Boston & Maine Railroad
Historical Society Incorporated

File No. 11

Signals & Related Equipment

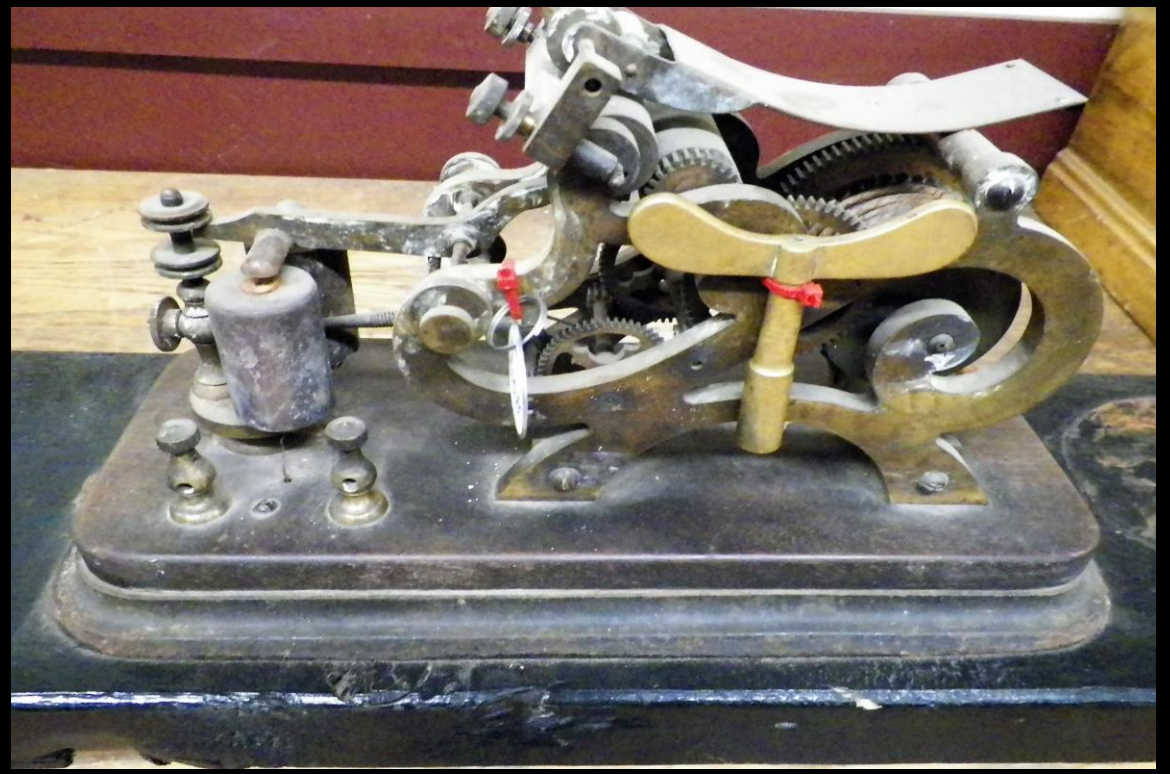
Hardware Collection

Train Signal & Equipment

- During the early years of railroading, methods had to be devised to ensure that two trains did not meet at the same time on the same section of track.
- This was initially accomplished through the use of timetables and train orders.
- Block Signal systems were developed, which indicated to the locomotive engineer whether or not a train was head in the next block of track.
- These signals were set manually until the track circuit was developed, which sensed the presence of a train in the block and set the signals automatically.
- The track circuit was designed to be fail-safe, so that the battery or any wire connections were to fail or if a rail was broken, a clear signal would be displayed.
- Insulated joints were used to define the limits of the block.
- Various types of track circuits are utilized in automatic traffic control device installations at highway-rail grade crossings.

Morse Recording Register with Brass Key Circa 1890's

Conn River Line 38 ¼"x 7"x 5..5"



Boston & Maine Railroad Historical Society - Railroad Telegraph Display

Donation by; Donald F. Hodge

Resonator Box w/ Sounder

The Sounder is in a Candlestick base Resonator.

The Resonator box is mounted on a metal candlestick phone style base.

The Sounder is a Telegraph Instrument that allowed an operator to receive and interpret an incoming message by the Sounder.

Donation by; Donald F. Hodge

Railroad Telegraph Display

High Voltage Station Relay
Alphabet – Morse Code

Telegraph Keys Closed and Open
Wooden Pole w/ Glass Insulator

Glass Insulators

- Glass Insulators were first manufactured in quantity in the 1800's when the first telegraph and telephone circuits were put in place. A way was needed to prevent the telegraph signal from draining into the earth wherever the wire touched a sold object.
- Insulators were invented to fulfill this need.
- There are hundreds of different styles and color insulators today.
- Many of the older pieces were made from glass or porcelain.
- Smaller insulators were used on telephone and telegraph circuits, and larger insulators were made for electrical (power supply) wires.
- Generally speaking, the higher the voltage in the power lines, the larger the insulator holding those lines has to be. This is because electricity can actually " jump" over a fairly long path if the voltage is high enough.
- Insulators with wide "umbrella" disk and wide lower skirts (the flared-out part on the insulator's bottom) are designed to keep the distance between the wire and the pole as long as possible, so that this "jumping" or arcing doesn't happen.

Glass Insulators

Green Glass Insulator
Dated Oct 8, 1907

Clear Glass Insulator
Armstrong DPI 44

Green Glass Insulator
Hemingray #40

Wood & Metal
Glass Insulator Post

No. 1617 Two Wooden Threaded Glass Insulator Post.

No. 1618 Metal Threaded Glass Insulator Post.

No. 1623 Metal Rod /w Wooden Threaded Glass Insulator Post.

No. 1624 Metal Road /w Rubber Threaded Glass Insulator Post.

Donation by; Robert Grodzicki

Glass Signal Battery Jar

Fitz William New Hampshire

Battery Jars & Covers: Cylindrical Type / Rectangular Type

The following description of how the battery works:

The electrolyte is derived from a blue vitriol and water solution.

The blue vitriol must completely cover the copper element, and sufficient water must be added to cover the zinc element.

A teaspoonful of sulphuric acid is added to this solution to give the best results.

In order to prevent creeping of the electrolytic salts, the top of the jar is generally dipped into hot paraffiny. Best results are obtained by pouring a layer of pure mineral oil over the top of the electrolyte, because it prevents evaporation as well as the creeping of salts.

To put the battery into service after these steps have been taken, it is necessary only to place the cell an a short circuit for about 24 hours.

Donation by; Robert Grodzicki

Wooden Whistle Post

Whistles are just as essential in the operation of a railroad as are block signals, and other safety devices. Each different series of toots carries its on special message of warning or instruction.

Here is the "whistle language" used by the B an M:

"------"means a long toot; "0" means a short one.

------ ------ 0 0 Approaching crossing (last short toot sounds just as crossing is reached)

---------- 0 0 0 When train stops on main line, engineer instructs flagman to protect rear end of train.

------ ------ ------ ------ Train ready to proceed. Engineer calls in flagman from West or South.

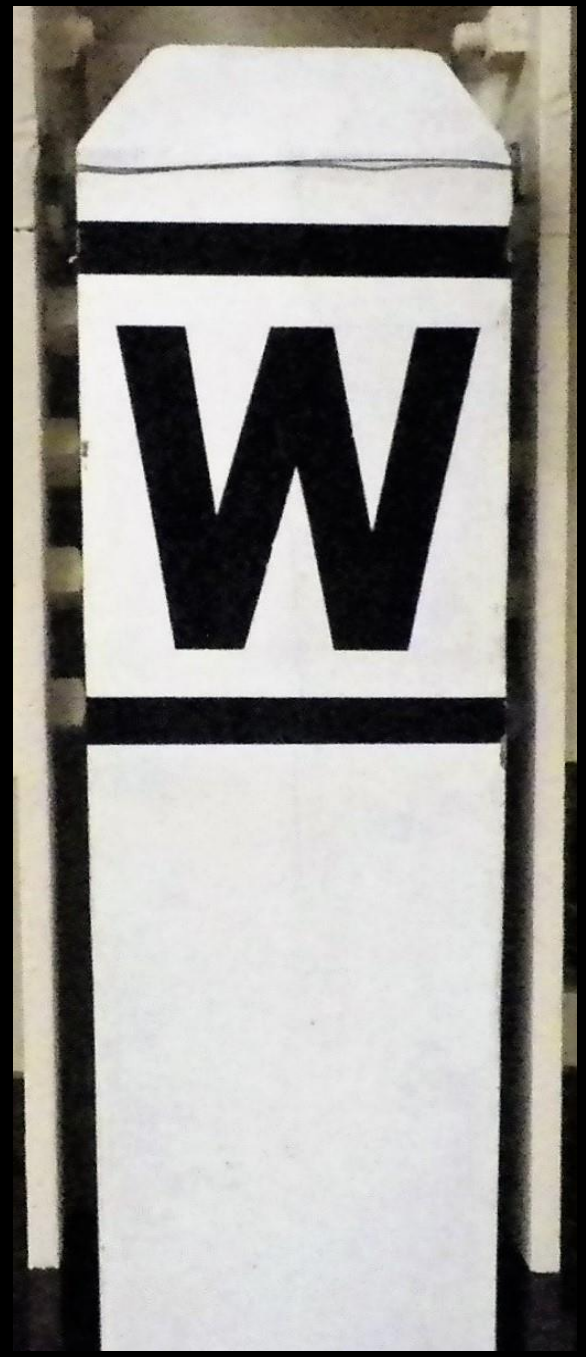
------ ------ ------ ------ ------ Train ready to proceed. Engineer calls in flagman from East or North.

0 0 0 When train is stopped, engineer is going back. When train is running, engineer acknowledges signal from conductor to stop at next station.

---------- 0 0 0 when train is running, alarm for fire or livestock on the right-of-way. Signal is given two or three times as train passes fire or livestock, and again on reaching next station or section crew.

---------- Approaching junction, or mail crane where train picks up mail bag "on the fly", or for warning.

0 0 0 0 0 0 0 (succession) Alarm for persons or livestock on the track.



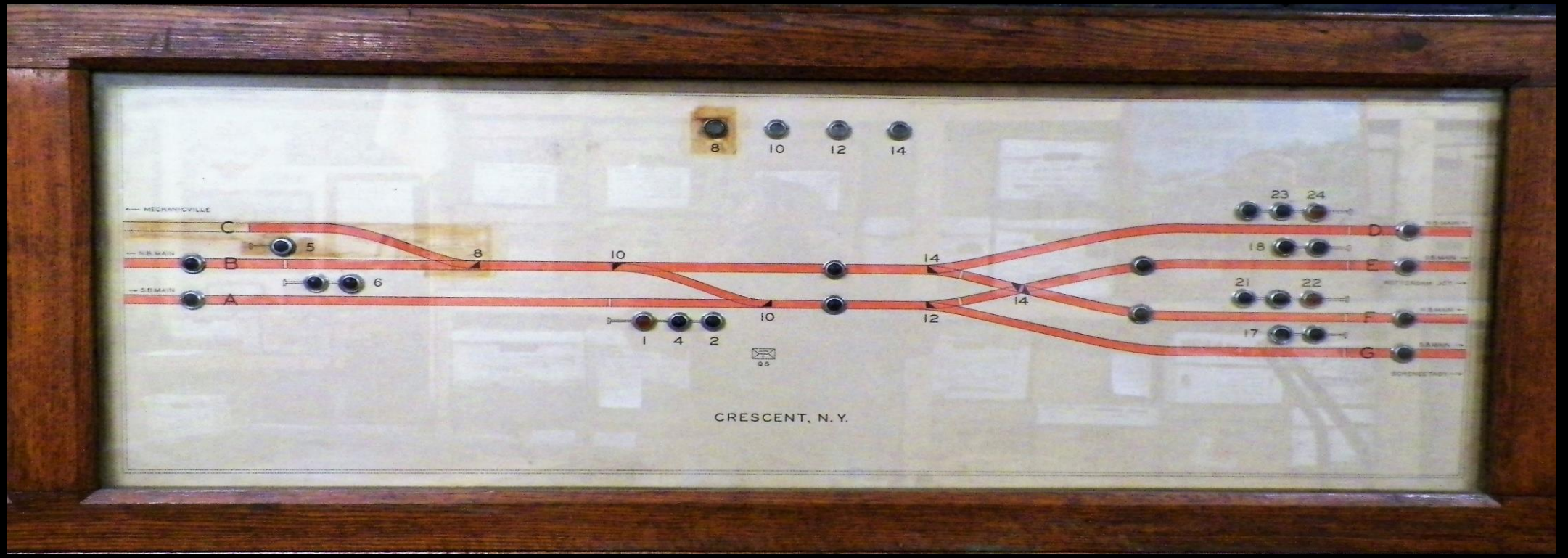
Wooden 24”x 16”
Railroad Whistle Sign

Donation by; Joseph Shaw

Model Board 23” H x 105” L x 5” W - Crescent New York Mechanicville to Rotterdam Junction

The Model Board contained Track Configuration – Indicator Lamps - Circa 1930’s

Donation by; Scott Whitney

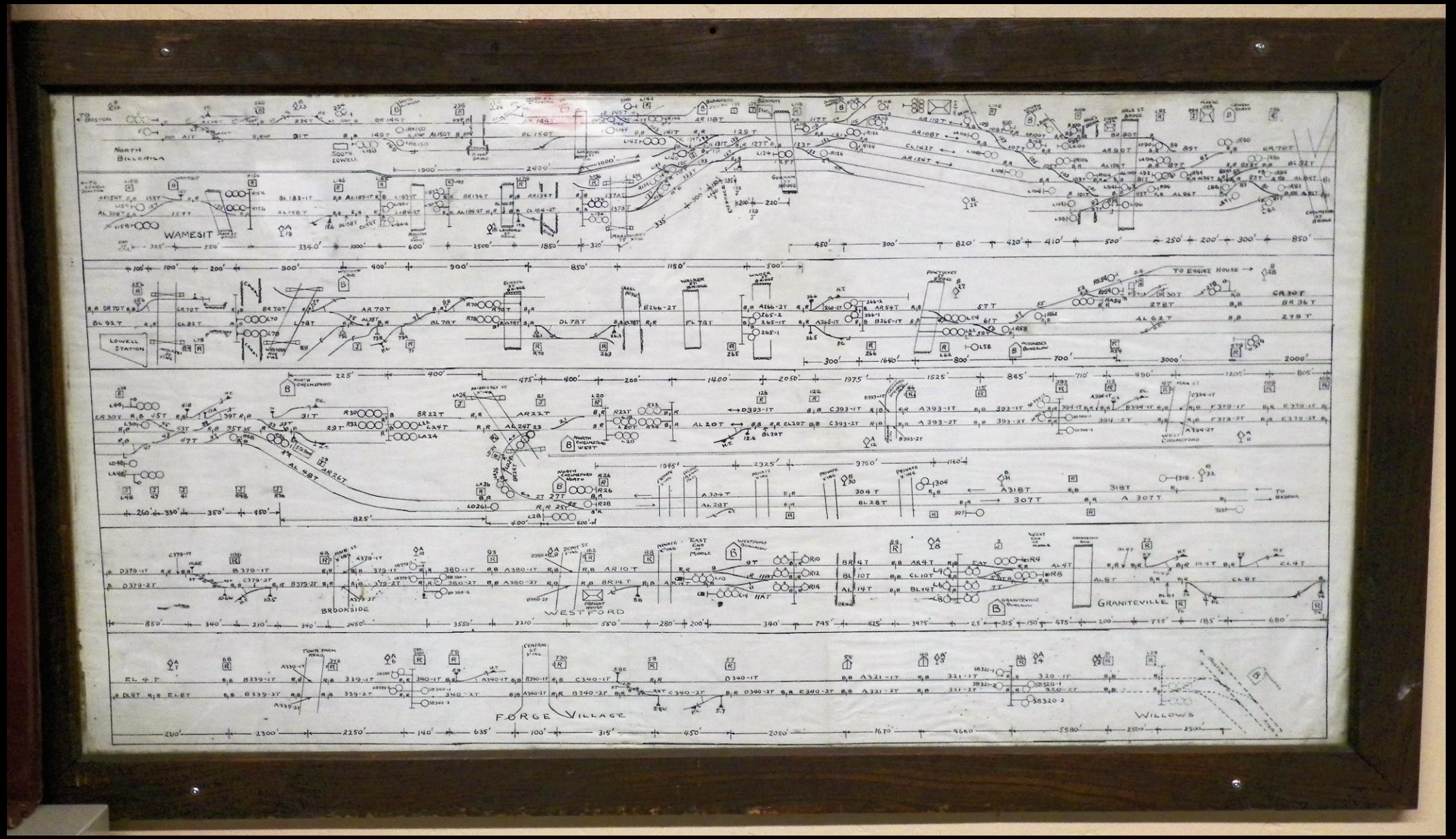


SOUTHBOUND MOVEMENTS

ROUTES	REVERSE LEVERS
A TO G	2 OR 1
A TO E	14 12 4 OR 1
B TO G	10 6
B TO F	6
B TO E	14 12 10 6
C TO G	10 8 5
C TO F	8 5
C TO E	14 12 10 8 5

NORTHBOUND MOVEMENTS

ROUTES	REVERSE LEVERS
D TO C	8 14 24
D TO B	14 23 OR 24
E TO C	8 10 12 14 18
E TO B	10 12 14 18
F TO C	8 22
F TO B	21 OR 22
G TO C	8 10 17
G TO B	10 17
G TO A	17



Boston & Maine Railroad

Framed: Track and Signal layout Lowell to Forge Village

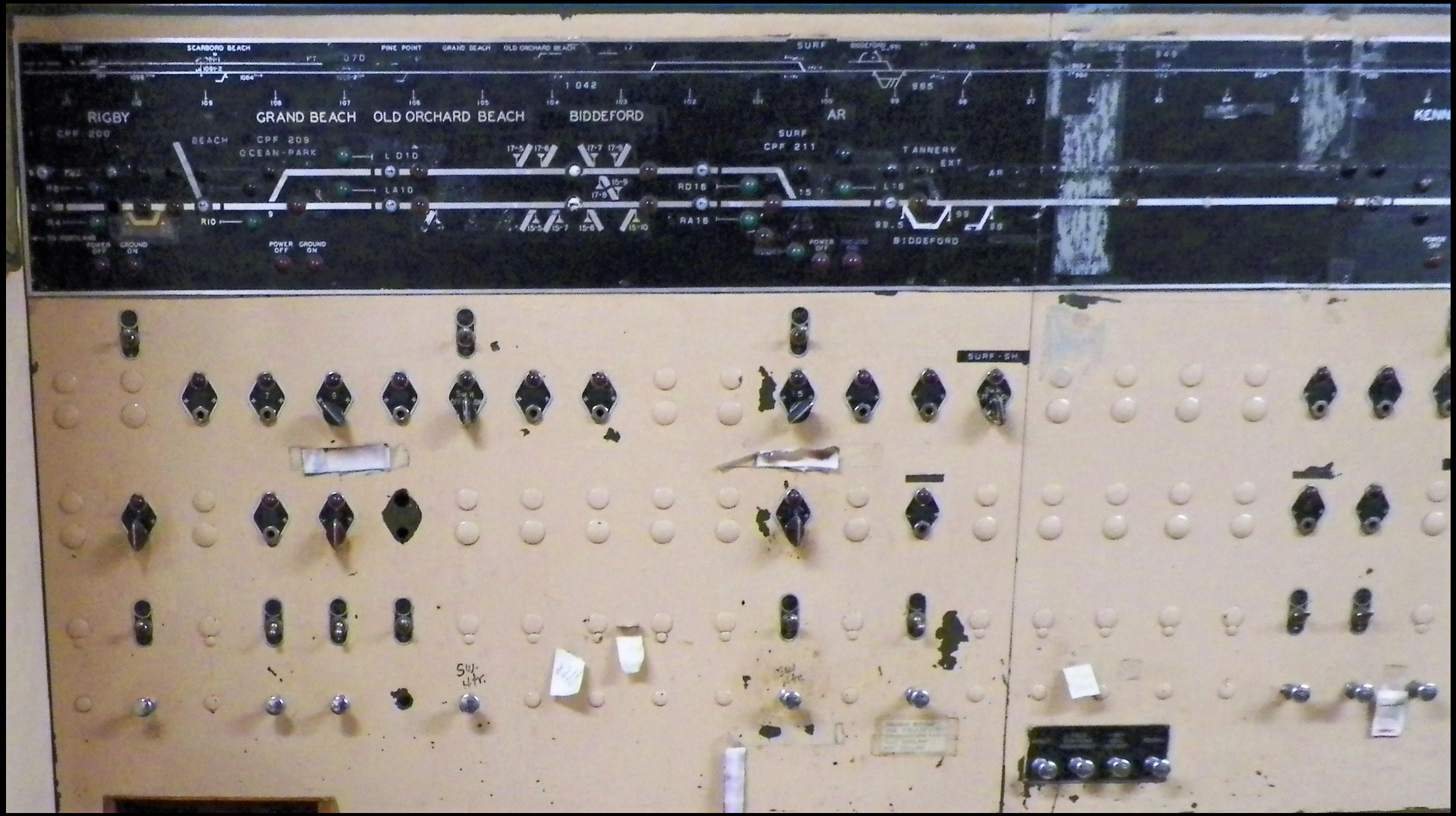
Donation by; Paul T. Kosciolek

Signaling: Central Traffic Control

- Central Traffic Control (CTC)
  Controls the movement of all trains over the many miles of track outlined on the board.
- The system consists of a centralized train Despatcher’s Office that controls railroad interlocking's and traffic flows in portions of the rail system designated as CTC territory.
- The Despatcher establishes a rout for trains many miles away by depressing the “Bottom Levers” which controls the routing signals.
- The “Top Levers” which control switches at interlocking, and by radio and telephone communication.
- Flip switches ignite the switch Snow Melter's.
- This Central Traffic Control console governs train movement on dingle and double track.
- Several similar consoles control different segments of the Boston & Maine Railroad System.

- The three B&MRR Central Traffic Control boards came from North Billerica, Ma.
- CTC controls railroad interlocking's and traffic flows from Rigby, ME to Dover, N.H.

- Donation by; Guilford Transportation Industries


SCARBORO BEACH
PINE POINT
GRAND BEACH
OLD ORCHARD BEACH
SURF
1 042
RIGBY
GRAND BEACH
OLD ORCHARD BEACH
BIDDEFORD
AR
CPF 209
BEACH
CPF 209
OCEAN-PARK
L D10
LA10
RIO
POWER OFF
GROUND ON
SURF
CPF 211
RD16
RA16
TANNERY
EXT
L16
BIDDEFORD
SURF-SH


KENNEBUNK
WELLS BEACH
NORTH BERWICK EAST
CPF 232
POWER OFF
GROUND ON
L54
L52
R52
SURF - SH
INDICATION CODE
CONTOL CODE
SWITCH HEATER
RESET
FIELD STATIONS DISCONNECT
BELL CUTOUT
RECALL


N. BERWICK EAST
N. BERWICK
CUMMINGS
SALMON FALLS
ROLLINSFORD
DOVER
NORTH BERWICK
CPF 233
ROLLINSFORD
CPF 241
POWER ON
GROUND CLEAR
ALL LOCATIONS
L54
L52
L64
R64
R62
LA62
L86
L84
TO BOSTON
RA84
RD84
TO SOMERSWORTH
POWER OFF
GROUND ON
SWITCH
HEATER
Sw. H.
OFF ON

Maine Central Railroad
Spraying Switch Light Signal
Union Switch & Signal Company

High vs Low or Dwarf Signals

High Signals:

Typically can give authorization for a train to proceed at the maximum allowable speed as given on the Timetable or in the Rules Book.

Dwarf Signals:

Are usually limited to medium or slow movements.

Limited Speed:

A speed not exceeding 45 miles per hour.

Passenger Trains 45 MPH / Freight Trains 40 MPH

Medium Speed:

A speed not exceeding 30 miles per hour.

Automatic and Approach Signal

Automatic Block – Block aspects convey basic track occupancy information and advise the engine (operator) which of the basic signal rules (common to all railroads) he/she is to follow in the operation of his/her train at any point on the railway line.

These include clear, advance Approach, Approach which instruct the engineer to “expect no stop”, “expect stop at second signal” and “expect stop at next signal” respectively.

Approach at Speed – When a train needs to be told to slow down due to dynamic conditions an “Approach Speed” aspect is used. These inform the engineer to slow to a prescribed speed by the next signal.

The most common reason for this is that the train is to take a diverging, or non-Normal speed route at the next interlocking.

Signals of this type include Approach Medium, Approach Limited, Approach Slow and Approach Diverging.

General Railway Signal Co.

Color-Light Signals

Consist of three bulbs shining through 3 lenses, or “Roundels,” one each Red, Yellow and Green. Typically, the lights are grounded vertically with green at the top, exactly opposite of the highway traffic signals that protect road intersections.

A need to protect signals in Subway-Tunnels led to the development of Color-Light Signals, in the first decade of this century.

Donation by; Michael Pace

Searchlight Basics

SA Searchlight Signals released for production in 1927.

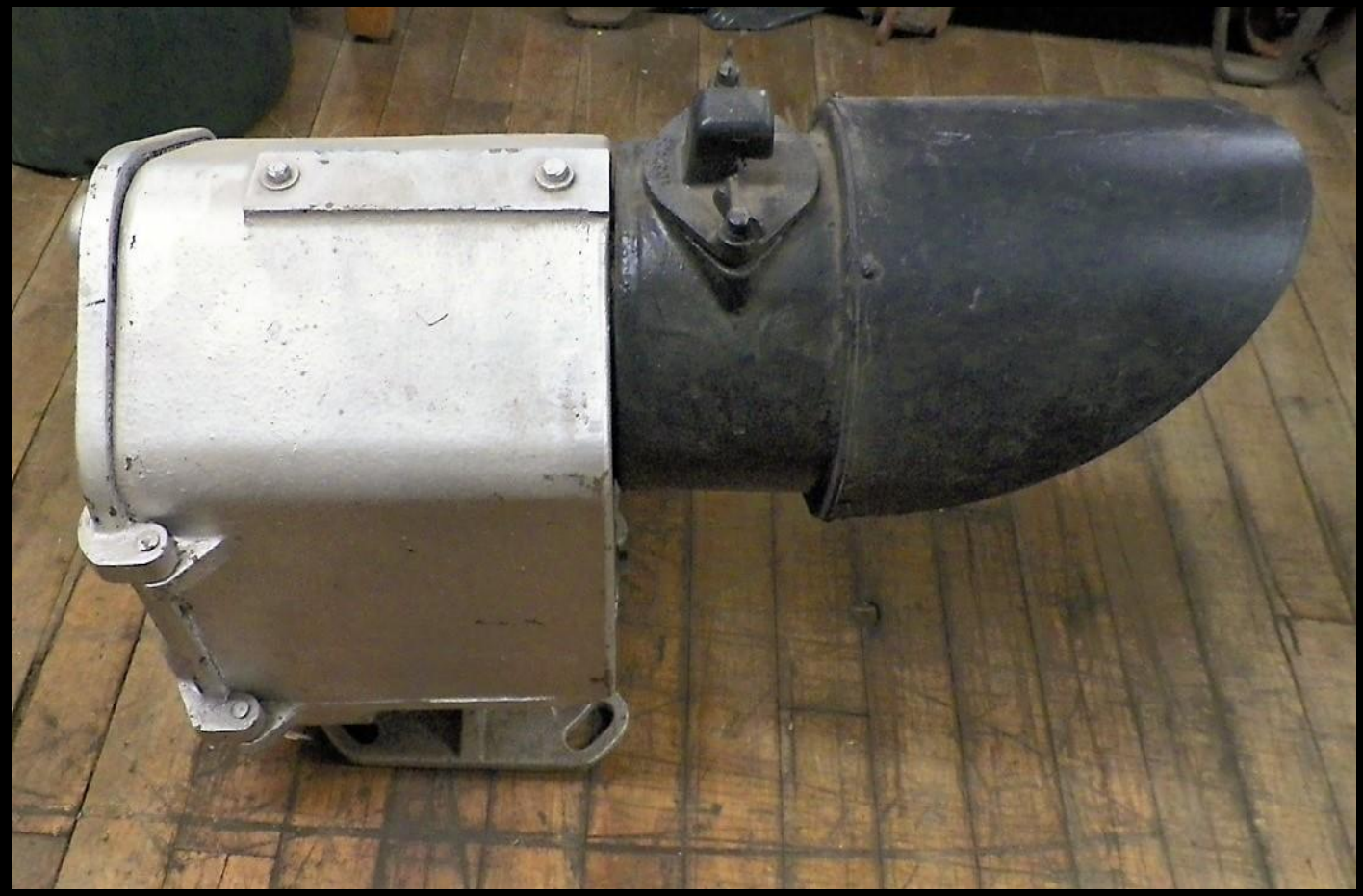
Over 70,000 SA Searchlight units have been produced to date.

Searchlight Signals have only one set of lenses and a single light source.

The searchlight signal is one of the few signals that uses a reflector.

The reflector is elliptical in shape, and the blub is put at the focus point of the reflector.

The placement of the blub is positioned so that the light beam is focused to another focal point before leaving the lamp assembly.



B&MRR Dwarf Semaphore Signal

B&MRR 2 Position Dwarf Semaphore Signal:

Dwarf signals normally control movements from a siding to a mainline or from mainline to a siding or from mainline to mainline.

The 2 position dwarf only tells you that the points are set for the move, they can be placed to “proceed” when the track ahead is occupied.

They are very similar in appearance to a 3 position dwarf signal.

In later years some 2 position dwarfs were light signals, in this form they were indistinguishable from a 3 position dwarf.

The big difference between a 2 and 3 position dwarf is that a 2 position dwarf showing a green light, “proceed” did not imply the track was clear, a 3 position dwarf displaying a green light “clear low speed” tells the driver that the track is clear to the next signal.

The Dwarf Signal was from:
Hale Street Interlocking Lowell, MA. Located North of Hale Street Bridge on the west-side. Was removed when the Hale Street Tower was closed in the 1940’s, a new Lowell Tower was built.

Donation by; Donald S. Robinson

United Switch & Signal Co.

Signal Indicator

This is a US&S Trackside Block Indicator.
They were mounted on a short pole and allowed track crews or train crews stopped at a siding to see the signal indicator.

By default a semaphore is in the “Stop” position and drops when voltage is applied (very low voltage).

Donor; Anonymous

Train Order Semaphore Signal Boards

- Train Order Signals:
- In North America, Semaphores were employed as train order signals, with the purpose of indicating to engineers whether they should stop to receive a telegraph order.
- It was common for train order signals to point the arm straight down to indicate “Procced” train order signals were typically located at the station building, with a tall common post mounted signal arms falling in opposing directions.

- MECRR Train Order Signal Boards

Combined Stop and Distant Signal Semaphores

- Combined Stop & Distant Signal:
- Where signals are closely spaced, a stop signal and a distant signal can be mounted on the same post.
- The distant signal is always the lower of the two.
- The two signals are “Slotted” so that the distant signal can only clear if the stop signal is clear.
- Both signals display a light at night, which means that the danger indication appears as red over yellow.

Boston & Maine Railroad

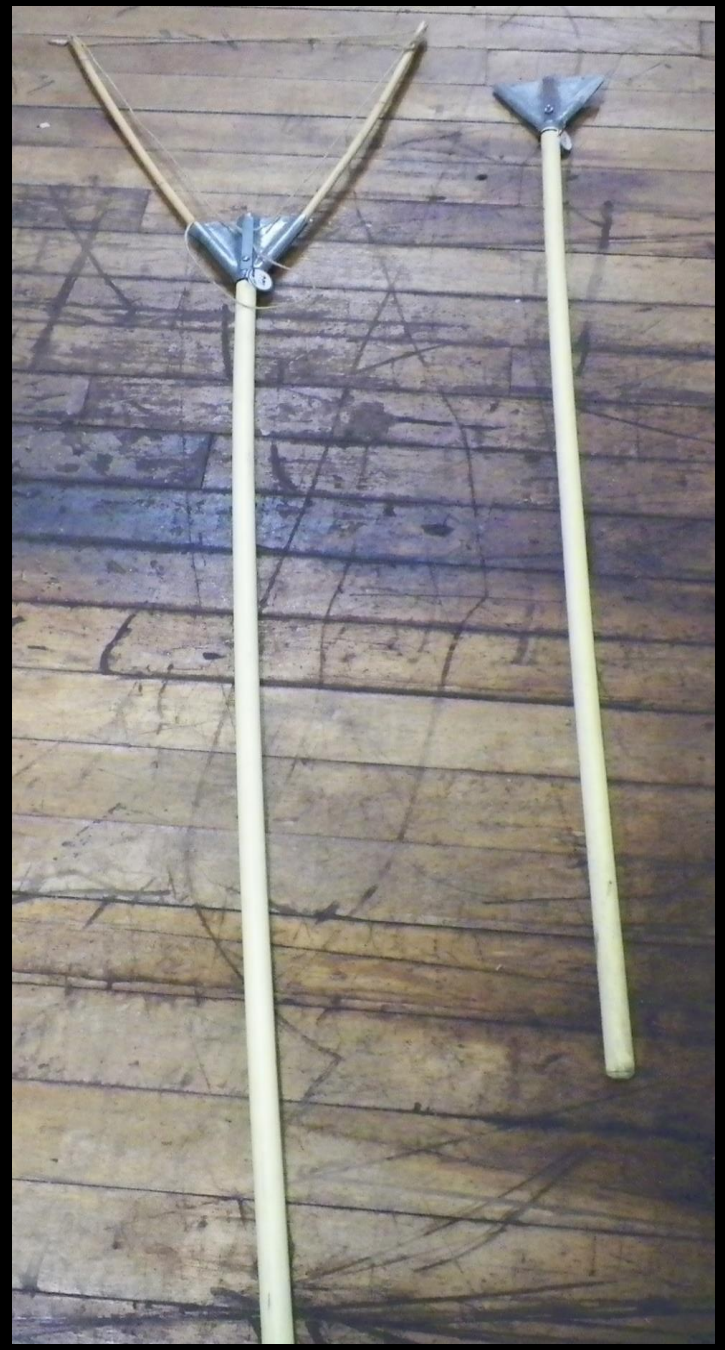
Semaphore Signal: Spectacle – Hub – Three Roundels w/ Stop Distant Signal Blade

Donation by; Joanne Reynolds

GRAY BOSTON
Train Order Lamps

Signal Lamp was either a Train Order Signal or a Semaphore Lamp. It was mounted on a signal pole to notify on coming trains to pick up orders at the next stop.

It is electrified and appears to be Circa 1920’-30’s.



Train Order Fork's

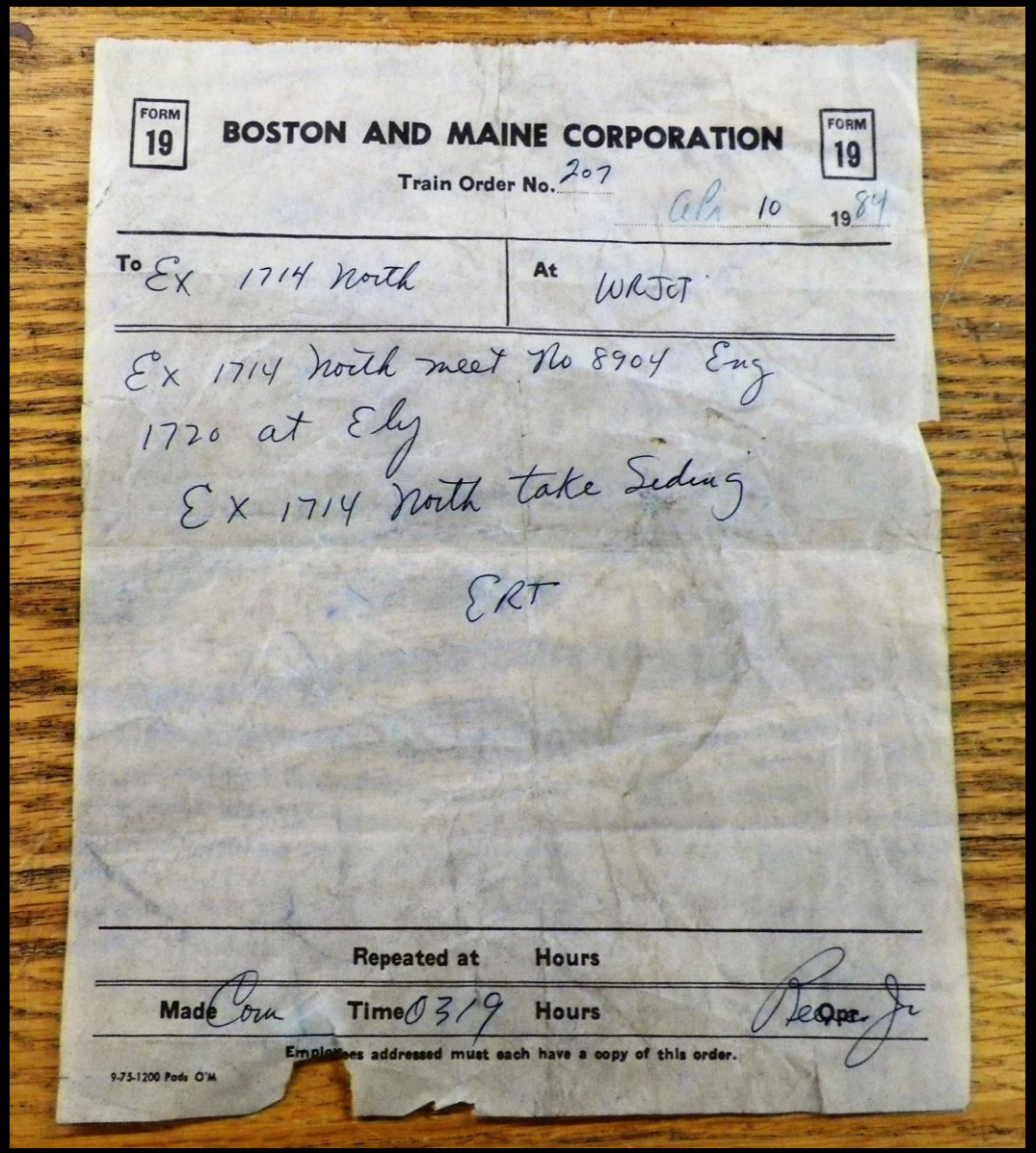
Train Order provides the means to deal with changes in operating conditions as they rise. A paper order was placed in the train Order Fork or Hoop, either held by the operator or mounted at trackside. The Yellow Order Fork's are 75" Long and 54" long.

Donation by; Richard K. Hurst

Boston & Maine Railroad

Train Order No. 207 Extra 1714 White River Junction

Donation by; Donald S. Robinson



FORM 19

BOSTON AND MAINE CORPORATION

FORM 19

Train Order No. 207 Apr 10 19 84

To Ex 1714 North | At WRJct

Ex 1714 North meet No 8904 Eng 1720 at Ely

Ex 1714 North take Siding

ERT

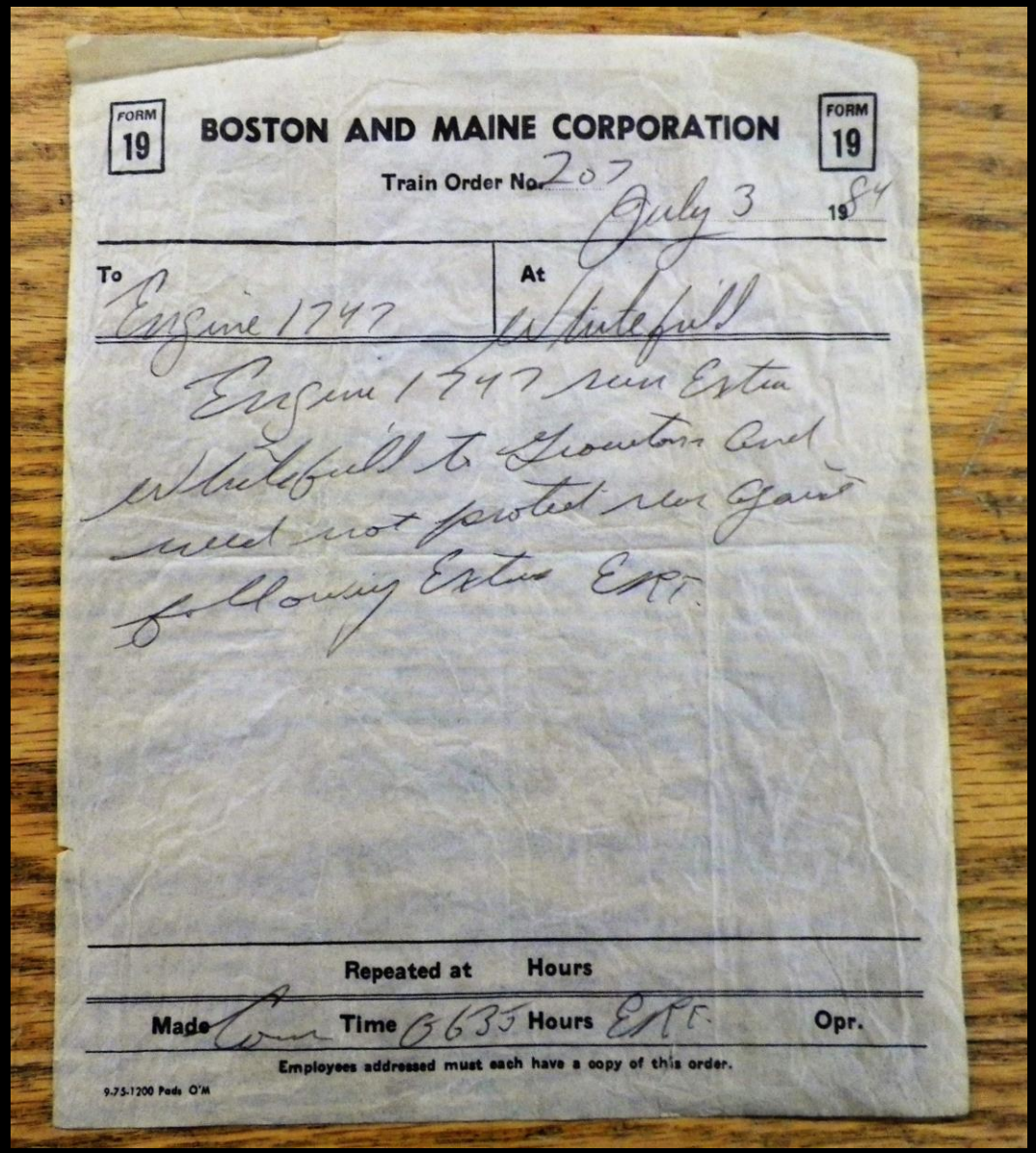
Repeated at Hours

Made Com Time 0319 Hours Opr.

Employees addressed must each have a copy of this order.

9-75-1200 Pads O'M

Train Order No. 207 Engine 1747 at Whitefield



FORM 19

BOSTON AND MAINE CORPORATION

FORM 19

Train Order No. 207 July 3 19 84

To Engine 1747 | At Whitefield

Engine 1747 run Extra Whitefield to Groveton and will not protect rear following Extra ERT.

Repeated at Hours

Made Com Time 0635 Hours ERT Opr.

Employees addressed must each have a copy of this order.

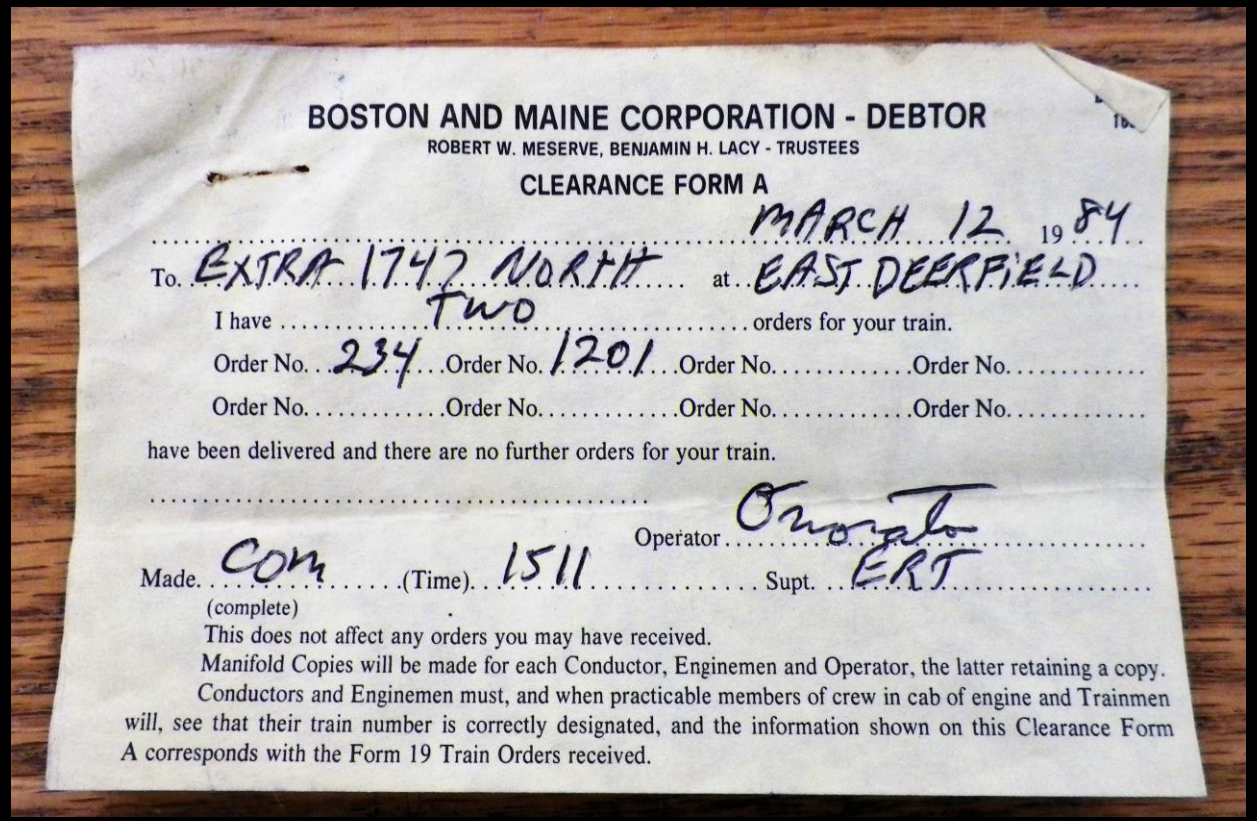
9-75-1200 Pads O'M

Boston & Maine Railroad

Clearance Form A

March 12, 1984
To: Extra Engine 1747 North at East Deerfield
I have Two Orders for your train.
Train Order No. 234 Order No. 1201

Donation by; Donald S. Robinson



BOSTON AND MAINE CORPORATION - DEBTOR
ROBERT W. MESERVE, BENJAMIN H. LACY - TRUSTEES

CLEARANCE FORM A

MARCH 12 19 84

To. EXTRA 1747 NORTH at EAST DEERFIELD

I have Two orders for your train.

Order No. 234 Order No. 1201 Order No. Order No.

Order No. Order No. Order No. Order No.

have been delivered and there are no further orders for your train.

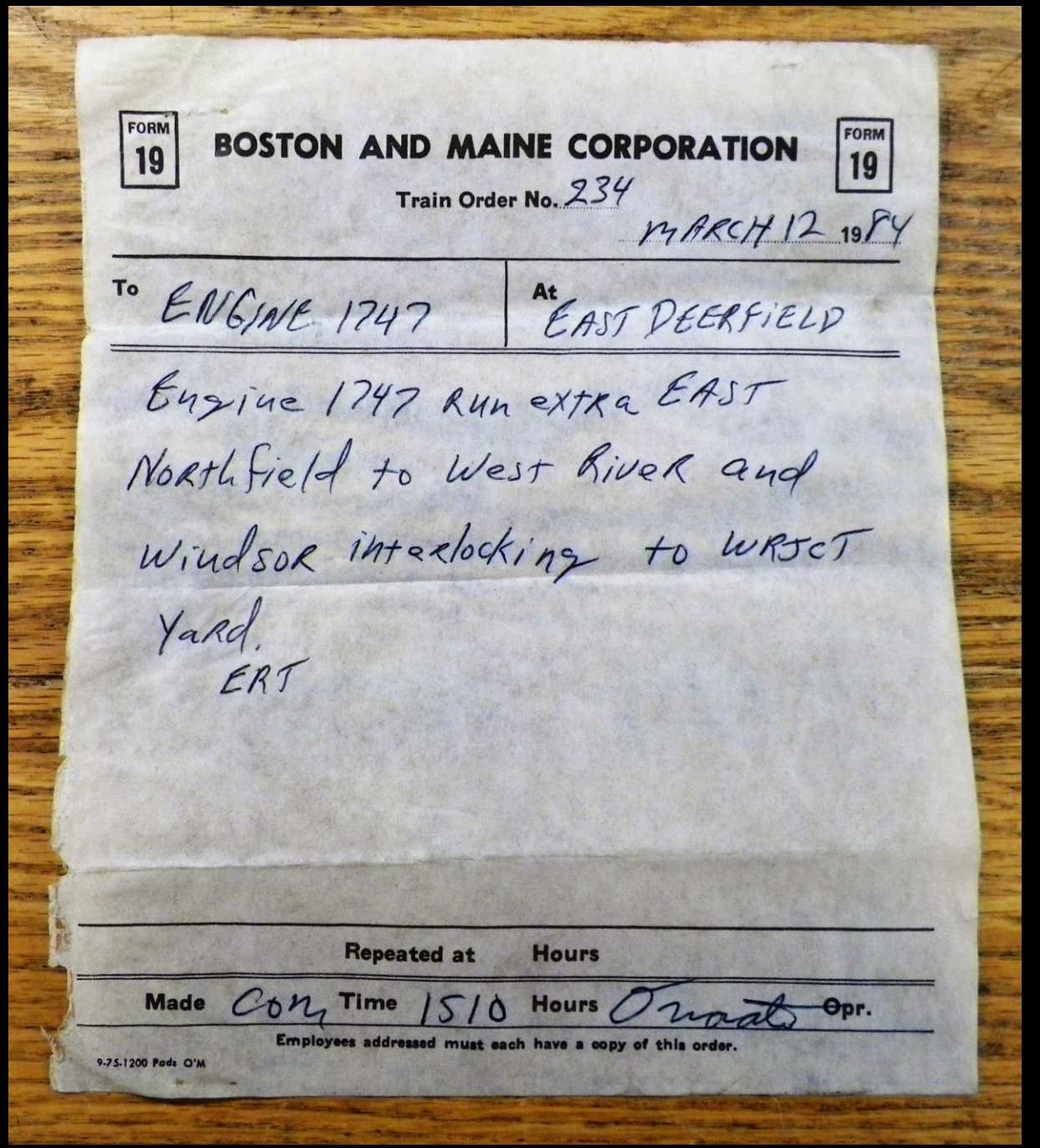
Operator

Made Com (Time) 1511 Supt. ERT
(complete)

This does not affect any orders you may have received.

Manifold Copies will be made for each Conductor, Enginemen and Operator, the latter retaining a copy.

Conductors and Enginemen must, and when practicable members of crew in cab of engine and Trainmen will, see that their train number is correctly designated, and the information shown on this Clearance Form A corresponds with the Form 19 Train Orders received.



FORM 19

BOSTON AND MAINE CORPORATION

FORM 19

Train Order No. 234

MARCH 12 1984

To ENGINE 1747 | At EAST DEERFIELD

Engine 1747 Run extra EAST Northfield to West River and Windsor interlocking to WRJCT Yard.
ERT

Repeated at Hours

Made Com Time 1510 Hours Opr.

Employees addressed must each have a copy of this order.

9-75-1200 Pads O'M

RACO Signal Locks

Brass or Steel RACO Signal Locks:

These small padlocks classified as Signal Locks used to secure the electrical boxes on semaphores and for other purposes in the railroad's block system operating department.

Most of these locks have a cylinder mechanism requiring a flat key to open them while others need a hollow barrel type key.

Jones Crossing Wig Wag Signal

Guilford Rail Transportation Industries 11/27/1995

Dimensions of a Wig Wag Signal:

23 feet to angle supporting flasher guy wires

21 feet 6” to bell centerline

20 feet to flasher support arm, flasher arm 50’ long

18 feet to bottom of mechanism box, box 24” high by 16” square

Wig Wag arm 5 feet long, measured from side of box

16 feet to base of wig-wag arm brace

15 feet to platform, platform 60” long by 15” wide

12 feet to base of platform brace

6 feet to bottom of ladder

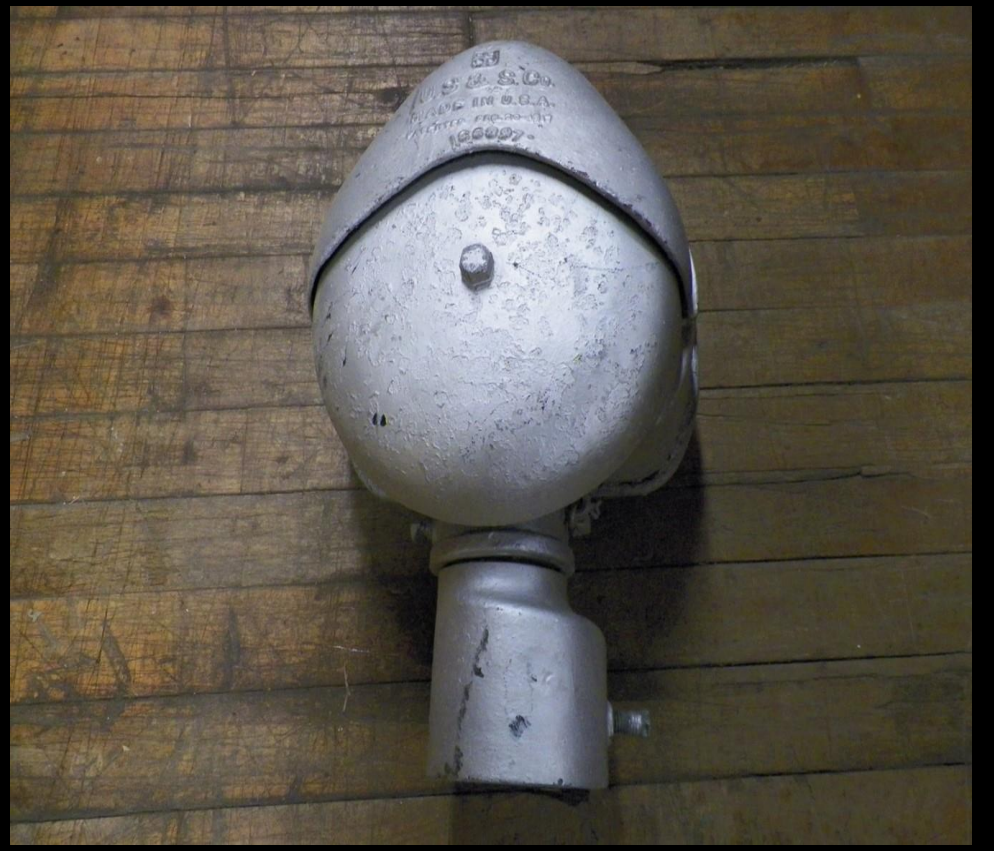
2 feet to bottom of relay case mounting bracket

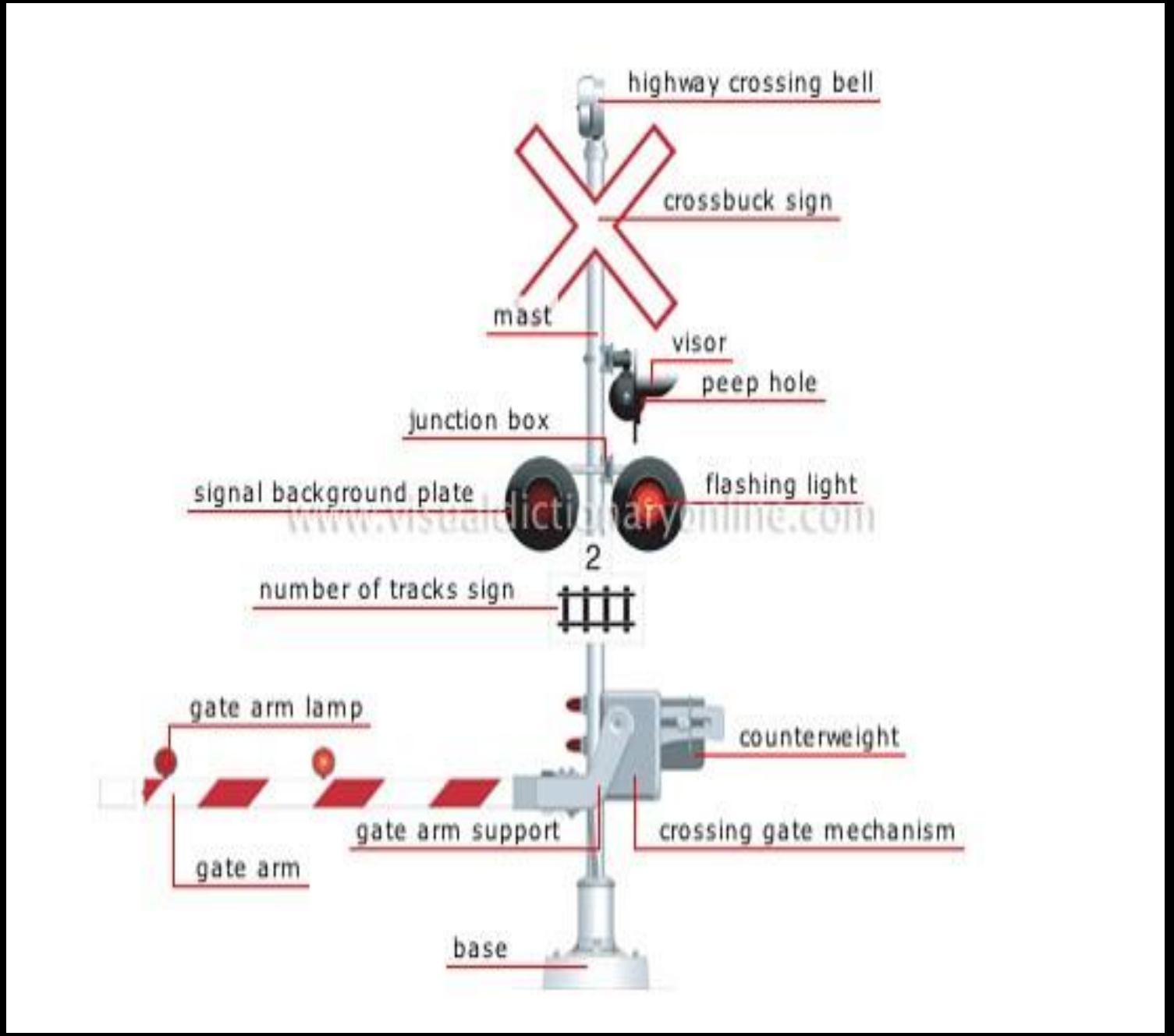
Boston & Maine Railroad

Wig-Wag Signal – Jones Crossing, Milton New Hampshire

Donation by; Guilford Rail Transportation Industries

Model 15A Teardrop Highway Crossing Bell





Railroad Grade Crossing Cross Bucks

Wooden Cross Buck 72”x 10” Sign

Cast Steel MECRR Cross Buck 48” 9” Sign

Highway Grade Crossing Equipment

Steel Cross Buck /w Reflectors 48”x 10” Sign

Steel Highway Grade Crossing Junction Box

Highway Crossing Grade Signal Equipment

Signal: Visor, Flashing Light, Black Ground Plate

Back of Signal Flashing Light /w Peep hole on each side

Two Tracks 17”x 27” Metal Sign

Sign, that Display the number of tracks at the road crosses

Crossing Gate Battery Lamp

From the Chelsea Fire

Donation by; Charles Lamie

Flashing Signal Gate Arm Lamps

Tag No. 774 Railway Equipment Co. LED aluminum & Fiberglass Gate Arm Lamps are activated as the gate is lowered.

Tag No. 938 & 939

The flashing signal lamps are activated as the gate is lowered.

Highway Grade Crossing Signal Base

Cast Steel Highway Grade Crossing base

Aluminum Highway Grade Crossing base

Boston & Maine Railroad Historical Society

Acknowledgement

- The following donations have made it possible to preserve the B&MRR and our New England Railroad History.
- Anonymous Donors:
- Donors: Robert Grodzicki, Donald F. Hodge, Richard K. Hurst, Paul T. Kosciolek, Charles Lamie, Michael Pace, Joanne Reynolds, Donald S. Robinson, Joseph Shaw, Scott Whitney
- Guilford Rail Transportation Industries

- Submitted by:
  The Hardware Committee
  Boston & Maine Railroad Historical Society