digelec

MODEL 824
PORTABLE
E/EEPROM PROGRAMMER
USER MANUAL

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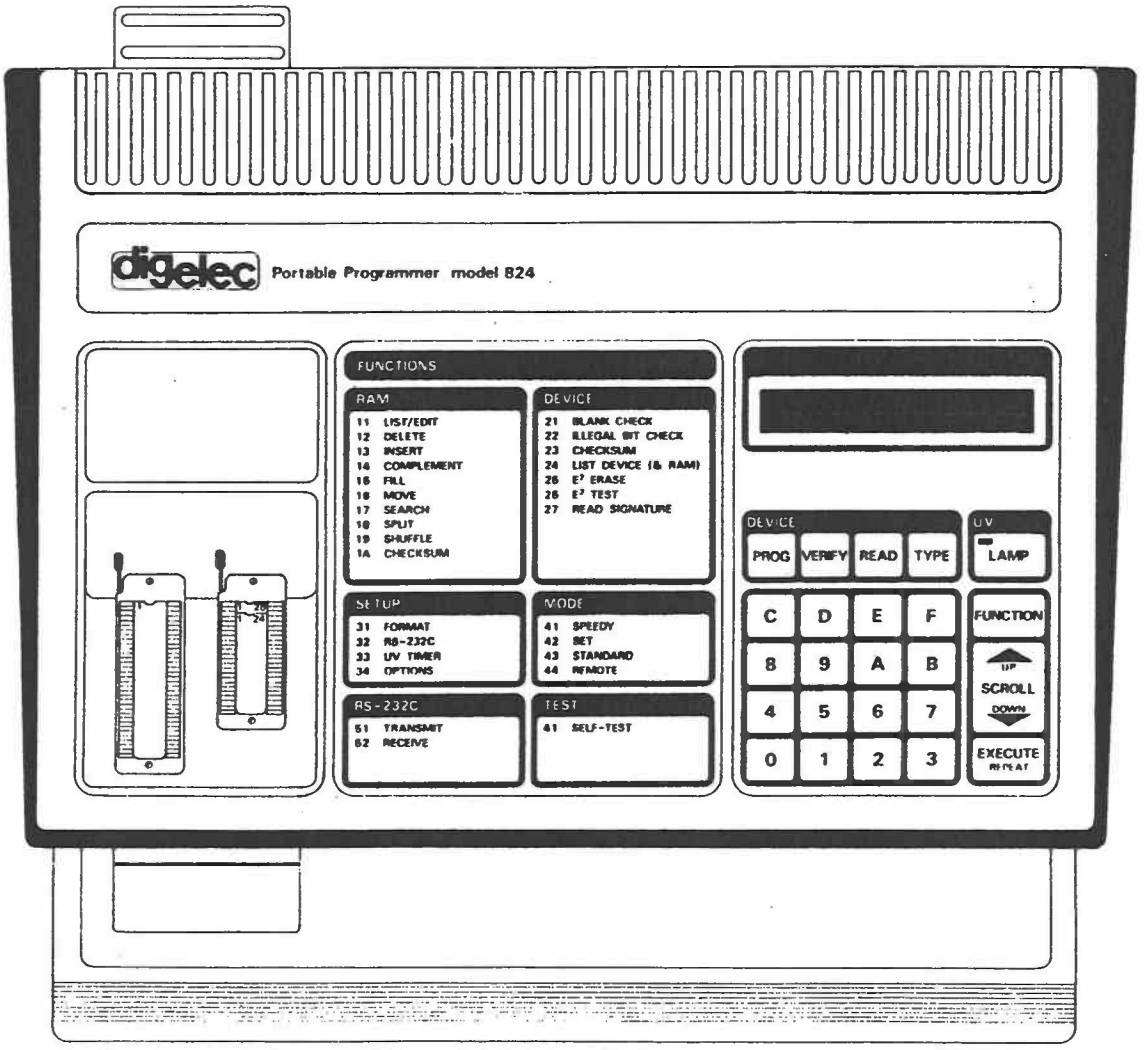
DIGELEC INC. (U.S.A.): 1602 LAWRENCE AVENUE, OCEAN, NEW JERSEY 07712. TEL: (201)493—2420, TLX: 754—098

DIGELEC AG. (EUROPE): DORFLISTRASSE 14, CH—8057 ZURICH, SWITZERLAND. TEL: (01)312 46 22, TLX: 823—795 DIGE CH



THE MODEL 824 PORTABLE E/EEPROM PROGRAMMER

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CHAPTER 1
INTRODUCTION

1.1 GENERAL

The DIGELEC model 824 portable E/EEPROM programmer programs all available EPROMs, EEPROMs and single-chip microprocessors with a capacity of up to 1024K bits.

The model 824 is designed to provide the versatility and flexibility required by the design engineer. The 824 can be operated manually, via the built-in keyboard, or from a remote terminal connected at the RS-232C port. A wide range of communication formats are available for interfacing with various computers. The 824 can be operated from the IBM PC or the INTEL MDS using the DIGELEC SOFTLINK program.

The system design of the 824 offers several features to increase throughput and save time. The SPEEDY mode allows you to operate device functions relying on default parameters set according to the device type. The SET mode enables you to download a complete file from the computer and to program complete sets of multiple EPROMs with one keystroke per device.

Performance speed is increased by enabling the user the option of turning off several of the checks that accompany various functions. Throughput is increased by reducing the amount of keying-in necessary. On demand, the system will save a setup configuration in temporary storage (NOVRAM), to be recalled even after power-down, and thus save keying-in time.

The 824 also affords the portability necessary for the field service engineer. It is housed in an impact-resistant case to endure rugged conditions, and it comes equipped with a flip-out carrying handle. All of the 824 functions are listed on the front panel of the instrument. Thus, no additional documentation is necessary for the experienced user. The built-in EPROM UV Eraser makes the 824 a complete, compact and self-supporting programming station.

At DIGELEC, we are continually upgrading our software to accommodate the latest technological developments. The system software for the 824 resides in the innovative SOFTPACK firmware cartridge. This cartridge, inserted externally, enables you to upgrade your programmer with one, easy step to support the programming algorithms of the latest devices.

As new devices are introduced on the market, we make every attempt to support them. A **Programming Guide** is issued periodically with the current list of devices supported. We have included with your programmer the latest version of the model 824 **Programming Guide**. Should you wish an updated version in the future, please contact your local sales representative.

1.2 PROGRAMMER FUNCTIONS

The following functions are available for editing the data in the user RAM of the 824, and testing and programming your device.

1.2.1 Editing Functions

LIST/EDIT	Display addresses and data which can be edited and incremented/decremented with the SCROLL keys
DELETE	Delete a data block in RAM
INSERT	Insert data in RAM
COMPLEMENT	Perform a complement of data in RAM
FILL	Fill RAM with a constant or a string
MOVE	Move a data block in RAM without effecting the original block
SEARCH	Search a specified string in RAM
SPLIT/SHUFFLE	Split and shuffle for 16-bit data manipulation
CHECKSUM	Calculate a four-digit checksum on data in RAM

1.2.2 Device Functions

SELECT TYPE	Select the device type
PROGRAM	Program the device with the data from RAM
VERIFY	Compare the data in RAM with the data in the device
READ	Transfer data from the device into user RAM
CHECKSUM	Calculate a four-digit checksum for data in the device
ILLEGAL BIT CHECK	Check that the device can be programmed with RAM data when the device is not in its erased state

BLANK CHECK	Check that the device is in its erased state
LIST DEVICE & (RAM)	Display both device and RAM data
EEPROM ERASE	Erase EEPROM by electronic signals
EEPROM TEST	Perform an ERASE/WRITE/READ/ERASE test on the EEPROM
READ SIGNATURE	Display the type code and the manufacturer code of devices that have a signature

1.2.3 Data Transfer Functions

RECEIVE	Receive data from an external computer to the programmer RAM
TRANSMIT	Transmit data to an external computer from the programmer RAM

1.2.4 Setup Functions

FORMAT	Select the data format for transmission
RS-232C	Initialize the parameters for transmission
UV TIMER	Set the time setting of the UV Eraser
SAVE SETUP	Save parameters in the programmer NOVRAM
RECALL SETUP	Recall parameters previously saved in the NOVRAM
FACTORY SETUP	Invoke default parameters from the programmer ROM
LINE FREQUENCY	Set either 50 or 60 Hz, as required
TEST CHIP	Protect device against damage from improper insertion
SIGNATURE TEST	For devices with a silicon signature, verify that the device type designated is the same as that inserted in the textool socket

AUTO MATCH	For devices with a silicon signature, select the device type by reading its signature
BUZZER	Sound a short, audible signal at the end of each operation
PRINTER	Allow the printing of all RAM in-device content or content errors for LIST DEVICE (& RAM), ILLEGAL BIT-CHECK and VERIFY
SECURITY	For devices that can be protected, select SECURITY ON to prevent the device from being read from/ written to
DEVICE CHECKS	Disable BLANK CHECK and/or ILLEGAL BIT CHECK as required

1.3 HOW TO USE THIS MANUAL

This manual will present the capabilities of the 824, enabling you to make the maximum use of all of its features. A complete explanation of the 824 functions is provided, as well as a guide to programmer operation.

The manual is structured in the following way:

Chapter 1 is a general introduction to the 824. The unit is described in general terms, followed by a listing of the 824 functions, and a glossary of the terms used in this document.

Chapter 2 contains technical specifications. This includes functional and environmental specifications, dimensions, power requirements and ordering information.

Chapter 3, entitled "Getting Acquainted", includes a detailed description of the 824 front panel.

Chapter 4, entitled "Getting Started", describes the procedure for setting up the 824 for operation. In this chapter are installation instructions, as well as some instructions about handling and inserting EPROMs.

Chapter 5 contains a discussion of the modes of operation. The 824 modes are specially designed to increase throughput and save you valuable time. This chapter also contains a variety of examples for the operation of the 824 in each of its modes.

Chapter 6 contains a detailed description of the functions used to set up the programmer operation. Included are the parameters for transmission and the transmission formats, and the timer for the UV eraser. In addition, a series of options are available for enabling or disabling device tests, setting the line frequency and saving the setup, if desired.

Chapter 7 is a complete description of the functions available for editing data in the programmer RAM. Examples are provided for each function.

Chapter 8 is a complete description, with examples, of the functions used to test and program your device. Both the dedicated device function keys and the device functions accessed by code entry are discussed.

Chapter 9 contains a complete discussion of the data transfer functions.

Chapter 10 is a guideline for writing software enabling programmer operation from a remote computer.

1.4 A GLOSSARY OF TERMS

Block Size	The size of the data block to be effected by any given function
Device Address	The first address of the device to be effected by the specified function
Last Address	Last address of the RAM block to be effected by the specified function
Non-Volatile Storage	A storage media that retains information in the absence of power, and which will make the information available when power is restored
RAM	Random Access Memory. RAM is a temporary location for information storage. When power is down, the data in RAM is lost.
RAM Begin	The first address in the RAM data block
Upper Limit	The uppermost address to be effected by the function. This term applies only to the RAM functions DELETE and INSERT. See sections 7.3 and 7.4.

CHAPTER 2
SPECIFICATIONS

2.1 FUNCTIONAL SPECIFICATIONS

General Architecture:	Microprocessor-controlled (8085)
Device Sockets:	Two sockets, 28-pin and 40-pin
User Data RAM:	Standard 64K byte, expandable to 256K byte
I/O Port:	Standard RS-232C Serial Port Expansion Bus Port
Baud Rates:	50, 75, 110, 150, 300, 600, 1200, 2400, 4800, 9600
Stop Bits:	1 or 2
Parity:	Even, odd, or none
Keyboard:	16-key hexadecimal keypad 4 direct access device function keys 5 control keys
Remote Control:	Standard (compatible with SOFTLINK)
Display:	16-character alphanumeric
Audible Signal:	Response to keying-in data and operating errors
Translation Formats:	INTEL HEX (85/86), MOTOROLA (S1/S2/S3), TEKTRONIX (standard & extended), BINARY, ASCII-HEX (x), SIGNETICS HEX, and MOSTEK (Z80) New formats are added on a regular basis, supported by user-oriented application notes.
Eraser:	Erasure time - 1 to 99 minutes in increments of 1 minute UV wave length - 253.7 nanometer Capacity - Erases 6 devices at a time

2.2 PHYSICAL SPECIFICATIONS

Dimensions:	Width:	37 cm (14.6 in)
	Height:	11.5 cm (4.5 in)
	Depth:	28 cm (11 in)
Weight:	Net:	3.6 Kg (7.9 lb)
	Shipping:	4.8 kg (10.5 lb)

2.3 ENVIRONMENTAL SPECIFICATIONS

Operating Temperature:	0 - 40° C
Humidity:	Up to 85% (non-condensing)

2.4 POWER REQUIREMENTS

Operating Voltages:	110/220V +10% (field selectable)
Frequency:	50/60 Hz

2.5 OPTIONS AND ORDER INFORMATION

Model 824:	Portable Programmer
824 SOFTPACK:	Software cartridge for model 824
SOFTLINK/PC:	Software package to remotely control the 824 from the IBM PC
SOFTLINK/MDS:	Software package to remotely control the 824 from the INTEL MDS
824 TESTPACK:	Software package to test the 824

CHAPTER 3
GETTING ACQUAINTED

3.1 INTRODUCTION

The 824 is a self-contained programming station. All of the features of the 824, including its functions and codes, are listed on the programmer front panel. Thus, once you understand the basic operating procedure, you may operate the 824 independently of product documentation.

In this chapter, you will become acquainted with the organization and location of the functions on the front panel, as well as various other programmer features.

Figure 3.1 shows a top view of the front panel, with the four main sections labeled A, B, C, and D. It will be helpful to refer to this figure throughout the chapter.

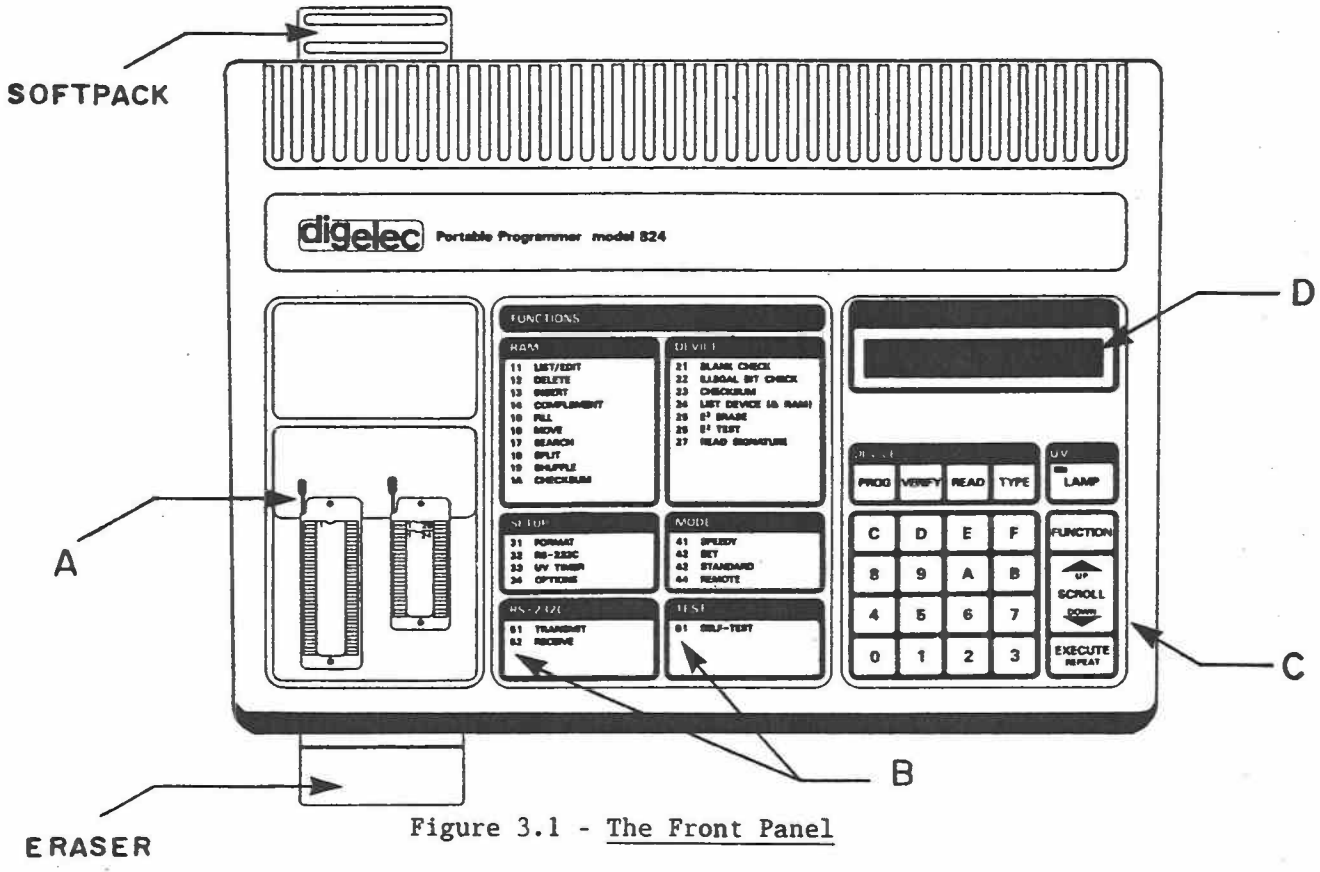


Figure 3.1 - The Front Panel

Section A: The Device Center. The device center is comprised of three stations. The device to be programmed is locked into the socket. Above the sockets is a pad for temporarily storing devices. Below the sockets is the UV eraser drawer. Refer to Figure 3.2.

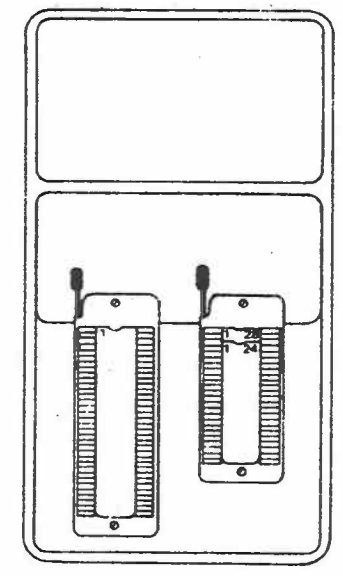
Section B: The Function Panel. All of the functions and operating modes are listed on the function panel. Refer to Figure 3.3.

Section C: The Keypad. There are three groups of keys on the keypad, used to enter data and operate the programmer and eraser. Refer to Figure 3.4.

Section D: The Alphanumeric Display. Located at the upper right side of the front panel, the display prompts data and addresses, and displays a variety of messages.

3.2 THE DEVICE CENTER (Section A)

The following are the three stations of the device center.



Device Storage Pad: A pad for storing devices is conveniently located above the device sockets.

Device Sockets: The 824 has two device sockets for testing and programming 24-, 28- and 40-pin devices. A lever is located adjacent to each socket for locking the device into place.

UV Eraser: The UV eraser drawer is located below the sockets. Refer to sections 4.6 and 6.5 on handling the UV eraser.

Figure 3.2 -
The Device Center

3.3 THE FUNCTION PANEL (Section B)

The function panel is located in the middle section of the front panel. Six groups of functions are listed, with the codes for their invocation.

RAM: These functions can be performed on the data in the user RAM of the 824. Refer to Chapter 7.

DEVICE: These functions can be performed on the device that is locked into the socket. Refer to Chapter 8.

SETUP: The SETUP functions are used to set the 824 operating parameters and to determine how it will be used. Refer to Chapter 6.

MODE: The 824 offers a variety of modes for making programming more convenient. Refer to Chapter 5.

RS-232C: The functions used to receive/transmit data from an external computer via its serial port. Refer to Chapter 9.

TEST: Used to perform a self-test.

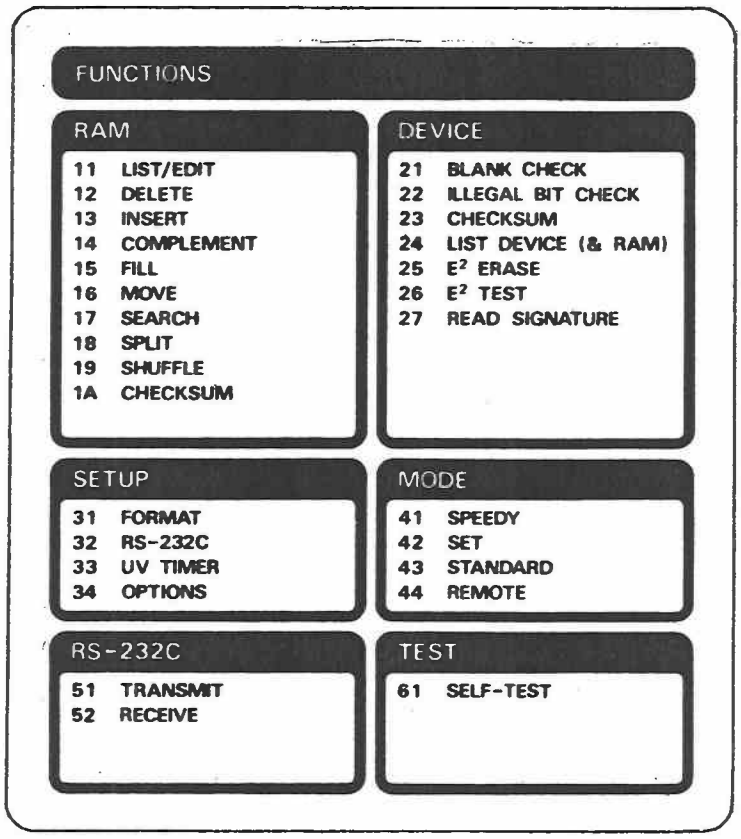


Figure 3.3 - The Function Panel

3.4 THE KEYS (Section C)

There are three types of keys on the front panel.

Hexadecimal Keypad: The soft-touch hexadecimal keypad has sixteen keys numbered 0 through F, which are used to select a function and to enter data manually.

Device Keys: The uppermost horizontal row contains the four most commonly-used device functions: PROGRAM, VERIFY, READ, TYPE. These functions are accessed directly via these keys. Refer to Chapter 8 for a complete discussion.

Control Keys: The keys listed vertically on the far right of the keypad are the control keys: UV LAMP, FUNCTION, SCROLL UP/DOWN, and EXECUTE (REPEAT). These keys are used to control the operation of the 824, and are described below.

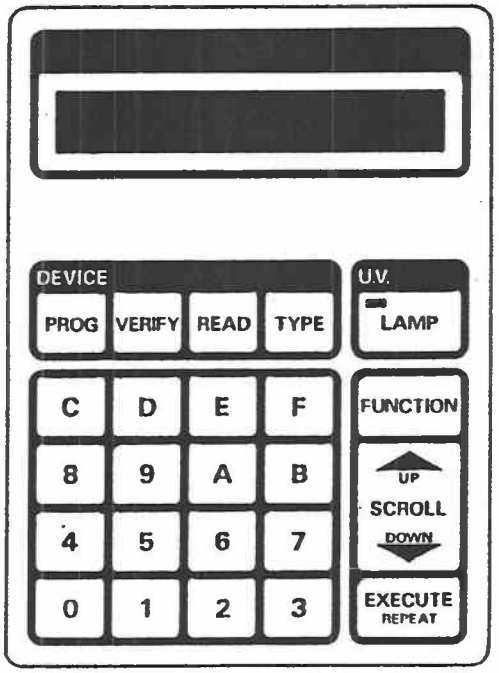


Figure 3.4 - The Keypad

- UV LAMP: The UV LAMP key is used to activate the UV eraser. The eraser drawer is located on the lower left side of the front panel.

- FUNCTION: The FUNCTION key is used to activate a function and to terminate a function in progress. When the key is pressed, the following prompt is displayed:

  ENTER FUNCTION

- SCROLL UP/DOWN: The SCROLL keys are used both to access alternative options within the SETUP functions and to access higher and lower addresses than addresses displayed. Addresses increment/decrement rapidly if the key is pressed longer than one second.

- EXECUTE: The EXECUTE key is used to start the execution of a specified function and to confirm a message on the display. It is also used to repeat a function, bypassing the FUNCTION key.

  In SETUP, this key is used to select the option currently displayed.

3.5 THE DISPLAY (Section D)

The 16-character alphanumeric display prompts the user with clear messages throughout programmer operation.

3.6 THE PORTS

RS-232C Serial: The RS-232C serial port is used to transmit and receive data from another computer, and for operation in remote mode, in which the 824 is controlled by a remote computer.

Expansion Bus: General purpose bus, to be used by test equipment or for future expansion.

3.7 THE AUDIBLE SIGNAL

Various operations are verified by an audible signal.

A short beep confirms a keystroke.

A long beep:
- Confirms that a function has been completed
- Alerts the user of an incorrect entry
- Signifies the completion of erasure

CHAPTER 4
GETTING STARTED

This chapter contains information about setting up the Model 824 for operation. In this chapter you will find instructions for installing the 824 and bringing the power up. This chapter also contains information on handling your EPROM, and the UV Eraser.

4.1 YOUR 824 PACKAGE

Your package contains the following items. Check to confirm that the items below are in your shipment.

- The Model 824 portable programmer
- The SOFTPACK software cartridge
- The USER MANUAL

4.2 INSTALLING THE SOFTPACK CARTRIDGE

Along with your model 824 programmer, you will receive the SOFTPACK cartridge, in which the 824 software resides. This design enables the programmer software to be continually updated to accommodate the latest devices on the market. You will be able to install the most up-to-date software by simply inserting the latest SOFTPACK revision.

The SOFTPACK cartridge is inserted at the back of the programmer. Refer to Figure 4-1.

NOTE

Insert your SOFTPACK cartridge with the label facing up. The cartridge must be inserted completely for the instrument to operate properly.

C A U T I O N

Trying to insert or extract the SOFTPACK when the 824 is powered-on may cause permanent damage to the programmer, and will void the warranty.

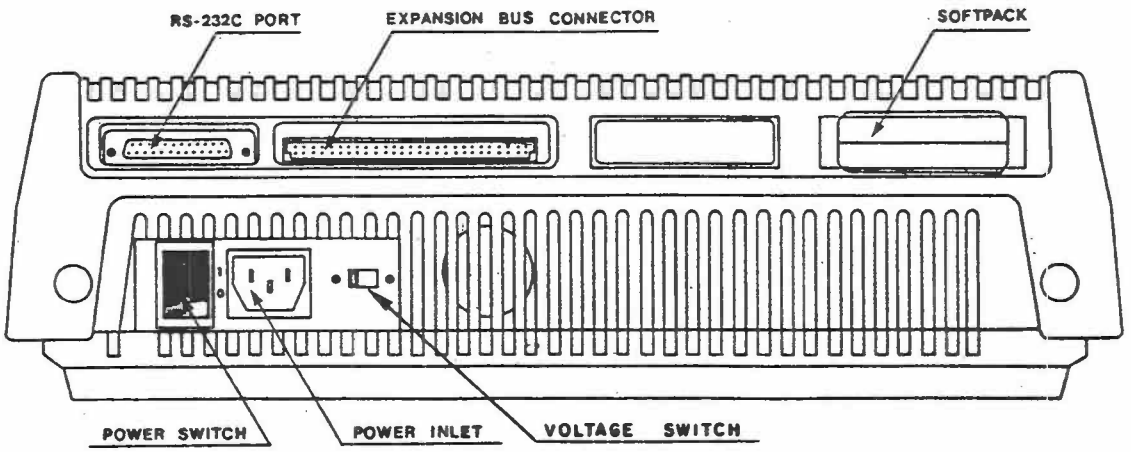


Figure 4.1 - The Model 824 Back Panel

4.3 POWER-ON

Connect the plug to the power supply.

C A U T I O N

The input AC voltage is preselected at the factory to either 110 VAC or 220 VAC. The selected voltage is marked near the power inlet. Make sure you are using the proper voltage. To select a voltage other than marked, turn off the 824 and switch the 110/220V selector located on the back panel to the required position. Refer to Figure 4.1.

The power-on switch is located on the back right hand side of the unit. Flip the power-on switch up. The 824 will respond with a short audible signal, and the following display:

DIGELEC

A system test is then performed, while the following messages are displayed:

SYSTEM RAM TEST

SYSTEM PORT TEST

TESTING SUPPLY

If the data test fails, check whether a device is installed in one of the sockets. Remove it and press the EXECUTE key to continue.

If the system test passes the following message will be displayed:

TEST OK REV X.X (or X.XX)

X.X (or X.XX) = Software revision number

The system is now ready for operation. Press the FUNCTION key to initiate the 824 operation.

4.4 INSERTING THE DEVICE

The model 824 programmer supports all of the devices listed in the PROGRAMMING GUIDE.

The front panel contains two textool sockets for programming 24-, 28- and 40-pin devices. A locking lever is located on top of each socket for locking the device into place.

To ensure reliable programming, a good electrical connection must be established between the device and the socket. For best results:

- Insert the device in the textool socket appropriate to the size of the device. Both 28-pin and 24-pin devices must be inserted into the right hand socket. However, 24-pin devices must be inserted so that the top four pins are empty.

- Hold the device with the notched end upwards, and insert the pins starting at the bottom of the device socket.

NOTE

Lock the device securely into place. The textool lever must be in a locked position to register the presence of a device. If the lever is in an unlocked position, the programmer will assume that no deivce is inserted.

4.5 PRECAUTIONS

Observe the following precautions to avoid damaging the device.

- Do not insert or remove a device while the programmer is performing an operation.
- Be certain that the device is inserted properly in the textool socket. The bottom pins of the device must mate with the bottom pins of the socket.
- Be sure that the lever is lowered until it is parallel to the surface of the programmer before initiating a device function.
- Lift the lever before attempting to remove a device.

4.6 UV ERASER

The UV eraser is located at the lower left side of the programmer. Refer to Figure 3.1.

To activate the UV eraser:

- Open the UV eraser drawer and place your EPROMs inside.

  For best results, erase up to six EPROMs at a session. EPROMs should be placed in the drawer front to back, rather than side to side, with pins facing down.

- Adjust the time setting for the UV lamp according to the device specifications. Refer to section 6.5 for details on the UV lamp timer.

CHAPTER 5
MODES OF OPERATION

5.1 MODES

The 824 can be operated in one of four modes. The operating modes of the 824 are specially designed to simplify your operations and to make programming faster and more convenient.

The modes of operation of the 824 are listed on the front panel under the heading MODES.

41 SPEEDY
42 SET
43 STANDARD
44 REMOTE

The first two operating modes, SPEEDY and SET, are designed to minimize the need to key-in parameters. They are only applicable for device operations.

In SPEEDY mode, the system enables device and data transfer operations without parameter entry. The parameters are automatically set according to the device size.

In SET mode, the system uses the device size as a default for repeating the execution of a single function.

STANDARD mode enables you to enter parameters manually and to alter them individually.

In REMOTE mode, the programmer is controlled completely from an external computer.

When you bring up the power of your programmer, it will always operate in the mode last saved in the non-volatile memory. Thus, if you have saved SPEEDY mode in function 34 (OPTIONS), when you bring up your programmer for the next working session it will automatically work in SPEEDY mode. Refer to section 6.6.6. The default setting in the factory setup is STANDARD mode.

In this chapter, the four modes of operation will be discussed fully. An example will follow the discussion of each mode. To emphasize the uniqueness of each mode of operation, each example will demonstrate the execution of the device function READ, in a different mode of operation.

To select an operating mode, press the FUNCTION key. At the display of the message

ENTER FUNCTION

enter the function code listed to the left of the mode and press the EXECUTE key. The message

MODE SELECTED

will then be displayed.

5.2 SPEEDY MODE (Function 41)

The SPEEDY mode will enable you to perform a device function without entering the parameters. The system will automatically set the parameters based on the size of the device.

Since parameters cannot be entered in SPEEDY mode, an operation cannot be performed on part of a device. The function selected will be performed on the entire address range of the device.

Select SPEEDY MODE as described in section 5.1.

PRESS: <FUNCTION>

Display: ENTER FUNCTION

PRESS: 41 <EXECUTE>

Display: MODE SELECTED

The 824 programmer is now set to operate in SPEEDY mode.

Continue operation by selecting a device function. The programmer will remain in SPEEDY mode until the mode of operation is reset, or until the power is turned off.

The programmer can be set to save the selected mode for operation at a session following power-down by selecting the SAVE SETUP option, function 34 (OPTIONS).

When SPEEDY mode has been selected, select the device function. The function will then execute relying on the parameters based on the device size.

To invoke another function, press the FUNCTION key. To repeat a function, press the EXECUTE key.

Subsequent operations will be executed in SPEEDY mode unless the mode is reselected or power is turned off.

The default parameters in SPEEDY mode are as follows:

RAM BEGIN	00000
*BLOCK SIZE	Equal to the device size
DEV ADDRESS	00000

*When executing data transfer functions in SPEEDY mode, the BLOCK SIZE can be equal to the memory size of the programmer. Refer to Chapter 9.

Example:

To READ a device in SPEEDY mode.

Display	Enter	Description
	<FUNCTION>	Begin the execution of every function (in this case device function) by pressing the FUNCTION key.
ENTER FUNCTION	<READ>	To read a device into the programmer RAM.
READING DEVICE		The operation is in progress.
READ DONE XXXX		The function is complete. A checksum is displayed.

5.3 SET MODE (Function 42)

SET mode will enable you to repeat the execution of a device function with a single keystroke. The system will determine the RAM BEGIN address for the next operation automatically. The size of the data block is determined by the device type which is set in the function TYPE. See 8.2.4.

Use this function to test or program a series of devices with data blocks residing in sequential blocks in the programmer RAM. The system will increment addresses in the data block automatically, in accordance with the size of the device specified.

Select SET mode as described in section 5.1.

PRESS: <FUNCTION>

Display: ENTER FUNCTION

PRESS: 42 <EXECUTE>

Display: SET SIZE XX

The 824 programmer will now operate in SET mode.

XX = The number of devices that can be effected by the function, based on the size of the device and the programmer RAM. The default value for XX is XX = RAM size/device size and it is represented in DECIMAL.

The SET SIZE number can be changed by entering the required number on the keypad. If set size (XX * device size > RAM size) exceeds RAM size, the follwoing message will be displayed:

SET TOO LARGE

Continue operation by selecting a device function. The programmer will remain in SET mode until the mode of operation is reset, or until the power is turned off.

The programmer can be set to save the selected mode setting for operation after power-down by saving the setting in the SAVE SETUP option, function 34 (OPTIONS). Refer to section 6.6.6.

Example:

To READ a group of four 8K devices into a 32K byte block in RAM. After selecting SET mode, enter 4 as set size.

Display	Enter	Description
	<FUNCTION>	The execution of every function (in this case, device function) begins by pressing the FUNCTION key.
ENTER FUNCTION	<READ>	Press the READ key.
INSERT CHIP 01	<EXECUTE>	The system prompts you to insert the first chip of the set.
READING DEVICE		
READ DONE XXXX	<EXECUTE>	Checksum is displayed.
INSERT CHIP 02	<EXECUTE>	The system will automatically increment the begin address of the next RAM data block by the device size.
READING DEVICE		
READ DONE XXXX	<EXECUTE>	Checksum is displayed.
INSERT CHIP 03	<EXECUTE>	The system will automatically increment the begin address of the next RAM data block by the device size.
READING DEVICE		
READ DONE XXXX	<EXECUTE>	Checksum is displayed.
INSERT CHIP 04	<EXECUTE>	The system will automatically increment the begin address of the next RAM data block by the device size.
READING DEVICE		
READ DONE XXXX		Checksum is displayed.

Pressing the READ key will bring the system back to CHIP 01.

5.4 STANDARD MODE

STANDARD mode is the default value for mode selection in the factory setup.

In STANDARD mode, parameters are entered manually through an interactive dialogue with the 824 programmer.

Because parameters are entered individually, STANDARD mode is the natural choice for performing an operation on a specific data block rather than on a whole device. When parameters are not entered, the function will execute as in SPEEDY and SET modes, and will base its parameter defaults on the size of the device.

All of the examples in Chapters 7, 8 and 9 describe the operation of the programmer in STANDARD mode.

Select STANDARD mode as described in section 5.1.

PRESS: <FUNCTION>

Display: ENTER FUNCTION

PRESS: 43 <EXECUTE>

Display: MODE SELECTED

Continue operation by selecting a device function.

The programmer can be set to save the selected mode setting for operation at a session after power-down, by saving the setting in the SAVE SETUP option, function 34 (OPTIONS).

Example:

To read a given data block of a device in STANDARD mode.

Display	Enter	Description
ENTER FUNCTION	<READ>	To read a device into the programmer RAM.

The programmer will now prompt the parameters in dialogue form. Enter the correct parameters for the following prompts.

RAM BEGIN

BLOCK SIZE

DEV ADDRESS

Refer to section 8.2.3 for a complete description of performing READ in STANDARD mode.

5.5 REMOTE MODE

In REMOTE mode, the programmer is completely controlled from an external computer. Chapter 10 contains a complete description of the options available in REMOTE mode.

The DIGELEC SOFTLINK program is available for operating the model 824 from the IBM PC and the INTEL MDS. See ordering information in Chapter 2.

CHAPTER 6
SETUP FUNCTIONS

The SETUP functions are used to initialize the parameters for operation.

They are listed below the RAM functions on the function board of the front panel under the heading SETUP (Figure 3.1), and include:

31 FORMAT
32 RS-232C
UV TIMER
OPTIONS

6.1 INVOKING A FUNCTION

The SETUP functions can be invoked by either (a) stepping from one to the next (using the EXECUTE key) and bypassing the alternative selections for each function, (b) scrolling from one to the next (using the SCROLL key) and setting each function parameter in its turn, or (c) by direct access.

The ability to scroll through all of the SETUP functions consecutively, without breaking to ENTER FUNCTION, saves time and enables the initialization of the SETUP as one procedure. It is therefore possible to initialize all of the SETUP parameters in one sweep and avoid having to return to SETUP functions during operation.

The SETUP functions are accessed directly by entering the function code on the keypad and executing the following dialogue.

PRESS: <FUNCTION>

Display: ENTER FUNCTION

PRESS: Function code
The function code is a two-digit number, located to the left of the function name on the front panel.

Display: Function name and code

PRESS: <EXECUTE>

6.2 SELECTING A PARAMETER

Each of the four SETUP functions listed above contains alternative selections of parameter settings. Once a function is invoked (as specified in section 6.1), the series of parameters that are associated with that heading are displayed alternately, by scrolling up or down from one to the next. A selection is made by pressing the EXECUTE key when the desired parameter is displayed.

6.3 FORMAT (Function 31)

The transmission formats appear sequentially in the following order:

*INTEL HEX
*MOTOROLA (S1/S2/S3)
*TEKTRONIX
BINARY
ASCII HEX SPACE
SIGNETICS HEX
MOSTEK - Z80

*These formats handle both 8-bit and 16-bit inputs. The 824 will automatically determine whether the hex file is for 8 or 16 bits.

New formats are added on a regular basis, supported by user-oriented application notes.

Select a transmission format by scrolling (up or down) to display the list of available formats. Press the EXECUTE key to confirm the correct display.

Once a format has been selected, the system will automatically invoke the next SETUP function: RS-232C.

6.4 RS-232C (Function 32)

To make the communication possible, both the programmer and the external computer must be set with the same parameters. Setting non-compatible parameters at each side will abort transmission.

The transmission parameters are as follows:

Baud Rate: The figure that indicates how many bits per second are transmitted on the line. Thus, 1200 baud means that the transmission speed is 1200 bits per second.

Note: The baud figure does not relate directly to the byte transfer rate. Therefore, dividing the baud by 8 will not give the byte transfer rate. To get the byte transfer rate one should know how many bits are transferred in one frame and from that to determine the actual byte transfer rate.

Data Bits: The number of data bits in each frame varies between 5 and 8 and is selected according to application.

Parity Bit: This bit indicates the parity of the data bits in the frame. The parity bit can be one of the following selection: odd, even, and none (no parity at all).

Stop Bits: The stop bit terminates the frame. Either 1 or 2 stop bits can be selected.

DSR: Enables handshaking via the DSR pin of the RS-232C connector.

XON/XOFF: Enables handshaking using the XON/XOFF protocol.

Header: Enables the user to designate a single character to precede the data string, and serve as a "start transmission" character. Data will not be received unless the prescribed flag is received.

Trailer: Enables the user to designate a single character to follow the data string and will indicate the termination of the data transmission (not applicable in binary format).

Auto Split: Will perform automatic SPLIT operation on the received data during receiving. Applicable only for 16-bit formats.

Table 6.1 shows the first display of the parameters for transmission and the additional options that may be displayed for selection by pressing the SCROLL key. Confirm your selection by pressing the EXECUTE key.

Table 6.1 - Setting the Parameters for Transmission

*First Display	SCROLL Options
BAUD RATE 9600	50, 75, 110, 134/5, 150, 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600.
HALF DUPLEX	FULL DUPLEX
ONE STOP BIT	TWO STOP BITS
NUMBER OF BITS 8	5, 6, 7, 8
PARITY NONE	ODD, EVEN
XON/XOFF DISABLE	**ENABLE
DSR OFF	ON
TRAILER OFF	ON
HEADER OFF	ON
AUTO SPLIT OFF	ON

*The first display will depend on the last SETUP configuration saved in the non-volatile memory. For this table, we have assumed that the factory SETUP is stored in the non-volatile memory.

**In this case, confirmation will display XON YY and XOFF ZZ, where YY and AA are the standard codes for XON/XOFF respectively. The user can at this stage set his own XON/XOFF codes.

When the parameters for transmission have been entered, the system will automatically invoke the next SETUP function: UV ERASER.

6.5 UV TIMER (Function 33)

The length of time is set for the UV eraser. The following message will be displayed:

UV ERASER 30 MIN.

The erasure time can be changed by either scrolling up/down to the required figure, or the value may be entered directly on the keypad.

All of the programmer functions can be used while the UV eraser is working.

NOTE

The timer resolution is one minute. If the programmer is either programming or performing a data transfer function while the UV eraser is operating, the timing mechanism will stop for the length of time required to perform the operation. It will then continue to erase for the full time set.

6.6 OPTIONS (Function 34)

The following additional SETUP options are accessed under the function OPTIONS.

Table 6.2 - Additional SETUP Options

Option	*First Display	SCROLL Options
IB CHECK	ON	OFF
BLANK CHECK	OFF	ON
LINE FREQUENCY	50 HZ	60 HZ
TEST CHIP	ON	OFF
SIGNATURE	OFF	ON
AUTO MATCH	OFF	ON
BUZZER	ON	OFF
PRINTER	ON	OFF
SECURITY	OFF	ON
SAVE SETUP	EXIT SETUP	RECALL SETUP FACTORY SETUP SAVE SETUP

*The first display will depend on the last SETUP configuration saved in the non-volatile memory. For this table, we have assumed that the factory SETUP is stored in the non-volatile memory.

6.6.1 IB Check and Blank Check

The Illegal Bit Check (IBC) and the Blank Check (BC) SETUP options are relevant only to the PROGRAM function. Refer to section 8.2.1 for a complete description of the PROGRAM function.

In the PROGRAM function, several data checks are performed automatically preceding and following the programming of data into the device. The IBC and BC procedures precede programming, and determine whether the programming can take place depending on the status of the device.

The first two options are used to set the system to either perform or not perform (ON/OFF) these checks.

NOTE

The default value for IBC is ON, and for BC is OFF. If, however, both are set to ON, the system will set the BC to ON and the IBC to OFF.

6.6.2 Line Frequency

The line frequency (for the operation of the UV eraser timer) can be set to either 50 or 60 Hz, depending on the country where the programmer is used. This function is not available in revisions 3.2 and higher.

6.6.3 Chip Test

The 824 has a built-in mechanism to test your chip before the execution of a device function to determine whether it is inserted in the textool properly, and thus protect it against damage.

The chip test is performed before the execution of a device function. If the device is inserted correctly, no message is displayed. If it is inserted improperly, the selected operation cannot be performed.

The display will prompt one of two error messages:

Display	Description
MISPLACED	A device is not present in the textool. Note: The device must be locked in place for the chip test to pass. The pins of a device smaller than the socket are inserted incorrectly.
BACKWARDS	The device is inserted upside down.

NOTE

Due to the variations in behavior between devices from different manufacturers, the inverse chip test may register incorrectly. If the message MISPLACED or BACKWARDS appears even though the chip is inserted correctly, set the chip test to OFF to enable device operations.

6.6.4 Signature Test

The signature test is a built-in mechanism that will verify the silicon signature of EPROMs (where a signature is provided).

The signature test is further verification that the device type designated is the same as that inserted in the textool. When the signature test is set to ON, the device type selected must conform to the signature of the device in the socket. The programmer will enable device operations only if the type and the signature match.

If the signature test is set to ON and the device does not have a signature, the programmer will disregard the test setting and operation will continue uninterrupted.

If the device has a signature but it does not match the selected type, the programmer will display the message:

TYPE MISMATCH

and will abort the operation. Otherwise, the programmer operation will continue.

6.6.5 Auto Match

The auto match feature enables the automatic type selection according to the signature of the device inserted in the textool socket. This is applicable only for devices with a signature.

Auto match ON reads the signature and automatically sets the type and its appropriate parameters, thus enabling the user to perform device operations (for those devices that have a signature), without having entered the type beforehand.

If the device has no signature, the programmer will display the message:

NO SIGNATURE

6.6.6 Buzzer

The buzzer feature provides a short, audible tone at the end of each operation and also when the programmer is turned on. If the buzzer has been set to ON, the programmer will beep when each operation is completed. When the buzzer is set to OFF, no beep will be sounded.

6.6.7 Printer

This function enables the user to print out the contents of both the RAM and the DEVICE when performing one of the following functions:

LIST DEVICE & RAM
ILLEGAL BIT CHECK
VERIFY

For the LIST DEVICE & RAM function, it is possible to select whether to print errors only or the entire content. Use function 34, OPTIONS for selecting PRINT ALL or PRINT ERRORS ONLY. For the VERIFY and ILLEGAL BIT CHECK functions, only PRINT ALL is available. Figures 6.1 and 6.2 show sample printouts.

PRINT ALL

LIST DEVICE & RAM

ERROR*	D-ADDR	D-DATA	R-DATA	R-ADDR
	00200	01	01	01000
ERR**	00201	CA	FE	01001
	00202	0F	0F	01002
	00203	02	02	01003
ERR**	00204	F3	BB	01004

Figure 6.1 - PRINT ALL Option

PRINT ERRORS ONLY

LIST DEVICE & RAM:

ERROR*	D-ADDR	D-DATA	R-DATA	R-ADDR
ERR**	00201	CA	FE	01001
ERR**	00204	F3	BB	01004

Figure 6.2 - PRINT ERRORS ONLY Option

6.6.8 Security

Some EPROMs (8751H and others) have a security bit which, when programmed, disables any device reading thus, protecting the device content.

When the security function is set to ON, the programmer will automatically program the security bit after programming the device.

The security bit will not be effected if the security option is set to OFF.

The security function has no effect on devices without the security bit.

6.6.9 Save SETUP

The SETUP option is used to save the configuration determined by one of the SETUP functions, or to recall a previously initialized SETUP. The status selected in this option will also determine the status of the setting for the mode (Chapter 5) and the device type (section 8.2.4).

Parameters can be called up from three different sources:

- The last saved parameters.
  These parameters are saved in the non-volatile memory. The parameters that were last saved (with the SAVE SETUP option) are entered into the non-volatile memory and become the default values for the SETUP parameters.

- The defaults set at the factory.
  A SETUP configuration is determined at the factory and is present in the ROM of your programmer. These parameters can be recalled by selecting the option FACTORY SETUP.

- The parameters entered in the scratchpad RAM.
  These parameters are only viable for one working session. The values entered reside in the scratchpad RAM and are lost when power is down or when the parameters stored in the non-volatile memory are invoked.

One of the following can be selected in the SETUP option:

EXIT SETUP
RECALL SETUP
FACTORY SETUP
SAVE SETUP

Scroll to display each option and press <EXECUTE> to select your choice.

EXIT SETUP: This is the default value for this function and the first message displayed. SETUP parameters recently changed are not transferred to the non-volatile memory and will therefore be lost at power down.

RECALL SETUP: The SETUP parameters that were saved in the non-volatile memory are recalled. This option is used when the parameters are reset temporarily and then returned to the SETUP that was saved. Automatic RECALL SETUP is performed when the 824 is powered on.

FACTORY SETUP: The SETUP parameters that were entered at the factory, and are present in the ROM of your programmer, are called up. These parameters cannot be changed. Refer to Table 6.3 for a listing of the parameters present in ROM. In addition to the parameters listed, the device type is set to EPROM 2764 and the mode of operation to STANDARD.

SAVE SETUP: The parameters entered into the scratchpad RAM (either manually or by reading the factory SETUP from ROM) are saved. They will become the system SETUP defaults at the next power-up.

NOTE

When you receive the programmer from the factory, the contents of the factory SETUP and the non-volatile memory are identical.

Table 6.3 - SETUP Parameters

Parameter	Factory SETUP	SCROLL Options
FORMAT	INTEL-HEX	MOTOROLA, TEKTRONIX, BINARY, ASCII-HEX (X), SIGNETICS HEX, MOSTEK (Z80)
BAUD RATE	9600	4800, 2400, 1200, 600, 300, 150, 110, 75, 50
DUPLEX	HALF	FULL
STOP BIT	ONE	TWO
NUMBER OF BITS	8	5 - 8
PARITY	NONE	ODD, EVEN
ON/OFF	DISABLE	ENABLE
DSR	OFF	ON
TRAILER	OFF	ON
HEADER	OFF	ON
AUTO SPLIT	OFF	ON
UV ERASER	30 MIN	*$\pm$1 minute
IB CHECK	ON	OFF
BLANK CHECK	OFF	ON
TEST CHIP	ON	OFF
SIGNATURE	OFF	ON
AUTO MATCH	OFF	ON
BUZZER	ON	OFF
PRINTER	ON	OFF
SECURITY	OFF	ON
EXIT SETUP	EXIT SETUP	RECALL SETUP FACTORY SETUP SAVE SETUP

*Time can also be entered on the hex keypad.

CHAPTER 7
RAM FUNCTIONS

The RAM functions are used to prepare the data for programming.

This chapter contains a complete discussion of the functions that can be performed in the programmer RAM. These functions are listed at the top left-hand side of the programmer function panel (refer to Figure 3.1) under the heading RAM, and are numbered with function codes 11 through 1A.

11	LIST/EDIT	16	MOVE
12	DELETE	17	SEARCH
13	INSERT	18	SPLIT
14	COMPLEMENT	19	SHUFFLE
15	FILL	1A	CHECKSUM

These functions will be discussed individually, in the order that they appear above, and examples will be provided for each function.

7.1 INVOKING A FUNCTION

All functions listed on the function panel are invoked with the following dialogue.

PRESS: <FUNCTION>

Display: ENTER FUNCTION

PRESS: Function code
The function code is a two-digit number, located to the left of the function name on the front panel.

Display: Function name and code

PRESS: <EXECUTE>

Display: First prompt of selected function

The function is then executed by entering the values for the parameters in dialogue form. The display will prompt the user to enter a parameter. The value entered is displayed on the far right of the display.

The display is confirmed by pressing <EXECUTE>, which invokes the prompt for the next parameter. A message indicating that the function is completed will be the final display for any given function.

7.2 LIST/EDIT (Function 11)

Addresses and their data are displayed and can be edited individually.

The function execution begins with the prompt:

RAM BEGIN 00000

Enter the first address in the RAM data block.

Data is then displayed from the address specified in the following format:

EDIT AAAAA DD

where AAAAA = address
DD = data at address AAAAA

Addresses are incremented/decremented by scrolling up/down.
The function is terminated by pressing the EXECUTE key.

Example:

To enter the data 11, 12, 13 at addresses 00, 01, and 02.

Display	Enter	Description
1. RAM BEGIN	<EXECUTE>	The default 0 is our first address.
2. EDIT 00000 DD	11 <SCR UP>	Enter data and scroll up to increment one address.
3. EDIT 00001 DD	12 <SCR UP>	Enter data and scroll up to increment one address.
4. EDIT 00002 DD	13 <EXECUTE>	Enter data and press <EXECUTE> to terminate the data entry session.
5. EDIT COMPLETE		

7.3 DELETE (Function 12)

A block of data is deleted and the ensuing data is moved downward to occupy the addresses of the data deleted. The uppermost addresses within the upper limit (equal to the number of deleted addresses) will be in their erased state. The data at the addresses following the upper limit is not effected.

The following prompts are displayed. The user enters values for each parameter in dialogue form.

RAM BEGIN	The first address in the RAM data block.
BLOCK SIZE	The size of the data block to be deleted.
UPPER LIMIT	The uppermost address to be effected by the function. The default for this parameter is determined by the device size.

Example:

To delete a 100 byte data block beginning at address 1000, and to fill the deleted addresses with the ensuing data, up to address 2000.

Display	Enter	Description
1. RAM BEGIN	1000 <EXECUTE>	The first address of the data block.
2. BLOCK SIZE	100 <EXECUTE>	The number of address to be deleted.
3. UPPER LIMIT	2000 <EXECUTE>	The uppermost address to be effected by the function.
4. DELETING		Function is in progress.
5. DELETE DONE		

7.4 INSERT (Function 13)

A data block is inserted, pushing the ensuing data upward toward higher addresses. Data (equal to the number of inserted addresses) is lost byte by byte from the specified upper limit. The data at addresses following the upper limit is not effected.

The following messages are displayed. The user enters values for each parameter in dialogue form.

RAM BEGIN	The first address in the RAM data block.
UPPER LIMIT	The uppermost address to be effected by the function. The default value for this parameter is determined by the device size.

Data is entered in the following format:

ENTER DATA XX DD

where XX = The number of data insertions. The first address inserted is 01, the second address inserted is 02 etc.
DD = Data originally located at that address.

Example:

To insert the data 12 and 13 at addresses 100 and 101, and to increment the ensuing data up to address 2000. The original data in addresses 1FFE and 1FFF is lost.

Display	Enter	Description
1. RAM BEGIN	100 <EXECUTE>	The first address in the data block.
2. UPPER LIMIT	2000 <EXECUTE>	The highest address to be effected by the function.
3. ENTER DATA 01 DD	12 <SCROLL UP>	Enter data and scroll to the next address.
4. ENTER DATA 02 DD	13 <EXECUTE>	Enter data and press <EXECUTE> to terminate the data entry session.
5. INSERTING		Function is in progress.
6. INSERT DONE		All data from address 03 and above (up to address 2000) is incremented two places. The data previously located at addresses 1FFE and 1FFF is lost.

7.5 COMPLEMENT (Function 14)

Each data item is inverted to its binary complement.

The following messages are displayed. The user enters values for each parameter in dialogue form.

RAM BEGIN	The first address in the RAM data block.
BLOCK SIZE	The size of the data block to be inverted.

Example:

To complement a data block of 500 bytes beginning at address 1000.

Display	Enter	Description
1. RAM BEGIN	1000 <EXECUTE>	The first address in our data block.
2. BLOCK SIZE	500 <EXECUTE>	The size of the block to be inverted to its binary complement.
3. COMPLEMENTING		Function is in progress.
4. COMPLEMENT DONE		

7.6 FILL RAM (Function 15)

A given data block is filled with a specified data constant or data string, that may not exceed 16 characters.

The following messages are displayed. The user enters values for each parameter in dialogue form.

RAM BEGIN — The first address in the RAM data block.
BLOCK SIZE — The size of the data block to be filled.

Data is entered in the following format:

ENTER DATA XX DD

where XX = The number of the byte in the string to be filled in the memory. The first byte entered is 01, the second byte entered is 02 etc.
DD = Data originally located at that address.

Example:

To fill a 20 byte data block beginning at address 10 with the repetitive data pattern 22, 23, 24.

Display	Enter	Description
1. RAM BEGIN	10 <EXECUTE>	The first address in the data block.
2. BLOCK SIZE	20 <EXECUTE>	The data block is 20 address bytes.
3. ENTER DATA 01 DD	22 <SCROLL UP>	Enter data and scroll up to increment one address.
4. ENTER DATA 02 DD	23 <SCROLL UP>	Enter data and scroll up to increment one address.
5. ENTER DATA 03 DD	24 <EXECUTE>	Enter data and press <EXECUTE> to terminate the data entry session.
6. FILLING		Function is in progress.
7. FILL DONE		

7.7 MOVE (Function 16)

A block of data is copied to another location without effecting the source block.

The following messages are displayed. The user enters values for each parameter in dialogue form.

FROM ADDR	The first address in the RAM data block to be moved.
BLOCK SIZE	The size of the data block to be moved.
TO ADDR	The first address of the move destination.

Example:

To move the data block 10 through 20 to location 50.

Display	Enter	Description
1. FROM ADDR	10 <EXECUTE>	The first address in the source data block.
2. BLOCK SIZE	10 <EXECUTE>	Enter data and press <EXECUTE>.
3. TO ADDR	50 <EXECUTE>	Enter the first address of the destination and press <EXECUTE>.
4. MOVING		Function is in progress.
5. MOVE DONE		

7.8 SEARCH (Function 17)

To search for a specified data string.

The following messages are displayed. The user enters values for each parameter in dialogue form.

RAM BEGIN	The first address in the RAM data block.
BLOCK SIZE	The size of the data block to be searched.

The data to be searched is entered in the following format:

ENTER DATA XX DD

where XX = The number of bytes to be searched. The number of the first byte entered is 01, the number of the second byte entered is 02 etc.
DD = Data originally located at that address.

Example:

To search a 100 byte data block, beginning at address 0, for the data string 22, 23.

Display	Enter	Description
1. RAM BEGIN	<EXECUTE>	The default value for RAM BEGIN is 0.
2. BLOCK SIZE	100 <EXECUTE>	The search for this string is in a 100 byte data block.
3. ENTER DATA 01 DD	22 <SCROLL UP>	Enter data and increment to the next byte.
4. ENTER DATA 02 DD	23 <EXECUTE>	Enter data and <EXECUTE> to terminate the session.
5. SEARCHING		Function is in progress.

If the data is found, it will be displayed in the following format:

6. FOUND AT AAAAA	<SCROLL UP>	AAAAA = The first address at which the data string was found. Scroll up to view the next address.
7. FOUND AT BBBBB	<SCROLL UP>	BBBBB = The second address at which the data string was found. Scroll up to view the next address.

If the data string is not found, the display will read:

DATA NOT FOUND

7.9 SPLIT (Function 18)

Divides odd and even address bytes into two blocks occupying the same space. The block generated from even addresses starts at RAM BEGIN. The block generated from odd addresses starts at RAM BEGIN + BLOCK SIZE/2.

NOTE

If the block size is an odd number, it will automatically be truncated to the nearest even number smaller than the block size. If the block size is 1001, it will be read as 1000.

The following messages are displayed. The user enters values for each parameter in dialogue form.

RAM BEGIN	The first address in the RAM data block.
BLOCK SIZE	The size of the data block to be split.

Example:

To split a 1000 byte data block beginning at address 0.

Display	Enter	Description
1. RAM BEGIN	<EXECUTE>	The default value for RAM BEGIN is 0.
2. BLOCK SIZE	1000 <EXECUTE>	The size of the data block to be split.
3. SPLITTING		Function in progress.
4. SPLIT DONE		

The block generated from even addresses starts at 0; the block generated from odd addresses starts at 800.

7.10 SHUFFLE (Function 19)

Merges two data blocks in RAM by selecting data in an alternating pattern between the upper and lower data blocks, creating one data block twice the size of either of the original two.

The following messages are displayed. The user enters values for each parameter in dialogue form.

RAM BEGIN	The first address in the RAM data block.
BLOCK SIZE	The size of the data block to be shuffled.

Example:

To shuffle a split 1000 byte data block.

Display	Enter	Description
1. RAM BEGIN	<EXECUTE>	The default value for RAM BEGIN is 0.
2. BLOCK SIZE	1000 <EXECUTE>	The size of the data block to be shuffled.
3. SHUFFLING		Function in progress.
4. SHUFFLE DONE		

7.11 CHECKSUM RAM (Function 1A)

A checksum for the data in RAM is calculated.

The following messages are displayed. The user enters values for each parameter in dialogue form.

RAM BEGIN	The first address in the RAM data block.
BLOCK SIZE	The size of the data block to be calculated.

Example:

To calculate a checksum on a 1000 byte data block beginning at address 0.

Display	Enter	Description
1. RAM BEGIN	<EXECUTE>	The default RAM BEGIN address is 0.
2. BLOCK SIZE	1000 <EXECUTE>	Enter the block size.
3. CHECKSUMMING		Function is in progress.
4. CHECKSUM XXXX		The checksum XXXX is displayed.

CHAPTER 8
DEVICE FUNCTIONS

The model 824 has a host of device functions presented in two groups. The first group is listed on the front panel under the heading DEVICE, and its functions are numbered with function codes 21 through 27 (refer to Figure 3.3). These functions are discussed in detail in section 8.1.

The second group includes the most commonly used device functions. They are accessed directly with dedicated device keys, listed horizontally above the keypad (refer to Figure 3.4), and are discussed in detail in section 8.2.

The device functions can be performed in one of several modes. Refer to Chapter 5 for a complete discussion of the 824 modes. In this chapter, the device functions are described as they are performed in STANDARD mode. After the function is invoked, the user enters the parameters are entered in dialogue form.

All of the functions described in this chapter can also be performed in SPEEDY mode which eliminates the necessity to key-in parameters, and in SET mode, for handling multiple devices.

8.1 DEVICE FUNCTIONS

The device functions are listed at the top right-hand side of the front panel (refer to Figure 3.3) under the heading DEVICE, and the function codes are numbered 21 through 27.

21 BLANK CHECK
22 ILLEGAL BIT CHECK
23 CHECKSUM
24 LIST DEVICE AND RAM
25 E^2 ERASE
26 E^2 TEST
27 READ SIGNATURE

These functions will be discussed individually, in the order that they appear above, and examples will be provided for each function.

For all examples in this chapter, we will be using the EPROM 2732 (4K X 8 device).

8.1.1 Invoking a Function

The device functions above are invoked with the following dialogue.

PRESS: <FUNCTION>

Display: ENTER FUNCTION

PRESS: Function code
The function code is a two-digit number, located to the left of the function name on the front panel.

Display: Function name and code

PRESS: <EXECUTE>

Display: First prompt of selected function

The function is then executed by entering the values for the parameters in dialogue form. The display will prompt the entry of a parameter, and the user will enter the value for that parameter.

Messages are displayed on the left-hand side of the display and their values are displayed on the far right of the display.

A selection is confirmed by pressing the EXECUTE key, which automatically invokes the prompt for the next parameter. A message indicating that the function is completed will be the final display for any given function.

To invoke another function, press the FUNCTION key.

To repeat a function, press the EXECUTE key.

NOTE

These functions can also be performed in SPEEDY mode to avoid entering parameters. In this mode, the function will execute using the default parameters. Refer to Chapter 5.

8.1.2 Blank Check (Function 21)

A check to determine that the data in a specified address range is erased.

The following messages are displayed and values are entered for each parameter, in dialogue form.

DEV ADDRESS	The first address in the device to be effected by the specified function.
BLOCK SIZE	The size of the data block. The default for this parameter is the size of the device.

If the device is erased, the function executes to completion and the following message is displayed:

```
CHECK DONE
```

However, if the system determines that the device is not erased, the function execution is interrupted and the following message is displayed:

```
BLANK CHK FAILED
```

The programmed addresses are then displayed with their data in the following format:

```
AD AAAAA  DATA DD
```

where AAAAA = Programmed addresses.
DD = Data present at that address.

Subsequent programmed addresses are viewed by scrolling up. They are then displayed individually in the format above.

Example:

To determine that all of the bits in the device are erased.
We are using the EPROM 2732 (4K device).

Display	Enter	Description
1. DEV ADDRESS	<EXECUTE>	The default begin address for the device is 0.
2. BLOCK SIZE	<EXECUTE>	The default is the device size. The 2732 is a 4K device, and the highest address is FFF.
3. BLANK CHECKING		Function is in progress
4. BLANK CHK FAILED	<SCROLL UP>	A unerased byte was found. Press <SCROLL UP> to view the byte and its address.
5. AD 00000 DATA 88	<SCROLL UP>	Address 0 contains the data 88. Scroll up to view the next unerased byte and address.
6. AD 00001 DATA 88	<FUNCTION>	Address 1 contains the data 88. Press <FUNCTION> to exit from the function.

8.1.3 Illegal Bit Check (Function 22)

A comparison is made between every bit in the data block in RAM and the device, to determine if the device can be programmed with the data from RAM.

The following messages are displayed. The user enters values for each parameter in dialogue form.

RAM BEGIN	The first address in the RAM data block.
BLOCK SIZE	The size of the data block. The default for this parameter is the device size.
DEV ADDRESS	The first address in the device to be effected by the specified function.

If the device can be programmed with the data from RAM, the function will execute to completion and the following message will be displayed:

CHECK DONE

If the device cannot be programmed with the data from RAM, the function execution will be interrupted and the following message will be displayed:

IB CHK FAILED

The mismatched addresses and their data are then displayed. The data for the device is on the left side of the display and the data for RAM is on the right.

Data is displayed in the following format:

PPPPP.DD RRRRR.DD

where PPPPP = PROM addresses that cannot be programmed.
DD = Data present at that address.
RRRRR = RAM addresses.
DD = Data present at that address.

To view the next incompatible addresses one by one in the format above, scroll up.

Example:

To determine if the data block 10 - 5F in the device can be programmed with data from the same address block in RAM.

Display	Enter	Description
1. RAM BEGIN	10 <EXECUTE>	Our RAM block begins at address 10.
2. BLOCK SIZE	50 <EXECUTE>	The data block to be checked.
3. DEV ADDRESS	10 <EXECUTE>	The RAM block is being compared to the same address range in the device.
4. IB CHECKING		Function is in progress.
5. IB CHECK FAILED		Some bits in the specified address block cannot be programmed with the data from RAM. Press <SCROLL UP> to view the mismatched addresses.
6. 00041.88 00041.FF	<SCROLL UP>	Address 41 of the device is programmed with data 88. Address 41 of RAM contains FF. Scroll up to view the next address that cannot be programmed with RAM data.
7. 00042.88 00042.FF	<FUNCTION>	The next consecutive incompatible addresses are displayed in the format as described above. To exit the function, press <FUNCTION>.

8.1.4 Checksum (Function 23)

A 16-bit checksum is calculated for the specified device address range.

The following messages are displayed. The user enters values for each parameter in dialogue form.

DEV ADDRESS	The first address in the data block of the device.
BLOCK SIZE	The size of the data block. The default for this parameter is size of the device.

Example:

To calculate a checksum for the entire device.

Display	Enter	Description
1. DEV ADDR	<EXECUTE>	The default is 0.
2. BLOCK SIZE	1000 <EXECUTE>	The block size is the entire device.
3. CHECKSUMMING		Function is in progress.
4. CHECKSUM XXXX		The checksum is displayed.

8.1.5 List Device (& RAM) (Function 24)

The data in the device and in RAM are displayed.

The following messages are displayed. The user enters values for each parameter in dialogue form.

RAM BEGIN	The first address in the RAM data block.
BLOCK SIZE	The size of the data block. The default for this parameter is the size of the device.
DEV ADDRESS	The first address in the data block of the device.

Data for the device is displayed on the left, and data for RAM is on the right, in the following format:

PPPPP.DD RRRRR.DD

where PPPPP = PROM addresses
DD = Data present at that address.
RRRRR = RAM addresses
DD = Data present at that address.

Subsequent addresses are viewed by scrolling up.

Example:

To view the data at address 20 of the device, and address 50 of RAM.

Display	Enter	Description
1. RAM BEGIN	50 <EXECUTE>	We are viewing data at the RAM address 50.
2. DEV ADDR	20 <EXECUTE>	We are viewing data at the device address 20.
3. 00020.88 00500.FF	<SCROLL UP>	Scroll up to increment both the device and the RAM addresses.
4. 00021.88 00051.FF	<EXECUTE>	Press <EXECUTE> to exit the function.
5. LIST COMPLETE		

8.1.6 E^2 Erase (Function 25)

This function is used to erase an E^2PROM.

Erasure is performed on the complete device. Therefore, no parameters are entered for this function. The function will use the default values which are the size of the device.

The device type must be set to an E^2PROM device. If a non-electrically erasable device type has been entered, the following message will be displayed:

TYPE MISMATCH

When the function is in progress, the following message will be displayed:

ERASING

When the function has finished, the following message will be displayed:

ERASE COMPLETE

8.1.7 E^2 Test (Function 26)

This function tests the integrity of the device by performing an erase/write/verify/erase cycle on the device.

8.1.8 Read Signature (Function 27)

The signature of the device is read and displayed. This function is only applicable for devices with signatures.

The signature is comprised of the manufacturer code, and the device code signature.

The signature is displayed in the following format:

MFG XX DEVCOD YY

where XX = The code of the manufacturer
YY = The device code signature

8.2 DIRECT ACCESS DEVICE FUNCTIONS

The four most frequently used device functions are accessed quickly and easily with dedicated function keys. These functions can be called up directly without executing the invocation process for all other 824 functions.

The direct access device functions are:

PROGRAM
VERIFY
READ
TYPE

These functions will be described as they are executed in STANDARD mode, for which the parameters are entered manually. However, the most common application of these functions is for performance on the entire range of the device. Hence, SPEEDY mode is the natural mode choice for the execution of these functions. Refer to Chapter 5 for a complete description of the modes of operation.

To invoke one of the above functions:

PRESS: <FUNCTION>

Display: ENTER FUNCTION

PRESS: Function name

Display: Selected function name

PRESS: <EXECUTE>

8.2.1 Program

The PROGRAM function is used to transfer data from the programmer RAM to the device.

Programming is always executed in two steps. First, data is loaded into the user memory (RAM). Chapter 7 contains a complete description of the functions used to prepare the RAM data. Secondly, data is programmed from RAM to the device.

The following messages are displayed. The user enters values for each parameter in dialogue form.

RAM BEGIN	The first address in the RAM data block.
BLOCK SIZE	The size of the data block. The default for this parameter is the device size.
DEV ADDRESS	The first address of the device to be effected by the specified function.

The PROGRAM function is comprised of three stages that are performed automatically.

- A check is performed to verify the status of the device. You may choose to perform either the IB check or the blank check, or you may disable both checks. Refer to section 6.6.1.

- Data is transferred from the programmer RAM to the device.

- The system verifies the data in the device against its source, the user RAM.

Example:

To program the EPROM 2732 with a 500 byte data block beginning at address 0 in RAM. We have set our programmer to the factory setup. Therefore, it will perform the IB check and not the blank check.

Set the device type as described in section 8.2.4.

Display	Enter	Description
1. RAM BEGIN	<EXECUTE>	The default start address is 0.
2. BLOCK SIZE	500 <EXECUTE>	We are programming 500 bytes from RAM to the device.
3. DEV ADDRESS	500 <EXECUTE>	Programming will begin with address 500 in the device.
4. IB CHECKING		The function is beginning to process.
5. PROGRAMMING		Data has been transferred to the device, and it is being verified against its source in RAM.
6. PROG DONE XXXX		The function is complete. A checksum is displayed.

8.2.2 Verify

The function VERIFY is used to perform a comparison between the data in RAM and the data in the device.

The following messages are displayed. The user enters values for each parameter in dialogue form.

RAM BEGIN	The first address in the RAM data block
BLOCK SIZE	The size of the data block. The default for this parameter is the device size.
DEV ADDRESS	The first address of the device to be effected by the specified function.

Example:

To verify a 100 byte data block in the EPROM 2732, beginning at address 300, against the data in RAM.

Display	Enter	Description
1. RAM BEGIN	300 <EXECUTE>	The start address of our data block is 300.
2. BLOCK SIZE	100 <EXECUTE>	We are verifying a 100 byte data block.
3. DEV ADDRESS	300 <EXECUTE>	The start address of our data block is 300.
4. VERIFYING		The function is processing.
5. VERIFY DONE XXXX		The function is complete. A checksum is displayed.

8.2.3 Read

A data block is read from the device to RAM.

The following messages are displayed. The user enters values for each parameter in dialogue form.

RAM BEGIN	The first address in the RAM data block
BLOCK SIZE	The size of the data block. The default for this parameter is the device size.
DEV ADDRESS	The first address of the device to be affected by the specified function.

Example:

To read a 100 byte data block from the device, beginning at address 300, to RAM.

Display	Enter	Description
1. RAM BEGIN	300 <EXECUTE>	The start address of our data block is 300.
2. BLOCK SIZE	100 <EXECUTE>	We are reading a 100 byte data block.
3. DEV ADDRESS	300 <EXECUTE>	The start address of our data block is 300.
4. READING DEVICE		The function is processing.
5. READ DONE XXXX		When the function is complete, the display will prompt the checksum of the data block.

8.2.4 Type

The TYPE function is used to select the required device type.

The correct device type must be selected prior to the execution of all device functions. To do so, press the FUNCTION key, followed by the direct access TYPE key.

At power-on, the programmer loads the default type from its non-volatile memory. The last device type saved in the SAVE SETUP option (refer to section 6.6.6) will be displayed.

The device type can be changed in one of two ways:

- Scroll to display the correct device type.
- Enter the device code on the keypad.

The newly selected device type will be displayed at the next working session, after the power is turned off, only if you save it in the SAVE SET-UP option. If not, the last saved device type will be displayed.

If the device code FFFF is entered, the 824 will try to set the device type by reading the device signature. If the device does not have a signature, the system will use the device type previously set.

NOTE

The EXECUTE key must be pressed after selecting the required device type. If it is not pressed, your selection will not be accepted and the previous device type will remain.

CHAPTER 9

RS-232C DATA TRANSFER FUNCTIONS

9.1 GENERAL

The 824 can transfer data to and from an external computer through the RS-232C serial communication port. The two data transfer functions are listed under the heading RS-232C on the front panel. Refer to Figure 3.1.

51 TRANSMIT
52 RECEIVE

Before attempting data transfer, the parameters for transmission must be set, as described in section 6.4. The parameter setting at the programmer and at the remote computer must correspond for reliable data transfer.

9.2 INVOKING A FUNCTION

The data transfer functions are invoked with the following dialogue:

PRESS: <FUNCTION>

Display: ENTER FUNCTION

PRESS: Function code (51 or 52)

Display: Function name and code

PRESS: <EXECUTE>

9.3 DATA TRANSFER IN SPEEDY MODE

Data transfer can be performed in either SPEEDY, SET or STANDARD mode.

In SPEEDY mode, parameters are not entered. The system bases its operation on the system defaults.

Block length will be equal to the size of the programmer memory when transferring in the following formats:

INTEL HEX
SIGNETICS
MOTOROLA
TEKTRONIX
MOSTEK

For all other data formats, the block length will be equal to the device size.

To perform a data transfer function in SPEEDY mode:

- Select SPEEDY mode, as described in section 5.2.

- Select the data transfer function as described above.

The function will then be performed automatically, without entering the parameters. While the function is executing, the system will display the blinking message, TRANSMITTING or RECEIVING.

When the function is complete one of the following two messages will be displayed:

TRANSMIT DONE
or
RECEIVE DONE

9.4 DATA TRANSFER IN SET MODE

In SET mode, the data transfer function behaves as in SPEEDY mode (refer to section 9.3). Therefore, if the programmer is set to the SET mode, a data transfer function can be performed without changing modes. The execution, however, will be based on the parameter defaults, as in SPEEDY mode.

9.5 DATA TRANSFER IN STANDARD MODE

In STANDARD mode, the user enters the parameters for the size of the data block, individually.

9.5.1 Transmit (Function 51)

Function 51 is used to transmit data from the programmer RAM to an external computer.

The following messages are displayed and the values are entered in dialogue form.

RAM BEGIN	The first address of the RAM data block.
BLOCK SIZE	The size of the data block to be transferred.
OFFSET	In TRANSMIT mode, the OFFSET will be the first address of the address field in the transmitted record.

NOTE

OFFSET is applicable only for data formats with address fields.

Example:

To transmit a 500 byte data block beginning at address 100, with OFFSET 0.

Display	Enter	Description
1. RAM BEGIN	100 <EXECUTE>	The RAM data block for transmission begins at address 100.
2. BLOCK SIZE	500 <EXECUTE>	We are transmitting a 500 byte data block.
3. OFFSET	<EXECUTE>	If a parameter is not entered the value will be 0.
4. TRANSMITTING		The function is in progress.
5. TRANSMIT DONE		The data transfer is complete.

An error in data transfer will prompt the message

USART ERROR

9.5.2 Receive (Function 52)

Function 52 is used to receive data from an external computer to the programmer RAM.

The following messages are displayed. The user enters values for each parameter in dialogue form.

RAM BEGIN	The first address of the RAM data block.
BLOCK SIZE	The size of the data block to be transferred.
OFFSET	In RECEIVE mode, the OFFSET is subtracted from the sum of the programmer RAM BEGIN ADDRESS and the address field of the received record.

NOTE

OFFSET is applicable only for data formats with address fields.

If RAM BEGIN address = 0, the OFFSET can be used as HUNT ADDRESS. In this case, all addresses less than the OFFSET will not be stored in the programmer RAM. Only addresses greater than the OFFSET will be received.

Example:

To receive a 100 byte data block with OFFSET 50 at the programmer RAM, beginning at address 1000.

Display	Enter	Description
1. RAM BEGIN	1000 <EXECUTE>	Data will be received from address 1000 in the programmer RAM.
2. BLOCK SIZE	100 <EXECUTE>	A 100 byte data block will be transferred.
3. OFFSET	50 <EXECUTE>	The OFFSET address is 50.
4. RECEIVING		The function is in progress.
5. RECEIVE DONE		The data transfer is complete.

An error in data transfer will prompt the message

USART ERROR

CHAPTER 10
REMOTE CONTROL

10.1 INTRODUCTION

This chapter is a guideline for writing software enabling a computer to control and interactively communicate with the model 824 in remote mode, via the RS-232C port.

The computer initiates communication with the model 824 by sending commands that instruct it to perform its various functions. The model 824 responds by transmitting a series of characters.

10.2 SETUP

Connect the model 824 to your terminal or computer, using the RS-232C port. For details on the port signals, refer to Appendix A. The transfer parameters must be set in the model 824 prior to initiation of transmission.

10.3 COMMANDS

Most of the commands consist of a single ASCII character followed by a carriage return. The model 824 will respond to commands transmitted from the computer with one of several characters:

>	The model 824 signals the successful completion of a function after the Remote mode has been selected by transmitting ">" followed by a <CR>.
F	The model 824 signals a fault by transmitting the character "F".
?	The model 824 responds to an unknown or invalid command with a question mark.

The commands sent to the programmer with a parameter must have the following syntax:

xx...xB, <CR>

where B = Command character
xx...x = Any number of hex characters of which only the last five represent parameters, followed by a carriage return.

If there are fewer than five parameter characters, leading zeros are added automatically. If the hexadecimal characters are omitted, the parameter is set to its default.

C A U T I O N

When operating the programmer from a remote site, no new commands should be issued before the programmer prompts ">" "F" or "?".

10.4 SETTING THE PARAMETERS FOR OPERATION

Command	Function	Description
AAAAAW	SET ADDRESS OFFSET	This address (AAAAA) is subtracted from all addresses transferred during data input via the serial interface. It is also added to addresses sent during data output. The default is zero.
IIIII<	SET INITIAL ADDRESS	The default initial address is zero. Use this command to change that address to "IIIII".
SSSSS;	DEFINE BLOCK LENGTH	This command defines the block length as "SSSSS". The default value is the size of the device.
HA	SET DATA FORMAT	This command selects the appropriate data format, where "H" is one of the following: 5 BINARY 7 ASCII HEX (SPACE) 9 ASCII HEX A SIGNETICS HEX B MOSTEK C MOTOROLA (S1/S2/S3) E TEKTRONIX (8 BIT & EXTENDED) F INTEL HEX 85/86
EEEEEf	SET FINAL ADDRESS	This command sets the final address for the operation as EEEEE. Note: If both 'f' and '<' were issued, the last one that was received is in effect.

10.5 DATA TRANSFER COMMANDS

Command	Function	Description
I	INPUT PORT DATA TO RAM	Data is loaded into RAM from the RS-232C port.
L	INPUT DEVICE DATA INTO RAM	The data from a programmed device is loaded into RAM.
O	OUTPUT RAM DATA TO PORT	Command "O" (capital O) sends RAM data to the RS-232C port.
o	OUTPUT DEVICE DATA TO PORT	Command "o" (lower case o) sends device data to the computer and loads it into RAM.
C	DEVICE/PORT DATA COMPARE	Data from the port is loaded to the RAM and compared to the device data. If there is a discrepancy, an error message (the character "F") is sent back to the remote computer.

10.6 RAM FUNCTIONS

Command	Function	Description
S	CHECKSUM	The RAM checksum is calculated, and the 16-bit result is sent to the computer in hex form "SSSS". This process is useful for checking the correct loading of data from the computer.
c	COMPLEMENT RAM	This command (lower case "c") complements the RAM contents.
\	RAM-RAM MOVE BLOCK	This command copies a block from one RAM address to another. The parameters for this command are defined as follows: SOURCE ADDRESS: Address set by the "<" command. DESTINATION ADDRESS: Address set by the ":" command BLOCK LENGTH: Set by the ";" command.

RAM FUNCTIONS (Cont'd)

Command	Function	Description
d	DELETE BLOCK	This command deletes a block from the RAM. The parameters are: RAM INITIAL ADDRESS: The address set by the "<" command. BLOCK LENGTH: Set by the ";" command. UPPER LIMIT: The highest effected address set by the ':' command.
xxxxx?	SPLIT	This command separates the contents of the even-numbered addresses from the contents of the odd-numbered addresses, starting with the RAM initial address=0, for a block length of xxxxx * 2. If the parameter xxxxx is not given, the RAM INITIAL ADDRESS and the BLOCK LENGTH defined previously are used. The even numbered block starts at RAM INITIAL ADDRESS; the odd-numbered block starts at RAM INITIAL ADDRESS + BLOCK LENGTH/2.
xxxxx>	SHUFFLE	This command merges two blocks of data (each with the length of XXXXX) by inserting into RAM INITIAL ADDRESS one byte from each block alternatively. The even numbered addresses are taken from the block starting at RAM INITIAL ADDRESS + 0 and the odd numbered addresses are taken from the block starting at RAM INITIAL ADDRESS + BLOCK LENGTH/2. If the parameter xxxxx is not given, the RAM INITIAL ADDRESS and the BLOCK LENGTH defined previously are used.
^	CLEAR RAM	This command brings each byte of the RAM to the device erased state.
l	LIST	This command (lower case "L") displays 20 data lines in the selected format on the remote console.

10.7 DEVICE FUNCTIONS

Command	Function	Description
BBBBB:	SET DEVICE START ADDRESS	The default device start address is zero. Use this character to change that address to any address ("BBBBB").
R	REQUEST DEVICE STATUS WORD	The model 824 sends the device status word in the form "AAAAA/B/C", consisting of the following three important parameters: AAAAA = Maximum device address (PM) in hex characters. If PM<1000H, then only three hex characters are used. If FFFH<PM<10000H, then four characters are used and if FFFFH<PM, then five hex characters are used. B = Number of device data bits. Eight (bits) for byte wide devices and 16 (bits) for word wide devices. C = Erased state of devices (1). For example, the response to the R command for various devices will be as follows: DEVICE RESPONSE 2716 7FF/8/1 2732 FFF/8/1 27256 7FFF/8/1 27512 FFFF/8/1 271024 FFFF/16/1
B	BLANK CHECK	The device is checked to make sure that all the data is erased. If the device is erased, then a ">" is sent from the model 824. Otherwise an error message (the character "F") is sent back to the remote computer.
s	DEVICE CHECKSUM CALCULATION	This command (lower case "s") causes the device checksum to be calculated and the 16-bit result of the addition of the 8-bit data words to be sent to the computer in the hex form "CCCC".

DEVICE FUNCTIONS (Cont'd)

Command	Function	Description
T	ILLEGAL BIT CHECK	A test is run on all the device bits that are already programmed, to check whether they can be programmed with the data stored in RAM.
V	RAM AND DEVICE DATA VERIFICATION	The device and RAM data are compared. If an error is detected, the function is terminated and the message "F" is transmitted to the computer.
P	PROGRAM DEVICE	The programming function has three stages performed internally: 1. Illegal bit test; checks all bits in the device to see if they can be programmed with data stored in RAM. 2. Programming 3. Verification; RAM and device data are verified. If an error occurs at any stage of programming, the message "F" will be sent. The model 824 will send a ">" character when programming has been completed successfully.
x	EEPROM ERASING	An EEPROM (electrically erasable PROM) is erased. An error message "F" will be sent if the inserted device is not an EEPROM.
XXXX@	SET DEVICE TYPE	The device type will be set according to the code XXXX. If the type is not recognized by the programmer, an error message will be returned.
[	OUTPUT OF EPROM	The 824 transmits its current selected type code number in the form "NNNN".

10.8 GENERAL FUNCTIONS

Command	Function	Description
H	(no operation)	This is a test character used to make a preliminary test of the communications from the remote computer to the model 824. The model 824 replies with the character ">".
G	REQUEST 824 SOFTWARE CONFIGURATION	This command enables the remote computer to interrogate the model 824 for the resident version of the software. The model 824 replies with Xnnn, "X" being the version and "nnn" the update; e.g., the reply "B100" indicates version B, revision 1.00.
z]	SELECT DISPLAY	This command selects the display format for address and data where "z" is one of the following codes: 0 Address: hexadecimal 1 Address: decimal 2 Address: octal 3 Data: hexadecimal 4 Data: octal 5 Data: binary 6 8 bits 7 4 low bits (LSN) 8 4 high bits (MSN)
M	REQUEST LAST ADDRESS OF THE PROGRAMMER MEMORY	This command sends to the serial port the value of [programmer memory size - 1]
n	EPROM PROGRAMMER TYPE	The model 824 will respond by displaying the message "824".
z	RETURN TO SYSTEM	Terminates the remote mode in the 824.

10.9 ERROR HANDLING

10.9.1 Error Requests

Command	Function	Description
F	REQUEST ERROR STATUS WORD	After receiving an "F" (error message) the model 824 sends the error status word in the form "XXXXXXXX" where "X" equals one hexadecimal character. After sending the word all bits are reset to 0. Refer to section 10.9.2 for the meaning of each bit.
X	REQUEST ERROR CODES	The model 824 sends an error code in the form of two numeric error codes. The codes are sent as two decimal characters strung together without separation. Refer to section 10.10.

10.9.2 Error Status Word

Errors occurring during operation in the Remote mode are recorded in the error status word. This word can be retrieved using the "F"command. The bits have the following designations:

Bit 31: any error
Bit 30: x
Bit 29: x
Bit 28: x
Bit 27: parametric bounds
Bit 26: x
Bit 25: x
Bit 24: always 0

Bit 23: any device error
Bit 22: over current
Bit 21: device misplaced or inserted backwards
Bit 20: device type error
Bit 19: device not erased
Bit 18: device not programmable (only with function "T")
Bit 17: device data does not correspond with RAM data
Bit 16: device not programmable (only with function "P")

Bit 15: x
Bit 14: always 0
Bit 13: always 0
Bit 12: port data does not correspond to RAM data
Bit 11: port checksum error
Bit 10: illegal entry error
Bit 9: USART error
Bit 8: DSR not ready

Bit 7: any RAM error (e.g. RAM data error)
Bit 6: always 0
Bit 5: always 0
Bit 4: format error
Bit 3: x
Bit 2: always 0
Bit 1: RAM write error
Bit 0: always 0

10.10 ERROR CODES

Using the command "X", the model 824 generates error codes based on the bits of the error status word. The codes have the following meaning (the corresponding bit number in the error status word is given in brackets):

17	(Bit 27):	parametric bounds error
20	(Bit 19):	device not erased
21	(Bit 18):	device not programmable (only in function "T")
23	(Bit 17):	device data does not correspond with RAM data
23	(Bit 16):	device not programmable (only in function "P")
29	(Bit 12):	port data does not correspond to RAM data"
31	(Bit 22):	overcurrent
33	(Bit 21):	device misplaced or inserted backwards
34	(Bit 20):	EPROM type number error
93	(Bit 10):	illegal entry

EXAMPLES FOR ADDRESSING

In the following examples we are working with the device type 2732. The highest device address is 0FFF.

1. No address inputs (default values)
   RAM start address: 00000 RAM end address: 00FFF
   Device start address: 00000 Device end address: 00FFF

2. Additional input of the block size 00A00 (command 0A00;)
   RAM start address: 00000 RAM end address: 009FF
   Device start address: 00000 Device end address: 009FF

3. Additional input of the RAM start address 01000 (command "1000<")
   RAM start address: 01000 RAM end address: 019FF
   Device start address: 00000 Device end address: 009FF

4. Additional input of the device start address 00600 (command"0600:")
   RAM start address: 01000 RAM end address: 019FF
   Device start address: 00600 Device end address: 00FFF

5. The following additional inputs cause address errors:
   0A01; device end address: 01000 (exceeds the device maximum address)
   0601: device end address: 01000 (exceeds the device maximum address)
   1601: RAM end address: 02000 (not available in case of 256K RAM)

APPENDIX A
RS-232C PORT

Pin	Mnemonic	Signal Name	Comments
1	CHGND	Chassis ground	
2	Rx	Receive	RS-232 input
3	Tx	Transmit	RS-232 output
4	RTS	Request to send	RS-232 output
5	CTS	Clear to send	RS-232 input
6	DSR	Data set ready	RS-232 input
7	GND	Signal ground	
20	DTR	Data terminal ready	RS-232 output

RS-232C PORT DATA

The RS-232C pin functions are as follows:

Pin 1 EAR (Protective Earth)
Connected directly to the main earth by a 1 Mohm resistor to the signal ground GND.

Pin 2 RxD (Received Data)
This input carries the data to be received by the Model 824 from the external device. To activate the receiver DSR input must be at HIGH level.

Pin 3 TxD (Transmit Data)
This output signal carries the data sent from the Model 824 to the external device. In the transmission gaps this output is held at low level. For enabling the transmitter, CTS and DSR inputs must be at HIGH level. By sending CTRL-S (CTRL-Q) to the Model 824 the transmitter will be disabled (enabled).

Pin 4 RTS (Request To Send)
Via this output the Model 824 indicates that it is ready to receive data, and that the external device can activate its transmitter. For rates above 2400 baud it is important to use the RTS output connected to the CTS input of the external device. If the Model 824 receives more than one character when RTS is LOW, the extra characters cannot be processed and is lost. The error message OVERFLOW ERROR is displayed.

Pin 5 CTS (Clear To Send)
Via this input the external equipment indicates that it is ready to transmit data. This pin must be HIGH before the Model 824 will send data. The transmission is immediately stopped when this input goes LOW even during the transmission of character.

Pin 6 DSR (Data Set Ready)
Via this input the external equipment indicates its active state. It must be HIGH for every port operation. Compared to the CTS input the DSR does not break off the transmission of one character.

Pin 7 GND (Signal Ground)
Connected to protection earth by an 1 Mohm resistor.

Pin 20 DTR (Data Terminal Ready)
When the Model 824 is switched on this output is HIGH, except while pressing a MODE-key or in SIM-mode.

APPENDIX B
DEVICE SIGNATURES

Manufacturer	Device	Manufacturer Code	Device Code
AMD	2764	01	08
AMD	27128	01	89
AMD	27256	01	08
AMD	27512	01	85
FUJITSU	27128	04	01
INTEL	2764	89	02
INTEL	2764A	89	08
INTEL	27256	89	04
SEEQ	2764	94	40
SEEQ	27128	94	0C1
SEEQ	27C256	94	C2