MicroLok® II Intermediate System for LED Signal Locations

With the use of LED style wayside signals expanding throughout the railroad industry, the MicroLok II Intermediate System has been modified to enable operation of ASTS USA’s LED colorlight signal units. The MicroLok II LED 12 Intermediate System provides a complete range of functions for the typical mainline intermediate location, and is housed in a standardized wayside package that is simpler and less costly to implement than previous designs. It is ideal for MicroTrax or E-Code coded track circuits in applications where a plug-in system with set I/O and LED signaling is desirable. Among its component options are cardfiles and boards that allow Ethernet-based remote communications. Like all MicroLok II-based products, the LED 12 Intermediate System is programmed using the familiar and versatile MicroLok II Development System software package.

General Description
The MicroLok LED 12 Intermediate System consists of a small set of hardware modules that can be configured for a variety of intermediate applications. Cardfiles and plug-in PCBs include:

- Several models of plug-in PCB cardfiles that accommodate Ethernet or serial communications to a remote wayside system of office, as well as ASTS USA or Alstom style VCOR relay options for vital power switching.
- The standard MicroLok II CPU board, which performs vital logic functions using the system’s resident Executive and Application software.
- MicroLok II vital I/O PCBs for parallel-channel inputs and outputs to relay coils, contacts, etc. Board types include Mixed (standard) Vital I/O and 8-Input/8-Output Isolated I/O.
- LED 12 PCB(s), which enables operation of up to 12 ASTS USA-design LED signal units, and also affords built-in “lamp-out” protection.
- ASTS USA’s standard MicroTrax and E-Code track circuit boards for through-the-rails transmission of track codes and detection of track shunts (train detection).
- Power Supply/CPS board, which provides both vitally-controlled power for the VCOR relay coil and operating power for system PCBs.

These PCBs are assigned to specific sets of cardfile slots, thus simplifying system field configuration work.

The MicroLok LED 12 cardfile incorporates an extended backplane motherboard with 12 front-accessible cage clamp connectors (Wago brand) that enable direct connection of external I/O wiring to the cardfile. This arrangement eliminates the need for separate rack-mount terminal strips and/or connector cable assemblies. To aid in field wiring, the connectors are assigned (as labeled) to specific types of PCBs. Slot-address jumpers for the LED 12 and track circuit PCBs (MicroTrax and E-Code) are also located on the motherboard. Additional jumpers allow for inputs to the LED 12 boards to be shorted together to support Constant Current Regulator (CCR) sharing between LED signal outputs, without the use of additional external wiring. Other motherboard-mounted devices include:

- EEPROM for storing unit-specific configuration data.
- Top mounted RJ-45 jack for Ethernet communications wiring.
- Two 25-pin “D” connectors to interface vital or non-vital serial communications wiring (when required) to the CPU PCB’s serial ports. These ports also permit daisy-chaining of several LED 12 systems.
- AREMA (AAR) terminal posts for connection of power input wiring (includes wired-in transient voltage protection). These terminals, which incorporate post-to-post straps, are also used to route VCOR-controlled power and CCR power when the LED 12 PCB is installed.
- Power ON/OFF switch and 10A fuse.
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General Information (cont’d)
The VCOR relay is housed in the left-hand bay of the cardfile and includes a built-in relay base. This arrangement eliminates the need for a separate VCOR rack installation outside the cardfile. Both ASTS USA PN-150B and Alstom B1 relays are provided in the various cardfile options (see Ordering Information).

Several models of the MicroLok II LED 12 System cardfile include an Ethernet Communications Module (ECM) that is stand-off mounted on the back side face of the motherboard. Ethernet communications are enabled through Port 4 on the CPU PCB and the Ethernet jack at the top of the cardfile. Versions of the cardfile not equipped with the Ethernet capability can be upgraded in the field at a later date by installing the ECM as an add-on component. Refer to catalog section RSE-1D1 for additional design information on the LED 12 System cardfile.

Applications
LED Signal Operation
The cardfile is equipped to carry one or two LED 12 PCBs, each capable of operating up to 12 ASTS USA LED signal units (maximum of 24 units per cardfile). The system is not compatible with other makes of LED signals. The LED signal external driver circuits incorporate Constant Current Regulators (CCRs) and several types of lighting and surge protection modules.

As shipped from the factory, there are three straps on the front terminal block to distribute system battery to feed to the regulators. The regulator and LED12 power can be isolated from the system power. To drive LED signal aspects with an isolated source, straps are repositioned from the factory-installed location and isolated battery is connected to specified terminals.

The cardfile motherboard includes jumpers that allow for the CCRs to be shared between multiple outputs without the use of additional external wiring. Note that CCRs can only be shared between outputs that will never be on at the same time. The motherboard allows for the grouping of three outputs per regulator. Specific CCR configurations permitted include:

- Each signal with its own CCR
- Each signal with a shared CCR (3 max.)
- Each signal with a shared CCR and failover-to-red capability

Refer to catalog sections RSE-7A1 and RSE-7A2 for additional information on the CCR and associated protective devices.

Vital Inputs and Outputs
The LED 12 system is equipped to carry one or two MicroLok II Vital I/O PCBs, each of which incorporates eight isolated outputs and 8 non-isolated inputs (16 channels max.). The eight isolated (+, −) individual vital inputs can be used for inputs such as switch machine correspondence or OS track circuit occupancy. Bi-polar inputs require a relay interface.

The LED 12 system can also incorporate one MicroLok II Vital Isolated 8-Output PCB. This PCB provides eight vital isolated outputs for double-break control of uni-polar relays and bi-polar relays. Each output provides a “+” and a “−” connection that is isolated from the house battery and other outputs. Outputs are jumper-selectable to drive normal vital relays. Or, outputs can be combined to drive bi-polar relays.

Refer to catalog section RSE-1D2.2 for additional information on these vital I/O PCBs.

Track Circuits
The MicroLok II LED 12 System accommodates both MicroTrax mainline circuits, with or without cab signals. A single MicroTrax Coded Track Circuit PCB is installed in the cardfile for this purpose, and interfaces to the rails via a Track Interface Panel. Train detection (track shunt) indications are passed via this panel to the PCB. Generated track circuit codes (22 available to user) are output to the rails via the panel. Two of the user codes are intended for non-vital purposes, such as train occupancy or tumble down. Twenty of the user codes are vital and are available for any purpose. The remaining reserved code is used to establish communication, referred to as “Link-Up”. Refer to catalog section RSE-1D3 for additional information on the MicroTrax-based panels.

E-Code Track Circuits are also included in the LED 12 System options. This track circuit option is compatible with all versions of Electro Code®. E-Code consists of two elements: One E-Code Track Circuit PCB and a Track Interface Panel. The E-Code track PCB interfaces with the LED 12 System’s CPU, where the functions of track messaging and train detection are performed. Both the track PCB and the interface panel are dual units to handle two independent track circuits. The Interface Panel is
Applications (cont’d)
derived for compatibility with highway crossing audio overlay equipment and provides secondary surge protection. It is functionally and mechanically equivalent to the Electro Code 5® (EC5) track interface panel – TIP-2. Refer to catalog sections RSE-1A2. RSE-1D3 and RSE-1D2.5 for additional information on related E-Code track circuit applications and equipment.

Ethernet Communications
Selected models of the MicroLok II LED 12 System are equipped to perform Ethernet-based communications using an integral ECM and Ethernet-style communications jack (refer to Ordering Information).
The Ethernet port is a standard eight-pin RJ45 connector which uses any of the widely available Category 5 (CAT5) or better cable (standard off-the-shelf cable). An Ethernet crossover cable is required to connect the NIA directly to a PC, while a standard Ethernet cable is used to connect the NIA to the network. 
ASTS USA Service Manual SM-9759 provides detailed procedures for:
- Configuring Internet Explorer to access the ECM configuration screens
- Connecting the ECM to the PC for configuration
- Accessing the ECM configuration page
- Configuring the ECM
- Selecting ECM options
- Uploading new ECM firmware
- Identifying IP addresses of Digi-Devices on a network
- Erasing existing configuration file

Advantages
- Ideal for applications where a plug-in system with set I/O and LED signaling is needed.
- Accommodates intermediate locations with ASTS USA LED signals;
- Simple installation, PCB configuration and wiring;
- Specialized I/O cables not required.
- ASTS USA service-proven MicroLok II hardware and software;
- Compatible with MicroTrax and/or E-Code track circuits (PCB options);
- Ample vital I/O for typical intermediate locations;
- Cardfile options with or without Ethernet port and ASTS USA or Alstom VCOR;
- Ethernet-based or serial link-based remote communications;
- Remote system configuration using Internet Explorer.

Specifications

Electrical
Input Power: 9.8 to 16.2 Vdc
Starting Voltage: 11.2 Vdc (min.)
Front Panel Fuse: 10A
Power Connection: 5 AREMA (AAR) Terminals
P.S./CPS PCB: Internal outputs: +5 Vdc @ 5A, +12 Vdc@1A, -1Vdc@1A
CPU-to-CPS check sig.:250 Hz

Inputs/Outputs:
LED 12 PCB: Up to 12 ASTS USA LED units per PCB
1 or 2 PCBs per cardfile
24 LED signals (max.)
Mixed Vital I/O PCB: 1 or 2 PCBs per cardfile
Up to 8 isolated inputs
Up to 8 non-isolated outputs
Isolated 8-Output PCB: 1 PCB per cardfile
Up to 8 isolated outputs
Configurable for uni-polar or bi-polar relay control
MicroTrax PCB: 1 PCB per cardfile
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Specifications (cont'd)

MicroTrax PCB (cont’d):

- Track circuits controlled: 2
- Track circuit lengths: Up to 22,000 feet @ 3 ohms ballast/1000 ft. (6705 m @ 3 ohms ballast/305 m)
- 23 total track codes
- 22 user-defined codes
- 2 user codes reserved for non-vital data (e.g. tumble-down)
- 1 user code reserved for comm. “Link-up”

E-Code PCB:

- Compatible with all versions of Electro Code

Remote Communications

Ethernet:

- 1 CPU PCB port utilized (Port 4)
- 1 RJ-45 jack (8-pin)
- Required cable: Cat. 5 or better
- EMC-to-PC direct connection: Crossover cable required

Serial:

- 1 CPU PCB port utilized (Port 3)
- RS-232/423-compatible

Mechanical

- Cardfile Connectors: 12 cage clamp connectors
- RJ-45 Ethernet Jack (8-pin)
- 2 25-pin "D" connectors (serial links)
- 5 AREMA (AAR) terminal posts

Cardfile Dimensions:

- 19” W x 16.76” H x 11.09” D (48.25 cm W x 42.6 cm H x 28.2 cm D)

Cardfile Mounting:

- Rack or wall (see Ordering Information)

Environmental

- Temperature: -40°C to +70°C (-40°F to +158°F)
- Humidity: 0% to 95%, non-condensing

Ordering and Additional Information

- Refer to Ordering Tabulation for MicroLok II LED 12 cardfile options and field-installed components.
- Other MicroLok II PCBs not shown in tabulation are not compatible with LED 12 System Cardfile.
- Refer to the following RSE catalog sections for ordering information on peripheral components:
  - Track Interface Panels for MicroTrax and E-Code: RSE-1D3
  - CCR and protective devices for LED signal circuits: RSE-7A1, RSE-7A2
- Refer to RSE-1D2.4 for additional information on the LED 12 PCB.
- Request ASTS USA Service Manual SM-9759 for additional MicroLok II LED 12 System information.

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<tr>
<th>Order No.</th>
<th>VCOR Type</th>
<th>Ethernet Port</th>
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<tr>
<td>N18003001</td>
<td>ASTS USA PN-150B</td>
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<td>ASTS USA PN-150B</td>
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<td>N18003101</td>
<td>Alstom B1</td>
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<td>N18003102</td>
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<th>Order No.</th>
<th>Cardfile PCBs (1)</th>
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<tbody>
<tr>
<td>N17061301</td>
<td>Central Processing Unit (CPU)</td>
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<tr>
<td>N17066101</td>
<td>LED 12 PCB</td>
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<tr>
<td>N17061601</td>
<td>Mixed Vital I/O (12V type)</td>
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<tr>
<td>N17065801</td>
<td>Isolated 8-Output PCB (12V type)</td>
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<tr>
<td>N451910-0701</td>
<td>MicroTrax Coded Track Circuit</td>
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<tr>
<td>N17063901</td>
<td>E-Code Track Circuit</td>
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<tr>
<td>N16661203</td>
<td>Power Supply/CPS</td>
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Note (1): Refer to RSE-1D2 for PCB specs.

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<thead>
<tr>
<th>Order No.</th>
<th>Misc. Equipment</th>
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<tr>
<td>N322500-701</td>
<td>ASTS USA PN-150B 400 ohm VCOR</td>
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<tr>
<td>A62-0125</td>
<td>Alstom B1 500 ohm VCOR</td>
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<td>N17006202</td>
<td>Ethernet Communications Module</td>
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<td>X18000802</td>
<td>Cardfile Rack Mounting Kit</td>
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<tr>
<td>X180025021</td>
<td>Cardfile Shelf Mounting Kit</td>
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<tr>
<td>J071153</td>
<td>Cardfile Replacement Fuse</td>
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