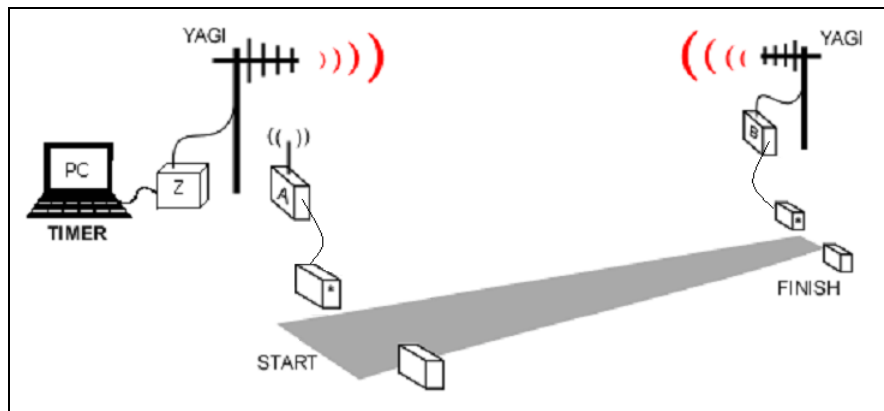*s i n b a d*

engineering corp

Wireless Timing Installation Overview

The Pennsylvania Hillclimb Association Wireless Timing System includes a Timing Computer that runs the AXWare timing software, three Race America T-Link radio units, antennas, antenna towers, and sensors for the start and finish lines. The diagram below shows a typical configuration.

The three T-Link units are the heart of the wireless system. Each unit has a specialized purpose, and is clearly marked on the bottom with a letter to identify its function – A, B or Z. The A T-Link unit manages the start sensor, the B T-Link unit manages the finish sensor, and the Z T-Link unit acts as a go-between for the A and B units and the Timing Computer.

Most of the installation tasks can be performed the day before the event, but some equipment must be installed at the beginning of each event day, and removed at the end of the day.

Pre-event setup: On the day before the event, the antenna masts, antennas and long cable runs are installed and tested. These items are left in place for the entire event.
- **Number of workers:** 4-5 people to raise the antenna mast, 1-2 people to test. If cable runs are required (i.e., Duryea and Pagoda), 1-2 additional workers to run the cables (cables can be run while the antenna masts are being raised to reduce overall installation time).
- **Time:** 1-2 hours to raise masts (full worker crew), 1-2 hours to test (reduced crew); 1-2 hours to run cable (if needed, and which can be done in parallel with mast setup).
- **Additional Equipment:** A pickup truck or other vehicle is needed to transport equipment to the start and finish lines. A 6 foot step ladder is needed to raise the antenna masts.

Event day setup: On each day of the event, electronic components such as T Link Units, wireless RS232 units and sensors/emitters as well as short cables, etc, are set up before the start of the event, and removed at the end of the day. The T-Link and wireless RS232 units (if needed) are recharged at the end of each day.
- **Number of workers:** 1-2 people.
- **Time:** Approximately 60 minutes before and 30 minutes after each event day

Post event tear down: When the event is over, the equipment is taken down, packed and stored away.
- **Number of Workers:** 4 minimum for each antenna mast, 1-2 workers to wind up cable (if any), which can be done in parallel with antenna mast dismantling
- **Time:** 45 minutes
- **Additional Equipment:** A 6 foot step ladder is needed to lower the antenna masts.

Wireless Timing Installation Details

Basic installation tasks are detailed below. Please consult the Site Installation Guide for site specific details on antenna position and cable requirements.

Pre-Event Setup: On the day before the event

Antenna and cable setup can be done at the same time, but testing needs to wait until both are complete.

Set up and position the antennas – for most sites, antenna masts are raised for the B and Z T-Link Units only. However, Pagoda and Duryea also require elevation of the A T-Link antenna.

To raise the antenna masts:
- Attach the antenna to the mast, connect the antenna cable and tie on 2 sets of 3 or 4 guy lines.
- Place the mast base in position, level it and stake it down.
- Insert the mast into the base and tighten the wing nuts.
- Raise the mast by standing on the step ladder, and raising each section. Tape the antenna cable to the mast at intervals. **Note** – a person must man each set of guy lines to keep the mast upright while it is being raised.
- Once the mast is raised, stake down the guy lines, adjusting tension until the mast is straight.
- Loosen the base wing nuts, align the antenna by rotating it in the base to the appropriate compass course, and retighten the base wing nuts.

Once all antenna masts are raised, verify antenna positioning using AXWare and the Timing Computer.

Run the cable – Cable runs are needed when (a) the distance from the A T-Link unit to the start line is greater than 100 feet, (b) the distance from the B T-Link unit to the finish line is greater than 100 feet, and/or (c) the distance from the Z T-Link unit to the Timing Computer station is greater than 100 feet and wireless RS232 transmitters cannot be used. Currently, cable runs are only required for the Pagoda and Duryea events.

Test – To perform a complete system test, install all of the components needed for the connections, including timing sensors. Test the Z T-Link unit, and then the A and B units with the Z unit still in place.
- **Z T-Link to Timing PC:** To test, connect the Timing Computer to the Z T-Link Unit, run AXWare and make sure the Timing Computer can talk to the Z T-Link unit
- **A T-Link unit to start sensor**: Only needed if long cable run used for A T-Link to start line. To test, run AXWare and make sure start events are received when the sensor is tripped.
- **B T-Link unit to finish sensor:** Only needed if long cable run used for B T-Link to finish line. To test, run AXWare and make sure finish events are received when the sensor is tripped.

When testing is complete, remove all components except the antennas and masts and long cables.

Event Day Setup: On each day of the event

Before the event starts each day, set up the T-Link units, the sensor/emitters and any components needed to complete the connections. Use the rain boxes for all items that are not waterproof. Work with the Chief of Timing to connect the Z T-Link to the Timing Computer and test the system.

At the end of the day, remove T-Link Units, sensor/emitters and other items installed at the beginning of the day (cables, rain boxes, etc.). Recharge the T-Link Units and Wireless RS232 units (if used).

Post Event Teardown: After the event is over

Power off all electronic equipment. Roll up the cable. Take down antenna masts and bases, and remove the antennas, disconnecting the antenna cables. Disconnect the T-Link units and other components and pack up the equipment. **Note -** some of the equipment is very fragile, and some of the pieces are small, so care must be taken during teardown not to break or lose any of the system components.