Recommended Instructions for Test of Positive Train Control Wayside Interface Units (WIU) before Placing in Service
Revised 2020 (4-3 pages)

A. Purpose

1. This Manual Part makes recommendations for the testing of Positive Train Control (PTC) Wayside Interface Unit (WIU) installations or modifications before placing in service.

2. For the purposes of this Manual Part, the WIU functionality encompasses only the conversion of wayside device status into data messages and responses to incoming messages. This Manual Part addresses only the additional testing required for this functionality.

B. General

1. The WIU generally performs the tasks of:
   a. Converting wayside device status information into serial messages in the form of datagrams that are transmitted to the communications network.
   b. Receiving and responding (if appropriate) to messages from the communications network.

2. As applicable, the location, WIU address, and other characteristics of the WIU and associated wayside devices are identified in a track database maintained by the host railroad (or others). The validation of this information shall be verified prior to placing in service, not covered in this Manual Part, but is verified prior to placing in service in accordance with railroad procedures.

3. This Manual Part generally applies to non-vital overlay, vital overlay, vital stand-alone and mixed PTC systems.

C. Installation

1. WIU’s shall be installed per Manual Part 1.5.1. Recommended Instructions for the Installation and Maintenance of Solid State Equipment.

D. Tests


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1. At the location or locations monitored by the WIU, all appropriate tests should either be conducted in conjunction with WIU tests or have been conducted on the wayside signal equipment before WIU tests are performed.

2. Tests which may interfere with safe operation of trains shall not be started until train movements have been fully protected as instructed per railroad procedures. Temporary repairs or adjustments, when required, shall be made in such manner that safety of train operation shall not be impaired. When repair, adjustment, change or replacement is made, tests shall be made immediately to determine that the apparatus-WIU functions as intended. When making test of apparatus-WIUs, proper instruments shall be used and it shall be known that no unsafe conditions are created by the application of testing equipment. Proper protection for train movements shall be provided as instructed. Consideration shall be given to data that may be transmitted over the communications network from the unit under test.

3. All testing requires verification that actual data values within the message corresponds to the proper wayside appliances and status. Additional system level tests may be required as defined in the PTC Safety Plan.

4. There are various ways to perform the testing as discussed below.

a. WIU tests may involve disconnecting communication connection between the WIU and the Wayside Message Server (WMS) or Communications Network. In cases where the WMS is integrated within the WIU, a method must be provided to test the WIU datagram with the testing device before the WMS function. The testing device is then connected directly to the WIU under test. (Where not practical, a separate cable may be used. When a separate cable is used, a separate test shall be performed to verify the in-service cable operation).

Figure 2341-1 shows one typical arrangement for testing WIU's.
Figure 2431-1 WIU Test Apparatus

b. WIU testing may be performed directly through the communications network from the testing device in combination with a data radio or other suitable equipment that simulates all scenarios available to the WIU location.

5. WIU testing device shall indicate all relevant WIU status information. As an example, the following types of information should be verified for WIUs developed in compliance with Draft AAR Manual of Standards and Recommended Practices, Standard S-92020 Interoperable Train Control Wayside Interface Unit Requirements:

a. WIU address and other header information is correct.

b. All monitored device status changes are reflected in transmitted datagram (switch position, signal aspect, hazard detector, etc.) in the proper sequence. All valid switch, signal and hazard detector states shall be tested.

c. Testing of many if not all of the states (for example; G/R, G/D, 1 Normal, 1 Reverse, or 1 not indicating,) may be performed in a lab environment for microprocessor based systems that control signals and switches, etc. This requires testing against a known Logic Controller application program. Field testing in this case requires validation that the application program used in lab testing is the same.
that exists in the field, and an alternative set of validation tests is performed.

d. Additional testing requirements may be specified by manufacturers such as testing of invalid signal states. There is no requirement that these tests may not be required to be done in the field.

e. WIU responds to locomotive request messages from the communications network or locomotive simulator if required for the location.

f. In addition, tests for diagnostic and system management functions should be validated with the Testing Device.

6. Results of tests required herein and all other tests that may be required shall be recorded, as instructed on the prescribed forms.