

# **TMS370 EEPROM PROGRAMMER**

## **User's Guide**

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## 1. Introduction

This manual will guide you through the installation of the TMS370 EEPROM programmer, referenced hereafter as the TMS370 Programmer. The TMS370 Programmer has been designed for parallel EEPROM data access via PC control operation such as reading, writing, verifying EEPROM data, clearing WPO registers, erasing EEPROM memory area.

## 2. Check list and Requirements

### *Hardware requirements*

<b>Host</b>	- A 32-bit x86 based with a free Serial port (Comm1, 2) a hard-disk system.
<b>Memory</b>	- Minimum 16 Mbytes
<b>Display</b>	- Color VGA display recommended
<b>Power supply</b>	- A 12-14 volt/300 mA linear power supply source
<b>Tool</b>	- TMS370 Programmer board*
<b>Cable</b>	- An RS232C “straight-thru” cable*
<b>Adapters</b>	- four 28, 44, 68 PLCC adapters*

### *Software checklist*

<b>OS</b>	- MS-Windows (Win95, Win98, Win2000, WinXP)
<b>Software tool -</b>	- ETL TMS370 control software*

### *\* Package check list*

**Contents:** -TMS370 programmer board set included:

- TMS370 programmer board
- 9-pin “straight-thru” cable
- Four PLCC adapters \*\*
- Programming adapters flexible cable
- CD (included control software)
- This manual

**\*\*NOTE:** Base adapters set not included TMS374C003 programming adapter

## 3. Installing

The TMS370 Programmer is designed to accept TMS370 8-bit MCU EEPROM data memory. The TMS370 Programmer support Divide/1 and Divide/4 rate IC's (See Appendix, Clock options). To understand TMS370 Programmer components meaning see Figure 1. To install and use the TMS370 Programmer, follow these steps:

- Install TMS370 control software. Insert the supplied ETL CD-ROM in the computer and navigate to “Install Software” > “Install TMS370 Prog.”, then execute the “Setup.exe” file; this will guide you through the setup process.

**NOTE:** TMS370 hardware don't support etluniprog.exe control software

- Connect TMS370 Programmer to the power supply source (12-14 V  $\geq$  300 mA).

- Attach TMS370 Programmer to computer. Use the 9-pin RS232C cable that is shipped with the TMS370 Programmer.
- Before connecting TMS370 Programmer, make sure that TMS370 Programmer and the target adapter board are not powered.
- Insert explored TMS370 IC into target programming adapter (see APPENDIX).
- TMS370 control software can now be started. However, do not open control software and any files before connecting power supply to TMS370 Programmer.

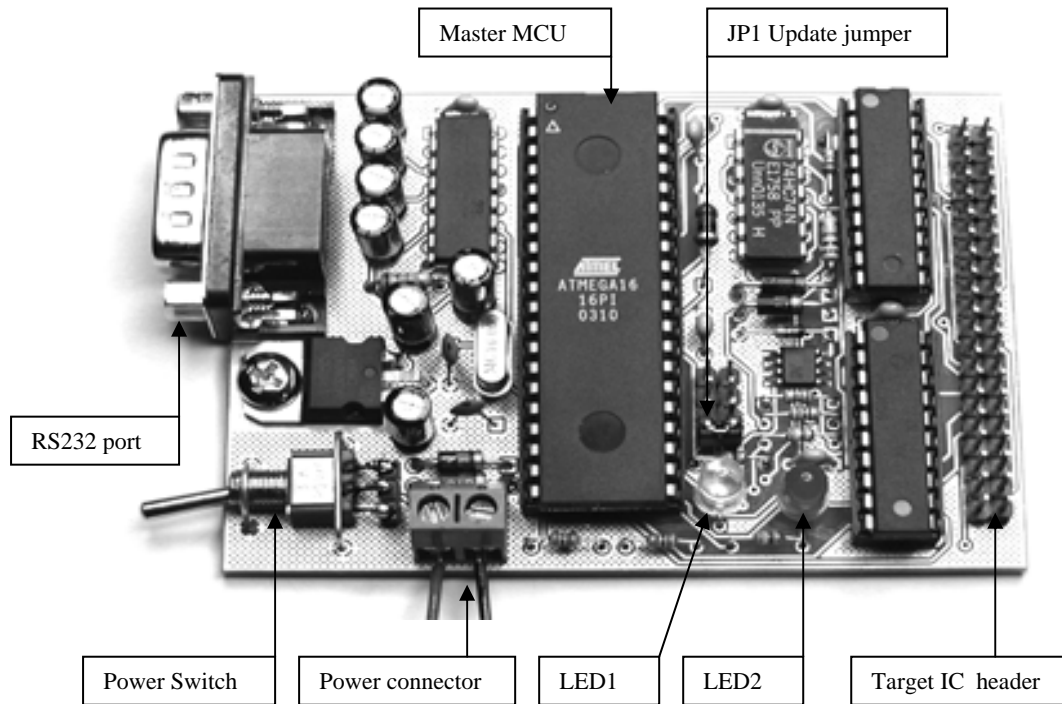


Figure 1. TMS370 EEPROM PROGRAMMER components

## 4. Quick Start

Follow the procedure described below to configure TMS370 Programmer:

- Execute TMS370.exe file and start operation.

After start you should see TMS370 main window interface. Select the “Device” before selection serial port number, then click “Port\_Number” item on menu bar for port activation. For example: selected device TMS375C006. Now you should see chosen device on the bottom part of main TMS370 window interface:

Device: TMS375C006 EEPROM 1E00h-1FFFh  
Adapter: ETL-375‘006-44PLCC

**NOTE:** Use corresponding adapter “ETL 375‘006” marked to access this type of microcontroller.

See APPENDIX 1 (Figures 7, 8, 9, 10)

“ETL ‘756” programming adapter support follow devices:

- TMS370C056A

- TMS370C756A
  - TMS370C058A
  - TMS370C758A
- “ETL ‘742” programming adapter support follow devices:
- TMS370C042A
  - TMS370C742A
- “ETL ‘702” programming adapter support follow devices:
- TMS370C002
  - TMS370C702
- “ETL 375 ‘006” programming adapter support follow devices:
- TMS375C006
  - TMP375C706
- “ETL 374 ‘003” programming adapter support follow devices:
- TMS374C003A /See APPENDIX 2/

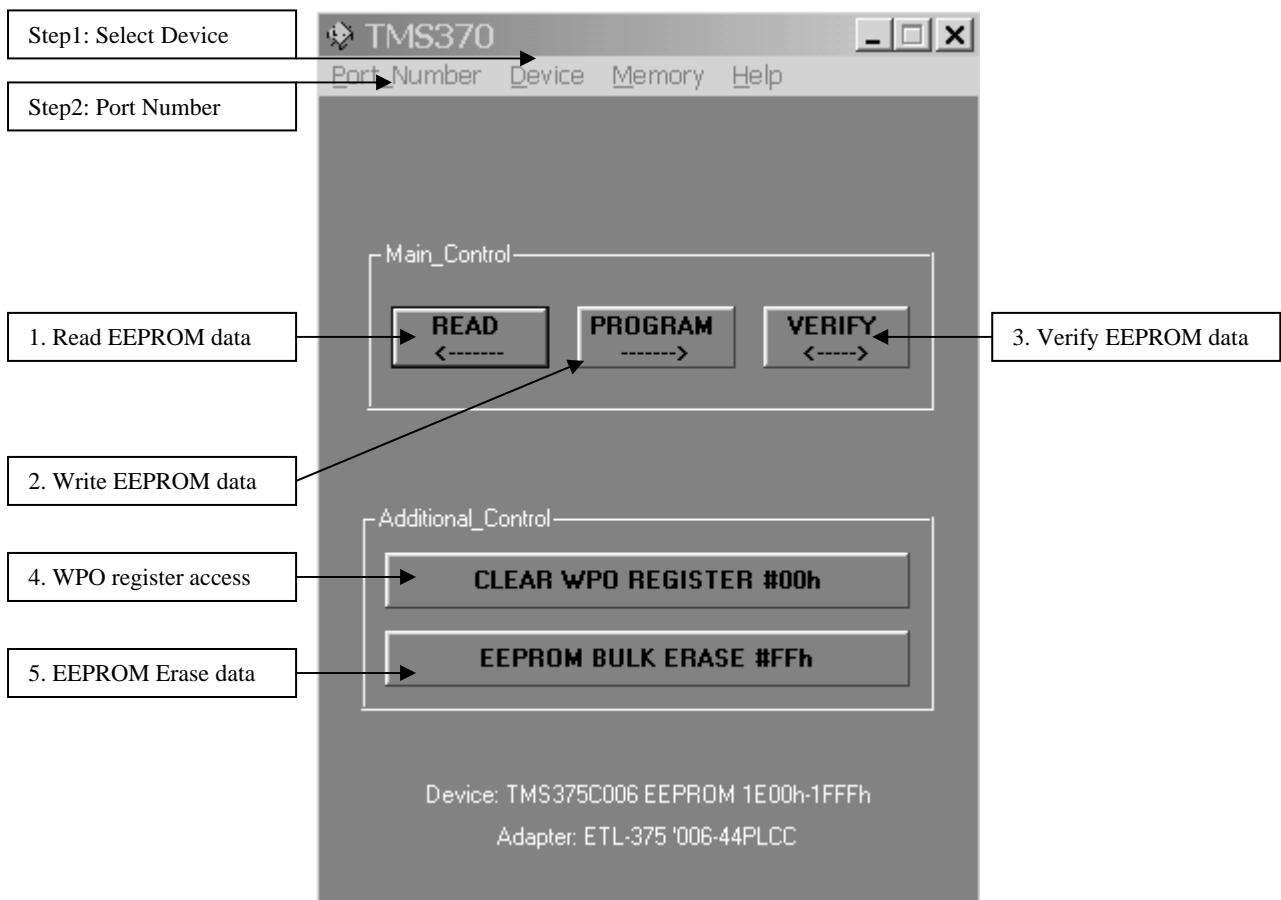


Figure 2. TMS370 main window interface

- Attach corresponding programming adapter to TMS370 main board, than insert explored MCU into adapter programming socket according with 1-pin orientation (see Figures 7-10).
- Turn ON power switch. LED1 appear to “Orange” color, LED3 appear to “Yellow” color than LED2 (“Red”) will now be lit, telling that power is present and TMS370 Programmer ready to operate.

- Read operation will execute every time when user click “READ” command button. During this operation the LED2 will illuminate continuously to “Red” color, LED1 to “Green”, then LED2

disappear when operation is completed.

- Write operation will execute every time when user click “WRITE” command button. During this operation the LED2 and LED1 will illuminate “Red” color continuously, then LED1 will flashing, then LED2 disappear when operation is completed.

- Verify operation will execute every time when user click “VERIFY” command button. During this operation LED2 will illuminate continuously to “Red”, the LED1 will flashing to “Green” color, then LED2 disappear when operation is completed. When operation completed you should see comparative table, that contain error codes, data address and written and verified data.

- Clear WPO register operation will execute every time when user click “CLEAR WPO REGISTER #00h” command button. During this operation LED2 will illuminate continuously to “Red”, then disappear when operation completed.

**NOTE:** WPO registers located into EEPROM at follow addresses:

- \$1E00, \$1F00 for devices with 512 bytes of EEPROM

- \$1F00 for devices with 256 bytes of EEPROM

- Erase EEPROM operation will execute every time when user click

“EEPROM BULK ERASE #FFh” command button. During this operation LED2 will illuminate continuously to “Red”, then disappear when operation completed.

**NOTE:** Data \$FF will write into all address of EEPROM data memory

## 5. LED's meaning

The TMS370 board included 2 operation LED's and one LED located on corresponding programming adapter (see APPENDIX). LED's meaning tables below:

LED1(3 colors LED):	Status LED (Orange)	Function LED (Green)	Function LED (Red)
Status Function	Continuously lit: TMS370 board is ready	Continuously lit: Read operation in progress  Middle flashing: Verify operation in progress	Continuously lit, middle flashing: Write operation in progress

LED2:	Status LED	Function LED (Red)	Error LED (Red)
Status Function Error	Disappear	Continuously lit: Read, Write, Verify, Erase, Clear WPO operations in progress	Continuously lit: LED don't disappear when operation completed***

LED3:	Status LED (Yellow)	Function LED (Yellow)	Error LED
Status Bus activity	Continuously lit: The board is ready	Continuously lit: Operations in progress  Middle flashing: Operations in progress	Disappear: 1) A programming adapter don't respond or broken. 2) Target IC don't respond or broken

Table 1. LED's meaning

\*\*\*Programmer don't respond turn OFF power supply source, restart TMS370.exe software (see chapter 7 Troubleshooting; Error messages)

## 6. Memory dump viewer

Click “Memory” menu item to enter memory dump viewer mode. For devices with 512 bytes EEPROM use “EEPROM\_1E00\_1FFF” menu item, for devices with 256 bytes EEPROM use “EEPROM\_1F00\_1FFF” menu item. WPO registers address cells “Yellow” color marked. Next step click “Open” menu item to review a dump contents. Memory address space display in {HEX} format only. Click on cell, that contain a byte which need to edit and enter new value into cursor prompted text box, when new data entered press “Enter” on PC keyboard and cursor will automatically jump to the follow cell. A cell enable to edit appear to “Red” color. When edit procedure is finished just click “Done” menu item for return to main window interface.

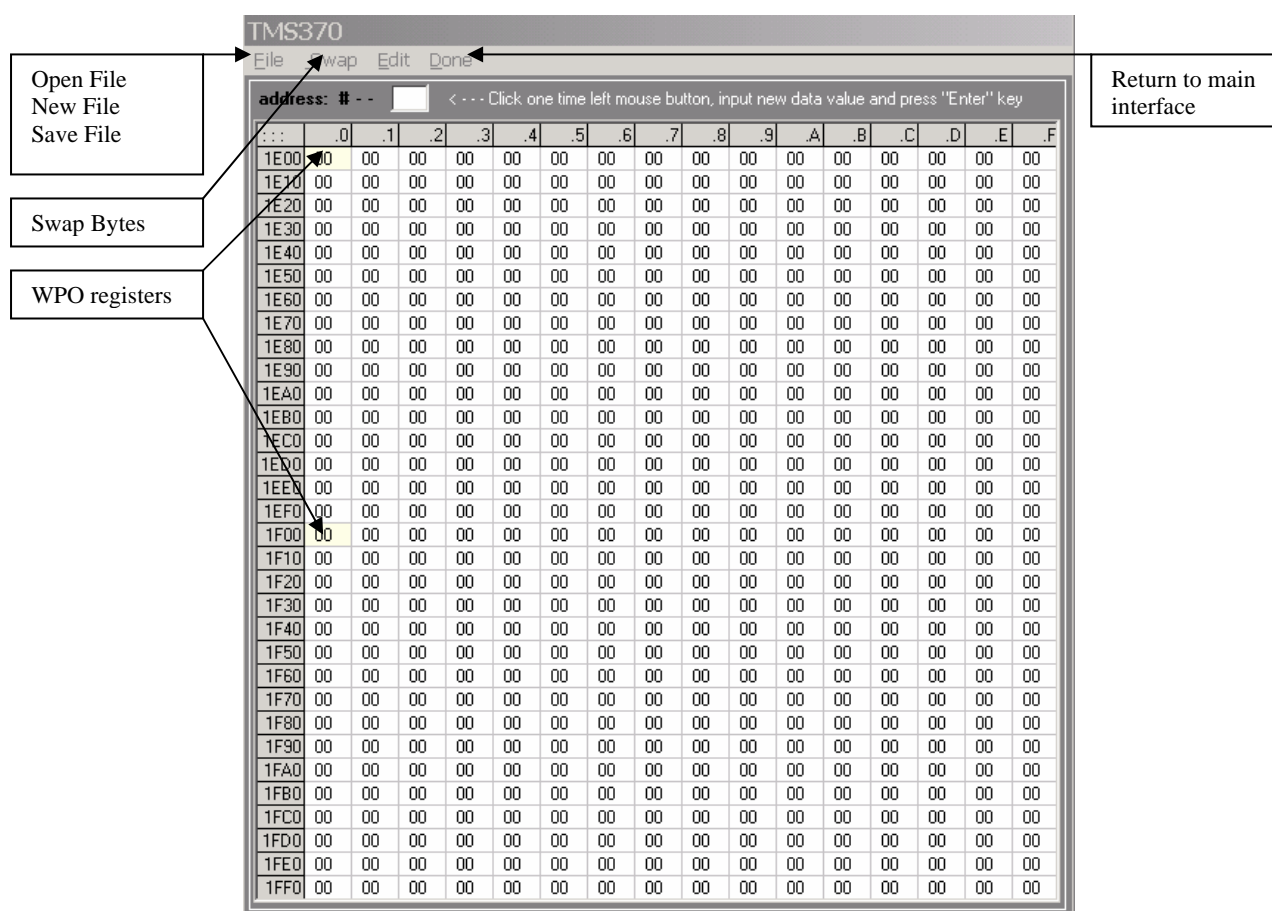


Figure 3. Memory dump viewer window

Menu items meaning:

“Open File”: this option loads a file from disk into the memory buffer

“New File” this option loads a \$FFh data into the memory buffer

“Save File” this option saves the current buffer to disk

“Swap” this option a word swap between 2 bytes

“Done” this option return to the main window interface

## 7. Troubleshooting; Error messages

Problem	Reason	Solution
The LED1 is not on	The DC cable not connected Wrong polarity supply Wrong power supply source	Connect the DC power cable Check polarity wires Check DC voltage 12-14 V 300mA min
The LED2 don't disappear when operation is completed	Error during operation Bad contacts into programming socket Clock rates insufficient	Clean all contacts in target IC socket; Replace quartz crystal on programming adapter to other new
The LED3 not appear	Target IC broken Bad contact into programming socket Target IC (bus) don't respond	Clean all contacts in target IC socket; Replace target MCU to other good; check target bus connector
The LED1 appear long time to Green/Red color at the same time with LED2 Red color	Program don't respond	Turn OFF then turn ON TMS370 Programmer board; Restart TMS370.exe

Table 2. LED's troubleshooting meaning

### ERROR MESSAGES:

- ✓ Message "ERROR, RESTART PROGRAM"/Critical error; program must be terminated/
  - Reason: incorrect characters returned. This message appear with next errors: Bad contacts into target IC socket; error during command execution
  - Solution: Check target IC socket; Turn Off and Turn On power switch and restart the TMS370.exe. Restart your Operation System and try start the program again
- ✓ Message "Communication Error"/Critical error; further program running with errors/
  - Reason: incorrect characters returned. This message appear with next errors: receive/transmit error during executing commands
  - Solution: Continue running program with errors; Turn Off and Turn On power switch and restart the TMS370.exe
- ✓ Message "Error Comm: Check Port Number/Cable/Turn On Power Supply"/Critical error/
  - Reason: Power switch turned Off; Serial cable not connected; Port number incorrect;
  - Solution: Turn On Power switch; Connect serial cable from PC to programmer board
- ✓ Message "The Comm1 already open with another process, use other port"/Non critical error/
  - Solution: Select Comm2 serial port
- ✓ Message "The Comm2 already open with another process, use other port"/Non critical error/



- Solution: Select Comm1 serial port
- ✓ Message “Port not available”/Non critical error/
- Solution: Select Comm1 or Comm2 serial port
- ✓ Message “Port not open”/Non critical error/
- Solution: Close other process, close TMS370 program and restart it again
- ✓ Message “Warning: uploading buffer size <> 512 bytes!”/Non critical error/
- ✓ Message “Warning: uploading buffer size <> 256 bytes!”/Non critical error/
- Solution: Load correct file size into dump viewer buffer
- ✓ “Zero timeout value”/Non critical error/
- Solution: Close other process, close TMS370 program and restart it again



Figure 4. Verify data window

## 8. Updates

### HARDWARE UPDATE:

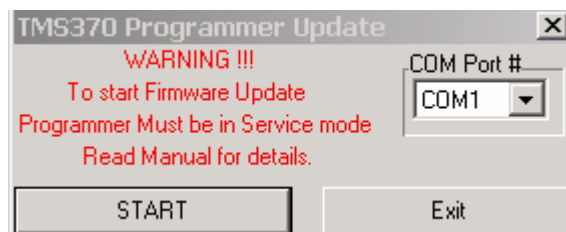


Figure 5. Hardware update utility

- Remove JP1 update jumper (see Figure 1)
- Make sure, that target IC not mount into programming adapter, or just disconnect bus connector
- Make sure, that file tms370uf.hex located in the same directory
- Turn ON power supply source
- Start the tms370\_update.exe utility

- Select serial port number
  - Click “Start” command button
  - LED1 will be flashing to “Green “ color during update operation in progress
  - When LED1 stop flashing, turn OFF power supply source
  - Mount JP1 update jumper
- Hardware update procedure finished.

#### SOFTWARE UPDATE:

To update software version of TMS370.exe control software follow next steps:

- Open the “Control panel” (Win98/2000/XP OS)
- Click on pictogram “Add or Remove Programs”
- Select “TMS370” then click “CHANGE/REMOVE” button to uninstall current TMS370 control software version
- Install new TMS370 control software version downloaded from <http://www.etlweb.net>

***Attention: Don’t remove following files from current directory:tms370\_update.exe; tms370uf.hex; err256.bin;err512.bin; ST6UNST.LOG. Listed files extremely important for normal maintenance of tms370 software/ hardware tools.***

## 9. Technical support

Technical support for this tool is provided by the ETL team. Contact information is provided below:

email: [techsupport@etlweb.net](mailto:techsupport@etlweb.net)  
[techsupport@etlweb.com](mailto:techsupport@etlweb.com)  
 website: [www.etlweb.net](http://www.etlweb.net)  
[www.etlweb.com](http://www.etlweb.com)

We also have an extensive range of ETL programming tools available. Please visit our website for complete details.

For TMS370 theory, please visit TI website [www.ti.com](http://www.ti.com)

Related documents: SPNU 127; SPNA017; SPND003; SPNU116C

## APPENDIX 1

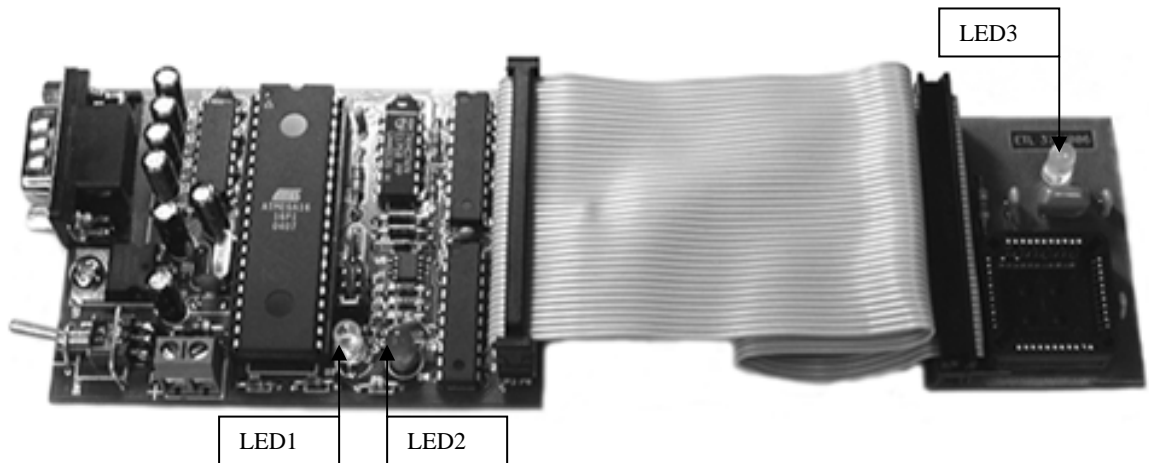


Figure 6. TMS370 programmer assembled

***Attention: Use ETL shipped interface cable and programmer adapters only! Improper cables, adapters, serial cables can damage your programmer and/or your PC!***

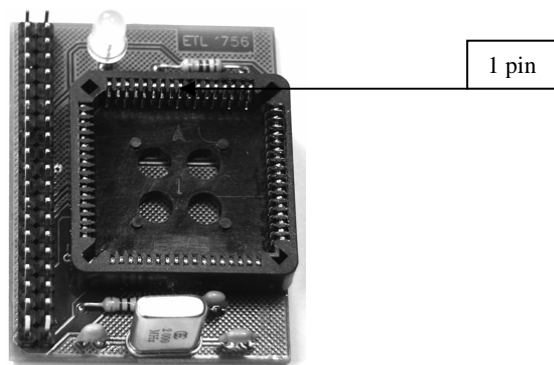


Figure 7. ETL-370'756-68PLCC programming adapter

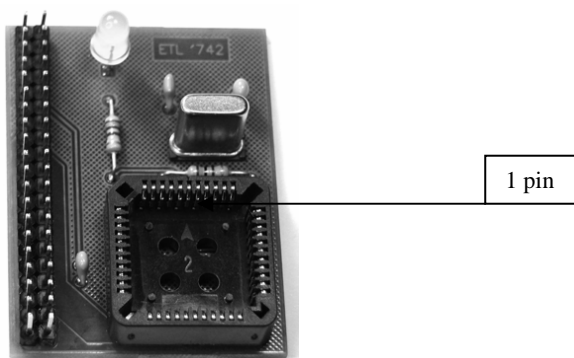


Figure 8. ETL-370'742-44PLCC programming adapter

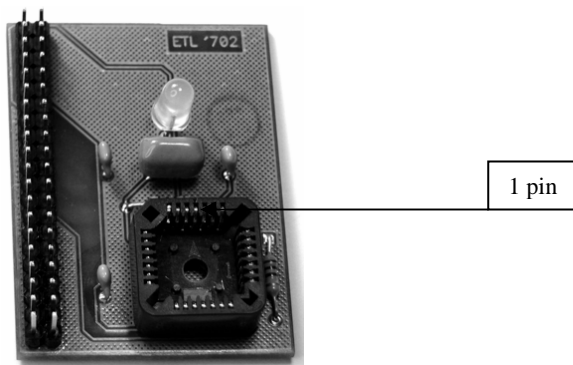


Figure 9. ETL-370'702-28PLCC programming adapter

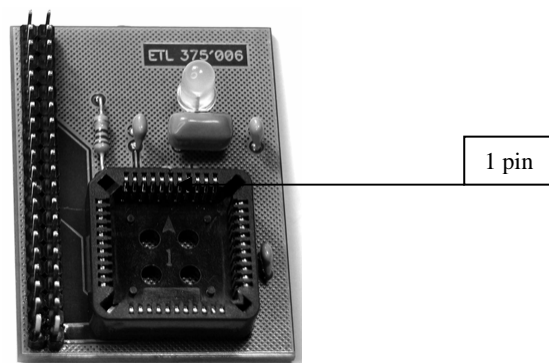


Figure 10. ETL-375'006-44PLCC programming adapter

## CLOCK OPTIONS:

TMS370 programmer support both divide-by-1 and divide-by-4 clock options. The main advantage of choosing low-speed crystal resonators extend through less of the emissions spectrum than the harmonic of faster crystal resonators.

## APPENDIX 2

TMS374C003A programming example:

1. Solder TMS374C003A device on ETL 374'003 programming adapter.
2. Attach adapter to TMS370 EEPROM programmer.
3. Turn ON power switch to feel supply voltage.
4. Select TMS374C003 menu item.
5. Click "READ" command button and save the original file before specific programming operation.
6. Create a new file and fill \$00 data to all address space from \$1FF00 to \$1FFF (See Figure 11), for example "zero.bin".
7. Click "WRITE" command button and write "zero.bin" file into EEPROM location and correct "Error codes" into of EEPROM location.
8. Create a new file that contain new data, for example "newdata.bin", keep data at address \$1F00 = \$00 and \$1FFF = \$00 (Don't write any data except \$00 to address \$1F00, \$1FF) every time before write new data (See Figure 12).

9. Click “WRITE” command button and write “newdata.bin” file into EEPROM location
10. Click “READ” command button and verify result.

**NOTE:** Override mode not supported TMS374C003A device and required special command to enter test mode. TMS370 EEPROM programmer generate test modes for TMS374C003A device. Commands “VERIFY”, “CLEAR WPO REGISTER”, “EEPROM BULK ERASE” not supported for TMS374C003A device.

address: #	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
1F00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1F10	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1F20	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1F30	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1F40	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1F50	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1F60	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1F70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1F80	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1F90	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1FA0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1FB0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1FC0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1FD0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1FE0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1FF0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

Figure 11. “zero.bin” file example

address: #	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
1F00	39	30	35	36	30	34	37	35	20	43	54	00	00	00	00	00
1F10	00	00	47	97	47	97	65	31	49	2D	30	30	30	32	33	32
1F20	57	30	4C	30	54	47	46	34	38	57	35	32	32	39	32	35
1F30	32	53	31	36	30	38	00	00	00	00	00	00	00	00	00	00
1F40	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1F50	00	00	00	00	00	00	00	00	00	00	39	38	30	36	30	38
1F60	00	00	00	00	00	00	00	00	00	00	00	00	24	81	00	05
1F70	07	B4	1D	67	22	B4	14	67	23	00	00	00	00	00	00	00
1F80	00	00	00	00	00	16	23	08	A5	07	02	FF	04	04	93	94
1F90	D2	F3	6A	FE	8D	5C	A7	FA	90	8F	C0	95	F1	4E	0F	3A
1FA0	07	B4	1D	67	22	B4	14	67	23	00	00	00	00	00	00	00
1FB0	00	00	00	00	00	16	23	08	A5	07	02	FF	04	04	93	94
1FC0	D2	F3	6A	FE	8D	5C	A7	FA	90	8F	C0	95	F1	4E	0F	3A
1FD0	07	B4	1D	67	22	B4	14	67	23	00	00	00	00	00	00	00
1FE0	00	00	00	00	00	16	23	08	A5	07	02	FF	04	04	93	94
1FF0	D2	F3	6A	FE	8D	5C	A7	FA	90	8F	C0	95	F1	4E	0F	3A

Figure 12. “newdata.bin” file example