ELAN DIGITAL SYSTEMS LTD

E9A EPROM/EEPROM EDITING PROGRAMMER

OPERATING INSTRUCTIONS

WSE2A V2.0

CONTENTS

POWER

The programmer is supplied pre-wired for 240V,120V or 110V 50/60 Hz and consumes approx 40 Watts.

For operation at 240 and 220V use a 500mA anti-surge fuse 20mm in length. For operation at 120 and 110V use a 1 A anti-surge fuse 20mm in length.

The I.E.C. power socket has an integral fuse carrier with provision for a spare fuse at the front of the carrier.

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 sockets. Power is not applied until a device operation cycle has started.

28 Pin Devices
Pin No.1 is at the TOP LEFT HAND corner.

24 Pin Devices
The devices must be inserted in the LOWER part of the socket.

CAUTION

Only insert or remove devices in sockets when the system is in its idle mode.

Do not operate these systems in highly static areas unless full industrial anti-static precautions can be proved to have been taken.

Do not turn power on or off when a device is in any socket.

BATTERY BACK UP

The SCRATCHPAD Ram (not DATA Ram) is supported by a trickle charged Nickel Cadium Cell. Selected defaults for Device Type, Number of sockets and Serial/Parallel configuration are automatically held for periods in excess of six months when powered down.

Similarly when a Label Printing facility is incorporated, label codes are held in the power 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 slide switch on the PSU board.

IMPORTANT - To prevent over-writing of Scratchpad Ram Data which could result in unwanted alteration of default values, only switch off the programmer when in the idle mode, i.e. when display is static showing selected device type.

CONTROL MODES

PUSHBUTTONS

PROG VFY BLK READ (STEP) RST ENTER

PROG	- Program from Master
VFY	- Verify from Master
BLK	- Blank Check
READ	- Read Master Device into Ram
STEP <	- Step Backwards
STEP >	- Step Forwards
RST	- Reset Operation
ENTER	- Enter Operation

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.
0	- Simulate.
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 even and odd bytes.
8	- Merge top and bottom halves.
9	- Calculate check sum.
A	- Convert RAM to ONE's Complement

128K BYTE ADDRESS ENTRY

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

PROGRAMMING MODES

MODE A Verify, where possible, each byte of the device immediately after it has been programmed.

Complete programme cycle as follows:-

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

ii) Set up next address (Start Zero).

iii) If data correct go to step (ii).

iv) Programme this address with data.

v) If data correct go to step (ii), else fail.

vi) Verify whole device with required data.

MODE B Inhibit verify during programme cycle of standard 50 ms pulse device selections,i.e."slow"programming. 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 the programme cycle.

Complete programme cycle as follows:-

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

ii) Programme all locations in the devices.

iii) Verify whole device with required data.

DISPLAY

The system has an eight digit HEXADECIMAL display. The messages are:-

DIGIT No. 1 2 3 4 5 6 7 8	DESCRIPTION
2 7 6 4 (example)	Device type selected
2 5 0 (example)	Access time selected
8 (example)	Number of sockets
A (example)	Programming Mode
E d	Indicates END of operation
E d C C C C	Indicates END of operation and the check sum.
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		" Parity
E 12		" Overflow
E 13		" Combination
E 14		" Check Sum
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	Device data not equal during access time test
E 40		E4 Adaptor device failed to program
E 41		E4 Adaptor device incorrectly inserted.
E 42		E4 Adaptor device READ fail
E 51		E11 Output data fail

PROM DEVICE SELECTION GUIDE

+	2508	
+	2716	includes 2516,27C16 (SINGLE rail type only)
	2532	
	2732	
	2732A	
	2564	
+	2764	INTEL using 50 ms Program Pulse.
+	2764 1	INTEL using INTEL Intelligent Prog Algorithm.
+	2764 2	INTEL intelligent Identifier & Prog Algorithm.
+	2764 3	FUJITSU QUICKPRO Intelligent Prog Algorithm.
+	2764 A	INTEL using INTEL Intelligent Prog & Alg.Vpp=12.5V
	2764 H	MOSTEK 2764
	68764	MOTOROLA
+	27128	INTEL using 50 ms Program Pulse.
+	27128 1	INTEL using INTEL Intelligent Prog Algorithm.
+	27128 2	INTEL Intelligent Identifier & Prog Algorithm.
+	27128 3	FUJITSU QUICKPRO Intelligent Prog Algorithm.
+	27128A	INTEL using INTEL Intelligent Prog & Alg.Vpp=12.5V
+	27256 1	INTEL using intelligent Prog Alg.Vpp=12.5V
+	27256 2	INTEL Intelligent Identifier & Prog.Alg.12.5V
+	27256 3	FUJITSU QUICKPRO Intelligent Prog Alg.Vpp=21V
+	27512 1	INTEL using intelligent Prog Alg.Vpp=12.5
+	27512 2	INTEL Intelligent Identifier & Prog.Alg.12.5v
+	27512 4	AMD Intelligent Identifier & Prog. Alg.Vpp=12.5V
+	2815	
+	2816	
	48016	
	8741	Requires E4 Adaptor
	8742	" " "
	8748	" " "
	8748H	" " "
	8749	" " "
	8755	" " "
	8751	" E7 " (also 8744)
	8752	" " "
	68701	" E5 "

1. Fast Programming using intelligent Programming Algorithm specified by Intel.
   This reduces programming time for 2764 from 7 minutes to approximately 50 seconds and 27128 from 13 minutes to approximately 100 seconds. During FAST programming Vcc is raised from 5V to 6V.
2. Intelligent IDENTIFIER & 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 type device.
   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 2764 from 7 minutes to approximately 20 seconds and 27128 from 13 minutes to approximately 40 seconds. During FAST programming Vcc is raised from 5v to 6v.

+ These devices are verified during the programme cycle. Therefore the number of sockets in use MUST be selected (on gang programmers and copiers).

TO SELECT DEVICE TYPE, ACCESS TIME, NUMBER OF SOCKETS & PROGRAMMING MODE.

		(display)
1.	The display indicates current type	27128
2.	Press RST. The system Beeps and the Display flashes the current type.	(27128)
3.	Press STEP > and hold to scroll forward through the device types.	(27128)
	OR	
	Press STEP < and hold to scroll backwards	
4.	If the device, access time, number of sockets and programming mode are correct press ENTER. The system Beeps and the display stops flashing.	27128
	OR	
	If the device is correct but the access time needs changing. Press RST. The systems Beeps and the display flashes the current time.	(350)
5.	Press STEP > and hold to scroll faster times.	(300)
	OR	
	Press STEP < and hold to scroll slower times	(400)
6.	If the device, access time, number of sockets and programming mode are correct press ENTER. The system Beeps and the display indicates the type.	27128
	OR	
	If the number of sockets needs changing, press RST. The system Beeps and the display flashes the current number.	(8)
7.	Press STEP < and hold to scroll forwards.	(1)
	OR	
	Press STEP > and hold to scroll backwards	(7)
8.	If the device, access time, number of sockets and programming mode are correct Press ENTER. The system Beeps and the display indicates the type.	27128
	If the programming mode needs changing Press RST. The system Beeps and the display flashes the current mode.	(A)
9.	Press STEP > and hold to scroll forwards.	(b)
10.	If the device, access time, number of sockets and programming mode are correct Press ENTER. The system Beeps and the display indicates the type.	27128

TO READ MASTER DEVICE INTO RAM AND SCROLL MASTER DATA.

1. Select device type and place device in MASTER socket.	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. For example when combining two 2732 EPROM's into a 2764 the second 2732 would be read into RAM address 1000.	XXXX
4. Press ENTER. The system Beeps and reads the whole device into RAM. The display indicates the check sum.	CCCC
5. Press READ to read the data in the device. The display indicates address 0000 and data dd.	0000dd
6. Press STEP > to scroll forwards through the addresses of the device.	0001dd
OR	
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 to quickly read any area of the device.

7. Press RST to terminate the operation and power down the socket.	27128
8. Remove the device from the socket.	

TO BLANK CHECK DEVICES

1.	Select device type and place devices into copy socket.	27128
2.	Press BLK. The system BLANK checks the copy sockets consecutively. The display indicates the device type and the copy socket number currently being processed.	27128 n
3a	If the device is BLANK the display indicates Ed for END.	Ed
3b	If a 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 AAAAFF dd
	i) Press STEP > to continue BLANK check on the remaining addresses of the device.	
	ii) Press ENTER to continue BLANK check on the next copy socket device.	27128 n
	iii) 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
3a	If all the devices are BLANK the display indicates Ed for END.	Ed
3b	If a 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 AAAAFF dd
	i) Press STEP > to continue BLANK check on the remaining addresses of the device.	
	ii) Press ENTER to continue BLANK check on the next copy socket device.	2815 n
	iii) Press RST to terminate operation.	2815

TO VERIFY COPY WITH MASTER DEVICE

1. Select device type, place master into MASTER Socket and copies into COPY sockets.	27128
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
3a. If all the devices verify correctly the display indicates Ed for END.	Ed
3b. If a device has different data the display indicates the address AAAA, Master data MM and the copy socket number n flashing with the device data dd.	AAAAMM n AAAAMMdd
i) Press STEP > to continue Verify check on the rest of the device.	
OR	
ii) Press STEP < to display the data at the previous address.	AAA9MMdd
OR	
iii) Press ENTER to continue Verify check on the next copy socket device.	27128 n
OR	
iv) Press RST to terminate operation.	27128
3c. 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
i) Press ENTER to continue verify check on the next copy socket device.	27128 n
ii) Press RST to terminate operation	27128

TO PROGRAM COPY FROM MASTER

1. Select device type, place master into the MASTER socket and blank devices into the COPY sockets.	27128
2. Press PROG and hold for 2 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
a) If the device has an illegal bit programmed the system will Beep continuously and display the address AAAA, Master data MM and the socket number n.	AAAAMM n
i) Press ENTER to continue test on the next device and program regardless.	27128 n
ii) Press RST to terminate the operation, replace the offending device and start again.	27128
b) If 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 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. Press ENTER to step to the next error.	E 5 n
c) 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
d) If the devices programs correctly the display indicates Ed for END and the check sum CCCC.	Ed CCCC
e) If the device has different, data the display indicates the address AAAA, Master data MM and the socket number n flashing with the device data dd.	AAAA9MM n AAAAMMdd
i) Press STEP > to continue Verify check on the remaining addresses of the device.	
ii) Press STEP < to display the data at the previous address.	AAA9MM n AAAAMMdd
iii) Press ENTER to continue verify check on the.	27128 n
iv) Press RST to terminate operation.	27128

TO PROGRAM COPY FROM RAM

1.	Select device type and place copy devices into COPY sockets.	27128
2.	Press RAM PROGRAM. 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. The display indicates the device type and the socket number under test.	27128 n
	a) 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
	i) Press ENTER to continue test on the next device and program regardless.	27128 n
	ii) Press RST to terminate the operation, replace the offending device and start again.	27128
	b) If all 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 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. Press ENTER to step to the next error.	E 5 n
	c) 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
	d) If all the devices program correctly the display indicates Ed for END and the checkC. sum CCCC.	Ed CCCC
	e) 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
	i) Press STEP > to continue Verify check on the remaining addresses of the device.	
	ii) Press STEP < to display the data at the previous address.	AAA9RR n AAA9RRdd
	iii) Press ENTER to continue verify check on the next copy socket device.	27128 n
	iv) Press RST to terminate operation.	27128

TO VERIFY COPY WITH RAM DATA

1.	Select device type and place copies into COPY sockets.	27128
2.	Press RAM VERIFY. The display indicates start address.	0000
3.	Key required start address.	XXXX
4.	Press ENTER. The system verifies the copy devices. The display indicates the device type and the socket number currently being processed.	27128 n
5a	If the devices verify correctly, the display indicates Ed for END.	Ed
b)	If the 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
i)	Press STEP > to continue Verify check on the rest of the device.	
ii)	Press STEP < to display the data at the previous address.	AAA9RRdd
iii)	Press ENTER to continue verify check on the next copy socket device.	27128 n
iv)	Press RST to terminate operation.	27128
5c.	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.	E23 n
i)	Press Enter to continue the verify check on the next copy socket.	27128 n
ii)	Press RST to terminate operation.	27128

TO FIND ACCESS TIME OF COPY.

ACCESS TIME FROM MASTER

1. Select device type, place master into MASTER Socket and copies into COPY sockets.	27128	
2. Press VFY and hold for double BEEP. The system Verifies one copy at a time with the Master to identify the fastest speed the device can be read. When calculated the display shows the access time and the socket number.	27128	n
	200	n
If the MASTER Data is different to the COPY data the display will indicate E 24 n, where n is the socket number.	E 24	n
i) Press ENTER to continue the test on the next socket.		
ii) Press RST to terminate the operation.		

ACCESS TIME FROM RAM

1. Select device type, enter data into RAM and copies into COPY socket.		
2. Press RAM VERIFY. The display indicates the start address.	0000	
3. Key required start address.	XXXX	
4. Press ENTER and hold for double BEEP.		
The system verifies one copy at a time with the Master to identify the fastest speed the device can be read. When calculated,the display show the access time and the socket number.	200 n	
If the MASTER Data is different to the COPY data the display will indicate E 24 n where n is the socket number.	E 24 n	
i) Press ENTER to continue the test on the next socket.		
ii) Press RST to terminate the operation.		

EDITING FUNCTIONS USING RAM (64K BYTE STANDARD)

1. Amends data.
2. Block data.
3. Copy Block of data to another area.
4. Exchange String of characters.
5. Find String of characters.
6. Compare RAM with Master.
7. Split even and odd addresses of RAM.
8. Merge two halves of RAM.
9. Calculate Checksum of RAM.
A. Convert RAM to ONE's Complement.

1. To Amend data (to change data currently in RAM)

		27128
1.	Press key 1. Display indicates address 0000.	0000
2.	Enter required address through Keyboard.	XXXX
	OR	
	Press RESET to exit from Amend mode and display device type.	27128
3.	Press button ENTER to enter the address and to display the current data in the format: Address, Current data.	XXXX,DD
4.	Enter required data through keyboard. Display indicates Address, Current data, Required data.	XXXX,DD RR
5.	Press STEP> to store the amended data in RAM. This will also step to the next address and display details:	XXXY,DD
	OR	
	Press STEP < to store the amended data in RAM and step to the previous address and display details.	XXXW,DD
	If this address is to be amended, repeat steps 4 and 5.	
6.	Press RESET to exit from Amend mode and display device type.	27128

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.

	27128
Select 1 for Amend	0000
Key in address 123	0123
Press ENTER	0123,45
Key in required data 67	0123,45 67
Press STEP >	0124,A1
Key in required data A2	0124,A1 A2
Press STEP >	0125 FF
Press STEP >	0126,C2
Key in required data 11	0126,C2 11
Press STEP >	0127,XX
Press RESET	27128

2. <u>To change a Block of Ram to the same value</u>

		27128
1.	Press Key 2. Display indicates address 0000.	0000
2.	Enter start address through keyboard.	XXXX
3.	Press ENTER. Display indicates last address 3FFF.	3FFF
4.	Enter last address through keyboard.	YYYY
5.	Press ENTER. Display indicates required data FF.	FF
6.	Enter required data through keyboard.	DD
7.	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.

	27128
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. <u>To Copy a block of data from one area of RAM toanother</u>

		27128
1.	Press key 3. Display indicates 0000.	0000
2.	Enter the start address of block to be copied.	XXXX
3.	Press ENTER. The display indicates last address.	0000
4.	Enter the last address of block to be copied.	YYYY
5.	Press ENTER. Display indicates destination.	0000
6.	Enter destination start address.	ZZZZ
7.	Press ENTER to carry out copy.	

Example: To copy the block of data (address 100 to 1FF) to address E00.

	27128
Select 3 for Copy.	0000
Key in address 100	0100
Press ENTER	0000
Key in address 01FF	01FF
Press ENTER	0000
Key in address 0E00	0E00

	Press ENTER	27128

4. <u>To Exchange a string of characters (1 to 8characters long) for another string of characters (1 to 8 characters long)</u>

1.	Press Key 4. Display indicates start address 0000.	0000
2.	Enter the start address.	XXXX
3.	Press ENTER. Display indicates last address.	3FFF
4.	Enter the last address.	YYYY
5.	Press ENTER.	-
6.	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. Display indicates string SSSSSSSS.	SSSSSSSS
7.	Enter string of required characters (1 to 8 characters long). It a particular character is masked, press ENTER to skip to next position. Display indicates required string RRRRRRRR.	RRRRRRRR
8.	Press ENTER to carry out the Exchange.	27128

Example: Exchange all occurrences of the string of data '12131415' by 'ABCD', between addresses 0600 and 07FF.

Assume the contents of each byte of RAM is the least significant 2 characters of the address. e.g. Address 110 = 10,111 = 11,etc.

	27128
Select 4 for Exchange.	0000
Key in address 0600	0600
Press ENTER	3FFF
Key in address 7FF	07FF
Press ENTER	-
Key in string 12131415	12131415
Key in string ABCD------ (Press ENTER for each masked character.)	ABCD

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. 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.

	27128
1. Press Key 5. Display indicates start address 0000	0000
2. Enter the start address.	XXXX
3. Press ENTER. Display indicates last address 3FFF.	3FFF
4. Enter the last address.	YYYY
5. Press ENTER.	-
6. Key in required string of characters (1 to 8 characters long). If a particular character is masked Press Enter to skip to next position.	SSSSSSSS
At the first occurence of the string of data the operation will stop and display the address.	AAAA
7. Press ENTER to locate the next occurence of the string:	
OR	
Press Key 1 to Amend the address. Display indicates address and data.	AAAA,DD
8. Enter required data through keyboard. Display indicates address, current data and required data.	AAAA,DD RR

9. Press STEP > to store the amended data in RAM. This will also step to the next address and display details: AAA8,DD

OR

Press STEP < to store the amended data in RAM, step to the previous address and display details. AAA9,DD

If this address is to be amended repeat steps 8 and 9.

10. Press RESET to exit from Amend/Find mode and continue search for next occurrence of the string. BBBB

When the search is completed the display will revert back to the device type. 27128

Example: Find all occurrences of the string of data 12131 between the addresses 300 and 4FF. Examine the data surrounding the string and change the first occurrence of data 10 to F0. Assume the contents of each byte of RAM are the least significant 2 characters of the address, e.g. Address 100 = 00, 101 = 01, etc.

	27128
Select 5	0000
Key in address 300	0300
Press ENTER	3FFF
Key in address 4FF	04FF
Press ENTER	-
Key in string 12131	12131
Press ENTER 3 times.	0312
Select 1	0312,12
Press STEP <	0311,11
Press STEP <	0310,10
Key in data F0	0310,10,F0
Press STEP >	0311,11
Press STEP >	0312,12

Press STEP >	0313,13
Press STEP >	0314,14
Press STEP >	0315,15
Press RESET	0412
Press ENTER	27128

Thus the string occurred at addresses 312 and 412.

6. Compare Master Device.

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

1.	Select Device type and place in Master Socket.	27128
2.	Press Button 6. Display indicates RAM address 0000.	0000
3.	Enter required RAM start address.	XXXX
4.	Press ENTER.	
	a) If the two data areas are the same the display will revert back to the device type.	27128
	b) If a mismatch is found the display indicates The EPROM address, Device data and RAM data.	XXXX DD RR

Repeat Step 4 to continue Verify function.

Example: 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	0110,02 01
Press STEP >	0111,3E F2
Press STEP >	05AF, AB 47
Press STEP >	0580,69 96
Press STEP >	0746, 44 22
Press STEP >	07F1,5B 5A
Press STEP >	27128

7. SPLIT even and odd bytes of RAM.

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

1.	Press Button 7. The display indicates it is busy until the operation is complete.	-:-

8. MERGE the top and bottom halves of RAM.

(the bottom half become the even bytes and the top half the odd bytes of RAM)

1.	Press Button 8. The display indicates it is busy until the operation is complete.	-:-

9. Calculate CHECKSUM of RAM.

To calculate the checksum (the least significant 16 bits of the sum total of RAM data) of part or the whole RAM.

1.	Press Button 9. Display indicates start address 0000.	0000
2.	Key in required start address through keyboard.	XXXX
3.	Press ENTER. Display indicates last address 3FFF.	3FFF
4.	Key in required last address through keyboard.	YYYY
5.	Press ENTER. The display indicates the 4 character checksum.	CCCC

10. To set RAM To ONE's Complement.

1.	Press Button A and hold for 2 BEEPS. The system will convert each byte of RAM to it's ONE's complement and display the new checksum.	-:- CCCC

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

1.	Switch power on.	88888888
2.	Hold key 'E' on until the display is cleared.	0000
3.	Enter CODE through keyboard.	****
4.	Press ENTER. If the code is accepted the system will BEEP and display the device type.	2732

```
****************************************
*                                      *
*        RAM KEY LOCK CODE = 0B0B      *
*                                      *
****************************************
```

OPERATING INSTRUCTIONS FOR E4 ADAPTOR (8741/48/48H/49/55) & E7 ADAPTOR (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.

2. Connect Adaptor to 26 pin ribbon cable socket at the right hand rear of the programmer. IMPORTANT: Observe carefully the orientation of the polorized socket before making any connection.

3. Connect Adaptor to power supply via I.E.C. socket at the rear and switch on. The L.E.D. visible from the top of the unit should be illuminated.

4. Select device type (8748,8749,8755 etc.) on the 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 push buttons on the main unit. To programme the security bit in the 8751. Programme the device, when the display indicates End (Ed xxxx). Press PROG & hold for two BEEPS. After this operation it is impossible to re-programme, 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. Remove mains supply from Adaptor. Remove 26 way connector from Adaptor.

9. Note that the 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 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 programme 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.

Input/Output DATA CONFIGURATION

The system has a 3 digit configuration code.

1st digit = RECORD FORMAT
2nd digit = BAUD RATE
3rd digit = DATA STREAM SELECTION

RECORD FORMAT	BAUD RATE	DATA STREAM SELECTION 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=MOTOROLAR S REC	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	E=19200	F=NONE	8	2

TO SELECT COMMUNICATIONS CONFIGURATION

	(display)
1. The display indicates current type.	27128
2. Press RST and hold for 2 BEEPS. The display indicates the configuaration code and flashes one digit.	[1da]
3. Press STEP > and hold to scroll forward through the selections.	[2da]
OR	
Press STEP < and hold to scroll backwards through the selections.	[1da]
4. If the CONFIGURATION is correct press ENTER.	27128
The system BEEPS and the display stops flashing.	
OR	
If this digit is correct,but the next digit needs changing. Press RST. The systems BEEPS and the display flashes the next digit.	[1da]
5. Repeat steps 3 and 4 until the configuration is correct.	

TO INPUT DATA TO ELAN SYSTEM

1. Select required communications configuration code.	27128
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)	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 52 and 53 records.	
i) Key up to 4	
4. Transfer Data from development system to Elan. The display will indicate the address currently being loaded.	AAAA
5. At the end of transmission the display indicates END (Ed) and the check sum CCCC.	Ed CCCC

TO OUTPUT DATA FROM ELAN SYSTEM

1. Select required communications configuration code.	27128
2. Press OUTPUT. Display indicates start address zero.	0000
3. Enter required Start Address.	XXXX
4. Press ENTER. Display indicates last address.	3FFF
5. Enter required last address.	YYYY
6. Press ENTER.	
7. For formats 2 and 6 only. Key the most significant address digits.	0 X
8. The Elan will now transmit data. The display indicates the current address.	AAA0
9. At the end of transmission the display indicates END (Ed) and the check sum CCCC.	Ed CCCC

RS 232 CONNECTIONS

The I/O connector on to the back left hand side of the unit is a standard 25 pin D type plug with the data and signal line connected as follows:

PIN NO.	DESCRIPTION	CLASSIFICATION
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	-
15	External Clock	Input
20	Data Terminal Ready	Output

Although bidirectional 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 Way '3M' type connection on the back right hand side of the unit carries data and handshaking lines for the parallel port.

ELAN 26 WAY 3M CONNECTOR	DESCRIPTION	CLASSIFICATION	CENTRONICS 36 WAY STANDARD
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	$\overline{\text{STROBE}}$	Output	1
17	BUSY	Input	11

SERIAL FORMATS. All output formats terminate with Cnt 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 preceeds 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	TERMINATE MARK: 'CONTROL C' is used to identify the end of the block.

2. INTEL LOADER FORMAT

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 length of zero (00) indicates an end-of-file. Character 2 is high order record length of character.
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 - 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 number. 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

Character	Description
1 - N	Binary data

4. TEKTRONIX HEXADECIMAL FORMAT

Character	Description
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 byte of data is represented by 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 'semi 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 record length of zero (00) 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.
N+1-N+4	CHECKSUM:A 4-character hex checksum which is the sum of all bytes in the record except the semi colon and checksum.
N+5-N+6	CARRIAGE RETURN.LINE FEED

6. MOTOROLAR S RECORD (S0,S1,S2,S3,S4,S5,S6,S7,S8 & S9 are actioned.)

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

Frame	CC = 30 Header Record		CC = 31 Data Record		CC = 39 End-of-file 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.	38		38	-----	43	-------
.	34		30			(checksum)
.		44-D		32		
.	34	--------	32			
.	35					
.		52 - R		-----		
.	32	_______	41	A8 (Checksum)		
.			48			
.	----	--------	------	------		
	39					
		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

Character	Description
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
"	" " " "	"" ""
"	" " " "	"" ""
"	" " " "	""
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)	=	Nonprinting Carriage Return Line feed
(CR)	=	End of File (When a record terminates without a, or ;)

Set System Variable "Inhibit Rtn after !M" Value 04 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.

4to7 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.

8. SPACE

9toN DATA: Each byte of data is represented by a two character hex number followed by a space character. The high order character preceeds 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' are 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 CHARACTER	HEXADECIMAL FIELD (FOUR CHARACTERS)	SECOND FIELD	MEANING	ELAN
0	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	ACTIONED
8	Ignore checksum	None	Do not checksum for error	ACTIONED
9	Load address	None	Absolute load address	ACTIONED
A	Load address	None	Relocatable address	IGNORED
B	Data	None	Absolute data	ACTIONED
C	Data	None	Relocatable data	IGNORED
D	Load bias value	None	Load point specifier	IGNORED
F	None	None	End-of-record	ACTIONED
G	Location	6-character symbol	Relocatable symbol definition	IGNORED
H	Location	6-character symbol	Absolute symbol definition	READ

TO SELECT REMOTE CONTROL

1. Switch system on
2. Select Device type (this can be reselected 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 following commands.
6. Press RESET to terminate Remote Control.

REMOTE CONTROL COMMANDS

Computer Command	Name	Description
Control Command		
RETURN		Execute last command
Z	Terminate	Programmer operates in stand alone mode.
Programmer Status Enquiry		
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 Enquiry	Programmer returns error codelist.
H	Handshake	Programmer returns
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; 0 = VOH)
g	Programmer Software release	Programmer Generation number.

Device Commands

B	Blank Check	Check 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 imput 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	

Configuration Commands

nn A	*	Select Format	Select I/O record format.
nn f	*	Select Format	Select I/O record format.
nnnn W	+	Virtual Address Disp.	Sets RAM address to required system base address.
nnnn :	+	Device Start Address	
nnnn <	+	RAM Start Address	
nnnn ;	+	RAM End Address	Specifies highest RAM address nnnn-1. Defaults to device size.
nnnn(hash symbol)	+	O/P DATA START ADDRESS	
n a	*	ACCESS TIME	
n n		NUMBER OF SOCKETS	where n = no of sockets
r		RAM SIZE ENQUIRY	
nn t	*	SELECT DEVICE TYPE	
d		DEVICE TYPE ENQUIRY	
nnnn @	*	SELECT DEVICE TYPE	
(		DEVICE TYPE ENQUIRY	

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.

Programmer Responses			Description
RETURN	LINE FEED	(i)	To Indicate command received
> RETURN	LINE FEED	(ii)	On successful completion of command
F RETURN	LINE FEED	(ii)	On Unsuccessful completion of command
? RETURN	LINE FEED	(ii)	Command not understood

(i) A software option switch can be set to inhibit this response.

(ii) A software switch can be set to inhibit the Return/Line Feed after the response >, F and ?.

(i)&(ii) A software option switch can be set to inhibit all line feeds.

REMOTE DEVICE CODES

Type	t 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
2764H	0B	
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 4	17	
2815	18	8523
2816	19	3723
8741	20	5654
8742	21	
8748	22	5256
8748H	23	5056
8749	24	5057
8755	25	4755
8751	26	
8752	27	

REMOTE FORMAT CODES

Format	f code	A code
1. Ascii Hex	01	50
2. Intel	02	83
3. Binary	03	-
4. Tek Hex	04	86
5. Mos Tech	05	81
6. S1S9	06	82
7. Dec Binary	07	-
8. Binary	08	10
9. Block Dump	09	-
A RCA Cosmac	0A	-
B PPX	0B	-
C TEXAS TAGS	0C	

REMOTE ERROR CODES

Code	Description
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 a x enquiry, not a X enquiry.

e.g.

mm	skt no.
80	1
40	2
20	3
10	4
08	5
04	6
02	7
01	8
FF	all
C0	1 & 2
81	1 & 8

etc.

LABEL PRINTING (OPTIONAL)

The details of eight labels can be entered and stored by the Elan system. 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 Elan 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 accross the page. It will then output the next line of text until it finds the end of label character 00 Hex.

Note. i) Each line of text must terminate with a carriage return

ii) Each label must terminate with a zero

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

TO ENTER THE LABELS INTO ELAN FROM KEYBOARD	27128
1) Select input format 0 for labels	(Onn)
2) Press INPUT	-
3) Enter Label Number (0 to 7). The display indicates Label 0 location 00	0 00
4) Press ENTER. Current data DD	0 00 DD
5) Key in required Data	0 00 DD RR
6) Press STEP >. Repeat steps 5 and 6 until the label details are complete.	0 01 DD
7) Press RESET	27128

TO ENTER THE LABELS INTO ELAN FROM RS232 OR EPROM:-

1) Load text into user Ram.

Label No.	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

2) Select Input format 0 for labels (Onn)

3) Press INPUT -

4) Press ENTER 0 00

5) Press READ. The contents of User RAM address 0000 to 01FF is copied into label RAM and saved. 27128

TO PRINT LABELS:-

1) Select output format 0 for labels. (Onn)

2) Press OUTPUT. 0000

3) Enter 4 digit print control word. 1824

   1st digit = label no.
   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 ACTIVATE SYSTEM VARIABLES:-

1. Turn ELAN system off.

2. Press both STEP buttons while the ELAN 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:-
   i) Press RESET.

   To change variables:-
   i) Press ENTER.
   ii) Key in required value.(see table below)
   iii) Press ENTER.

System Variables Available. (2 DIGIT CODE)

LEFT DIGIT

Inhibit Line Feed	Special	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 Rtn. 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 = 90

E11 SIMULATE ADAPTOR

E11 Simulate Adaptor

1.1 General

The E11 Simulator is designed to speed up programme/hardware development by simulating the target system EPROM. Small programme 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, 27256. Two E11's in a slave/master configuration provide twin EPROM simulation or 16 bit simulation.

Data is edited in the main programmer (E2A or E9A) and transferred to the E11 via the 26 way 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 way ribbon cable connects the E11 to the target system terminating in a 28 pin DIL Plug or 24 pin DIL plug. An additional 5 way 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 target 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'.

1.2 Power

The E11 draws power from the main programmer or target system. Consumption is less than the EPROM replaced - typically 10mA standby, 45 mA active. The RAM support Nickel Cadmium 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.

1.3 Connections

26 WAY Connector at Rear of E11

Attach to the 26 way connector at the rear of the main programmer using the ribbon cable supplied. This connection can be made with or without the programmer powered up. IMPORTANT: Observe carefully the orientation of the polorized socket before making any connection.

30 WAY Connector at left hand side of E11

Connect to the target system EPROM socket using the 24 way or 28 way DIL plug cable supplied. Observe orientation and do not plug into a 'live' system.

5 WAY Connector at rear of E11

	Pin No.	Signal	Comments
Left Hand Pin	1	Ov	Not normally used
	2		No Connection
	3		No Connection
	4	$\overline{\text{RESET}}$	) Always use one of) these signals to
Right Hand Pin	5	RESET	) control micro-) processor in) target system.

1.4 System synchronization using RESET/$\overline{\text{RESET}}$control

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

1. 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.

2. 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 connection.

1.5 Operation without RESET/$\overline{\text{RESET}}$ 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 programme 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/re-synchronization provided by the RESET or the RESET connection.

1.6 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 simulate device type.

To conserve battery back up 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.

1.7 Operating Procedure

1. Using 26 way ribbon cable connector, connect the E11 rear socket to the 26 way socket at the rear of the programmer. (the programmer may be powered or non-powered).

2. With the target system switched off remove Eprom to be simulated and insert either 24 Pin or 28 Pin DIL plug into empty socket. Observe orientation. Connect the other end of the DIL plug lead into the side socket on the E11.

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

4. Write programmer data into E11 (see section 1.9 for guidance). Device type indicator should now be illuminated on E11.

5. Switch on target system.

6. Press SIMULATE button on E11.

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

1.8 Control of the E11 from the Main Programmer

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

1. Write Data into E11.
2. Read Data from E11.
3. Verify E11 data with E Series 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 0 — [-:- -:-]
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 E Series RAM with E11 RAM.

INPUT = READ E11 RAM into E SERIES.

OUTPUT = WRITE E SERIES RAM into E11 RAM.

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

Press Reset to exit from E11 mode. Device type

1.9 Writing Data to the E11

1. Press key Zero to enable E11 functions
   Device type [-:- -:-] Device type

2. Press key Output. The E Series programmer will write the correct amount of data for the selected device type from start address Zero to the E11 Simulator.
   : -- :

   At the end of data transfer the checksum is displayed.
   CCCC

3. Press RST
   [-:- -:-] Device type

1.10 Reading data from the E11

1. Press key ZERO to enable E11 function.
   Device type [-:- -:-]

2. Press key OUTPUT. The E Series 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

1.11 Verifying Data

VERIFY E Series RAM with E11 RAM

1. Press key ZERO to enable E11 functions	Device type [-:- -:-] Device type
2. Press key VERIFY. The system verifies the two sets of data. The display indicates that the function is being carried out.	: __ :
3a. If the data verifies correctly the display indicates Ed for End.	Ed
3b. If the system has different data the display indicates the address AAAA,E Series data MM and the E11 data dd.	AAAAMMdd
i) Press STEP > to continue Verify check	
OR	
ii) Press STEP < to display the data at the previous address	
OR	
iii) Press RST to terminate operation	[-:- -:-] [device type]

1.12 Example - simulating a 27128 device

2) Select device type 27128	
3) Load the data from Hex Keypad via RS232 or load Master EPROM into E Series RAM start address ZERO.	
4) Press Key ZERO	[-:- -:-] [27128]
5) Press Key OUTPUT to WRITE data to E11 When the transfer is complete the display indicates the checksum.	: -- : CCCC
6) Press RESET	[-:- -:-] [27128]
7) Press E11 SIMULATE button	
The target system will now run. Monitor the required functions.	
The E2A/E9A is now free to carry out other functions.	
8) Press E11 RESET Button to terminate Simulation.	
9) Press RESET on E2A/E9A.	
10) Amend the Memory address of the function. Repeat steps 3 to 9 as required.	

1.13 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 slave push buttons 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.

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 procedure:

1.	Enter Simulate operating mode in usual way by pressing Key '0' on hex-keypad.	[-:- -:-] flashing [device type]
2.	Press 'ENTER' Key once on lower Keypad The 1 on the right hand side of the display indicates SLAVE selection.	[-:- -:-1] flashing [device type]
3.	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 [device type]

elan digital systems ltd.

16-20 kelvin way, crawley, west sussex, RH10 2TS, england. telephone: crawley (0293) 510448