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GFK-0351T

IMPORTANT PRODUCT INFORMATION

READ THIS INFORMATION FIRST

Product: Programmable Coprocessor Module, Version 3.03

Catalog Number	Hardware Identification	EPROM Label	Location
IC697PCM711P	PCMA2	387-031K3.03 387-036H3.03	U60 U59
IC697PCM711PX	PCMA1	387-031K3.03 387-036H3.03	U60 U59

This is release 3.03 of the Programmable Coprocessor Module, PCM. It provides a software work-around for a microprocessor problem and corrects several minor software errors in CCM communication. The PCM supports application programming in the MegaBasic and C languages. The module also communicates using the Communications Control Module (CCM) protocol.

Hardware Compatibility

Modules that were shipped as IC697PCM711A through IC697PCM711G are based on the PCMA1 hardware platform. These modules are identified by "PCMA1" screened on the component side of the printed wiring board, at the center of the rear edge. A sticker on the top edge of of the board identifies the hardware revision level. Revisions R05 through R11 may be upgraded to release 3.03 using the field update kit 44A286371-G12. These modules must be identified as IC697PCM711PX by attaching the corresponding label provided in the update kit.

PCMA1 hardware revisions R04 and earlier may not be upgraded to release 3.03.

PCMA1 hardware revisions R05 (shipped as IC697PCM711B) and R06 (shipped as IC697PCM711C) may be upgraded to release 3.03, but additional restrictions apply. See *"Special Operational Notes"* for information on using PCMA1 revision R05 in a rack powered by the 100-watt power supply, IC697PWR711. See also *"Additional Restrictions With PCMA1 Revisions R05 and R06."*

All PCMA2 modules (shipped as IC697PCM711J through IC697PCM711N) may be upgraded to release 3.03 using the field update kit 44A286371-G12. These modules must be identified as IC697PCM711P by attaching the corresponding label provided in the update kit.

Functional Compatibility

PCM firmware version 3.03 is compatible with release 1.00 or later of PCM support software (TERMF), IC641SWP063A and IC641SWP023A, and release 2.04 or later of PCM development software (PCOP), IC641SWP061B and IC641SWP021A. To develop MegaBasic applications, you must use either TERMF or PCOP.

PCM firmware version 3.03 is also compatible with release 2.04 or later of the PLC CPU.

There are no changes to these PCM publications: *MegaBasic Programming Language Reference Manual* and *PCM Development Software (PCOP) User's Manual* for this release. However, new material will be added to the *Programmable Coprocessor Module and Support Software User's Manual* at the next revision. See *"Changes and Additions to the User Manuals"* later in this document for information on these changes.

Special Operational Notes

1. **MegaBasic Defaults to Task Seven:** When MegaBasic is started from an R (RUN) command in a **`PCMEXEC.BAT`** file, and the command does not specify a task number, the PCM operating system assigns MegaBasic to task number 7. This behavior applies to **`PCMEXEC.BAT`** files created by the PCM operating system as well as files created by users, and is consistent with PCM firmware version 2.51 and all earlier releases. In PCM release 3.00, MegaBasic defaults to task 15.

2. **PCM Serial Ports Are not Isolated:** The two PCM serial ports are not isolated from module ground in either RS-232C or RS-422 / RS-485 mode. Common-mode input signals must be limited to 12 volts or less for RS-422 / RS-485 mode. An external RS-232C / RS-485 converter with common-mode isolation is recommended for serial data paths longer than 50 feet.

3. **PCMA1 Revision R05 With 100W Power Supply:** If PCMA1 hardware revision R05 of the PCM (shipped as IC697PCM711B) is used in a rack powered by a 100-watt power supply, IC697PWR711, loss of battery backed memory on the PCM may occur. Revision R05 modules must be replaced by R06, IC697PCM711C, or later modules. Alternatively, R05 modules may be converted in the field to Revision R06.

   Modification Instructions for PCMA1 Revision R05 Hardware: The following instructions describe the modification required to convert a PCMA1 revision R05 PCM, IC697PCM711B, to hardware revision R06.

   A. On the component side of the board, cut the conductor that runs between connector 6PL, pin B31, and capacitor C91. The cut must be made near the C91 marking.

   B. Place an R06 label on the board in place of the R05 label.

4. **PROM Change:** PCM RAM, including the RAM Disk (the RAM: device), is automatically cleared on the first power-up after the PCM PROM (at location U60 in IC697PCM711) is changed. If RAM disk files must be preserved, store them to an attached personal computer (PC), using TERMF or PCOP, before upgrading the PCM firmware. Then, load them back to the PCM after the upgrade.

5. **Power-up Delay:** The first COMMREQ sent to a PCM after a power cycle needs to be delayed until the PCM has finished power-up initialization. See the *Programmable Coprocessor Module and Support Software User's Manual* for example PLC programs which delay before sending CCM and MegaBasic COMMREQs.

6. **Data Requests to the PLC CPU:** Requests for PLC data from a PCM to a PLC CPU are limited to 2K bytes of data per request. This applies to all IC697 PCM applications, including CCM and custom programs developed in MegaBasic or C.

7. **NOWAIT SYSREAD Frequency:** There are system limitations on the number and frequency of MegaBasic SYSREAD requests which may be sent to the PLC CPU. When the PCM application needs to obtain PLC reference data as often as it is updated (once per sweep), the PLC System Communications Window mode should be set to RUN TO COMPLETION (the default). However, if there are too many requests or if there are several PCMs, the CPU watchdog timer may expire, causing the CPU OK LED to flash. In that case, reduce the number of requests or the number of PCMs in the system, or configure the System Communications Window for LIMITED mode.

Problems Resolved by this Upgrade

1. **Microprocessor Problem:** Certain versions of the 80C186 microprocessor cause PCM modules with firmware versions 3.02 and earlier to fail occasionally. Failures may occur while a PCM communicates simultaneously on the PLC backplane and one or both serial ports. When a failure of this type occurs, the MODULE OK LED goes off immediately.

   Parts that cause this problem were produced by Intel* and used in IC697PCM711M and IC697PCM711N modules manufactured between February, 1993 and June, 1993. These modules used PCMA2 revision R03 hardware.

   Some IC697PCM711N modules use a different version of the microprocessor and are labeled as hardware revision R04. These modules are not affected by this problem.

   The microprocessors that cause the problem may be identified by inspecting the product markings stamped on the top surface. When you hold a PCM module with the component side of the board facing you and the front cover to the left, the microprocessor is located near the upper left corner. There are three large integrated circuits in this area, and the microprocessor is the middle size part. The designation "U15" is printed near one corner.

   In order to positively identify microprocessors that exhibit this problem, you must check three characteristics of the identification stamped on the part:

   A. The part must be marked with the product code number "TN80C186XL 12" or "TN80C186XL 16".

   B. The identification code, located under the product code, must contain exactly nine alphanumeric characters and end with "A" or "B".

   C. The part must be marked with the Intel "i" logo.

   If the microprocessor does not have these **exact** markings, the module is not affected by this problem.

2. **PLC Reference Table Access by CCM:** CCM now queries the PLC CPU to determine the valid ranges for register (%R), discrete input (%I), and discrete output (%Q) references. In previous firmware releases, CCM would sometimes prevent access to valid references.

3. **CCM Target ID Check Incompatible with Previous Versions:** In PCM firmware versions 2.51 and earlier, the target ID fields in received CCM message headers are not checked to ensure they match the target ID of the most recent ENQuiry sequence. This check was added in versions 2.52 through 3.02. Consequently, a few existing CCM applications that generate messages with incorrect target ID values fail with those versions, although they function correctly with earlier PCM firmware.

   The CCM specification states that target ID fields in message headers must match the most recent ENQuiry sequence, but no harm is caused if they do not. The check has been removed in version 3.03.

4. **CCM COMMREQ Fails with %AI or %AQ Status Word:** Previously, when a CCM COMMERQ Status Word location in %AI or %AQ memory was specified, normal CCM access to register (%R) memory would sometimes fail. In this release, CCM operates correctly with status word locations in %AI and %AQ memory.

5. **CCM Slave May Begin to EOT All Incoming Headers:** In previous PCM firmware releases, a signal interruption on the Receive Data (RD) communication line would cause a CCM slave to enter a mode where it timed out while waiting for an incoming message header and then returned an EOT. A reset of the module was necessary to recover. This problem no longer occurs.

Problems Resolved by Version 3.02

1. **Critical Section Functions of the VTOS Operating System:** The VTOS **`Start_crti_sec`** and **`End_crit_sec`** functions now disable and enable maskable interrupts, respectively, as expected. Previously, the code had no effect on interrupts.
2. **MegaBasic SYSLINK Error with Default String Dimensions Disabled:** The string argument of the PCM MegaBasic **`SYSLINK`** procedure is now explicitly dimensioned. Previously, turning off default string or array dimensions with PARAM(12) = -1 or PARAM(13) = -1 caused a runtime error from **`SYSLINK`**.

Problems Resolved by Version 3.01

1. **Controlling PCM LEDs from MegaBasic:** When a MegaBasic application is started by a **`PCMEXEC.BAT`** file, the PCM uses a default task number for MegaBasic unless **`PCMEXEC.BAT`** explicitly specifies a task. In this PCM firmware release, as well as release 2.51 and all earlier releases, the default task number for MegaBasic is seven (7). In release 3.00, the default MegaBasic task number is 15.

   When the MegaBasic application controls a PCM light emitting diode (LED) indicator, the LED must be configured for control by MegaBasic. The MegaBasic task number must be specified in a **`PCMEXEC.BAT`** command. If the task number for PCM firmware release 2.51 or earlier is assumed, and MegaBasic runs as the default task number, then the application will not be able to control the LED when running in a release 3.00 PCM. This problem has been corrected in this release.
2. **CCM Q/N Enquiry:** Partial **`N`** or **`Q`** enquiry sequences no longer disrupt detection of valid **`N`** or **`Q`** enquiry sequences. Any valid enquiry sequence will now be responded to regardless of prior transmissions.
3. **Multidrop Enquiry:** In multidrop configurations, switching from one slave to the next sometimes required a retransmission of the enquiry sequence. A retransmission is no longer required.

Restrictions and Significant Open Problems

1. **CCM Timeout On Large Requests:** CCM requests for 3000 bytes or more of data may occasionally abort with a serial timeout error (Error code 0102H).
2. **Redirection of MegaBasic STDIN:** When MegaBasic is run with STDIN redirected from a file on an attached PC and execution of the MegaBasic program terminates for any reason, MegaBasic is unable to read input characters from the PC file. Redirecting STDIN from a PCM RAM disk file works correctly.
3. **MegaBasic Serial Data Rate:** When both PCM serial ports are configured for software flow control and a data rate higher than 19,200 bps, and a MegaBasic program transmits and receives characters on both ports at the same time, the PCM watchdog timer may expire, halting operation and turning off the OK LED.
4. **CCM Data Rate:** Recoverable CMM communication errors, such as dropped characters, may occur when the CMM operates on both ports simultaneously at data rates above 9600 bps. It is recommended that the data rate on either CMM port not exceed 9600 bps when using both ports simultaneously as initiators.
5. **WAIT Mode COMMREQ:** Programming the COMMREQ function block for WAIT mode will degrade PLC sweep time and may halt the PLC CPU, turning off its OK LED. Do not use WAIT mode COMMREQs unless you have a compelling reason. If WAIT mode is used, it is absolutely essential that no COMMREQs are sent until the PCM is ready to receive them, and that the sum of the worst-case PLC sweep time (without sending a COMMREQ) plus the longer of the two COMMREQ timeout values is less than the PLC CPU watchdog timer setting. If two or more WAIT mode COMMREQs can be sent during the same PLC sweep, the total of the timeouts for all the COMMREQs must be considered. See the *Programmable Coprocessor Module and Support Software User's Manual*.
6. **Extra Fault:** When a WAIT mode COMMREQ which specifies an invalid PCM TASK ID is executed, two "Bad task id" faults are posted to the PLC fault table.

7. **NOWAIT I/O and CTRL-C:** If a MegaBasic program performs NOWAIT read and NOWAIT write operations simultaneously on the same serial port, and the program is aborted with CTRL-C or a MegaBasic STOP statement, the PCM may hang if the program is restarted before the I/O operations complete.

Additional Restrictions With PCMA1 Revisions R05 and R06

1. **Model 781 and 782 CPUs:** PCMA1 hardware revisions R05 (shipped as IC697PCM711B) and R06 (shipped as IC697PCM711C) may not be used with Model 781 and 782 CPUs.
2. **PLC Memory Write Limitation:** When using PCMA1 hardware revisions R05 (shipped as IC697PCM711B) and R06 (shipped as IC697PCM711C), application write requests to the PLC must be limited to 128 registers (%R, %AI, %AQ, %P, and %L memory) or 128 bytes of discrete memory (%I, %Q, %M, %T, %G, or %S). This restriction applies to both MegaBasic and CCM applications. Failure to observe this restriction may cause the PCM to hang, although its OK (top) LED may not go out when a hangup occurs.

Changes and Additions to the User's Manual

The text from *"Controlling PCM LEDs from MegaBasic"* under *"Problems Resolved by Version 3.01"* in this document will be incorporated into the next revision of the *Programmable Coprocessor Module and Support Software User's Manual*.