The PF signal from undervoltage sensor U36, input to the IOP through buffer U19, is monitored to verify the state of the low voltage power supply. When PF is low, the +5V rail is lower than 4.6V. If this is the case when the supply should be on, it may indicate an overload condition or an actual power supply failure.

3.1.1.2 Serial Control Buses

Two serial buses originate from the microcontroller; the Inter-Integrated-Circuit bus (I^2C) and the "DAC" bus. These are used to control remote I/O ports and digital-to-analog converters (DACs) on other modules in the projector. The I^2C bus is also used to access a small EEPROM on the projector's Backplane Board, which stores parameters during manufacture and setup of the projector. (This EEPROM is powered by +5V through R17 on the Control Board.)

The I^2C bus is composed of the SDA signal, carrying bi-directional serial data, and SCL, a clock signal. Both signals are buffered by open-drain inverters (U12) with local pull-up resistors to +5V. The DAC bus is composed of the DATA signal, which outputs data to the DACs, and CLOCK, which is toggled during data transfer. Both of these signals are HCMOS.

3.1.1.3 Keypad Input

The microcontroller receives and decodes serial data signals from three sources: the projector's built-in keypad, the projector's built-in IR sensor, and the 'REMOTE' jack (J1) on the Control module's panel. The built-in keypad and the IR-sensor are connected to the Backplane Board, from which the signals KEYPAD and IR-SENSOR are input to the CLM. The microcontroller also receives REMOTE-IN from J1, a signal which indicates the presence of a plug in the jack.

The built-in keypad, built-in IR-sensor, and REMOTE jack all draw power from the +12V-STBY supply rail. As with +5V-STBY, this voltage is present as soon as AC power is applied to the projector.

3.1.1.4 RS-232

The projector communicates with other devices using RS-232 via the "IN" and "OUT" connectors (J2 and P3 respectively) on the Control Module's panel. Cables attached to these connectors need only three wires; transmit, receive and ground. The transmit and receive signals are connected to an internal UART in the microcontroller through an RS-232 interface IC (U13) operating from +5V-STBY. A series of AND gates (U15) between the microcontroller and the interface IC allow the connection of multiple projectors in a "network", allowing any projector to talk to any other. The gates create two sets of transmit/receive pairs. One pair connects to a "down-linked" device (eg. another projector) via P3. The other pair connects to an "up-linked" device (another projector or a computer) via J2.

An additional RS-232 connector (J3) is provided for communication with a Marquee Signal Switcher. It is connected through another interface IC (U14) to a UART within the microcontroller on the DPB. When projector power is off, transmissions from the switcher are also routed, via U22, into the UART of the IOP microcontroller to listen for a "power-on" message. The IOP disconnects this signal from its UART when power is turned on.