

June 9, 1999

BOSTON TRANSPORTATION DEPARTMENT

Specification for Closed Loop Field Master (24 Volt DC)

1. GENERAL

The closed loop field master shall consist of a local master unit and 24 VDC power supply as described herein. The local master shall be capable of generating master co-ordination functions as defined by NEMA TS-2.

It shall be possible to monitor and control the local master via a twisted pair cable connection from the central master. Software and hardware shall be supplied which will allow programming and control at a remote location (ie the central master) . The communications to central from the closed loop field master shall be designed to operate over existing twisted pair voice grade wires unless a telephone connection has been provided to the control cabinet. In that case, a dial up from/to the central master shall be provided.

The closed loop master shall provide for automatic selection of any of 16 timing plans either based on volume and/or occupancy data or by time of day. Remote flash and co-ordinated operation shall be programmed by time of day/day of week.

It shall be possible to operate the closed loop field master in a mode where both 24 VDC outputs and system communication are active simultaneously. This will make it possible to control intersections with compatible timer units via the system communication ports and adjacent non-compatible controllers via 24 VDC outputs.

2. TIMING AND ENVIRONMENT

Timing shall be synchronous with the power line when such power is available. When commercial power is lost, the timing shall be maintained by a back-up source. Accuracy during such back-up operations shall be +/- .005% throughout its full temperature range.

No time shall be gained or lost during changeover from 115 VAC to the back-up system and back to 115 VAC.

3. OUTPUTS

The electronic master outputs shall each have single-pole, double-throw relay outputs with a contact rating of at least 15 amps at 115 VAC resistive load. Outputs shall be provided as follows:

A twelve (12) terminal fuse block shall be provided complete with appropriate value glass tube type fuses and mounted in the control box for connections to interconnect cable. Fuses shall be 1/4" X 1 1/4". The positions on the terminal block and functions are to be as follows from bottom to top:

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#1 - common (not fused)
#2 - Cycle #2
#3 - Cycle #3
#4 - Split 2
#5 - Split 3
#6 - reset #1
#7 - remote flash
#8 - Aux function #1
#9 - coordination operation
#10 - Cycle #4
#11 - Split #4
#12 - Time Base Reset

3. OUTPUTS (cont.)

Inputs/outputs shall each be provided with appropriately rated lightning protection on the controller side of the fuse strip.

If the fuse block design is such that it is not appropriate to wire solid #14 AWG cable directly to the fuse block terminals, wiring shall be provided from the fuse block terminals to an appropriate size terminal block for field connections. Wiring from the fuse block to the interconnect input terminal strip shall be direct and not be bundled with any other controller cables.

Only one split and one cycle output shall be provided to the 24 VDC field output at a given time.

The TPA, TPB, TPC and TPD outputs from the master coordination unit (a portion of this closed loop master) as defined by NEMA TS-2 table 3.6.1 shall be encoded to correspond to the corresponding reference dial and split numbers. Dial 1, Split 1 shall have no cycle or split lines active. (All 0 volts) Dial 4 and Split 4 lines would be 24 VDC when TPA, TPB, TPC and TPD are all "on."

A 24 VDC power supply external to the controller unit shall be supplied according to NEMA TS-2 Section 5.3.5. The 24 VDC outputs shall be supplied from this unit.

Offset #1 (Reset #1) shall be the active reset under coordinated operations.

A second interconnect terminal fuse block shall be provided for system communication to local controllers. It shall also utilize 1/4" x 1 1/4" tube type fuses. Order from bottom to top shall be as follows:

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Channel 1

1. Transmit 1
2. Transmit 2
3. Receive 1
4. Receive 2

Channel 2

5. Transmit 1
6. Transmit 2
7. Receive 1
8. Receive 2

3. OUTPUTS (cont.)

Appropriate transient protection shall be provided on the controller side of this fuse strip. Connections from the local cabinets to the controller units from these 2 pair connections shall be via the 9 pin port 3 connector defined by NEMA TS2 at the local controllers. These system communication ports (channels 1, 2) shall provide upload/download of controller unit timing data, including time of day/day of year for timing reference and upload of controller status and system detector volume and occupancy data from the local controllers to the closed loop master.

Wiring logic shall be such that when the closed loop master has failed but 24 VDC power is available in the control cabinet, field output for reset power will be zero (0) volts. Local master reset output shall be 24 VDC interrupted once a cycle by zero (0) volts for the duration of the sync pulse.

Other functions shall be wired to provide 24 VDC when the function is enabled by the appropriate master output relay circuit.

The remote flash function shall be designed to preclude cycling back and forth between stop and go and flash operation except as called for by the local closed loop master time of day/week/year settings. If intermittent communications failures preclude reliable operation, the closed loop master shall discontinue communications outputs but continue to output hardwire functions until declared by the operator to be repaired. It shall be possible to make this "repaired" declaration either locally at the closed loop field master or from the central closed loop master.

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Specification for Closed Loop Field Master4. WARRANTY

Each unit shall be warranted to be free from defects in material and workmanship for a period of one year from the date of installation. Any warranty service required shall be promptly performed at the manufacturer's facility or the manufacturer's authorized service agency. The purchaser will pay transportation costs to such service point, the manufacturer will pay those costs to return the unit by normal surface transportation means.

5. SERVICE INFORMATION

Service information shall be furnished to the Boston Transportation Department consisting of schematics, parts locators, parts lists and trouble-shooting guide. Three (3) copies shall be provided for each electronic master. Parts lists shall include part maker reference to two manufacturers.

6. OPERATING INSTRUCTIONS FOR FIELD EQUIPMENT

Three sets of operating instructions shall be furnished with each electronic master. Two (2) sets will be fully detailed. A third set of abbreviated instructions shall be laminated for permanent field reference.

Year 2000 Compliance Requirements

The Contractor represents and warrants that the information technology for this device is Year 2000 compliant. Year 2000 compliant means information technology that accurately processes date/time (including, but not limited to, calculating, comparing and sequencing) from, into, and between the twentieth and twenty-first centuries, and the years 1999 and 2000 and leap year calculations. Furthermore, Year 2000 compliant information technology, when used in combination with other information technology, shall accurately process date/time data if the other information technology properly exchanges date/time data with it. This warranty shall survive the expiration or termination of the Contract under which the device is purchased.

Year 2000 Warranty

The Contractor represents and warrants that the product is Year 2000 compliant. Year 2000 compliant means information technology that accurately processes date/time data (including, but not limited to, calculating, comparing, and sequencing) from, into, and between the twentieth and twenty-first centuries, and the years 1999 and 2000 and leap year calculations.

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Maintenance Training

The contractor shall provide instructional time and furnish all materials and services necessary to train experienced City maintenance personnel in the maintenance and repair, to the component level, of the following systems equipment and approximate duration:

Closed Loop Master 8 hours

Training sessions shall be conducted at the facilities in Boston. Eight (8) hours of training during periods to be approved by the Boston Transportation Department Director of Operations shall be provided for up to 10 trainees.

Training sessions shall only take place after all syllabi and proposed instructor(s) are submitted and approved by the Boston Transportation Department Engineer.

Master Programming

The contractor shall after shop testing, fully program the closed loop master according to the plans for the project or as directed by the engineer. A copy of the controller program shall be supplied to the BTD engineer in an IBM compatible format on a 3.5 inch disk.

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