

MANUAL  
OF THE  
AMERICAN RAILWAY ENGINEERING  
ASSOCIATION

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The Object of this Association is the Advancement of Knowledge  
Pertaining to the Scientific and Economic Location, Construc-  
tion, Operation and Maintenance of Railways. Its  
Action is not Binding upon its Members.

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EDITION OF 1915

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AMERICAN RAILWAY ENGINEERING ASSOCIATION  
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## 4 TRACK MAPS.

Note.—Reference is made to the Specifications for Maps and Profiles, as prescribed by the Interstate Commerce Commission in accordance with Section 19A of the Act to Regulate Commerce, dated February 1, 1914, shown in Vol. 15, 1914, pp. 943-950.

(1) Track Maps should show all physical conditions pertaining to the construction and operation of the railway in the limits of the right-of-way, without reference to title or ownership. They should show all main and sidetracks, their alinement, distance between them, and capacity in cars; all buildings upon the right-of-way and adjacent thereto, dimensions and character thereof and location with reference to main or sidetracks; bridges, culverts, water stations, coaling plants, turntables, shop buildings, water mains, conduits, wire lines of all kinds and supports, fences, street car and other railway crossings, and the angle they make with the railway track; sewers, signals of all kinds and physical conditions on the property. Important structures on such maps should be located by chainage numbers and plusses.

(2) They should be corrected whenever any changes are made in any of the features shown thereon, and at stated periods a corrected copy sent to the proper office.

(3) It is recommended that a scale of 100 ft. to the inch be used for such maps except in territories of large industrial development, where varying scales may be used to suit local conditions.

(4) Track Maps should show plainly the meridian, scale, original date and date corrected.

(5) The conventional signs adopted by this Association should be used where it is possible and convenient.

(6) On Track Maps drawn to a scale of 1 in. equals 50 ft. or less, tracks should be represented exclusively by double lines.

(7) On Track Maps drawn to a scale of 1 in. equals 200 ft. or more, tracks should be represented exclusively by single lines.

(8) On Track Maps drawn to a scale of 1 in. equals 100 ft.:

(a) On maps representing preliminary studies and designs of proposed track layouts, tracks should be represented by single lines, except that double lines may be used where considered necessary to show turnout details.

(b) On maps representing completed work, station plats and permanent records, tracks should be represented by double lines.

\* Adopted, Vol. 9, 1908, pp. 664, 665, 668, 669, 686-690; Vol. 10, 1909, pp. 835-837, 870, 871; Vol. 16, 1915, pp. 786, 1085.

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Size 8 x 13 inches.






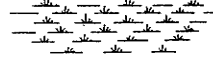
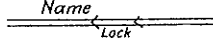
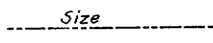

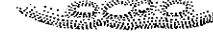


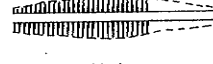
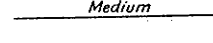
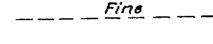
*A. B. & C. R. R. Co.*  
**\*MONTHLY REPORT OF EXPENDITURES ON AUTHORIZATION.**

FOR MONTH OF \_\_\_\_\_ 19\_\_\_\_  
 Authority No. \_\_\_\_\_ Description \_\_\_\_\_  
 Amount \$ \_\_\_\_\_ of Work \_\_\_\_\_  
 Location \_\_\_\_\_ Date Begun \_\_\_\_\_ 19\_\_\_\_ Date Completed \_\_\_\_\_ 19\_\_\_\_

AUTHORITY	Item	Amount	Expended During Current Month	Previous Expenditures	Total Expenditures to Date	Est. Expenditures for Ensuing Month	Total Est. Cost of Work Ensuing Month	Est. Cost of Completed Work	Increase	Decrease	Remarks

\* Adopted, Vol. 9, 1908, pp. 665-667, 673, 691.

<sup>12</sup> CONVENTIONAL SIGN FOR USE ON RAILWAY PROFILES,  
RIGHT-OF-WAY AND TRACK MAPS.

HYDROGRAPHY.	
<i>Stream</i>	
<i>Springs and Sinks</i>	
<i>Lakes and Ponds</i>	
<i>Falls and Rapids</i>	
<i>Water Line</i>	
<i>Marsh</i>	
<i>Canals</i>	
<i>Ditches</i>	
RELIEF.	
<i>Contour System</i>	
<i>Sand</i>	
<i>Cliffs</i>	
<i>Cut</i>	
<i>Embankment</i>	
<i>Top of Slope</i>	
<i>Bottom of Slope</i>	

<sup>12</sup> Adopted, Vol. 15, 1914, pp. 930-940, 1160; Vol. 16, 1915, pp. 789, 1086, 1087.

\* RAILWAYS ( TOPOGRAPHICAL MAPS.)

Steam	
Electric	
Street Railways	

\* RAILWAY TRACKS (TRACK MAPS.)

Railway Track or Old Track to Remain	
Old Track to be Taken up	
Proposed Tracks	
Proposed (Future) Tracks	
Foreign Tracks	
Alinement { 4° Curve to Right } { 2° " " Left }	

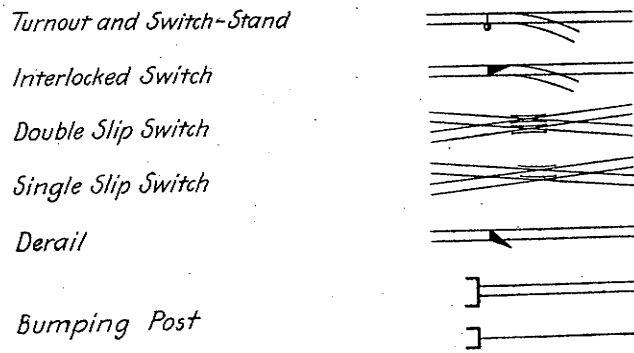
BOUNDARY AND SURVEY LINES.

{ Political Divisions, State, County } { or Township Lines.		Bethel Twp. - Wayne Co., Mich. Posey Twp. - Adams Co., Ind.
{ Government Surveys, Base, Meridian, } { Township, Section or Harbor Line		Sec. 18, T. 12 N., R. 1 E., 3rd P.M. Sec. 13, T. 11 N., R. 1 E., 3rd P.M.
Street, Block or other Property Line		
Survey Lines		
Center Lines		
Company Property Line		
Fence (on Street Line)		
Fence (on Company Property Line)		

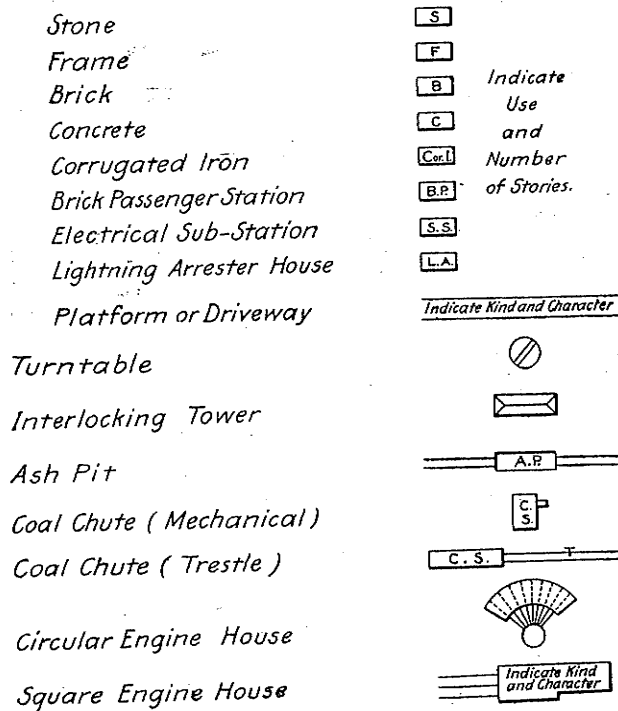
\* For Railway Track and Yard Studies Use  
Single or Double Lines.

<i>Stone Fence</i>	
<i>Board Fence</i>	
<i>Picket Fence</i>	
<i>Barb Wire Fence</i>	
<i>Rail Fence</i>	
<i>Worm Fence</i>	
<i>Woven Wire Fence</i>	
<i>Snow Fence</i>	
<i>Snow Shed</i>	
<i>City</i>	
<i>Village</i>	
<i>City Limits</i>	
<i>Fire Limits</i>	
<i>Section Corner</i>	
<i>Section Center</i>	
<i>Triangulation Station or Transit Point</i>	
<i>Bench Mark</i>	
<i>Stone Monument</i>	
<i>Iron Monument</i>	

TRACK FIXTURES.



\* BUILDINGS.

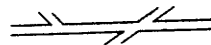


\* Indicate Type and Construction by Combination of Letters, as:  
 F.F. = Freight Frame Station, B.F. = Brick Freight Station.

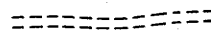


HIGHWAYS AND CROSSINGS.

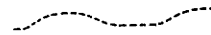
*Public and Main Roads*



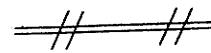
*Private and Secondary Roads*



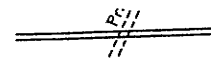
*Trails*



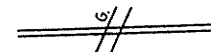
*Street and Public Road Crossings*



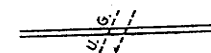
*Private Road Crossing*



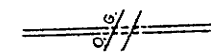
*Road Crossing at Grade*



*" " under "*



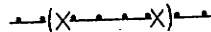
*" " overhead*



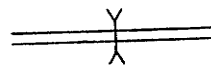
*Crossing Gate*



*Turnstile*



*Cattle Guard*

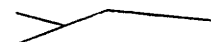


*Farm Gate*



MINES.

*Tunnel*



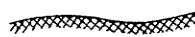
*Shaft*



*Test Opening*



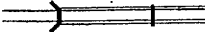

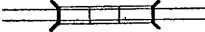
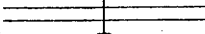


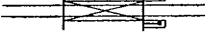

*Coal Outcrop*



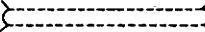
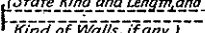
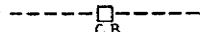
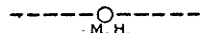

*Mine in Operation*




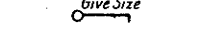
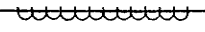
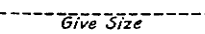
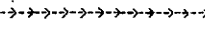
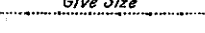
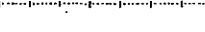
BRIDGES.

<i>Girder</i>	
<i>Truss</i>	
<i>Trestle</i>	
<i>Signal Bridge</i>	
<i>Lift Span</i>	
<i>Bascule, Double Leaf</i>	
<i>Bascule, Single Leaf</i>	
<i>Draw Span</i>	

CULVERTS, SEWERS, ETC.

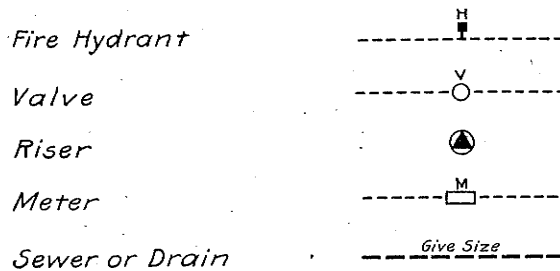
<i>Masonry Arch or Flat Top Culvert</i>	
<i>Pipe or Wood Box Culvert or Drain</i>	
<i>Catch Basin</i>	
<i>Manhole</i>	
<i>Sump</i>	

WATER SUPPLY AND PIPE LINES.

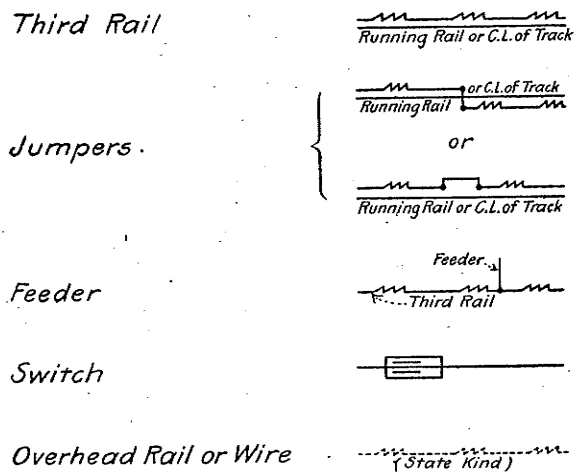
<i>Water Tank</i>	
<i>Water Column</i>	
<i>Track Pan</i>	
<i>Company Water Pipe</i>	
<i>Other Water Pipe</i>	
<i>Steam or Gas</i>	
<i>Compressed Air</i>	

WATER SUPPLY AND PIPE LINES.

(CONTINUED.)



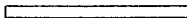
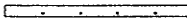


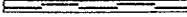
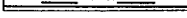




ELECTRIFIED LINES.



## Rail.

Give Weight in Lbs. per Yard.

## Ballast.

<i>Earth</i>	
<i>Sand</i>	
<i>Cinders</i>	
<i>Gran. Slag</i>	
<i>Screenings</i>	
<i>Burnt Clay</i>	
<i>Chats</i>	
<i>Gravel</i>	
<i>Slag</i>	
<i>Broken Stone</i>	

SIGNS AND SIGNALS.

*Mile Post*



*Section Post*



*Yard Limits*



*Highway Crossing Bell*



*Flanger Sign*



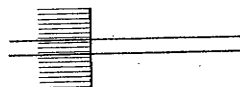
*Whistle Post*



*Crossing Sign*



*Tell-Tale*

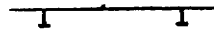


MISCELLANEOUS.

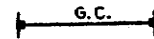
*Pole Wire Lines*



*Rail Rest*



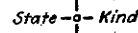
*Gantry Crane*



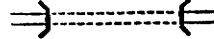
*Arc Lamp*



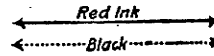
*Other Lamps*



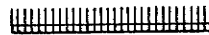
*Railway Tunnel*



*Dimension Lines*



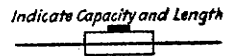
*Cribbing*



*Abutment, Wall and Pier*



*Track Scales*



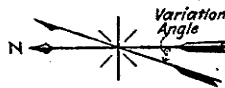
*Wagon Scales*



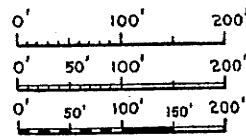
*Mail Crane*



*True and Magnetic Meridian*



*Graphic Scales*



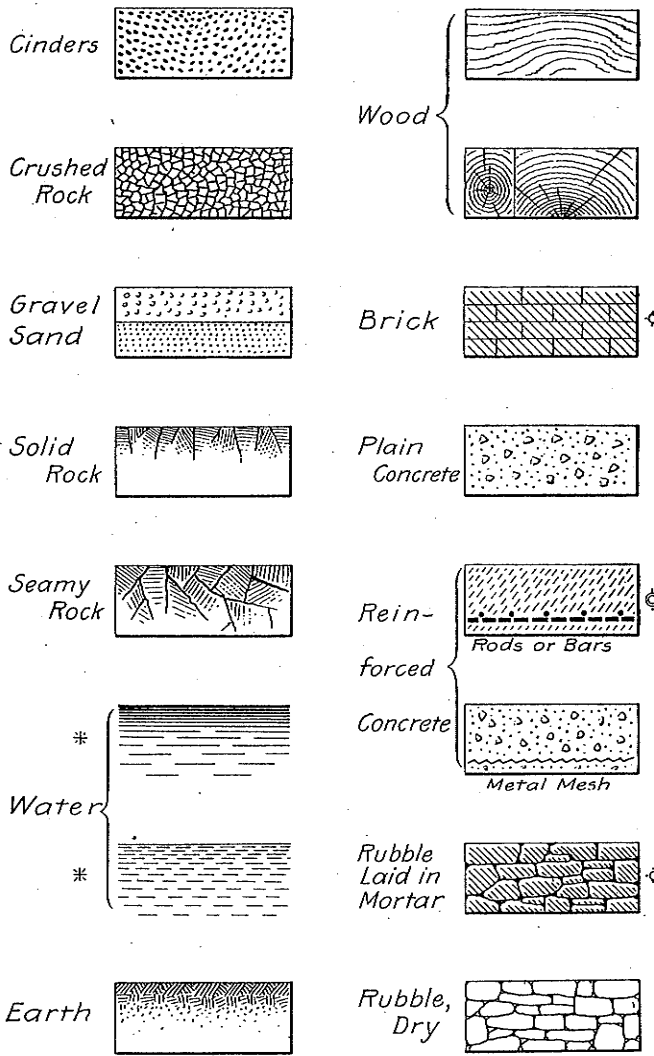
*Boom Crane*



*Gas Container*



STANDARD SECTIONS .

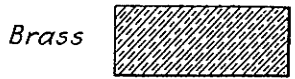
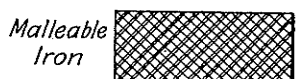
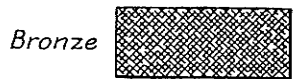
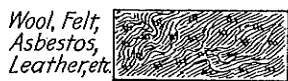
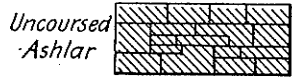
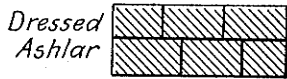
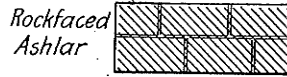


\* May be Used Alternately.  
 ◇ Courses may be Omitted.

⊕ Broken Line Symbol Preferred with Rod and Bar Reinforcement.

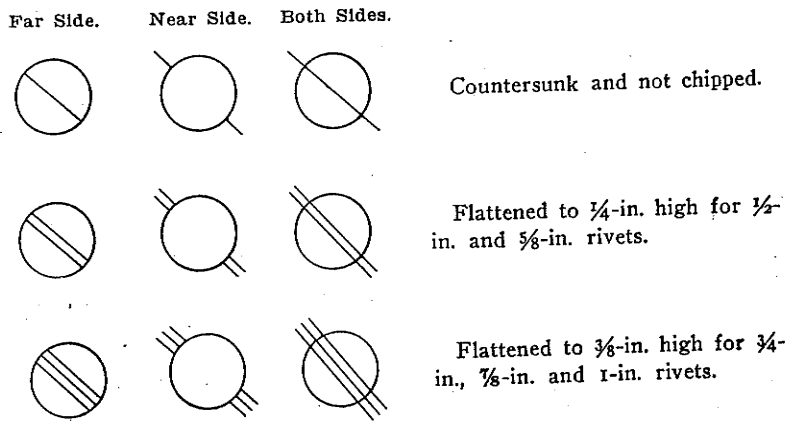
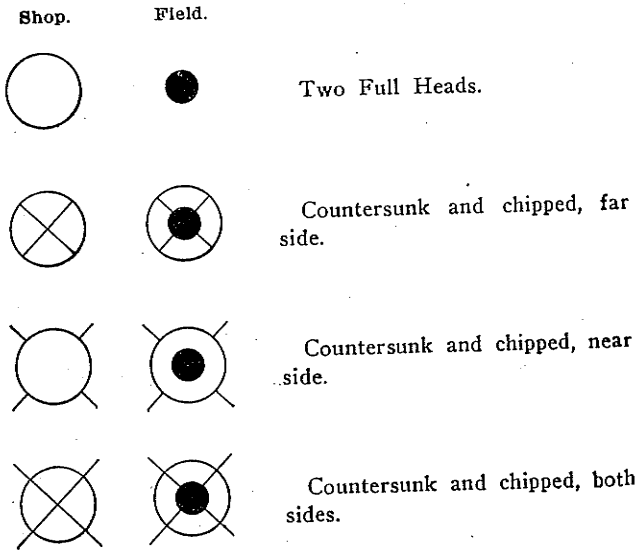
00'  
 00'  
 30'  
 1

STANDARD SECTIONS.





A—BRIDGE RIVETS.



B—STRESSES.

+ Tension.  
 - Compression.



10 CONVENTIONAL SIGNS FOR SIGNALS AND INTERLOCKING.

OPERATING.		NON-AUTOMATIC.		SLOTTED (MECH.)	SEMI-AUTOMATIC (POWER)		AUTOMATIC (POWER)	SPECIAL REQUIRES REFERENCE TO NOTES.	
		MECHANICAL	POWER		STICK	NON-STICK			
		CHARACTERISTICS							
			1	2	3	4	5	6	7
TWO POSITION SIGNALING.	2-POSITION. 0 TO 60-0 TO 70								
	0 TO 75-0 TO 90	A	A1	A2	A3	A4	A5	A6	A7
THREE POSITION SIGNALING.	2-POSITION. 0 TO 90								
	0 TO 45	B	B1	B2	B3	B4	B5	B6	B7
	2-POSITION. 0 TO 45								
	2-POSITION. 45 TO 90	C	C1	C2	C3	C4	C5	C6	C7
	3-POSITION. 0 TO 45 TO 90								
	D	D1	D2	D3	D4	D5	D6	D7	
	E	E1	E2	E3	E4	E5	E6	E7	

**NOTE:** ARMS SHOULD ALWAYS BE SHOWN IN NORMAL POSITION.

SPECIAL - 3 POSITION NON-AUTOMATIC, 0 TO 45.  
SEMI-AUTOMATIC STICK, 45 TO 90.

SPECIAL - 3 POSITION NON-AUTOMATIC, 0 TO 45.  
SEMI-AUTOMATIC NON-STICK, 45 TO 90.

ABSOLUTE STOP SIGNAL.      DISTANT SIGNAL.

PERMISSIVE STOP SIGNAL.      TRAIN ORDER SIGNAL.

ENDS OF BLADES IN SYMBOLS ARE TO BE OF THE ACTUAL FORMS USED BY THE ROAD CONCERNED. IF NOT SPECIFIED THE ABOVE FORMS WILL BE USED ON PLANS.

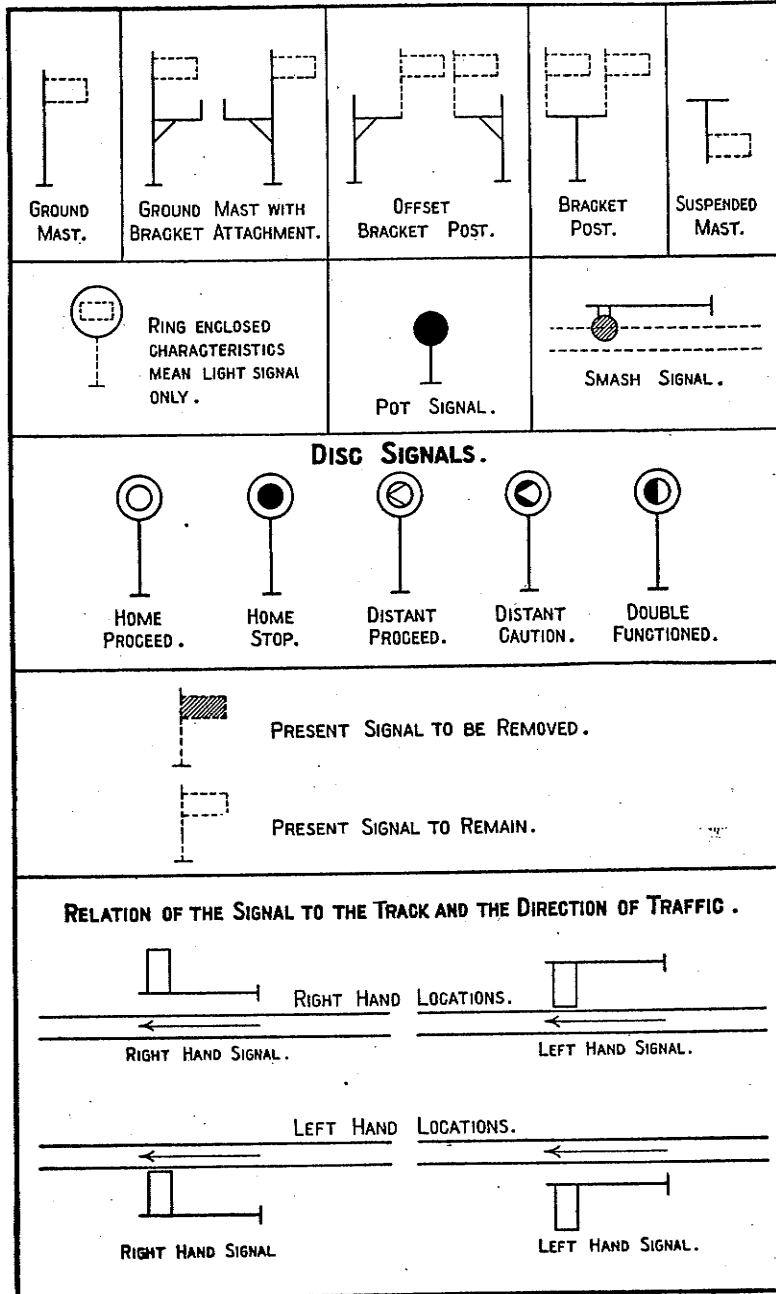
FIXED ARM.  
 UPPER QUADRANT SIGNAL.  
 LOWER QUADRANT SIGNAL.  
 VERTICAL } MARKER LIGHTS.  
 STAGGERED }

DIAGRAMS OF PROPORTIONS FOR MAKING SYMBOLS FOR SIGNAL BLADES.

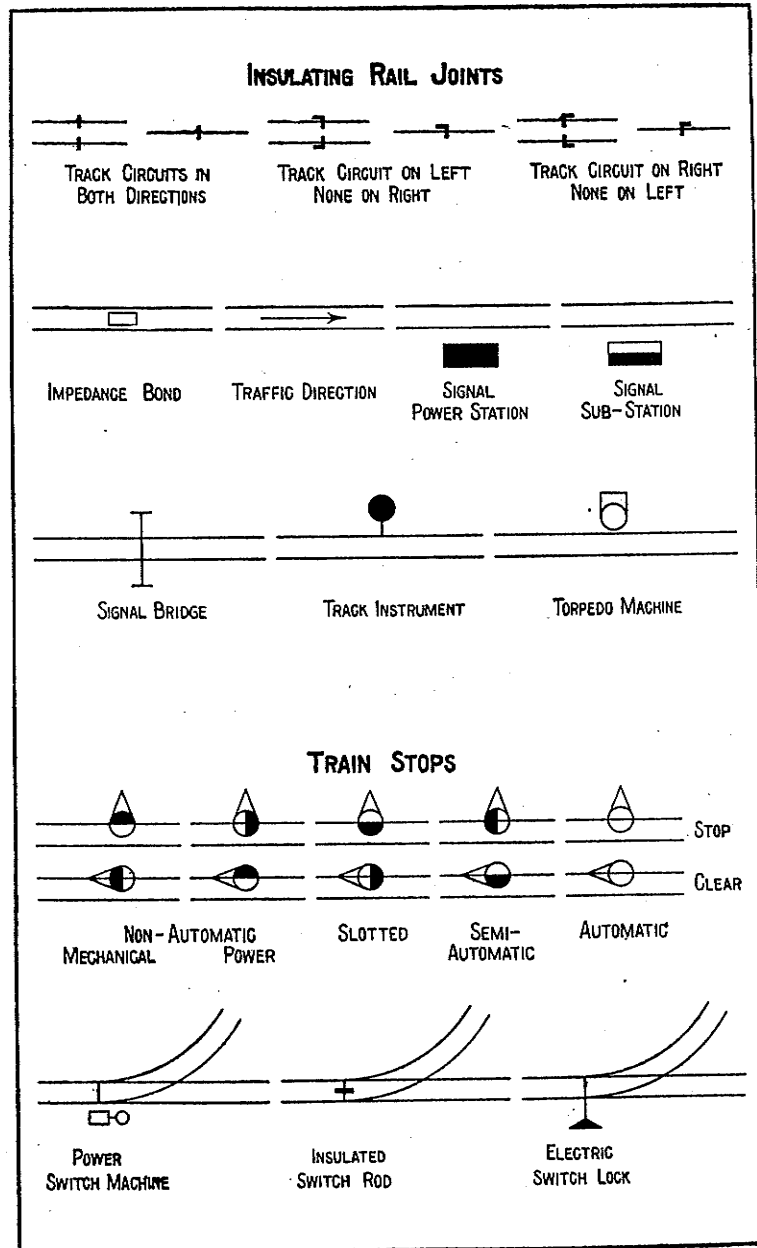
10 Adopted, Vol. 7, 1906, pp. 515-521, 548; Vol. 15, 1914, pp. 81-92, 1009.

EQUAL  
SIZES  
REFERENCE  
NOTES.

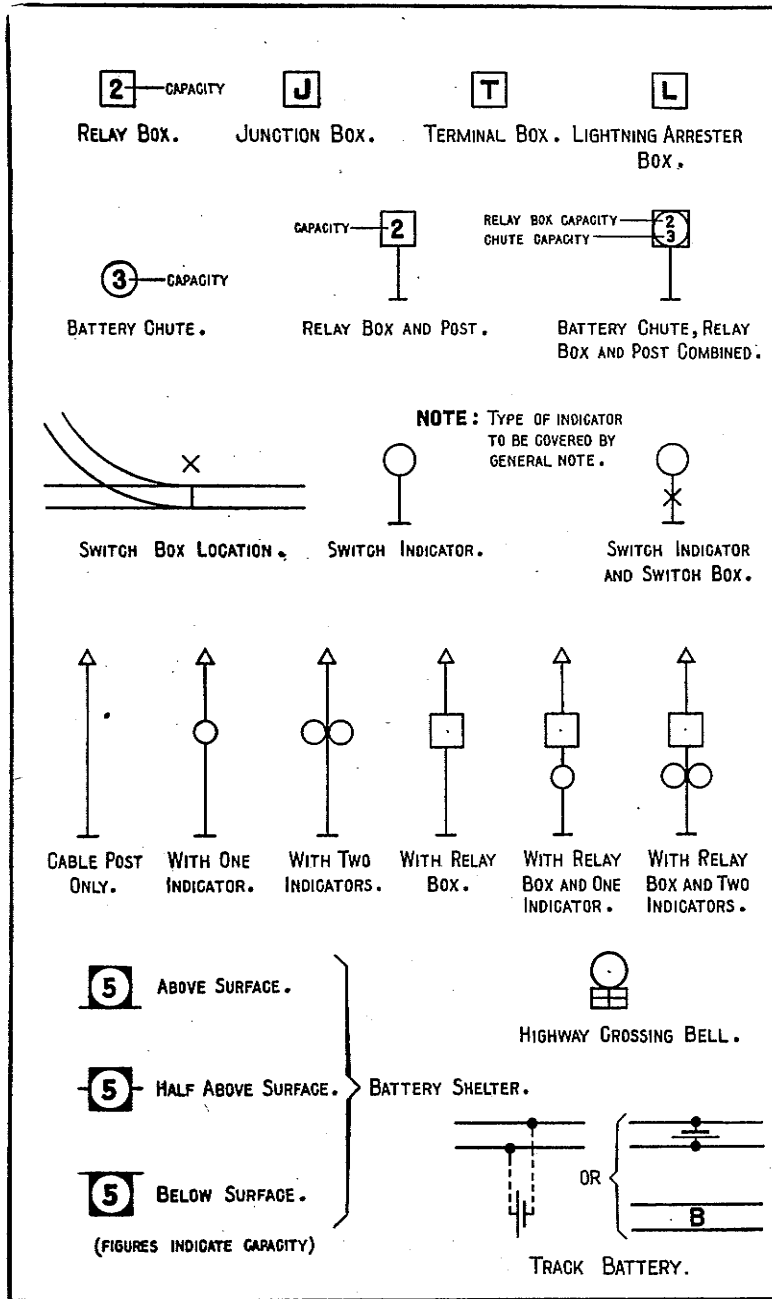
- 7
- A7
- B7
- C7
- D7
- E7



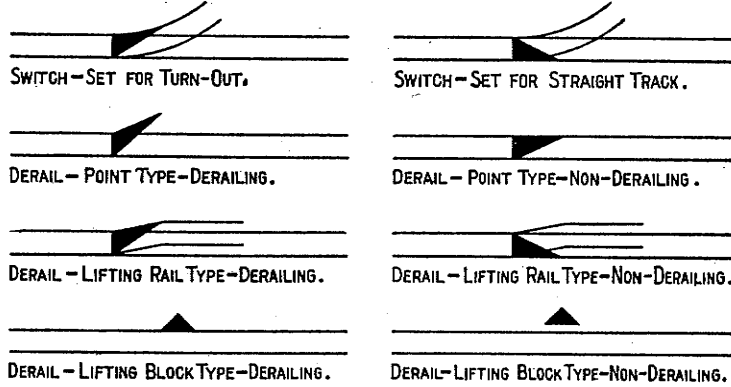
3  
1  
3  
3



F  
 N RIGHT  
 :FT  
 ON  
 NE  
 STOP  
 CLEAR

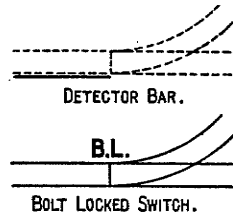
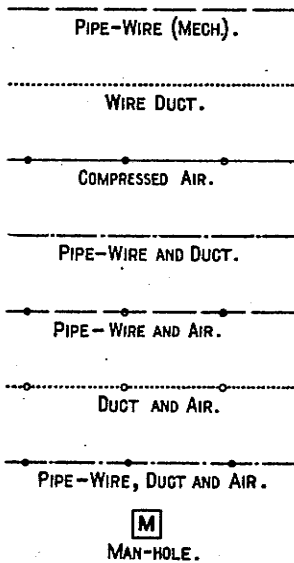


**INTERLOCKED SWITCHES AND DERAILS.**

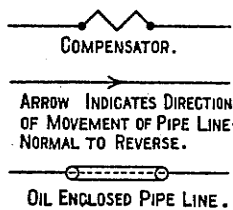


**NOTE:** NON-INTERLOCKED SWITCHES AND DERAILS TO BE SHOWN SAME AS ABOVE EXCEPT SHADING IN TRIANGLES OMITTED.

**RUNS OF CONNECTIONS.**

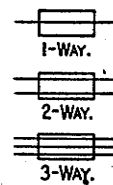


**S.L.M.** = SWITCH & LOCK MOVEMENT.  
**F.P.L.** = FACING POINT LOCK.

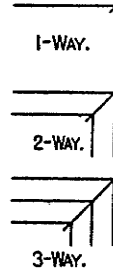


ARROW INDICATES DIRECTION OF MOVEMENT OF PIPE LINE-NORMAL TO REVERSE.

**BOLT LOCKS.**



**CRANKS.**



TRACK



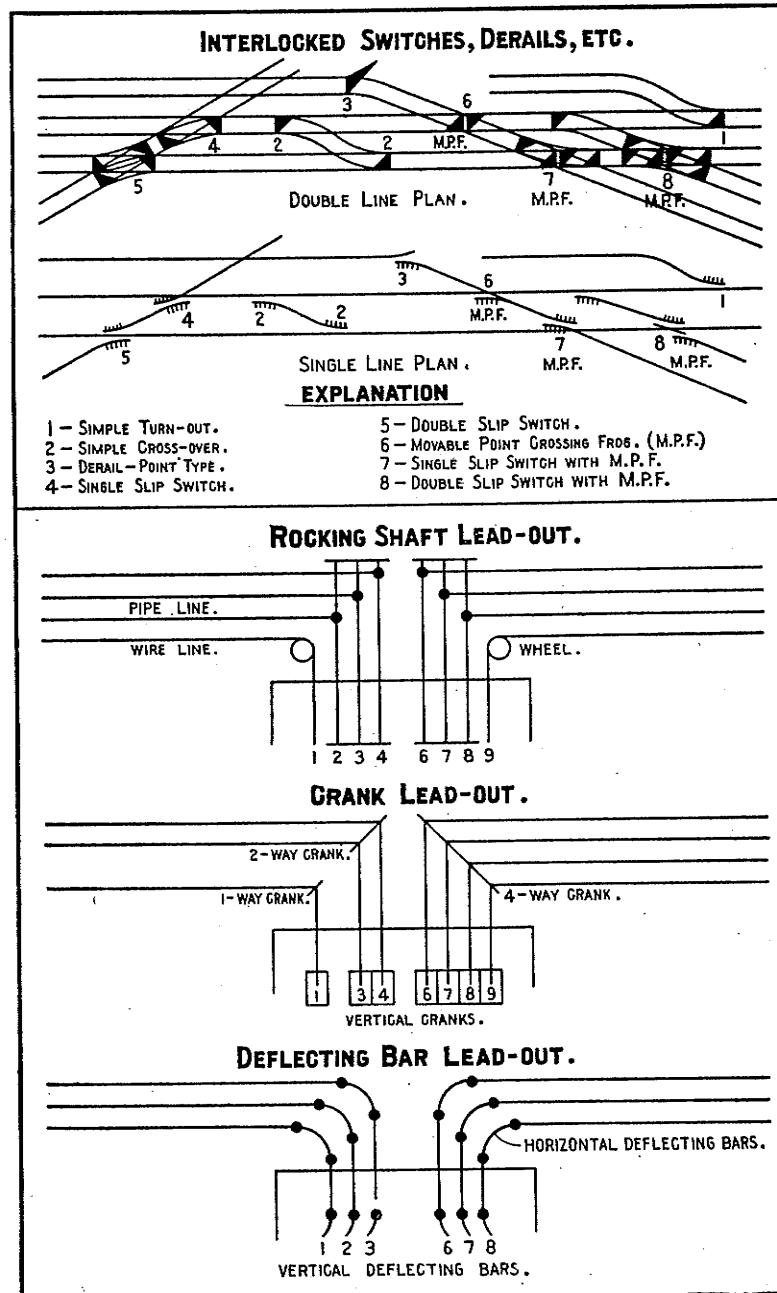
**INTERLOCKING OR BLOCK STATION.**



OPERATOR FACING TRACK.

OPERATOR WITH BACK TO TRACK.

**NOTE:** UNLESS OTHERWISE SPECIFIED ON PLAN IT WILL BE ASSUMED THAT WHERE AN INTERLOCKED SIGNAL IS SHOWN CLEAR OR A DERAIL SHOWN IN NON-DERAILING POSITION THE CONTROLLING LEVER IS REVERSED, AND THAT ALL OTHER LEVERS ARE NORMAL.



VG.

RAILING.

RAILING.

CKS.

KS.

TRACK.

RE NORMAL.

**RELAYS, INDICATORS AND LOCKS.**

ELEMENTS OF SYMBOLS  
TO BE COMBINED AS  
NECESSARY.

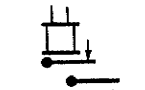
	D. C. ELECTRO MAGNET.
	A. C. ELECTRO MAGNET.
	COIL ENERGIZED OR DE-ENERGIZED.
	NEUTRAL FRONT CONTACT - CLOSED OR OPEN.
	NEUTRAL BACK CONTACT - CLOSED OR OPEN.
	POLARIZED ARMATURE - WITH CONTACTS.
	3-POSITION ARMATURE - WITH CONTACTS.
	HIGH CURRENT CONTACT.
	MAGNETIC BLOW-OUT CONTACT.
	BELL ATTACHMENT.
	DOUBLE WINDING - SPECIFY IF DIFFERENTIAL.
	SLOW ACTING.
	DISC TYPE INDICATOR. ○ = DISC INVISIBLE. ● = DISC VISIBLE.
	SEMAPHORE TYPE INDICATOR.  = 3-POSITION.
	WIRE WOUND ROTOR.
	STATIONARY WINDING.  = HIGH VOLTAGE WINDING.
	ELECTRIC LOCK - SHOW SEGMENTS FOR LEVER IN NORMAL POSITION.

(SEE NEXT PAGE FOR EXAMPLES OF COMBINATIONS.)

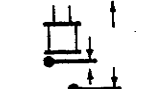


**RELAYS, INDICATORS AND LOCKS.**

EXAMPLES OF COMBINATIONS.



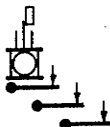
D.C. RELAY - NEUTRAL - ENERGIZED -  
ONE INDEPENDENT FRONT CONTACT CLOSED -  
ONE INDEPENDENT BACK CONTACT OPEN.



D.C. RELAY - POLARIZED - ENERGIZED -  
TWO COMBINATION FRONT AND BACK NEUTRAL CONTACTS -  
TWO POLARIZED CONTACTS CLOSED -  
TWO POLARIZED CONTACTS OPEN.



D.C. INDICATOR - SEMAPHORE TYPE - ENERGIZED -  
THREE FRONT CONTACTS CLOSED -  
BELL ATTACHMENT.

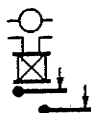


D.C. INDICATOR - SEMAPHORE TYPE - ARM HORIZONTAL -  
ENERGIZED - WITHOUT CONTACTS.

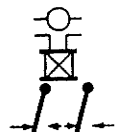
**NOTE:** INDICATORS (OR REPEATERS) WITHOUT CONTACTS SHOULD BE SHOWN WITH ARMATURES TO INDICATE WHETHER ENERGIZED OR DE-ENERGIZED.



A.C. RELAY - ONE ENERGIZING CIRCUIT TYPE (SINGLE PHASE)  
ENERGIZED - ONE FRONT CONTACT.



A.C. RELAY - TWO ENERGIZING CIRCUIT TYPE - ENERGIZED -  
WIRE WOUND ROTOR -  
TWO NEUTRAL FRONT CONTACTS.



A.C. RELAY - TWO ENERGIZING CIRCUIT TYPE - ENERGIZED -  
WIRE WOUND ROTOR -  
TWO POLARIZED CONTACTS.



A.C. RELAY - TWO ENERGIZING CIRCUIT TYPE - ENERGIZED -  
STATIONARY WINDINGS -  
ONE NEUTRAL FRONT CONTACT -  
TWO 3-POSITION CONTACTS.



D.C. INTERLOCKED RELAY.



D.C. ELECTRIC BELL.

DESIGNATE RESISTANCE IN OHMS OF ALL D.C. RELAYS, INDICATORS AND LOCKS.

Disc Visible.  
Position.  
Winding.  
In Normal  
Combinations.)