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1 MODEL 600 PROCESSOR OVERVIEW

1.1 Description

This bulletin describes the hardware and firmware features and installation procedures for the single-width SY/MAX Type SCP-631 and SCP-632 processors. Single or multiple Model 600s may be installed into any SY/MAX digital or register rack assembly.

A versatile and powerful instruction set allows the Model 600 to perform over 100 functions. In the SCP-631, up to 16,000 words of user programming are available for user programs, while the SCP-632 has a nominal memory size of 26,000 words. A math coprocessor is standard in both Model 600 versions to perform floating-point math operations.

An additional feature in the Model 600 is the processor-to-processor communication capability known as the SY/PEER™ Communication Link. This 10 megabit per second, masterless serial communication link allows for transfer of register and control data between other Model 600 processors on the SY/PEER Link. A single SY/PEER Link supports up to 16 concurrently operating Model 600s and allows sharing of information without having to consider serial communications traffic and the impact on scan time associated with conventional serial data transfer.

The Model 600 monitors the SY/PEER Link communications activity with a front panel PEER COMM ERROR LED to indicate when a SY/PEER Link communication or scan sync error has occurred. Two front-panel RS-422 serial differential communication ports provide a direct interface to other SY/MAX equipment, including programmers, Network Interface Modules, and other SY/MAX processors.

The Model 600 offers a real-time clock/calendar that may be used for interval timing of task execution and scanning operations. The clock/calendar and processor memory are additionally supported by an onboard lithium battery that allows the clock accuracy and contents of memory to be maintained when power is removed from the Model 600. The charge levels for the onboard lithium battery and the batteries in the SY/MAX power supply are monitored, and a front panel "BATTERY LOW" LED indicates when either or both batteries require replacement.

1.2 Technical Overview

FEATURES

In the terms of SY/MAX processor features and functionality, the Model 600 is similar to the Model 400's product characteristics including the instruction set, method of program execution, real-time clock/calendar, onboard battery, keyswitch positioning, operating modes, etc. The major addition of the Model 600's features and functionality lies in the capability to communicate over the high-speed SY/PEER Link. Other feature enhancements include:

- Increased number of onboard data storage registers to 6,928 (retentive).
- Increased memory size to 26Kwords in the SCP-632.
- The ability to install multiple Model 600s in one rack assembly, though only the processor residing in the CPU slot can directly control external I/O.
- The ability to configure up to 16 Model 600s on one SY/PEER Link.
- The ability for a user-defined group or all Model 600s located on the SY/PEER Link to be synchronized for parallel processing.

Noted differences between the Model 600 and the Model 400 include:

- Scan time is slightly slower than the Model 400 by approximately 10%.
- Physical size is approximately 2.5 inches deeper than the Model 400.
- Increased current requirements to 5500mA @ 5 volts.
- SY/PEER Link related features such as the BNC connector, configuration switches, and PEER COMM ERROR LED.

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SY/PEER COMMUNICATION LINK

The SY/PEER Communication Link is a dedicated serial communication link that operates at 10Mbits per second and can be configured for a maximum distance of 656 feet (200 meters). Each Model 600 connected to the SY/PEER Link (up to 16 devices) updates a user-selected portion of a shared block of 1,024 registers located in each processor. This shared register area allows high-speed processor-to-processor communication and eliminates the need for READ/WRITE rungs and/or ROUTE information as with the SY/NET® communication network. Register update times are determined by the block size, but are typically under 5 milliseconds.

Systems which are restricted to a single programmable controller have inherent throughput limitations based on factors such as program length, instruction set execution time, I/O update time, and response to outside interrupts (such as communications). The high speed of the SY/PEER Link simplifies many of these concerns by virtue of its deterministic nature. For example, in any given system there may exist a critical group of I/O or program segments which must be scanned within a certain period of time. From a systems architecture perspective, it may be desirable to dedicate a single programmable controller to this task. The typical SY/PEER Link update rate of under 5 milliseconds ensures that any relevant alarm registers or I/O information are broadcast to other link members in this time period. These members could be processing less critical logic associated with the system, or executing operations such as PID or math which are inherently scan intensive.

The SY/PEER Link is designed exclusively for high-speed data storage information communication and is used specifically for transferring control process data. The deterministic SY/PEER Link is regulated by a proprietary protocol which is not designed to support communication of programming terminals or other manufactures' devices. In order to preserve the deterministic updates of the register data, *only SY/PEER devices (e.g. Model 600 processors) should be connected to the link cable.* Refer to Section 15 for detailed information on the Model 600 SY/PEER Link operation and functionality. In addition, processors on the link can optionally have their scans synchronized; refer to Section 16.

The Model 600 can operate as a member of the SY/PEER Link or as a stand-alone processor, similar in functionality to the Model 400; however the Model 600 offers almost twice as many onboard registers for use in data storage and as internal relays. In the stand-alone mode, the first 6928 registers behave as regular data storage registers, while the shared registers previously allocated to the SY/PEER Link operation may be used as non-retentive data storage registers (i.e., they reset upon power-up).

In the following sections, discussions on register usage are based on using the first 6928 registers for standard ladder logic programming. Register addresses 6929 through 7952 are allocated as shared registers. Register addresses above 7952 are used for special functions, internal control, and status conditions.

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1.3 Front Panel Features

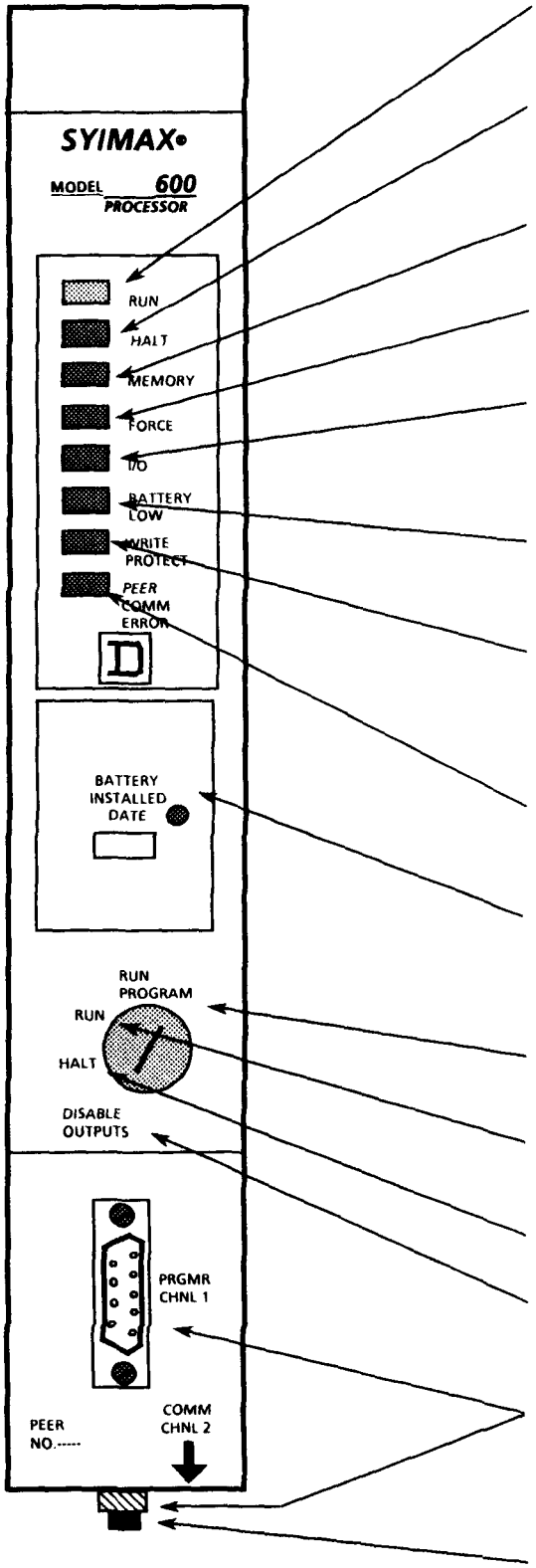


Figure 1.1 Model 600 Front Panel Identification

LED STATUS INDICATORS (See Section 4.2)

RUN (GREEN) - When ON steady, the processor is scanning ladder diagram program and operating on I/O's. When FLASHING, the processor is operating on ladder diagram program, but is not energizing any outputs (Disable Outputs mode).

HALT (RED) - When ON steady or FLASHING, the processor has halted its execution and is no longer scanning the program. If FLASHING while the RUN LED is ON, the Model 600 is in a HOLDING state waiting for all SYNC members to go to RUN.

MEMORY (RED) - When ON steady in combination with the HALT LED FLASHING, indicates that the processor is halted due to a memory error.

FORCE *(RED) - When ON steady or FLASHING, I/O have been* forced to an ON or OFF state thereby overriding the ladder diagram program.

I/O (RED) - When ON steady in combination with the HALT LED FLASHING, indicates the processor has halted due to a malfunction in the I/O system. The I/O system is regarded as any I/O or register module that the processor controls in a rack assembly.

BATTERY LOW *(RED) - When ON steady, indicates that the* onboard battery is low. When FLASHING, indicates that the power supply batteries are low. The ON steady condition takes precedence.

WRITE PROTECT (RED) - When ON steady, indicates that the user memory is protected by the keyswitch positioned in the RUN mode and/or the internal write-protect jumper is in the NO PROGRAM position. When FLASHING, indicates some type of software-generated security is in effect. The ON steady condition takes precedence.

PEER COMM ERROR (RED) - When ON steady, indicates a "peer link" hardware error. When flashing, indicates either a SY/PEER Link communications error or that one of the peer sync group members is not synchronized.

BATTERY ACCESS DOOR - Used to gain access to the processor's on-board backup battery. See Section 12.1.

KEYSWITCH (See Section 4.1)

RUN/PROGRAM. In this mode, the processor executes the ladder program and allows changes to be made to the program while in RUN.

RUN. In this mode, the processor executes the ladder program but does not allow changes to be made to the program while in RUN, or forcing to occur or be changed.

HALT. In this mode, the processor does NOT execute the ladder program and all outputs are turned OFF.

DISABLE OUTPUTS. In this mode, the processor executes the ladder program, but outputs are turned OFF.

COMMUNICATION PORTS (See Section 5)

RS-422 serial differential ports for connecting programming and peripheral equipment (COMM CHNL 2 on bottom front of unit).

PEER BNC port (bottom rear) for connecting the Model 600 to the high-speed SY/PEER Link.

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