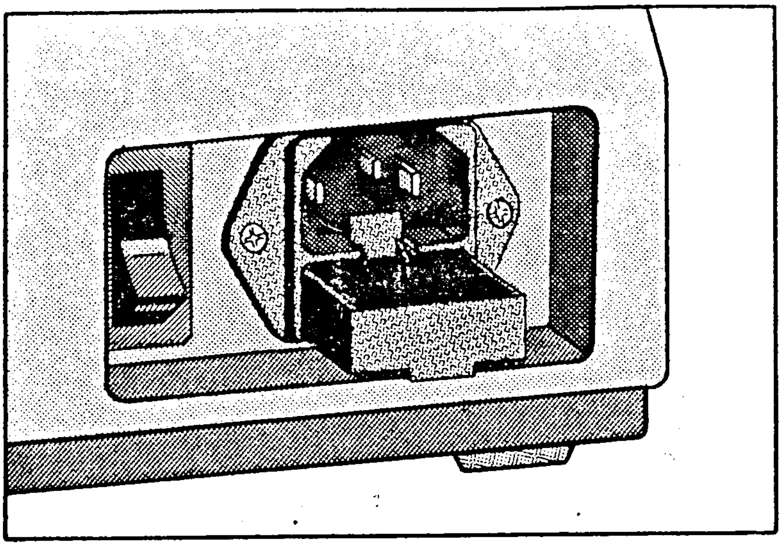
ELAN DIGITAL SYSTEMS LTD.

"E" SERIES PROGRAMMER
OPERATING INSTRUCTIONS

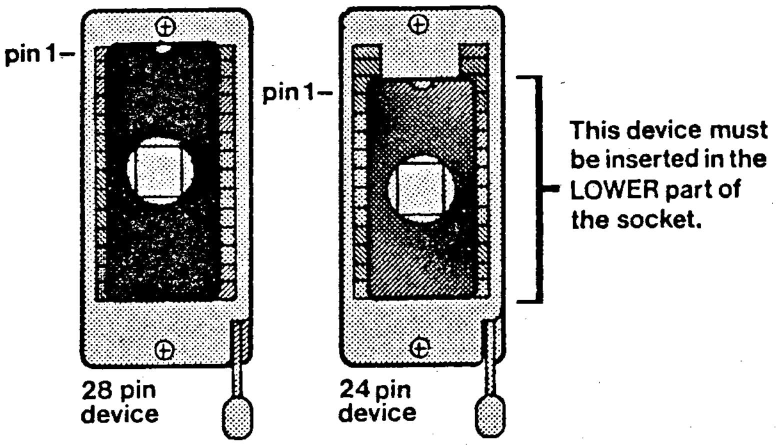
Rev:1.Ø

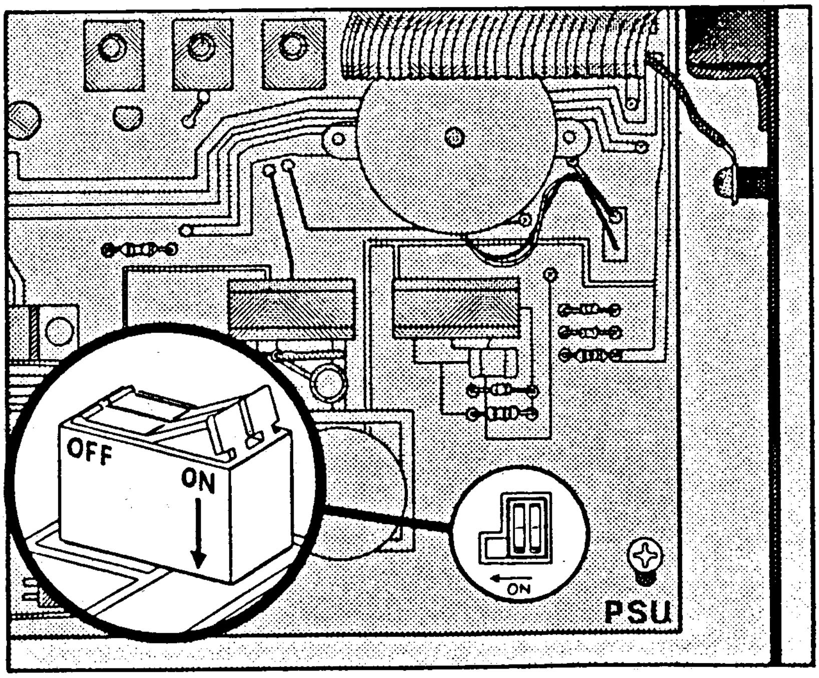
TABLE OF CONTENTS

TABLE OF CONTENTS (continued)



I.E.C. supply socket with integral fuse carrier and spare fuse holder. (front compartment)


pin 1
pin 1
This device must be inserted in the LOWER part of the socket.
28 pin device
24 pin device



Location of battery switch on the PSU board.

CHAPTER 1, GENERAL INFORMATION

POWER REQUIREMENTS

The programmer can be supplied pre-wired for 240v, 220v, 120v or 110v 50/60 Hz and consumes approximately 40 watts.

For operation at 240v/220v use a 500mA SLO-BLO fuse 20mm length.
For operation at 120v/110v use a 1A SLO-BLO fuse 20mm length.

When the power is switched on, the system self-tests the integrity of the memory and turns all the segments of the display on for visual inspection.

SOCKETS

The master and copy sockets are fully protected and powered down during insertion. All are 28 pin zero insertion force (ZIF) sockets. Power is not applied until a device operation cycle has started and is removed when the cycle is completed.

28 Pin Devices: Pin No. 1 is at the top left hand corner.

24 Pin Devices: These devices must be inserted in the lower part of the socket (bottom justified).

<u>CAUTION:</u> Only insert or remove devices in sockets when the system is in its idle mode, i.e., when display is static showing device type.

Do not operate these systems in high static areas unless antistatic precautions have been taken.

Do not turn power on or off when devices are in any sockets.

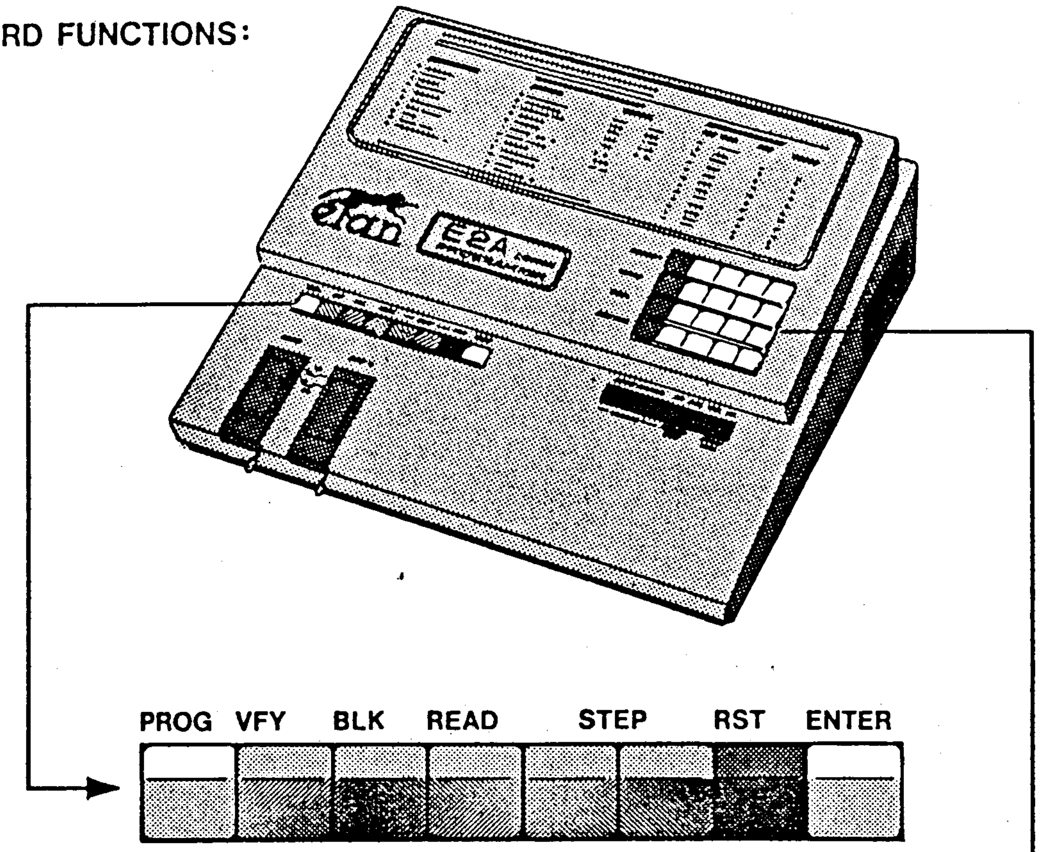
BATTERY BACK-UP

The SCRATCHPAD RAM (not DATA RAM) is supported by a trickle-charged Nickel Cadium Cell. Selected defaults for device type, access time, number of sockets and serial/parallel configurations are automatically held for periods in excess of six months when powered down.

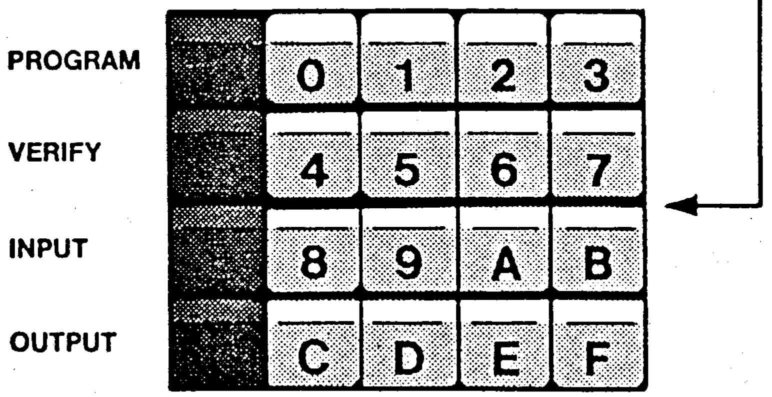
Similarly, when the label printing option is installed, label codes are saved in the powered down state.

If the programmer is not to be used for periods in excess of one year, the battery should be switched off, using the dip switch on the PSU board.

KEYBOARD FUNCTIONS:



PROG	Program copy socket(s) with data from master socket
VFY	Verify copy socket(s) with data from master socket
BLK	Check copy socket(s) for blank eproms, erases E² proms
READ	Read master socket data to RAM
←STEP	Step backwards when viewing data
STEP→	Step forwards when viewing data
RST	Reset – Resets from mode or permits selection of defaults
ENTER	Performs entry of data when editing



PROGRAM	Program copy socket(s) with data from RAM
VERIFY	Verify copy socket(s) with data from RAM
INPUT	Input serial data in selected format
OUTPUT	Output serial or parallel data in selected format

0 – F	Hexadecimal numbers
0	Simulator
1	Amend data
2	Block change to set value
3	Copy block of data
4	Exchange string of characters
5	Find string of characters
6	Compare RAM with master
7	Split odd and even bytes
8	Merge top and bottom halves
9	Calculate checksum
A	Convert RAM to ONE's Complement

PRIMARY CONTROL MODES

PUSHBUTTONS

PROG VFY BLK READ <-STEP-> RST ENTER

PROG	-	Program from master
VFY	-	Verify from master
BLK	-	Blank check (* NOTE 1)
READ	-	Read master device into RAM
STEP <-	-	Step backwards
STEP ->	-	Step forwards
RST	-	Reset operation (* NOTE 2)
ENTER	-	Enter operation (* NOTE 3)

RAM KEYPAD CONTROL

PROGRAM	0	1	2	3
VERIFY	4	5	6	7
INPUT	8	9	A	B
OUTPUT	C	D	E	F

PROGRAM	-	Program from RAM
VERIFY	-	Verify from RAM
INPUT	-	Input data to RAM
OUTPUT	-	Output data from RAM
0 to F	-	Hexadecimal numbers (Editing mode)
0	-	Simulate (with E11 adapter)
1	-	Amend data
2	-	Block change to set value
3	-	Copy block of data
4	-	Exhange string of characters
5	-	Find string of characters
6	-	Compare RAM with master
7	-	Split even/odd bytes
8	-	Merge top and bottom halves
9	-	Calculate checksum
A	-	Convert RAM to one's complement
B-F	-	Unallocated

* Note 1: See Page 3-2 "Chip erase EEPROMs" for second function.
* Note 2: See Appendix D "E11 Simulator" for secondary function.
* Note 3: See Appendix D "E11 Simulator" for secondary function.

128K ADDRESS ENTRY

The standard 64K system has address range 0 to FFFF. The 128K version has address range 0 to 1FFFF. To enter the most significant digit, press STEP-> and the display indicates the digit by displaying a colon in the middle of the address i.e., "00:00". Press STEP-> again and the system will address the lower 64K i.e., "0000".

PROGRAMMING MODES

Mode A

Verify where possible, each byte of the device immediately after it has been programmed.
Complete program cycle as follows:-

a. Illegal bit test of whole device. To confirm that the required data can be stored in the device.

b. Set up next address (start zerö).

c. If data correct, go to step b.

d. Program this address with data.

e. If data correct, go to step b.

f. Verify whole device with required data.

Mode B

Inhibit verify during program cycle of standard 5Øms pulse device selections. This mode should not normally be used. It has only been incorporated to allow early Texas 2764 devices to be programmed. These devices do not meet specifications because they will not verify during program cycle.

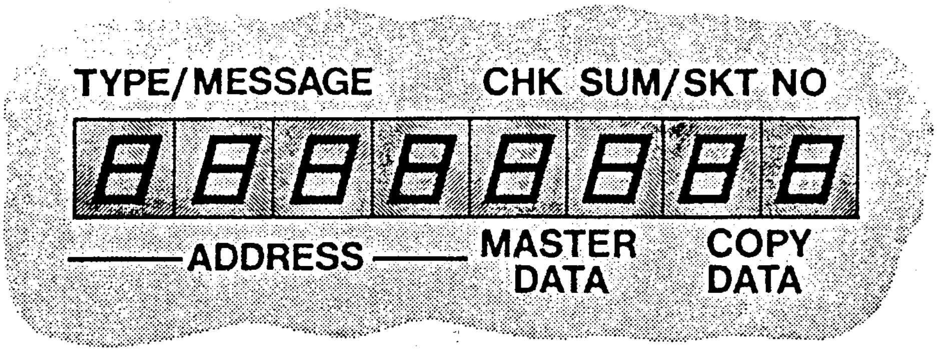
Complete program cycle as follows:

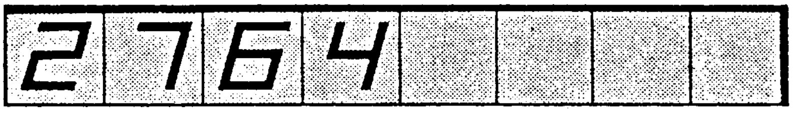
a. Illegal bit test of whole device. To confirm the required data can be stored in the device.

b. Program all locations in the devices.

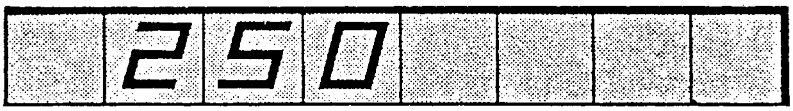
c. Verify whole device with required data.

DISPLAY EXAMPLES:

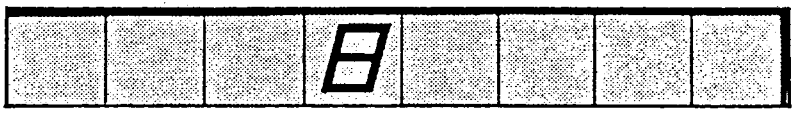




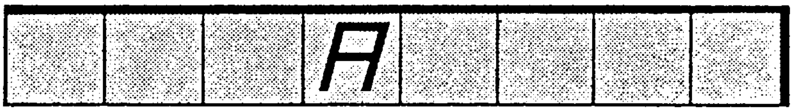
DEVICE TYPE



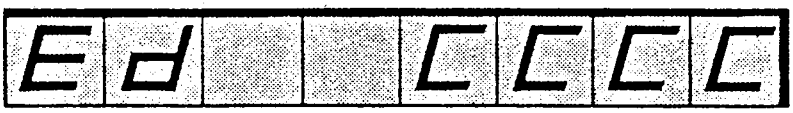
ACCESS TIME



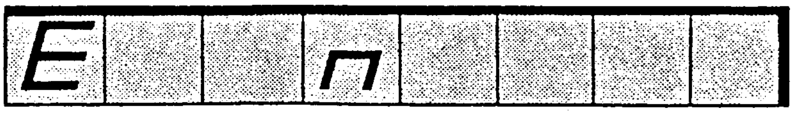
COPY SOCKET Nº



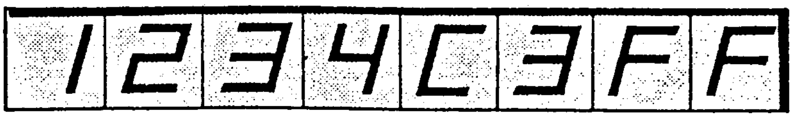
PROGRAMMING MODE



END OF OPERATION AND CHECK SUM



ERROR CODE



ADDRESS:	1234
MASTER DATA:	C3
COPY DATA:	FF

DISPLAY

The system has an eight digit hexadecimal display. The messages are:

DIGIT									DESCRIPTION
1	2	3	4	5	6	7	8		
2	7	6	4					-	Device type selected
	2	5	0					-	Access time in nano seconds selected.
			8					-	Number of sockets (E8A/E9A)
			A					-	Programming mode
E	d							-	Indicates end of operation
E	d			c	c	c	c	-	Indicates end of operation and the checksum
E			n					-	Indicates error and code
A	A	A	A					-	Indicates the current address
				D	D			-	Indicates the master data
							n	-	Indicates the copy socket number
						D	D	-	Indicates the copy socket data
	- : -							-	Indicates system busy

ERROR CODES

E	1		-	System internal EPROM error
E	2		-	System internal scratchpad error
E	3		-	System internal RAM error
E	4		-	Master socket device read error
E	5	n	-	Verify error during program cycle
E	6		-	Device data line fail
E	7		-	Vcc fail
E	9		-	Vpp fail
E	10		-	RS232 framing
E	11		-	RS232 parity
E	12		-	RS232 overflow
E	13		-	RS232 combination
E	14		-	RS232 checksum
E	20	n	-	Intelligent identifier manufacturer code error.
E	21	n	-	Intelligent identifier device code error
E	23	n	-	Access time fail during verify
E	24	n	-	Verify fail during access time test
E	25		-	More devices in copy sockets than number selected
E	26	n	-	Blank fail on socket n in set mode
E	27	n	-	Verify fail on socket n in set mode
E	28	n	-	Illegal bit fail on socket n in set mode
E	29		-	Device incorrectly inserted
E	40		-	E4 adapter device failed to program
E	41		-	E4 adapter device incorrectly inserted
E	42		-	E4 adapter device read fail
E	51		-	E11 output data fail

DEVICE SELECTION GUIDE

NOTE

"*" These devices are verified during the program cycle. Therefore, the number of sockets in use must be selected on the E8A, E9A and E12 only.

"**" As above but on E12 only.

*	2508		
*	2716		Includes 2516,27C16 (single voltage type only)
	2532		
**	2732		Includes 27C32
**	2732A		
	2564		
*	2764		INTEL using 50ms program pulse
*	2764	1	INTEL using INTEL intelligent program algorithm
*	2764	2	INTEL intelligent identifier & program algorithm
*	2764	3	FUJITSU "QUICKPRO" intelligent program algorithm
*	2764	A	INTEL using INTEL intelligent program algorithm Vpp=12.5v
**	27C64	1	INTEL using INTEL intelligent program algorithm Vpp=12.5v
**	27C64	2	INTEL intelligent identifier & program algorithm Vpp=12.5v
**	87C64	1	INTEL using INTEL intelligent program algorithm Vpp=12.5v
**	87C64	2	INTEL intelligent identifier & program algorithm Vpp=12.5v
	68764		MOTOROLA
*	27128		INTEL using 50ms program pulse
*	27128	1	INTEL using INTEL intelligent program algorithm
*	27128	2	INTEL intelligent identifier & program algorithm
*	27128	3	FUJITSU "QUICKPRO" intelligent program algorithm
*	27128A		INTEL using INTEL intelligent program algorithm Vpp=12.5v
*	27256	1	INTEL using INTEL intelligent program algorithm Vpp=12.5v
*	27256	2	INTEL intelligent identifier & program algorithm Vpp=12.5v
*	27256	3	FUJITSU "QUICKPRO" intelligent program algorithm Vpp=12.5v
*	27512	1	INTEL using INTEL intelligent program algorithm Vpp=12.5v
*	27512	2	INTEL intelligent identifier & program algorithm Vpp=12.5v
*	27512	4	AMD intelligent identifier & program algorithm Vpp=12.5v
**	27513	1	INTEL using INTEL intelligent program algorithm Vpp=12.5v
**	27513	2	INTEL intelligent identifier & program algorithm Vpp=12.5v
*	2815		
*	2816		
	48016		

ADAPTER DEVICE SELECTION GUIDE

8741A	Requires E4 adapter
8742	" " "
8744	Requires E7 adapter
8748	Requires E4 adapter
8748H	" " "
8749H	" " "
8755A	" " "
8751	Requires E7 adapter
8751H	" " "
8752	" " "
68701	Requires E5 adapter

NOTES

1. Fast programming 'using intelligent programming algorithm specified by INTEL. This reduces programming time for the 2764 from 7 minutes to approximately 50 seconds and the 27128 from 13 minutes to approximately 100 seconds. During fast programming, Vcc is raised from 5v to 6v.

2. Intelligent identifier and programming algorithm specified by INTEL. The intelligent identifier mode allows the reading out of binary code from a hidden area in an EPROM not forming part of the user memory and enables the programmer to identify the EPROM manufacturer and device type. Not all EPROMs have this code and damage could be caused to the EPROM if this mode is used incorrectly. Check with your distributor or EPROM manufacturer.

3. Fast programming using "QUICKPRO" programming algorithm specified by FUJITSU. This reduces programming time for the 2764 from 7 minutes to approximately 20 seconds and the 27128 from 13 minutes to approximately 40 seconds. During fast programming, Vcc is raised from 5v to 6v.

CHAPTER 2, SETTING UP THE PROGRAMMER

TO SELECT DEVICE TYPE, ACCESS TIME, NUMBER OF SOCKETS/SET MODE AND PROGRAMMING MODE

		DISPLAY
1.	The display indicates device type.	[27128]
2.	Press RST. The system beeps and the display flashes the current device type.	[27128]
	a. Press STEP-> and hold to scroll forward through the device types, or	[27256]
	press STEP<- and hold to scroll backwards through the device types.	[27128]
3.	If device type is correct, press RST. The system beeps and the display flashes the current access time test limit in nano seconds.	[350]
	a. Press STEP-> and hold to scroll faster times, or	[300]
	press STEP<- and hold to scroll slower times.	[400]
4.	If access time is correct, press RST. The system beeps and the display flashes the current number of devices/set mode selected. (E8A, E9A and E12 only. If using an E2A, go to Step 5.)	[1 -16]
	a. Press STEP-> and hold to scroll forward, or	[4 - 8]
	press STEP<- and hold to scroll backward	[2:1-16]
5.	If the number of devices/set mode selected is correct, press RST. The system beeps and flashes the current programming mode.	[A]
	a. Press STEP-> to change mode if required.	[B]
6.	When all selections are correct, press ENTER The system beeps and returns to the idle mode.	[27128]

TO ACTIVATE SYSTEM VARIABLES

1. Turn programmer off.

2. Press both STEP buttons while the programmer is switched on and hold until the system beeps. When the display clears the 8's, it will display the device type followed by SYS.

3. Press PROGRAM button and release quickly. The display will show two digits representing the variables available.

   To leave variables unchanged:

   a. Press RESET.

   To change variables:

   a. Press ENTER.
   b. Key in required value (see table on page 2-3)
   c. Press ENTER.

SYSTEM VARIABLES AVAILABLE (2 DIGIT CODE)

LEFT DIGIT

INHIBIT LINE FEED	SPECIAL (ALWAYS NO) *	REMOTE INHIBIT RTN/LF AFTER >	REMOTE INHIBIT RTN/LF BEFORE >	LEFT DIGIT
NO	NO	NO	NO	0
NO	NO	NO	YES	1
NO	NO	YES	NO	2
NO	NO	YES	YES	3
NO	YES	NO	NO	4
NO	YES	NO	YES	5
NO	YES	YES	NO	6
NO	YES	YES	YES	7
YES	NO	NO	NO	8
YES	NO	NO	YES	9
YES	NO	YES	NO	A
YES	NO	YES	YES	B
YES	YES	NO	NO	C
YES	YES	NO	YES	D
YES	YES	YES	NO	E
YES	YES	YES	YES	F

RIGHT DIGIT

ENABLE REMOTE RESPONSE DELAY	RCA INHIBIT RETURN AFTER !M	RCA WITH MICRO MONITOR	SERIAL TIME OUT	RIGHT DIGIT
NO	NO	NO	NO	0
NO	NO	NO	YES	1
NO	NO	YES	NO	2
NO	NO	YES	YES	3
NO	YES	NO	NO	4
NO	YES	NO	YES	5
NO	YES	YES	NO	6
NO	YES	YES	YES	7
YES	NO	NO	NO	8
YES	NO	NO	YES	9
YES	NO	YES	NO	A
YES	NO	YES	YES	B
YES	YES	NO	NO	C
YES	YES	NO	YES	D
YES	YES	YES	NO	E
YES	YES	YES	YES	F

NOTE: For INTEL MDS remote control, set code to 90.

* "SPECIAL" is a special protocol, it should always be set to NO.

CHAPTER 3, SET MODE FUNCTIONS
NUMBER OF SOCKETS/SET MODE

The E12 can be configured in the following ways:-

1) GANG MODE: 1 to 4 sockets of the same data.

Example of Display		Description
1	=	1 copy socket selected
2	=	2 copy sockets in gang
3	=	3 copy sockets in gang
4	=	4 copy sockets in gang

2) 8 BIT SET: Each socket treated as a consecutive block of Data

Example of Display		Description
2 - 8	=	2 consecutive 8 bit devices
2:2 - 8	=	2 sets of 2 consecutive 8 bit devices
3 - 8	=	3 consecutive 8 bit devices
4 - 8	=	4 consecutive 8 bit devices

3) 16 BIT SET: Each pair of sockets treated as a 16 bit word

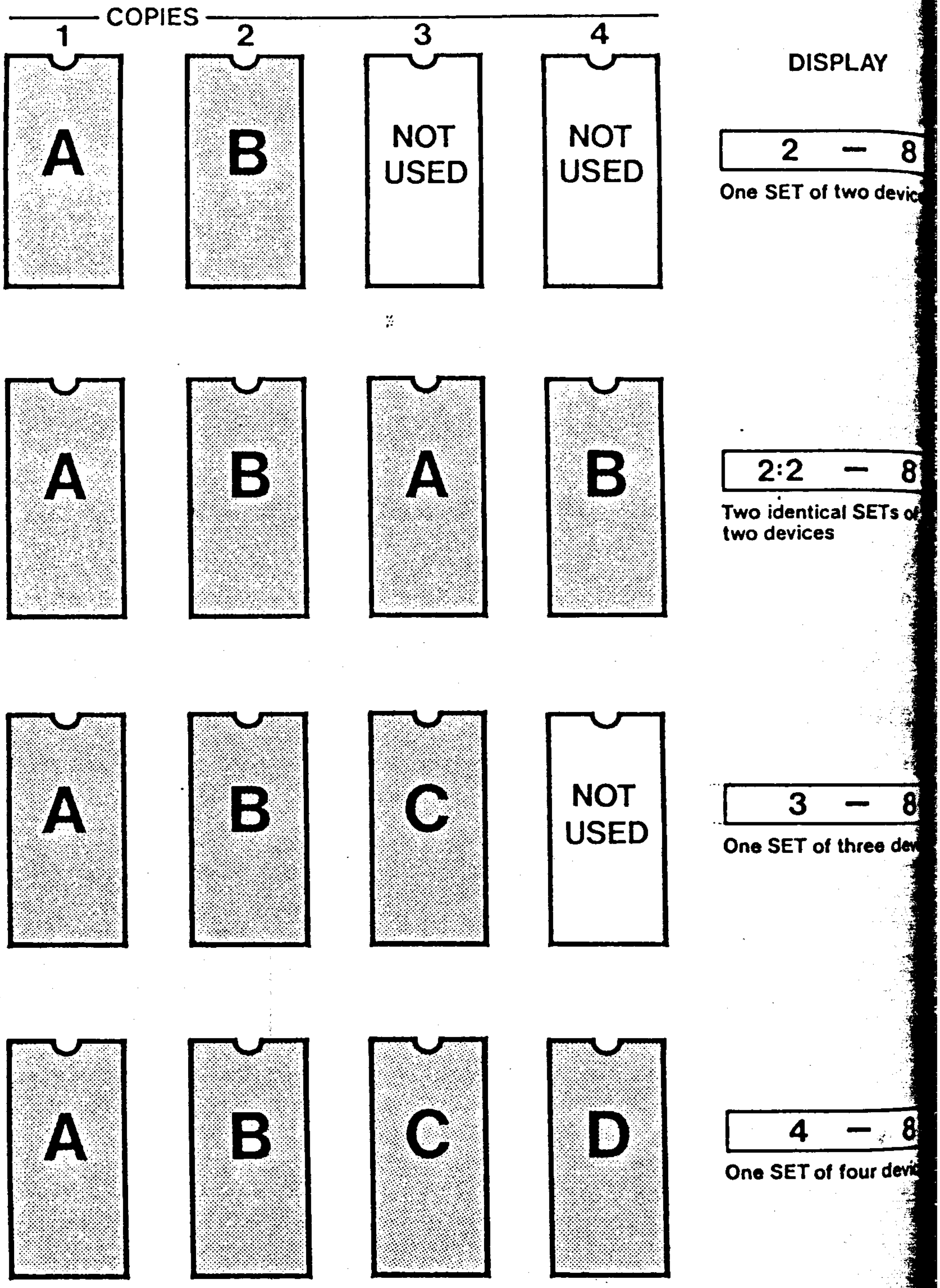
Example of Display		Description
1 - 16	=	1 SET of 16 bit data (even bytes in 1st socket, odd bytes in 2nd socket)
2:1 - 16	=	2 consecutive blocks of 16 bit data (1st block even bytes in 1st socket, odd bytes in 2nd socket. 2nd block even bytes in 3rd socket, odd bytes in 4th socket)
2 - 16	=	2 SETS of 16 bit data. (even (even bytes in 1st and 3rd sockets, odd bytes in 2nd and 4th sockets)

4) 32 BIT SET: The four sockets treated as a 32 bit word.

Example of Display		Description

1 - 32	=	1 SET of 32 bit data. (address 0, 4, 8 and every 4th byte in socket 1;
		address 1, 5, 9 etc in socket 2;
		address 2, 6, A etc in socket 3;
		address 3, 7, B etc in socket 4)

8 BIT SET PROGRAMMING



One SET of two devic

Two identical SETs of two devices

One SET of three de

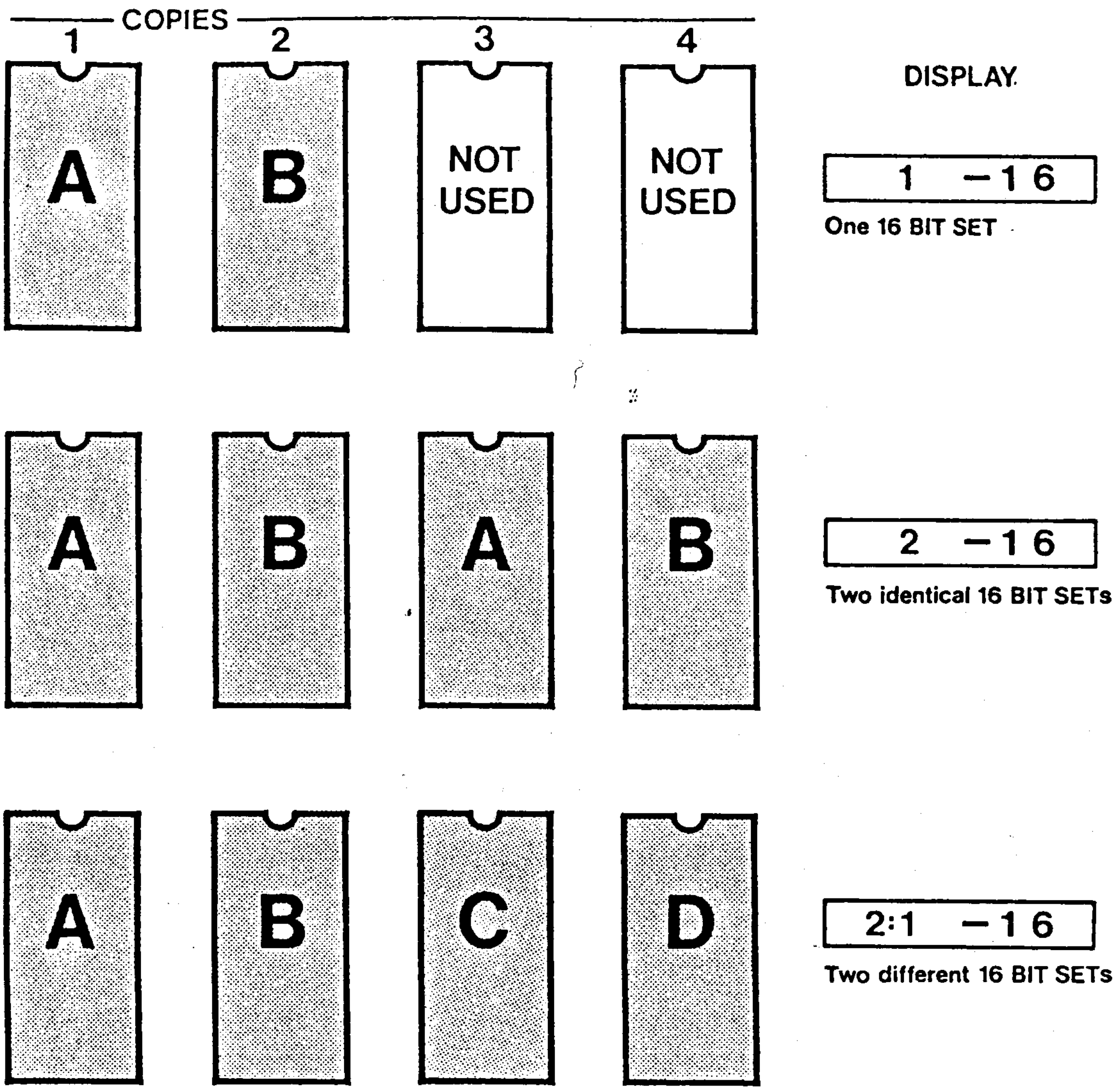
One SET of four devi

EXAMPLE: 2764

Data blocks are stored consecutively in RAM

EPROM	RAM ADDRESS	
	START	FINISH
A	0000	1FFF
B	2000	3FFF
C	4000	5FFF
D	6000	7FFF

16 BIT SET PROGRAMMING

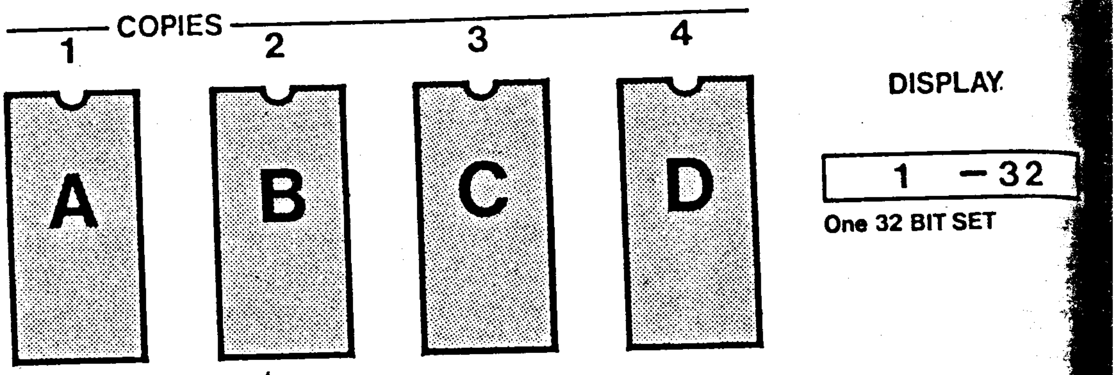


EXAMPLE: 2764

Data blocks are stored consecutively in RAM

EPROM		RAM ADDRESS
A	Even Address Bytes	0000 3FFF
B	Odd Address Bytes	
C	Even Address Bytes	4000 7FFF
D	Odd Address Bytes	

32 BIT SET PROGRAMMING



EXAMPLE: 2764

EPROM	RAM ADDRESS 0000 – 7FFF
A	Address Bytes 0, 4, 8, etc.
B	Address Bytes 1, 5, 9, etc.
C	Address Bytes 2, 6, A, etc.
D	Address Bytes 3, 7, B, etc.

TO READ MASTER SET INTO RAM

1. Select device type and required SET mode and place MASTER SET into copy sockets. [27128]

2. Press READ. The system Beeps and displays the RAM start address 0000. [0000]

3. Key in required RAM start address if different from 0000. [XXXX]

4. Press ENTER. The System Beeps and reads the whole set of data into RAM. The display indicates the checksum and the socket number. [1 CCCC]

5. Press ENTER to step to the checksum of the next socket. Repeat step for the whole set. [2 CCCC]

   [27128]

TO VERIFY COPY SET WITH RAM DATA

1. Select device type and SET mode and place copies in COPY socket. [27128]

2. Press RAM VERIFY or VER. The display indicates RAM start address zero. [0000]

3. Key required start address [XXXX]

4. Press ENTER. The system verifies the copy sets and displays the busy signal. [-:-]

5a. If the devices verify correctly, the display indicated Ed for END. [Ed]

b. If the device has different data the display indicates error E 27 n where n is the socket number. Press ENTER to step to the next socket with different data. [E 27 n]
27128

PROGRAM COPY SET FROM RAM

1. Select device type and place copy devices into COPY sockets. [27128]

2. Press RAM PROGRAM or PROG. The display indicates the RAM start address. [0000]

3. Key required RAM start address. [XXXX]

4. Press ENTER. The system interrogates the copy devices to confirm the RAM data can be programmed into the copy devices. [-:-]

   If the data cannot be programmed into the copy device the error code E 28 n is displayed where n is the socket number. Press ENTER to step to the next error socket. [E 28 n]

   If the copy device is not Blank the system Beeps and displays P. [P]
   Press enter to continue the operation to programme the copy devices. [AAAA]

   To reduce programming time the system skips bytes containing blank data and continues to display the last address programmed.

   Where possible (see EPROM device selection guide) the system verifies the devices before and after applying the program pulse. The system does not program bytes already containing the correct data.
   If a device fails to program the system stops programming and displays the error code, where n represents the socket number in error. [E 5 n]
   Press ENTER to step to the next error.

   At the end of the program cycle, the system verifies the RAM data with the copy set and displays Ed CCCC where CCCC is the checksum of the 1st socket. [Ed CCCC]
   Press ENTER to step to the next socket checksum. [n CCCC]

CHAPTER 4, EPROM/EEPROM FUNCTIONS

TO READ MASTER DEVICE INTO RAM AND SCROLL MASTER DATA

		DISPLAY
1.	Select device type and place device in master socket.	[27128]
2.	Press READ. The system displays start address 0000. (If using an E8A, the programmer will read the device immediately upon pressing the READ button. Go to step 5 below.)	[0000]
3.	Key in required start address.	[XXXX]
4.	Press ENTER. The system beeps and pauses momentarily while reading the whole device into RAM. The system beeps when done reading and displays the checksum.	[CCCC]
5.	Press READ to read the data in the device. The system beeps and the display indicates address 0000 and data dd.	[0000dd]
6.	Press STEP-> to scroll forwards through the addresses of the device, or	[0001dd]
	press STEP<- to scroll backwards through the addresses of the device.	[3FFFdd]
	NOTE: If the STEP button is held for 8 continuous address steps, the next significant address digit will start to scroll. This enables you to quickly read any area of the device.	
7.	Press RST to terminate the operation and power down the socket. The system returns to the idle mode.	[27128]
8.	Remove the device from the socket.	

TO BLANK CHECK DEVICES

1.	Select device type and place devices into copy sockets.	[27128]
2.	Press BLK. The system blank checks the copy sockets consecutively. The display indicates the device type and the socket number being checked.	[27128 n]

TO BLANK CHECK DEVICES (continued)

DISPLAY

3. If the devices are blank, the display indicates Ed for end.

[Ed]

If the device is not blank, the display indicates the address AAAA, data blank FF and the copy socket number n flashing with the device data dd.

[AAAAFF n]
[AAAAFFdd]

a. Press STEP-> to continue blank check on the remaining addresses of the device.

b. Press ENTER to continue blank check on the next copy socket device.

[27128 n]

c. Press RST to terminate operation.

[27128]

TO CHIP ERASE EEPROMS

1. Select device type and place device into copy socket.

[2815]

2. Press BLK and hold for two beeps. The system erases the copy socket devices and proceeds to blank check the devices consecutively. The display indicates the device type and the copy socket number currently being processed.

[2815 n]

3. If all of the devices are blank, the display indicates Ed for end.

[Ed]

If a device is not blank, the display indicates the address AAAA, data blank FF, and the socket number n flashing with the device data dd.

[AAAAFF n]
[AAAAFFdd]

a. Press STEP-> to continue blank check on the remaining addresses of the device.

b. Press ENTER to continue blank check on the next copy socket device.

[2815 n]

c. Press RST to terminate operation.

[2815]

TO VERIFY COPIES WITH MASTER DEVICE

1. Select device type, place master into master socket and copies into copy sockets.

[27128]

TO VERIFY COPIES WITH MASTER DEVICE (continued)

DISPLAY

2. Press VFY. The system verifies each copy device consecutively. The display indicates the device type and the copy socket number currently being processed. [27128 n]

3. If all of the devices verify correctly, the display indicates Ed for end. [Ed]

If a device has different data, the display indicates the address AAAA, master data MM and the socket number n flashing with the device data dd. [AAAAMM n] [AAAAMMdd]

a. Press STEP-> to continue verify check on the rest of the device, or

press STEP<- to display the data at the previous address, or [AAAAMMdd]

press ENTER to continue verify check on the next copy socket device, or [27128 n]

press RST to terminate operation. [27128]

If a device fails to verify at the set access time but can be read correctly at a slower speed, the display indicates the error code and the socket number. [E 23 n]

a. Press ENTER to continue verify check on the next copy socket device. [27128 n]

b. Press RST to terminate operation. [27128]

TO PROGRAM COPIES FROM MASTER

1. Select device type, place master into master socket and blank devices into copy sockets. [27128]

2. Press PROG and hold for two beeps. The system interrogates the copy devices to confirm the master data can be programmed into the copy devices. The display indicates the device type and the socket number under test. [27128 n]

If a device has an illegal bit programmed, the system will beep continuously and display the address AAAA, master data MM, and the copy data dd. [AAAAMMdd]

TO PROGRAM COPIES FROM MASTER (continued)

	DISPLAY
a. Press ENTER to continue test on the next device and program regardless.	[27128 n]
b. Press RST to terminate the operation, replace the offending device, and start again.	[27128]
If all of the devices are programmable, the system will start.	[AAAA]
To reduce programming time, the system skips bytes containing blank data and continues to display the last address programmed.	
Where possible (see device selection guide), the system verifies the devices before and after applying the program pulse. The system does not program bytes already containing the correct data. If a device fails to program, the system stops programming and displays the error code. Where n represents the socket number in error, press ENTER to step to the next error.	[E 5 n]
At the end of the program cycle, the system verifies the master with the copy devices. The display indicates the device type and the socket number under test.	[27128 n]
If all of the devices program correctly, the display indicates Ed for end and the checksum CCCC. The system will beep periodically until RST is pressed.	[Ed CCCC]
If a device has different data, the display indicates the address AAAA, master data MM and the socket number n flashing with the device data dd.	[AAAAMM n] [AAAAMMdd]
a. Press STEP-> to continue verify check on the remaining addresses of the device.	
b. Press STEP<- to display the data at the previous address.	
c. Press ENTER to continue verify check on the next copy socket device.	[27128 n]
d. Press RST to terminate operation.	[27128]

TO PROGRAM COPIES FROM RAM (E2A/E9A/E12 only)

		DISPLAY
1.	Select device type and place devices into copy sockets.	[27128]
2.	Press RAM PROGRAM. The display indicates start address.	[0000]
3.	Key required start address.	[XXXX]
4.	Press ENTER. The system interrogates the copy devices to confirm the RAM data can be programmed into the copy devices. The display indicates the device type and the socket number under test.	[27128 n]
	If a device has an illegal bit programmed, the system will beep continuously and display the address AAAA, RAM data RR and the socket number n.	[AAAARR n]
	a. Press ENTER to continue test on the next device and program, regardless.	[27128 n]
	b. Press RST to terminate the operation.	[27128]
	If all of the devices are programmable, the system will start.	[AAAA]
	To reduce programming time, the system skips bytes containing blank data and continues to display the last address programmed.	
	Where possible (see device selection guide), the system verifies the devices before and after applying the program pulse. The system does not program bytes already containing the correct data. If a device fails to program, the system stops programming and displays the error code. Where n represents the socket number in error. Press ENTER to step to the next error.	[E 5 n]
	At the end of the program cycle, the system verifies the RAM with the copy devices. The display indicates the device type and the socket number under test.	[27128 n]
	If all of the devices program correctly, the the display indicates Ed for end and the checksum CCCC.	[Ed CCCC]

TO PROGRAM COPIES FROM RAM (continued)

DISPLAY

If a device has different data, the display indicates the address AAAA, RAM data RR and the socket number n flashing with the device data dd. [AAAARR n]
[AAAARRdd]

a. Press STEP-> to continue verify check on the remaining addresses of the device.

b. Press STEP<- to display the data at the previous address.

c. Press ENTER to continue verify check on the next copy socket device. [27128 n]

d. Press RST to terminate operation. [27128]

TO VERIFY COPIES WITH RAM DATA (E2A/E9A/E12 only)

1. Select device type and place copy devices into copy sockets. [27128]

2. Press RAM VERIFY. The display indicates start address. [0000]

3. Key in required start address. [XXXX]

4. Press ENTER. The system verifies the copy device consecutively. The display indicates the device type and the socket number currently being processed. [27128 n]

5. If the devices verify correctly, the display indicates Ed for end. [Ed]

   If a device has different data, the display indicates the address AAAA, RAM data RR, and the socket number n flashing with the device data dd. [AAAARR n]
   [AAAARRdd]

   a. Press STEP-> to continue verify check on the rest of the device.

   b. Press STEP<- to display the data at the previous address.

   c. Press ENTER to continue verify check on the next copy socket device. [27128 n]

   d. Press RST to terminate operation. [27128]

TO VERIFY COPIES WITH RAM DATA (continued)

		DISPLAY
	If a device fails to verify at the set access time, but can be read correctly at a slower speed, the display indicates the error code and the socket number.	[E 23 n]
a.	Press ENTER to continue the verify check on the next copy socket.	[27128 n]
b.	Press RST to terminate operation.	[27128]

TO FIND ACCESS TIME OF COPIES

FROM MASTER

1.	Select device type, place master into master sockect and copies into copy sockets.	[27128]
2.	Press VFY and hold for double beep. The system verifies one copy at a time with master to identify the fastest speed the device can be read.	[27128 n]
	When calculated, the display shows the access time and the socket number.	[200 n]
	If the master data is different to the copy data, the display indicates the error code and the socket number.	[E 24 n]
a.	Press ENTER to continue the test on the next socket.	[200 n]
b.	Press RST to terminate the operation.	[27128]

FROM RAM (E2A/E9A/E12 only)

1.	Select device type, enter data into RAM, and insert copies into copy sockets.	
2.	Press RAM VERIFY. The display indicates RAM start address.	[0000]
3.	Key required RAM start address.	[XXXX]
4.	Press ENTER and hold for double beep. The system verifies one copy at a time with RAM to identify the fastest speed the device can be read. When calculated, the display shows the access time and the socket number.	[200 n]

TO FIND ACCESS TIME OF COPIES (continued

	DISPLAY
If the master data is different to the copy data, the display indicates the error code and the socket number.	[E 24 n]
a. Press ENTER to continue the test on the next socket.	[200 n]
b. Press RST to terminate the operation.	[27128]

CHAPTER 5, RAM EDITING FUNCTIONS (E2A/E9A/E12 ONLY)

EDITING FUNCTIONS USING RAM (64K BYTE STANDARD)

1. AMMEND DATA
2. BLOCK CHANGE
3. COPY BLOCK
4. EXCHANGE STRING
5. FIND STRING
6. COMPARE RAM
7. SPLIT RAM
8. MERGE RAM
9. CHECKSUM

A. ONE'S COMPLEMENT

(1) AMEND DATA

	To change data currently in RAM	DISPLAY
a.	Press key 1. Display indicates address 0000.	[0000]
b.	Enter required address through keyboard or,	[XXXX]
	Press RESET to exit from amend mode and display device type.	[27128]
c.	Press ENTER button to enter the address and to display the current data in the format address AAAA, and current data DD.	[AAAADD]
d.	Enter required data through keyboard. Display indicates address AAAA, current data DD and required data RR.	[AAAADDRR]
e.	Press STEP-> to store the amended data in RAM. This will also step to the next address and display details, or	[XXXXDD]
	press STEP<- to store the amended data in RAM and step to the previous address and display details. If this address is to be amended, repeat steps d and e, or	[XXXWDD]
	press ENTER to store the amended data. This will also reset the address to zero. Key in the next address to be amended and repeat the procedure.	
f.	Press RESET to exit from amend mode and display device type.	[27128]

(1) AMEND DATA (continued)

EXAMPLE: To amend RAM address 0123 from 45 to 67, address 0124 from A1 to A2, and address 0126 from C2 to 11. Leave address 0125 with FF.

	DISPLAY
Select 1 for amend.	[0000]
Key in address 0123.	[0123]
Press ENTER.	[012345]
Key in required data 67.	[01234567]
Press STEP->.	[0124A1]
Key in required data A2.	[0124A1A2]
Press STEP->	[0125FF]
Press STEP->.	[0126C2]
Key in required data 11.	[0126C211]
Press STEP->.	[0127XX]
Press RESET.	

(2) BLOCK CHANGE

To change a block of RAM to the same value.

a.	Press key 2. Display indicates address 0000.	[0000]
b.	Enter start address through keyboard.	[XXXX]
c.	Press ENTER. Display indicates last address 3FFF.	[3FFF]
d.	Enter last address through keyboard.	[XXXX]
e.	Press ENTER. Display indicates required data "FF".	[FF]
f.	Enter required data through keyboard.	[DD]
g.	Press ENTER to carry out the operation. The display will revert back to device type.	[27128]

EXAMPLE: To set all locations of RAM, address 0340 to address 0672, to value 28.

Select 2 for block change.	[0000]
Key in address 0340.	[0340]
Press ENTER.	[3FFF]
Key in address 0672.	[0672]
Press ENTER.	[FF]
Key in data "28".	[28]
Press ENTER.	[27128]

(3) COPY BLOCK

To copy a block of data from one area of RAM to another.

		DISPLAY
a.	Press key 3. Display indicates the start address of block.	[0000]
b.	Enter the start address of block to be moved.	[XXXX]
c.	Press ENTER. The display indicates last address of block.	[0000]
d.	Enter the last address of the block to be moved.	[XXXX]
e.	Press ENTER. Display indicates destination.	[0000]
f.	Enter destination address.	[XXXX]
g.	Press ENTER to carry out copy.	[27128]

EXAMPLE: To copy the block of data (address 0100 to 01FF) to address 0E00.

Select 3 for copy.	[0000]
Key in start address 0100.	[0100]
Press ENTER.	[0000]
Key in last address 01FF.	[01FF]
Press ENTER.	[0000]
Key in destination address 0E00.	[0E00]
Press ENTER.	[27128]

(4) EXCHANGE STRING

To exchange a string of characters (1 to 8 characters long) for another string of characters (1 to 8 characters long)

a.	Press key 4. Display indicates start address 0000 of search area.	[0000]
b.	Enter the start address of search area.	[XXXX]
c.	Press ENTER. Display indicates last address of search area.	[3FFF]
d.	Enter the last address of search area.	[XXXX]

(4) EXCHANGE STRING (continued)

		DISPLAY
e.	Press ENTER.	[-]
f.	Enter string of characters to be replaced (1 to 8 characters long). If a particular character is masked, press ENTER to skip to next position.	[SSSSSSSS]
g.	After the eighth character is entered the system is ready to input the required replacement characters.	[-]
h.	Enter string of required characters (1 to 8 characters long). If a particular character is masked, press ENTER to skip to next position.	[SSSSSSSS]
i.	After the eighth digit is input the system carries out the exchange. The display reverts back to the device type when done.	[27128]

EXAMPLE: Exchange all occurrences of the string of data 12131415 to ABCD between addresses Ø6ØØ and Ø7FF.

Assume the contents of each byte of RAM is the least significant 2 characters of the address, i.e.,for address 11Ø,data =1Ø, for address 111, data =11 etc.

Select 4 for exchange.	[ØØØØ]
Key in address Ø6ØØ.	[Ø6ØØ]
Press ENTER.	[3FFF]
Key in address Ø7FF.	[Ø7FF]
Key in string 12131415.	[-]
Key in string ABCD.	[ABCD-]
Press ENTER four times.	[27128]

Address	Data Before Exchange	Data After Exchange
612	12	AB
613	13	CD
614	14	14
615	15	15
712	12	AB
713	13	CD
714	14	14
715	15	15

(5) FIND STRING

To find a specified string of characters in RAM (1 to 8 characters long) with the option of inspecting and amending bytes in the vicinity.

		DISPLAY
a.	Press key 5. Display indicates start address 0000 of search area.	[0000]
b.	Enter the start address.	[XXXX]
c.	Press ENTER. Display indicates last address of seach area.	[3FFF]
d.	Enter the last address.	[XXXX]
e.	Press ENTER.	[-]
f.	Key in required string of characters (1 to 8 characters long). If a particular character is masked, press ENTER to skip to next position. At the first occurence of the string of data, the operation will stop and display the address.	[AAAA]
g.	Press ENTER to locate the next occurence of the string, or	
	press key 1 to amend the address. Display indicates address and data.	[AAAADD]
h.	Enter required data through the keyboard. Display indicates address, current data and required data.	[AAAADDRR]
i.	Press Step-> to store the amended data in RAM. This will also step to the next address and display details, or	[AAAADD]
	Press STEP<- to store the amended data in RAM, step to the previous address and display details.	[AAAADD]
	If this address is to be amended, repeat steps h and i.	
j.	Press RESET to exit from amend/find mode and continue search for next occurrence of the string.	[AAAA]

(5) FIND STRING (continued)

		DISPLAY
k.	When the search is completed, the display will revert back to the device type.	[27128]

EXAMPLE: Find all occurences of the string of data 12131 between the addresses 0300 and 04FF. Examine the data surrounding the string and change the first occurence of data 10 to F0. Assume the contents of each byte of RAM are the least significant 2 characters of the address, i.e, change as on page 4-4.

Select 5.	[0000]
Key in address 0300.	[0300]
Press ENTER.	[3FFF]
Key in address 04FF.	[04FF]
Press ENTER.	[-]
Key in string 12131.	[12131-]
Press ENTER three times.	[0312]
Select 1.	[031212]
Press STEP<-.	[031111]
Press STEP<-.	[031110]
Key in data FO.	[031010F0]
Press STEP->.	[031111]
Press STEP->.	[031212]
Press STEP->	[031313]
Press STEP->	[031414]
Press STEP->	[031515]
Press RESET	[0412]
Press ENTER	[27128]

Thus, the string occurred at addresses 0312 and 0412.

(6) COMPARE RAM

The unit will compare an area of RAM data with a device giving details of differences.

a.	Select device type and place in master socket.	[27128]
b.	Press button 6. Display indicates RAM start address.	[0000]
c.	Enter required RAM start address.	[XXXX]

(6) COMPARE RAM (continued)

<u>DISPLAY</u>

d. Press ENTER.

i) If the two data areas are the same, the display will indicate Ed for end. [Ed   ]

ii) If a mismatch is found, the display indicates [AAAADDRR]

press STEP-> to continue to next mismatch. If no mismatch is found, the display will indicate ED for end, or

Press STEP<- to see previous address.

<u>EXAMPLE:</u> Verify two 27128 EPROMs. Assume the two have the same data, except for:

Address	EPROM X	EPROM Y
110	01	02
111	F2	3E
5AF	47	AB
580	96	69
746	22	44
7F1	5A	5B

First load EPROM X into RAM:	[27128]
Select Read.	[0000]
Press ENTER.	[Ed CCCC]
Press RESET.	[27128]

Now compare the two EPROMs	[27128]
Place EPROM Y into master socket.	
Select 6.	[0000]
Press ENTER.	[01100201]
Press STEP->.	[01113EF2]
Press STEP->.	[05AFAB47]
Press STEP->.	[05806996]
Press STEP->.	[07464422]
Press STEP->.	[07415B5A]
Press STEP->.	[Ed]

(7) SPLIT RAM

Split even and odd bytes of RAM (place even bytes into bottom half, and odd bytes into top half of RAM).

		DISPLAY
a.	Press button 7. The display indicates it is busy until the operation is complete.	[-:-]

(8) MERGE RAM

To merge the top and bottom half of RAM (the bottom half becomes the even bytes and the top half the odd bytes of RAM):

a.	Press button 8. The display indicates it is busy until the operation is complete.	[-:-]

(9) CHECKSUM

To calculate checksum of RAM.

a.	Press button 9. Display indicates start address.	[0000]
b.	Key in required start address.	[XXXX]
c.	Press ENTER. Display indicates last address.	[3FFF]
d.	Key in required last address.	[YYYY]
e.	Press ENTER. The display indicates the 4-character checksum.	[CCCC]

E12 ONLY:
Note: When 16 Bit Set Mode is selected this routine calculates two checksums. The first is the checksum of the even bytes and the second the checksum of the odd bytes.

In 32 Bit Set Mode the routine calculates four checksums:-

1st = sum of Bytes 0,4,8 and every 4th Byte
2nd = sum of Bytes 1,5,9 and every 4th Byte
3rd = sum of Bytes 2,6,A and every 4th Byte
4th = sum of Bytes 3,7,B and every 4th Byte

(A) ONE'S COMPLEMENT

To set RAM to one's complement.

a.	Press button A and hold for two beeps. The system will convert each byte of RAM to its one's complement and display the new checksum.	[-:-] [CCCC]

CHAPTER 6, INPUT/OUTPUT COMMUNICATIONS (E2A/E9A/E12 ONLY)

INPUT/OUTPUT DATA CONFIGURATION

The system has a 3 digit configuration code:
1st digit = record format
2nd digit = baud rate
3rd digit = data stream characteristics

DATA STREAM SELECTION

RECORD FORMAT	BAUD RATE	PARITY	DATA BITS	STOP BITS
0=Label printing	1=50	0=parallel	8	(output option)
1=ASCII hex space	2=75	1=even	7	1
2=INTEL LOADER	3=110	2=odd	7	1
3=Optional	4=134.5	3=none	7	1
4=TEK HEX	5=150	4=even	7	2
5=MOS TECH	6=200	5=odd	7	2
6=MOTOROLA S RECORD	7=300	6=none	7	2
7=DEC BINARY	8=600	A=even	8	1
8=Binary	A=1800	B=odd	8	1
9=Block dump	B=2400	C=none	8	1
A=RCA COSMAC	C=4800	D=even	8	2
B=PPX	D=9600	E=odd	8	2
C=TEXAS TAGS	E=19200	F=none	8	2
D=ASCII BNPF FORMAT				

TO SELECT COMMUNICATIONS CONFIGURATION

DISPLAY

1. The display indicates current device type. [27128]

2. Press RST and hold for two beeps. The display indicates the configuration code and flashes one digit. [1dA]

3. Press STEP-> and hold to scroll forward through the selections, or [2dA]

   press STEP<- and hold to scroll backwards through the selection. [1dA]

4. If the configuration is correct, press ENTER. The system beeps and the display stops flashing, or [27128]

   if this digit is correct but the next digit needs changing, press RST. The system beeps and the display flashes the next digit. [1dA]

5. Repeat steps 3 and 4 until the configuration is correct. The configuration currently set will be saved when the programmer is powered down.

SERIAL TEST ROUTINE

Quite often the development system serial configuration is unknown and not even available to the user. If this is the case the programmer can be used to narrow down the possibilities quite quickly.

1. Estimate the baud rate. This can be done quite easily by dumping a file from the development system to the serial port and timing it. Then compare the time with the table of values below. A 1k dump in format ASCII hex space takes the following times:

Time in Seconds	Baud Rate	Time in Seconds	Baud Rate
4	9600	200	200
8	4800	240	150
15	2400	270	134.5
22	1800	320	110
30	1200	480	75
60	600	740	50
120	300		

2. Set the programmer serial configuration code to 3RC, where R is the correct baud rate. Format 3 is in fact binary without a header and will therefore store all data recieved.

3. Set the programmer into input mode, ready to receive data. Send a small known file to it.

a. If the programmer detects an error the data sent must be 8 data bits and either odd or even parity or 7 data bits, no parity and 1 stop bit. Try them out to confirm this.

b. If the programmer receives the data without detecting an error you have either found the correct configuration the first time or the data is 7 bits with parity. Select the Amend mode on the programmer to examine the data stored and identify the ASCII code.

EXAMPLE: If an ASCII 0 and 1 has been stored the data will appear as follows:

Stored Data	Diagnosis
30/31	7 data bits, no parity or 8 data bits
30/B1	7 data bits and even parity
B0/31	7 data bits and odd parity

TO INPUT DATA TO THE PROGRAMMER

DISPLAY

1. Select required communications configuration code.

2. Press INPUT.

3a. With formats 1, 3, 7 and 8, the display indicates start address zero. [0000]

- i. Enter start address. [XXXX]

- ii. Press ENTER. It is now ready to receive data.

3b. With formats 4, 5, A, B and C, the display indicates it is ready to receive data. [-:-]

3c.* With format 2, the display prompts for the entry of the most significant address displacement when using 16 bit format (8086). The Hex digit represents address bits 16 to 19. [0]

- i. Key most significant address. It is now ready to receive data. [X]

3d.* With format 6, the display prompts for the entry of the most significant address when using S2 and S3 records. The Hex digits represent address bits 16 to 31 .

- i. Key up to 4 digits.

4. Transfer data from the development system to the programmer. The display will indicate the address currently being loaded. [AAAA]

5. At the end of transmission, the display indicates Ed for end and the checksum CCCC. [Ed CCCC]

* Note: This is to select the correct 64K page of data.

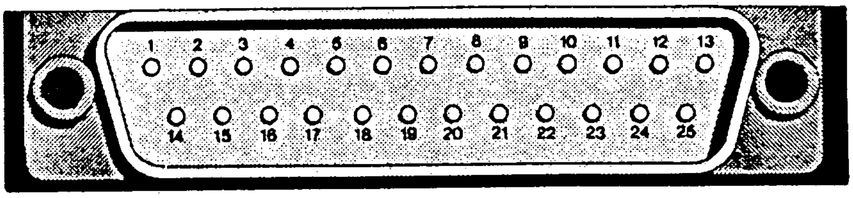
TO OUTPUT DATA FROM THE PROGRAMMER

		DISPLAY
1.	Select required communications configuration code.	[27128]
2.	Press OUTPUT. Display indicates start RAM address zero.	[0000]
3.	Enter required start RAM address if different from 0000.	[XXXX]
4.	Press ENTER. Display indicates last RAM address.	[3FFF]
5.	Enter required last RAM address.	[YYYY]
6.	Press ENTER.	
7. *	For formats 2 and 6 only, key most significant address digits. (See 3c and 3d on page 6-3)	[0] [X]
8.	The programmer will now transmit data. The display indicates the current address.	[A000]
9.	At the end of transmission, the display indicates Ed for end and the checksum CCCC.	[Ed CCCC]

* Note: This is to select the correct 64K page of data.

RS232 CONNECTIONS

The I/O connector on the back of the programmer is a standard 25 pin "D" type male connector with the data and signal line connections as follows:



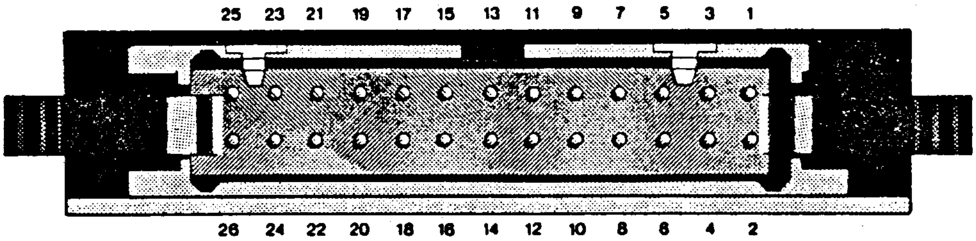
PIN NO.	DESCRIPTION	CLASSIFICATION
1	Chassis	---
2	Serial data out	Output
3	Serial data in	Input
4	Request to send	Output
5	Clear to send	Input
6	Data set ready	Input
7	Signal ground	---
20	Data terminal ready	Output

Although bi-directional handshaking is provided, the programmer can operate without these signals being connected.

The system will also respond to X ON/X OFF while outputting data.

PARALLEL PORT CONNECTIONS

The 26-pin ribbon cable connector on the back of the programmer carries data and handshaking lines for the parallel port.



26 PIN RIBBON CABLE CONNECTOR	DESCRIPTION		CLASSIFICATION	CENTRONICS 36 PIN CONNECTOR
4	Data	0	Output	2
6		1	"	3
8		2	"	4
10		3	"	5
12		4	"	6
14		5	"	7
16		6	"	8
18		7	"	9
1		0V	Common	16
5		Strobe	Output	1
17		Busy	Input	11

Do not make connections to pins not listed in first column. These are used with "E" Series adapters.

TO SELECT REMOTE CONTROL

1. Switch system on.

2. Select device type (this can be re-selected under remote control.

3. Select serial configuration.

4. Press and hold ENTER button. The display will show the device type followed by the letter "C" in the last digit.

5. The system is now ready to respond to the commands which are shown starting on page 5-6.

6. Press RESET to terminate remote control.

REMOTE CONTROL COMMANDS

COMPUTER COMMAND/ CONTROL COMMAND	NAME	DESCRIPTION
RETURN		Execute last command.
Z	Terminate	Programmer operates in stand-alone mode.
PROGRAMMER STATUS INQUIRY		
D	Odd parity	Programmer confirms parity compatible.
E	Even parity	" "
N	No parity .	" "
J	1-stop bit	Programmer confirms stop bit compatible.
K	2-stop bit	" "
X	Error code	Programmer returns last code.
x	Error code inquiry	Programmer returns error code list.
H	Handshake	Programmer returns prompt.
R	EPROM status	Programmer indicates status of EPROM selected. AAAA/B/C, where AAAA = device word limit, B = byte size, and C = VOL/VOH status (1 = VOL; Ø = VOH).
g	Programmer software release	Programmer generation number. (a 4 charecter response)

DEVICE COMMANDS

B	Blank check	Check if EPROM is erased.
b	Erase EEPROM	
T	Illegal bit check	Check data can be programmed into device.
L	Load master	Reads copy socket 1 into RAM.
V	Verify	Verify RAM with copy socket.
P	Program	Program copy socket from RAM.

RAM COMMANDS

I	Input	Input data from computer to RAM.
O	Output	Output data from RAM to computer (up to the word limit of selected EPROM.
S	Checksum	Programmer calculates the two byte checksum of RAM data up to the word limit of the selected EPROM.
C	Compare	Compare input data from computer with RAM.
nn Y	Fill RAM	Fill RAM within RAM start and end addresses with data "nn".
c	Complement	Convert all RAM to its one's complement.
m	Merge RAM	
s	Split RAM	

NOTE: After an I or C command a 10 millisecond delay must occur before sending the data records.

CONFIGURATION COMMANDS (E12 ONLY)

nn M	Record length	Select output record length nn Hex.
nn U	Nulls	Enables output of nn Hex Nulls after carriage rtn.

CONFIGURATION COMMANDS (E2A/E9A/E12 ONLY)

nn A	* Select format	Select I/O record format.
nn f	* Select format	Select I/O record format.
nnnn W	+ Virtual address displacement	Sets RAM address to required system base address. (only applicable to systems with less than 64K RAM.)
nnnn w	$ Virtual address displacement	Where nnnn is the Hex value of address lines 16 to 31.
nnnn :	+ Device start address	This must be zero on E12.
nnnn <	+ RAM start address	
nnnn ;	+ RAM end address	Specifies highest RAM address nnnn-1. Defaults to device size. 0000 will set end address FFFF.
nnnn	+ O/P data start address	
n a	* Access time	
n n	Number of sockets /set mode	Where n = number of sockets
e	Access time inquiry	
k	Number of sockets/set mode inquiry	
r	RAM size inquiry	
nn t	* Select device type	
d	Device type inquiry	
nnnn @	* Select device type	
(	Device type inquiry	

NOTE: The spaces shown in the multiple commands such as "nn t" are for clarity and must be omitted in practice.

* = See following tables for values of "n".

+ = These addresses are reset to device defaults on selection of a device. The E12 will only operate on a whole device.

$ = This command is for use with formats which have greater than 64K address capability, e.g.i) For Intel extended record format which has 20 address lines, the command 000Fw would select address range F0000H to FFFFFH in the programmer.
e.g.ii)For Motorola S Record format which can accommodate up to 32 address lines the command F000w would select address range F0000000H to F001FFFF in the programmer.

PROGRAMMER RESPONSES	DESCRIPTION
RETURN line feed	a. To indicate command received.
> RETURN line feed	b. On successful completion of command.
F RETURN line feed	b. On unsuccessful completion of command.
? RETURN line feed	b. Command not understood.

a. A software option switch can be set to inhibit this response.

b. A software switch can be set to inhibit the return/line feed after the response ">", "F", and "Z".

a & b A software option switch can be set to inhibit all line feeds.

REMOTE ACCESS TIME CODES

ACCESS TIME	a CODE
450	0
400	1
350	2
300	3
250	4
200	5
150	6
100	7

REMOTE NUMBER OF SOCKETS/SET MODE

E9A No. SKTs	E12 MODE	CODE
1	1	1
2	2	2
3	3	3
4	4	4
5	2 - 8	5
6	2:2 - 8	6
7	3 - 8	7
8	4 - 8	8
	1 - 16	9
	2:1 - 16	A
	2 - 16	B
	1 - 32	C

REMOTE DEVICE CODES

	t	@
TYPE	CODE	CODE
2508	00	1922
2716	01	1923
2532	02	3125
2732	03	1924
2732A	04	2724
2564	05	3130
2764	06	3533
2764 1	07	7933
2764 2	08	
2764 3	09	4533
2764A	0A	9333
* 27C64 1	26	
* 27C64 2	27	
* 87C64 1	28	
* 87C64 2	29	
68764	0C	2529
27128	0D	3551
27128 1	0E	7951
27128 2	0F	
27128 3	10	4551
27128A	11	9351
27256 1	12	9332
27256 2	13	
27256 3	14	
27512 1	15	
27512 2	16	
27512 4	17	
* 27513 1	24	
* 27513 2	25	
2815	18	
2816	19	3723
48016	1A	
8741	1B	5654
8742	1C	
8748	1D	5256
8748H	1E	5056
8749H	1F	5057
8755	20	4755
8751	21	
8752	22	
68701	23	

* E12 only

REMOTE FORMAT CODES

	f	a
FORMAT	CODE	CODE
ASCII hex space	01	50
INTEL LOADER	02	83
Optional	03	-
TEK HEX	04	86
MOS TECH	05	81
MOTOROLA S REC	06	82
DEC BINARY	07	-
Binary	08	10
Block dump	09	-
RCA COSMAC	0A	-
PPX	0B	-
TEXAS TAGS	0C	-
ASCII BNPF FORMAT	0D	-

REMOTE ERROR CODES

CODE	DESCRIPTIONN
01	E series configuration out of range
mm20	Blank check fail
mm21	Illegal bit fail
mm22	Program fail
mm23	Verify fail
29	Read fail
31	Data line fail
37	None EE device
38	Device fail
81	Serial stream error
82	Serial I/O error

Where "mm" is a mask indicating the socket numbers which fail the test. Note: This will only be sent on an "x" inquiry, not an "X" inquiry.

E.g.,	mm	skt number
	80	1
	40	2
	20	3
	10	4
	08	5
	04	6
	02	7
	01	8
	FF	all
	CO	1 & 2
	81	1 & 8
	etc.	

CHAPTER 7, EXTRA OPTIONS

LABEL PRINTING (OPTIONAL)

The details of eight labels can be entered and stored by the programmer. 64 characters of memory are allocated to each label area. Special print control characters can be entered to select different print formats (e.g., condensed or bold characters).

The programmer will output the characters from the first location until it finds a carriage return (OD hex). It will then repeat this text the number of times selected across the page. It will then output the next line of text until it finds the end of label character 00 hex.

NOTE:

a. Each line of text must terminate with a carriage return.

b. Each label must terminate with a zero.

c. All lines of text must contain the same number of printable characters.

		DISPLAY
	To enter the labels into the programmer from keyboard:	
1.	Select input format 0 for labels.	[0nn]
2.	Press INPUT.	[0]
3.	Enter label number (0 to 7). The display indicates	[0 00]
4.	Press ENTER. Current data DD.	[0 00DD]
5.	Key in required data.	[0 00DDRR]
6.	Press STEP->.	[0 01DD]
	Repeat steps 5 and 6 until the label details are complete.	
7.	Press RESET.	[27128]

TO ENTER THE LABELS INTO THE PROGRAMMER FROM RS232 OR EPROM

1. Load text into user RAM.

LABEL NUMBER	START ADDRESS	END ADDRESS
0	0000	003F
1	0040	007F
2	0080	00BF
3	00C0	00FF
4	0100	013F
5	0140	017F
6	0180	01BF
7	01C0	01FF

	DISPLAY
2. Select input format 0 for labels.	[0nn]
3. Press INPUT.	[0]
4. Press ENTER.	[0 00]
5. Press READ. The contents of user RAM addresses 0000 to 01FF is copied into label RAM and saved.	[27128]

TO PRINT LABELS

1. Select output format 0 for labels.	[0nn]
2. Press OUTPUT.	[0000]
3. Enter 4-digit print control word.	[1824]

1st digit = label number.
2nd digit = number of labels across page.
3rd & 4th digits = decimal count of number of labels to print.

4. Press ENTER. The required labels will be output to printer.

TO ENABLE SELECTIONS AND RAM EDITING WITH CODE LOCK (OPTIONAL)

1. Switch programmer off.

2. Press the E button while the programmer is switched on and hold until the display clears the 8's. The display shows 0000. [0000]

3. Enter security code through keyboard. [****]

4. Press ENTER. If the code is accepted the system will beep and display the device type. [27128]

```
*************************************
*                                   *
*      RAM KEY LOCK CODE = 0B0B     *
*    (unless otherwise specified)   *
*                                   *
*                                   *
*************************************
```

APPENDIX A, EPROM/EEPROM REFERENCE TABLE

					t	@
					PRGMR	FAMILY
	ARRAY		PIN	PROGRAMMER	CODE	PIN OUT
DEVICE	SIZE	TECH.	OUT	SELECTION	REMOTE	REMOTE
ADVANCED MICRO DEVICES						
AM2716	2k X 8	NMOS	24	2716	01	1923
AM9716	"	"	"	"	"	"
AM2732	4k X 8	"	"	2732	03	1924
AM9732	"	"	"	"	"	"
AM2732A	"	HMOS	"	2832A	04	2724
AM2764	8k X 8	"	28	2764 1	07	7933
AM27128	16k X 8	"	"	27128 1	0E	7951
AM27256	32k X 8	"	"	27256 1	12	9332
AM27512	64k X 8	"	"	27512 4	17	
EUROTECHNIQUE (THOMSON)						
ET2716Q	2k X 8	NMOS	24	2716	01	1923
ETC2716	"	CMOS	"	"	01	–
ET2732Q	4k X 8	NMOS	"	2732	03	1924
ETC2732Q	"	CMOS	"	"	03	1924
ET2764Q	8k X 8	NMOS	28	2764	06	3533
FAIRCHILD SEMICONDUCTORS						
F2716	2k X 8	NMOS	24	2716	01	1923
FUJITSU						
MBM2716	2k X 8	NMOS	24	2716	01	1923
MBM2716H	"	"	"	"	01	1923
MBM2732	4k X 8	"	"	2732	03	1924
MBM2732A	"	NMOS	"	2732A	04	2724
MBM2764	8k X 8	"	28	2764 3	09	4533
MBM27128	16k X 8	"	"	27128 3	10	4551
MBM27C256	32k X 8	CMOS	"	27256 3	14	–
HITACHI						
HN480160	2k X 8	NMOS	24	48016	–	–
HN462716	2k X 8	NMOS	24	2716	01	1923
HN462716G	"	"	"	"	01	1923
HN462532	4k X 8	"	"	2532	02	3125
HN462732	"	"	"	2732	03	1924
HN482732A	"	"	"	2732A	04	2724
HN482764	8k X 8	HMOS	28	2764 1	07	7933
HN482764G	"	"	"	"	07	7933
HN4827128	16k X 8	"	"	27128 1	03	7951

APPENDIX A (continued)

DEVICE	ARRAY SIZE	TECH.	PIN OUT	PROGRAMMER SELECTION	t PRGMR CODE REMOTE	@ FAMILY PIN OUT REMOTE
				INTEL		
2758	1k X 8	MOS	24	2508	ØØ	1922
2716	2k X 8	NMOS	"	2716	Ø1	1923
2815	2k X 8	HMOS	"	2815	18	8523
2816	"	"	"	2816	19	3723
2732	4k X 8	NMOS	"	2732	Ø3	1924
2732A	"	"	"	2732A		
2764	8k X 8	"	28	2764 1	Ø7	7933
2764A	"	"	"	2764A	ØA	9333
27C64	"	CMOS	"	27C64 1	26	
87C64	"	"	"	87C64 1	28	
27128	16k X 8	NMOS	"	27128 1	ØE	7951
27128A	"	"	"	27128A	11	9351
27256	32k X 8	"	"	27256 2	12	9332
27512	64k X 8	"	"	27512 2		
27513	16k X 8 [X4 pages]	"	"	27513 1		
				MITSUBISHI		
M5L2716K	2k X 8	NMOS	24	2716	Ø1	1923
M5L2732K	4k X 8	"	"	2732	Ø3	1924
M5L2732A	"	"	"	2732A	Ø4	2724
M5L2764K	8k X 8	"	28	2764 1	Ø7	7933
M5L27128K	16k X 8	"	"	27128	ØE	7951
				MOSTEK		
2716	2k X 8	NMOS	24	2716	Ø1	1923
MK2764	8k X 8	NMOS	28	2764 H	ØB	-
				MOTOROLA		
MCM 2532	4k X 8	NMOS	24	2532	Ø2	3125
MCM 68764	8k X 8	"	"	68764	ØC	2529
MCM 68766	"	"	"	68766	-	-

APPENDIX A (continued)

					t	@
					PRGMR	FAMILY
	ARRAY		PIN	PROGRAMMER	CODE	PIN OUT
DEVICE	SIZE	TECH.	OUT	SELECTION	REMOTE	REMOTE
		NATIONAL SEMICONDUCTOR				
MM2758A	1k X 8	NMOS	24	2508	00	1922
MM2716	2k X 8	"	"	2716	01	1923
MM2716E	"	"	"	"	01	1923
MM2716M	"	"	"	"	01	1923
NM27C16	"	CMOS	"	"	01	1923
NMC2816	"	NMOS	"	2816	19	3723
MC2816E	"	"	"	"	19	3723
NMC2816M	"	"	"	"	19	3723
NMC2532	4k X 8	"	"	2532	02	3125
NMC2732	"	"	"	2732	03	1924
NMC27C32	"	"	"	"	03	1924
NMC2764	8k X 8	"	28	2764	06	3533
		OKI				
MSM2758	1k X 8	NMOS	24	2508	00	1922
MSM2716	2k X 8	"	"	2716	01	1923
MSM2532	4k X 8	"	"	2532	02	3125
MSM2732	"	"	"	2732	03	1924
MSM2732A	"	"	"	2732A	04	2724
MSM2764	8k X 8	"	28	2764 1	07	7933
		ROCKWELL INTERNATIONAL				
R87C32	4k X 8	CMOS	24	2732A		
		SEEQ TECHNOLOGY				
5213 *1	2k X 8	NMOS	24	2816	19	3723
5133	8k X 8	"	28	2764	07	7933
5143	16k X 8	"	"	27128 1	0E	7951
		SGS-ATES Semiconductor Corporation				
M2716	2k X 8	NMOS	24	2716	01	1923
M2532	4k X 8	"	"	2532	01	3125
		SIEMENS				
SAB2716	2k X 8	NMOS	24	2716	01	1923
		SYNERTEK				
SY2716	2k X 8	NMOS	24	2716	01	1923

APPENDIX A (continued)

					t	@
					PRGMR	FAMILY
	ARRAY		PIN	PROGRAMMER	CODE	PIN OUT
DEVICE	SIZE	TECH.	OUT	SELECTION	REMOTE	REMOTE
			TEXAS INSTRUMENTS			
TMS2516	2k X 8	NMOS	24	2716	Ø1	1923
TMS2532	4k X 8	"	"	2532	Ø2	3125
TMS2732	"	"	"	2732	Ø3	1924
TMS2564	8k X 8	"	"	2564	Ø5	313Ø
TMS2764 *2	"	"	"	2764	Ø6	3533
			THOMSON (see EUROTECHNIQUE)			
			TOSHIBA			
TMM323D	2k X 8	NMOS	24	2716	Ø1	1923
TMM2732	4k X 8	"	"	2732	Ø3	1924
TMM2732D	"	"	"	"	Ø3	1924
TMM2764 *3	8k X 8	"	28	2764 1	Ø7	7951
TMM27128D *3	16k X 8	"	"	27128 1	ØE	7951

*1. Can be programmed but cannot be chip-erased in one operation.

*2. Use suppressed verify during programming for early versions of this device (i.e., mode B).

*3. These devices may exhibit a noise problem in gang programming which gives mis-read or mis-verify. Select mode B and slow programming (2764 or 27128) and reduce number of devices in gang to three.

APPENDIX B, SERIAL COMMUNICATION FORMATS

Serial Formats - All output formats terminate with CONTROL Z.

1. ASCII HEX SPACE FORMAT

CHARACTER	DESCRIPTION
1	Block mark: "CONTROL A" & "CONTROL B" used to identify the beginning of a block.
2 to N	Data: Each byte of data is represented by a two-character hex number followed by a space character. The high order character precedes the low order. The system reads only the two characters that proceeded a space. Therefore, the sequence: AB space, carriage return, line feed, CD space (Note: commas included to improve legibility - they are not transmitted) would result in the two two 8-bit words described by AB and CD being stored.
N + 1	Terminate mark: "CONTROL C" is used to identify the end of the block.

2. INTEL LOADER FORMAT (8 and 16 bit)

1 Record mark: A colon is used to mark the beginning of a record.

2 - 3 Record length: A two-character hex representation of the number of bytes of data in the record, a length of zero (00) indicates an end-of-file. Character 2 is high order record length of characters.

4 - 7 Load address: A four-character hex address at which the first data bytes are loaded into successive (higher) memory locations. Character 4 is the high order address digit. In an end-of-file record, the load address is taken as the starting address.

8 - 9 Record type: A two-character hex code specifying the record type. All data records are type 00. The most significant digit is character 8.

10 - N Data: Each byte of data is represented by a two-character hex humber. The high order character precedes the low order.

N + 1 - N + 2 Checksum: A two-character hex checksum, which is the negative sum of all bytes in the record except the colon and checksum, evaluated modulo 256. The sum of all bytes in the record plus the checksum must be zero.

N + 3 Carriage return

N + 4 Line feed

3. OPTIONAL

1 - N Binary data

4. TEKTRONIX HEXADECIMAL FORMAT

1. Record mark: A slash is to mark the beginning of a record.

2 - 5 Load address: A four-character hex address at which the first data bytes are loaded into successive (higher) memory locations. Character 2 is the high order address digit. In an end-of-file record, the load address is taken as the starting address.

6 - 7 Record length: A two-character hex representation of the number of bytes of data in the record. A record length of zero (00) indicates an end-of-file. Character 6 is the high order record length of character.

8 - 9 Header checksum: A two-character number representing the eight-bit sum, modulo 256 of the hex values of the six characters 2 - 7.

10 - N Data: Each bytes of data is represented by a two-character hex number. The high order character precedes the low order.

N + 1 - N + 2 Data checksum: A two-character number representing the eight-bit sum, modulo 256, of the hex values of the digits that make up the N data bytes.

N + 3 - N + 4 Carriage return
Line feed

5. MOS TECHNOLOGY

1 Record mark: A semicolon is used to mark the beginning of a record.

2 - 3 Record length: A two-character hex representation of the number of bytes of data in the record. A record length of zero (ØØ) indicates end-of-file, Character 2 is the high order record.

4 - 7 Load address: A four-character hex address at which the first data bytes must be loaded. Ensuing data bytes are loaded into successive (higher) memory locations. Character 4 is the high order address digit. In an end-of-file record, the load address is taken as the starting address.

8 - N Data

N + 1 - N + 6 Checksum: A four-character hex checksum which is the sum of all bytes in the record except the semicolon and checksum.

N + 5 - N + 6 Carriage return
Line feed

6. MOTOROLA S RECORD

The checksum is the one's complement of the summation of the 8-bit bytes.

	(SO RECORDS)		(S1 RECORDS)		(S9 RECORDS)	
	CC = 30		CC = 31		CC =39	
	HEADER		DATA		END-OF-FILE	
FRAME	RECORD		RECORD		RECORD	
1. Start-of-record	53	S	53	S	53	S
2. Type of record	30	0	31	1	39	9
3.	31		31		30	
Byte count		12		16		03
4. ----------	32	---	36	---	33	---
5.	30		31		30	
6. Address/size	30	0000	31	1100	30	0000
7.	30		30		30	
8. ----------	30	---	30	---	30	---
9.	34		39		46	
Data		48-H		98		FC
10.----------	37		37	---	43	---
	34		30			(checksum)
		44-D		32		
	34	---	32			
	35					
		52 - R		---		
	32	---	41	A8 (checksum)		
			48			
----------	---	---	---	---		
		9E				
N. Checksum---	45	---				

7. DEC BINARY

CHARACTER	DESCRIPTION
1 to (H-1)	Header: Binary value 1111 1111 is used to identify header.
H	Terminate header: Binary value 0000 0000 is used to identify last character of header.
D - N	Binary data characters: Terminates on selected device boundary.

8. BINARY

1	Header: Binary value 1111 1111
2 - N	Binary data characters: Terminate on selected device boundary.

9. BLOCK DUMP (output only)

```
Address     16 bytes hex dec. data     16 bytes ADCII data
AAAA        HH HH . . . . .HH HH       AA . . . . . . .AA AA
  "         "  "          "  "         "                "
  "         "  "          "  "         "                "
  "         "  "          "  "         "
AAAA        HH HH . . . . .HH HH       AA . . . . . . .AA
```

A. RCA COSMAC FORMAT

```
!M (CR)(LF)
AAAA HHHHHH . . . . . . . . . . .HH;(CR)(LF)
AAAA HH . . . . . . . . . . . . .HH,(CR)(LF)
HHHH  . . . . . . . . . . . . . .HH(CR)(LF)
```

!M = Start character

AAAA = Address field

HH = Two hexadecimal digits

; = End of record character if followed by expressed address

, = End of record character (no address following)

(CR)(LF) = Non-printing carriage return line feed

(CR) = End of file (when a record terminates without a, or ;)

Set system variable inhibit return after !M value Ø4 to allow the address to be on the same line as start character, e.g., !MAAAA.

B. PPX - ASCII HEX SPACE

1 — Block mark * used to identify the beginning of a block.

2,3 — Carriage return
Line feed

4 to 7 — Load address: A four-character hex address at which the first bytes must be loaded. Ensuing data bytes are loaded into successive (higher) memory locations.

8 — Space

9 to N — Data: Each byte of data is represented by a two-character hex number followed by a space character. The high order character precedes the low order. The system reads only the two characters that preceeded a space. Therefore, the sequence: AB space, carriage return, line feed, CD space (Note: Commas included to improve legibility - they are not transmitted) would result in the two 8-bit words described by AB and CD being stored.

N + 1, N + 2 — Record terminate mark: Carriage return, Line feed, or

N + 1 — Block terminate mark: Dollar

C. TEXAS TAGS

TAG CHAR.	HEXADECIMAL (FOUR CHARACTERS)	SECOND FIELD	MEANING	PRGMR
Ø	Length of all relocatable code	8-character program identifier	Program start	READ
1	Entry address	None	Absolute entry address	READ
2	Entry address	None	Relocatable entry address	IGNORED
3	Location of last appearance of symbol	6-character symbol	External ref. last used in relocatable code	IGNORED
4	Location of last appearance of symbol	6-character symbol	External ref. last used in absolute code	READ
5	Location	6-character symbol	Relocatable external definition	IGNORED
6	Location	6-character symbol	Absolute external definition	READ
7	Checksum for current record	None	Checksum	ACTIOND
8	Ignore checksum	None	Do not checksum for error	ACTIOND
9	Load address	None	Absolute load address	ACTIOND
A	Load address	None	Relocatable address	IGNORED

C. TEXAS TAGS (continued)

TAG CHAR.	HEXADECIMAL (FOUR CHARACTERS)	SECOND FIELD	MEANING	PRGMR
B	Data	None	Absolute data	ACTIOND
C	Data	None	Relocatable data	IGNORED
D	Load bias value	None	Load point specifier	IGNORED
F	None	None	End-of-rec.	ACTIOND
G	Location	6-character symbol	Relocatable symbol definition	IGNORED
H	Location	6-character symbol	Absolute symbol definition	READ

D. ASCII BNPF FORMAT

CHAR.	DESCRIPTION
1	START OF FIELD; "B" used to identify the begining of a word.
2 - 9	Each bit within the data word is represented by a "P" if a "1" or an "N" if a "0".
10	END OF FIELD. "F" used to identify the end of a word.
n	TERMINATE MARK: "ETX" (non-printable) used to identify the end of a block.

Any character except "B" or "ETX" after an "F" and before a "B" (eg. line feed, carriage return etc.) will be ignored on input. For output a carriage return and line feed are sent after every eighth word.

APPENDIX C, ASCII CHARACTER CODES

DEC	HEX	CHR	DEC	HEX	CHR	DEC	HEX	CHR
ØØØ	ØØH	NUL	Ø43	2BH	+	Ø86	56H	V
ØØ1	Ø1H	SØH	Ø44	2CH	,	Ø87	57H	W
ØØ2	Ø2H	STX	Ø45	2DH	-	Ø88	58H	X
ØØ3	Ø3H	ETX	Ø46	2EH	.	Ø89	59H	Y
ØØ4	Ø4H	EØT	Ø47	2FH	/	Ø9Ø	5AH	Z
ØØ5	Ø5H	ENQ	Ø48	3ØH	Ø	Ø91	5BH	[
ØØ6	Ø6H	ACK	Ø49	31H	1	Ø92	5CH	/
ØØ7	Ø7H	BEL	Ø5Ø	32H	2	Ø93	5DH	]
ØØ8	Ø8H	BS	Ø51	33H	3	Ø94	5EH	^
ØØ9	Ø9H	HT	Ø52	34H	4	Ø95	5FH	_
Ø1Ø	ØAH	LF	Ø53	35H	5	Ø96	6ØH	'
Ø11	OBH	VT	Ø54	36H	6	Ø97	61H	a
Ø12	OCH	FF	Ø55	37H	7	Ø98	62H	b
Ø13	ODH	CR	Ø56	38H	8	Ø99	63H	c
Ø14	OEH	SO	Ø57	39H	9	1ØØ	64H	d
Ø15	ØFH	SI	Ø58	3AH	:	1Ø1	65H	e
Ø16	1ØH	DLE	Ø59	3BH	;	1Ø2	66H	f
Ø17	11H	DC1	Ø6Ø	3CH	<	1Ø3	67H	g
Ø18	12H	DC2	Ø61	3DH	=	1Ø4	68H	h
Ø19	13H	DC3	Ø62	3EH	>	1Ø5	69H	i
Ø2Ø	14H	DC4	Ø63	3FH	?	1Ø6	6AH	j
Ø21	15H	NAK	Ø64	4ØH	@	1Ø7	6BH	k
Ø22	16H	SYN	Ø65	41H	A	1Ø8	6CH	l
Ø23	17H	ETB	Ø66	42H	B	1Ø9	6DH	m
Ø24	18H	CAN	Ø67	43H	C	11Ø	6EH	n
Ø25	19H	EM	Ø68	44H	D	111	6FH	o
Ø26	1AH	SUB	Ø69	45H	E	112	7ØH	p
Ø27	1BH	ESCAPE	Ø7Ø	46H	F	1132	71H	q
Ø28	1CH	FS	Ø71	47H	G	114	72H	r
Ø29	1DH	GS	Ø72	48H	H	115	73H	s
Ø3Ø	1EH	RS	Ø73	49H	I	116	74H	t
Ø31	1FH	US	Ø74	4AH	J	117	75H	u
Ø32	2ØH	SPACE	Ø75	4BH	K	118	76H	v
Ø33	21H	?	Ø76	4CH	L	119	77H	w
Ø34	22H	"	Ø77	4DH	M	12Ø	78H	x
Ø35	23H	*	Ø78	4EH	N	121	79H	y
Ø36	24H	$	Ø79	4FH	Ø	122	7AH	z
Ø37	25H	%	Ø8Ø	5ØH	P	123	7BH	{
Ø38	26H	&	Ø81	51H	Q	124	7CH	}
Ø39	27H	'	Ø82	52H	R	125	7DH	}
Ø4Ø	28H	(	Ø83	53H	S	126	7EH	~
Ø41	29H	)	Ø84	54H	T	127	7FH	DEL
Ø42	2AH	*	Ø85	55H	U			

DEC = Decimal, HEX = Hexadecimal (H), CHR = Character
LF = Line feed, FF = Form feed, CR = Carriage return,
DEL =Rubout

APPENDIX D, E11 SIMULATOR

GENERAL

The E11 Simulator is designed to speed up program/hardware development by simulating the target system EPROM. Small program changes can be quickly made and instantly checked. A single E11 will simulate the current range of JDEC standard 24 pin and 28 pin devices, i.e., 2716, 2732, 2764, 27128, and 27256. Two E11s in a slave/master configuration provide twin EPROM simulation or 16-bit simulation.

Data is edited in the main programmer (E2A/E9A/E12) and transferred to the E11 via the 26-pin ribbon cable. Data from the E11 can be read back or verified with data in the main programmer.

Battery backup in the E11 supports the memory for approximately 10 minutes so that, if required, the E11 can be disconnected from the programmer and used separately.

A 30-pin ribbon cable connects the E11 to the target system terminating in a 28-pin or 24-pin DIP plug. An additional 5-pin connector at the rear of the E11 has an optional 0v connection and RESET/RESET connections. Normally, RESET connection will be used to disable the targe system when out of simulation and to synchronize the target system with the E11. Failure to use this control will almost certainly result in misoperation of the target system. Alternatively, a power up reset synchronization can be used without the reset connection (see "Operation without Reset Control").

POWER

The E11 draws power from the main programmer or target system. Consumption is less than the EPROM replaced - typically 10mA standby, 45mA active. The RAM Nickel Cadium battery is automatically trickle-charged when the E11 is connected to the main programmer or target system. Approximately 10 minutes after the E11 has been disconnected from the target system and the main programmer, the battery support to RAM is automatically switched off.

CONNECTIONS

26-Pin Connector at Rear of E11:

Connect to the 26-pin connector on the rear of themain programmer using the ribbon cable supplied. This connection can be made with or without the programmer powered up.

30-Pin Connector at side of E11 :

Connect to the target system EPROM socket using the 24-pin or 28-pin DIP plug cable supplied. Observe orientation and do not plug into a live system.

5-Pin Connector at Rear of E11:

	PIN NO.	SIGNAL	COMMENTS
Left hand pin	1	0v	Not normally needed
	2		No connection
	3		No connection
	4	$\overline{\text{RESET}}$	) Always use one of these signals to control micro-processor in target system
Right hand pin	5	RESET	

SYSTEM SYNCHRONIZATION USING RESET/RESET CONTROL

The target system micro-processor must be halted or reset under control of the E11 for two reasons:

With the EPROM removed and the E11 in circuit but not simulating, the target system would try to run accessing a disabled tri-state buffer on the E11. The target system would therefore run in an indeterminate uncontrolled manner which may be potentially dangerous.

The RESET signal generated by the E11 is rather like a power on reset which normally initializes the micro-processor. Internally, tri-state address and data buffers are enabled and synchronized to the target system CE and OE signals.

Both RESET and $\overline{\text{RESET}}$ are open collector transistors pulled up to +5v with 4K7 resistors. When connecting to the target system, there may be conflict between the E11 reset signal and the target system reset signal if this is an active circuit. In this case, it may be possible to connect to the effective point of reset remote from the actual micro-processor reset pin. Always consult circuit diagram before making RESET or RESET connections.

OPERATION WITHOUT RESET/RESET CONNECTION

Although the most useful and convenient method of operation involves the use of either RESET or RESET connection, it is possible to obtain synchronization and connect running without this connection. This is achieved by putting the E11 into simulate mode before the target system is powered up. When the target system powers up, it's internal reset circuitry effects a power on reset which synchronizes it to the E11. However, the disadvantage of this method is that if amendments to the program are required and the E11 is taken out of simulate mode, the whole procedure of turning off the target system, re-entering simulate mode, and turning back on the target system must be carried out to effect resynchronization. It is therefore much more convenient to use the automatic reset/resynchronization provided by the reset or reset connection.

E11 CONTROLS AND INDICATORS

Simulate switch — Puts the E11 into simulate mode. The reset signals are inactive, i.e. RESET is high; RESET is low. In this mode, data cannot be transferred between the E11 and the main programmer.

Reset mode — Takes the E11 out of simulate mode. The reset signals are active, i.e., RESET is low; RESET is high. In this mode, data cannot be simulated but data transfers between the E11 and the main programmer may take place.

Simulate indicator — When lit, indicates that the E11 is in simulate mode.

Device type indicator — When lit, indicates the selected simulated device type.

To conserve battery backup power, the LED indicators are only illuminated when the E11 is connected to a powered-up programmer or target system. If the E11 has lost data and device selection (i.e., if it has been disconnected from a source of power for periods greater than 10 minutes), then none of the indicators will be illuminated until this information is restored.

OPERATING PROCEDURE

A. Using the 26-pin ribbon cable connector, connect the E11 rear jack to the 26-pin jack at the rear of the programmer (the programmer may or may not be powered up).

b. With the target system switched off,remove EPROM to be simulated and insert either 24-pin or 28-pin DIP plug into empty socket. Observe orientation. Connect the other end of the DIP plug lead into the side jack on the E11.

c. Connect RESET or $\overline{\text{RESET}}$ to the micro-processor reset control (see Section 1.4 and 1.5 for guidance).

d. Write programmer data into E11 (see Section 1.9 for guidance).

e. Switch on target system.

f. Press simulate button on E11.

To escape from simulate and restore the target system, use the above steps in reverse order.

CONTROL OF THE E11 FROM THE MAIN PROGRAMMER

The E Series programmers can carry out three functions with the E11 simulator.

a. Write data into E11.
b. Read data from E11.
c. Verify programmer RAM with E11 RAM.

To simplify the operation, data is always written to or read from start address zero in the programmer.

To enable E11 functions, press hex key "Ø" [-:- -:-]
The display will flash to indicate E11 mode (device type)

This gives the three RAM control keys VERIFY, INPUT, and OUTPUT the following double functions:

VERIFY = Verify programmer RAM with E11 RAM
INPUT = Read E11 RAM into programmer
OUTPUT = Write programmer RAM into E11 RAM

While a function is being carried out, the display indicates: : -- :

Press RESET to exit from E11 mode Device type

WRITING DATA TO THE E11

a.	Press key ZERO to enable E11 functions	Device type [-:- -:-]
b.	Press key OUTPUT. The programmer will write the correct amount of data for the selected device type from start address zero to the E11 simulator.	: -- :
c.	Press RESET	[-:--:-] Device type

READING DATA FROM THE E11

a.	Press key ZERO to enable E11 function	Device type [-:- -:-]
b.	Press key INPUT. The programmer will read the correct amount of data for the selected device type from the E11 and place it in RAM starting at address zero.	: -- :
	At the end of data transfer, the checksum is displayed.	CCCC
c.	Press RESET	

VERIFYING DATA

Verify programmer RAM with E11 RAM

a.	Press key ZERO to enable E11 functions	Device type [-:- -:-]
b.	Press VERIFY key. The system verifies the two sets of data. The display indicates the function is being carried out.	: -- :
c.	If the data verifies correctly, the display indicates Ed for end.	Ed
	If the system has different data, the display indicates the address AAAA, E Series data MM and the E11 data dd.	AAAA MM dd
	Press STEP> to continue verify check, or	

Press STEP< to display the data at the previous address, or

Press RESET to terminate operation [-:- -:-]

EXAMPLE - SIMULATING A 27128 DEVICE

a. Select device type 27128

b. Load the data from hex keypad via RS232, or load master EPROM into programmer RAM start address zero.

c. Press key ZERO. [-:- -:-]

d. Press key OUTPUT to write data to E11. When the transfer is complete, the display indicates the checksum.

[27128]
: -- :
CCCC

e. Press RESET. [-:- -:-]

[27128]

f. Press E11 SIMULATE button.

The target system will now run. Monitor the required functions.

g. Press E11 RESET button to terminate simulation.

h. Press RESET on programmer.

i. Amend the memory address of the function. Repeat Steps 3 to 9 as required.

TWO E11's IN MASTER/SLAVE CONFIGURATION

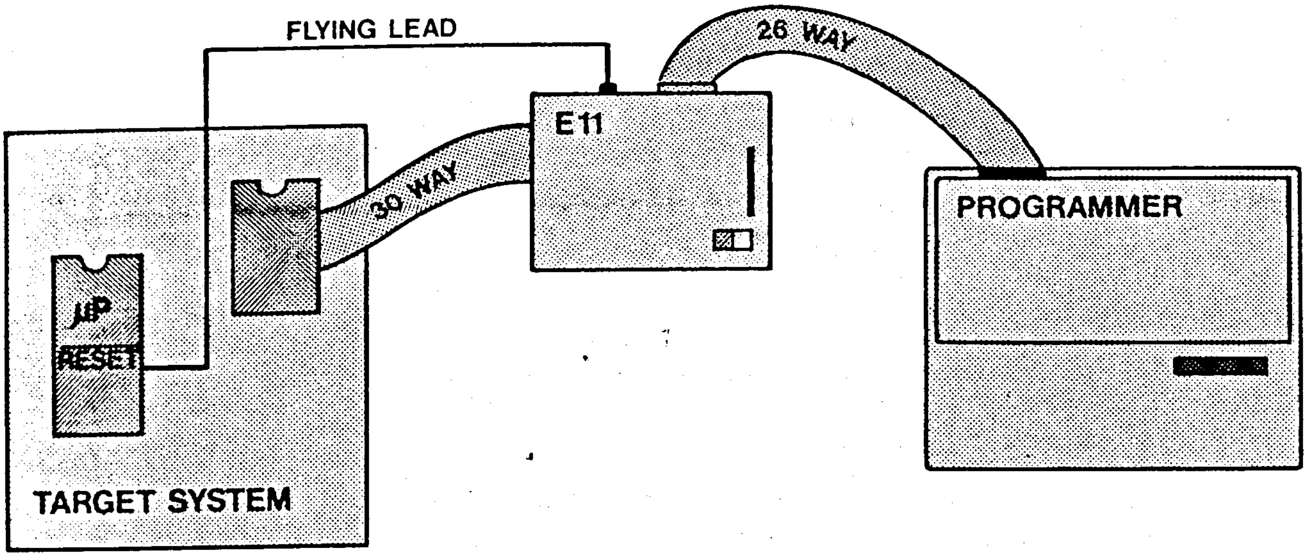
GENERAL

An additional E11 may be used as a slave unit (if internally linked), to extend the single EPROM socket simulate facility to two sockets.

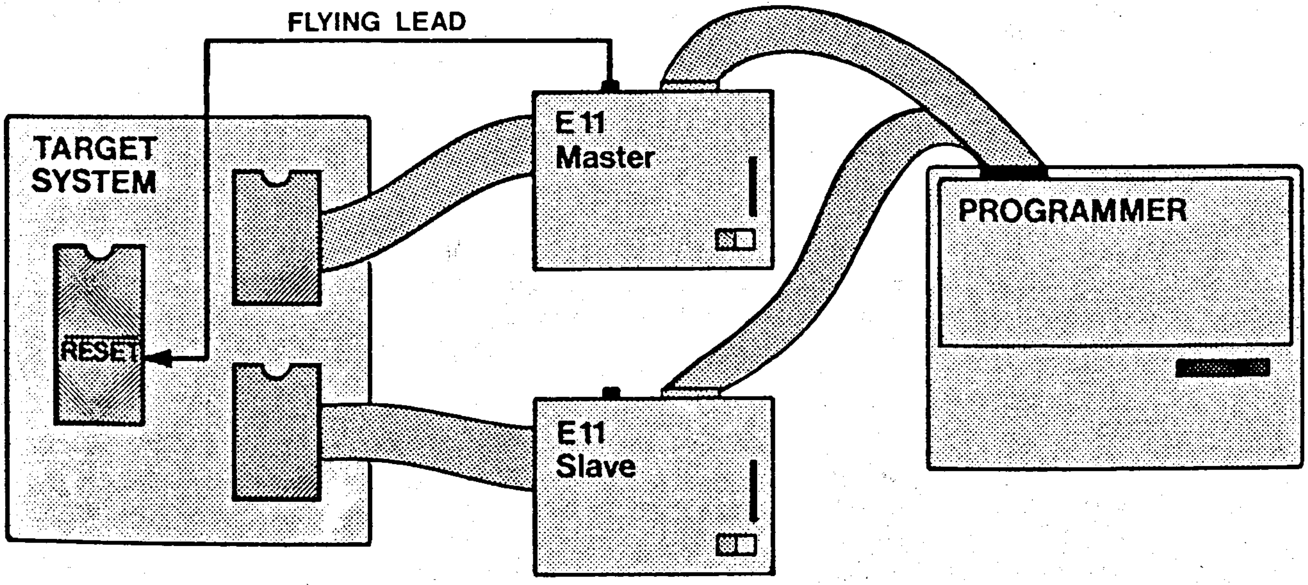
When used in a master/slave configuration, the E11 slave pushbuttons are not used - control of reset or simulate being under control of the master E11. Accordingly, one single reset or reset connection is required from the master E11 to the target system.

A dedicated slave E11 can still be used independently in exactly the same way as a standard master E11 provided that slave data transfers have been selected on the main programmer.

CONFIGURATION OF E11 WITH TARGET SYSTEM AND PROGRAMMER



26 WAY CABLE : Connects to Programmer for Data Transfers
30 WAY CABLE : Connects to Target System eprom socket
1 FLYING LEAD : Micro-Processor control signal



Programmer selects Master or Slave for Data Transfers

E11 Master's pushbuttons (Reset and Simulate) controls Slave and Master E11's L.E.D. displays on both E11 units display device type and simulate status

One Flying Lead from MASTER is required to control µP

DATA TRANSFERS TO MASTER OR SLAVE

The operating system of the main programmer assumes, unless commanded, that data transfers are to a master E11. To select the slave unit for data transfers, carry out the following procedures:

a. Enter simulate operating mode in usual way by pressing key "Ø" on hex keypad.

[-:- -:-]
flashing
(device type)

b Press ENTER key once on lower keypad. The 1 on the right hand side of the display indicates slave selection.

[-:- -:-1]
flashing
[device type]

c. Carry out write/read/verify in usual way.

To revert to master E11 data transfers, press ENTER key once; the "1" on the right hand side of the display will disappear, indicating master selection.

[-:- -:-]
flashing

APPENDIX E, E4/E7 ADAPTER
OPERATING INSTRUCTIONS FOR E4 ADAPTER
(8741/48/48H/49/55) & E7 ADAPTER (8744/51/52)

CAUTION: Irrevocable damage to the device may be caused if the following sequence is not strictly adhered to.

1. Switch on E series programmer. Verify E series adapter is powered down.

2. Connect E series adapter with a 26-pin ribbon cable to the ribbon cable jack on the rear of the programmer.

3. Power up E series adapter on the top of the unit should be illuminated.

4. Select device type (8748/49/55, etc.) on the E series programmer.

5. When the device type has been entered (i.e., when the display has stopped flashing the type), the corresponding device may be inserted into the 40-pin zero insertion socket. Carefully observe orientation of the socket – reversal may result in instant destruction of the device.

6. Programming, reading, and verification may be carried out in the usual manner using the lower set of pushbuttons on the programmer. To program the security bit in the 8751, program the device, then when the display indicates end [Ed xxxx], press PROG and hold for two beeps. After this operation, it is impossible to reprogram, read, verify, or blank check the device until erased.

7. Only remove the device at the end of an operation. The RESET button may be safely used to abort a programming, verification, or blank check operation.

8. Power down sequence is the reverse of power up. Ensure 40-pin socket is empty. Switch off power to adapter, and remove 26-pin ribbon cable from programmer.

9. Note that the unit will function normally with other EPROM types while the adapter is connected. The RS232 interface is operational, but the parallel output connection is utilized by the adapter.

10. Unlike normal EPROMs and the 8755, a "clean" 8748 or 8749 will have "00" in each location instead of "FF". To reduce unnecessary programming time, the programmer does not program blank locations with blank data and therefore a device with only a few locations of data and many blank locations will be programmed in a much shorter time than the maximum for a device which has data in all locations.

APPENDIX F, E5 ADAPTER

OPERATING INSTRUCTIONS FOR E5 ADAPTOR (68701)

1. Switch off 'E' series programmer.

2. Switch on E5 Adaptor. The L.E.D visible from the top of the unit should be illuminated.

3. Connect E5 Adaptor to programmer via 26 way ribbon connector.

4. Select device type on programmer : 68701 E5.

5. When the device type has been entered (ie when the display has stopped flashing the type) the E5 Adaptor is ready for use. CAREFULLY observe orientation of the 40 pin socket - incorrect insertion of the 68701 may cause damage to the device. The 40 pin socket is safely "powered down" in the idle mode.

6. Programming, Reading, Blank check and Verification may be carried out by using the LOWER set of pushbuttons on the programmer. These functions are similar in operation to normal EPROM programming except that data is always loaded into and read from RAM base address 0000 in the main programmer.

7. At the end of an operation the Adaptor is in the idle mode and it is then safe to remove or insert a device. The RESET button may be safely used to abort any operation and place the adaptor in the idle mode. Under some situations the Adaptor may enter a "lock up" state and fail to initialize an operation. To escape press RESET once and repeat the required operation.

8. Power down sequence is the reverse of power up.

   Ensure 40 pin socket is empty
   remove 26 way ribbon cable
   remove Mains Supply from the Adaptor

9. Note that the main programmer will function normally with other EPROM types whilst the Adaptor is connected. The RS232 interface is operational but the parallel output connection is utilized by the Adaptor.

10. Unlike normal EPROMS the 68701 has '00' in unprogrammed locations instead of the usual 'FF'. To reduce unneccessary programming time the programmer does not programme blank locations or locations which are already programmed with identical data to RAM and therefore a device with only a few locations of data to change will be programmed in a much shorter time than the maximum for a device which has data to be programmed in all locations.

AFTER SALES SUPPORT AND SERVICE

In case of operating difficulties (and before making any returns) please contact:-

For U.K. and rest of the world (excluding U.S.A.):
 i) Your Distributor or
 ii) the Customer Support Engineer at Elan Digital Systems Ltd
 Tel: (0293) 510448

For U.S.A. the Technical Support Representitive, Tel: (415) 964-5338

Advice can be given on all aspects of the programmer's operation and the problems encountered when interfacing with other systems.

In the event of a return being necessary please use the original packing material or pack very carefully to minimise damage in transit. Equipment received in inadequate packing will be returned in new packing and charged at cost.