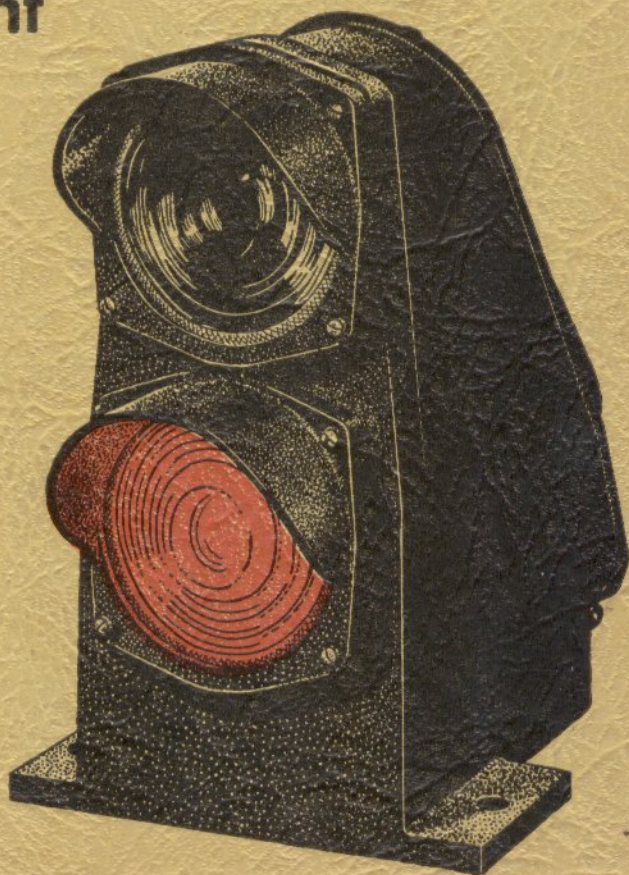


# Types MD and ME *MD* Dwarf Signals

Two-Indication  
Color Light



BULLETIN 175

# Types MD and ME Dwarf Signals

Two-Indication  
Color Light



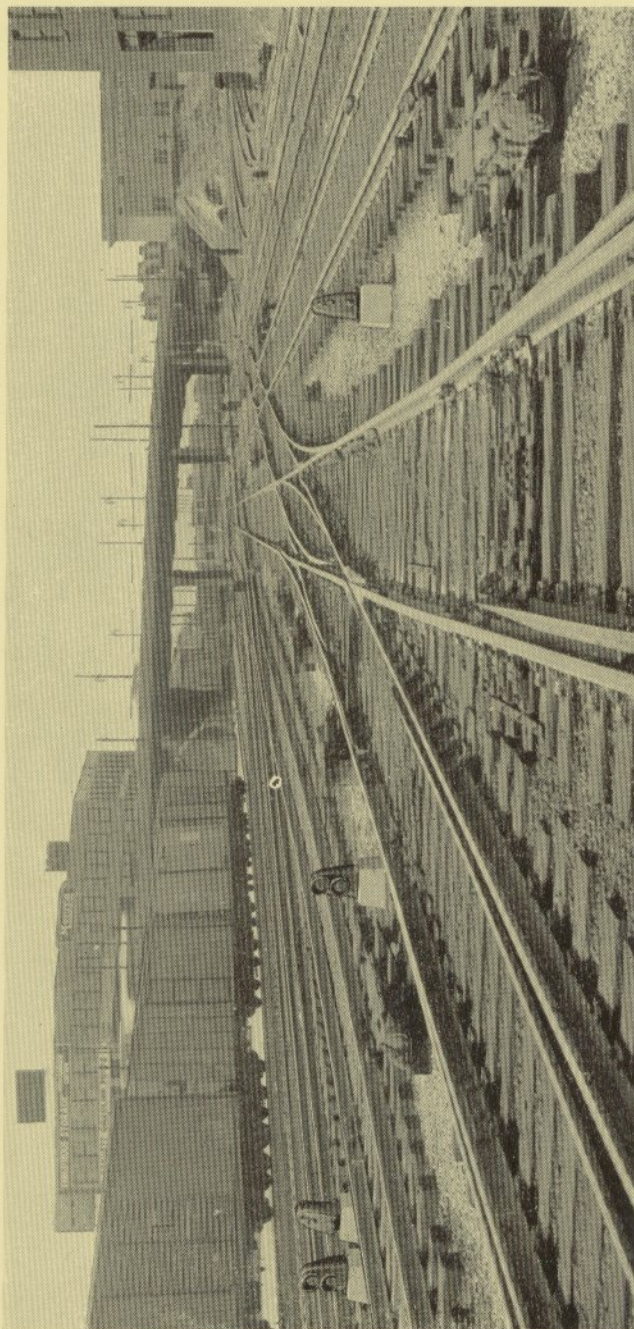
Bulletin 175  
December 1941

**GENERAL RAILWAY SIGNAL COMPANY**

ROCHESTER, NEW YORK

Zachary C. Gillihan 2008





Type MD color light signals in Atlanta Terminal

Copyright 1941 General Railway Signal Company

Printed in U. S. A.

Zachary C. Gillihan 2008

## Foreword

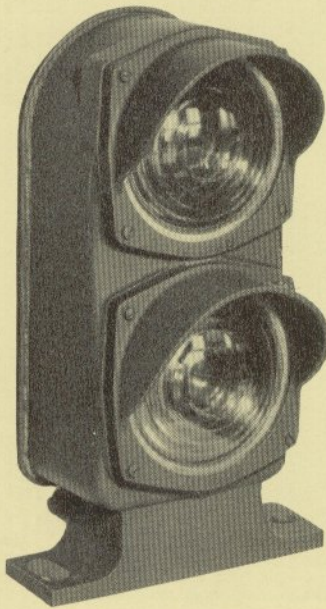
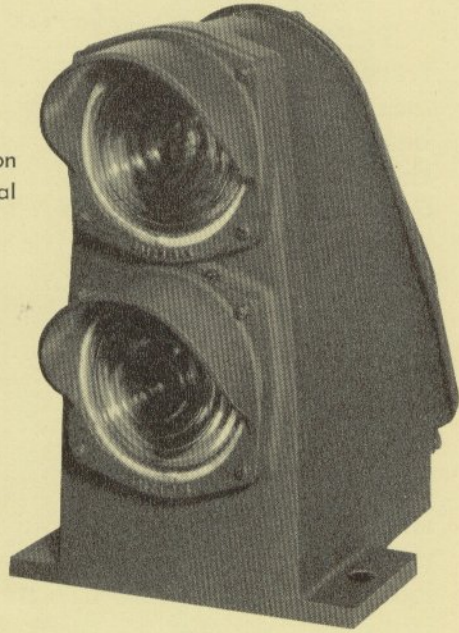
The trend of recent years has been toward the transmission of signal indications from a fixed location to the trainmen by means of a light beam. Considerable effort has been expended on the development of signals of simple design and dependable operating characteristics to provide and control the desired light beam. As a result, for a simple and dependable dwarf signal that will provide and control a distinct indication light beam, the General Railway Signal Company has developed the Types MD and ME Color Light Signals.

Types MD and ME signals are compactly built, self-contained units and provide highly satisfactory dwarf signal indications with a minimum of working parts and, accordingly, for a low original and annual maintenance cost. Being two-indication color light signals, they are directly controllable by either a neutral or a polar relay, the circuit for which may in turn be controlled by a lever in an interlocking machine or by some other method of selection. This, combined with the fact that they are operatable by circuits similar to and as commonly used for the control of solenoid, or other type, two-indication signals in all-electric interlockings, makes them particularly desirable for use in replacement of such types of signals which have become obsolete, worn-out, or which require excessive maintenance and repairs, or which in any other way are not operating satisfactorily.

On the following pages are described the salient features, construction details, and the typical uses with associated circuits of these two-indication dwarf signals. For brevity, the terms MD and ME signal will be used henceforth in referring to these types of signals.



Type MD two-indication  
color light dwarf signal



Type ME two-indication  
color light dwarf signal

## **Features of the MD and ME Signals**

1. They provide more visible and distinct indications than older type two-indication dwarf signals.
2. Any desired color aspect is available in either the upper or lower lens.
3. Being small and compactly built, they are less likely to be damaged.
4. Being totally enclosed, they operate perfectly in any weather.
5. Electrical parts such as terminal blocks, wires, and receptacles, susceptible to breakdown or grounding, and consequently contributing to low insulation tests, are reduced to a minimum.
6. Low power consumption.
7. The MD signal case provides space for all control relays, transformers, etc. ordinarily required.
8. No wires in addition to those ordinarily used for the control of a two-indication solenoid dwarf signal are required from the control point to the signal location.
9. Individual cross protection, or its equivalent, may be retained or provided. In addition, a lever light may be provided which will visibly indicate to the operator the operation of the lever, the signal, and the continuity of the filament of the proceed or of the restricting indication lamp, as desired.
10. If signal selection and control exists through a switch repeater relay, or is being installed, these features may be incorporated in the MD and ME signal controls.



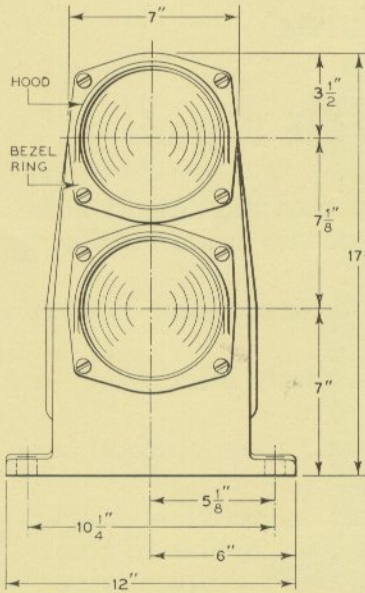


Figure 1  
Front of MD signal

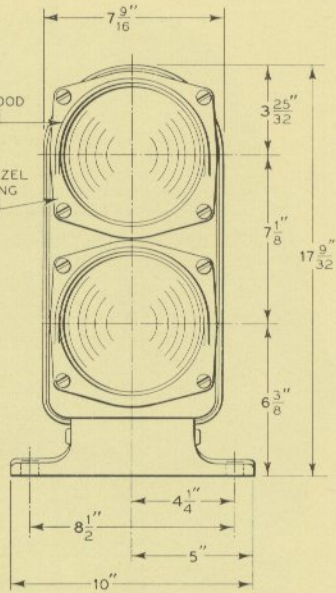


Figure 2  
Front of ME signal

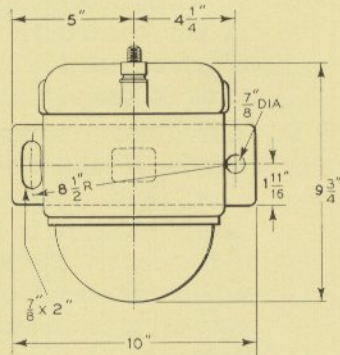
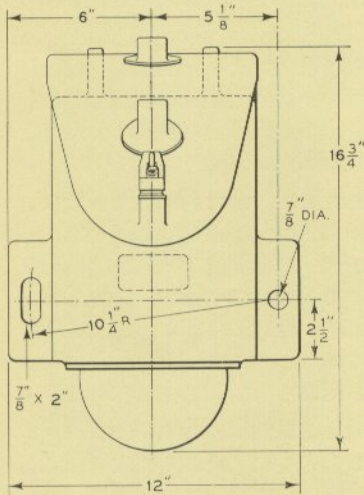


Figure 3. Plan of MD and ME signals showing mounting dimensions

## Construction

The construction of the MD and ME signals is shown in Figures 1, 2, 3, 4, and 5. The chief difference in these two signals is that the MD signal case provides housing space for control relays, transformers, etc., while in the case of the ME signal such associated apparatus must be housed separately.

Figures 1 and 2 show front views of the MD and ME signals respectively. On each signal note that the hood and the bezel ring for holding the outer lens in place is of one-piece construction, and, in each instance, is fastened to the case by four fillister-headed screws.

Figure 3 is a plan view showing the dimensions for the foundation mountings. Note that the left-hand anchor bolt holes are elongated,  $\frac{7}{8}$ " x 2". This permits lateral adjustment of the light beam after the signal is located on its foundation prior to the anchor bolts being finally tightened.

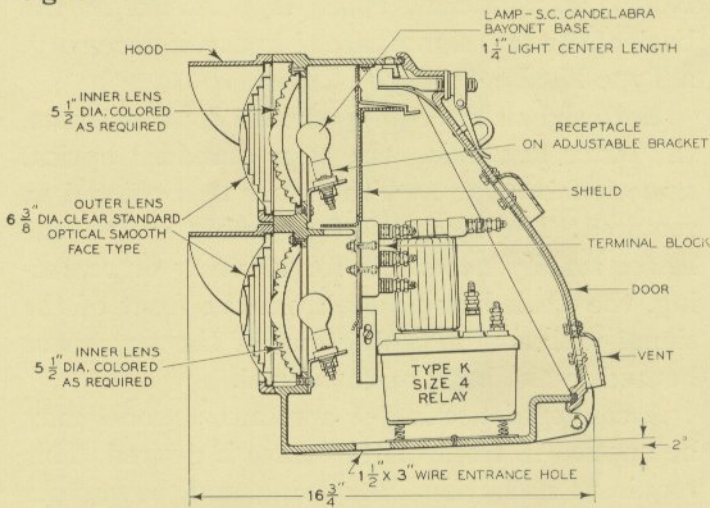


Figure 4. Side cutaway view of MD signal



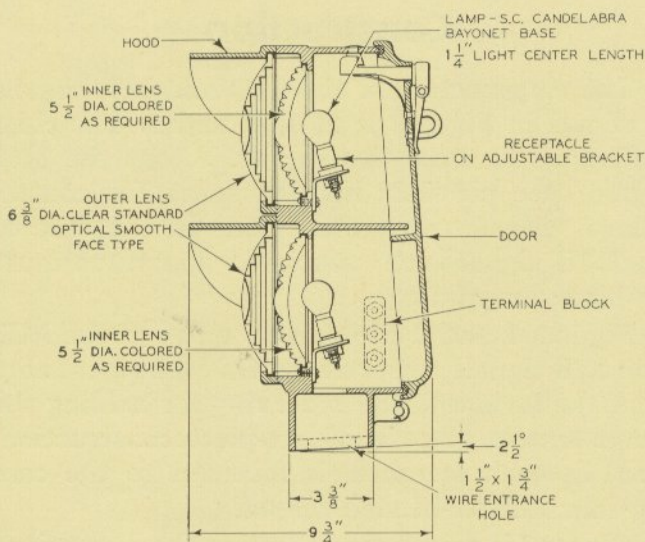


Figure 5. Side cutaway view of ME signal

Figures 4 and 5 are side cutaway views of the MD and ME signals respectively, showing the essential parts in their respective positions. Note that sufficient space is provided in the back of the MD signal case to house, if necessary, a Type K Size 4 relay.

Both signals are equipped with doublet lenses, the outer lens being the clear standard optical smooth face type and the inner lens colored as required. The manner of assembly makes the lenses readily accessible for cleaning or replacing, the work being done from the front of the signal without disturbing any of the apparatus housed in the back of the signal.

A convex deflecting or spreadlite roundel may be applied in front of the lenses if desired. This requires an additional bezel ring, and the manner of assembly is shown in Figure 6.

Hoods are provided to shield the lenses from extraneous light thus preventing interference with the indication.

The shield provided behind the lamps in the MD signal thoroughly excludes any light from an outside source that may be transmitted through the lenses from the rear when the case door is opened. It is easily removed when it is desired to gain access to the lamps or lamp receptacles.

The terminal blocks as shown (in the MD signal—one on either side of and independent of the shield) provide: in the MD signal six, and in the ME signal three, independent terminal posts and are typical of those supplied for the termination of outside wires. More or less terminals may be provided, as specified, within the limitations of available space. An independently mounted variable resistor for readily adjusting the lighting voltage may be supplied if specified. A typical mounting of the resistor in the ME

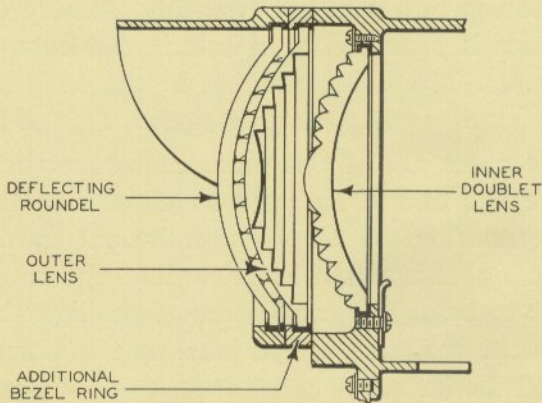


Figure 6. Deflecting or spreadlite roundel applied to an MD or ME signal



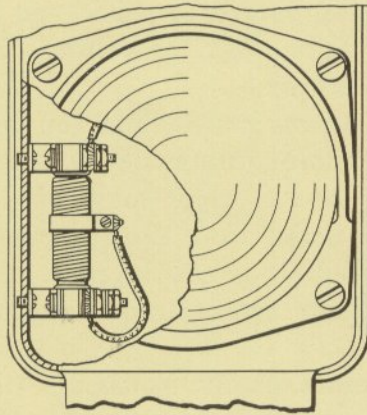


Figure 7. Typical mounting of lighting voltage adjusting resistor in ME signal

Signal is shown in Figure 7. Only one is required for each signal when used in series with the lights' common return.

The doors, hinged at the bottom, open downward and allow access to the apparatus. Two screened vents are provided on the door of the MD signal, one above the other, to provide ventilation and prevent sweating. A wire cable entrance is provided by a hole in the bottom of the cases. The hole provided in the MD signal is  $1\frac{1}{2}$ " x 3" and in the ME signal,  $1\frac{1}{2}$ " x  $1\frac{3}{4}$ ".

The cases are of one-piece cast construction, as are the doors, and are so constructed that when mounted on a level foundation, the front of the signal is tilted backward at the top sufficient to bring the center line of the light beam up to the trainman's eye level at the normally desired distance.

Lampwick gaskets are provided around the lenses and in the door jambs.

## MD Signal Housing Space

The MD signal control relays, transformers, etc., may be housed in the signal case where local conditions do not afford other nearby housing facilities.

Sufficient space is provided for housing a combination assemblage such as one G-R-S Type K Size 2 relay with a small transformer (G-R-S Type S1 or S2), or with a G-R-S Type WE relay with rectifier, and resistors and terminal posts. A typical arrangement of this equipment is shown in Figure 8. The largest single relay which may be housed in the case is a G-R-S Type K Size 4.

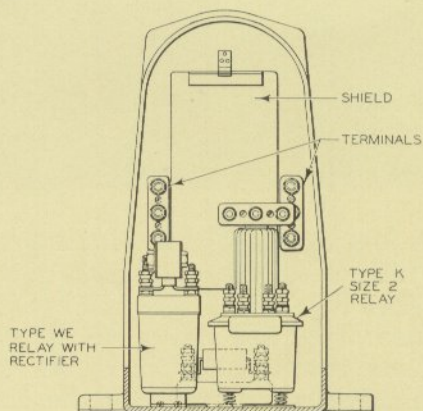


Figure 8. Equipment housed in MD signal case

Usually, dwarf signals within terminal or switching yards, or existing bridge signals, are located in groups and their respective control relays, transformers, etc., may be centrally housed in adjacent relay housings or cases. This latter method affords more room and allows for the use of more varied types of relays, transformers, etc.; and too, fewer wires are required from the more centrally located housings to the individual signal locations.



## Optical Characteristics

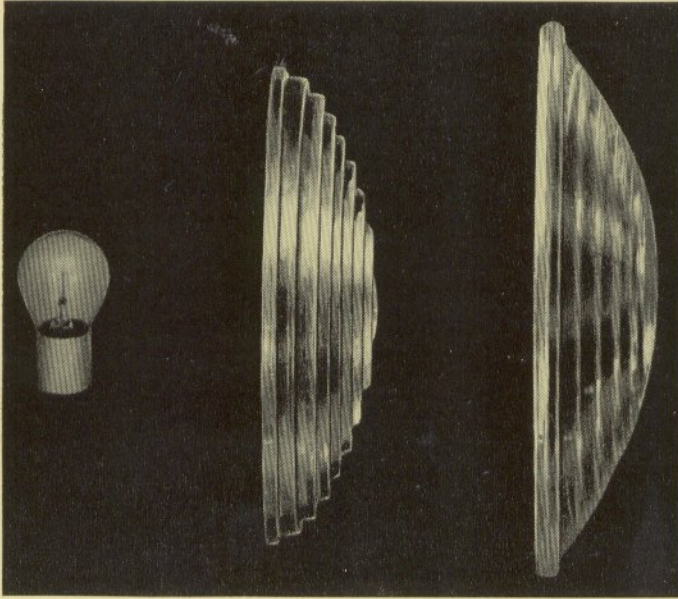


Figure 9 is a candle power distribution curve typical of the optical characteristics of the doublet lens assemblage supplied in the MD and ME signals. The dotted line shows the spread in the vertical plane through the horizontal axis and the solid line shows the spread in the horizontal plane through the vertical axis in the directions as designated: Left and Up, and Right and Down. A study of the curve shows that a distinct aspect of considerable width horizontally and vertically may be anticipated at the distances normally required of a dwarf signal.

A 13.3 watt, 11.3 volt, 13.8 mean spherical candle power rated lamp burned at 10.3 volts was used for making this curve. The beam intensity and maximum range values will vary with the mean spherical candle power output of the lamp employed; thus, if this lamp were

# Zachary C. Gillihan 2008

burned at a higher voltage, or if a lamp of a higher candle power rating were employed, these values would of course be increased.

TYPE OF APPARATUS: $6\frac{3}{8}$ " DOUBLET, TYPE MD SIGNAL	
LAMP DATA	OPTICAL SYSTEM
DRAWING NO. 34866-32	
BULB S-8 FIL. C-2R	
1000 HOUR RATING WATTS 13.3 VOLTS 11.3 MSCP 13.8	SINGLE CONTACT CANDELABRA BASE LAMP
RECOMMENDED BURNING WATTS 11.5 VOLTS 10.3 MSCP 10	
FOR THIS TEST BURNED AT VOLTS 10.3 MSCP 10	$6\frac{3}{8}$ " DIA. LENS

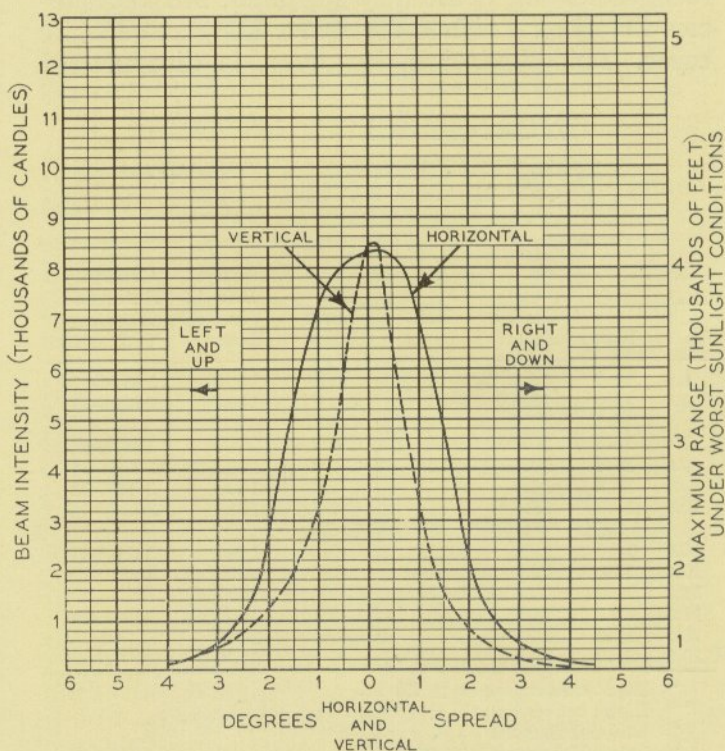


Figure 9. Candle power distribution curve applicable to MD and ME signals



## Lamps

An important feature of the MD and ME signals is their compactness, a desirable feature of a dwarf signal. In the design of these signals an optical system that would be compact and give the maximum in signal aspect was adopted. Consistent with this was the adoption of a lamp having the same inherent characteristics. This resulted in the selection of the single contact candelabra bayonet base type lamp. These lamps have a light center length of  $1\frac{1}{4}$ " which in all instances should be closely adhered to.

Single contact candelabra bayonet base type receptacles are ordinarily supplied, but receptacles may be furnished for other lamps in special cases. This deviation, however, is discouraged.

### INCANDESCENT LAMPS

1/64 in. PRECISION SINGLE CONTACT,  
CANDELABRA BAYONET BASE  
1-1/4 in. LIGHT CENTER LENGTH

RATING		Candle Power	Bulb Shape	Fila-ment Form	Average Life in Hours	G-R-S Ordering Reference Drawing Number
Volts	Watts					
8.0	10.0	10.0	S-11	C-2R	1000	34866-43
8.0	13.0†	13.0†	S-11	C-2V†	1000	34866-37
	3.5‡			C-12‡		
8.0	18.0	20.0	S-11	C-2R	1000	34866-44
9.0	15.3	17.0	S-11	C-2R	1000	34866-34
10.0	10.0	10.0	S-11	C-2R	1000	34866-33
10.0	13.0†	13.0†	S-11	C-2V†	1000	34866-60
	3.5‡			C-12‡		
10.0	18.0	20.0	S-11	C-2R	1000	34866-29
10.0	25.0	29.0	S-11	C-2R	1000	34866-47
11.0	11.0	9.0	S-11	C-2V	2500	34866-59
11.3	13.3	14.0	S-8	C-2R*	1000	34866-32
13.5	17.0	16.0	S-11	C-2V	2000	34866-25
120.0	25.0	17.0	G-16-1/2	C-5**	1000	34866-46

\* Light center length  $\pm .04$  in.

\*\* Light center length  $\pm 4/64$  in. Vertical burning.

† Major Filament

‡ Minor Filament } In Multiple

Figure 10. Lamps recommended for use in MD and ME signals

as other types are not entirely satisfactory because of the variations in the position of the light filament and the inconvenience of the necessarily larger bulb.

The receptacles are each mounted on an individual movable bracket, thus permitting adjustment or refocusing of the individual lamps when necessary.

Figure 10 is a table of selected lamps recommended for use in the MD and ME signals. Note that the voltages and wattages designated are varied sufficiently to provide a lamp that will meet the requirements of the vast majority of installations.

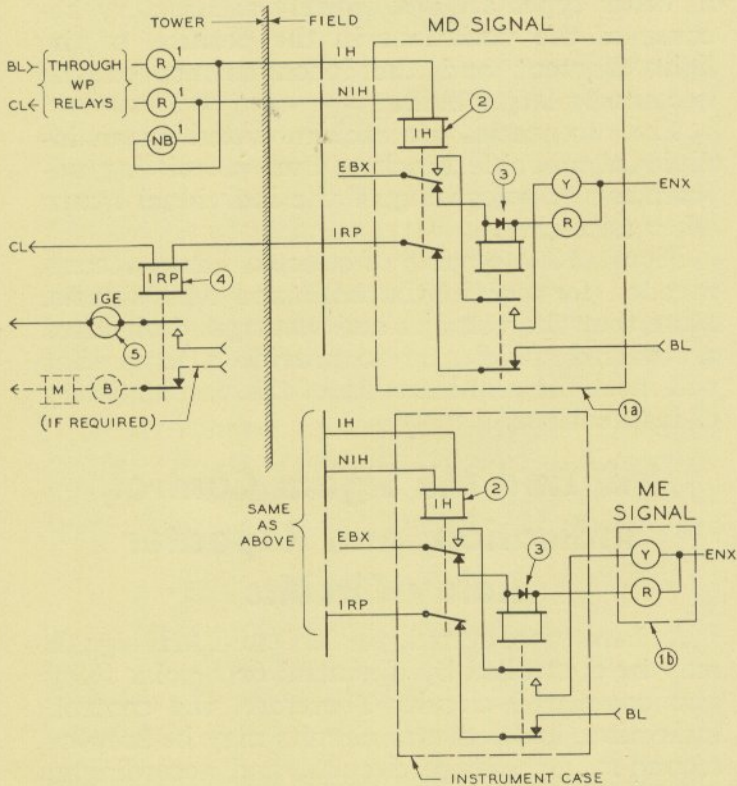
## **MD and ME Signal Control, Indication, and Repeater Relay Circuits**

As heretofore stated, the MD and ME signals may be controlled by a neutral or a polar relay and associated circuit. Therefore, the control, indication, and repeater circuits may be first- or second-range voltage circuits, and accordingly, may be applied to any type of interlocker or other desired method of control.

Figures 11 and 12 are typical first-range voltage control circuits for these signals, applicable to any type control machine and operatable with the more commonly used relays. The principal associated devices are identified sufficiently to enable ready reference to the G-R-S Catalog for complete ordering information.

The circuits themselves, being of a comparatively simple nature, are self-explanatory as to operation. Note in Figure 11 the aspect displayed by the signal is controlled by a neutral relay, and that by the medium of the lightout relay (3), the red repeater relay (4), and the lever light (5), a continuous visual indication is afforded the





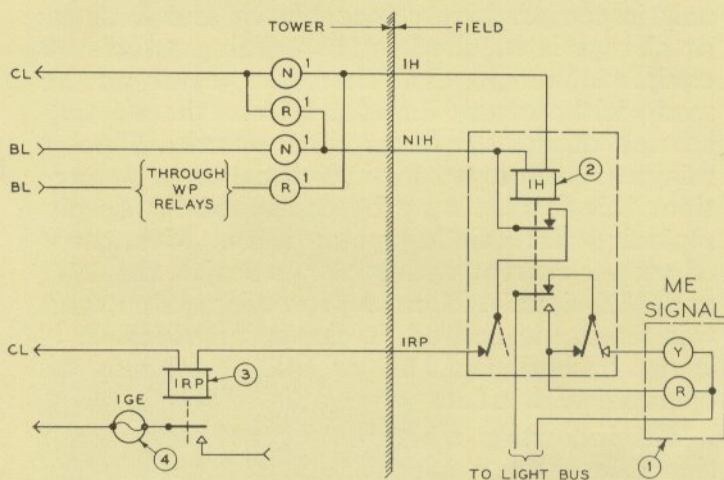
- 1a. Type MD Signal, 36722-52. (See Page 28).
- 1b. Type ME Signal, 36722-60. (See Page 28).
2. Type K, Size 2 Relay, 53000-122 Gr (as required by voltage, etc.).
3. Type WE Relay with Rectifier, 54250-18 (voltage as specified).
4. Type K, Size 2 Relay, 53000-122 Gr (as required by voltage, etc.).
5. Receptacle and lamp (as required by type of cabinet or illuminated track diagram).

Figure 11. First-range voltage control of Types MD and ME color light dwarf signals with red repeater relay in tower for lever light and indication control

operator as to the operation of the field equipment and the continuity of the filament of the restricting indication lamp.

In Figure 12, the signal aspect is controlled by a polar relay (2). By means of the red repeater relay (3) and the lever light (4) a visual indication is afforded the operator of the proper functioning of the control relay and circuit.

Other variations of low voltage control and repeater-indication circuits are possible in order to conform with local conditions and standards.



1. Type ME Signal, 36722-60. (See Page 28).
2. Type K, Size 6 Polar Relay, 53002-123 Gr (as required by voltage, etc.).
3. Type K, Size 2 Relay, 53000-122 Gr (as required by voltage, etc.).
4. Receptacle and lamp (as required by type of cabinet or illuminated track diagram).

This circuit may be applied to the MD Signal; however, because relay (2) is a Size 6, housing facilities other than the MD case have to be provided.

Figure 12. First-range voltage control of Type ME color light dwarf signal with red repeater in tower and only three wires required, tower to field location



## Applications to Existing Interlocking

In many existing interlockings it may be desired to replace obsolete, worn-out dwarf signals. In G-R-S All-Electric Interlockings of the Model 2 type where solenoid type dwarfs exist this may be particularly true. Here the signal control and indication circuits already exist and the replacement scheme using MD or ME signals is comparatively inexpensive and little or no change is required in the existing associated equipment or circuits. The replacement can be made without any departure from the existing scheme of operation. In other words, if polar relays are employed for individual cross protection, this feature may be continued by simply replacing the existing polar relays with those of proper current ratings for use with the MD and ME signals. If cross protection exists, and this feature is desired, it can be provided. If it is not desired, the MD or ME signal may be operated without it.

The indication magnets as provided on each signal lever of a Model 2 interlocker may be continued in operation as before and no change of the coils is required unless it is desired to change the indication circuit to a first-range voltage circuit.

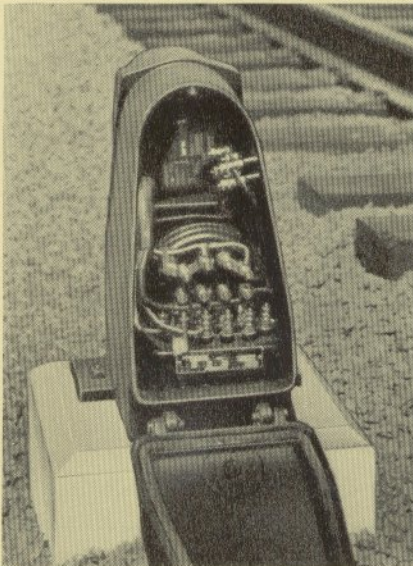
Thus, the replacement may be effected without necessitating any major change of wiring in the field or interlocking machine. The old solenoid dwarf signal foundations may be utilized for mounting the MD or ME signals. These facts, when summed up, show that the replacement may be effected simply and quickly. Therefore, if unsatisfactory operation is being realized by the use of worn-out or obsolete signals, the replacement will undoubtedly be justified.

## Typical Circuits for Replacement

Figures 13 to 18 inclusive are typical circuits designed to meet the requirements of local conditions where it is desired to use either the MD or the ME signal to replace existing solenoid dwarf signals controlled from G-R-S Model 2 interlockers.

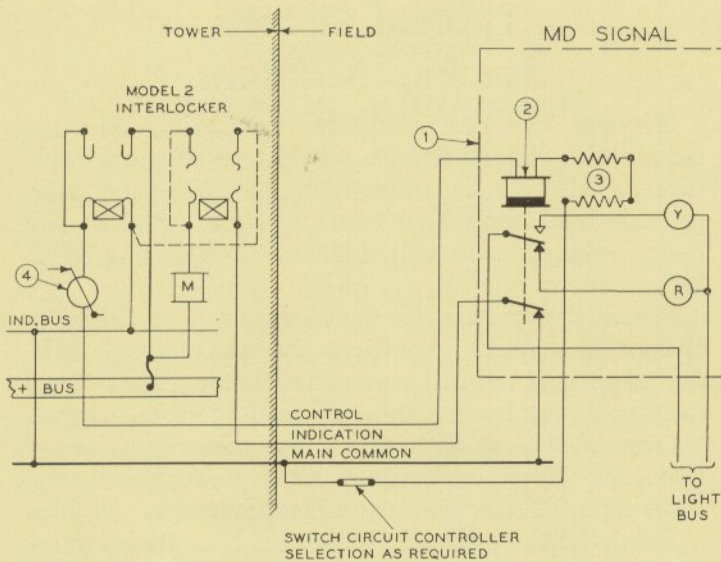
These typical circuit drawings are individually shown as applied to either the MD or the ME signal, but it should be borne in mind that they may in every instance be applied to either signal as was shown in Figure 11; the difference being that the Type ME signal does not afford any housing space for relays or transformers.

Each typical circuit is notated as to its particular feature and sufficient data relative to each of the principal associated devices is provided to facilitate ready ordering references. Additional ordering information may be found in the G-R-S Catalog.



MD signal with cover open, showing Model 2 Form B relay in place





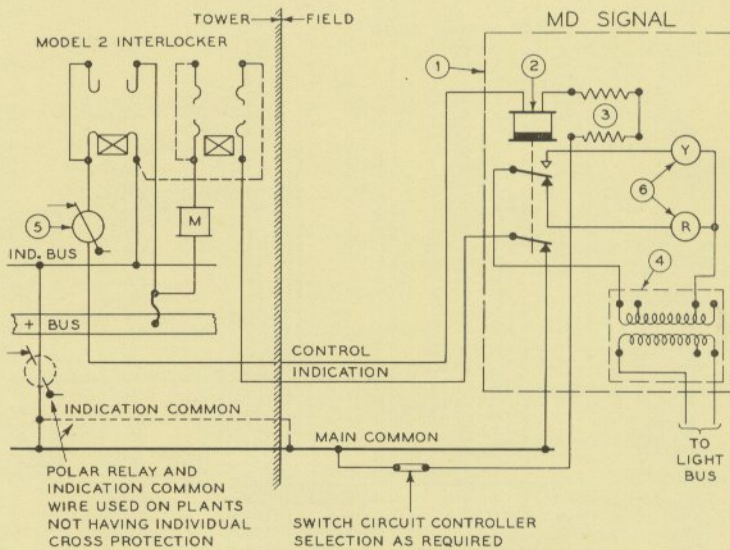
1. Type MD Signal, 36722-52. (See Page 28).
2. Type K, Size 2 Relay, 53000-121 Gr 42, (1-ohm; slow-release; operating current 0.170 amp.).
3. Two resistors, 200-ohm, 50482-12 Gr 7.
4. Cross Protection Relay, 33880-1 Gr 18, (64-ohm; reversing current 0.065 amp.). To replace existing polar relay or to be added to levers not equipped with individual cross protection.

Note: K2 Relay is slow-release in order to check lever momentarily at normal indication when moved from reverse to normal.

Dotted wiring shows indication circuit used on old type levers to provide reverse indication; on later machines reverse indication is effected mechanically and dotted wiring is omitted.

Specify voltage of signal light bus.

Figure 13. Typical circuit for Type MD color light signal when used to replace existing solenoid dwarf signal controlled from Model 2 interlocker



1. Type MD Signal, 36722-52. (See Page 28).
2. Type K, Size 2 Relay, 53000-121 Gr 42, (1-ohm; slow-release; operating current 0.170 amp.).
3. Two resistors, 200-ohm, 50482-12 Gr 7
4. Type S1 Transformer for 110 volts, 60 cycles. Specify 53715-1 Gr 1, Amus 13AS-50.
5. Cross Protection Relay, 33880-1 Gr 18, (64-ohm; reversing current 0.065 amp.). To replace existing polar relay or to be added to levers not equipped with individual cross protection.
6. Signal lamps, 34866-32, 11.3 volts, 14.4 watts.

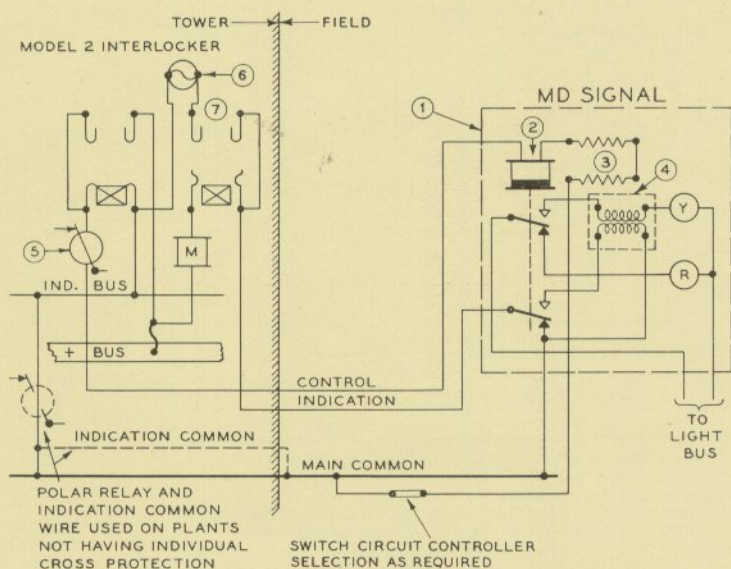
Note: K2 Relay is slow-release in order to check lever momentarily at normal indication when moved from reverse to normal.

Dotted wiring shows indication circuit used on old type levers to provide reverse indication; on later machines reverse indication is effected mechanically and dotted wiring is omitted.

Specify signal light bus voltage and frequency.

Figure 14. Typical circuit for Type MD color light signal when used to replace existing solenoid dwarf signal controlled from Model 2 interlocker; individual light transformer in signal





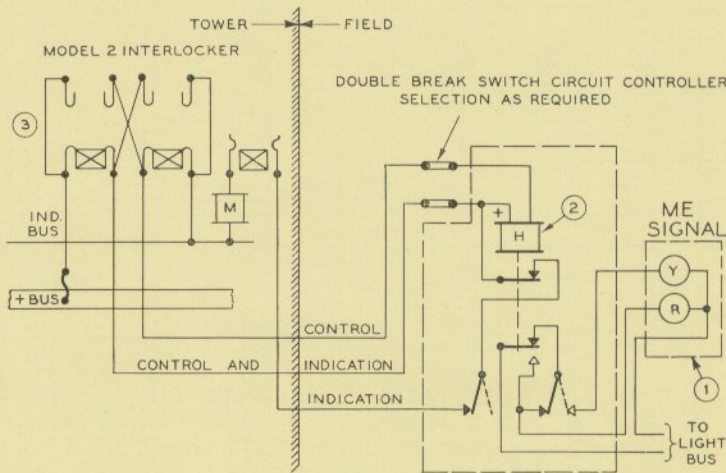
1. Type MD Signal, 36722-52. (See Page 28).
2. Type K, Size 2 Relay, 53000-121 Gr 42, (1-ohm; slow-release; operating current 0.170 amp.).
3. Two resistors, 200-ohm, 50482-12 Gr 7.
4. Type S2 Transformer, 53715-2 Gr 1. Amus—as required by voltage and frequency of signal lighting bus.
5. Cross Protection Relay, 33880-1 Gr 18, (64-ohm; reversing current 0.065 amp.). To replace existing polar relay or to be added to levers not equipped with individual cross protection.
6. Receptacle and lamp (as required by type of cabinet).
7. Contact spring (as required for existing controller).

Note: K2 Relay is slow-release in order to check lever momentarily at normal indication when moved from reverse to normal.

Lever equipped with lever light to indicate when signal displays "PROCEED."

Figure 15. Typical circuit for Type MD color light signal when used to replace existing solenoid dwarf signal controlled from Model 2 interlocker; indication transformer in signal

# Zachary C. Gillihan 2008

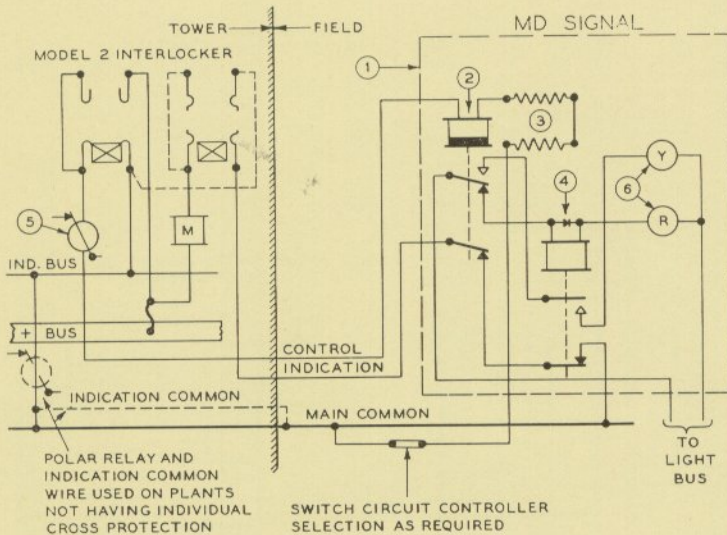


1. Type ME Signal, 36722-60. (See Page 28).
2. Type K, Size 6 Polar Relay, 53002-123 Gr 23; 8400-ohm for operation on 110 volts d-c.
3. Three-tier controller (as required for existing interlocker).

Note: Type K6 Polar "H" Relay used for signal and indication control.

Figure 16. Typical circuit for Type ME color light signal when used to replace existing solenoid dwarf signal controlled from Model 2 interlocker





1. Type MD Signal, 36722-52. (See Page 28).
2. Type K, Size 2 Relay, 53000-121 Gr 42, (1-ohm; slow-release; operating current 0.170 amp.).
3. Two resistors, 200-ohm, 50482-12 Gr 7.
4. Type WE Relay with rectifier, 54250-17 Gr 51, (for 10 volts, 60 cycles light energy).
5. Cross Protection Relay, 33880-1 Gr 18, (64-ohm; reversing current 0.065 amp.). To replace existing polar relay or to be added to levers not equipped with individual cross protection.
6. Signal lamp, 34866-32, 11.3 volts, 14.4 watts.

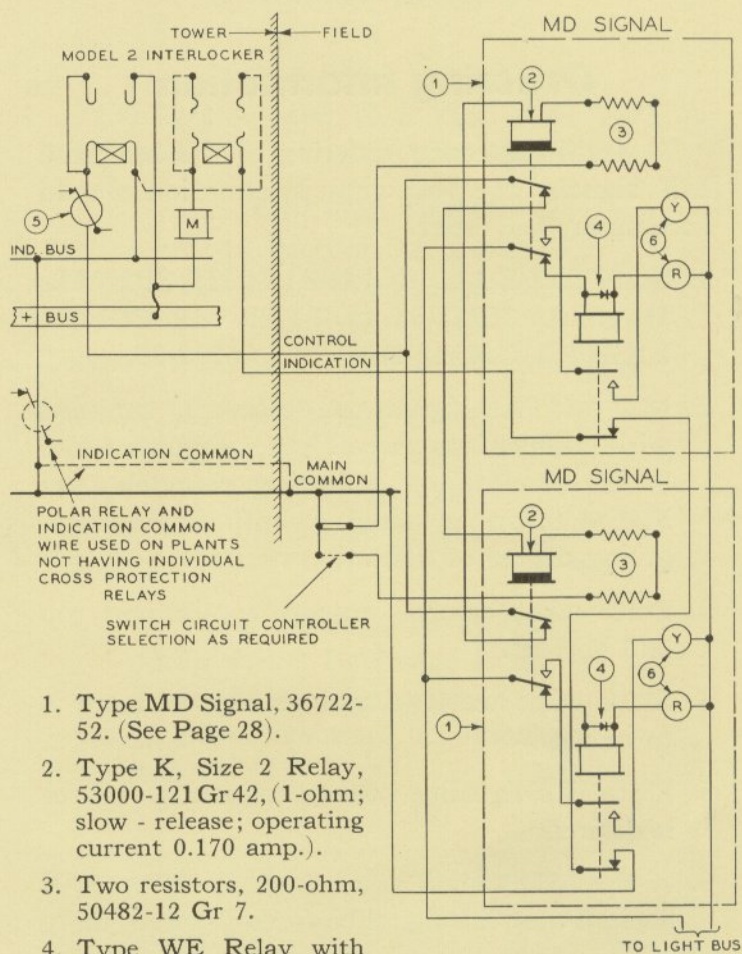
Note: K2 Relay is slow-release in order to check lever momentarily at normal indication when moved from reverse to normal.

Dotted lever wiring shows indication circuit used on old type levers to provide reverse indications; on later machines reverse indication is effected mechanically and dotted wiring is omitted.

Specify signal light bus voltage and frequency.

Normal indication controlled through front contacts of WE relay in series with red lamp; this checks filament of lamp each time lever is returned to normal position.

Figure 17. Typical circuit for Type MD color light signal when used to replace existing solenoid dwarf signal controlled from Model 2 interlocker; light-out relay in series with red lamp



1. Type MD Signal, 36722-52. (See Page 28).
2. Type K, Size 2 Relay, 53000-121 Gr 42, (1-ohm; slow - release; operating current 0.170 amp.).
3. Two resistors, 200-ohm, 50482-12 Gr 7.
4. Type WE Relay with rectifier, 54250-17 Gr 51, (for 10 volts, 60 cycles light energy).
5. Cross Protection Relay, 33880-1 Gr 18, (64-ohm; reversing current 0.065 amp.). To replace existing polar relay or to be added to levers not equipped with individual cross protection.
6. Signal lamps, 34866-32, 11.3 volts, 14.4 watts. (See "NOTE" on Fig. 17).

Figure 18. Typical circuit for two Type MD color light signals controlled from one lever of Model 2 interlocker



## Ordering Information

To facilitate ready ordering of the MD and ME signals, the following information should accompany the order.

1. State TYPE MD COLOR LIGHT SIGNAL, Dwg. No. 36722-52, or TYPE ME COLOR LIGHT SIGNAL, Dwg. No. 36722-60.
2. MD and ME signals are ordinarily supplied with doublet lens assembly per Figures 4 and 5. If spreadlite or deflecting roundels, per Figure 6, are required, specify accordingly, giving degree of deflection desired.
3. State what colored aspects are desired top and bottom.
4. State what wattage and voltage of lamp is to be used.
5. State if a lighting voltage adjusting resistor is desired.
6. If the MD signal, state to what extent it is desired that the signal be factory-wired; lamp receptacles to terminals only, or wired complete and equipped with relays, resistors, transformers, etc., as per Figures 11 to 18 inclusive, Bulletin 175. In the latter case, give lighting bus voltage and frequency and normal rated voltage of control and indication or repeater circuits.

# Zachary C. Gillihan 2008

## DISTRICT OFFICES

### NEW YORK OFFICE

230 Park Avenue, New York, New York  
Telephone Murray Hill 9-7533

### CHICAGO OFFICE

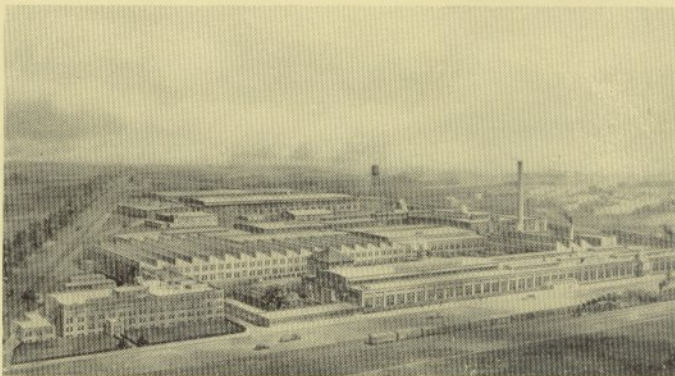
1019 Peoples Gas Building  
122 South Michigan Avenue  
Chicago, Illinois  
Telephone Harrison 2361 and 2362

### ST. LOUIS OFFICE

2044 Railway Exchange Building  
611 Olive Street  
St. Louis, Missouri  
Telephone Main 4696

### SAN FRANCISCO OFFICE

Merchants Exchange Building  
465 California Street  
San Francisco, California  
Telephone Exbrook 1538



General Railway Signal Company, Rochester, New York  
Established 1904



