C & I Meter Hardware Specification

Internal Document

Version: 1.3

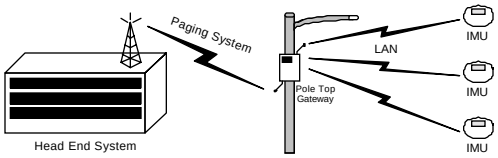
February 3, 2000

Table of Contents

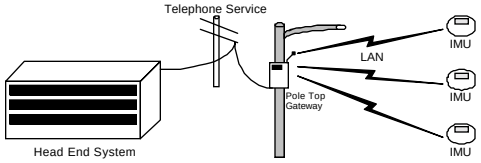
1. Introduction

The purpose of this document is to outline all the requirements necessary for the C & I Meter. The C & I Meter will be the link between the Information Managing Units (IMU), the Commercial and Industrial (C&I) Electric Meter and the head end system. The IMUs will reside on the water and gas meters, which will communicate with the C & I Meter via RF. The C & I Meter may reside on a pole top. There will be two types of C & I Meter Wide Area Network (WAN) interfaces defined within this document, however the WAN interface is not limited to just these two. One will communicate back to the head end via a wireless paging system and the other will communicate via Plain Old Telephone Service (POTS).

The C & I Meter will consist of a Power Supply, a Control Module, a Network Communications Interface (NCI), a paging or POTS modem and one or two antennas depending on the type of C & I Meter required. The specifications for these modules are listed in the following sections. Presented below are two diagrams depicting the two types of networks that are possible, using the C & I Meter.



Paging Based WAN C & I Meter



POTS Based WAN C & I Meter

2. Module Specification

The specifications for each of the modules described above and their enclosure are listed in this section.

2.1 Power Supply

2.1.1 Electrical

- 90 – 265 VAC input voltage range.
- 50 or 60 Hz.
- 100% operational with 100 mS of service interruption.
- +5 VDC ± 5% @ 3.5 A output, continuous.
- +3.6 VDC @ 300 mA output, continuous.
- Maximum ripple of ± 100 mV.
- Load Regulation of ± 5 %.
- Isolation designed to applicable portions of the ANSI C-12 standard.
- Processor controller power recycling.
- Appropriate Electro Static Discharge (ESD) and lightning protection for the power supply.

2.1.2 Mechanical

- 1 Green “POWER” LED
- 1 Red “HEARTBEAT” LED on the Ampro parallel port.
- 1 Red “STATUS” LED on the Ampro parallel port.
- 1 Yellow “TX” and 1 Green “RX” LEDs on the Pager.
- 1 Yellow “TX” and 1 Green “RX” LEDs on the NCI.
- 1 4 pin 0.100” centers header for a manufacturer keyboard connection.
- A TBD connector for a battery charger card.
- An SPI UART and RS232 level shifter for interface with the NCI.
- A manual processor reset, push button switch.
- PC/104 power interface; 1-64 and 1-40 pin dual row 0.100” centers female sockets.
- 2-10 pin 0.100” centers dual row female sockets for the Ampro COM1 and COM2 RS232 serial ports.
- 1-10 pin 0.100” centers dual row female socket for the Ampro utility port.
- 1-26 pin 0.100” centers dual row female socket for the Ampro parallel port.
- 4 mounting holes for the PC/104 card.
- 2-22 pin 2 mm centers dual row female shrouded connector for Pager and for NCI board.
- 4 mounting holes for the Pager.
- 4 mounting holes for the NCI board.
- A 5 pin straight, keyed Molex type 0.156” centers header, with pins 2 and 4 removed, for power connection.
- A 3 pin straight, keyed Molex type 0.156” centers header, with pin 2 removed, for telco connection.
- A 2 pin straight, keyed Molex type 0.156” centers header for the modem connection.

2.2 Control Module

2.2.1 Electrical

- Ampro CoreModule / 3SXi.
- +5 VDC powered through PC/104 Interface.
- 500 mA consumption.

2.2.2 Mechanical

- PC/104 form factor and interface.
- Two serial (RS232) ports with a 10 pin dual row straight 0.100” centers headers placed on the bottom of the board.
- One parallel interface port with a 26 pin dual row straight 0.100” centers headers placed on the bottom of the board.
- One utility port with a 10 pin dual row straight 0.100” centers headers placed on the bottom of the board.

2.3 NCI Module

2.3.1 Electrical

- 900 mA @ +5 VDC and 150 mA @ +3.6 VDC power supply.
- RF Specification (Refer to NCI specification document).
- Appropriate Electro Static Discharge (ESD) and lightning protection on the antenna connection.

2.3.2 Mechanical

- 1-22 pin 2 mm centers dual row male shrouded connector, placed on the bottom of the board for power, serial (RS232) and other I/O connections.
- One right angle SMA connector for the external antenna.

2.4 Pager

2.4.1 Electrical

- Motorola ReFlex CreateaLink 2XT transceiver.
- 2 A max at +5 VDC power consumption set at 2 W transmit power.

2.5 POTS Modem

2.5.1 Electrical

- 33.6Kbps data modem.
- 200 mA @ +5 VDC power supply.
- Appropriate Electro Static Discharge (ESD) and lightning protection on the telephone line connection.

2.5.2 Mechanical

- PC/104 form factor and interface.
- Do not populate RJ11 connectors.
- Solder to TIP and RING connections 2-22 AWG wires with a Molex type, keyed female connector on the other end of the cable.

3. Tamper Switch

A tamper switch in the form of a mechanical switch will be provided. The switch will be actuated by the lid on the enclosure. The switch will be in the closed position for as long as the lid is closed on the enclosure. Once the lid is opened the switch will open signaling the processor of a tamper situation.

4. Battery Backup

A battery backup is required such that if the C & I Meter detects MAINS power outage, it will signal the head end via the WAN of the outage. The battery will hold long enough to support a connection on either of the two currently supported WAN interfaces, telco and pager.

There will also be a charger card associated with the type of battery used.

5. Enclosure

- NEMA 4X steel type.
- Powder coated (white preferred for final product).
- 8"x 6"x 3.5" in dimension.
- Dedicated grounding stud.
- Hinged lid with a weather proof gasket.
- 4 outside connector holes; 1 for the power connector, 1 for the LAN antenna connector and 1 for the WAN antenna connector or the telco connector.

6. Antennas

6.1 LAN Antenna

- 902 – 928 MHz.
- 6 dBi Gain.
- N type connector.
- 50 Ohms.
- Water resistant.

6.2 WAN Antenna

- 896 – 942 MHz.
- 6 dBi Gain.
- N type connector.
- 50 Ohms.
- Water resistant.

7. Housing Connectors

- N type, antenna bulkhead connector with a 10 inches RG316/U cable and a right angle SMA on the other end of the cable.
- 4 pin Power metal type female connector with 4-18 AWG, **XX** inches wires, and a 5 pin keyed female 0.156" centers connector on the other end of the cable.
- 3 pin telco metal type female connector with 3-18 AWG, **XX** inches wires, and a 3 pin keyed female 0.156" centers connector on the other end of the cable.

8. External Cables (Optional)

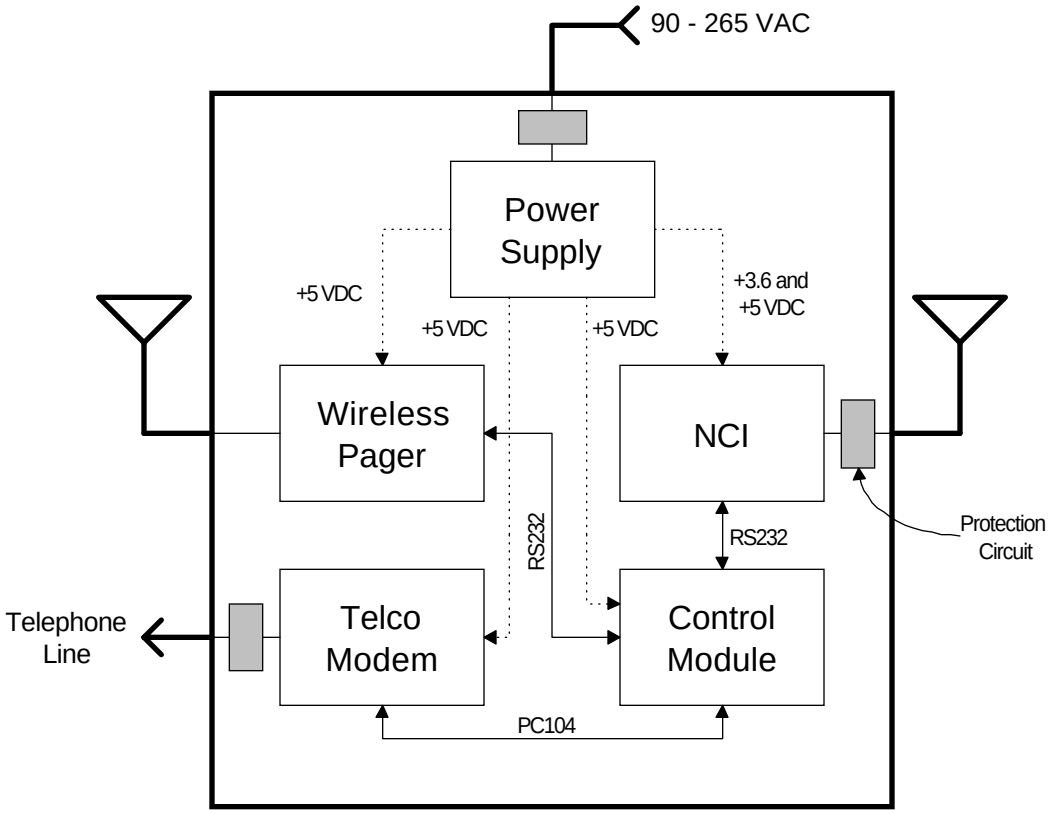
- 4 pin Power metal type male over-molded connector with 4-18 AWG shielded and sleeved, 12 feet wires, and a 3 prong light pole power connector on the other end of the cable.
- 3 pin telco metal type male over-molded with 3-18 AWG shielded and sleeved, 20 feet wires, without any termination on the other end of the cable.

9. Environmental

- -40 - +85 ^{o}C working temperature range.
- Up to 95 % humidity (non-condensing).
- 10 years mean time before failure.

10. Block Diagram

The following diagram depicts the connections between the 5 different modules within the C & I Meter enclosure.



The telco modem and the wireless pager are stuffing options. When one is installed the other isn't depending on the installation needs.

Revision History

Revision	Description	Date
0.1	Preliminary release	08/30/99
0.2	Released for review	09/02/99
1.0	Production Release	09/08/99
1.1	Addition of Tamper Switch, Battery Backup and Power Recycling	10/20/99
1.2	Deleted reference to the Harley Project	01/26/00
1.3	Changed Reference from Diablo to Innovatec	02/03/00