user audio alert signaling. Adjust the speaker volume from the Volume button. To indicate the audio level, a pop-up bar appears on the screen.

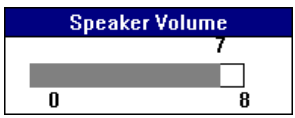


Figure 5
Volume Pop-Up Bar

The new volume setting is saved in the memory.

Operating the MW-520 for the First Time

Powering On

Note

The Main power switch on the processor's front panel must be ON when the system is connected to a power supply.

Press the Power button on the upper right corner of the MW-520 display to power it on. Upon power up, all display buttons and LEDs are lit for a period of 1 second. The power status LED remains lit, meaning that the system is on.

If the MW-520 is *ignition-sensitive*, insert the car key into the ignition switch and rotate it to ACC position, or start the engine, before powering on.

Understanding POST

When you turn the MW-520 on, a routine called Power-On Self Test (POST) automatically runs to test the computer components.

Error messages appear if the POST test failed. There are two kinds of messages:

- Beep codes identify specific problems that can occur within the MW-520. After POST successfully completes, you hear one system beep. If you hear more than one system beep during start-up, make a note of the number of beeps you hear in each set of beeps. Then report the information to your dealer/distributor or technical support representative.
- Screen messages are built into the workstation to report both normal and abnormal system conditions. Each message is preceded by a two-digit number.

  If an error message appears, take any action suggested in the message. If the message identifies the error condition but suggests no corrective action, write down the number preceding the message and contact your dealer/distributor for assistance.

The Operating System

The MW-520 supports Windows NT, Windows 95 and Windows 3.11 for Workgroups operating systems. However, only one operating system is installed.

Microsoft DOS 6.2 and Windows 3.11 may be installed on all models. Windows 95 and Windows NT require the V525 upgrade option that includes an 1.4 GB fixed hard disk.

Adjusting the LCD Display

The MW-520 incorporates a transflective monochrome LCD or a transmissive color Thin Film Transistor (TFT). Both screens provide the best possible readability in the lighting conditions typically found in the vehicle environment.

The MW-520 is shipped with color palette settings that have been optimized for operation in the vehicle. The appearance of the screen can be changed as described below.

The contrast and brightness of the display are affected by both the settings of the brightness and contrast controls of the color palette.

Adjustment to the color palette can be made in the Windows 3.11 Control Panel under the "Color" section. For a monochrome screen, best results are obtained using dark text with light background or dark background with light text. Gray colors are not recommended!

After setting the color palette, use the Contrast control to increase or decrease the contrast as needed. The middle range of contrast settings provides the best viewability. The extreme high and low settings can cause dark, invisible screen corners, shadow lines, or a light screen with poor text visibility.

Adjustment of color palette in Windows 95/Windows NT can be made in the Control Panel under the Appearance tab of the "Display" section. For a color screen, best results are obtained using the "Windows Standard" scheme and for a monochrome screen, best results are obtained using the "High Contrast White" color scheme.

Powering On in Extreme Temperature Conditions

The MW-520 operating temperature range is:

- -20°C - +50°C (for the basic model)
- 0°C - +50°C (for upgrade option V525)

To enable the full operating temperature range, the BIOS setup *Idle Mode* parameter must be set to its default value.

When powering on in these conditions, i.e immediately below or above the operating temperature range, the temperature LED blinks. The workstation will automatically power up once the operating temperature range is reached, or you may turn it off and try later on.

If the ambient temperature is much lower than the normal operating temperature, all LEDs and buttons will light up for a period of 1 second and the MW-520 will not power up.

Operating the MW-520 in Extreme Temperature Conditions

If, during normal operation, the ambient temperature deviates from the normal operating range, the temperature LED will blink and a warning message will be displayed on the screen. The MW-520 will automatically power off after 3 minutes.

Powering On with a Discharged Vehicle Battery

The MW-520 will power on normally when the vehicle battery voltage is at least 10.3V.

In the 9.4 - 10.3V range, the power status LED will blink and the workstation will not power-up.

Below 9.4V, all LEDs and buttons will light up for a period of 1 second and the MW-520 will not power up.

Operating the MW-520 with a Discharged Vehicle Battery

If, during normal operation, the vehicle battery voltage drops to 10.2V, the power status LED will blink and a warning message will be displayed on the screen. If the voltage continues to drop, the MW-520 will automatically power off at 8.5V.

Restarting the MW-520

Restarting the MW-520 when it is running under Windows 95/Windows NT may damage your operating system or your hard disk.

You can restart (reboot) the MW-520 by:

- Pressing <Ctrl+Alt+Del>. This is a warm (or soft) boot.
- Pressing the Reset button on the processor's front panel. This is a cold (or hard) boot.

As the system starts, it conducts tests of its components, known as POST.

When you restart the system, you lose any data you have not saved to a hard-disk drive, or PCMCIA card.

Powering Off

To turn the MW-520 off, press the Power button on the display. The system will not immediately power off, since a certain amount of time is needed for the Windows application to shut down.

Save important information before turning off the MW-520.

The MW-520 automatically turns off as a result of:

- Extreme temperatures
- Discharged vehicle battery.

In critical conditions, the workstation may be powered off by turning off the Power switch on the processor's front panel.

Turning off the Main Power Switch or disconnecting the power cable when the MW-520 is running under Windows 95/Windws NT may seriously damage your operating system or your hard disk.

If the MW-520 is *ignition-sensitive* it turns off automatically, when the engine is switched off. However, a warning is issued before powering off, so you can return the car key to ACC position and resume working, if so required.

Using the Keyboard

The MW-520 has a QWERTY 84-key keyboard. By pressing designated keys, you can have access to all of the key functions of a full size keyboard.

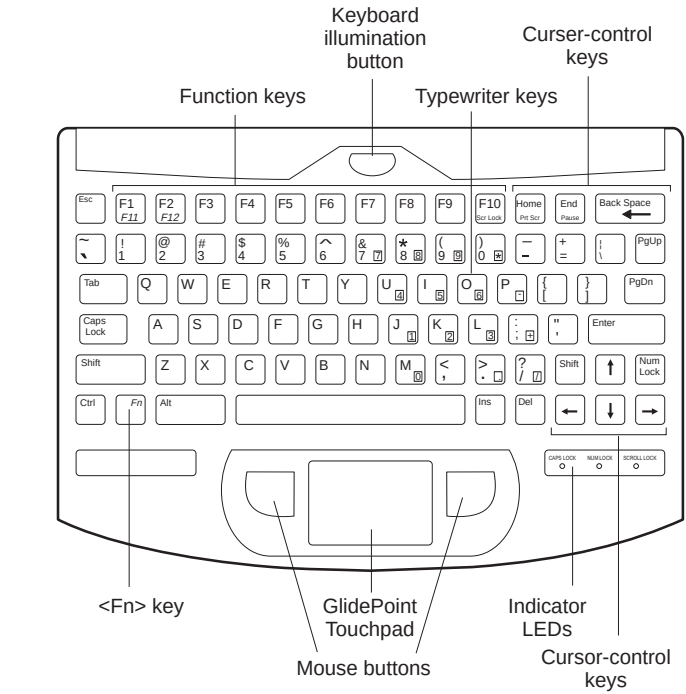


Figure 6
MW-520 Keyboard

The keys on the keyboard can be grouped into the following categories:

- Typewriter keys are arranged like a standard typewriter keyboard and are used for standard text entry.
- Function keys can be programmed to perform complex operations. Many programs have predefined operations mapped to function keys.
- Cursor control keys move the cursor. They may take on other functions, depending on your software.

Indicator LEDs

The indicator LEDs display the status of the MW-520 functions, as listed below:

Light	Description
Caps Lock	On: <Caps Lock> key is activated.
Num Lock	On: <Num Lock> key is enabled.
Scroll Lock	On: <Scroll Lock> is activated.

Lighting the Keyboard

To turn on the keyboard illumination, press the Keyboard illumination button.

Using the Numeric Keypad

The keyboard includes a numeric keypad, a group of keys that you can set to type numbers. The <Num Lock> key activates these functions.

The boxed number in the lower right corner of each key indicates the numeric function.

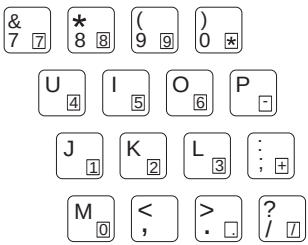


Figure 7
Numeric Keypad

The following table shows how you activate the numeric keypad and the various functions, such as arrow functions, PgUp, PgDn, etc,.

Note

For your convenience, use the numerals and functions located on the typewriter keys. Use the numeric pad only when the specified scan code is required.

Press	**To activate...**
Num Lock	15 boxed numbers and symbols Cursor control functions: • arrows, PgUp, PgDn, Home, End, Ins, Del • Print Screen, Scroll Lock, Pause
<Fn>	Function keys: • F11 and F12

Using the GlidePoint® Touchpad

The keyboard includes the GlidePoint touchpad, which is a high performance pointing device that is used with the left and right mouse button beneath the keyboard to perform standard mouse functions.

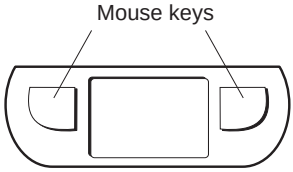


Figure 8
GlidePoint Touchpad

To use the touchpad:

- Place your finger on the pad and move your finger in the direction you want the cursor to move. The faster you move your finger, the faster the cursor moves across the screen.
- Roll your finger from side to side to move the cursor short distances.
- Quickly tap your finger on the touchpad to click on an item.
- Tap your finger twice to double-click on an item.
- Tap and hold to drag, draw, and highlight.
- Tap your finger on the upper right corner of the touchpad, to operate the right mouse button.

You can also use the buttons on each side of the touchpad in the same way you use standard mouse buttons.

To clean the touchpad, use a soft cloth dampened with ethyl or rubbing (isopropyl) alcohol. Wipe the surface gently.

Connecting Peripheral Devices

Caution

Turn off the MW-520 before you connect a peripheral device. Connecting a peripheral device with the workstation powered on may seriously damage it.

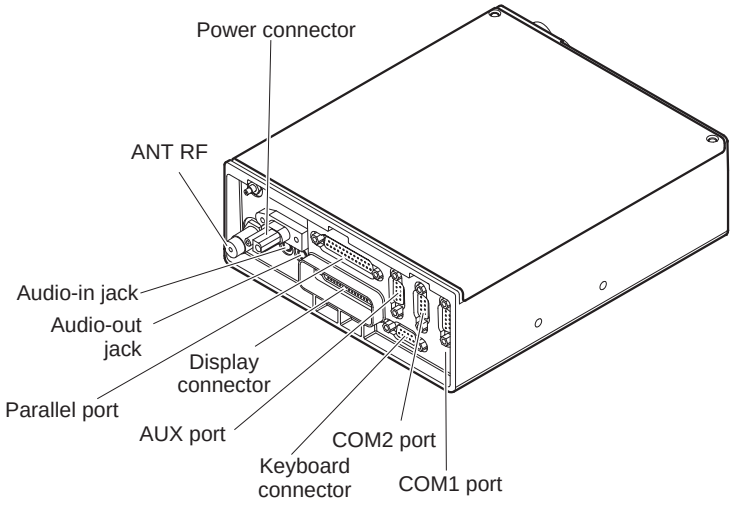


Figure 9
Peripheral Ports

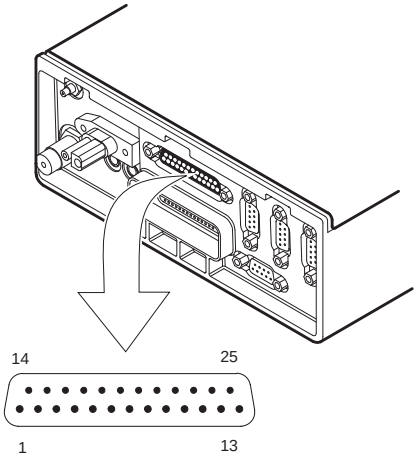
You can attach peripheral devices to these connectors:

- Parallel port: Plug a parallel device, such as a parallel printer, into this 25-pin port.
- Serial port: Plug a serial device, such as a serial printer, into this 9-pin port. If the device has a 25-pin connector, you need a 25-to-9 pin serial adapter.
- Audio connectors:
  - Connect an external microphone to the microphone jack.
  - Connect an external 5 Watts speaker.
- Auxiliary port: Plug the interface cable of an external monitor into this 15-pin connector and then plug the monitor power cord onto a grounded outlet.

Connecting a Peripheral Device to the Parallel Port

The MW-520 has one built-in parallel port. The port uses a 25-pin female connector. The default configuration for the port is LPT1 with the addresses 3BCh through 3BEh and IRQ7.

You can use an off-the-shelf parallel printer cable to connect the MW-520 to the printer. The following table shows the parallel port pinouts.



Pin	Signal
1	PSTB#
2	PD0
3	PD1
4	PD2
5	PD3
6	PD4
7	PD5
8	PD6
9	PD7
10	PACK#
11	PBUSY
12	PEP
13	PSLCT
14	PAFD#
15	PERR#_PRL
16	PINIT#
17	PSIN#
18-23	GND
24	PNF_SIRQI3
25	NC

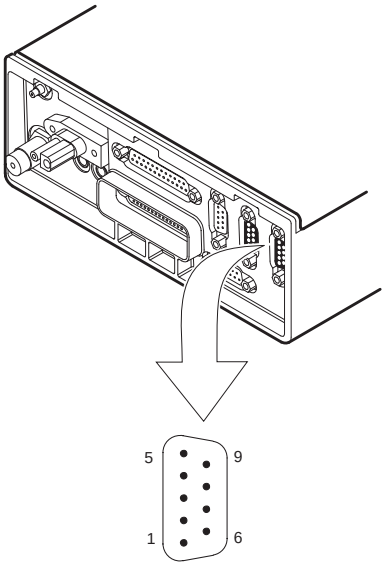
Figure 10
Parallel Port Pinouts

If the MW-520 has two additional standard serial COM ports (option V184), the expansion box will be connected to this port and the pinout listed above is irrelevant.

Connecting a Peripheral Device to the Serial Port

The serial connector is a DB-9 male connector that conforms to the EIA RS-232C communication standard and is configured as a DTE device. By default, Port1 is enabled through System Setup and it is configured as COM1 with the addresses 3F8h through 3FFh and IRQ 4, or COM2 with the addresses 2FBh through 2FFh and IRQ 3.

The 9-pin serial port is completely AT-compatible. Because many peripheral devices use 25-pin (DB-25) connectors, you may need to use a DB9-to-DB25 adapter cable between the 9-pin serial port and the peripheral device.

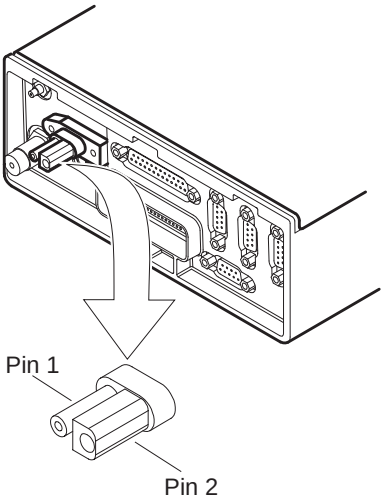


Pin	Signal
1	DCD
2	Rx
3	Tx
4	DTR#
5	GND
6	DSR#
7	RTS#
8	CTS#
9	RI#

Figure 11
Serial Port (COM1 or COM2) Pinouts

Power Connector

The MW-520 power connector is used by the DC connector for vehicle.

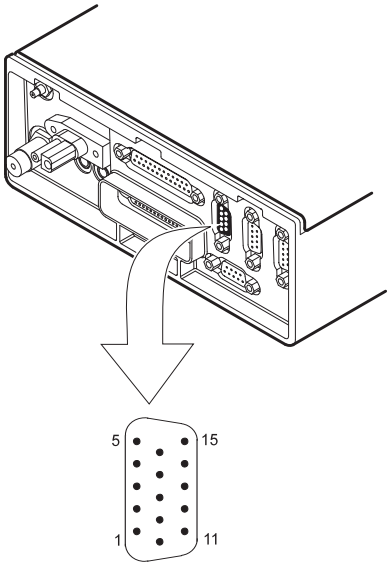


Pin	Signal
1	PVBAT
2	NVBAT

Figure 12
Power Connector Pinouts

AUX Connector

The AUX connector used for an external VGA monitor and for connecting the ignition-sense wire, is a 15-pin female connector.



Pin	Signal
1	RED
2	GREEN
3	BLUE
4	DGND
5	DGND
6	AGND
7	AGND
8	AGND
9	IGN_HIGH
10	DGND
11	DGND
12	IGN_HIGH
13	HSYNC
14	VSYNC
15	IGN_LOW

Figure 13
AUX Port Pinouts

Connecting a Monitor

After connecting the monitor, the display is switched automatically between the LCD panel and the external monitor.

Connecting the Ignition-Sense Wire

For a detailed description of the ignition-sense wire connection see the *Mobile Workstation 520™, Vehicle Installation Manual,* publication no. 68P02951C30.

Configuring the MW-520

The System Setup program enables you to configure the MW-520 hardware. The settings you choose are stored in battery-maintained memory that saves the information, even when the power is turned off. When the MW-520 is turned back on, it is configured with the values found in this memory.

Run System Setup if you get a message prompting you to run the program. You may also want to run System Setup, particularly the first time you use the MW-520, to set the time and date, use security or power-management features, or alter the settings of other features.

This section describes the System Setup menus, fields, and options. Note that

- Not all versions of System setup contain all the fields listed here.
- Field names and order of appearance may vary according to version.
- The italicized options are the defaults.

Warning

Incorrect settings can cause your system to malfunction.

Main Menu

To start the MW-520 Setup Utility:

1. Turn on or reboot the MW-520. PhoenixBIOS® displays this message:

   `Press <F2> to enter SETUP`

   on the bottom line of the screen.
2. Press <F2> to display the Main Menu

Menu Bar

The Menu Bar at the top of the window lists these selections:

Main	Use this menu for basic system configuration.
Advanced	Use this menu to set the Advanced Features available on your system's chipset.
Security	Use this menu to set User and Supervisor Passwords.
Power Savings	Use this menu to configure Power Management features.
Exit	Exits the current menu.

Use the left/right "← →" arrow keys to make a selection.

See "Exit Menu" on page 40, for a description on exiting the Main Menu.

Legend Bar

Use the keys listed in the legend bar on the bottom to make your selections or exit the current menu. The following chart describes the legend keys and their alternates:

Key	**Function**
<F1> or <Alt-H>	General Help window.
<Esc>	Exit this menu.
← or → arrow keys	Select a different menu.
↑ or ↓ arrow keys	Move cursor up and down.
<Tab> or <Shift-Tab>	Cycle cursor up and down.
<Home> or <End>	Move cursor to top or bottom of window.
<PgUp> or <PgDn>	Move cursor to next or previous page.
<F5> or <->	Select the Previous Value for the field.
<F6> or <+> or <Space>	Select the Next Value for the field.

Key	Function
<F9>	Load the Default Configuration values for this menu.
<F10>	Load the Previous Configuration values for this menu.
<Enter>	Execute Command or Select *P* Submenu.
<Alt-R>	Refresh screen.

To select an item, use the arrow keys to move the cursor to the field you want. Then use the plus-and-minus value keys to select a value for that field. The Save Values commands in the Exit menu save the values currently displayed in all the menus.

To display a sub menu, use the arrow keys to move the cursor to the sub menu you want.

Then press <Enter>

A "➢" pointer marks all sub menus.

Field Help Window

The help window on the right side of each menu displays the help text for the currently selected field. As you move the cursor to each field, it updates the values.

General Help Window

Pressing <F1> or <Alt-H> on any menu brings up the General Help window that describes the legend keys and their alternates.

The scroll bar on the right of any window indicates that there is more than one page of information in the window. Use <PgUp> and <PgDn> to display all the pages. Pressing <Home> and <End> displays the first and last page. Pressing <Enter> displays each page and then exits the window.

Press <Esc> to exit the current window.

Main Menu Selections

You can make the following selections on the Main Menu itself. Use the sub menus for other selections.

Feature	Options	Description
System Time	HH:MM:SS	Set the system time.
System Date	MM/DD/YYYY	Set the system date.
System Memory	N/A	Displays amount of conventional memory detected during bootup.
Extended Memory	N/A	Displays amount of extended memory detected during bootup.
Video System	EGA/VGA	Specifies the video system type. No options are available.

IDE Adapters

The IDE adapters control the hard disk drives. PhoenixBIOS® supports up to two IDE adapters. Each adapter supports one master drive and one optional slave drive in these possible combinations:

- 1 Master
- 1 Master, 1 Slave

The Main Menu contains two IDE Adapter fields to configure these drives. Each field calls up a submenu.

Use the legend keys listed on the bottom to make your selections and exit to the Main Menu.

Caution

Before attempting to configure a hard drive, make sure you have the configuration information supplied by the manufacturer of your hard drive. Incorrect settings can cause the MW-520 to malfunction.

Feature	Options	Description
Autotype Fixed Disk	N/A	Pressing <Enter> at this field attempts to read the hard disk parameters from the drive itself and sets the following options to their optimum setting. Sets Type field to "User" and allows editing other fields.
Type	1 to 39 User Auto CD None	1 to 39 fills in all remaining fields with values for predefined disk type. "User" prompts user to fill in remaining fields. Manually enter the number of cylinders, heads and sectors per track. "Auto" autotypes at each boot, displays settings in Setup menu and does not allow editing of remaining fields.
Cylinders	1 to 16,384	Number of cylinders.
Heads	1 to 16	Number of read/write heads.
Sector/ Track	1 to 63	Number of sectors per track.
Write Precomp	N/A	Obsolete
Multi-Sector Transfer	Auto 2 sectors 4 sectors 8 sectors 16 sectors	Auto sets the number of sectors per block at the highest number supported by the drive. This is not always the fastest option.
LBA Mode Control	Enabled Disabled	Enables Logical Block Access. Default is Disabled.
32-Bit I/O	Enabled Disabled	Enables 32-bit communication between CPU and IDE card. Requires PCI or local bus.

Feature	Options	Description
Transfer Mode	Standard Fast PIO1 Fast PIO2 Fast PIO3 or Standard Fast DMA A Fast DMA A Fast DMA A	Selects the method for transferring the data between the hard disk and the system memory. The Setup menu only lists those options supported by the drive and platform.

Memory Cache

Enabling cache saves time for the CPU by holding data most recently accessed in regular memory (dynamic RAM or DRAM) in a special storage area of static RAM (SRAM), which is faster. Before accessing regular memory, the CPU first accesses the cache. If it does not find the data it is looking for there, it accesses regular memory.

The actual features displayed on the Memory Cache menu depend on your system's hardware.

Use the legend keys listed on the bottom to make your selections and exit to the Main Menu.

Use the following chart to configure the memory cache:

Feature	Options	Description
Cache	Disabled L1 Enabled *L1 & L2 Enabled*	Generally enables or disables all memory caching.

Memory Shadow

Enabling memory shadow allows to run the BIOS cache from DRAM instead of ROM.

Use the legend keys listed on the bottom to make your selections and exit to the Main Menu.

Use the following chart to configure the memory shadow:

Feature	Options	Description
System Shadow	Enabled Disabled	Enables or disables memory shadowing. Should always be Enabled.
Video Shadow	*Enabled* Disabled	Enables loading the video memory segment into the Upper Memory Block.

Num Lock

Selecting "Num Lock" on the Main Menu displays the Keyboard Features menu.

Use the legend keys listed on the bottom to make your selections and exit to the Main Menu.

Use the following chart to configure the keyboard features:

Feature	Options	Description
Numlock	On *Off*	On of Off turns NumLock on or off at bootup.

Advanced Menu

Selecting "Advanced" from the menu bar on the Main Menu displays the Advanced menu.

Use the legend keys listed on the bottom to make your selections and exit to the Main Menu. Use the following to make your selection:

Feature	Options	Description
Reset Configuration Data	Yes *No*	Select *Yes* to clear the system configuration data.

Feature	Options	Description
Large Disk Mode Access	*DOS* Other	Select DOS if you have DOS. Select Other if you have another operating system such as UNIX. A large disk is one that has more than 1024 cylinders, more than 16 heads, or more than 63 tracks per sector.

Integrated Peripherals Menu

Most chipsets manage the connections between the CPU and the I/O ports (COM: and LPT1:), the floppy disks, and the hard-drive controllers. Some systems have a separate on-board chip for handling these items. If your system has a separate on-board I/O chip, selecting “Integrated Peripherals” menu on the Advanced Menu displays the Integrated Peripherals menu.

Use the legend keys listed on the bottom to make your selections and exit to the Main Menu. Use the following chart in configuring the chipset:

Feature	Options	Description
COM ports		Select a unique address and interrupt request for the listed COM ports. Auto selects the next available combination.
COM1	Disabled *3F8, IRQ 4*	
COM2	Disabled *2F8, IRQ 3*	
COM3	Disabled *3E8, IRQ 4*	
COM4	Disabled *2E8, IRQ 3*	
COM5	Disabled *3E8, IRQ 11*	

Feature	Options	Description
LPT port	Disabled *3BC, IRQ 7*	Select a unique address and interrupt request for the LPT port. Auto selects the next available combination.
LPT mode	Output only Bi-directional *ECP*	Set the LPT mode.
Local Bus IDE Adapter	Disabled *Enabled*	Enables the integrated bus IDE adapter.

Security Menu

Selecting "Security" from the menu bar displays the Security menu. Use this menu to configure the system-security.

Use the legend keys to make your selections and exit to the Main Menu.

Enabling "Supervisor Password" requires a password for entering Setup. The passwords are not case sensitive. Pressing <Enter> at either Set Supervisor Password or "Set User Password" displays a dialog box like this:

```
Set Password
Enter new password: [ ]
Re-enter new password: [ ]
```

Use the following chart in making your selections:

Feature	Options	Description
Supervisor Password	*Disabled* Enabled	Disables/enables the supervisor password.
Set User Password	*Disabled* Enabled	Disables/enables the user password.
Supervisor Password	Up to seven alphanumeric characters	A dialog box for entering the supervisor password is displayed. This password gives full access to SETUP menus.

Feature	Options	Description
Set User Password	Up to seven alphanumeric characters	A dialog box for entering the user password is displayed. This password gives restricted access to SETUP menus. Requires prior setting of the Supervisor password.
Password on boot	*Disabled* Enabled	Enabled requires a password on boot. Requires prior setting of the Supervisor password. If supervisor password is set and this option is disabled, BIOS assumes user is booting.

Power Savings Menu

Selecting “Power” from the menu bar displays the Power menu.

Use this menu to specify your settings for Power Management. Remember that the options available depend upon the hardware installed in your system. Those shown here are from a typical system.

A power-management system reduces the amount of energy used after specified periods of inactivity. The Setup menu pictured here supports a Full On state, an Idle and Standby state with partial power reduction, a Suspend state with full power reduction.

Use the legend keys to make your selections and exit to the Main Menu. Use the following chart in making your selections:

Feature	Options	Description
Power Savings	Off *Customize*	Select Customize to make your own selections from the following fields. Off turns off all power management.
Idle Mode	Off *3 sec* 5,10,20,30,40, 60 sec	Turns on/off CPU idle mode.

Feature	Options	Description
Auto Suspend Timeout	Off *10 min* 15,20,30, 40, 60 min	Inactivity period required after Standby to Suspend (maximum power shutdown).
Hard Disk Timeout	Off *1 min* 10,15,30,45 sec 1,2,4,6,8,10, 15 min	Inactivity period of hard disk required before standby (motor off).
Video Timeout	*Off* 10,15,30,45 sec 1,2,4,6,8,10, 15 min	Inactivity period of keyboard/ mouse required before screen is turned off.
CPU Heat Control	*Off* On	Enables/disables CPU duty cycle reduction during overheat conditions.
Resume On Time	*Off* 1, 24 hours	Amount of time in Suspend state, before the machine will resume to full on.

Exit Menu

Selecting "Exit" from the menu bar displays the Exit menu.

The following sections describe each of the options on this menu. Note that <Esc> does not exit this menu. You must select one of the items from the menu or menu bar to exit.

Save Changes and Exit

After making your selections on the Setup menus, select "Save values & Exit". This procedure stores the selections displayed in the menus in CMOS (short for "battery-backed CMOS RAM") a special section of memory that stays on after you turn your system off. The next time you boot your computer, the BIOS configures your system according to the Setup selections stored in CMOS.

After you save your selections, the program displays this message:

```
Changes have been saved.
Continue
Press <Enter> to continue
```

If you attempt to exit without saving, the program asks if you want to save before exiting. During bootup, PhoenixBIOS® 4.0 attempts to load the values saved in CMOS. If those values cause the system boot to fail, reboot and press <F2> to enter Setup. In Setup, you can get the Default Values (as described below) or try to change the selections that cause the boot to fail.

Save Changes

Save Current Values saves all the selections without exiting Setup. You can return to the other menus is you want to review and change the selections.

Load Previous Values

If, during a Setup Session, you may change your mind about changes you have made and have not yet saved the values to CMOS, you can restore the values you previously saved to CMOS.

Selecting Load Previous Values on the Exit menu updates all the selections and displays this message:

```
CMOS values have been loaded!
Press <space> to continue
```

Get Default Values

To display the default values for all the Setup menus, select “Get Default Values” from the Main Menu. The program displays this message:

```
Default values have been loaded!
Press <Enter> to continue
```

If, during bootup, the BIOS program detects a problem in the integrity of values stored in CMOS, it automatically restores the default configuration.

Discard Changes and Exit

Use this option to exit Setup without storing in CMOS any new selections you have made. The selections previously in effect remain in effect.

Enabling Advanced Power Management for Windows NT

The MW-520 system software includes the Phoenix Technologies APM 2.0 for Windows NT driver that reduces battery-power consumption when you run Windows NT. You do not have to use this driver to use Windows.

To configure the driver on your workstation, do the following:

1. From the Windows NT *Control Panel*, double-click on the *SoftEx Power Management* icon.
   The *Softex Power Management Control* dialog-box appears.
2. Open the *Settings* tab.
3. Set the Power Management parameter to *Advanced* and enable its icon in the Taskbar.
4. Save your changes and exit.
5. Reboot your computer and start Windows.

Using Standby and Suspend

Standby Mode

The *Hard Disk* and *Video Timeout* fields in the System Setup enable you to specify the time period the MW-520 can remain idle (no user input or disk activity) before the MW-520 enters standby mode. You can disable this options by selecting *OFF*, or you can specify a *Hard Disk* or *Video Timeout* delay time of from 10 seconds to 15 minutes.

In Standby mode, the system and video memory and the video controller slow down. The LCD backlight and hard drive, turn off to save energy. DPMS (a form of monitor power management) to an external monitor is invoked.

To resume from standby, you can touch the touchpad or any key on the keyboard.

If you enable both standby and suspend, the workstation enters standby when the delay time you chose in System Setup has elapsed, and then enters suspend when the delay time you chose for suspend has elapsed.

Suspend Mode

The *Suspend Timeout* field in System Setup enables you to specify the time period the MW-520 can remain idle (no user input or drive activity) before it enters Suspend mode. You can disable this option by selecting *OFF*, or you can specify a *Suspend Timeout* delay time of from 1 to 30 minutes.

During suspend, the system saves power by turning off the microprocessor and DMA clocks, video, and all controllable peripheral devices.

Entering Suspend Mode

The MW-520 enters Suspend mode:

- Upon pressing the Suspend/Resume button.
- If there is no MW-520 activity for a pre-defined time-out (as setup in the BIOS)

In Suspend mode, the display and computer sections are turned off, and the workstation enters a power saving mode. The status Suspend/Resume LED is on.

Resuming from Suspend Mode

The MW-520 wakes up from Suspend mode when one of the following occurs:

- Pressing Suspend/Resume button again
- Pressing the Emergency key
- Pressing any key
- Operating the touchscreen (for upgrade option V311).
- The workstation receives a radio message
- The *Suspend Timeout* time as set in the BIOS setup has elapsed.

The MW-520 wakes up to its previous terminal state (previous display, LED indication, etc.)

The MW-520 automatically resumes and issues a warning, if the ambient temperature is outside the operating range limits or the car battery is discharged.

Resuming from Suspend Mode in Windows NT

In addition to all of the above, when running under Windows NT, the MW-520 wakes up from Suspend mode when a PCMCIA card is inserted into the PCMCIA bay. Concomitantly, an information message is displayed. Press OK to resume normal operation.

Using PCMCIA Cards

Two PCMCIA Type II or one PCMCIA Type III card slot are available for extended memory and miniature hard disk applications. PCMCIA cards are about the size of a thick credit card and have a 68-pin connector at one end. You may use the PCMCIA memory cards to boot the terminal externally, update applications, transfer files to other terminals, or store data files.

If you install a Type III card in the bottom slot, you cannot install a card in the top slot.

A beep is sounded when the PCMCIA card is inserted or removed from the slot.

Inserting the PCMCIA Card

Caution

Do not insert or remove cards when the MW-520 is in system suspend. In addition, before you insert or remove a card, make sure that you exit any software that accesses the card.

There are two types of PCMCIA cards you can use with the MW-520. A Type II card is 5 mm thick, and a Type III card is 10.5 mm thick. You can place a Type II card in either the upper or lower slot. You can place a Type III card only in the lower slot. When a Type III card goes into the lower slot, you cannot use the upper slot. You may find it useful to get in the habit of always using the lower slot to make sure the card you are using is properly inserted.

To insert a PCMCIA card into a slot:

1. Open the slot door.
2. Align the card with a slot and insert the card into the slot until it locks in place.

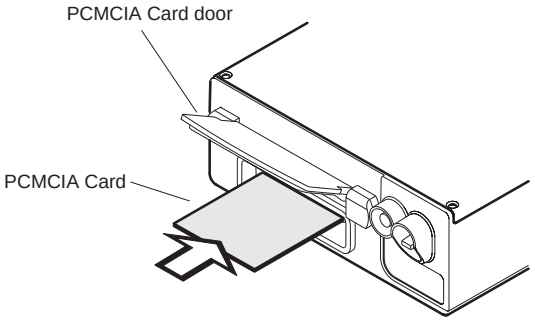


Figure 14
Inserting a PCMCIA Card

The eject button for the card slot is even with the card when the card is properly inserted.

Removing PCMCIA Cards

To remove a PCMCIA card from the MW-520 if your operating system is Windows 3.11:

- Push the card eject button on the right side of the slot
- Pull the PCMCIA card out of the slot compartment, as shown in the following illustration:

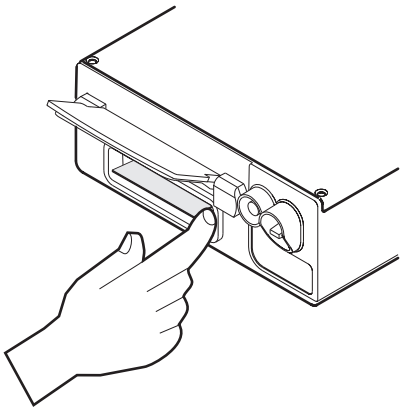


Figure 15
Removing a PCMCIA Card

To remove a PCMCIA card from the MW-520 if your operating system is Windows 95:

1. Click on the PCMCIA card indicator on the taskbar.
2. Highlight the name of the card you want to remove, then click the Stop button.
3. Push the card eject button on the right side of the slot when prompted to do so.
4. Pull the card out of the slot compartment

If you use the card immediately, pull it out about one inch and then push it back in.

Assigning Resources for PCMCIA Cards

PCMCIA cards are configured differently in Windows NT, Windows 95 and Windows for Workgroups.

Configuring PCMCIA Cards in Windows NT

When you have Windows NT as your operating system, the Phoenix Card Executive for NT is automatically loaded onto your hard drive. Card Executive configures the PCMCIA card properly each time it is inserted in MW-520.

It is recommended to insert Ethernet cards before running Windows NT and removing the cards after Windows shutdown. Card Executive enables Modems, ATA and SRAM cards “hot insertion” mode, i.e., inserting and removing the cards while Windows NT are running.

Whenever you insert a PCMCIA card in your workstation for the first time, the *PCMCIA IDE Driver Parameters* appears on the screen. To configure a PCMCIA card:

1. Set the IRQ Level parameter to IRQ 9.
2. Set the I/O Port Address to 0×150.
3. Press *Continue.*
   A prompt for configuration completed appears on the screen.

Configuring PCMCIA Cards in Windows 95

Windows 95 automatically assigns computer resources (such as communication ports and memory addresses) to a PCMCIA card installed in or removed from the MW-520.

For further information on configuring a PCMCIA card in Windows 95:

1. Click on the Start button on the Window 95 taskbar. A pop-up menu appears.
2. Click on *Help*. A submenu appears.
3. Click on the Index tab. The Index help window appears.
4. Type in field 1:

   `PCMCIA Card`

   A list of PCMCIA card topics appears in field 2.
5. Follow the instructions on the screen.

Configuring PCMCIA Cards in Windows for Workgroups

Note

PCMCIA cards may be configured in option V525 of MW-520 only.

When you have Windows for Workgroups as your operating system, the Phoenix Card Manager is automatically loaded onto your hard drive.

Phoenix Card Manager assumes the role of a computer-based technical support and advisor. It guides you through dialog boxes to diagnose and resolve most PCMCIA card compatibility problems, such as missing card drivers, improperly installed software, IRQ and I/O port resource conflicts, and incorrect allocation of memory. Once the Card Manager has identified and resolved the configuration issue, it automatically configures the PCMCIA card properly each time it is inserted into the MW-520.

Whenever you insert a PCMCIA card into your computer, Card Manager sounds either a single beep or a double beep. A single beep indicates that your PCMCIA card is configured. A double beep indicates that your card is not configured. You only need to use Card Manager if you hear an error beep.

To configure a PCMCIA card with Card Manager:

1. Open the Program manager window.
2. Open the Phoenix Card Manager window.
3. Double-click on the Card Agent icon.
4. Click on the Configuration button in the Card Agent - [Card Information] window.

Follow the on-screen instructions.

Memory Restraints

Your system has been configured to support the most common PCMCIA cards such as Modem, Sound, SCSI, and Ethernet. However, in an effort to provide the maximum amount of system memory for running your software programs in Windows for Workgroups, support for ATA cards (both Type II and III), and SRAM cards has been omitted from the installed configuration.

Use CardWizard to change your system configuration so that it supports ATA cards (both Type II and III) and SRAM cards.

Disabling the PCMCIA Card Support

If you do not plan to use any PCMCIA cards, you can recover all the system memory that they would normally use.

To disable the PCMCIA card support:

1. Disable the device statements for the PCMCIA card drivers in the CardSoft section of your CONFIG.SYS file by adding REM to the beginning if each line. After you do this, the CardSoft section will look similar to the following:

```
DEVICEHIGH /L:1,4560 =C:\WINDOWS\IFSHLP.SYS

REM DEVICE=C:\PCM402.13\PROGRAM\DPMS.EXE
REM
DEVICEHIGH=C:\PCM402.13\PROGRAM\CNFIGNAM.EXE/
DEFAULT
REM DEVICEHIGH=C:\PCM402.13\PROGRAM\PCMSS.EXE
REM DEVICEHIGH=C:\PCM402.13\PROGRAM\PCMS95.EXE
REM DEVICEHIGH=C:\PCM402.13\PROGRAM\PCMRMAN.SYS
REM DEVICEHIGH=C:\PCM402.13\PROGRAM\PCMSCD.EXE
REM DEVICEHIGH=C:\PCM402.13\PROGRAM\PCMATA.SYS
REM DEVICEHIGH=C:\PCM402.13\PROGRAM\PCMMDT.EXE
```

Note

The PCMCIA driver directory is subject to change without notice.

2. Recover the upper memory reserved for use by the PCMCIA card drivers:

a. Find the following line in your CONFIG.SYS file:

```
C:\DOS\EMM386.EXE X=C800-DFFF NOEMS
```

SRAM cards may not function properly, if this area is not defined in the EMM386.EXE file.

b. Remove the memory address X=C800-DFFF as shown below:

```
C:\DOS\EMM386.EXE NOEMS
```

3. Prevent Windows 3.1 from loading the PCMCIA card drivers by editing your SYSTEM.INI file, which is in the C:\WINDOWS subdirectory.
   a. Find the following line in your SYSTEM.INI file:

```
;by PCM+ device=*vcd
```

   b. Change it to the following:

```
device=*vcd
```

   c. Delete the following line in the SYSTEM.INI file:

```
; *** ADDED BY PCM+ SETUP ***
device=C:\PCM401\PROGRAM\PCMVCD.386
COM5BASE=2E8
; Excludes added by PCM+ for [DEFAULT-BOOT]
EmmExclude=C800-CFFF D000-DFFF
```

   d. Delete the following line in the WIN.INI file:

```
run=C:\PCM400\PROGRAM\EPD.EXE
```

Formatting SRAM Cards in Windows 95

When inserting a new SRAM card into the PCMCIA slot under Windows 95, the drive is not automatically accessible. To format the SRAM card:

1. Open a MS-DOS prompt and insert the card into its slot.
2. Change directory to `C:\Windows\TFFS95`.
3. Type `SFORMAT #x`, where x equals 1 for the upper slot, and 0 for the bottom slot.
4. Remove the SRAM card from its slot.
   The card is now ready for use.

Calibrating the Touchscreen

Option V311 comprises an Elo™ TouchSystems touchscreen. To calibrate the touchscreen, do the following.

Windows NT

1. From the Windows NT *Start* menu, select *Programs/Elo/ Touchscreen Calibration.*
   The *Calibration* dialog-box appears.
2. From the *Calibrate* menu select *Do Calibration* and follow the instructions on the screen.
3. Click OK to close the dialog-box and complete the command.

Windows 95

1. From the Windows 95 *Control Panel*, double-click on the *Elo Touchscreen* icon.
   The *Touchscreen* dialog-box appears.
2. Click the *Calibrate* button and follow the instructions on the screen.
3. Click OK to close the dialog-box and complete the command.

Note

A click is sounded each time you touch the screen. You can disable this click in the Sounds folder of the Control Panel.

Caution

Please refrain from changing the setup since incorrect settings may damage your system configuration.

Updating the System BIOS

When performing the BIOS update, please note the following rules:

- Do not interrupt the power while updating the BIOS. Interrupting the power may create a fatal error, causing the MW-520 to become inoperable once it has been turned off. If the power is interrupted, turn off the MW-520 and call Motorola Service Center.
- Write down your System Setup settings before you perform a BIOS update.

To perform the BIOS update:

1. Save your work and close all open applications.
2. Disable the Power management on the BIOS setup.
3. Insert the BIOS Update card in the PCMCIA slot. This card contains a bootable DOS configuration, BIOS version x.y, in file XXXXX.ROM and two utility files: PLASH.EXE and PLATFORM.BIN.
4. Boot the MW-520 without memory managers EMM386.EXE and HIGHMEM.SYS.
5. Update the BIOS by executing PHLASH.EXE XXXXX.ROM.
6. If the update is completed successfully, the following message appears:

   ```
   PhoenixPhlash Status
   Flash memory has been successfully programmed.
   PRESS ANY KEY TO RESTART THE SYSTEM

   If the system does not restart
   TURN THE POWER OFF, THEN ON
   ```
7. Remove the BIOS Update disk from the slot and press any key to reboot the MW-520.
8. If the BIOS update has errors, follow the instructions on the "Troubleshooting for BIOS update" for more information.

Troubleshooting the BIOS Update

If the flash BIOS update was not successful, make sure that

- You have the right BIOS update disk for your machine.
- You have completely inserted the card in the PCMCIA slot.
- The BIOS update card has not been damaged or corrupted.

Then try the BIOS update again. If the problem continues, contact your Motorola dealer.

Maintenance and Troubleshooting

Cleaning the MW-520

The MW-520 is designed to operate well in typical field conditions. Simple routine maintenance can extend the life of the unit, ensuring continued dependability.

Cleaning the Keyboard

For minor spills, wipe with a damp cloth.

If the keyboard is heavily contaminated or if the keycaps stick as a result of a spill, call a service technician.

- Do not immerse the keyboard in water.
- Do not use solvents of petroleum-based cleaners.

Cleaning the Display

The LCD has a polarized surface and can be damaged easily. To prevent damage:

- Do not touch the screen.
- Do not get liquids on the screen.
- Do not use water, window cleaner, acetone, aromatic solvent, or dry, rough towels to clean it.

To clean the LCD, use a soft cloth with ethyl or rubbing (isopropyl) alcohol. Wipe the screen lightly.

Turn your equipment off if you accidentally:

- Expose the LCD to liquid.
- Drop, jar, or damage the LCD.

Call a service technician if either of these instances occur.

Troubleshooting

If you ever have difficulty running the MW-520, follow these steps:

1. Consult this section for advice on how to handle operating problems or error messages.
2. If reading this section does not help you to resolve the problem, contact Motorola’s Technical Support Center.

Operating Problems

This section tells you what to do if you ever have problems running the MW-520. If any problem persists after you take corrective action, contact your reseller for assistance.

The MW-520 does nothing when you turn it on.
Check that the Main Power switch on the processor's front panel is on, and that the display and power cables are connected. Try turning on the MW-520 again.

If the MW-520 is ignition sensitive, verify that you inserted the key in the ignition switch and turned it to ACC or start the engine.

The Power button does not turn the MW-520 off.
Check your Windows configuration to verify if any application is running. If no application is active, turn the MW-520 off from the Main Power switch.

The MW-520 is not behaving as expected.
Operating the MW-520 at high speed with the cache enabled may cause system instability with some operating systems. If the MW-520 is not behaving as expected and no error messages appear, disable the L2 Memory Cache setting in System Setup.

Nothing appears on the LCD panel when you turn on the MW-520.
Adjust the brightness and contrast. Press any key to restore the display.

The Power LED blinks when you turn the MW-520 on.
Check if the ambient temperature is within the operating range limits and the car battery is not discharged.

Some of the letter keys type numbers instead of the indicated letters.
Is the Num Lock indicator light on? If so the numeric keypad on the keyboard is active. To return the keypad to typing letters, press <Num Lock>.

Certain software programs "hang" during operations when there is no interaction with the keyboard or peripheral devices.
Check the Suspend/Resume LED to see if it is on. If so the MW-520 is in suspend mode. Press any key to return the workstation to normal operation.

The MW-520 cannot restart.
Check if a PCMCIA card with a bootable operating system is in the PCMCIA slot. Remove the card and restart the MW-520.

A serial or parallel device attached to a serial or parallel port on the rear panel of the system unit does not work properly.
Check the attached device. Is it turned on? Is the cable properly installed between the device and the port? If you are using Windows 95 as your operating system, make sure the Plug and Play OS field is set to Yes. If you are using an operating system other than Windows 95, make sure the Plug and Play OS is set to No.

If you are using DOS, for serial devices, set the serial port to the same baud rate, parity, data-bit, start-bit, and stop-bit parameter values as the attached device. Use the MODE command to set these parameters. Refer to the serial device manufacturer's instructions for the correct parameter values.

A PCMCIA card does not work correctly.
Make sure that the PCMCIA card is inserted right side up in the PCMCIA card slot. Check that the card is inserted fully into the slot. The eject button for the card slot is even with the card when the card is properly inserted. If you are using a PCMCIA card modem, check the modem cable connections.

The MW-520 sounds the following beeps when turned on in extreme temperature and humidity conditions:

- **one long beep, three short beeps, one long beep, three short beeps.**

Press the Reset button.

Tips for Using the MW-520

This information helps you avoid potential problems as you use the MW-520.

- Follow all the instructions and cautions in your MW-520 user documentation.
- Do not disassemble the MW-520. Opening the system chassis voids your warranty.
- Do not remove or install a computer hard drive when the computer is on.
- The MW-520 automatically enters suspend to RAM mode if the system temperature rises to 85°C. Should the system temperature rise above 90°C, the MW-520 automatically shuts off. Do not turn the MW-520 back on until it is cool to the touch.

General Specifications

Processor		Intel® Pentium®, 120 MHz or 166 MHz MMX™	
Internal memory		8 MB RAM expandable to 64 MB	
LCD		Monochrome VGA	Color VGA (optional)
	Resolution:	640 x 480	640 x 480
	Gray Levels/Colors:	64 Grays	256,000 Colors
	Type:	Transflective	Active Matrix
Communications/Expansion			
	Serial:	2 with 16550 UART support	
	Parallel:	1 with ECP/EPP support	
	Video:	Analog VGA	
	PC Card Slots:	Two Type II or One Type III	
Mass Storage			
	Hard Disk:	1.4 GB or larger (optional)	
	Flash Disk:	10 MB (standard)	
Keyboard			
	Main:	QWERTY, 84 keys total, 12 function keys, spill-resistant	
	Pointing Device:	Integrated Touch-Pad (optional)	
	Display Keys:	6 illuminated function keys	
Radio Communications			
	Frequency Range:	806 - 824 MHz Tx, 851 - 869 MHz Rx	
	Protocol:	MDC-4800™, RD-LAP 9.6, RD-LAP 19.2 (25 kHz spacing)	
	RF Power Output:	3 Watts into 50 Ohm load	
	Power Amplifier:	35 Watt, External (optional)	
Physical size (H×W×D)			
	Processor Unit:	2.65" x 7" x 8.5"	
	Mono Display Unit:	10.3" x 11" x 1.3"	
	Color Display Unit:	10.5" x 12" x 2"	
	Keyboard Unit:	2" x 12" x 8"	

Environmental		
	Operating Temperature	-20° to +50°C without Hard Disk option[1] 0 to 50°C with Hard Disk option
	Storage Temperature	-40° to +70°C
	Humidity	90% to 95% non condensing @ 50°C
	Vibration	Per MIL STD 810E

Specifications subject to change without notice.

1. Extreme temperature conditions could cause the mono display to experience contrast degradation, i.e., the display contrast ratio decreases when the temperature decreases. The display performance degrades when the temperature is below -5°C.

Acronyms and Abbreviations

APM	Advanced Power Management
ATA	AT Attachment
BIOS	Basic Input/Output System
CMOS	Complementary Metal-Oxide Semiconductor
CPU	Central Processing Unit
DMA	Direct Memory Access
DRAM	Dynamic Random Access Memory
DTE	Data Terminal Equipment
ECP	Extended Capabilities Port
EIA	Electronics Industries Association
EPP	Enhanced Parallel Port
FCC	Federal Communications System
IDE	Integrated Drive Electronics
IRQ	Interrupt ReQuest
LCD	Liquid Crystal Display
LED	Light Emitting Diode
MDC	Mobile Data Communications (a Motorola RF protocol)
PCI	Peripheral Component Interconnect
PCMCIA	Personal Computer Memory Card International Association
PTT	Push-To-Talk
RAM	Random Access Memory
RF	Radio Frequency
RNC	Radio Network Controller
ROM	Read Only Memory
Rx	Receive
SRAM	Static RAM
SVGA	Super VGA
TFT	Thin Film Transistor
Tx	Transmit
VGA	Video Graphics Array
VRM	Vehicular Radio Modem

Glossary

Application	A computer program used to perform a specific work.
BIOS	Software for transferring information between elements such as memory, screen and disk.
Boot	To start the MW-520. A cold boot resets the MW-520 and runs through all self-tests. A warm boot clears out the MW-520 memory only.
Bus	A communication channel carrying signals from any device used by the system to another device. For example, data being transferred to and from a hard disk travels on a bus.
COM Port	COM stands for communication. COM ports are the serial ports of the MW-520.
CMOS complementary metal-oxide semiconductor)	The memory that stores the configuration you establish by running the computer's setup program. CMOS memory uses very little power and stores the information even when the computer is turned off.
DB-9	A standard 9-pin connector used for serial interfaces.
DB-15	A standard connector similar to DB-9, but with 15 pins. This connector is specified for the Auxiliary Unit Interface.
DB-25	A 25-pin connection for V.24 or RS-232 C interfaces.
Device driver	A program that controls how software communicates with a physical device (for example, a mouse, memory, or a printer).
DOS (disk operating system)	A software that supervises computer's operation, including handling I/O.
Drive	A hierarchical organization of directories, stored on a disk.
Emergency key	An orange key - although it can be any key - that is configured to send emergency information to Dispatch.
FCC	The U.S. federal regulatory agency responsible for the regulation of interstate and international communications by radio, television, wire, satellite and cable.
Hard disk	A large-capacity data-storage device that is installed inside the MW-520.
Host	Application host. The computer attached to the RNC. It communicates with subscriber units.

IDE	A hard drive with a built-in controller.
Operating System	A program that supervises the computer's operation, including handling I/O.
PCI (peripheral component interconnect)	A 32-bit local bus that provides connections for 32-bit add-in boards. The bus operates at an external clock speed of the microprocessor (up to 33 MHz). PCI devices are configured automatically by the system.
PCMCIA slot	Either of the two sockets on the processor into which the PCMCIA cards are placed.
POST (power-on self test)	A test performed by the MW-520 whenever you turn on the power or press the reset button. POST checks system integrity.
QWERTY format	The standard American keyboard format in which the Q, W, E, R, T and Y keys are the first six alphanumeric keys on the top row of the keyboard.
RAM (random-access memory)	A portion of the system's memory that is designed as a temporary storage area for data and programs. RAM includes conventional and extended memory.
ROM (read-only memory)	Permanent memory dedicated to a particular function.
RF Network	A network of radio receivers, transmitters and amplifiers that routes radio traffic from one point to another.
RNC	Radio Network Controller. A component of the RF network used to communicate with the host computer.
RS-232 Serial port	Any of the two standard COM ports on the MW-520.
SRAM	Static RAM. A type of non-volatile RAM that is preserved using an electric current.

Appendix A: Expansion Box (Option V184)

Overview

The front panel of the expansion box shows the following connectors:

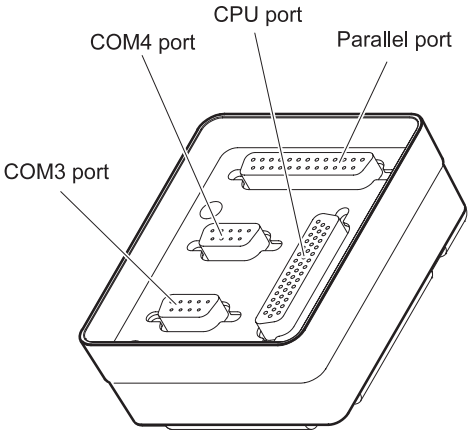


Figure 16
Expansion Box

Connector	Description
Parallel port	DB-25 female connector for printer. Plugging in a parallel printer requires an off-the-shelf cable.
To CPU	DB-44 female connector for the processor unit. Requires the Motorola cable part no: 3002132C56.
COM3 port	DB-9 RS-232 male connector. Requires an off-the-shelf cable, depending on the selected accessory (Motorola VRM600, printer).
COM4 port	Same as COM4.

Connecting Peripheral Devices

Turn off the MW-520 before you connect a peripheral device. Connecting a peripheral device with the workstation powered on may seriously damage it.

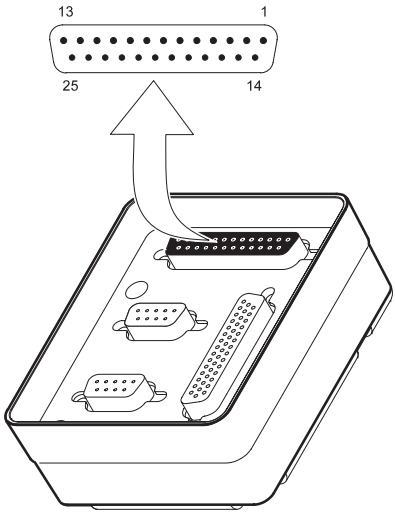
You can attach peripheral devices to these connectors:

- Parallel port: Plug a parallel device, such as a parallel printer, into this 25-pin port.
- Serial port: Plug a serial device, such as a serial printer, into this 9-pin port. If the device has a 25-pin connector, you need a 25-to-9 pin serial adapter.

Connecting a Peripheral Device to the Parallel Port

The expansion box has one built-in parallel port. The port uses a 25-pin female connector. The default configuration for the port is LPT1 with the addresses 3BCh through 3BEh and IRQ7.

You can use an off-the-shelf parallel printer cable to connect the expansion to the printer. The following table shows the parallel port pinouts.



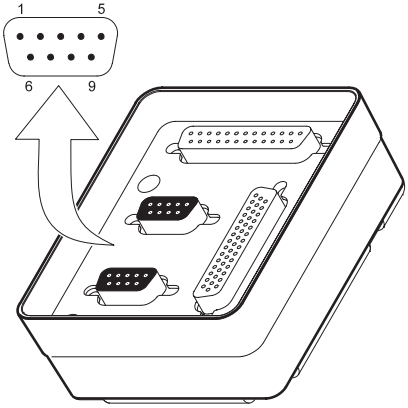
Pin	Signal
1	PSTB#
2	PD0
3	PD1
4	PD2
5	PD3
6	PD4
7	PD5
8	PD6
9	PD7
10	PACK#
11	PBUSY
12	PEP
13	PSLCT
14	PAFD#
15	PERR#_PRL
16	PINIT#
17	PSIN#
18-23	GND
24	PNF_SIRQI3
25	NC

Figure 17
Parallel Port Pinouts

Connecting a Peripheral Device to the Serial Port

The serial connector is a DB-9 male connector that conforms to the EIA RS-232C communication standard and is configured as a DTE device. By default, Port1 is enabled through System Setup and it is configured as COM13 with the addresses 3E8h through 3FFh and IRQ 4, or COM4 with the addresses 2E8h through 2EFh and IRQ 3.

The 9-pin serial port is completely AT-compatible. Because many peripheral devices use 25-pin (DB-25) connectors, you may need to use a DB9-to-DB25 adapter cable between the 9-pin serial port and the peripheral device.



Pin	Signal
1	DCD
2	Rx
3	Tx
4	DTR#
5	GND
6	DSR#
7	RTS#
8	CTS#
9	RI#

Figure 18
Serial Port (COM3 or COM4) Pinouts

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