



The 481 Mini-Master Stations

The 481 Mini-Master is a low-cost, fully featured alarm and control supervisory system master station that contains everything necessary for supporting up to 32 remote stations. The Mini-master is ideal as a stand-alone system for small monitoring applications, or may be integrated into larger network management schemes incorporating other 400 series masters or "embedded" operations support systems.

The Mini-Master is a microprocessor based master housed in a 1-3/4" H X 19" W enclosure suitable for mounting in industry standard 19/23" racks. Low power consumption (12 watts max at -21 to -56 Vdc) allows reliable operation at sites that provide only station battery. An optional AC power adapter (110 or 220 Volts) is available.

This unit supports two RS232 ports. One port is dedicated to the optional serial printer. The second port is application dependent. Here, TBOS is provided for presentation of system alarms and the operation of remote unit controls.

A flexible range of communications cards are available with the Mini-Master including FSK and RS232. The Mini-Master is compatible with the 481 Series RTUs as well as the Badger's other master stations on a common supervisory network.

The front panel of the Mini-Master provides an "LED-per-RTU" and keypad user interface. A total of 32 LEDs provide high visibility indications of status conditions at each of 32 RTUs (a MiniMaster equipped with TBOS is only capable of providing the status of 8 RTUs on the TBOS port). When an alarm indication is received for an RTU, the user may enter the "Station Level" interface, where the 32 LEDs represent the 32 alarm inputs at the selected RTU. The LEDs indicate status data such as major/minor, normal/off-normal conditions, and will also indicate any station failure (communications or power). An audible alarm indicator can be programmed to sound on major or major and minor alarms. Four Seven-Segment displays are provided to display information such as the selected RTU address, measured voltages at analog monitoring inputs, and prompts and error codes for assisting operator interaction with the system.

The front panel keypad provides a simple, intuitive method of receiving and responding to alarm conditions. Through the keypad, the operator may acknowledge alarms, cutout (disable) RTUs, print alarm data, or execute remote control relays. An optional "Interactive Terminal Interface" is provided to allow the operator to use the system through a "dumb" terminal. An on-board database (user-defined) allows the entry or "plain-language" descriptions of alarm monitoring and control points.

The 481 Mini-Master is designed for high-reliability and cost-effective monitoring of almost any network topology.

Both momentary and latching remote controls may be executed from the master station for the immediate correction of many fault conditions. By operator selection, any control point may be operated in either the momentary or latching mode. The operator may read the condition of remote controls at will.

Communication between master and remotes may be accomplished in dedicated communication facilities (microwave radio, leased phone lines utilizing FSK, Bell 202 Modem, RS-232 or RS422).

On dedicated facilities, polling is automatic. When addressed, the remote stations report any change in status at all alarm points. The master continuously checks each remote to verify system integrity.

Reports

In addition to automatically updated change-of-status information, the operator can request by menu or by function key. Reports are available as both screen display and printed copy.

The reports available include the following:

Badger Alarm and Control, LLC

1820 Arnold Industrial Way, Suite A, Concord, CA 94520 | Tele: 925/686-3031 | Facsimile 925/686-3035 | WebPage www.badgerac.com

Badger Alarm and Control,



- Listing of all "standing" alarms
- Status of all alarm and control points at a specified remote station
- Master Station configuration
- Configuration of alarm and control points at any remote station

Mult-Master Configuration with 481 MiniMaster Stations

A network configuration of two or more MiniMaster Master Stations monitoring the same remote stations (RTU) is called "Multi-mastering". The master can be in one of two network conditions:

Active (primary)

This is the normal stand-alone mode of operation responsible for issuing polling commands to the RTUs. One Master Station will be designated as the active (primary) master.

Passive (secondary)

The passive master only listens to the active master poll commands and to the RTU responses. The passive master will display System/Station COS status data for RTUs in its database. It cannot issue polling commands, however, it can issue control relay commands to the RTUs. In a system where one master is designated as the active master, all other master stations will be designated as passive.

The active master operates as a normal stand-alone master, polling the installed RTUs. The other master stations are all in the passive mode. All passive masters are listening to the poll commands from the current active master. If no poll commands are heard by the passive master within a user-selected period of time (called inactive timeout), the passive master with the shortest timeout entered in its database assumes active status and begins to actively poll the RTUs in the network. If for any reason the passive master next in line (to go active) does not respond, the passive master with the next lowest timeout value will take the role of active master. After six polling cycles, the current master pauses to allow the highest priority master to again take command if it is again operational or the communications line has been reestablished.

Any of the networked masters can take over RTU polling responsibilities in the event the primary master station fails. When the failed master station is functioning properly again, it automatically assumes the primary master station status. A priority structure determines which secondary master will take over for the failed primary master station. Priority is defined by setting the "Inactive Channel Timeout" in each master station's database.

The Inactive Channel Timeout defines the length of time during a polling cycle when the polling master will fall silent and monitor the communication line. In this state, the master is described as being in the "Standby" mode. The master will remain in Standby if it detects another master communicating on the line. If the Standby master does not detect communication on the line, and the line remains silent for the length of the Inactive Channel Timeout, the master will become active and begin polling again.

Badger Alarm and Control, LLC

1820 Arnold Industrial Way, Suite A, Concord, CA 94520 | Tele: 925/686-3031 | Facsimile 925/686-3035 | WebPage www.badgerac.com

Badger Alarm and Control,



Passive Master Operation

The passive master may be located at the same site as the active master, thus providing local hardware redundancy, or at another site providing COS status indications and remote control relay execution capabilities. If more than two masters are networked, monitoring path break detection should be considered in their placement. If there is a path break, the passive master at the far end of the break will become active. This is because the timer in the passive master will expire, not having heard the active master's polling commands on the common communication line.

Masters in the passive mode does not issue polling command on the communication channel but will still perform the following functions:

- System/Station COS modes are as normal
- Audible alarm indications (major/minor)
- Alarm Acknowledgement
- Print status from front panel
- Remote Controls Execution - at the end of every active master polling cycle

Since all masters are bridged on a single communication channel, only one master station can communicate with remotes, or the condition of "glare" occurs, nullifying all commands. This means that any operation requiring the transmission of a command cannot be performed from a MiniMaster when designated as a passive master.

Remote Controls

Remote Control Relays at RTUs can be executed from any of the masters, active or passive. Controls are executed at the time of input from the active master as normal.