elan digital systems ltd

programming development & production aids

E2

OPERATORS MANUAL

elan

C,10,83

ELAN DIGITAL SYSTEMS LTD

E2 EPROM/EEPROM Editing Programmer

OPERATING INSTRUCTIONS

CONTENTS

POWER

The programmer can be supplied pre-wired for 240v,120v or 110v 50/60 Hz and consumes approx 30 watts.

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

The I.E.C. mains plug 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 Back Left Hand corner.

24 Pin Devices
The devices must be inserted in the FRONT 24 Pins of the socket. Pin No.1 at the BACK LEFT HAND side.

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 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, Number of sockets and Serial/Parallel configuration are automatically held for periods in excess of six months when powered down.

Similaly where Label Printing facillity is incorporated label codes are held in the power down state.

If the programmer is not to be used for periodss 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.
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 odd bytes.
8	- Merge top and bottom halves.
9	- Calculate check sum.
A	- Convert RAM to ONE's Complement

PROGRAMMING MODES

Mode A — Verify, where possible, each byte of the device immediately 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. 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 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:-

Dig 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 selected
A (example)	Verify during programming indicator
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

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 40		E4 Adaptor device failed to program
E 41		E4 Adaptor device incorrectly inserted.
E 42		E4 Adaptor device READ 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 Voltage.
	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 27128 with 12.5 vlt. Programming Voltage.
+	27256 1	INTEL using intelligent Prog Alg.Vpp=12.5
+	27256 2	INTEL Intelligent Identifier & Prog.Alg.12.5V
+	27256 3	FUJITSU QUICKPRO Intelligent Prog Alg.Vpp=21v
+	2815	
+	2816	
	8741	Requires E4 Adaptor
	8742	" " "
	8748	" " "
	8748H	" " "
	8749	" " "
	8755	" " "
	8751	" E7 " (also 8744)
	8752	" " "

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 to approximately 100 ,second. 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 a 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).

Input/Output DATA CONFIGUARATION

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
1=ASCII HEX SPACE	1= 50	1=EVEN	7	1
2=INTEL LOADER	2= 75	2=ODD	7	1
3=OPTIONAL	3= 110	3=NONE	7	1
4=TEK HEX	4= 134.5	4=EVEN	7	2
5=MOS TECH	5= 150	5=ODD	7	2
6=EXORCISOR S1S9	6= 200	6=NONE	7	2
7=DEC BINARY	7= 300	A=EVEN	8	1
8=BINARY	8= 600	B=ODD	8	1
9=BLOCK DUMP	9=1200	C=NONE	8	1
A=RCA COSMAC	A=1800	D=EVEN	8	2
B=PPX	B=2400	E=ODD	8	2
	C=4800	F=NONE	8	2
	D=9600	0=Parallel	8 (output option)	
	E=External Clock *			

* Optional - may be used with E3 Cassette Interface.
Clock fequency should be 16 x Baud Rate.

TO SELECT COMMUNICATIONS CONFIGUARATION

(display)

1. The display indicates current type. 2732

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 CONFIGUARATION is correct Press ENTER. 2764
   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 configuaration is correct.

TO SELECT DEVICE TYPE, ACCESS TIME & MODE

	(display)
1. The Display INDICATES CURRENT TYPE	2732
2. Press RST. The system Beeps and the Display flashes the current type.	[2732]
3. Press STEP) and hold to scroll forward device types.	[2732A]
OR	
Press STEP (and hold to scroll backwards	[2532]
4. If the device, access time and the mode are correct. Press ENTER. The system Beeps and the display stops flashing.	2764
OR	
If the device is correct but the access time or mode needs changing. Press RST. The system 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 and the mode are correct Press ENTER. The system Beeps and the display indicates the device type.	2764
OR	
If the device and access time are correct but the mode needs changing. Press RST. The system Beeps and the display flashes the mode.	[A]
7. Press STEP > or < and hold to scroll the modes of operation.	[b]
8. If the device, access time and the mode are correct Press ENTER. The system Beeps and the display indicates the device type.	2764

TO READ MASTER DEVICE INTO RAM AND SCROLL MASTER DATA.

1. Select device type and place device in MASTER	2764
2. Press READ. The system Beeps and Displays start address 0000.	0000
3. Key in required start address.	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.	1FFFdd
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.	2764
8. Remove the device from the socket.	

TO BLANK CHECK DEVICE

1.	Select device type and place device into copy socket.	2764
2.	Press BLK. The system BLANK checks the copy socket. socket number currently being processed.	2764 n
3a	If the device is BLANK the display indicates Ed for END.	Ed
3b	If the device is not BLANK the display indicates the address AAAA data blank FF and the copy socket device data dd.	AAAAFFdd
	i) Press STEP) to continue BLANK check on the remaining addresses of the device.	
	OR	
	ii) Press ENTER to END.	Ed
	OR	
	iii) Press RST to terminate operation.	2764

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 device and proceeds to BLANK check the device. The display indicates the device type and the copy socket number currently being processed.	2815 n
3a	If the device is not BLANK the display indicates Ed for END.	Ed
3b	If the device is not BLANK the display indicates the address AAAA data blank FF and the copy socket device data.	AAAAFFdd
	i) Press STEP) to continue BLANK check on the remaining of the device.	
	OR	
	ii) Press ENTER to END.	Ed
	OR	
	iii) Press RST to terminate operation.	2815

TO VERIFY WITH MASTER DEVICE

1. Select device type, place master into MASTER Socket and copy into COPY socket. — 2764

2. Press VFY. The system Verifies the copy device. The display indicates the device type and the copy socket number currently being processed. — 2764 n

3a. If the device verify correctly data the display Ed for END. — Ed

3b. If a device has different data the display indicates the address AAAA, Master data MM and the copy socket device data. — 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 END. — Ed

OR

iv) Press RST to terminate operation. — 2764

TO PROGRAM COPY FROM MASTER

1. Select device type, place master into MASTER socket and blank device into COPY socket. — 2764

2. Press PROG and hold for 2 Beeps. The system interrogates the copy device to confirm the Master data can be programmed into the copy device. The display indicates the device type and the socket number under test. — 2764 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 copy socket device data. — AAAAMMdd

      i) Press ENTER to Program regardless. — 2764 n

      ii) Press RST to terminate the operation, replace the offending device and start again. — 2764

   b) If the device is 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 appling 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 device. The display indicates the device type and the socket number test. — 2764 n

   d) If the device 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 copy socket device data. — 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. — AAA9MMdd

      iii) Press ENTER to display the master check sum. — Ed CCCC

      iv) Press RST to terminate operation. — 2764

TO INPUT DATA TO ELAN SYSTEM

1. Select required communications configuaration code	2764
2. Press Input.	
a) * With System Object File formats the display prompts for the Base address displacement.	0
i) Key most significant Base address digits.	X000
b) With other file formats the display indicates start address zero.	0000
i) Enter start address.	XXXX
ii) Press Enter. It is now waiting to receive data.	
3. Transfer Data from development system to Elan. The display will indicate the address currently being loaded.	AAAA
4. At the end of transmission the display indicates END (Ed) and the check sum CCCC.	Ed CCCC

* With Intel 8086 Hexadecimal Object File format it is necessary to enter the two most significant Base address digits.

Press STEP) .The display indicates two addresses to be entered.

Key in most sigificant 2 addresses.

The system is now ready to receive data.

TO OUTPUT DATA FROM ELAN SYSTEM

1.	Select required communications configuaration code.	2764
2.	Press Output. Display indicates start address zero.	0000
3.	Enter required start address.	XXXX
4.	Press Enter. Display indicates last address.	1FFF
5.	Enter required last address.	YYYY
6.	Press Enter.	
	a) With System Object File formats the display prompts for the Base address displacements.	0
	b) Key most significant Base address digit.	X000
7.	The Elan will now transmit data. The display indicates the current address.	AAAA
8.	At the end of transmission the display indicates END (Ed) and the check sum CCCC.	Ed CCCC

TO PROGRAM COPY FROM RAM

1. Select device type and place copy device into COPY socket.	2764
2. Press RAM PROGRAM.The display indicates start address.	0000
3. Key required start address.	XXXX
4. Press ENTER. The system interrogates the copy device to confirm the RAM data can be programmed into the device type and the socket number under test.	2764 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 copy socket data.	AAAARRdd
i) Press ENTER to program regardless.	2764 n
ii) Press RST to terminate the operation, replace the offending device and start again.	2764
b) If the device is 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 appling 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 device. The display indicates the device type and the socket number under test.	2764 n
d) If the device has different data the display indicates Ed for END and the check sum CCCC.	Ed CCCC
e) If a device has different data the display indicates the address AAAA, RAM data RR and the copy socket device data.	AAAARRdd
i) Press STEP (to continue Verify check on the remaining addresses of the device.	
ii) Press ENTER to display the data at the previous address.	AAA9RRdd
iii) Press RST to terminate the operation.	2764

TO VERIFY COPY WITH RAM DATA

1.	Select device type and place copy into COPY socket.	2764
2.	Press RAM VERIFY. The display indicates start address.	0000
3.	Key required start address.	XXXX
4.	Press ENTER. The system Verifies the copy device. The display indicates the device type and the socket number currently being processed.	2764 n
5a	If the device verify correctly data 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 copy socket device data.	AAAARRdd
	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 END.	Ed
	iv) Press RST to terminate operation.	2764

EDITING FUNCTIONS USING RAM

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)

		2764
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.	2764
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) to store the Amended data in RAM. This will also step to the next address and display details:	XXXY,DD
	OR	
	Press Button (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.	2764

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.

	2764
Select 1 for Amend	0000
Key in address 123	0123
Press Enter	0123,45
Key in required data 67	0123,45 67
Press)	0124,A1
Key in required data A2	0124,A1 A2
Press)	0125 FF
Press)	0126,C2
Key in required data 11	0126,C211
Press)	0127,XX
Press Reset	2764

2.To change a Block of Ram to the same value

		2764
1.	Press Key 2. Display indicates address 0000.	0000
2.	Enter start address through keyboard.	XXXX
3.	Press Enter. Display indicates last address 1FFF.	1FFF
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.	2764

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

	2764
Select 2 for BLANK	0000
Key in address 0340	0340
Press Enter	1FFF
Key in address 0672	0672
Press Enter	FF
Key in data 28	28
Press Enter	2764

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

	2764
1. Press key 3. Display indicates address 0000.	0000
2. Enter the start address of block to be moved.	XXXX
3. Press Enter. The display indicates last address.	0000
4. Enter the last address of block to be moved.	YYYY
5. Press Enter. Display indicates destination.	0000
6. Enter destination address.	ZZZZ
7. Press Enter to carry out copy.	

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

	2764
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	2764

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

1.	Press Key 4. Display indicates start address 0000.	0000
2.	Enter the start address.	XXXX
3.	Press Enter. Display indicates last address.	1FFF
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 characteris masked Press Enter to skip to next position. Display indicates string SSSSSSSS.	SSSSSSSS
7.	Press Enter.	-
8.	Enter string of required characters (1 to 8 characters long). If a particular character is masked Press Enter to skip to next position. Display indicates required string RRRRRRRR.	RRRRRRRR
9.	Press Enter to carry out the	2764

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.

Select 4 for Exchange	2764
Key in address 0600	0600
Press Enter	1FFF
Key in address 7FF	07FF
Press Enter	-
Key in string 12131415	12131415
Press Enter	-
Key in string ABCD----	ABCD
Press Enter	2764

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.

	2764
1. Press Key 5. Display indicates 0000.	0000
2. Enter the start address.	XXXX
3. Press Enter. Display indicates last	1FFF
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
7. Press Enter. To carry out the operation At the first occurence of the string of data the operation will stop and display the address.	AAAA

8. Repeat Step 7 to locate the next occurence of the string:

OR

Press Key 1 to Amend the address. Display indicates address and data. — AAAA,DD

9. Enter required data through keyboard. Display indicates address, current data and required data. — AAAA,DD RR

10. Press) to store the Amended data in RAM. This will also step to the next address and display details: — AAA8,DD

OR

Press Button (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 9 and 10.

11. Press Reset to exit from Amend/Find mode and continue search for next occurence of the string. — BBBB

When the search is completed the display will revert back to the device type. — 2764

Example: Find all occurences of the string of data 12131 between the addresses 300 and 4FF. Examine the data surrounding the string and change the first occurence od 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.

	2764
Select 5	0000
Key in address 300	0300
Press Enter	1FFF
Key in Address 4FF	04FF
Press Enter	–
Key in string 12131	12131
Press Enter	0312

Select 1	0312,12
Press (	0311,11
Press (	0310,10
Key in data F0	0310,10,F0
Press)	0311,11
Press)	0312,12
Press)	0313,13
Press)	0314,14
Press)	0315,15
Press Reset	0412
Press Enter	2764

Thus the string occured at addresses 312 and 412.

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.	2764
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.	2764
	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 2764 1 rail 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	2764
Select Read	0000
Press Enter	Ed CCCC
Press Reset	2764
Now compare the two EPROMs	2764
Place EPROM Y into Master Socket	
Select 6.	0000
Press Enter	0110,02 01
Press)	0111,3E F2
Press)	05AF, AB 47
Press)	0580,69 96
Press)	0746, 44 22
Press)	07F1,5B 5A
Press)	2764

7. Split even and odd bytes of RAM. (up to 16K only)

1. Press Button 7. The display clears until the operation is complete.

8. Merge the top and bottom halves of RAM. (up to 16k only).

1. Press Button 8. The display clears 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.	Enter required start address through keyboard.	XXXX
3.	Press Enter. Display indicates last address 1FFF.	1FFF
4.	Enter 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

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 outputing data.

PARALLEL PORT CONNECTIONS

The 26 Way '3M' type connector 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 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

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 ther programmer.

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

4. Select device type (8748,8749 or 8755) on the E 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 Vertification 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 imposible 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, vertification 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 unit 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.

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 preceds the low order. The system reads only the two characters that preded 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.(8 & 16 BIT VERSIONS)

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) iondicates and 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 (OO) indicates and 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, odulo 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 (OO) indicates an end-of-file, Character 2 is the high order 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.
N+1-N+4	CHECHSUM: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. EXORCISER S1S9 FORMAT

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. Byte Count	31	12	31	16	30	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. Data	34	48-H	39	98	46	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)

A. RCA COSMAC

B. PPX - ASCII HEX SPACE

TO SELECT REMOTE CONTROL (OPTIONAL)

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 / Control Command	Name	Description
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	Compliment	Convert all RAM to its one's compliment.
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	*	ACCES 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 comands such as nn t are for clarity and must be ommited 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	
2815	15	8523
2816	16	3723
8741	17	5654
8742	18	
8748	19	5256
8748H	1A	5056
8749	1B	5057
8755	1C	4755
8751	1D	
8752	1E	

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	-

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 OO 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	2764
l) 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)	0 01 DD
Repeat steps 5 and 6 until the label details are complete	
7) Press Reset	2764F

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. 2764F

To Print Labels

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

2) Press Output. 0000

3) Enter 4 digit print control word. 1824

lst 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

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