Recommended Vital Circuit Design Guidelines for Highway Traffic Signal Pre-emption
Revised 2000 (3 Pages) (16-30-10)

A. Purpose
These recommended vital circuit guidelines apply to highway traffic signal pre-emption.

B. General

2. The pre-emption time shall be specified by the Highway Authority as referenced in Manual Part 3.3.10, (Recommended Instructions for Determining Warning Time and Calculating Minimum Approach Distance for Highway-Rail Grade Crossing Warning Systems).

3. Examples of pre-emption circuits are shown in Figures 1 and 2. The systems will operate in the same manner for trains entering from either direction.

4. The Interconnection between the traffic control signal and the railroad warning system shall be a double break supervised relay circuit or isolated vital serial data circuit.

5. When using relay logic, additional track circuits may be required beyond the normal crossing warning device control circuits. The length of these additional track circuits depends on the pre-emption time required for the highway traffic control signal Maximum Preemption Time (MPT). 

6. When using relay logic control circuits for highway traffic signal pre-emption, the pre-emption time provided will be inversely proportional to train speeds. When using constant warning time crossing control devices, the pre-emption time will remain consistent.

7. The vital circuit design guidelines provided in this manual part represent one method of constant warning time control logic and one method of relay control logic design for highway traffic signal pre-emption applications. Some
aspects of the circuit designs may vary, depending on the design practices of the individual railroad.

C. **Operation**

**Constant Warning Time Control Logic**

When a train enters either approach and the preset pre-emption warning time is reached, energy will be removed from the pre-emption terminals (PE) which will de-energize the pre-emption relay (PER). The PER, when de-energized, will open the control circuit for the Highway Traffic Controller. As the Train progresses over the crossing and clears the island, the PER will energize and close the circuit to the Highway Traffic Controller.
Relay Control Logic

When a train occupies track circuit WA, the west approach relay (WAR) will de-energize, removing energy from the traffic pre-emption relay (PER). The PER, when de-energized, will open the control circuit for the Highway Traffic Controller. The PER will remain de-energized as the train progresses through WT and XT. The west directional stick relay, (WSR) once established, will provide a by-pass circuit path around the east track relay (ETR) and the east train progresses over the crossing and clears the island track (XT), the PER will energize and close the circuit to the Highway Traffic Controller.
Additional drawings:

3. Two track with second train logic

4. Vital timer for constant time between APT and GCP
Figure 4

NOTE: MDPR TIME INTERVAL SET TO EQUAL TIME REQUIRED FOR CROSSING WARNING SYSTEM TO BEGIN OPERATION AFTER ADVANCE PREEMPTION IS INITIATED.