

GUIDE TO EXHIBITS IN HARRIS TOWER

Use this guide to help you understand the various exhibits as you move around Harris Tower on your own. Most of these exhibits are not explained in detail during your introduction to the simulation. Exhibits in the display cases are rotated on an occasional basis so are not covered in this document. Feel free to ask questions of the docents should you have any and enjoy your tour.



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Exhibits in Harris Tower

A. Bulletin Board

At the top of the stairs mounted on the wall is a “Bulletin Board” that actually held Bulletin Orders and General Orders. Since the rulebooks themselves were printed only periodically, any interim updates that were made were printed on paper sheets, punched with two holes at the top and posted on the hangers you see mounted on the board. While we are not certain where this board came from, it is representative of the style of one that might have hung in Harris Tower.

B. Documents

As you make your way around the second floor of Harris Tower, note the various pictures, schedules, rosters and other items framed and hung on the walls. These have been donated to the Harrisburg Chapter by members and friends, and while they would not have been a part of the “décor” when it was a working tower, the data and scenes pictured help to promote an appreciation for the work that was done here over the years.

C. Station Clock

On the south wall is a replica of a Seth Thomas “No. 2 Regulator” wall clock. The clock was donated by Bradley Woodworks of Milton, Ontario, Canada. Using the original manufacturer’s blueprints, Bradley manufactures an entire series of replicas of railroad

station clocks. As you can see, the workmanship is terrific! These clocks are available for sale on the web-site: www.bradleywoodworks.com.

This particular clock has been fitted with a computer controlled movement that is tied into our simulation system. This allows the clock to be set to “Simulation Time” when the Harris simulation is running and set to Time of Day when the simulation is idle. The clock is electronically set to correct time of day using data from the U.S. Naval Observatory in Annapolis, MD.

DO NOT CONFUSE THE TIME DISPLAYED ON THE SETH THOMAS WALL CLOCK WITH THE ACTUAL TIME OF DAY since the clock will normally be set to Simulation Time. (We wouldn't want you to miss your train!)

In the heydays of the PRR, all railroad clocks were synchronized to US Naval Observatory Time directly from the Naval Observatory. This voice announcement was carried over the PRR's Train Wire communications system, in its day the largest privately owned communications network in the world.

D. Typewriter and Stand

This Oliver typewriter came from the PRR at Olean, NY and is an identical model to that used by the PRR at most Lines East locations, including towers, during the 1920s and 1930s. It is unusual in other respects. Besides its obvious age, it types both English and Spanish letters (notice the figures above the “h” and the “N”). Also, whereas most typewriters had the

ability to shift into two positions (upper and lower case letters), this typewriter could shift into three positions (notice the three figures on some keys). This movement is controlled by the keys labeled “MAY” and “NUM.” The reasons for these unusual features of the typewriter are unknown. The steel stand was made in the PRR Altoona Shops and is one of many constructed for use on Lines East and is believed to be the only one of its kind in existence. It was used by the Chief Clerk in the Harrisburg PRR office of the Maintenance of Equipment (aka Mechanical) Department. This office was located in the Harrisburg station’s Hoffman Building on Market Street. After that office was done with the stand, it was handed down to the donor’s sales and service office in the Lancaster, PA, passenger station. When computers appeared on the scene, he was told to trash the stand. Recognizing the historical significance of the stand and the typewriter, the donor combined the two to make an unusual, yet appropriate, display for Harris Tower.

E. Model Board

The model board is the lighted map that shows the layout of the trackage that Harris Tower controlled. It is twenty feet wide, four feet high and made of steel. It contains over five-hundred indicator lamps that kept the operators at Harris apprised of the track conditions within the interlocking. The track diagram has been painstakingly restored to its early 1940’s layout. Your tower docent will explain the meaning of the various indicators.

F. Interlocking Machine

The Harris Tower Interlocking Machine is the device that contains the levers that actually controlled the track switches and signals at Harris. Its name derives from the fact that the levers are all mechanically tied together or “interlocked” in a manner that prevents the operators from setting two trains on a collision course. The machine also contains electrical locks that prevent the operators from throwing a track switch while that switch is occupied by a train. The Interlocking Machine is actually an analog computer, making decisions designed to keep people safe.

The Interlocking Machine at Harris was built by the Union Switch & Signal Company, located near Pittsburgh, PA. It is a Model 14 Electro-Pneumatic system. The term Electro-Pneumatic means that while the track switches were electrically controlled, it was air pressure that provided the motive power to actually move the switch. This system produced a considerable cost savings in the construction of a plant the size of Harris by eliminating a great deal of heavy electrical cabling. Rather than use powerful electric motors fed by heavy power cables to “bend the steel” of the track switches, much smaller control wires operate air valves and it is the air pressure that actuates the track switch.

The Harris Interlocking Machine uses 113 numbered levers. In general, odd-numbered levers controlled track switches, while the even-numbered levers controlled signals. Your tower docent will explain the operation of the Interlocking Machine in more detail.

G. Air Gauge

Located atop the interlocking machine is a small gauge registering air pressure between zero and 200 pounds per square inch. As described above, compressed air was piped throughout the interlocking to move track switches in the field.

The normal pressure was 90 pounds per square inch. Should the pressure should fall due to malfunction an alarm buzzer would sound in the Train Director's Control Panel.

At 30 lbs per square inch, any signals set to allow a train to proceed would only display a "Restricting" aspect, warning train crews to be on the lookout for switches that might not be properly aligned.

At 15 lbs per square inch there wasn't enough pressure to hold the track switches in position. All signals would automatically display "Stop," halting all train movements at Harris until the proper air pressure was restored.

H. Builders Plate

Affixed to the left side of the Interlocking Machine is a replica of the brass builder's plate that would have been there originally. The original builder's plate for the Harris machine has not been located. However, this replica was based on the original builder's plate from Rockville Tower, located about five miles west of Harris. Rockville had a machine similar to the one at Harris and it is believed that the two plates would be identical, based on the listed patent dates. Note the tribute to George Westinghouse,

founder of Union Switch & Signal Company, which is still in business producing railroad hardware today.

I. Ringer Boxes

These are located high on the right side of the wall facing the tracks. There are five of them representing important communications circuits that entered the tower, primarily dispatchers of the various divisions the operators at Harris interfaced with. When a message was coming to the tower on any of the five circuits, the bells on that circuit box would ring. The simulation is designed to ring the bells at appropriate times.

J. First Aid Station

In the Southeast corner of the tower is the original glass-fronted first aid cabinet. As a display inside the station are some smaller kits of various vintages.

K. Dwarf Signal

Wayside signals used at Harris are referred to as a “Dwarf Signal” because of its small size. The use of full size signals mounted on a tall mast is not possible within an interlocking due to the close spacing of the tracks. Note that one side of signal is curved. This further reduces the profile of the signal to allow it to be spaced even closer to the tracks.

The signal can display four aspects: Slow Clear, Slow Approach, Restricting and Stop. Your docent can explain each in more detail.

This signal is connected to the Harris Tower computer simulation and can be “slaved” to any signal on the territory,

allowing it to automatically display the aspect that would be seen by a passing train crew in the field.

This type of signal is still in use today. In fact, a look outside the tower windows reveals many such signals in use controlling train movements throughout Harrisburg Station.

L. Teletype Machine

As the plaque on the side of this classic machine says, it was donated by the North Jersey DX Association Amateur Radio Club in memory of Benjamin Friedland, former club president and onetime owner of his own railroad—the Morristown & Erie. This is a Teletype Corporation Model 15KSR, identical to the one that was used in Harris. It has been fully restored to working condition and has been integrated into the tower simulation, periodically printing “220 Reports” or lists of train compositions. The lists include car name, car number and position as well as the origin and ultimate destination of each and every car. These consist reports were transmitted from the trains originating terminal and were used by the operators at Harris to plan shifting movements in order to place the proper cars on the proper trains.

M. Operator’s Desk

The large desk was custom made for the PRR to provide work space for three people. Facing the model board, the left-most position was the Train Director. The Train Director was the boss of the tower. He would decide what trains would be routed to what tracks as well as what

route a train would take to traverse the territory. The center position was that of the “listening post.” It was the job of the listening post operator to monitor the Middle Division train wire circuit where other towers west of Harris would announce the passing of trains. The listening post operator would keep a log of the progress of trains approaching Harris from the West, allowing the Train Director to plan the movements at Harris well in advance. The right-most position was the Block Operator. This operator kept the written log of train movements through Harris. He also prepared any special orders and would physically “hoop” those orders up to passing trains.

N. Communications Panels

Also known as “Lamp & Key” boxes, these panels controlled the communications circuits to and from Harris Tower. The circuits were known as “block wire” and “train wire” circuits. Each key connected Harris to a particular communications circuit. Only one circuit could be selected on any given panel at a time. The block wire circuits connected the operators at Harris directly to adjacent towers. The train wire circuits connected Harris to a party line consisting of the dispatcher and all other towers in a given division. Incoming messages from the dispatchers were announced by the ringer boxes (described above.) Incoming messages from other locations were announced by a buzzer inside the boxes.

The jacks below the keys allowed Harris to “patch” circuits together. For example, Rockville Tower to the west of Harris did

not have a dedicated key to communicate directly with State Tower to Harris' east. If the operators at State and Rockville needed to communicate directly (and privately) with one another, the operators at Harris could plug a patch cord between the State and Rockville circuits and flip up both keys, enabling a temporary direct connection.

O. The Headset

In combination with the foot switch on the floor, the headset would allow the operators to talk on the various circuits in the communications panels on the desk. To speak on a particular circuit, the operator would flip the switch in the up position and step on the foot switch.

P. The Scissors Microphone

The scissors microphone allowed the operator at the left-most desk position—the Train Director—to communicate without wearing a headset. An additional key switch located in a small box on the right side of the desk's foot well allowed the Train Director to switch between the scissors microphone and his headset. In either case, the foot-switch still needed to be pressed to talk.

Q. The Loudspeakers

As an alternative to the use of headsets, communications could be monitored through the speakers in addition to the headsets. The voices on the speakers are, in many cases, voices of actual Harris Tower operators that were recorded and converted into typical messages. They represent messages that operators at Harris would have heard from other

towers up and down the railroad alerting all “on the line” to trains that have passed their locations.

R. The Train Director’s Control Panel

This panel was used by the Train Director for several functions. At the top is a row of indicator lights and pushbuttons. The indicator lights, in conjunction with an internal buzzer would alert the operators to certain conditions. The first ten are “Tap Out Lights” that indicate when a train is loaded and ready to depart the station. Other lamps activate when air pressure is low (See: Air Pressure Gauge, above) or when a dragging equipment detector indicates a problem with an inbound train.

The second row of pushbuttons are used to set the direction of traffic flow on tracks that are shared with State Tower and with the Reading Company. Establishing a direction of traffic flow prevents adjacent towers from routing trains into a head-on collision situation.

The third row of pushbuttons are safety switches that the Train Director needs to press before a Leverman can set a route into non-electrified trackage. They serve as a double check to prevent an electric locomotive from being inadvertently routed into a track without overhead catenary wire.

The fourth and fifth rows consist of rotary on/off switches. These switches control red “Plate Order” indicator lights on the Model Board. A Plate Order is an order issued by the Power Director telling the operators that power to the overhead

catenary wires was being turned off. The rotary switches did not actually effect the operation of the interlocking at Harris. The red lamps simply acted as “flags” that reminded the operators that electric locomotives could not be routed onto those tracks. (Steam or diesel locomotives could still use the tracks.)

Please feel free to ask one of our docents to explain the operation of this panel in more detail.

S. Tools

Within the metal wastebasket are some tools used by the railroad. The push broom is marked for the Penn Central Railroad, the successor to the PRR, and was used in Harrisburg Station. The shovel is initialed for the PRR. The wastebasket itself is marked “Property of the PRR” and, again, was used in Harrisburg Station. Atop the cabinet is an oil can used by steam locomotive engineers to place lubricating oil at various places around the engine’s wheels and running gear. Its long spout is used to lubricate otherwise hard to reach locations.

T. Equipment Cabinet

Housed within and attached to the cabinet are items required to be present in every PRR tower.

1. Displayed on the back are furled signal flags of the colors red, green, white, blue and yellow. Each color was used for a different purpose. Normally, these flags would be kept in the flag box attached to the left side of the cabinet, but are stored here so they can easily be seen.

2. Also on display is an order hoop which was used to hand train orders up to moving trains. Normally, there would be a row of order hoops arrayed on the back of the cabinet where the flags are. In use, the operator at Harris would have to go down to the tracks and hold the hoop up in the air as an engine approached. One of the crew from the engine had to stand in a position where he could hook his arm through the looped string holding the paper order(s). The specially-tied string would unsnap from the clamp on the stick and the engine crew would have its orders. The same thing would be done by the caboose crew, with duplicate orders created using carbon paper. The only hitch in this manual process would occur if the crew missed the string, in which case the train would have to stop and back up or the responsible party would have to walk back to get the orders.
3. Within the cabinet are five kerosene signaling lanterns with globes of the same colors as the flags: white (clear globe), green, yellow, red and blue. The lanterns were used at night for the same purposes as the flags were used during the day. After batteries were available for railroad use, the kerosene lanterns were replaced with electric lanterns of the same colors.
4. Within a groove on the top of the cabinet is a metal flag mounted on a wooden stick. This flag fits into a bracket outside the narrow bay window

next to the teletype machine and was used to signal trains that they had to receive train orders at the tower. At night, a yellow lantern was hung in front of the flag. By day, the yellow side of the metal flag conveyed the same message.

5. On the left side of the cabinet is the flag box. This is identical to the box carried by all conductors on a passenger train. It is marked with the PRR herald embossed on the top and held signaling flags. There is a compartment that opens on the bottom that held “track torpedoes.” These were explosive devices that could be attached to the rails to alert trains to danger. The torpedoes would detonate when they were run over making a loud bang that could be heard by the crew of a noisy locomotive, alerting the crew to proceed with caution. Also on the bottom is a compartment to hold a supply of fusees (flares), which were lighted at night and used to signify danger.

U. Mirror

In the bathroom is an authentic PRR engraved mirror that was salvaged from the Stationmaster’s Office, Harrisburg Station and donated by a chapter member. Based on the name of Frank Thomson, General Passenger Agent, listed in the lower left of the mirror, we know the mirror dates to the late 19th Century. The reason is that on February 3, 1897, Mr. Thomson was chosen by the Board of Directors to be the railroad’s

sixth President. He already held the position of First Vice-President at the age of 56.

V. Ceiling Lights

The ceiling lights are known as “schoolhouse” style lamps. These lights are replicas of the originals based on early photographs of the interior of the tower. The only original lights at Harris are the fixed ceiling light at the top of the stairs and the exterior light at the main entrance.

W. Link and Pin Coupler Set

Note: this exhibit will likely be located in a display case. Mounted on a display board are one link and one pin of the apparatus used to connect cars together before the advent of knuckle couplers. Two connect cars together, a brakeman would need two pins and one link. Standing between the cars as they were pushed together, he would have to guide the link (previously pinned to one of the cars) into a pocket on the other car and drop the pin through the top of the pocket, the link and the bottom of the pocket. Many a brakeman’s hand was crushed during this extremely dangerous maneuver. The history of this particular link and pin is presented on the card attached to the display.

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