# SERVICE EQUIPMENT

FRONT

BACK

WITHOUT BATTERY BACKUP

WITH BATTERY BACKUP

On Mn/DOT signal system projects, the Contractor must furnish and install a signal service cabinet (SSB) with battery backup capabilities. The signal service cabinet must be Mn/DOT approved and listed on the Mn/DOT Approved Products List (APL) for Signals.

For wood pole installations, the meter socket is located directly above the disconnecting means.

The height of the weatherhead must be approved by the electric company. Sufficient length of power conductors must extend beyond the weatherhead for connection to the power conductors from the source of power and a drip loop. Connection of the source of power will be made by the power company at no cost to the contractor.

## Signal Service Cabinet (SSB) Wiring and Operation with UPS

When a plan calls for an Uninterrupted Power Supply (UPS) to be installed in the Signal Service with Battery Backup (SSB) cabinet, there are a few items that are the Contractors' responsibility.

The plan will call for a 6 pair 19 AWG (6PR/ #19) telephone cable to be pulled from the SSB cabinet to the Traffic Signal Cabinet in the Communications conduit. This cable must be terminated as shown in the Appendix on Pages 34-14 and 34-15.

The Contractor must terminate wires on the power inverter See Page 22-4 for correct wire termination on the power inverter.

When the UPS and traffic signal are fully wired and the batteries are fully charged the UPS operation should be tested as follows:

1. Make sure the bypass switch is in BBS mode and not in bypass.

2. Shutting off the main breaker in the SSB cabinet will remove power from the signal cabinet and the UPS.

    a. At this point the UPS should switch into operation and the traffic signal should continue to operate.

    b. The strobe on the side of the cabinet should begin to flash as soon as the main breaker has been tripped.

3. Reset the main breaker and after 30 seconds the UPS should qualify the incoming AC voltages, at this time the UPS will stop supplying power to the traffic signal cabinet and switch over to utility power.

Once the initial power up test is completed the event and run time counters should be reset. After these initial resets are completed and the intersection is placed in automatic operation the event and run time counters should never be reset.

Battery backup systems should operate as follows:

1. They should run the traffic signal for two hours in automatic operation.

2. After two hours the UPS will close a set of contacts which should place the intersection in remote all red flash. The intersection will remain in flash until one of two events happen.

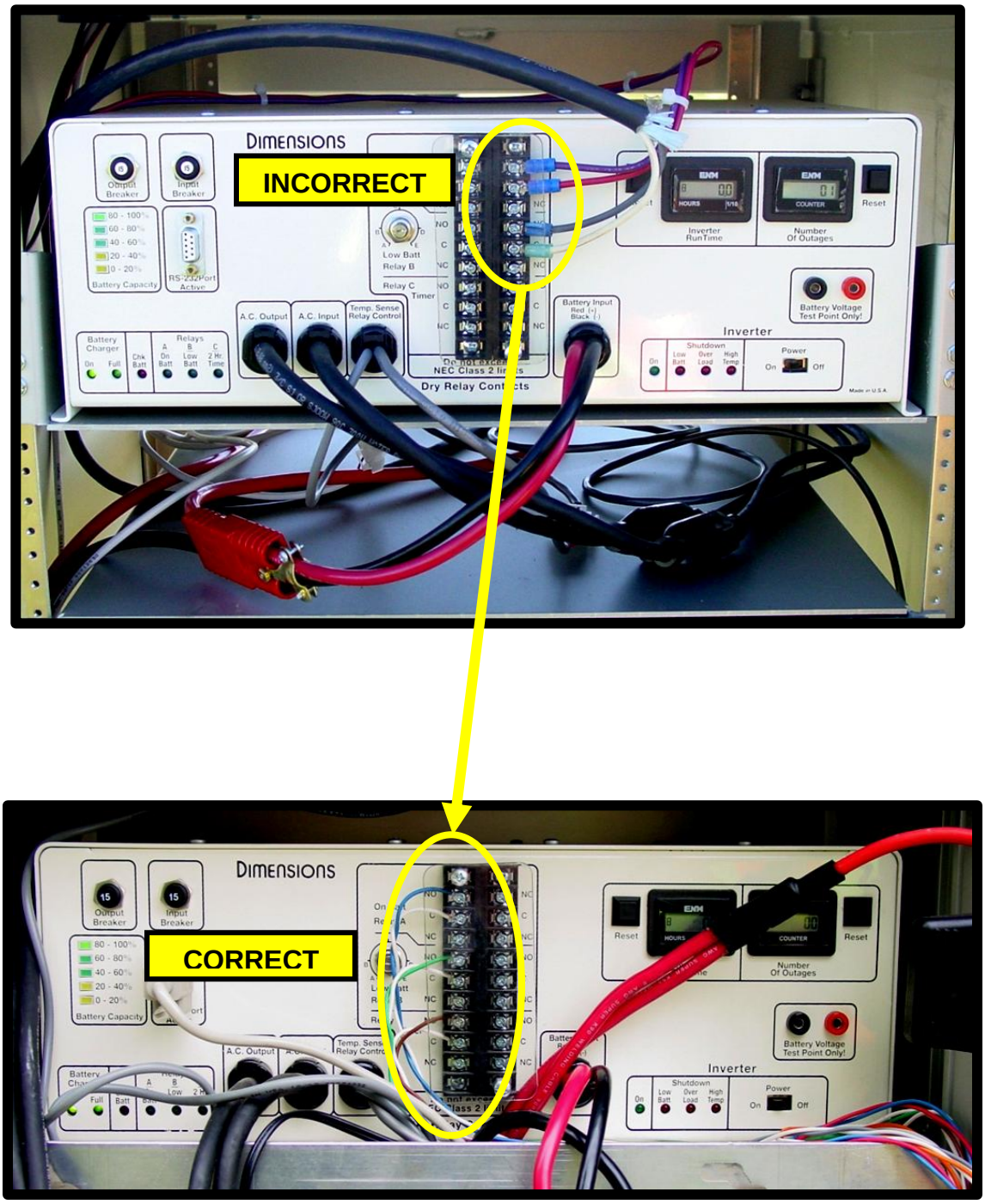
    a. The 120 VAC line is restored by the local power utility. The signal system will begin to operate on utility power and UPS will stop supplying power to the traffic signal.

    b. The batteries reach a point where they can no longer be discharged. If this event occurs the 120 VAC coming out of the inverter will be shut down and the intersection will go black. The signal system will resume operation when utility power is restored. After utility power is restored battery discharge levels need to be checked to ensure the UPS is recharging the batteries.

Based on a traffic signal cabinet with a 3 amp draw in automatic operation and a 1.5 amp draw in all red flash we would expect the intersection to operate in auto operation for two hours and in flash for an additional 6 to 10 hours. This is assuming the batteries are new and fully charged.

When required by the Contract documents, the Contractor is required to fill out an Electric Service Information form for each signal system project. A sample of this form is included in the Appendix.

Wires must be terminated on the power inverter correctly to ensure that the battery backup system operates as intended during a power outage.

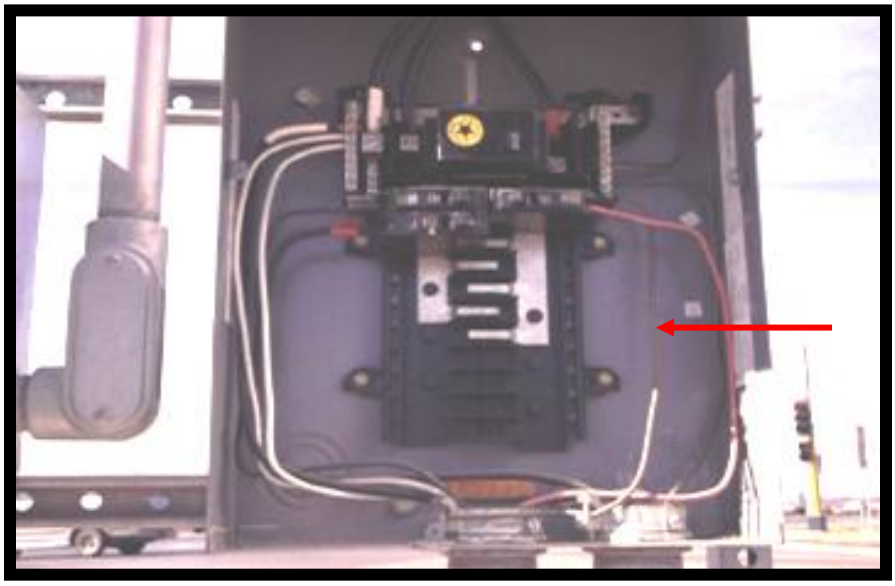


The meter socket must be approved by the power company and must contain a positive bypass mechanism having lugs that will allow power conductors to be stripped and laid into the lugs without being cut. The meter itself must be furnished and installed by the power company.

**Circuit Breaker Load Center** - At some locations, the disconnecting means must be a 3-wire, solid neutral, 100 amp, 120/240 volt AC, NEMA 3R rain tight enclosure for outdoor use, UL listed for use as service equipment. The mounting of the circuit breaker enclosure is detailed in the contract documents.

The load center must have a front cover and inner dead front cover hinged at the top and snap closes at the bottom. Both covers must be easily removable to allow easy installation and maintenance.
The Contractor must furnish circuit breakers in the load center as specified in the Contract documents.

Circuit breakers must be 120/240 volt AC, and have clearly marked “ON” and “OFF” positions. The circuit breakers and the load center enclosure must be made by the same manufacturer. Each breaker must be identified by the load they are carrying; Signals; Lighting.



The service equipment must utilize copper wires and must have connections that are UL listed for use with copper wire. All the lugs required for the connection of the power conductors in the load center must be solderless (set screw type), and must be the appropriate size for the conductors used.

The circuit breaker load center must be provided with an isolated, bondable neutral bar with the capacity to handle the number and size of the neutral and grounding conductors listed in the Contract Documents. Bonding of the neutral conductor must be in accordance with the National Electrical Code.


If a step-down transformer is needed, the transformer must be an outdoor, general purpose dry-type transformer. Transformer specifications and mounting details are listed in the Contract documents. The transformer must be National Recognized Testing Laboratory (NRTL) listed for indoor-outdoor applications and must meet applicable NEMA and IEEE standards.

The transformer must be protected by a circuit breaker mounted in a NEMA 3R rain tight enclosure for outdoor use.

Circuit breaker enclosure specifications and mounting details must be listed in the Contract Documents and be NRTL listed for indoor-outdoor applications and meet applicable NEMA and IEEE standards and have provisions for a padlock. The Contractor is responsible for coordinating and making the necessary arrangements to obtain the power connection.

# Rural Lighting and Flasher Service Cabinet (RLF)

Some Mn/DOT lighting system and flasher system projects may require the Contractor to furnish and install a Rural Lighting and Flasher (RLF) 120/240 VAC service cabinet. The RLF service cabinet must be Mn/DOT approved and listed on the Mn/DOT Approved Products List (APL) for Lighting.