MOTOROLA
Semiconductor Products Inc.

AN857
REV 2
Application Note

MC68705P3/R3/U3 8-BIT EPROM MICROCOMPUTER PROGRAMMING MODULE

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INTRODUCTION

This application note contains a schematic diagram and instructions which can be used to program the MC68705P3, MC68705R3, and MC68705U3 EPROM Microcomputer Unit devices. Because the routine required to program the EPROM MCU is actually located within the device, only a small number of parts are required to construct the programming module. Figure 1 illustrates the programming module schematic diagram. All that is required to program the EPROM MCU is the programming module and a +5 volt dc power supply.

PROGRAMMING

Except for the socket used in mounting the EPROM MCU device and the use of an 8K 2764 EPROM (for device location U3), programming any one of the EPROM MCUs is basically the same. Because of this similarity, the procedure for programming the MC68705P3 is described first, followed by the MC68705R3/U3 procedure.

MC68705P3 Programming

Prior to programming the MC68705P3 EPROM, its contents should be erased by exposing it to a high-intensity ultraviolet (UV) light with a wavelength of 2537 Å. The recommended dose (UV intensity × exposure time) is 15 Ws/cm^2. The UV lamps should be used without shortwave filters, and the MC68705P3 should be positioned about one inch from the UV tubes. Be sure the EPROM window is shielded from light except when erasing.

The 2764 UV EPROM is used for device location U3 when programming the MC68705P3. Before the MC68705P3 can be programmed, the 2764 UV EPROM must first be programmed with an exact duplicate of the information that is to be transferred to the MC68705P3.

NOTE

The erased value of the MC68705P3/R3/U3 EPROM MCU is 00_{16} whereas the erased value of the MCM2716 or MCM2532 is FF_{16}.

Step 1 — Close switches S1 and S2 and be sure that voltage (+5 V in this case) is not applied to the circuit board.

Step 2 — Insert the 2764 EPROM into the socket for device location U3 and insert the MC68705P3 into the U1 socket.

Step 3 — Apply +5 V to the circuit board.

Step 4 — Open switch S1 to apply V_{PP} to the MCU and then open switch S2 to remove reset.

NOTE

Once the MCU comes out of reset, the CLEAR output control line (PB4) goes high and then low, then the counter (MC14040B) is clocked by the PB3 output ($\overline{COUNT}$). The counter selects the 2764 EPROM byte which is to load the equivalent MC68705P3 EPROM byte selected by the MCU bootstrap program. Once data is programmed, $\overline{COUNT}$ increments the counter to the next location. This continues until the MCU is completely programmed.

Step 5 — Check that the programmed LED indicator is lit followed by lighting of the verified indicator LED. This signals that the EPROM MCU has been correctly programmed. Close switch S2 to reset the MCU.

Step 6 — Close switch S1 to remove V_{PP} and V_{IHTP}.

Step 7 — Disconnect (or turn off) the +5 V input to the circuit board and then remove the newly programmed EPROM MCU from its socket.

Step 8 — Remove the 2764 EPROM from its socket if no further programming is required.

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MC68705R3/MC68705U3 Programming

Programming either of these EPROM MCUs is similar to that described above for the MC68705P3 with three minor exceptions. These three exceptions are:

1. The 2764 UV EPROM is used for device location U3 when programming either the MC68705R3 or MC68705U3 EPROM MCU. This UV EPROM must be programmed with an exact duplicate of the information being transferred to the MC68705R3 or MC68705U3.
2. In step 2 the 2764 EPROM is inserted into the socket for device location U3 and the MC68705R3 or MC68705U3 is inserted into the U2 socket.
3. In the Note under step 4, operation of the 2764 and MC68705R3/U3 is identical to that described for the 2764 and MC68705P3.

PROGRAMMING MODULE CONSTRUCTION

The programming module is a double-sided Printed Wiring Board (PWB) with plated through holes. However, a single-sided board requiring only nine jumpers could be used. Component tolerances are generally not critical. The 5-to-26 volt converter (VR1) is manufactured by ASTEC International under part number ADIP26A05; however, if this part is not available, +26 V may be applied to the soldering feed through which is adjacent to the C4 + soldering feed through (PWB ground must also be connected for this supply). Table 1 provides the parts list for the programming module. PWB top and bottom printed wiring artwork layout diagrams are provided on removable pages located in the center of this application note.

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TABLE 1 — MC68705P3/R3/U3 Programming Module Parts List

R1	100 Ω
R2	4.7 kΩ
R3	4.7 kΩ
R4	510 Ω
R5	510 Ω
R6	4.7 kΩ
R7	4.7 kΩ
C1	0.1 μF
C2	1.0 μF
C3	100 pF
C4	1.0 μF
C5	1.0 μF
C6	10 μF
C7	10 μF
C8	75 pF
D1	1N4001
D2	22 V Zener-1N4748A or Equiv.
D3	1N4001
D4	1N4001
Q1	2N2222 or Equiv.
Q2	2N2222 or Equiv.
Y1	1 MHz (AT-Cut Parallel Resonance Crystal, 100 Ω Max.)
U1	MC68705P3 } Only Use One
U2	MC68705R3/U3 } Only Use One
U3	2764 EPROM
U4	MC14040B
VR1	ASTEC Voltage Converter 26A05
VR2	MC78L12
DS1	Red LED
DS2	Green LED
Misc:	1 — 40 Pin Low Insertion Force Socket 1 — 28 Pin Low Insertion Force Socket 1 — 24 Pin Low Insertion Force Socket 1 — 16 Pin Solder Tail Socket 2 — SPDT Switches

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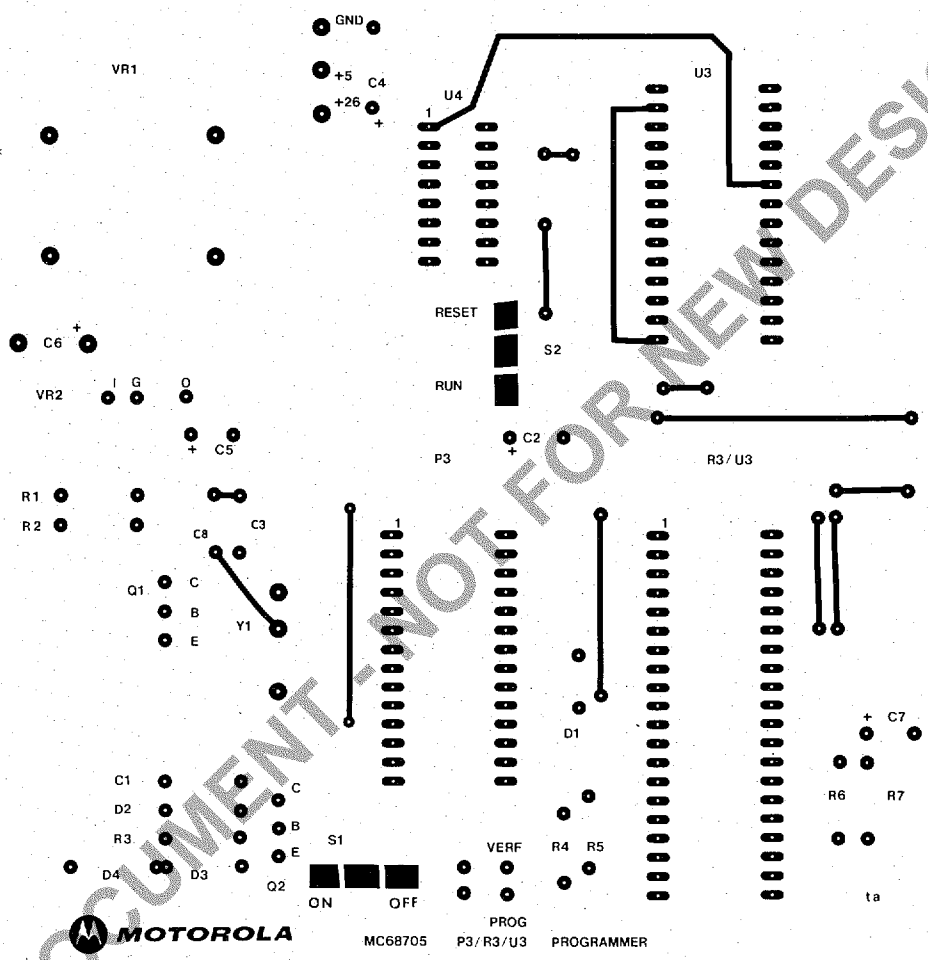

PWB (Top) Printed Wiring Artwork Layout Diagram

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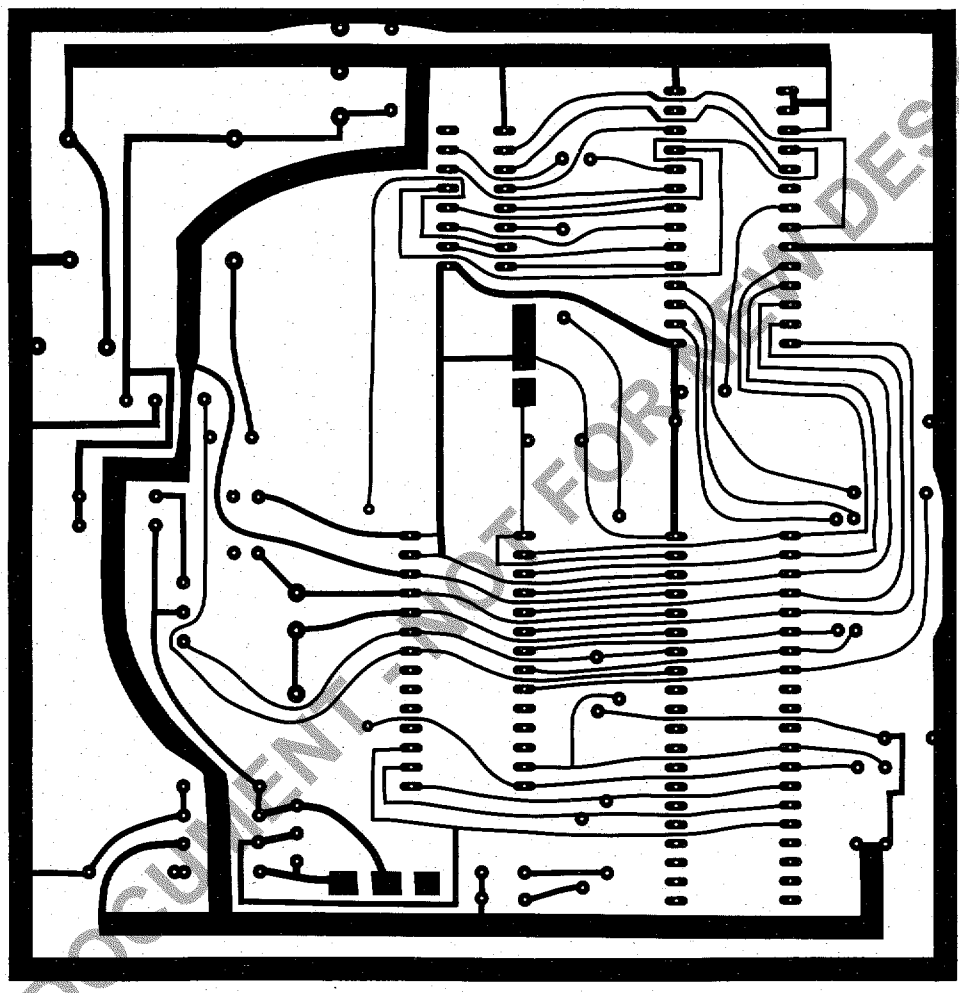

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PWB (Bottom) Printed Wiring Artwork Layout Diagram

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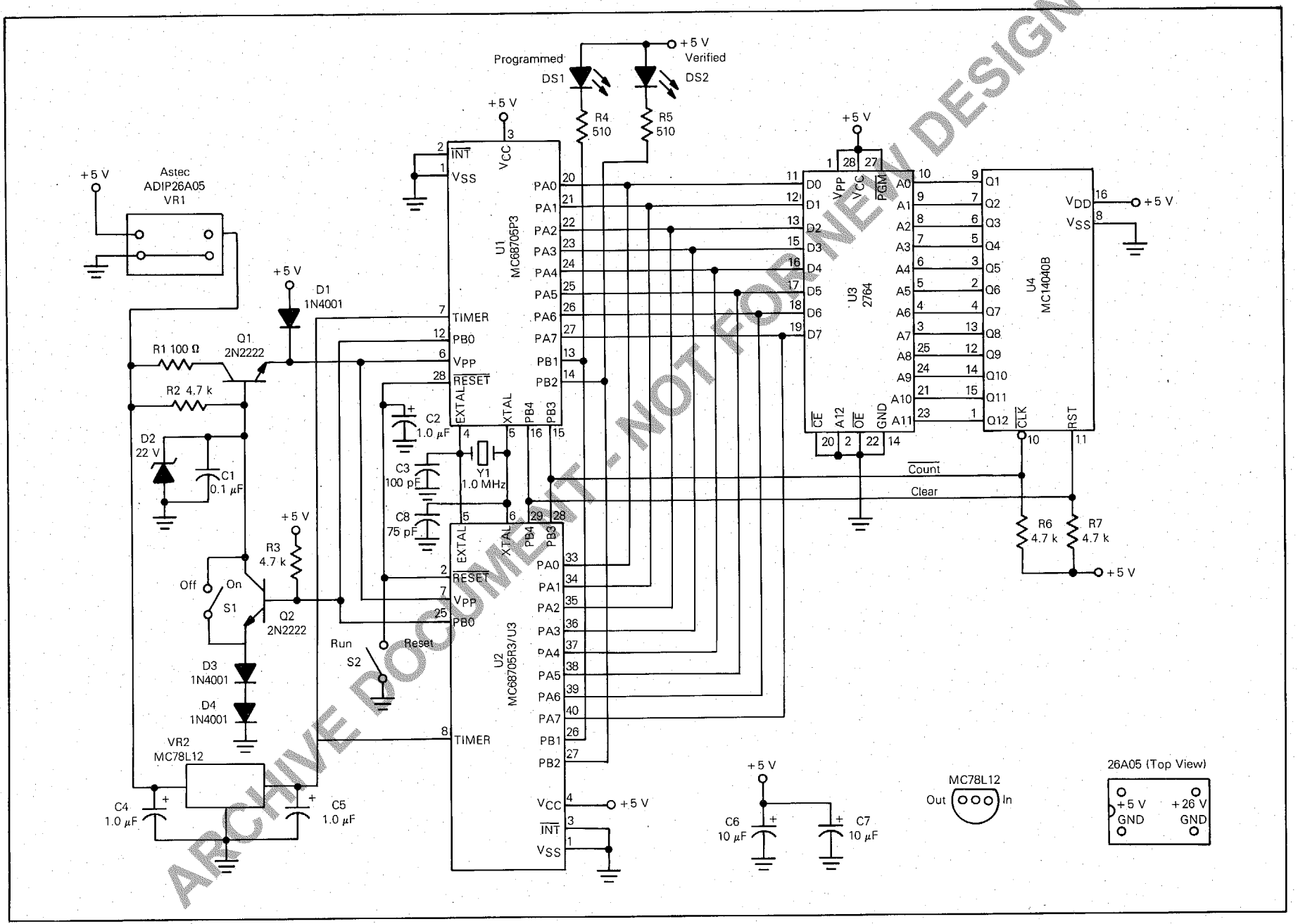

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FIGURE 1 — MC68705P3/R3/U3 Programming Module Schematic Diagram

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