

THE PENNSYLVANIA RAILROAD

**STANDARD SIGNAL MATERIAL
PLANS AND SPECIFICATIONS**

COMPILED IN
OFFICE OF CHIEF ENGINEER

PHILADELPHIA

A-26-50

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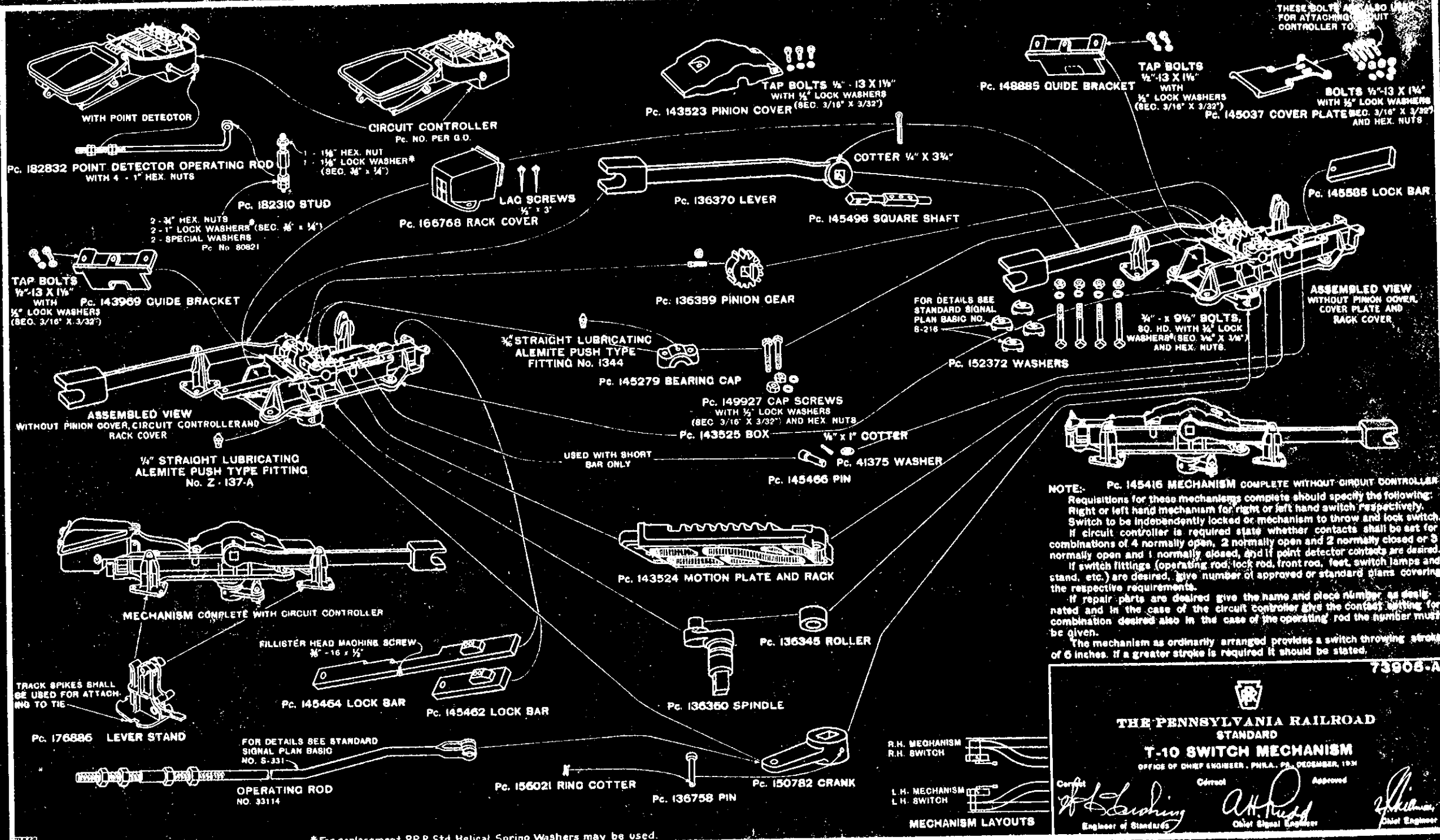
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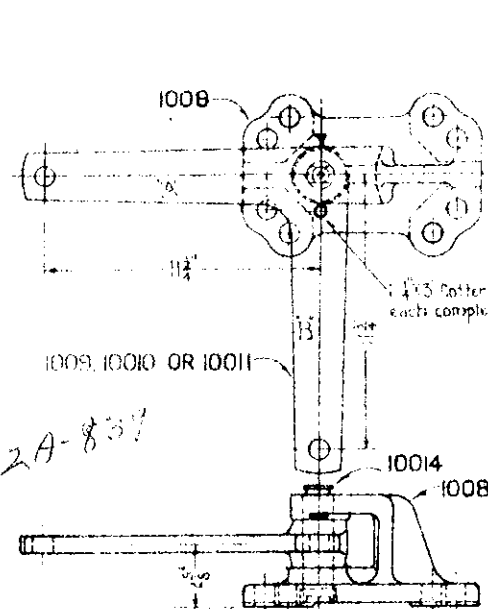
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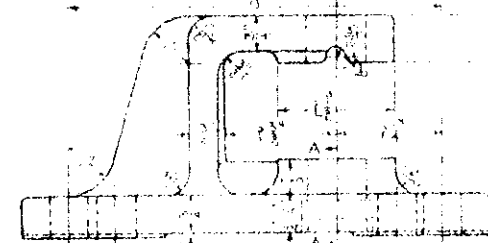
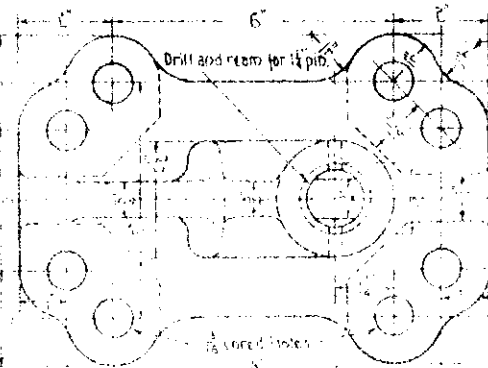
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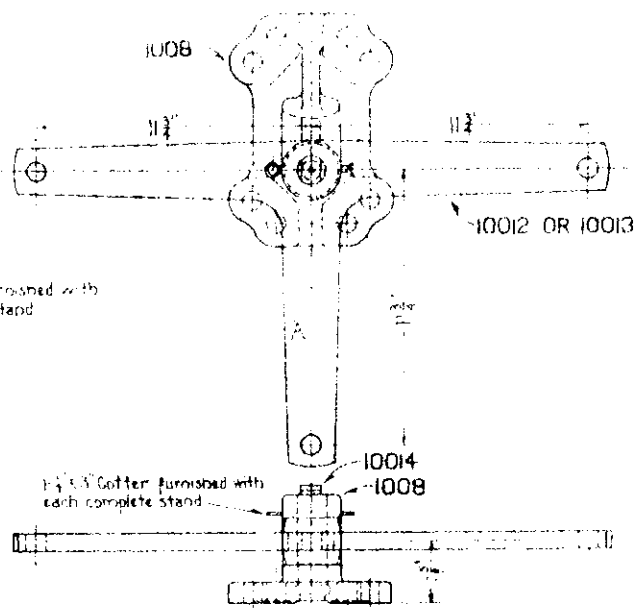




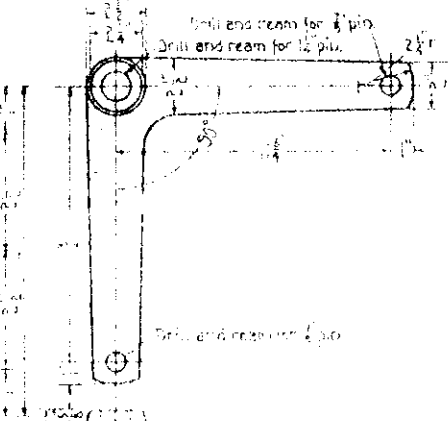
1001-CRANK AND STAND COMPLETE
1002-AS ABOVE 4" SET IN ARM 'A'
1003-4" SET IN ARM 'B'



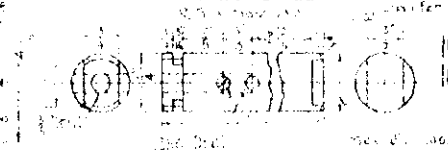
1008-STAND
CAST IRON



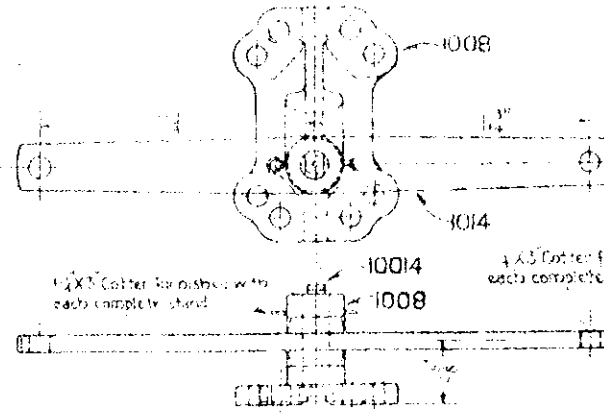
1004-CRANK AND STAND COMPLETE
1005-4" SET IN ARM 'A'



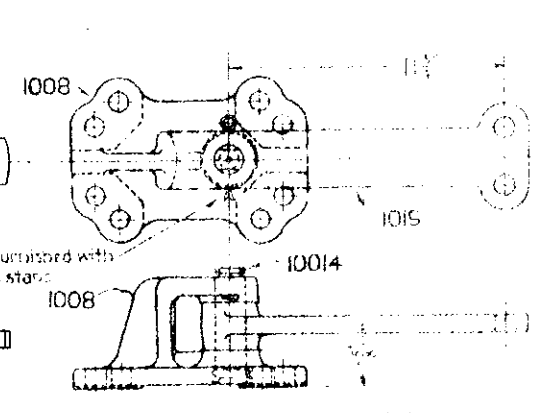
1009-RIGHT ANGLE CRANK
FORGED STEEL



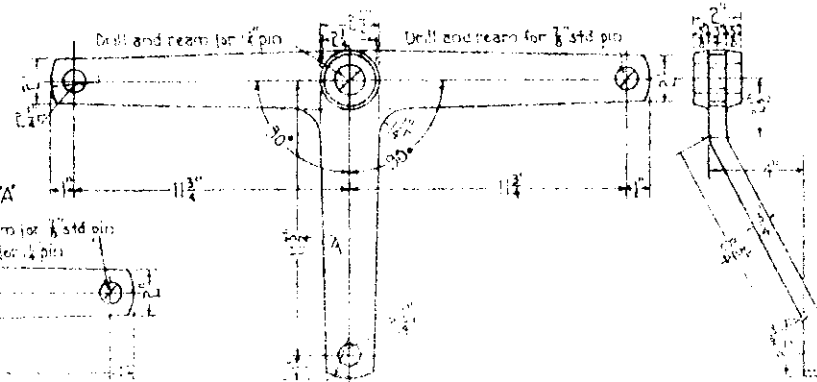
10014-PIN
CR. STEEL



1006-CRANK AND STAND COMPLETE



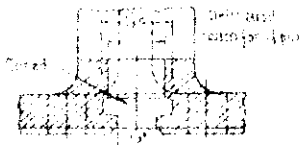
1007-RADIAL ARM AND STAND COMPLETE



10012-THREE ARM CRANK NO SET
10013-4" SET IN ARM 'A'

FORGED STEEL

Crack crank sh. be turned in tension and compressive for a minimum of 100,000 pounds, which must stand without a permanent set of more than .001 inch in any direction. After defects, strain to be applied at right angles to pin and through center of pin hole.

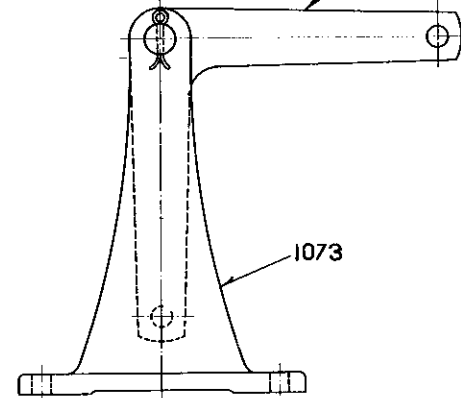
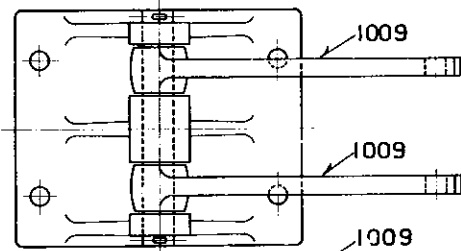


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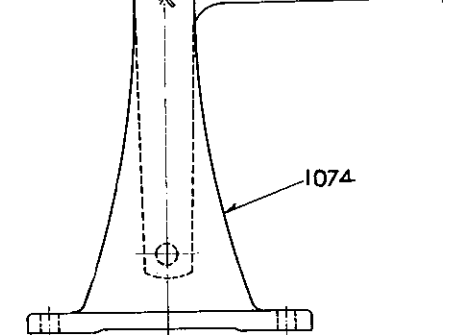
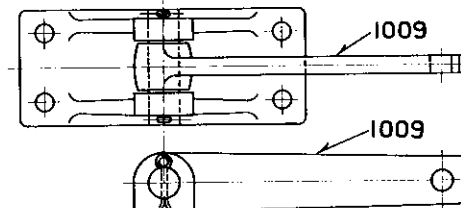
REVISIONS	
1	AS SHOWN
2	2A-8-37

THE PENNSYLVANIA RAILROAD
STANDARD
CRANKS AND STAND
ONE WAY HORIZONTAL

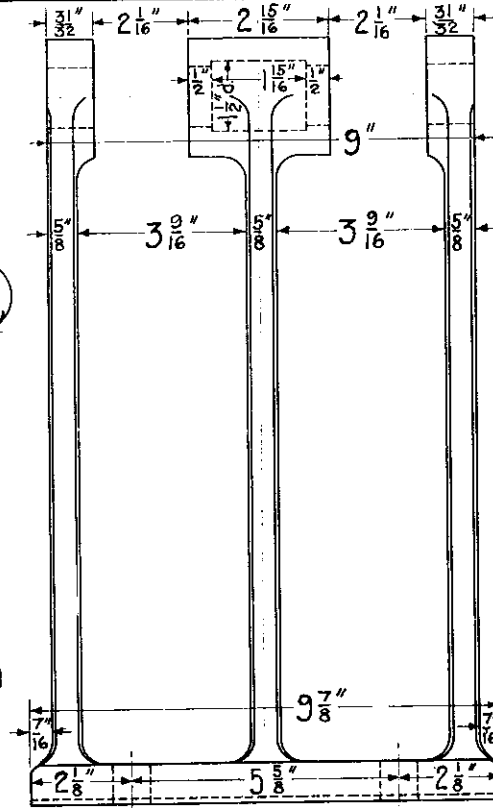
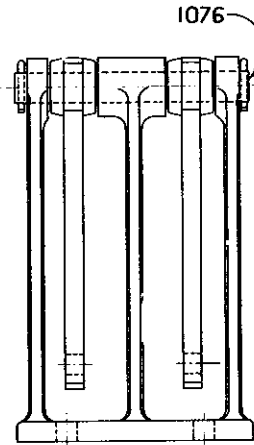
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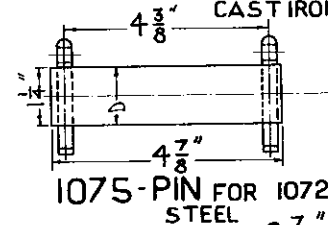
1071-2-WAY CRANK COMPLETE



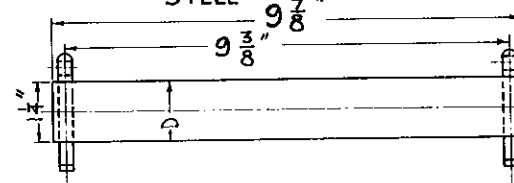
1072-1-WAY CRANK COMPLETE



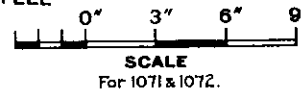
1073-2-WAY STAND
CAST IRON



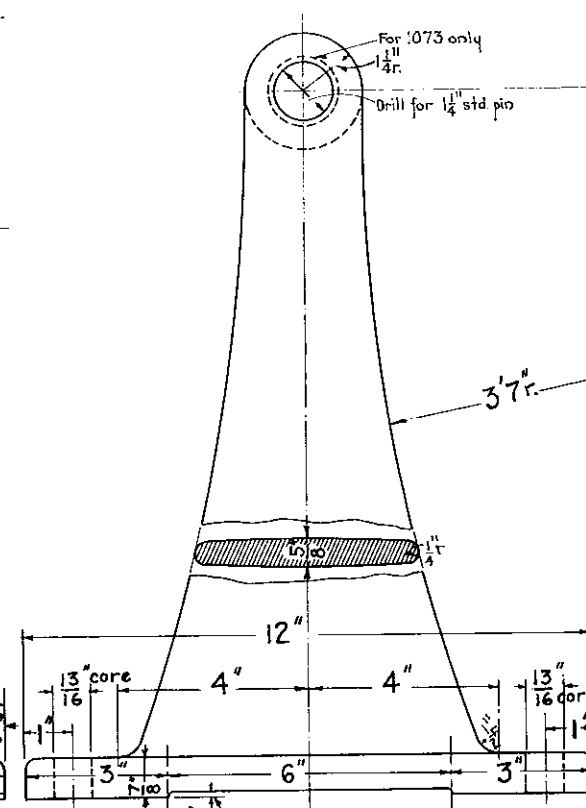
1075-PIN FOR 1072
STEEL



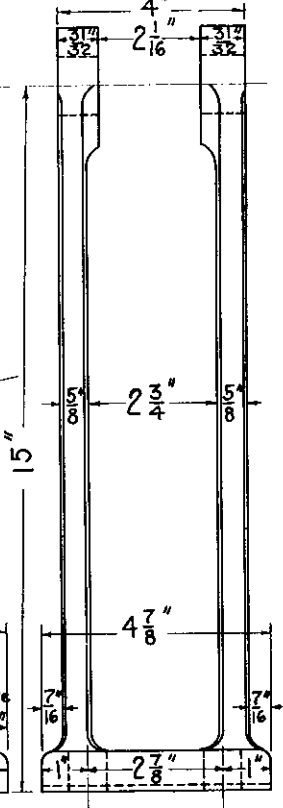
1076-PIN FOR 1071
STEEL



SCALE
For 1071 & 1076.



END ELEVATION FOR 1073 & 1074



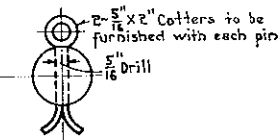
1074-1-WAY STAND
CAST IRON

Specification For Test of Cranks

Each crank shall be tested in tension and compression to strain shown in the following table, which it must stand without a permanent set of more than one thirty second ($\frac{1}{30}$) of an inch or other defects; strain to be applied at right angles to arm and through center of pin hole.

Length of Arm	Pounds Strain
$11\frac{3}{4}$ " or less	2500
$12\frac{1}{2}$ "	2000
$13\frac{1}{2}$ "	2200
16"	1800

NOTE-Diameter D Max. .001 less than I.E.S.
" D Min. .003 " " I.E.S.



SCALE
For 1073, 1074, 1075 & 1076.

1 SHEET

PENNSYLVANIA SYSTEM

STANDARD

CRANK AND STANDS

ONE AND TWO WAY VERTICAL

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., JUNE 8 1920

Approved

E. B. Temple
Chief Signal Engineer

Correct

A. H. Russell
Chief Signal Engineer

S-107-A

The diagram shows a rectangular platform section. The top view is a rectangle divided into six equal square compartments by vertical dashed lines. Each compartment contains a small circle representing a knot. The side view is shown below the top view, indicating a total width of 2'-1" and individual compartment widths of 5 3/4".

Top View Dimensions:

- Total Width: 2'-1"
- Individual Compartment Width: 5 3/4"
- Number of Compartments: 6

Side View Dimensions:

- Total Width: 2'-1"
- Individual Compartment Width: 5 3/4"
- Number of Compartments: 6

Text Description:

PLATFORM SECTIONS SHALL BE MADE OF DENSE SOUTHERN YELLOW PINE, A.R.E.A. SPEC. 207 WITHOUT DECAY, HOLES, SPLITS, SHAKES, LARGE LOOSE OR NUMEROUS KNOTS, SURFACED TO 1 1/2" x 5 3/4" AND THOROUGHLY TREATED BY THE PENTACHLOROPHENOL CLEAR TREATMENT PROCESS, USING 6.0 LBS. RETENTION PER CUBIC FOOT OF WOOD, 5% VOLUME BY WEIGHT OF SOLUTION.

DRILL & CSK. FOR #16 FLAT HD. WOOD SCREWS

1/2" 3 1/4" 3" 3 1/4" 3" 3 1/4" 3" 3 1/4" 1 1/2"

2'-1"

3/8" 3/4"

USE HOLES 10 FOR PIERS 1091 OR 1101
" " " " FOUNDATIONS 1111
" 1114 AND PIER 1116.

1084-PLATFORM SUPPORT
S.C.R. 2A-5953

D.H.S (FOR ATTACHMENT TO FOUNDATIONS)

O.H.S (FOR ATTACHMENT TO FOUNDATIONS)

ELEVATION

$\frac{1}{8} \times \frac{1}{2}$ ANGLE

ALL HOLES $\frac{9}{16}$ " DRILL, COUNTERSUNK TO CLEAR TOP OF $\frac{1}{4}$ " FLT. CAP SCREWS

FURNISH $\frac{1}{4}$ " X $\frac{1}{2}$ " P.C. CAP SCREWS & NUTS WITH EACH ANGLE

1095 PLATFORM ANGLE

Dimensions: $2' - 1\frac{1}{4}"$, $2' - 7\frac{3}{4}"$, $8' - 4"$, $2' - 1\frac{1}{4}"$

Vertical dimensions: $2\frac{3}{4}"$, $5\frac{11}{16}"$, $7\frac{7}{16}"$, $7\frac{7}{16}"$, $5\frac{11}{16}"$, $2\frac{3}{4}"$

1005 PLANT URM, AXELL O.H.S. FOR CASE 5304.
S.C.R. 2A-5934
ALL HOLES $\frac{7}{16}$ " DRILL, COUNTERSUNK TO CLEAR TOP OF $\frac{1}{2}$ " F.H. CAP SCREWS
FURNISH 3- $\frac{1}{2}$ " $\frac{7}{16}$ " F.H. CAP SCREWS & NUTS WITH EACH ANGLE
1089-TIE BAR O.H.S.

1086-PLATFORM ANGLE O.H.S. FOR CASE 5303
S.C.R. 2A-5955

ALL HOLES $\frac{9}{16}$ " DRILL, COUNTERSUNK TO CLEAR TOP OF $\frac{1}{2}$ " RH. CAP SCREWS

FURNISH 2- $\frac{1}{2}$ " x $\frac{1}{4}$ " F.H. CAP SCREWS & NUTS WITH EACH ANGLE

FURNISH 2- $\frac{1}{2}$ " x $\frac{1}{4}$ " F.H. CAP SCREWS & NUTS WITH EACH ANGLE

Fig. 10 shows two cross-sectional views of assemblies for Case 5304. The left view shows a base 1085 with a grid of vertical elements 1084 and 1086, and a central element 1089. The right view shows a similar assembly with a base 1085 and elements 1084 and 1086.

1086

1086

1086

1086

1086

ASSEMBLY FOR CASE 5303

1086

ASSEMBLY FOR CASE 5803

Technical drawing of a mechanical assembly. Dimensions shown include 1084, 1088, 1091, and 1092.

OF CROSS BAR
OF SLOT IN
ING THE BARS

CROSS BAR

TOP J.
MUST
AFTER
BAR

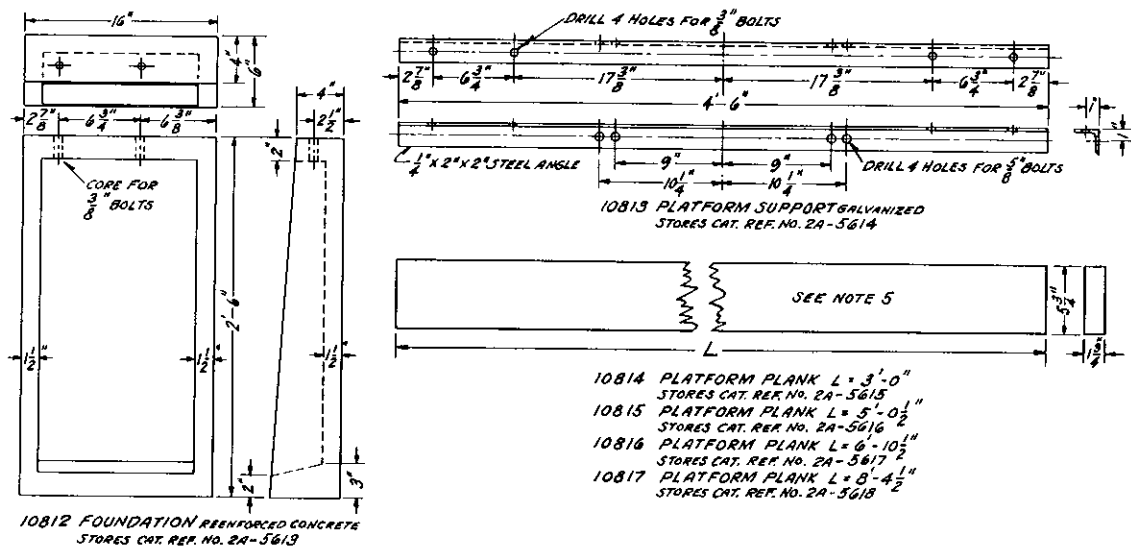
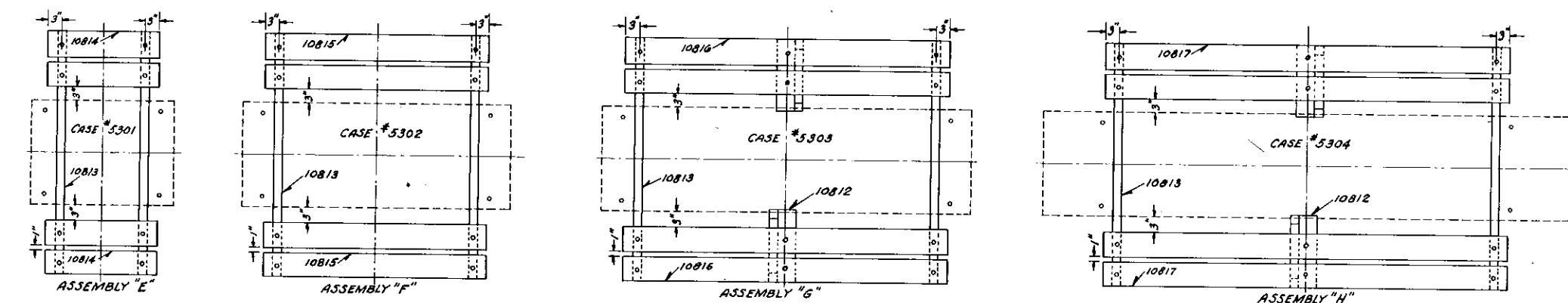
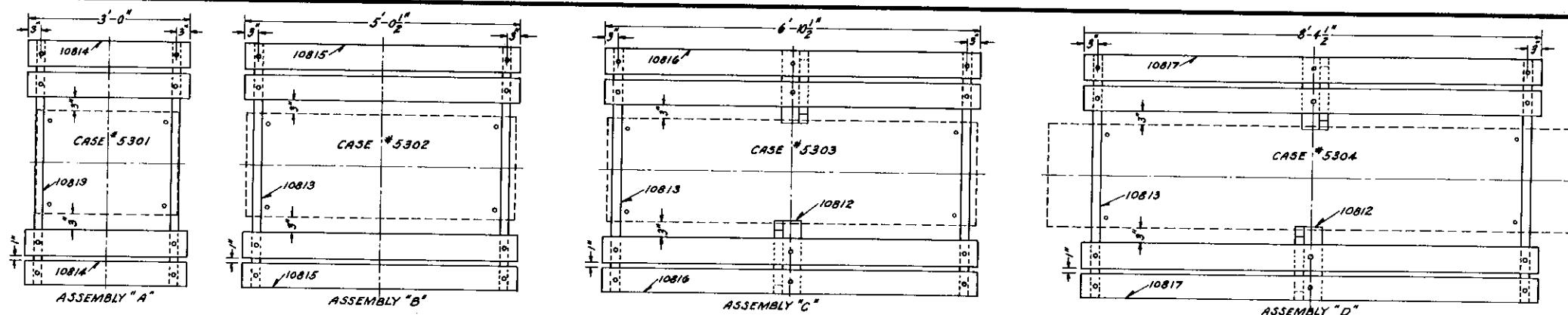
BEARING BAR

1. ALL METAL PARTS SHALL BE HOT DIP GALVANIZED. PARTS SHALL BE ORDERED SEPARATELY BY ITEM NUMBERS 10B1 TO 10B9, PLATFORM BEING ASSEMBLED IN THE FIELD.
2. PLATFORMS SHALL BE SECURED TO ANGLES WITH HOOK BOLTS OR OTHERWISE IN A MANNER SUITABLE TO MEET CONDITIONS IN THE FIELD.
3. PLATFORMS FOR CASES 5303 AND 5304 SHALL BE PROVIDED WITH CENTER SUPPORT 10B12.
4. AFTER INSTALLATION, PLATFORMS SHALL BE PAINTED SAME COLOR AS INSTRUMENT CASE.

5-108-A

OFFICE OF CHIEF ENGINEER
Approved
H. G. Salmonson
Assistant Chief Engineer-Signals

PHILA., PA. JUNE 7, 1951
Approved
J. H. Smith
Chief Engineer



- NOTES:-
1. ASSEMBLIES A, B, C & D SHOW APPLICATION OF PLATFORMS TO INSTRUMENT CASE FOUNDATIONS DRAWING S-111.
 2. ASSEMBLIES E, F, G & H SHOW APPLICATION OF PLATFORMS TO INSTRUMENT CASE FOUNDATIONS DRAWINGS S-109 AND S-110.
 3. PLATFORM PLANKS 10814, 10815, 10816 & 10817 SHALL BE DRILLED IN THE FIELD FOR 3/8" X 2 1/2" CARRIAGE BOLTS.
 4. USE PLATFORM PLANKS 10814, 10815, 10816 & 10817 AS SHOWN FOR INSTRUMENT CASE FOUNDATIONS DRAWING S-111. FOR INSTRUMENT CASE FOUNDATIONS DRAWINGS S-109 AND S-110 LOCATE LEFT ENDS OF PLANKS AS INDICATED, CUT RIGHT END AS SHOWN AND DRILL FOR 3/8" X 2 1/2" CARRIAGE BOLTS.
 5. PLATFORM PLANKS SHALL BE MADE OF DENSE SOUTHERN YELLOW PINE, A.R.E.A. SPEC. 207, WITHOUT DECAY, HOLES, SPLITS, SHAKES, LARGE, LOOSE OR NUMEROUS KNOTS, SURFACED TO 1 3/4" X 5 3/4" AND THOROUGHLY TREATED BY THE PENTACHLOROPHENOL - CLEAR TREATMENT PROCESS, USING 6.0 LBS. RETENTION PER CUBIC FOOT OF WOOD, 5% VOLUME BY WEIGHT OF SOLUTION.
 6. FOUNDATION 10812 WHERE USED SHALL BE FIRMLY EMBEDDED IN THE GROUND SUFFICIENTLY FOR PLANKS TO HAVE BEARING ON IT.
 7. AFTER INSTALLATION, PLATFORMS SHALL BE PAINTED SAME COLOR AS THE INSTRUMENT CASE.

REVISIONS

SHEET 2 OF 2

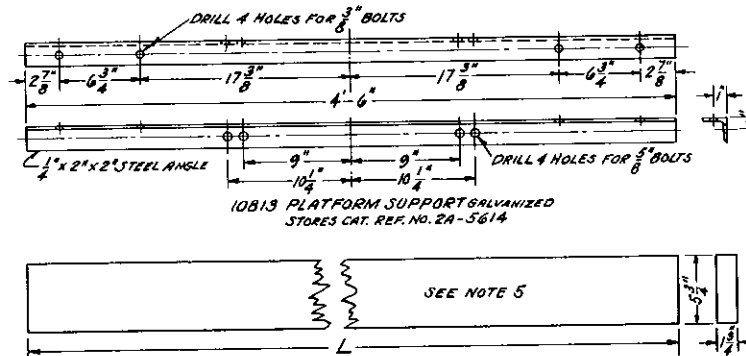
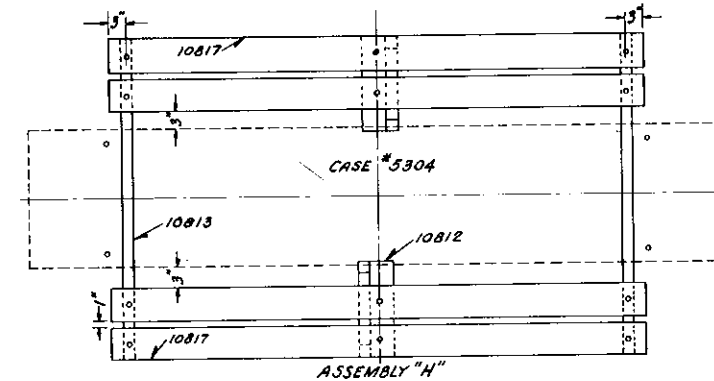
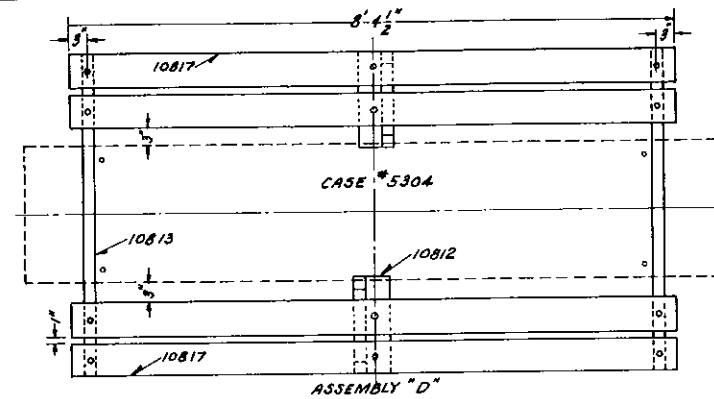
S-108-A

THE PENNSYLVANIA RAILROAD STANDARD PLATFORMS FOR INSTRUMENT CASES

OFFICE OF CHIEF ENGINEER, PHILA., PA., JUNE 7, 1951

Approved
H. G. Salmonson
Assistant Chief Engineer-Signals

Approved
J. H. Smith
Chief Engineer



- NOTES:-
1. ASSEMBLIES A, B, C & D SHOW APPLICATION OF PLATFORMS TO INSTRUMENT CASE FOUNDATIONS DRAWING S-111.
 2. ASSEMBLIES E, G & H SHOW APPLICATION OF PLATFORMS TO INSTRUMENT CASE FOUNDATIONS DRAWINGS S-109 AND S-110.
 3. PLATFORM PLANKS 10B14, 10B15, 10B16 & 10B17 SHALL BE DRILLED IN THE FIELD FOR $\frac{3}{8}$ " x $2\frac{1}{2}$ " CARRIAGE BOLTS.
 4. USE PLATFORM PLANKS 10B14, 10B15, 10B16 & 10B17 AS SHOWN FOR INSTRUMENT CASE FOUNDATIONS DRAWING S-111. FOR INSTRUMENT CASE FOUNDATIONS DRAWINGS S-109 AND S-110 LOCATE LEFT ENDS OF PLANKS AS INDICATED, CUT RIGHT END AS SHOWN AND DRILL FOR $\frac{3}{8}$ " x $2\frac{1}{2}$ " CARRIAGE BOLTS.
 5. PLATFORM PLANKS SHALL BE MADE OF DENSE SOUTHERN YELLOW PINE, A.R.E.A. SPEC. 207, WITHOUT DECAY, HOLES, SPLITS, SHAKES, LARGE, LOOSE OR NUMEROUS KNOTS, SURFaced TO 1 $\frac{3}{4}$ " x 5 $\frac{3}{4}$ " AND THOROUGHLY TREATED BY THE PENETRATION OF CREOSOL WOOD-TREATMENT-PROCESS, USING 6.0 LBS. PENETRATION PER CUBE FOOT OF CLEAR, 5% VOLUME BY WEIGHT OF SOLUTION.
 6. FOUNDATION 10B12 WHERE USED SHALL BE FIRMLY EMBEDDED IN THE GROUND SUFFICIENTLY FOR PLANKS TO HAVE BEARING ON IT.
 7. AFTER INSTALLATION, PLATFORMS SHALL BE PAINTED SAME COLOR AS THE INSTRUMENT CASE.

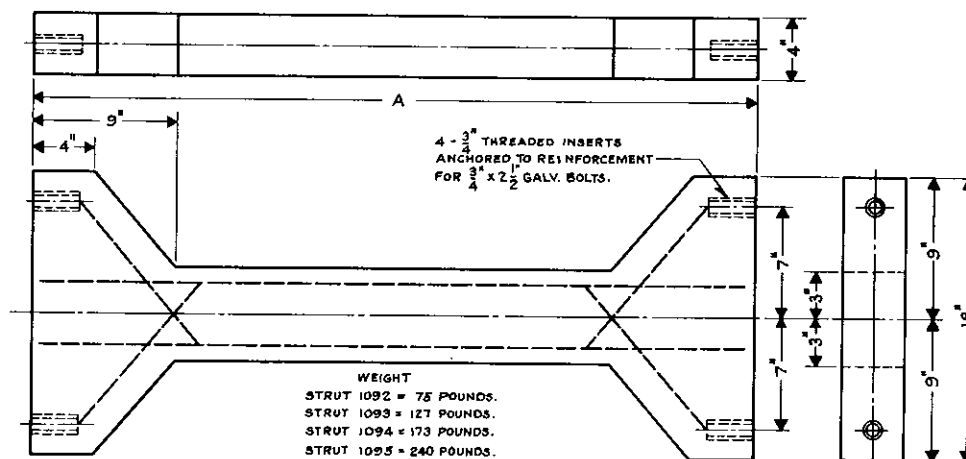
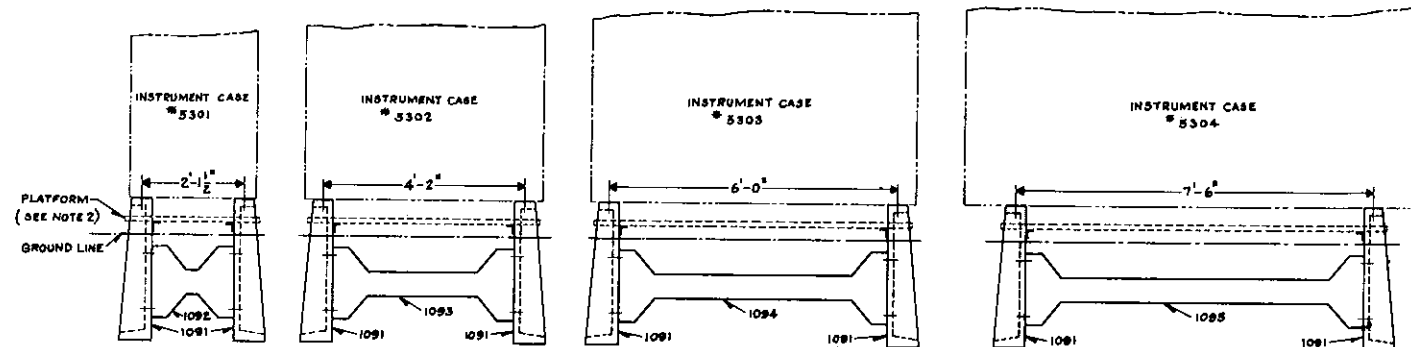
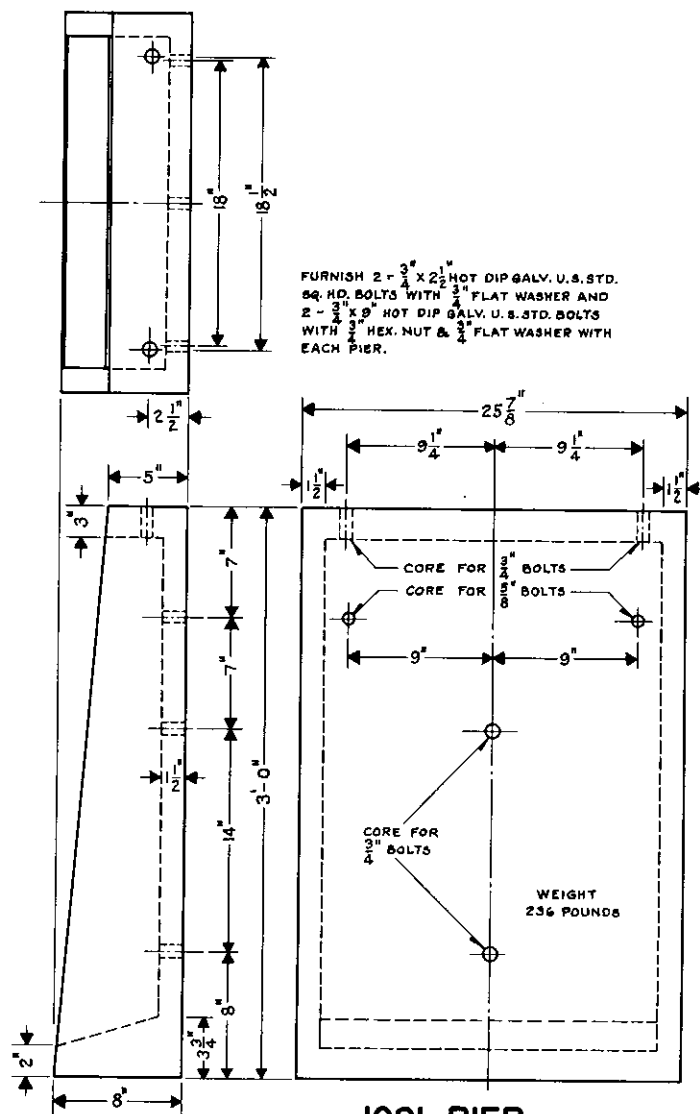
10814 PLATFORM PLANK L = 3'-0"
STORES CAT. REF. NO. 2A-5615

10815 PLATFORM PLANK L = 5'-0"
STORES CAT. REF. NO. 2A-5616

10816 PLATFORM PLANK L = 6'-10"
STORES CAT. REF. NO. 2A-5617

10817 PLATFORM PLANK L = 8'-4"
STORES CAT. REF. NO. 2A-5618

Approved 
Chief Engineer



- 1092 STRUT** FOR CASE 5301 A = 1'-8 1/2".
STORES CAT. REF. NO. 2A-5792
- 1093 STRUT** FOR CASE 5302 A = 3'-9".
STORES CAT. REF. NO. 2A-5793
- 1094 STRUT** FOR CASE 5303 A = 5'-7".
STORES CAT. REF. NO. 2A-5794
- 1095 STRUT** FOR CASE 5304 A = 7'-1".
STORES CAT. REF. NO. 2A-5795

- NOTE 1:-
- FOUNDATIONS ARE SHIPPED KNOCKED-DOWN AND ARE TO BE ASSEMBLED IN THE FIELD.
 - ORDER PLATFORM SUPPORTS, PLATFORM ANGLES AND GRATINGS IN ACCORDANCE WITH CURRENT ISSUE OF PLAN S-III.
 - FOUNDATIONS SHALL BE MADE OF PORTLAND CEMENT CONCRETE IN ACCORDANCE WITH AMERICAN RAILWAY ENGINEERING ASSOCIATION SPECIFICATION.
 - COARSE AGGREGATE SHALL CONSIST OF $\frac{3}{4}$ INCH MAXIMUM SIZE STONE OR GRAVEL.
 - NOT LESS THAN 6 BAGS OF CEMENT SHALL BE USED PER CUBIC YARD OF CONCRETE.
 - WATER CEMENT RATIO TO PRODUCE A COMPRESSIVE STRENGTH OF 2500 POUNDS PER SQUARE INCH AFTER 28 DAYS SHALL BE USED.
 - BOLTS SHALL BE PAINTED WITH ASPHALT PAINT BEFORE ASSEMBLY.

REVISIONS

1 SHEET

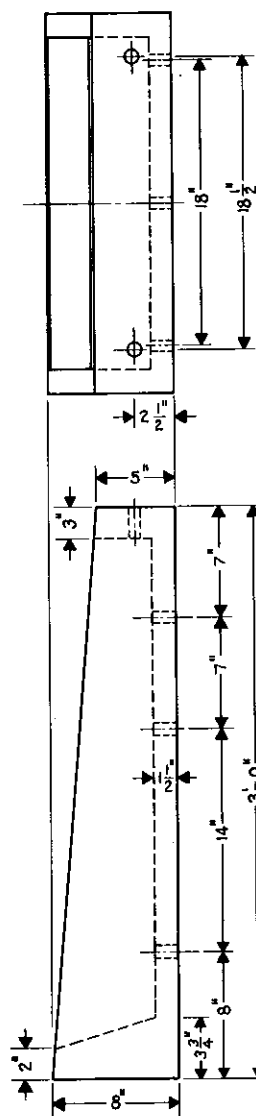


S-109-A

THE PENNSYLVANIA RAILROAD STANDARD FOUNDATION

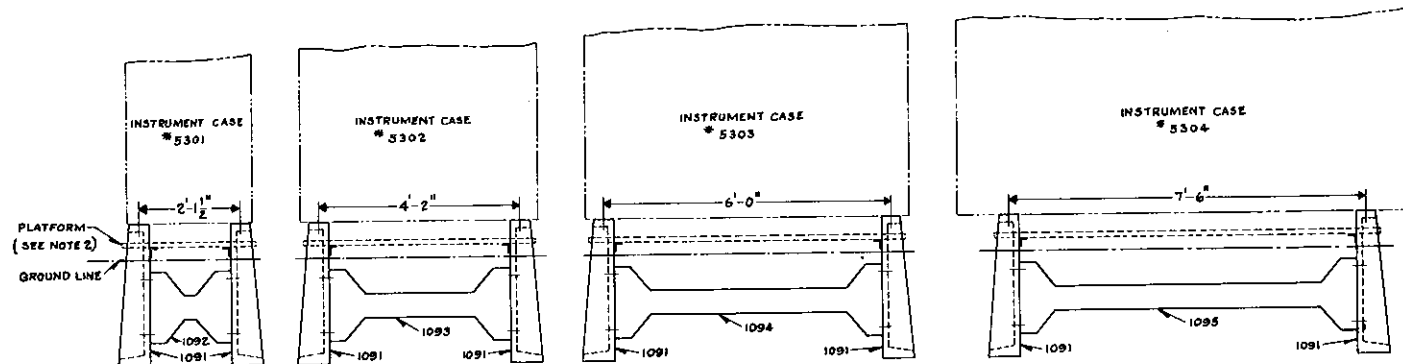
PRECAST CONCRETE
FOR INSTRUMENT CASES
OFFICE OF CHIEF ENGINEER, PHILA., PA.,

Approved *H. Griffith* Assistant Chief Engineer-T. C. & S.
Approved *J. H. H. H.* Chief Engineer

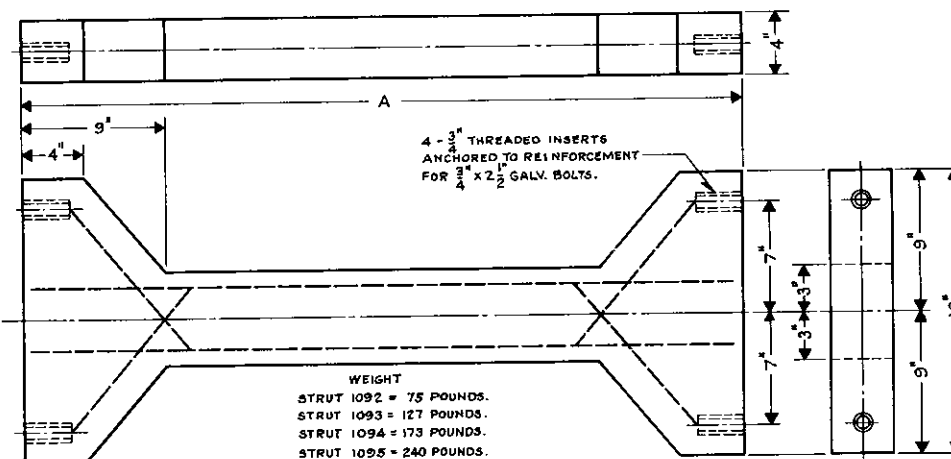


FURNISH 2 - $\frac{3}{4}$ " x 2 $\frac{1}{2}$ " HOT DIP GALV. U.S. STD. SQ. HD. BOLTS WITH $\frac{3}{4}$ " FLAT WASHER AND 2 - $\frac{3}{4}$ " x 9" HOT DIP GALV. U.S. STD. BOLTS WITH $\frac{3}{4}$ " HEX. NUT & $\frac{3}{4}$ " FLAT WASHER WITH EACH PIER.

1091 PIER REINFORCED CONCRETE.
STORES CAT. REF. NO. 2A-5791



APPLICATIONS OF FOUNDATIONS.



WEIGHT
STRUT 1092 = 75 POUNDS.
STRUT 1093 = 127 POUNDS.
STRUT 1094 = 173 POUNDS.
STRUT 1095 = 240 POUNDS.

REINFORCED CONCRETE.

- 1092 STRUT** FOR CASE 5301 A = 1'-8 1/2".
STORES CAT. REF. NO. 2A-5792
- 1093 STRUT** FOR CASE 5302 A = 3'-9".
STORES CAT. REF. NO. 2A-5793
- 1094 STRUT** FOR CASE 5303 A = 5'-7".
STORES CAT. REF. NO. 2A-5794
- 1095 STRUT** FOR CASE 5304 A = 7'-1".
STORES CAT. REF. NO. 2A-5795

NOTE 1-

- FOUNDATIONS ARE SHIPPED KNOCKED-DOWN AND ARE TO BE ASSEMBLED IN THE FIELD.
- ORDER PLATFORM SUPPORTS, PLATFORM ANGLES AND PLATFORMS IN ACCORDANCE WITH CURRENT ISSUE OF PLAN S-108.
- FOUNDATIONS SHALL BE MADE OF PORTLAND CEMENT CONCRETE IN ACCORDANCE WITH AMERICAN RAILWAY ENGINEERING ASSOCIATION SPECIFICATION.
- COARSE AGGREGATE SHALL CONSIST OF $\frac{3}{4}$ " INCH MAXIMUM SIZE STONE OR GRAVEL.
- NOT LESS THAN 6 BAGS OF CEMENT SHALL BE USED PER CUBIC YARD OF CONCRETE.
- WATER CEMENT RATIO TO PRODUCE A COMPRESSIVE STRENGTH OF 2500 POUNDS PER SQUARE INCH AFTER 28 DAYS SHALL BE USED.
- BOLTS SHALL BE PAINTED WITH ASPHALT PAINT BEFORE ASSEMBLY.
- WHERE GROUND CONDITIONS ARE FAVORABLE, STRUT MAY BE OMITTED.
- BOTTOM OF CASE SHALL BE APPROX. 10 IN. ABOVE TOP OF GROUND.

REVISIONS

8 APRIL 10, 1951
NOTES 8 AND 9 ADDED TO PLAN.
H. G. Salmonson
APPROVED

1 SHEET



S-109-B

THE PENNSYLVANIA RAILROAD
STANDARD
FOUNDATION

PRECAST CONCRETE

FOR INSTRUMENT CASES

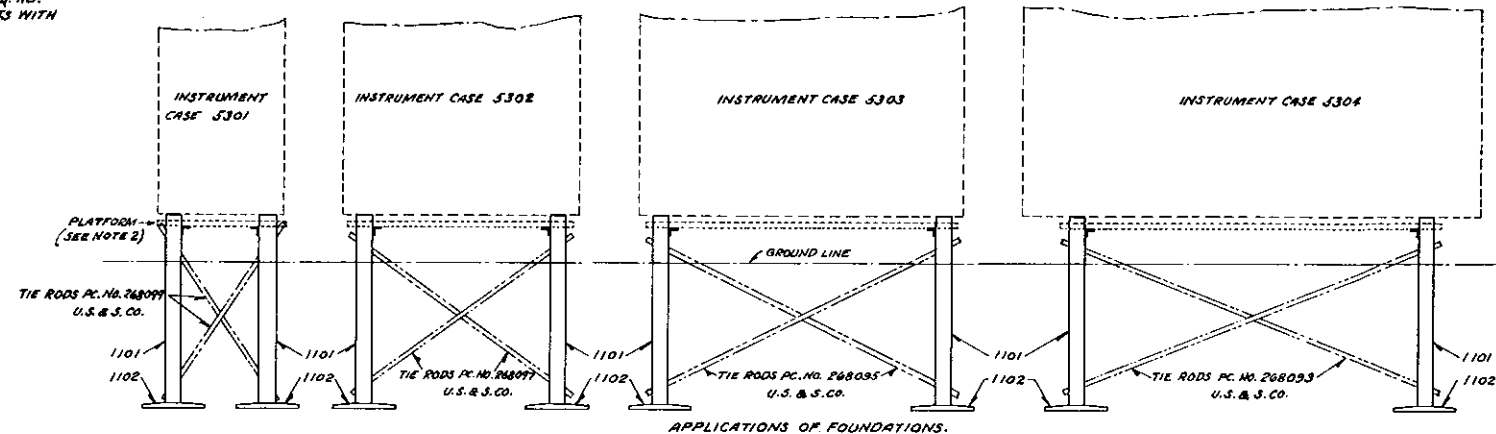
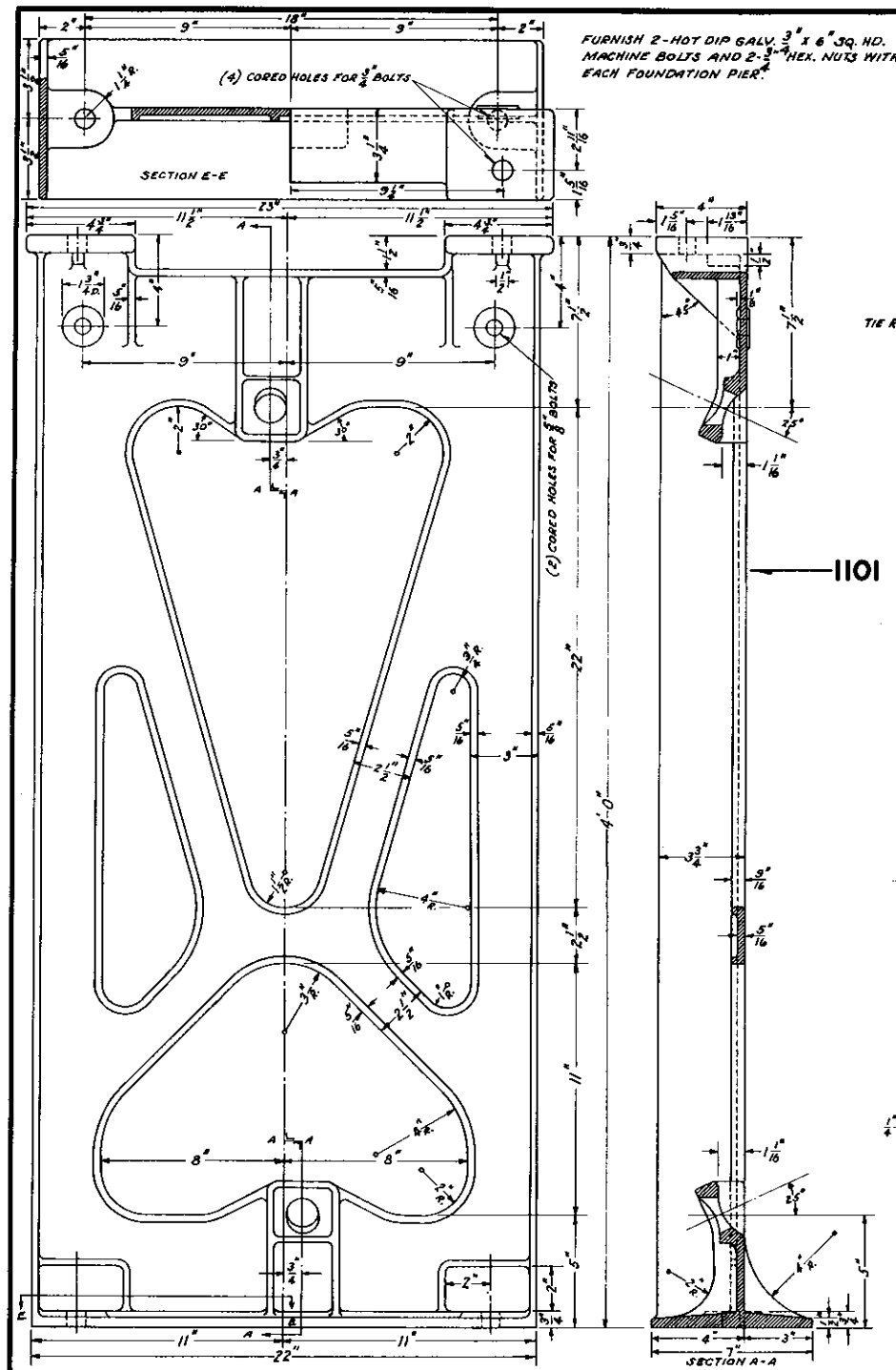
OFFICE OF CHIEF ENGINEER, PHILA., PA., APRIL 30, 1947.

Approved

H. C. Griffith
Assistant Chief Engineer-T.C.&S.

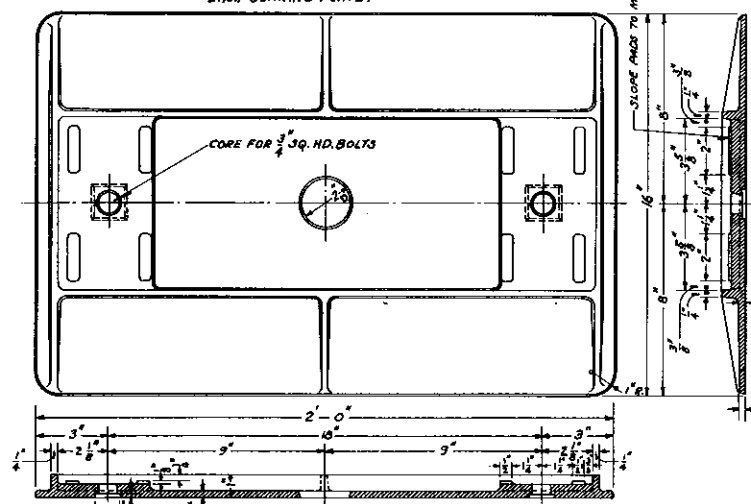
Approved

H. G. Salmonson
Chief Engineer



1101 FOUNDATION PIER CAST IRON.
STORES CAT. REF. NO. 2A-5571

FURNISH 2-HOT DIP GALV. $\frac{3}{4}$ " X 2 $\frac{1}{2}$ " SQ. HD. MACHINE BOLTS AND 2- $\frac{3}{4}$ " HEX. NUTS WITH EACH BEARING PLATE.



1102 BEARING PLATE CAST IRON.
STORE CAT. REF. NO. 2A-5572

NOTE:-

1. TIE RODS MAY BE ORDERED AND APPLIED TO PIERS, WHERE THE SOIL IS NOT SOLID ENOUGH TO HOLD THE PIERS IN PLACE.
2. ORDER PLATFORM SUPPORTS, PLATFORM ANGLES AND GRATINGS IN ACCORDANCE WITH CURRENT ISSUE OF DRAWING S-108.
3. WHERE GROUND CONDITIONS ARE FAVORABLE, BEARING PLATE 1102 MAY BE OMITTED.
4. BOTTOM OF CASE SHALL BE APPROX. 12 INCHES ABOVE THE TOP OF GROUND.

REVISIONS.

C. APRIL 11, 1951.
NOTES 3 & 4 ADDED TO PLAN.
APPROVED: J. J. Salmon

1 SHEET



S-110-C

THE PENNSYLVANIA RAILROAD
STANDARD
FOUNDATION
CAST IRON

FOR INSTRUMENT CASES

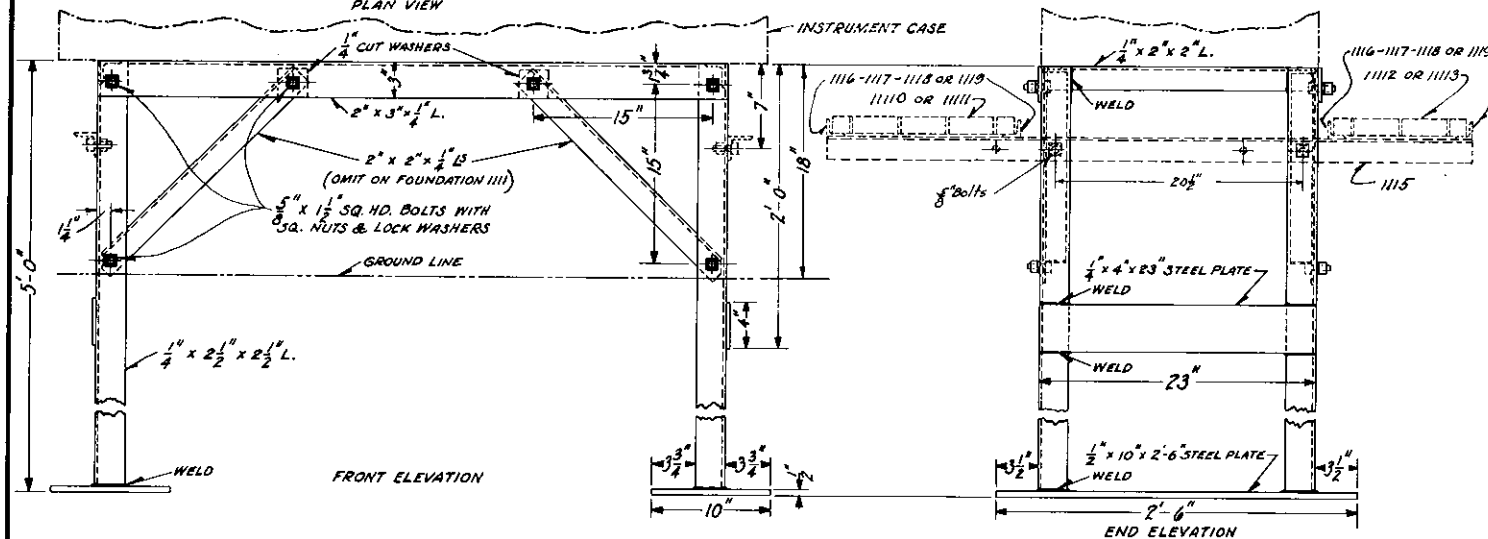
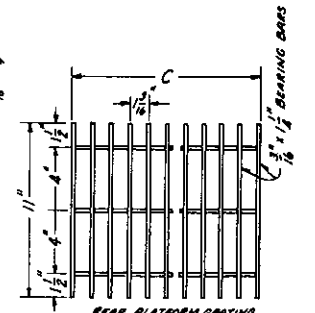
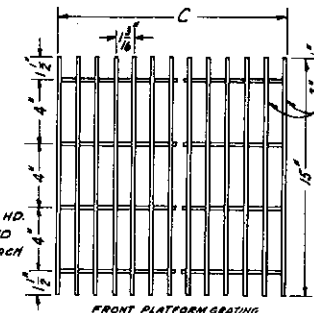
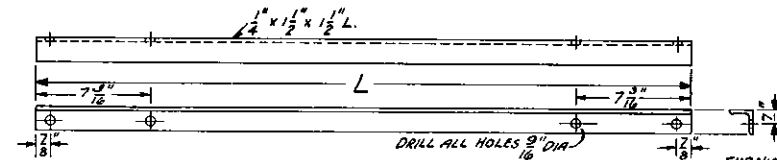
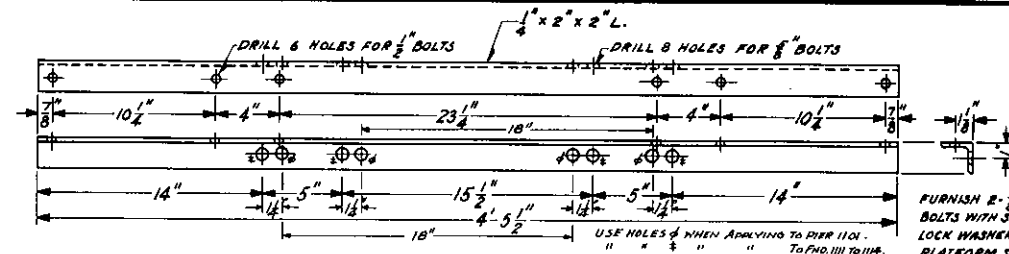
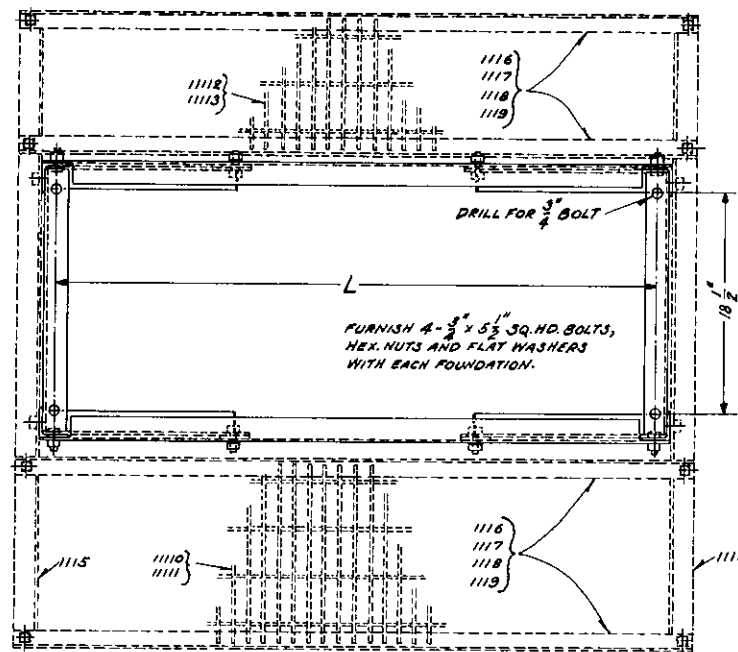
OFFICE OF CHIEF ENGINEER, PHILA., PA., APRIL 10, 1947.

Approved

Assistant Chief Engineer T. C. B. S.

Approved

Chief Engineer



1111 FOUNDATION FOR CASE 5301-L = 2'-1 $\frac{1}{2}$ "
STORES CAT. REF. NO. 2A-5540

1112 FOUNDATION FOR CASE 5302-L = 4'-2"
STORES CAT. REF. NO. 2A-5541

1113 FOUNDATION FOR CASE 5303-L = 6'-0"
STORES CAT. REF. NO. 2A-5542

1114 FOUNDATION FOR CASE 5304-L = 7'-6"
STORES CAT. REF. NO. 2A-5543

NOTE-

1. ALL PARTS OF FOUNDATIONS, PLATFORM SUPPORTS, PLATFORM ANGLES AND GRATINGS SHALL BE HOT DIP GALVANIZED AFTER FABRICATING AND WELDING, BUT BEFORE BOLTING TOGETHER.
2. CARE MUST BE TAKEN TO INSURE THAT ALL WELDS ARE OF FIRST-CLASS WORKMANSHIP.
3. FOUNDATIONS SHALL BE SHIPPED KNOCK-DOWN AND ASSEMBLED IN THE FIELD.
4. PLATFORM SUPPORTS, PLATFORM ANGLES AND PLATFORM GRATINGS SHALL BE ORDERED SEPARATELY.
5. WHEN INSTALLING FOUNDATIONS, A COATING OF GOOD RUST PREVENTIVE SHALL BE APPLIED TO ALL PARTS OF FOUNDATION UNDERGROUND AND TO A POINT 3" ABOVE THE GROUND.
6. GRATINGS SHALL BE SECURED TO PLATFORM ANGLES IN A MANNER SUITABLE TO MEET CONDITIONS IN THE FIELD.
7. ALL ANGLES SHALL BE COMMERCIAL O.H.S.

REVISIONS

REDRAWN FROM EXPERIMENTAL PLAN SK-III-B, DATED APR. 2, 1943, LAST REVISED APR. 18, 1946 & REDESIGNED. REVISED FEBRUARY 24, 47. DIMENSIONS OF PLATFORM ANGLES SLIGHTLY MODIFIED.

1 SHEET

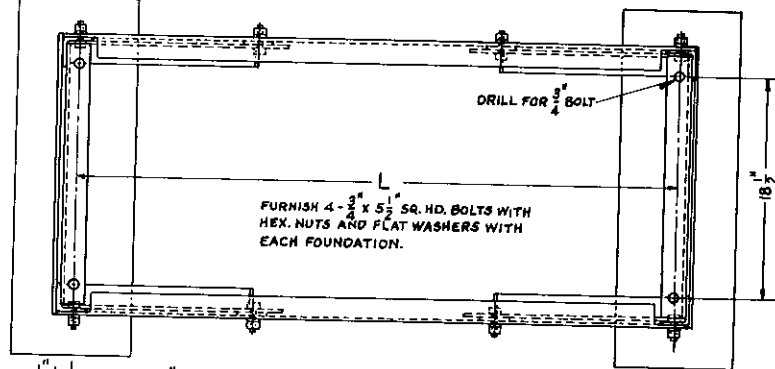
S-III-B

THE PENNSYLVANIA RAILROAD STANDARD FOUNDATIONS

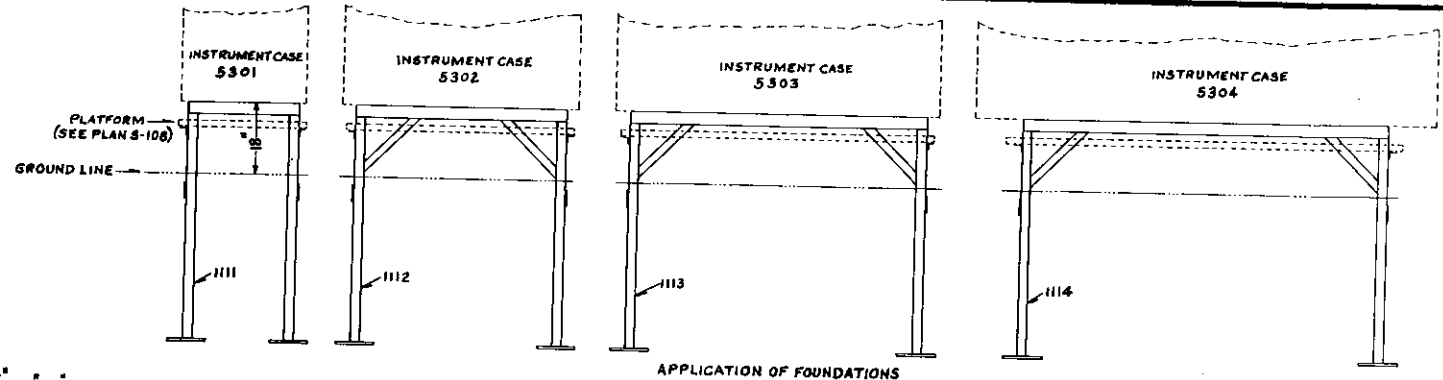
ANGLE IRON
FOR INSTRUMENT CASES
OFFICE OF CHIEF ENGINEER, PHILA., PA., JANUARY 9, 1947.

Approved *W. E. Griffith* Assistant Chief Engineer-T.C. & S.

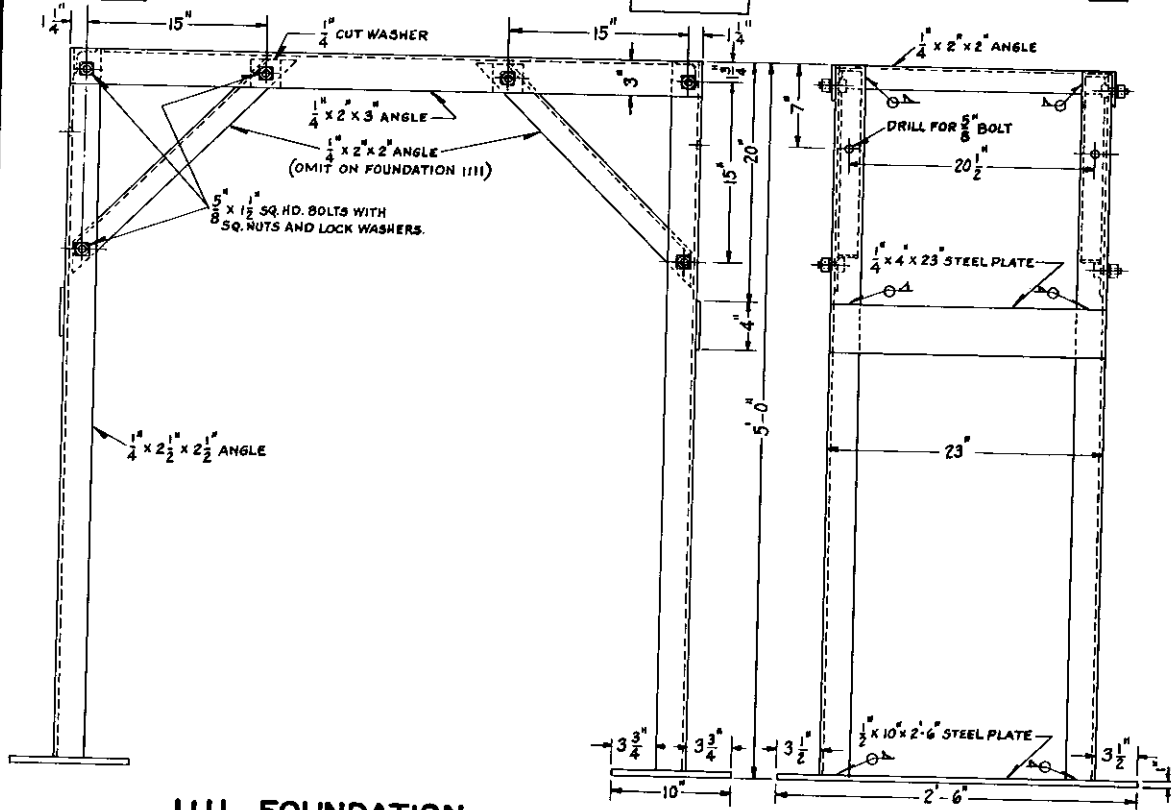
Approved *W. E. Griffith* Chief Engineer



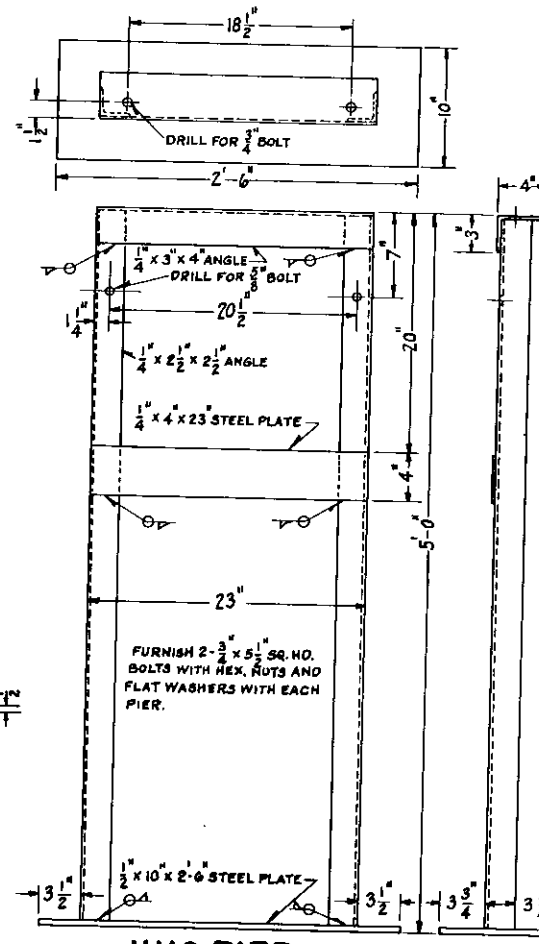
FURNISH 4 - $2\frac{3}{4}$ " x $5\frac{1}{2}$ " SQ. HD. BOLTS WITH HEX. NUTS AND FLAT WASHERS WITH EACH FOUNDATION.



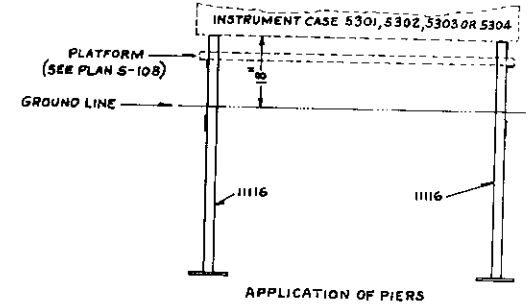
APPLICATION OF FOUNDATIONS



- III1 FOUNDATION** FOR CASE 5301 L = 2'-1 1/2"
STORES CAT. REF. NO. 2A-5540
- III2 FOUNDATION** FOR CASE 5302 L = 4'-2"
STORES CAT. REF. NO. 2A-5541
- III3 FOUNDATION** FOR CASE 5303 L = 6'-0"
STORES CAT. REF. NO. 2A-5542
- III4 FOUNDATION** FOR CASE 5304 L = 7'-6"
STORES CAT. REF. NO. 2A-5543



III16 PIER 2 REQUIRED FOR EACH CASE
STORES CAT. REF. NO. 2A-1426



APPLICATION OF PIERS

NOTE:-

1. ALL PARTS OF FOUNDATIONS AND PIERS SHALL BE HOT DIP GALVANIZED AFTER FABRICATING AND WELDING, BUT BEFORE BOLTING TOGETHER.
2. CARE MUST BE TAKEN TO INSURE THAT ALL WELDS ARE OF FIRST-CLASS WORKMANSHIP.
3. FOUNDATIONS III1, III2, III3 AND III4 SHALL BE SHIPPED KNOCKED-DOWN AND ASSEMBLED IN THE FIELD.
4. WHEN INSTALLING FOUNDATIONS AND PIERS, A COATING OF A GOOD RUST PREVENTIVE SHALL BE APPLIED TO ALL PARTS UNDERGROUND AND TO A POINT 3 INCHES ABOVE THE GROUND.
5. ALL ANGLES SHALL BE COMMERCIAL O.H.S.
6. ALL WELDS SHOWN ARE $\frac{5}{16}$ " FILLET WELDS UNLESS SPECIFIED OTHERWISE.

REVISIONS

REDRAWN FROM APPROVED PLANS S-III-B, DATED JAN. 9, 1947, LAST REVISED FEB. 24, 1947. PLATFORMS, PLATFORM SUPPORTS AND GROUNDINGS NOW SHOWN ON S-108. PIER III16 ADDED TO PLAN.

1 SHEET



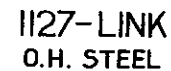
S-III-C

THE PENNSYLVANIA RAILROAD
STANDARD
FOUNDATIONS

ANGLE IRON
FOR INSTRUMENT CASES
OFFICE OF CHIEF ENGINEER, PHILA., PA., APRIL 9, 1951

Approved
H. B. Salmon
Assistant Chief Engineer - Signals

Approved
J. H. ...
Chief Engineer



Specifications For Test of Cranks

Each crank shall be tested in tension and compression to strain shown in the following table; which it must stand without a permanent set of more than one thirty second ($\frac{1}{30}$) of an inch or other defects; strain to be applied at right angles to arm and through center of pin.

Length of Arm	Pounds Strain
11 ³ / ₄ " or less.	2500
13"	2200
16"	1800

REVIS~~ION~~5

5-FEBRUARY 9, 1921

APPROVED:

S-112-B

1 SHEET

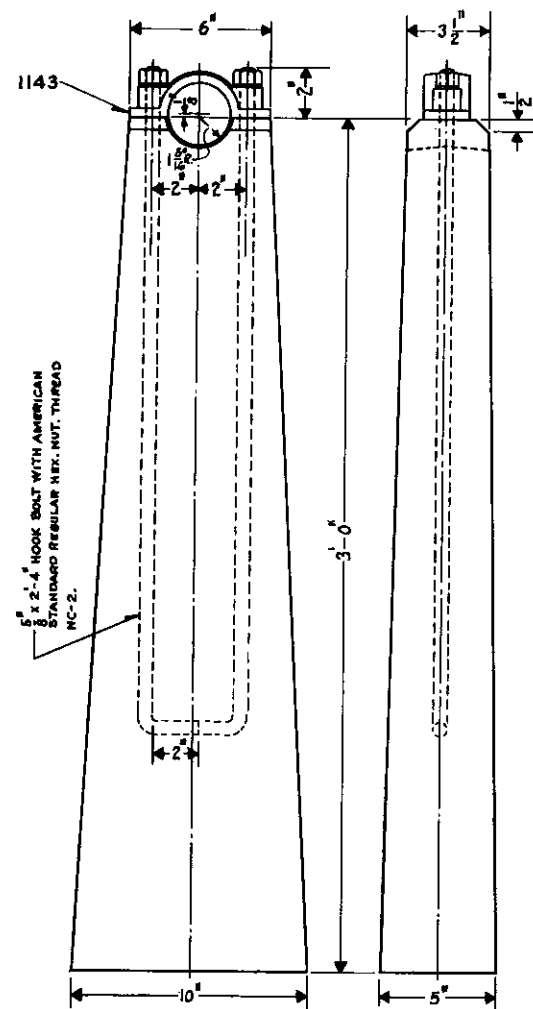


THE PENNSYLVANIA RAILROAD
STANDARD
PIPE COMPENSATOR
ONE-WAY HORIZONTAL

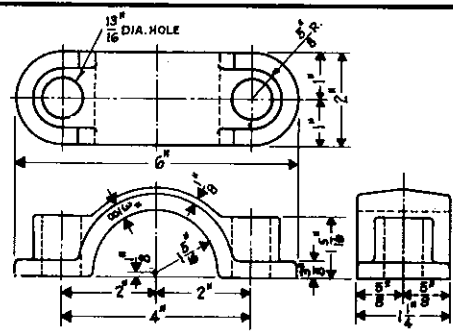
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA. PA. AUGUST 2, 1990

Corr: *A. N. Hardy*
Chief Signal Engineer

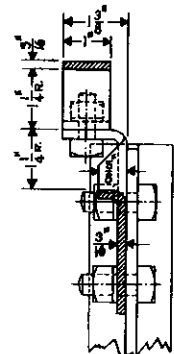
Approved _____
City Engineer

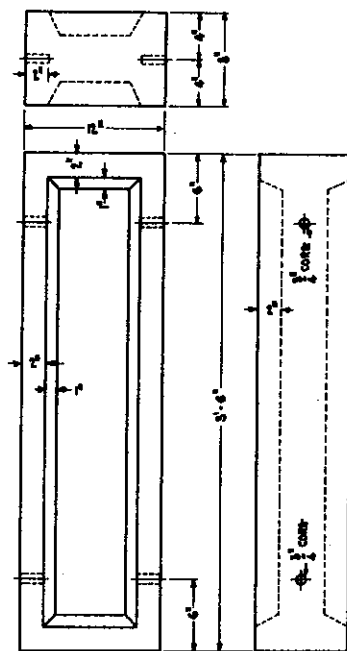


1141 FOUNDATION COMPLETE AS SHOWN.
(FOR 2 INCH AIR LINE)
CONCRETE.
STORES CAT. REF. NO. 2A-1047.
A. A. R. 316. SEC. M-1935.

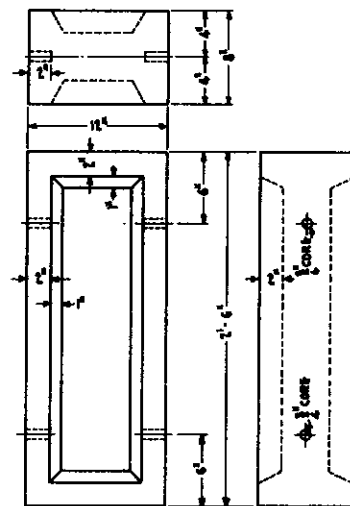


1143 CAP CAST IRON.
STORES CAT. REF. NO. 2A-5391
A. A. R. 316. SEC. M-1935.

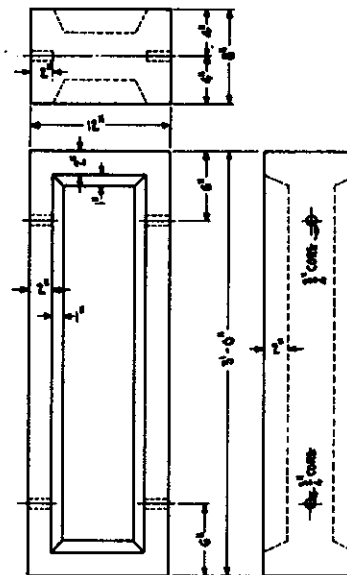




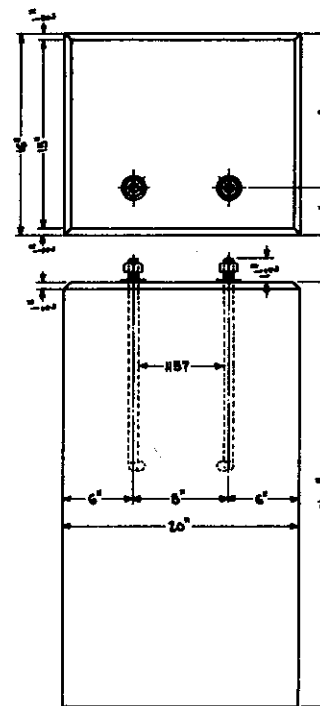
1151 - FOUNDATION
CONCRETE



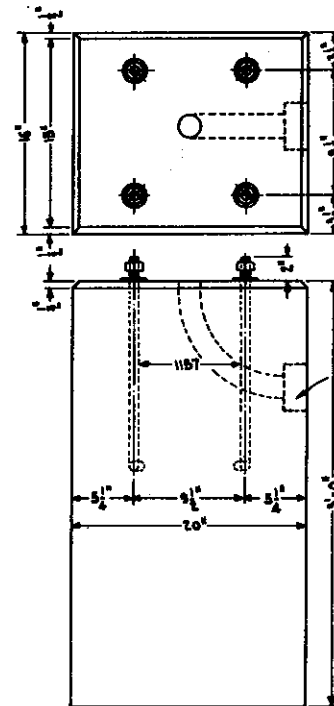
1152 - FOUNDATION
CONCRETE



1153 - FOUNDATION
CONCRETE

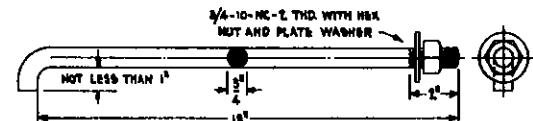


1155 - FOUNDATION
CONCRETE

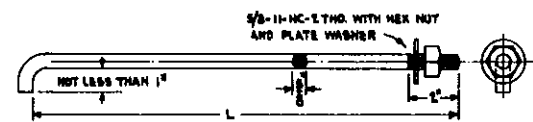


1156 - FOUNDATION
CONCRETE

RELEASED FOR TROWING



1157 - HOOK BOLT O.H.S.



1158 - HOOK BOLT L = 7 1/2" (FOR USE WITH 1157)

1159 - " " L = 5"

11510 - " " SPECIFY LENGTH WHEN ORDERING.
O.H.S.

REVISIONS
REDACTED FROM APPROVED PLAN S-115-B, DATED JULY 27, 1957, AND REVISED.

- NOTES:
1. FOUNDATIONS SHALL BE NOT LESS THAN TWO (2) FEET UNDERGROUND.
 2. CONCRETE SHALL BE IN ACCORDANCE WITH A.R.A. SIGNAL SECTION SPEC. 1111.

1 SHEET

S-115-C

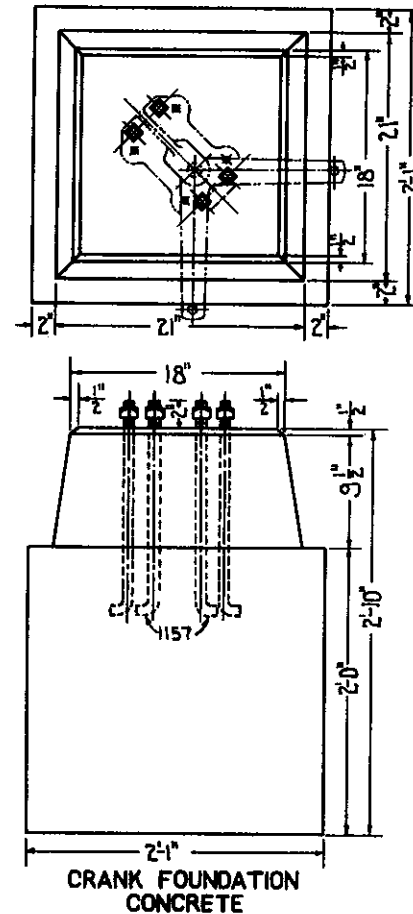
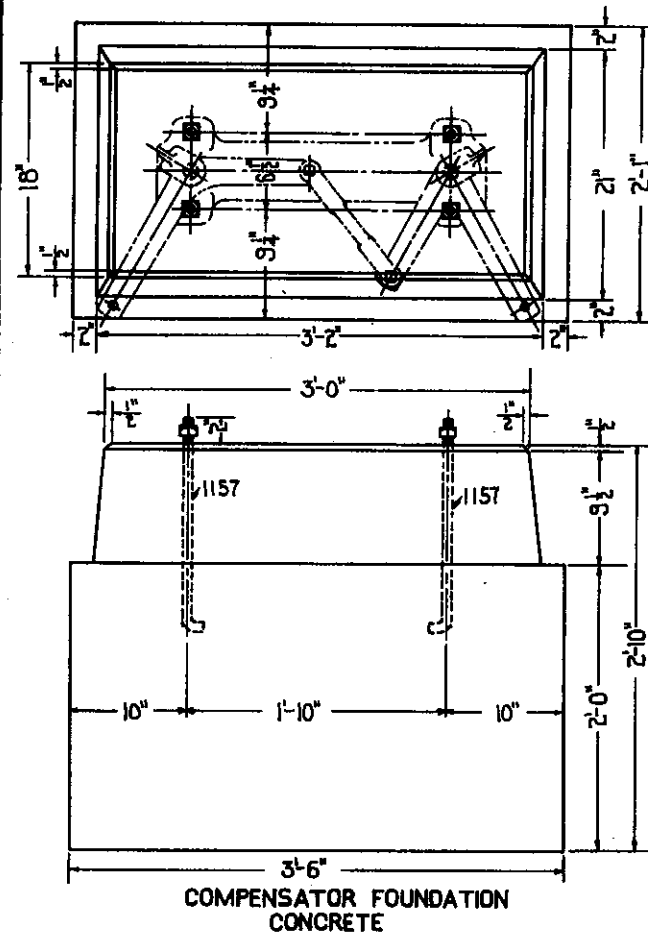
THE PENNSYLVANIA RAILROAD
STANDARD

FOUNDATIONS
PIPE CARRIERS AND INSTRUMENT CASES

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., JULY 11, 1957.

Approved: *[Signature]* Chief Signal Engineer

Approved: *[Signature]* Chief Engineer



NOTES:

1. FOREMEN SHOULD USE THEIR BEST JUDGMENT AS TO THE PROPER DEPTH OF FOUNDATIONS, BEING GOVERNED BY LOCAL CONDITIONS. FOUNDATIONS SHOWN ARE ADAPTABLE TO GOOD SOLID GROUND.
2. THE TOP SURFACE SHALL BE SLIGHTLY SLOPING AWAY FROM MECHANISM TO PROVIDE ADEQUATE DRAINAGE.
3. CONCRETE SHALL BE IN ACCORDANCE WITH A.E.A. SIGNAL SECTION SPECIFICATION 1111.

REVISIONS

11-22-20. Crank Stand formerly shown parallel with foundation.

Approved: *ANTHONY*

G- November 23, 1927.

Approved: *ANTHONY*

D- JULY 11, 1934.

Approved: *ANTHONY*

1 SHEET

S-116-D

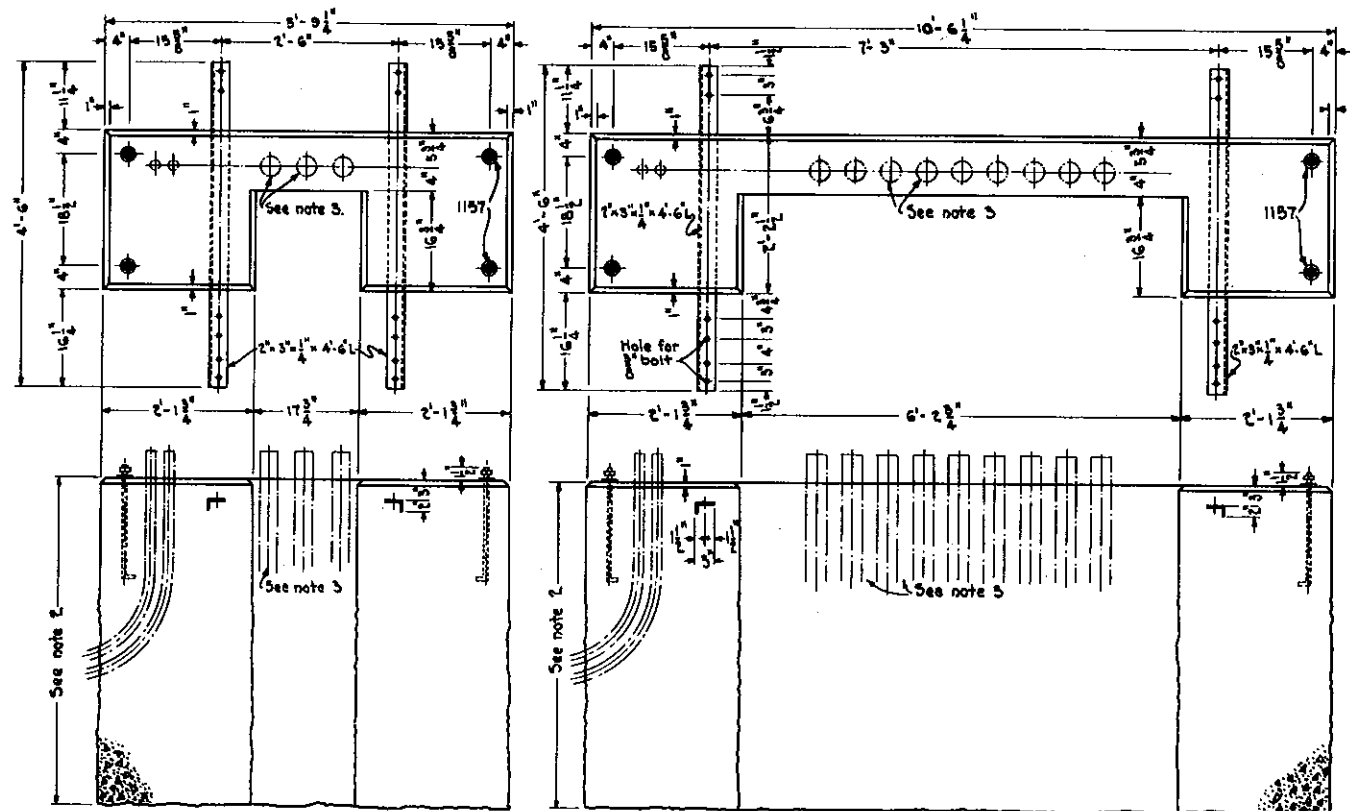


**THE PENNSYLVANIA RAILROAD
STANDARD
FOUNDATIONS FOR COMPENSATORS
AND CRANKS**

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., AUGUST 2, 1920

Correct
ANTHONY
Chief Signal Engineer

Approved: *ANTHONY*
Chief Engineer



1171 - FOUNDATION
(FOR USE WITH CASE "A" - PLAN S-530)

1172 - FOUNDATION
(FOR USE WITH CASE "B" - PLAN S-530)

NOTES:

1. CONCRETE SHALL BE IN ACCORDANCE WITH A.R. SIGNAL SECTION SPEC. 1111.
2. FOUNDATION SHALL BE NOT LESS THAN 3'-6" UNDERGROUND. FACING SHALL EXTEND NOT LESS THAN 6" BELOW GROUND LINE.
3. NUMBER, SIZE, LOCATION AND TERMINATION OF DUCTS TO BE DETERMINED BY LOCAL REQUIREMENTS. SPARE DUCTS FOR FUTURE ADDITIONS SHOULD BE GIVEN CONSIDERATION.

REVISIONS

1 SHEET

5-117-A



**THE PENNSYLVANIA RAILROAD
STANDARD
FOUNDATIONS**

FOR INSTRUMENT CASES

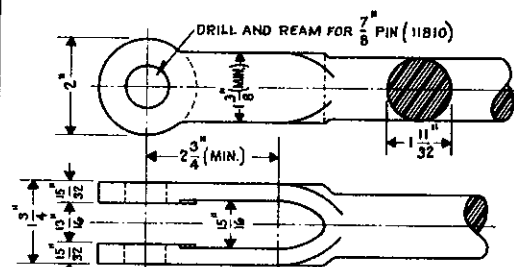
Office of Chief Signal Engineer, Phila., Pa., July 12, 1935.

Approved:

Approved:

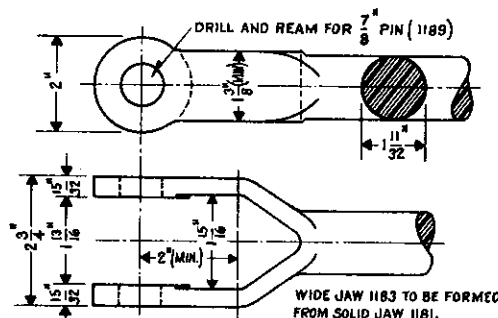
A. H. Ridd
Chief Signal Engineer-I

[Signature]
Chief Engineer



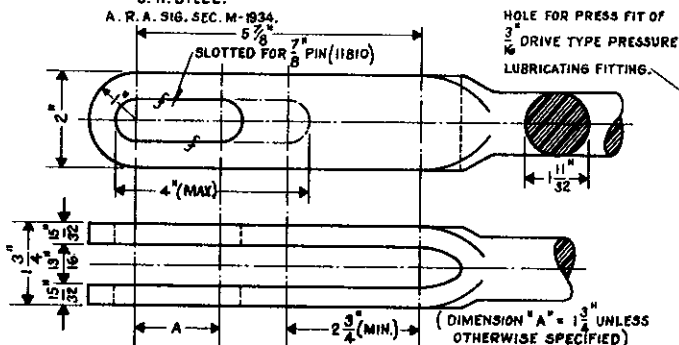
1181 SOLID JAW.

O. H. STEEL.
A. R. A. S16. SEC. M-1934.



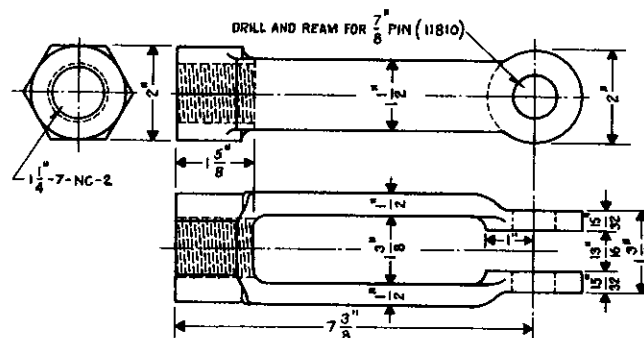
1183 WIDE JAW.

O. H. STEEL.
A. R. A. S16. SEC. M-1934.



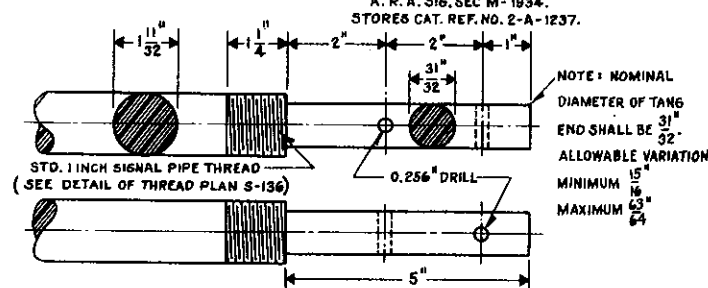
1185 SLOTTED JAW.

O. H. STEEL.
A. R. A. S16. SEC. M-1934.



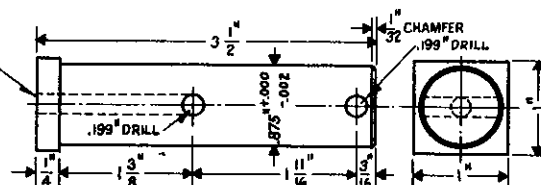
1187 SCREW JAW.

O. H. STEEL.
A. R. A. S16. SEC. M-1934.
STORES CAT. REF. NO. 2-A-1237.



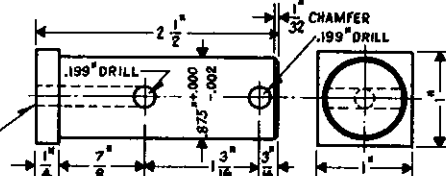
1188 DETAIL OF TANG END.

FOR 1 INCH SIGNAL PIPE.
O. H. STEEL.
A. R. A. S16. SEC. M-1934.



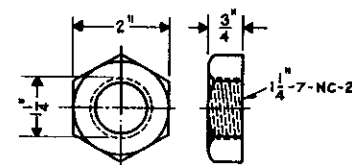
1189 WIDE JAW PIN.

MACHINERY OR C. R. STEEL.
A. R. A. S16. SEC. M-1935.
STORES CAT. REF. NO. 2-A-1684



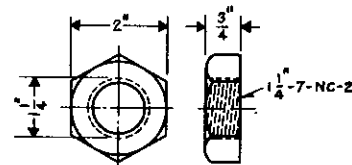
11810 STANDARD JAW PIN.

MACHINERY OR C. R. STEEL.
A. R. A. S16. SEC. M-1935
STORES CAT. REF. NO. 2-A-1685



11811 JAM NUT.

RIGHT HAND THREAD.
O. H. STEEL. COLD PUNCHED.
A. R. A. S16. SEC. M-1934.
STORES CAT. REF. NO. 2-A-1593.



11812 JAM NUT.

LEFT HAND THREAD.
O. H. STEEL. COLD PUNCHED.
A. R. A. S16. SEC. M-1934.
STORES CAT. REF. NO. 2-A-1592

NOTE:

1. REMOVE SHARP EDGES FROM ALL HOLES IN PINS 1189 AND 11810.
2. FURNISH ONE $\frac{3}{16} \times \frac{1}{2}$ COTTER WITH EACH PIN 1189 AND 11810.
3. IF LUBRICATING FITTING IS REQUIRED WITH PINS 1189 AND 11810, SPECIFY ON REQUISITION.

REVISIONS

REDRAWN FROM APPROVED PLAN
S-118-A, DATED JUNE 4, 1920 AND
REVISED.

1 SHEET



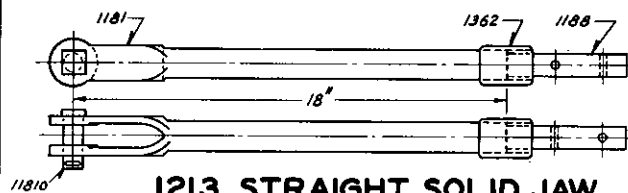
S-118-B

THE PENNSYLVANIA RAILROAD
STANDARD
SCREW AND SOLID JAWS
DETAILS

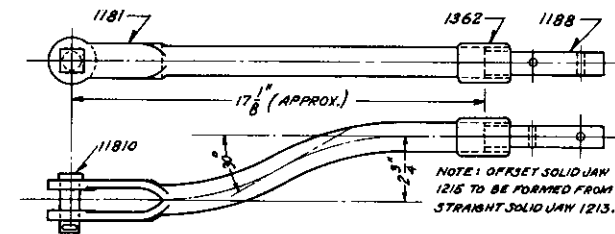
OFFICE OF CHIEF ENGINEER, PHILA., PA. MAY 20, 1940.

Approved
N. C. Stanton
Assistant Chief Engineer-Signals

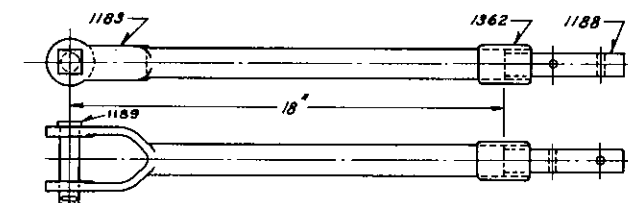
Approved
W. J. Sweeney
Chief Engineer



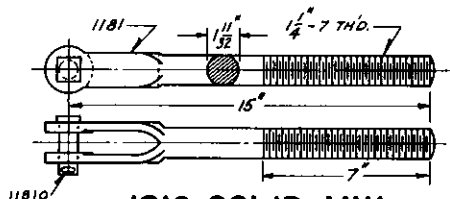
1213 STRAIGHT SOLID JAW
(TANG END) STORES CAT. REF. NO. 2A-1246
SAE-1020 STEEL FORGED. AAR SIG. SEC. M-1941.



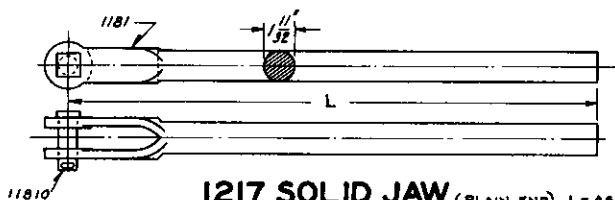
1215 OFFSET SOLID JAW
(TANG END) STORES CAT. REF. NO. 2A-1250
SAE-1020 STEEL FORGED. AAR SIG. SEC. M-1941.



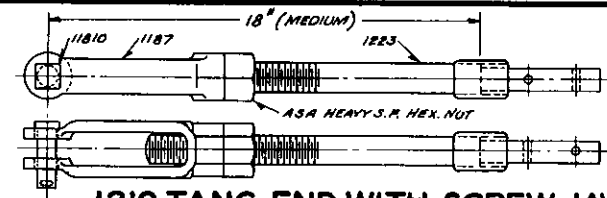
12110 WIDE JAW (TANG END)
STORES CAT. REF. NO. 2A-1254
SAE-1020 STEEL FORGED. AAR SIG. SEC. M-1941.



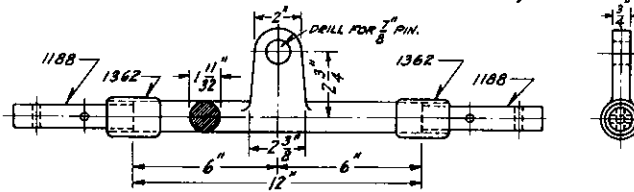
1216 SOLID JAW (THREADED END)
SAE-1020 STEEL FORGED.
STORES CAT. REF. NO. 2A-1247 AAR SIG. SEC. M-1940



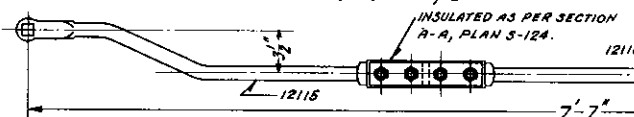
1217 SOLID JAW (PLAIN END) L=AS ORDERED
SAE-1020 STEEL FORGED
STORES CAT. REF. NO. 2A-1248
SIMILAR TO AAR SIG. SEC. M-1940



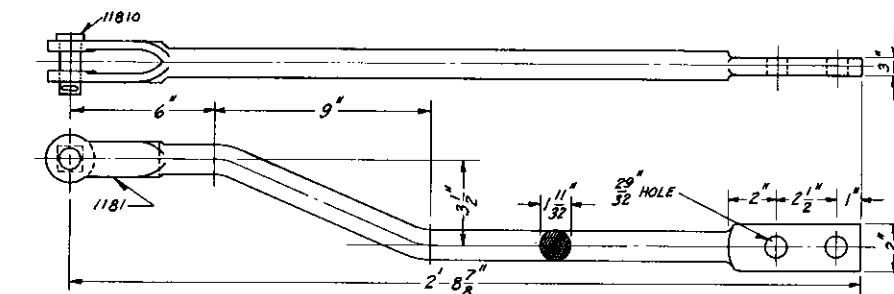
1219 TANG END WITH SCREW JAW
STORES CAT. REF. NO. 2A-1238 AAR SIG. SEC. M-1940.



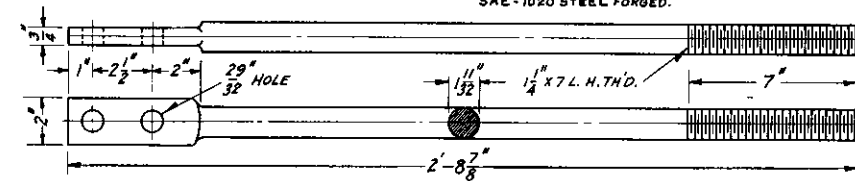
12111 LUG SAE-1020 STEEL FORGED.
STORES CAT. REF. NO. 2A-1454
AAR SIG. SEC. M-1942



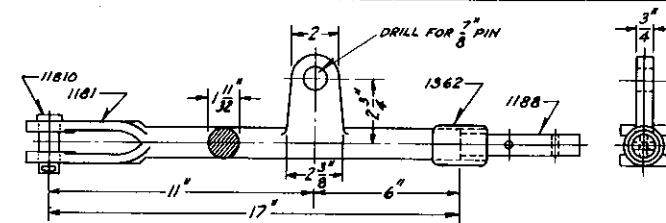
12114 ADJUSTABLE LINK INSULATED
STORES CAT. REF. NO. 2A-5682



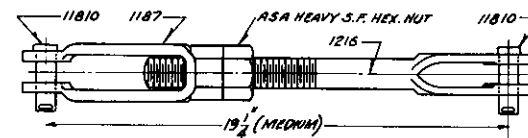
12115 OFFSET SOLID JAW
STORES CAT. REF. NO. 2A-5683
SAE-1020 STEEL FORGED.



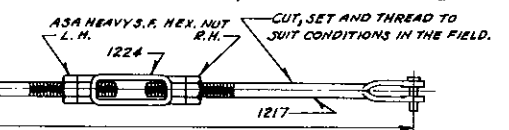
12116 THREADED END
STORES CAT. REF. NO. 2A-5684
SAE-1020 STEEL FORGED.



12112 LUG SAE-1020 STEEL FORGED.
STORES CAT. REF. NO. 2A-5680



12113 ADJUSTABLE LINK
AAR SIG. SEC. M-1940 STORES CAT. REF. NO. 2A-5681



12114 ADJUSTABLE LINK INSULATED
STORES CAT. REF. NO. 2A-5682

REVISIONS
REDRAWN FROM APPROVED DRAWING
S-121-A, DATED AUGUST 2, 1920
AND REVISED FORMER ITEMS 121,
1212, 1214, 1218 REMOVED FROM DRAWING.

1 SHEET



S-121-B

THE PENNSYLVANIA RAILROAD

STANDARD

JAWS, LUGS AND LINKS

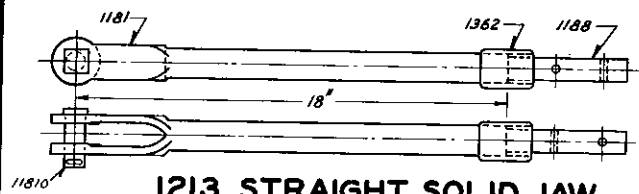
OFFICE OF CHIEF ENGINEER, PHILA., PA., DECEMBER 30, 1948.

Approved

H. G. Griffith
Assistant Chief Engineer - T.C. & S.

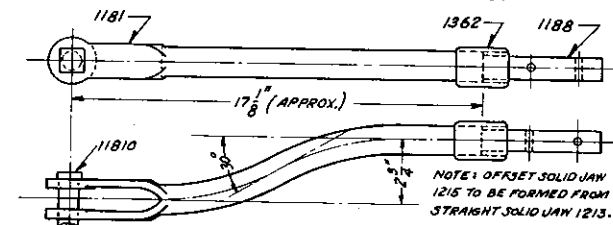
Approved

J. W. Smith
Chief Engineer



1213 STRAIGHT SOLID JAW

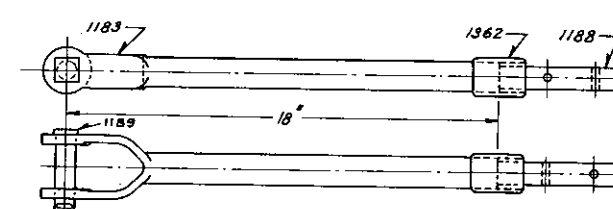
(TANG END) STORES CAT. REF. NO. 2A-1246
SAE-1020 STEEL FORGED. AAR SIG. SEC. M-1941.



1215 OFFSET SOLID JAW

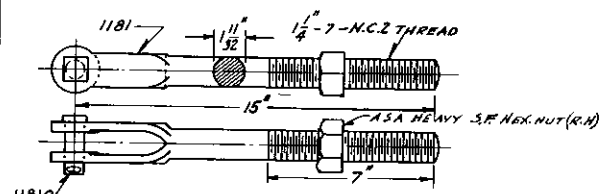
(TANG END) STORES CAT. REF. NO. 2A-1250
SAE-1020 STEEL FORGED. AAR SIG. SEC. M-1941.

NOTE: OFFSET SOLID JAW
1215 TO BE FORMED FROM
STRAIGHT SOLID JAW 1213.



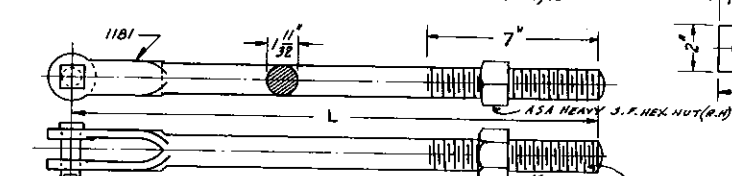
12110 WIDE JAW (TANG END)

STORES CAT. REF. NO. 2A-1254
SAE-1020 STEEL FORGED. AAR SIG. SEC. M-1941.



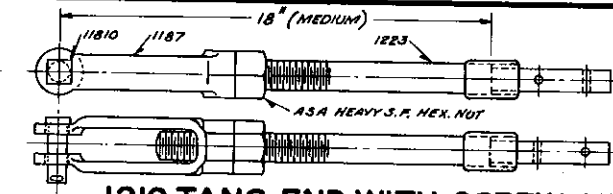
1216 SOLID JAW (THREADED END)

SAE-1020 STEEL FORGED.
STORES CAT. REF. NO. 2A-1247 AAR SIG. SEC. M-1940



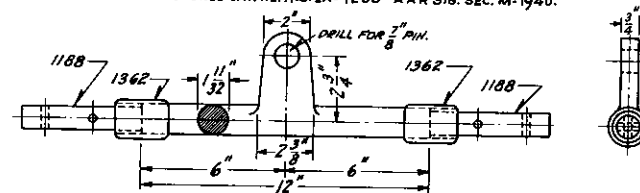
1217 SOLID JAW

(THREADED END) L=3 1/2" (SEE NOTE)
SAE-1020 STEEL FORGED
STORES CAT. REF. NO. 2A-1248
SIMILAR TO AAR SIG. SEC. M-1940



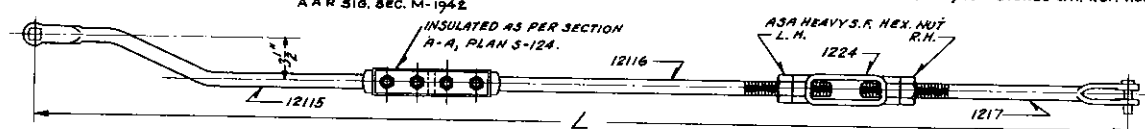
1219 TANG END WITH SCREW JAW

STORES CAT. REF. NO. 2A-1238 AAR SIG. SEC. M-1940.



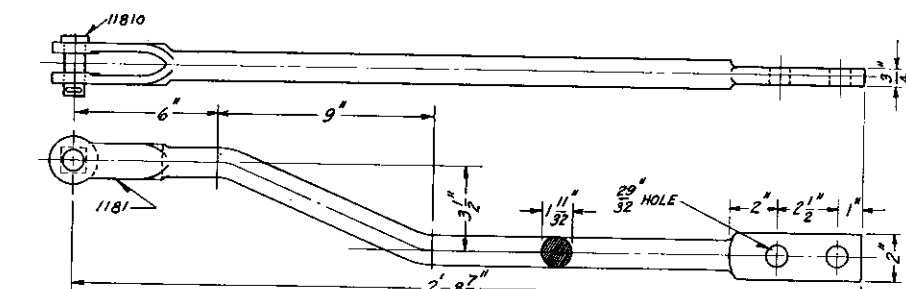
12111 LUG

SAE-1020 STEEL FORGED.
STORES CAT. REF. NO. 2A-1454
AAR SIG. SEC. M-1942



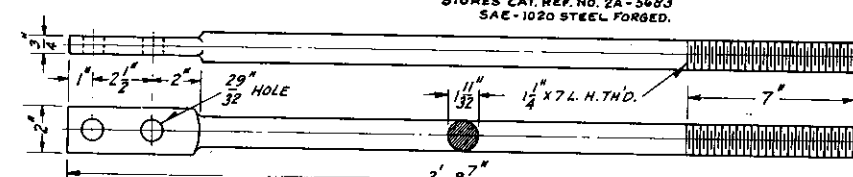
12114 ADJUSTABLE LINK

INSULATED
STORES CAT. REF. NO. 2A-5682
(SPECIFY LENGTH L WHEN ORDERING)



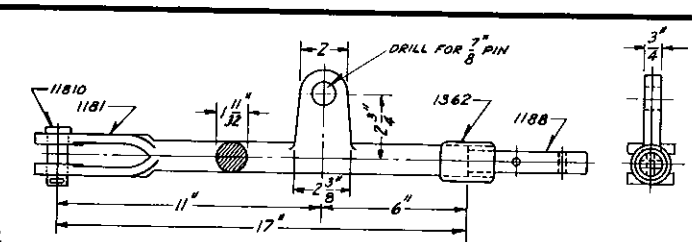
12115 OFFSET SOLID JAW

STORES CAT. REF. NO. 2A-5683
SAE-1020 STEEL FORGED.



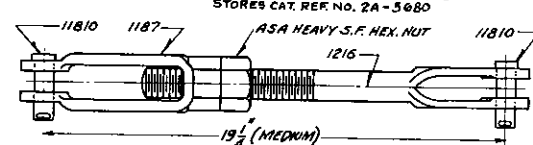
12116 THREADED END

STORES CAT. REF. NO. 2A-5684
SAE-1020 STEEL FORGED.



12112 LUG

SAE-1020 STEEL FORGED.
STORES CAT. REF. NO. 2A-5680



12113 ADJUSTABLE LINK

AAR SIG. SEC. M-1940 STORES CAT. REF. NO. 2A-5681

NOTES:
1. IF LENGTH L=3 1/2" FOR 1217 WILL NOT SUIT LOCAL
CONDITIONS, SPECIFY DESIRED LENGTH WHEN ORDERING.
2. LUBRICATING FITTINGS TO BE FURNISHED WITH PINS 1189 AND 11810.

REVISIONS
REDRAWN FROM APPROVED DRAWING S-121-A, DATED AUGUST 2, 1920 AND REVISED FORMER ITEMS 1211, 1212, 1214, 1215 REMOVED FROM DRAWING.
C-APRIL 17-1951 THREAD ADDED TO 1217. 1/2" A.S.A. NUT ADDED TO 1216 AND 1217. LENGTH IN FEET RECORDED FROM 1214 AND L SUBSTITUTED. NOTES 1 AND 2 ADDED.
APPROVED: H. G. Salmon

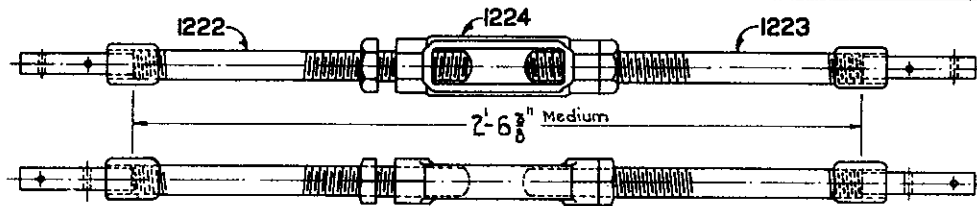
1 SHEET

S-121-C

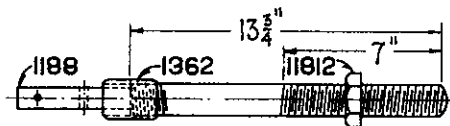
THE PENNSYLVANIA RAILROAD
STANDARD
JAWS, LUGS AND LINKS
OFFICE OF CHIEF ENGINEER, PHILA., PA., DECEMBER 30, 1948.

Approved: *H. G. Salmon*
Assistant Chief Engineer - T.C. & S.

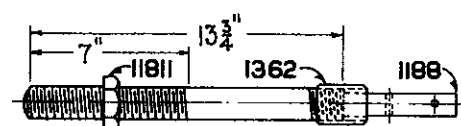
Approved: *H. G. Salmon*
Chief Engineer



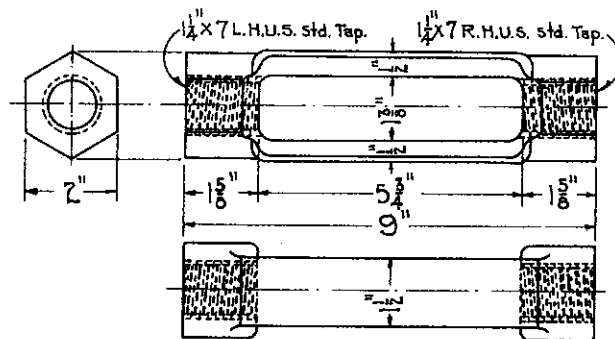
I221-P.A. SCREW COMPLETE
R. S. A. Feb. 1914



I222-THREADED TANG END
L.H. THREAD
R. S. A. Dec. 1916



I223-THREADED TANG END
R.H. THREAD
R. S. A. Dec. 1916



I224-P.A. TURNBUCKLE
FORGED STEEL
R. S. A. Feb. 1914

REVISIONS

1 SHEET

S-122-A

PENNSYLVANIA SYSTEM

STANDARD
PIPE ADJUSTING SCREW

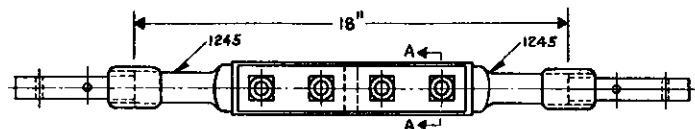
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., AUGUST 4, 1920.

Correct
A. H. Ross
Chief Signal Engineer

Approved
[Signature]
Chief Engineer

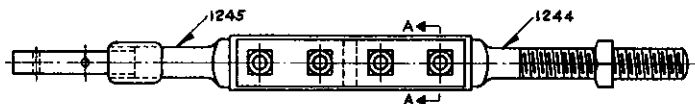
0" 1" 3" 5"
SCALE For I224.

0" 3" 6" 9"
SCALE For all other parts.



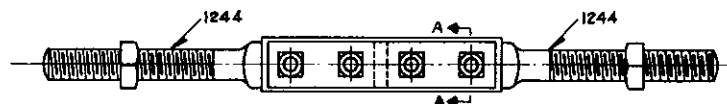
1241 TANG ENDS.

A. R. A. SIG. SEC. M-1934.
STORES CAT. REF. NO. 2-A-4150



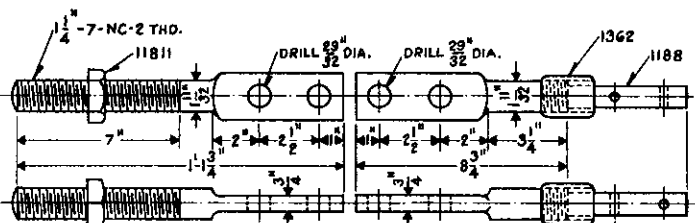
1242 TANG AND THREADED ENDS.

A. R. A. SIG. SEC. M-1934.
STORES CAT. REF. NO. 2-A-4151



1243 THREADED ENDS.

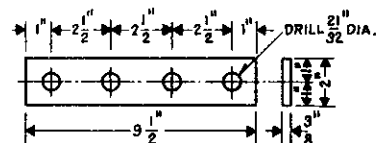
A. R. A. SIG. SEC. M-1934.
STORES CAT. REF. NO. 2-A-4152



1244 THREADED END. 1245 TANG END.

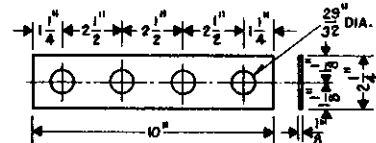
O. H. STEEL.
A. R. A. SIG. SEC. M-1934.
STORES CAT. REF. NO. 2-A-4153

O. H. STEEL.
A. R. A. SIG. SEC. M-1934.
STORES CAT. REF. NO. 2-A-4154



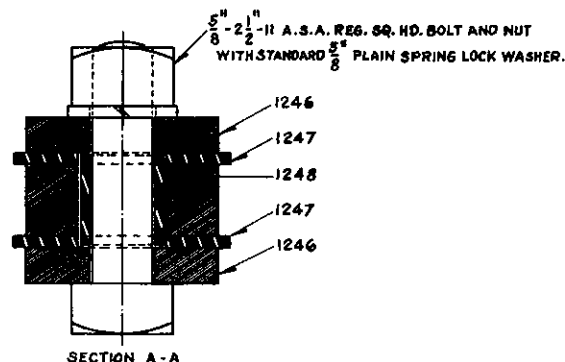
1246 SPLICE PLATE.

O. H. STEEL.
A. R. A. SIG. SEC. M-1934.
STORES CAT. REF. NO. 2-A-4155

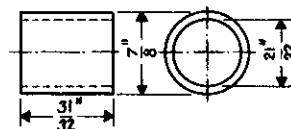


1247 INSULATION PLATE.

FIBRE
A. R. A. SIG. SEC. M-1934.
STORES CAT. REF. NO. 2-A-4156



SECTION A-A



1248 INSULATION BUSHING.

FIBRE.
A. R. A. SIG. SEC. M-1934.
STORES CAT. REF. NO. 2-A-4157

NOTE:
1. FIBRE SHALL BE IN ACCORDANCE WITH A. R. A. SIGNAL
SECTION SPECIFICATION NO. 13.

REVISIONS

1 SHEET



S-124-A

THE PENNSYLVANIA RAILROAD

STANDARD

PIPE LINE INSULATION

ONE INCH SIGNAL PIPE

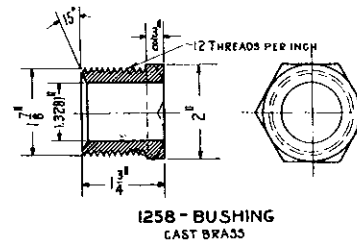
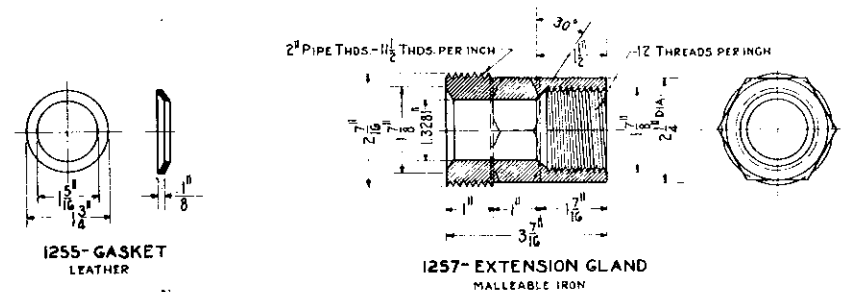
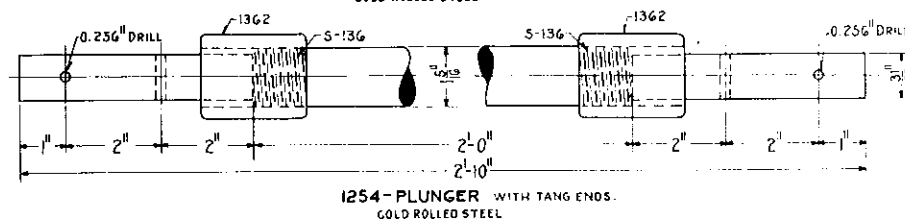
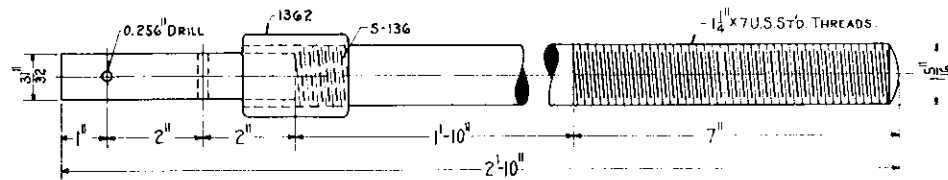
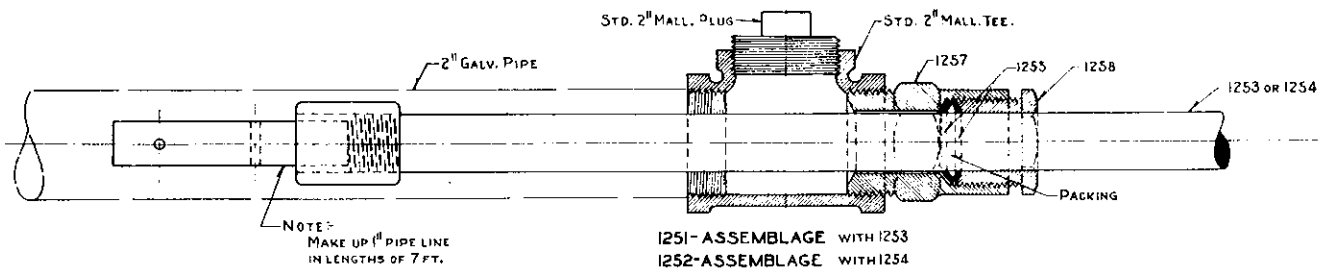
OFFICE OF CHIEF ENGINEER, PHILA., PA., MAY 20, 1940.

Approved

N. C. Stanton
Assistant Chief Engineer-Signals

Approved

W. J. Kingston
Chief Engineer



NOTE: STUFFING BOXES SHALL NOT BE USED INSIDE OF BUILDINGS.

A.R.A.-M 1926.

REVISIONS.

REDRAWN FROM APPROVED PLANS S-125-A
DATED 8-20-20 AND REVISED.
C- FEBRUARY 9, 1928
APPROVED: *AMH*

1 SHEET

S-125-C



THE PENNSYLVANIA RAILROAD
STANDARD

STUFFING BOX FOR 1" PIPE

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., APR. 20, 1925

Approved: *AMH*
Chief Signal Engineer

Approved: *AMH*
Chief Engineer

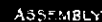
[illegible]

Diagram of a rectangular plate with four holes. The plate has a total width of 2.35 and a height of 1. The distance between the centers of the first and second holes is 0.8, and between the third and fourth holes is 0.8. The distance between the second and third holes is 0.75. The distance from the left edge to the center of the first hole is 0.1, and from the center of the fourth hole to the right edge is 0.1. The holes have a diameter of 0.25. The plate is subjected to a horizontal force F applied at the top and bottom edges, and a vertical force P applied at the center of the top edge.

Figure 1 is a schematic diagram of the test specimen. It is a rectangular plate with a total length of 22 inches and a width of 2 inches. Three circular holes are located along the top edge, with the central hole having a diameter of 1/2 inch. The distance between the centers of the holes is 10 inches. The specimen is subjected to a tensile load P at both ends. The top and bottom edges are labeled with dimensions 1/2 inch and 2 inches, respectively.

[illegible][illegible]

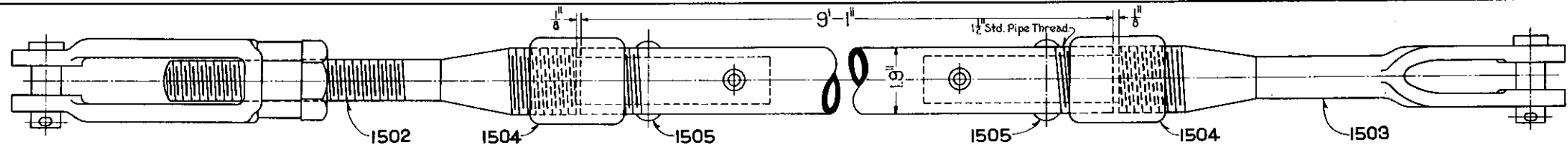
REVISIONS
REDRAWN FROM APPROVED PLAN
S-142-A, DATED 11-26-26, AND
REVISED

S-142-B

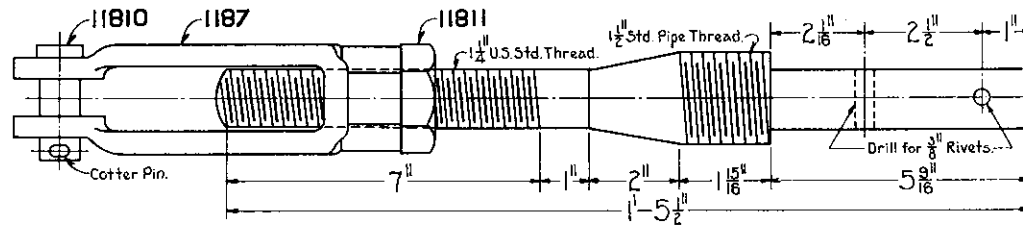
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA. PA MAY 28 1928

Arthur
Chief Signal Engineer

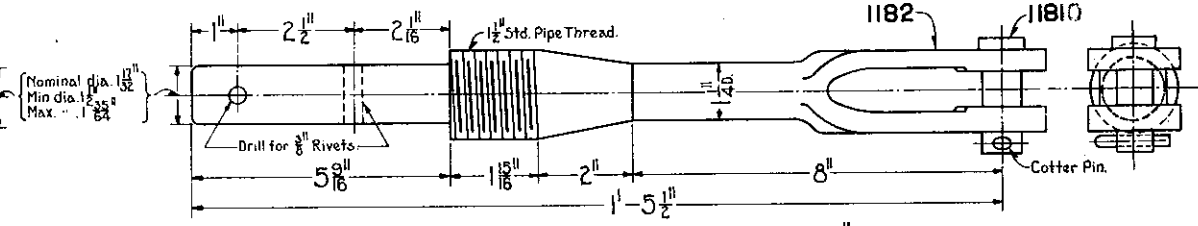
[Signature]
Chief Engineer



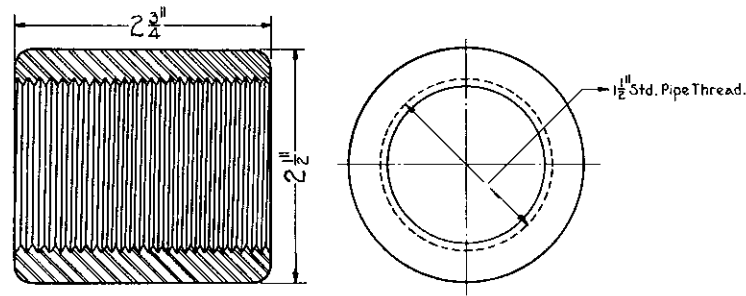
1501-DOWN ROD COMPLETE FOR ROCKING SHAFT & VERTICAL CRANK LEADOUTS.
STEEL OR WROUGHT PIPE.



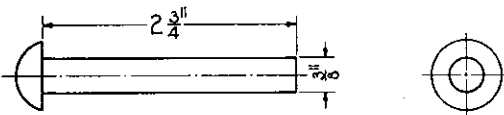
1502-SCREW JAW COMPLETE TANGED FOR 1 1/2" STD. PIPE.
FORGED STEEL.



1503-SOLID JAW COMPLETE TANGED FOR 1 1/2" STD. PIPE.
FORGED STEEL.



1504-COUPLING.
WROUGHT IRON.



1505-RIVET.
SOFT IRON.

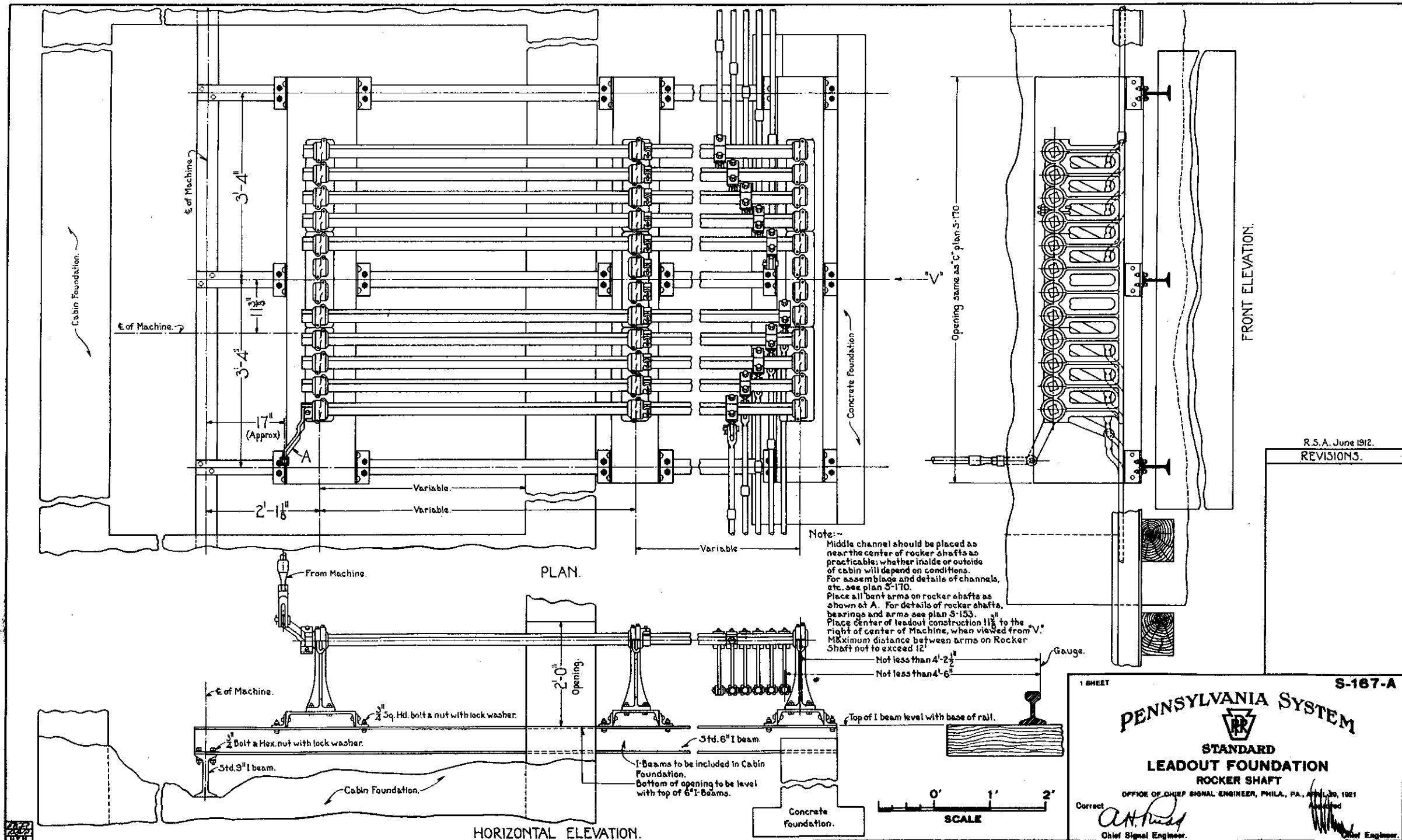
NOTE:-
CONNECT SCREW JAW TO TAIL LEVER OF MACHINE

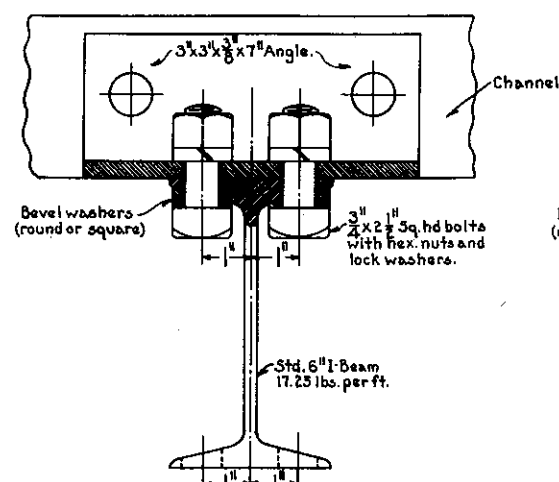
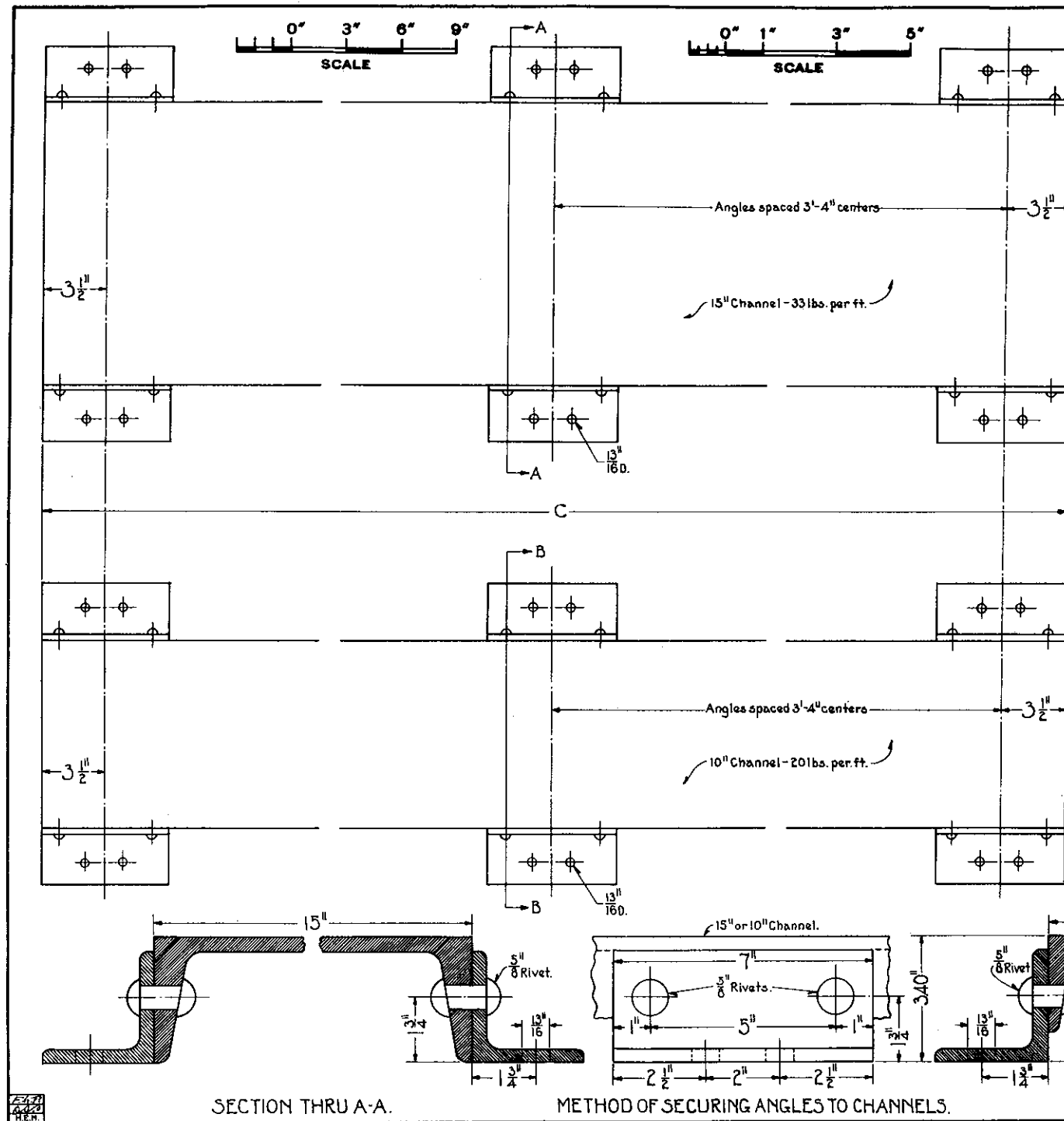
REVISIONS
B-MARCH 13-1928.
APPROVED: *at*

1 SHEET

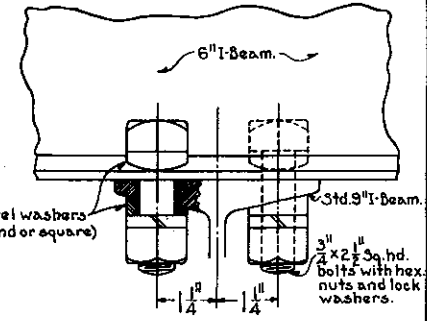
S-150-A

THE PENNSYLVANIA RAILROAD
STANDARD
DOWN ROD
FOR ELECTRO-MECHANICAL INTERLOCKING MACHINES
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA. NOV. 1, 1920.
Correct *at* Approved *at*
Chief Signal Engineer Chief Engineer





METHOD OF SECURING CHANNELS TO 6" I-BEAMS.

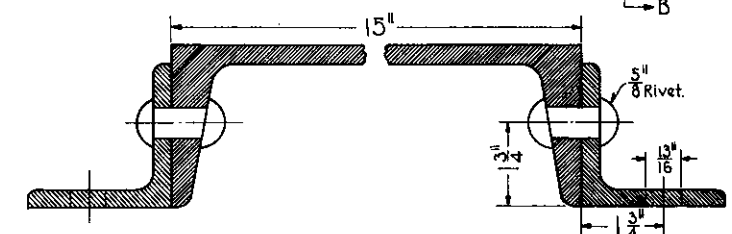


METHOD OF SECURING 6" I-BEAM TO 9" I-BEAM

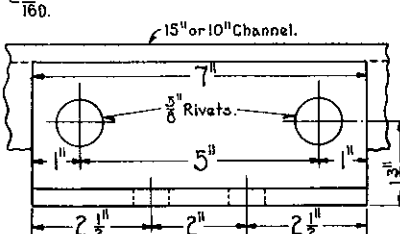
CHANNEL LENGTHS.		
Machine No. of levers	C	Angles 3"x3"x7/8" (for each channel)
8	3'-11"	4
12	7'-3"	6
16-20	10'-7"	8
24-28	13'-11"	10
32-36	17'-5"	12
40-48-52	23'-11"	16
56-60	27'-5"	18

ASSEMBLAGE.						
Machine.	6" I	10" C	15" C	Rivets	3/4" Sq. Hd. Bolts.	
8	2	12	2	1	24	20
12	3	18	2	1	36	42
16-20	4	24	2	1	48	56
24-28	5	30	2	1	60	70
32-36	6	36	2	1	72	84
40-48-52	8	48	2	1	96	112
56-60	9	54	2	1	108	126

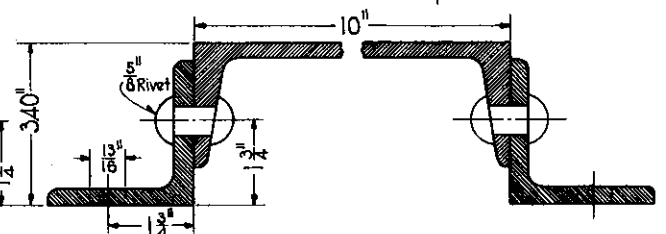
Note:— Each bolt shall be provided with hex. nut, lock washer and special bevel washer.



SECTION THRU A-A.



METHOD OF SECURING ANGLES TO CHANNELS.



SECTION THRU B-B.

R.S.A. June 1912.
REVISIONS.

1 SHEET

PENNSYLVANIA SYSTEM

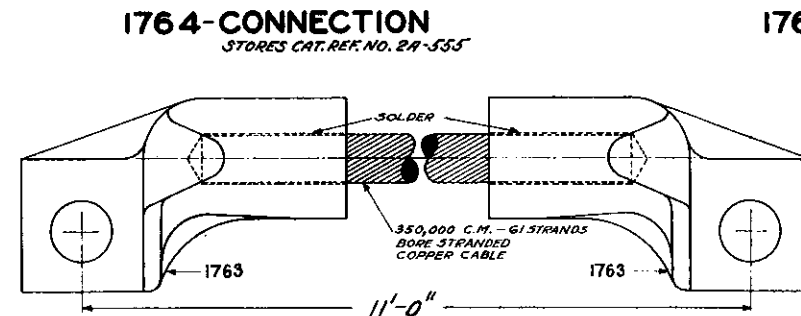
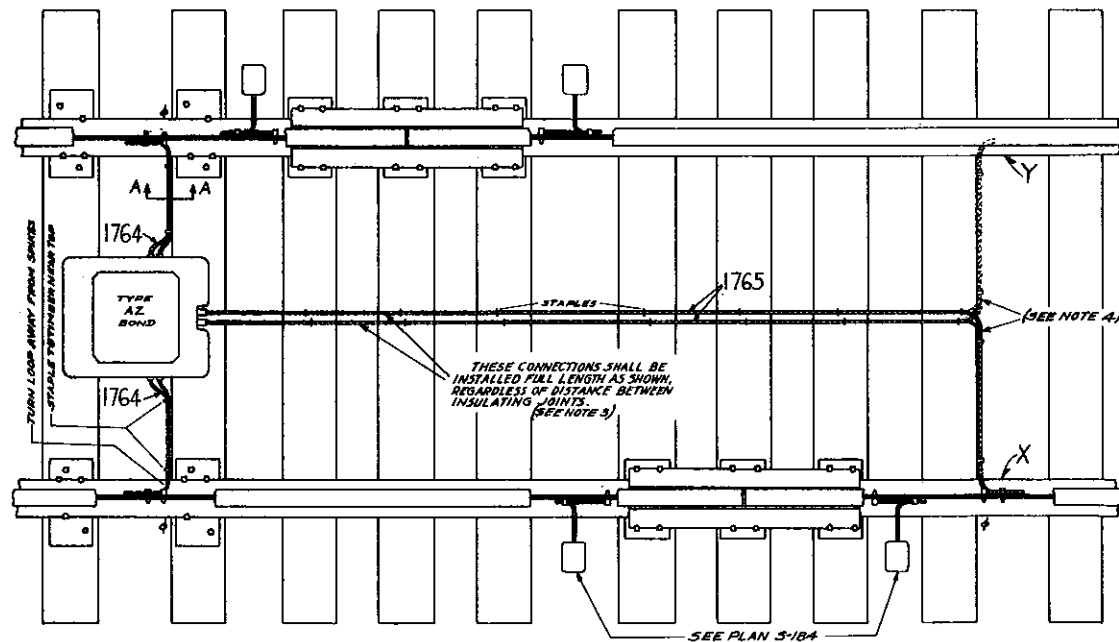
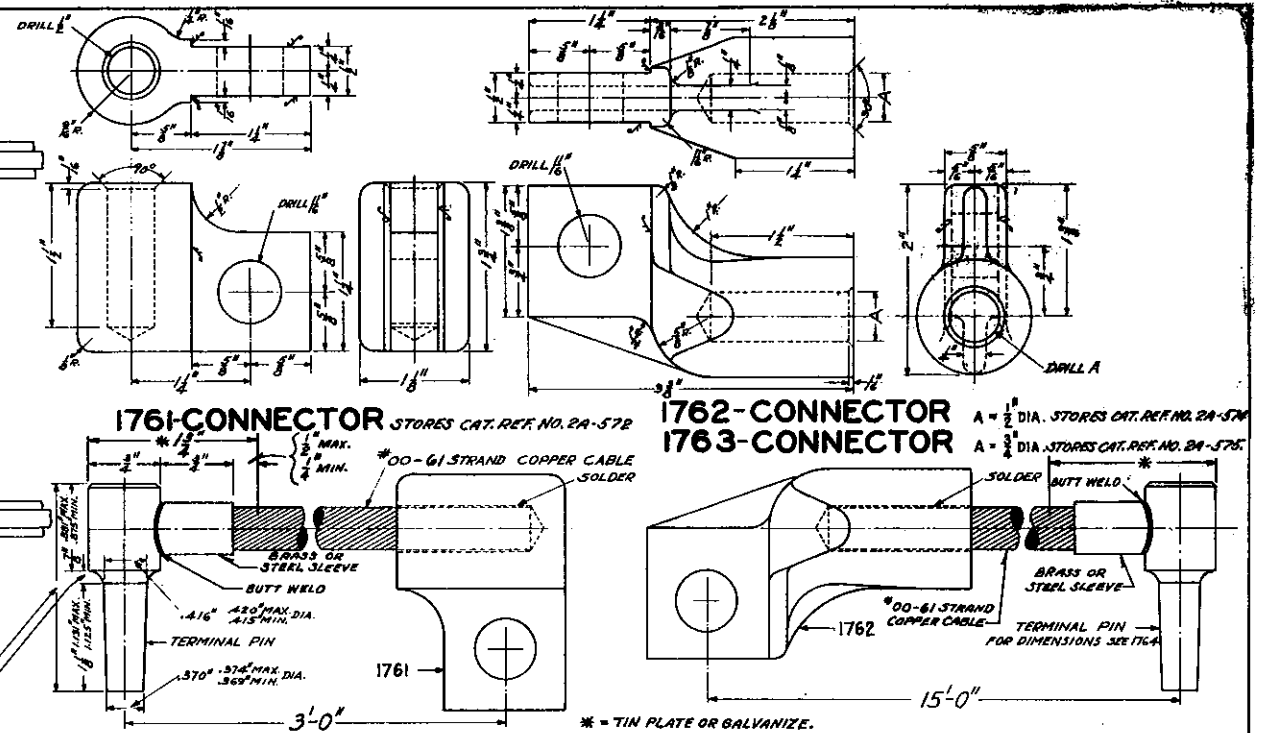
STANDARD LEADOUT FOUNDATION PARTS FOR ROCKER SHAFT LEADOUT

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., APRIL 29, 1921

Correct *[Signature]* Chief Signal Engineer.

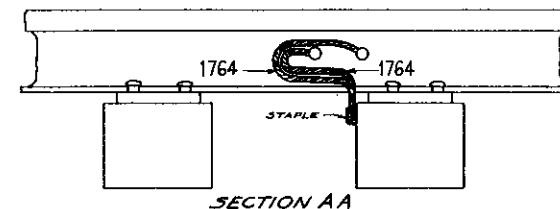
Approved *[Signature]* Chief Engineer.

S-170-A



1766-CONNECTION
STORES CAT. REF. NO. 2A-577

1. CONNECTORS 1761, 1762 AND 1763 SHALL BE MADE OF CAST BRASS
FINISHED ALL OVER WITH HARD SOLID.
2. WHERE APPLICABLE, TERMINAL PINS, WELDING AND GALVANIZING SHALL CONFORM TO THE
REQUIREMENTS OF SPECIFICATIONS SHOWN ON CURRENT ISSUE OF S-179.
3. WHEN INSTALLING, SUFFICIENT SLACK MUST BE LEFT IN
CONNECTIONS 1765 AND 1764 TO PREVENT STRAIN ON CONNECTORS.
4. CONNECT 1765 TO RAIL X WHEN X IS POWER RETURN RAIL.
" " 1765 " " Y " " Y " " "



REVISIONS
B - MAY 31, 1938 c.o.
APPROVED *A. C. Stanton*
C - APRIL 25, 1942 c.o.
APPROVED *A. C. Stanton*
THE FOLLOWING CHANGES MADE:-
COPPER CYCLE IN CONNECTIONS
1764 & 1765 FORMERLY 3" STRONG.
WIRE OF BRASS 5/16" DIAMETER AT
THE WELD ON TERMINAL PINS ADDED
PER TO C. TO C. OF JOINTS CHANGED.
NOTE 2 CHANGED

1 SHEET

S-176-C



THE PENNSYLVANIA RAILROAD
STANDARD

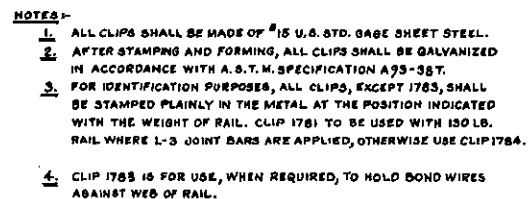
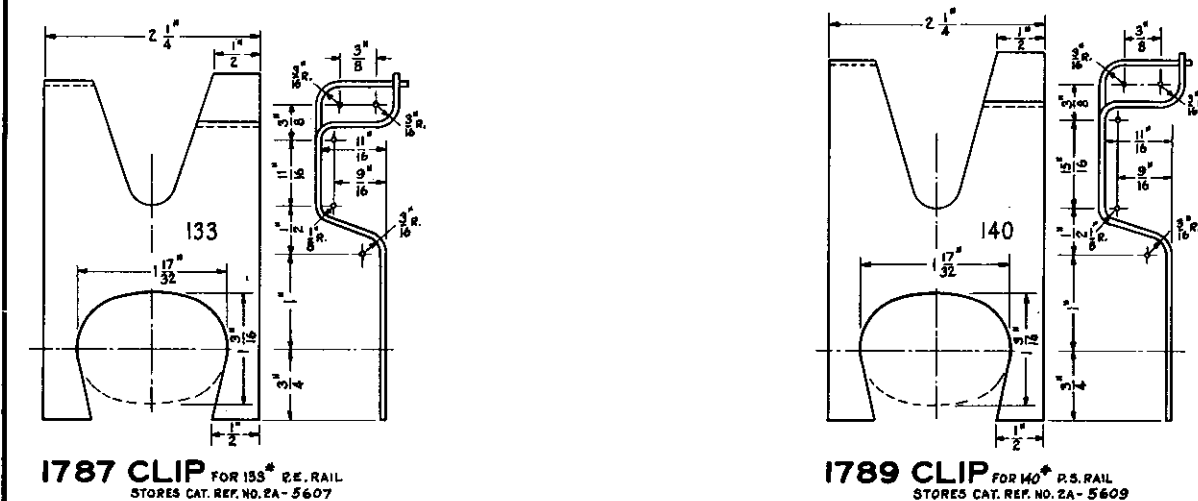
LAYOUT

FOR TYPE AZ IMPEDANCE BONDS

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., MAY 4, 1957.

Approved
[Signature]
Chief Signal Engineer

Approved 
Chief Engineer



CLIPS 1782, 1783 & 1784 FORMERLY SHOWN ON PLAN S-179-K, SHEET 1 AND CHANGED TO PROVIDE BETTER FIT. CLIPS 1761, 1787 & 1789 . ADDED. NOTES AND STORES CAT. REF. NUMBERS ADDED. DWS.S-179-K OBSOLETE.

1 SHEET

S-178-A



THE PENNSYLVANIA RAILROAD

STANDARD

RAIL BOND CLIPS

OFFICE OF CHIEF ENGINEER, PHILA., PA., FEBRUARY 17, 1947.

Approved *H. C. Griffith*
Assistant Chief Engineer - T. C. & S.

Approved *J. H. [Signature]*
Chief Engineer

SPECIFICATION.

1. PURPOSE.

(a) THE PURPOSE OF THIS SPECIFICATION IS TO PROVIDE REQUIREMENTS FOR RAIL BONDS AND RAIL BOND CLIPS FOR RAILWAY SIGNALING TRACK CIRCUITS.

2. MATERIAL AND WORKMANSHIP.

(a) MATERIAL AND WORKMANSHIP SHALL BE FIRST CLASS IN EVERY RESPECT.

3. DESIGN.

(a) GENERAL CONSTRUCTION AND DIMENSIONS OF RAIL BONDS AND RAIL BOND CLIPS SHALL BE IN ACCORDANCE WITH CURRENT ISSUE OF DWG. S-179.

4. CONDUCTORS.

(a) CONDUCTORS FOR RAIL BONDS 1794, 1796 AND 1798 SHALL CONSIST OF ONE ANNEALED COPPER WIRE SURROUNDED BY SIX GALVANIZED STEEL WIRES WITH SUCH A LAY THAT THE AXIAL LENGTH OF ONE TURN OF WIRE WILL BE MIN. 2 1/2 IN., MAX. 3 IN.

(b) CONDUCTORS FOR RAIL BONDS 1795, 1797 AND 1799 SHALL CONSIST OF SEVEN ANNEALED COPPER COVERED WIRES WITH SUCH A LAY THAT THE AXIAL LENGTH OF ONE TURN OF WIRE WILL BE MIN. 2 1/2 IN., MAX. 3 IN.

(c) CONDUCTORS SHALL BE CYLINDRICAL IN FORM, FREE FROM SCALES, INEQUALITIES, SPLITS AND ALL IMPERFECTIONS.

(d) COPPER, STEEL AND COPPER COVERED STEEL WIRES SHALL MEET THE FOLLOWING REQUIREMENTS AS TO MECHANICAL AND ELECTRICAL PROPERTIES:-

	STEEL 77 OR 83	COPPER 77 OR 81	COPPER COVERED STEEL 81
DIAMETER IN MILS			
BREAKING STRENGTH MIN. LBS. PER SQ. IN.	50,000	38,500	55,000
ELONGATION IN 10 IN. EACH WIRE, MIN. PERCENT	8	25	15
AVER. ELONGATION IN 10 IN. ALL WIRES, MIN. PERCENT	11	-	18
RESISTIVITY, OHMS PER MIL. FT. MAX. AT 68° F.	81.37	10.56	28.59

(e) DIAMETER OF COPPER WIRE WILL BE 77 MILS WHERE USED WITH 77 MILS STEEL WIRE AND 81 MILS WHERE USED WITH 83 MILS STEEL WIRE.

5. TERMINALS.

(a) TERMINALS SHALL BE MADE OF OPEN HEARTH STEEL CONTAINING NOT MORE THAN 0.20 PER CENT OF COMBINED CARBON.

(b) TERMINALS SHALL WITHSTAND BEING DRIVEN THE ENTIRE LENGTH OF THE PIN INTO A HOLE 3/8 IN. IN DIA., DRILLED IN A STEEL PLATE 3/8 IN. THICK, WITHOUT SHOWING A CRACK OR FLAW OF ANY KIND. IN ADDITION THE TERMINAL, AFTER BEING DRIVEN INTO THE STEEL PLATE APPROXIMATELY ONE-HALF ITS LENGTH, SHALL WITHSTAND BENDING AT 90° WITHOUT CRACKING OR SHOWING A FRACTURE OF ANY KIND.

6. WELDING.

(a) WELDING SHALL BE DONE WITH ELECTRIC DEVICES CAPABLE OF PRODUCING UNIFORMLY GOOD RESULTS. THE WELD SHALL BE SO MADE THAT THE ENDS OF ALL WIRES ARE UNITED DIRECTLY WITH THE TERMINAL TO INSURE A DENSE AND HOMOGENEOUS METAL WHICH SHALL BE FREE FROM BLOW HOLES AFTER FUSION.

7. IDENTIFICATION.

(a) EACH TERMINAL SHALL BE SO MARKED THAT THE MANUFACTURER CAN BE READILY IDENTIFIED.

8. GALVANIZING AND TINNING.

(a) AFTER WELDING, TERMINALS OF BONDS 1794, 1796 AND 1798 SHALL BE GALVANIZED IN ACCORDANCE WITH DRAWING, BY THE HOT DIP PROCESS.

(b) AFTER WELDING, TERMINALS OF BONDS 1795, 1797 AND 1799 SHALL BE GALVANIZED OR TINNED IN A MANNER IN ACCORDANCE WITH DRAWING. TINNING OR GALVANIZING SHALL BE HEAVY, WELL DONE, EVEN IN THICKNESS THROUGHOUT, SMOOTH AND FREE FROM LUMPS.

(c) TINNING SHALL BE OF LEAD TIN ALLOY, CONTAINING 70 PER CENT PURE TIN AND 30 PER CENT PURE LEAD.

9. ELONGATION.

(a) MANUFACTURER MUST SUBJECT EACH RAIL BOND TO A STRETCHING PROCESS SUFFICIENT TO ELONGATE BOND (REGARDLESS OF LENGTH) TO PERMANENT SET OF 1/2 IN. TO DETERMINE THE QUALITY OF THE WELDS. BONDS SHALL BE HELD BY THEIR TERMINALS IN SUCH A MANNER THAT THE WELDS ARE SUBJECTED TO THE FULL

STRAIN DEVELOPED IN THE STRETCHING OPERATION.

(b) STRETCHING MACHINE SHALL BE OF SUCH DESIGN THAT THE STRAIN WILL BE APPLIED TO EACH TERMINAL FOR NOT MORE THAN ONE SECOND.

10. INSPECTION.

(a) PURCHASER MAY INSPECT MATERIAL AT ALL STAGES OF MANUFACTURE.

(b) PURCHASER MAY INSPECT THE COMPLETED PRODUCT TO DETERMINE THAT THE REQUIREMENTS OF THIS SPECIFICATION HAVE BEEN MET.

(c) IF MATERIAL HAS NOT BEEN ACCEPTED AT POINT OF PRODUCTION AND IF, UPON ARRIVAL AT DESTINATION, IT DOES NOT MEET THE REQUIREMENTS OF THIS SPECIFICATION, IT MAY BE REJECTED, AND THE CONTRACTOR, UPON REQUEST, SHALL ADVISE THE PURCHASER WHAT DISPOSITION IS TO BE MADE OF THE DEFECTIVE MATERIAL. CONTRACTOR SHALL PAY ALL FREIGHT CHARGES.

(d) IF PURCHASER IS TO MAKE INSPECTION AT POINT OF PRODUCTION, IT SHALL BE SO STATED.

11. TESTS.

(a) TESTS MAY BE MADE AT POINT OF PRODUCTION, OR ON SAMPLES SUBMITTED, AND MAY ALSO BE MADE AT DESTINATION.

(b) UNLESS OTHERWISE AUTHORIZED BY THE PURCHASER, THE CONTRACTOR SHALL GIVE THE ENGINEER OF TESTS, AT ALTOONA, PA., SUFFICIENT NOTICE OF TIME WHEN MATERIAL WILL BE READY FOR TESTING.

(c) CONTRACTOR SHALL PROVIDE, AT POINT OF PRODUCTION, APPARATUS AND LABOR FOR MAKING REQUIRED TESTS UNDER SUPERVISION OF THE PURCHASER.

(d) TESTS ARE TO BE MADE AT POINT OF PRODUCTION, UNLESS OTHERWISE STATED.

(e) THREE BONDS TAKEN AT RANDOM FROM EACH SET OF 1000 OR LESS SHALL BE SELECTED BY THE PURCHASER FOR TESTS.

(f) TERMINALS OF ALL SAMPLE BONDS SHALL BE CHECKED AGAINST THE REQUIRED DIMENSIONS.

(g) TWO-THIRDS OF THE SAMPLES SHALL BE TESTED TO DESTRUCTION.

1. ON THE SAMPLES TESTED TO DESTRUCTION, THE TERMINALS SHALL BE GRIPPED IN THE TENSILE MACHINE AND UNIFORM STRESS APPLIED ALONG THE AXIS OF THE BOND. FAILURE SHALL NOT OCCUR AT LESS THAN 3300 LBS. AND SHALL NOT OCCUR IN THE WELD, THAT IS; EACH INDIVIDUAL WIRE SHALL SHOW FRACTURE AND NOT PULL OUT OF THE WELDED AREA.

IF ONE SAMPLE FAILS TO MEET THE 3300 LBS. LIMIT OR FAILS IN THE WELD, TWO ADDITIONAL SAMPLES TAKEN FROM THE SAME LOT SHALL BE SIMILARLY TESTED. IF MORE THAN ONE SAMPLE FROM A GIVEN LOT OR EITHER OF THE ADDITIONAL SAMPLES FAIL, THE ENTIRE LOT SHALL BE REJECTED.

2. TERMINALS FROM THE SAMPLES USED FOR MECHANICAL TESTS SHALL BE TESTED FOR DRIVING AND BENDING REQUIREMENTS OF SECTION 5 (b). IF ONE OF THESE TERMINALS FAILS IN EITHER OF THESE TESTS, TWO ADDITIONAL SAMPLES TAKEN FROM THE SAME LOT SHALL BE SIMILARLY TESTED. IF MORE THAN ONE SAMPLE FROM A GIVEN LOT OR EITHER OF THE ADDITIONAL SAMPLES FAIL THE ENTIRE LOT SHALL BE REJECTED.

(h) ONE THIRD OF THE SAMPLES SHALL BE USED FOR TINNING OR GALVANIZING TEST OF TERMINALS, GALVANIZING TEST OF STEEL WIRES, PHYSICAL TEST OF INDIVIDUAL WIRES AND ELECTRICAL TEST OF INDIVIDUAL WIRES. IF ANY SAMPLE FAILS ON ANY TEST, THE ENTIRE LOT SHALL BE REJECTED.

1. TINNING TEST.

(a) SOLUTION.

(1) POTASSIUM FERRICYANIDE SOLUTION: 5 GRAMS OF THE SALT ARE DISSOLVED IN 1000 C.C. OF DISTILLED WATER.

(2) NITRIC ACID SOLUTION SHALL HAVE A SPECIFIC GRAVITY OF 1.027 AT 60 DEG. F. MADE BY DILUTING SOC. C. OF NITRIC ACID CHEMICALLY PURE, HAVING A SPECIFIC GRAVITY OF 1.42, WITH 950 C.C. OF DISTILLED WATER.

(b) METHOD.

(1) THE SAMPLES SELECTED FOR THE TEST SHALL BE THOROUGHLY CLEANED WITH GASOLINE AND THEN WITH SOAP AND WATER. AFTER RINSING THE CLEAN SAMPLES WITH DISTILLED WATER, THEY SHALL BE IMMERSUED IN THE NITRIC ACID SOLUTION FOR ONE MINUTE, AND WITHOUT WIPING, DIPPED INTO THE FERRICYANIDE SOLUTION; IF A BLUE PRECIPITATE OR DISCOLORATION TAKES PLACE, IT INDICATES THE COATING HAS BEEN DISSOLVED OR PITTED.

THE SAMPLES SHALL THEN BE WASHED WITH DISTILLED WATER TO FREE THEM FROM THE FERRICYANIDE SOLUTION AND THE ABOVE OPERATION REPEATED. SAMPLES WHICH HAVE BEEN COATED IN A SATISFACTORY MANNER SHALL STAND FOUR IMMERSIONS OF ONE MINUTE EACH IN THE NITRIC ACID SOLUTION WITHOUT SHOWING A BLUE PRECIPITATE OR DISCOLORATION IN THE FERRICYANIDE SOLUTION. IF BLUE PRECIPITATE APPEARS THE WHOLE SHIPMENT SHALL BE REJECTED.

(2) GALVANIZING TEST SHALL BE IN ACCORDANCE WITH 6. S. T. SPECIFICATION NO. 1002.

(1) GALVANIZING OF RAIL BOND CLIPS SHALL BE TESTED IN ACCORDANCE WITH 6. S. T. SPECIFICATION NO. 1002.

12. PACKING.

(a) UNLESS OTHERWISE SPECIFIED, BONDS SHALL BE SECURELY TIED IN BUNDLES OF 50, WITH THE TERMINALS COMPLETELY AND CAREFULLY WRAPPED IN BURLAP OR EQUIVALENT PROTECTION.

(b) RAIL BOND CLIPS SHALL BE PACKED SO AS TO FACILITATE HANDLING AND SHIPPING.

13. MARKING.

(a) PURCHASER'S ORDER, NAME OF CONSIGNOR, AND NAME AND ADDRESS OF CONSIGNEE, SHALL BE PLAINLY MARKED ON OUTSIDE OF PACKAGE.

14. WARRANTY.

(a) CONTRACTOR SHALL WARRANT THE MATERIAL COVERED BY THIS SPECIFICATION TO BE FREE FROM DEFECTS IN MATERIAL AND WORKMANSHIP UNDER ORDINARY USE AND SERVICE, HIS OBLIGATION UNDER THIS WARRANTY BEING LIMITED TO MAKING, AT POINT OF PRODUCTION, ANY PART OR PARTS TO REPLACE THOSE WHICH SHALL BE FOUND DEFECTIVE AFTER SHIPMENT TO THE PURCHASER. THIS WARRANTY SHALL NOT APPLY TO ANY APPARATUS WHICH HAS BEEN SUBJECTED TO MISUSE, NEGLIGENCE OR ACCIDENT.

(b) CONTRACTOR SHALL COVENANT AND AGREE TO SAVE HARMLESS, AND INDEMNIFY THE PURCHASER AGAINST ALL CLAIMS, SUITS, ACTIONS OR PROCEEDINGS, DAMAGES, COSTS, FEES AND EXPENSES BY REASON OF INFRINGEMENT OR ALLEGED INFRINGEMENT OF PATENTS, OR PATENT ROYALTIES INVOLVED, IN CONSEQUENCE OF THE PURCHASE OR THE USE OF MATERIAL COVERED HEREBY.

15. FIELD WORK.

(a) 1795, 1797 OR 1799 SHALL BE USED THROUGH ROAD CROSSINGS, STATION PLATFORMS AND TUNNELS. 1794, 1796 OR 1798 SHALL BE USED AT ALL OTHER POINTS.

(b) AT POINTS WHERE JOINTS IN ROAD CROSSINGS AND STATION PLATFORMS CANNOT BE AVOIDED, THE PLANKING SHALL BE CUT BACK 3/4 OF AN INCH FROM HEAD OF RAIL TO ALLOW FOR INSPECTION OF BONDS.

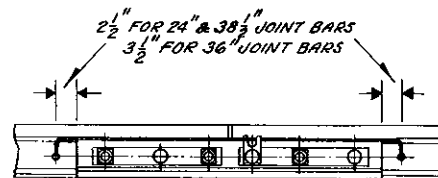
(c) HOLES FOR TERMINALS SHALL BE DRILLED IN OIL WITH 3/8 OF AN INCH DRILL AND PLUGGED SAME DAY AS DRILLED.

(d) WHERE PRACTICABLE HOLES SHALL BE DRILLED FROM OUTSIDE OF TRACK AND NOT FROM GAUGE SIDE OF RAIL. TERMINAL SHALL BE DRIVEN INTO RAIL FROM SAME SIDE OF HOLE AS DRILLED.

(e) GAUGE 5803, PLAN S-580, SHALL BE USED FREQUENTLY TO DETERMINE IF HOLE DRILLED IN RAIL IS WITHIN THE LIMITS INDICATED ON THE GAUGE.

(f) WHERE CONDITIONS CAUSE EXCESSIVE CORROSION, RAIL BONDS SHALL BE GIVEN A PROTECTIVE COATING OF NO-DK-ID, CONSISTENCY "A SPECIAL" OR NO. 2 SLUSHING OIL.

(g) HOLES SHALL BE DRILLED AS SHOWN IN FIG. "A", SO AS TO BE PROPERLY LOCATED FOR CROPPING RAIL ENDS.



APPLICATION OF RAIL BOND AND CLIP
FIGURE "A"

FOR DRAWINGS SEE SHEET NO. 1.

SHEET 2 OF 2

S-179-K



THE PENNSYLVANIA RAILROAD
STANDARD
RAIL BONDS AND CLIPS

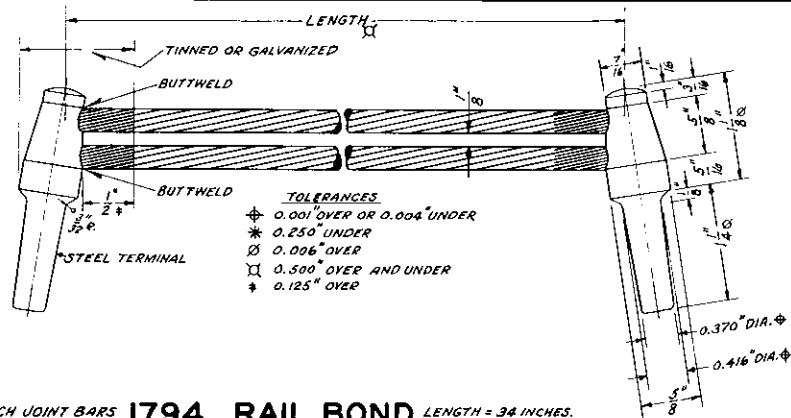
OFFICE OF ASSISTANT CHIEF ENGINEER-SIGNALS, PHILA., PA., NOVEMBER 4, 1937.

Approved

N. C. Stanton
Assistant Chief Engineer-Signals

Approved

W. J. Wynn
Chief Engineer

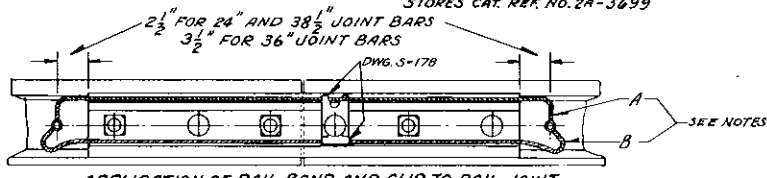


FOR 24 INCH JOINT BARS **1794 RAIL BOND** LENGTH = 34 INCHES.
STORES CAT. REF. NO. 2A-5694

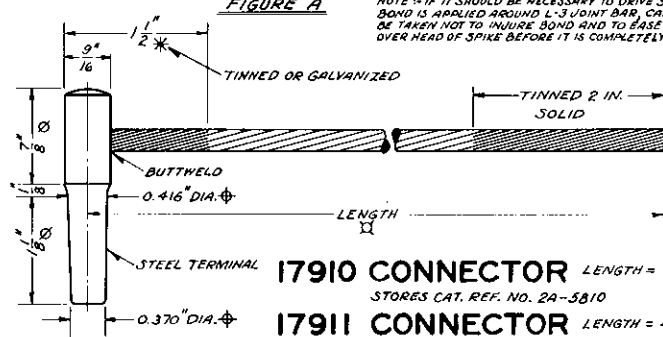
FOR 24 INCH JOINT BARS **1795 RAIL BOND** LENGTH = 34 INCHES.
STORES CAT. REF. NO. 2A-5695

FOR 36 AND 38 1/2 INCH JOINT BARS **1798 RAIL BOND** LENGTH = 48 INCHES.
STORES CAT. REF. NO. 2A-5698

FOR 36 AND 38 1/2 INCH JOINT BARS **1799 RAIL BOND** LENGTH = 48 INCHES.
STORES CAT. REF. NO. 2A-5699



APPLICATION OF RAIL BOND AND CLIP TO RAIL JOINT
FIGURE "A"



17910 CONNECTOR LENGTH = 4 FEET.
STORES CAT. REF. NO. 2A-5810

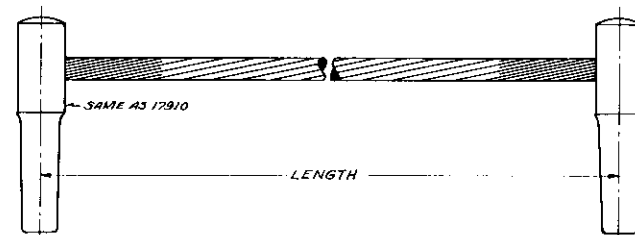
17911 CONNECTOR LENGTH = 4 FEET.
STORES CAT. REF. NO. 2A-5811

17912 CONNECTOR LENGTH = 11 FEET
STORES CAT. REF. NO. 2A-5812

17913 CONNECTOR LENGTH = 11 FEET
STORES CAT. REF. NO. 2A-5813

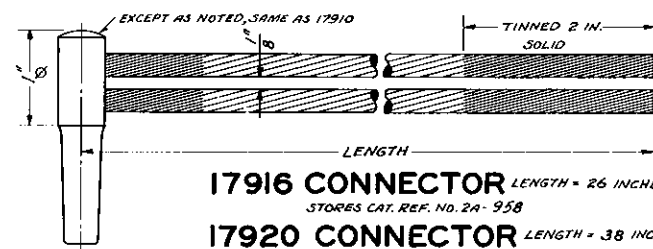
17921 CONNECTOR LENGTH AS ORDERED
STORES CAT. REF. NO. 2A-5821

17922 CONNECTOR LENGTH AS ORDERED
STORES CAT. REF. NO. 2A-5822



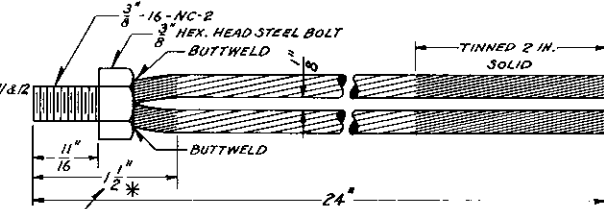
17914 CONNECTOR LENGTH = 15 FEET.
STORES CAT. REF. NO. 2A-5814

17915 CONNECTOR LENGTH = 10 FEET.
STORES CAT. REF. NO. 2A-5815



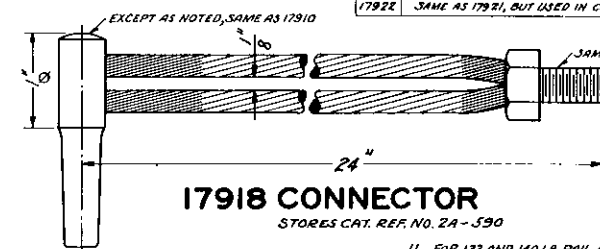
17916 CONNECTOR LENGTH = 26 INCHES
STORES CAT. REF. NO. 2A-958

17920 CONNECTOR LENGTH = 38 INCHES
STORES CAT. REF. NO. 2A-959



17917 CONNECTOR

STORES CAT. REF. NO. 2A-1257



17918 CONNECTOR

STORES CAT. REF. NO. 2A-590

FIELD WORK.

1. BONDS 1795 AND 1799 SHALL BE USED THROUGH ROAD CROSSINGS, STATION PLATFORMS AND TUNNELS. BONDS 1794 AND 1798 SHALL BE USED AT ALL OTHER POINTS. (SEE NOTE 13.)
2. AT POINTS WHERE JOINTS IN ROAD CROSSINGS AND STATION PLATFORMS CANNOT BE AVOIDED, THE PLANKING SHALL BE CUT BACK 3/4 FROM HEAD OF RAIL TO ALLOW FOR INSPECTION OF BONDS.
3. RAIL BONDS AND CONNECTORS SHALL BE APPLIED SAME DAY HOLES ARE DRILLED.
4. WHERE PRACTICABLE, HOLES SHALL BE DRILLED FROM OUTSIDE OF TRACK AND NOT FROM GAUGE SIDE OF RAIL. TERMINAL SHALL BE DRIVEN INTO RAIL FROM SAME SIDE OF HOLE AS DRILLED.
5. GAUGE 5803, PLAN 3-580, SHALL BE USED FREQUENTLY TO DETERMINE IF HOLE DRILLED IN RAIL IS WITHIN THE LIMITS INDICATED ON GAUGE.
6. WHERE CONDITIONS CAUSE EXCESSIVE CORROSION, RAIL BONDS AND CONNECTORS SHALL BE GIVEN A PROTECTIVE COATING OF NO. OX-10, CONSISTENCY "A-SPECIAL" OR NO. 2 SLUSHING OIL.
7. HOLES FOR RAIL BONDS SHALL BE DRILLED AS SHOWN IN FIG. "A", 30 AS TO BE PROPERLY LOCATED FOR CROPPING RAIL ENDS.
8. FOULING AND SHUNT CONNECTORS SHALL BE STAPLED ONE INCH BELOW TOP OF TIE.
9. CONNECTORS 17911, 17913 & 17922 ARE FOR USE IN CAB SIGNAL TERRITORY.
10. FOR STANDARD ARRANGEMENTS OF FOULING AND SHUNTING CIRCUITS SEE PLAN 3-803.

REQUISITES.

1. THE STRANDS OF BONDS 1794, 1798 AND CONNECTORS 17916, 17917, 17918 AND 17920 SHALL BE MADE OF 1- ANNEALED COPPER WIRE AND 6- GALVANIZED STEEL WIRES. THE DIAMETER OF EACH WIRE .077" AND DIAMETER OF EACH STRAND .231". AXIAL LAY .258."
2. THE STRANDS OF BONDS 1795 AND 1799 SHALL BE MADE OF 7- 40% COPPER COVERED STEEL WIRES. THE DIAMETER OF EACH WIRE .081" AND DIAMETER OF EACH STRAND .243". AXIAL LAY .275."
3. THE STRANDS OF CONNECTORS 17910, 17912, 1794, 17915 & 17921 SHALL BE MADE OF 7- 40% COPPER COVERED STEEL WIRES. THE DIAMETER OF EACH WIRE .102" AND DIAMETER OF EACH STRAND .306". AXIAL LAY .300."
4. THE STRANDS OF CONNECTORS 17911, 17913 & 17922 SHALL BE MADE OF 7- ANNEALED COPPER WIRES. THE DIAMETER OF EACH WIRE .102" AND DIAMETER OF EACH STRAND .306". AXIAL LAY .375."
5. MANUFACTURING TOLERANCES ALLOWED ON WIRE AND STRAND SIZES.
6. MATERIAL, WORKMANSHIP, TINNING, GALVANIZING, TESTS AND GENERAL SPECIFICATIONS SHALL BE IN ACCORDANCE WITH A. A. R. SIGNAL SECTION SPECIFICATION 151, CURRENT ISSUE.

APPLICATION OF WEB TYPE RAIL BONDS AND CONNECTORS

ITEM	APPLIED
1794	AROUND RAIL JOINTS, AND FOR OTHER USES AS SPECIFIED ON DRAWINGS
1795	SAME AS 1794, EXCEPT FOR USE AT ROAD CROSSINGS, STATION PLATFORMS & TUNNELS
1798	SAME AS 1794, ALSO BETWEEN STOCK RAIL AND WING RAIL OF FROGS (SEE DWG. 3-182-U)
1799	SAME AS 1795.
17910	FOR SHUNTING TRACK, EXCEPT IN CAB SIGNAL AND ELECTRIFIED TERRITORIES
17911	SAME AS 17910, BUT USED IN CAB SIGNAL TERRITORY.
17912	SAME AS 17910.
17913	SAME AS 17911.
17914	AS FOULING CONNECTOR.
17916	BETWEEN RAIL AND PARKWAY OUTLET. SEE DWG. 3-184-M. NOTES.
17917	BETWEEN DRAGGING EQUIPMENT DETECTOR AND PARKWAY OUTLET. SEE DWG. 3-241-U.
17918	BETWEEN STOCK RAIL AND 1/2 IN. PIPE AROUND FROG. SEE DWG. 3-182-J.
17920	SAME AS 17916.
17921	FOR SHUNTING TRACK WITH SJ-26 ELECTRIC LOCK, EXCEPT CAB SIGNAL TERRITORY.
17922	SAME AS 17921, BUT USED IN CAB SIGNAL TERRITORY.

REVISIONS

REBORN FROM PLAN 3-174-M, DATED 11-4-37 AND REVISED AS FOLLOWS:
BONDS 1796 & 1797 ELIMINATED.
TERMINALS OF BONDS 1794, 1795, 1798 & 1799 MADE TAPER HEAD. CLIPS NOW SHOWN ON PLAN 3-172. SPECIFICATIONS CHANGED TO A. A. R. SEC. 151, CON-
NECTORS 17910, 17911, 17912, 17915 & 17914 FORMERLY SHOWN ON PLAN 3-182-1.
CONNECTORS 17916, 17917, 17918 & 17920 FORMERLY SHOWN ON PLAN 3-184.
CONNECTORS 17921 AND 17922 ADDED.
REVISED NOVEMBER 12, 1946.
FIG. A AMPLIFIED TO INCLUDE BOND UNDER BOLTS. NOTES 11 & 12 ADDED.
M. REVISED DECEMBER 28, 1946.
CONNECTOR 17915 AND NOTE 13 ADDED TO SHEET 1.

APPROVED *H. G. Smith*

SHEET 1 OF 2.



S-179-M

THE PENNSYLVANIA RAILROAD

STANDARD

RAIL BONDS AND CONNECTORS

OFFICE OF CHIEF ENGINEER, PHILA., PA., NOVEMBER 12, 1946.

Approved

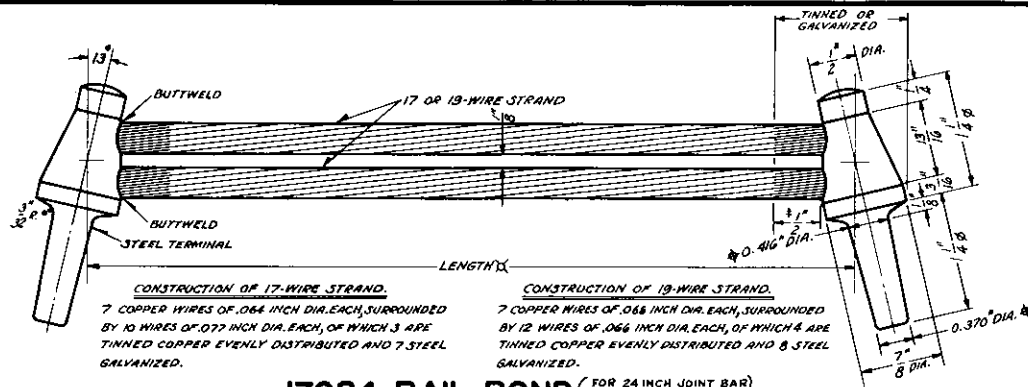
H. G. Smith

Assistant Chief Engineer T-C & S

Approved

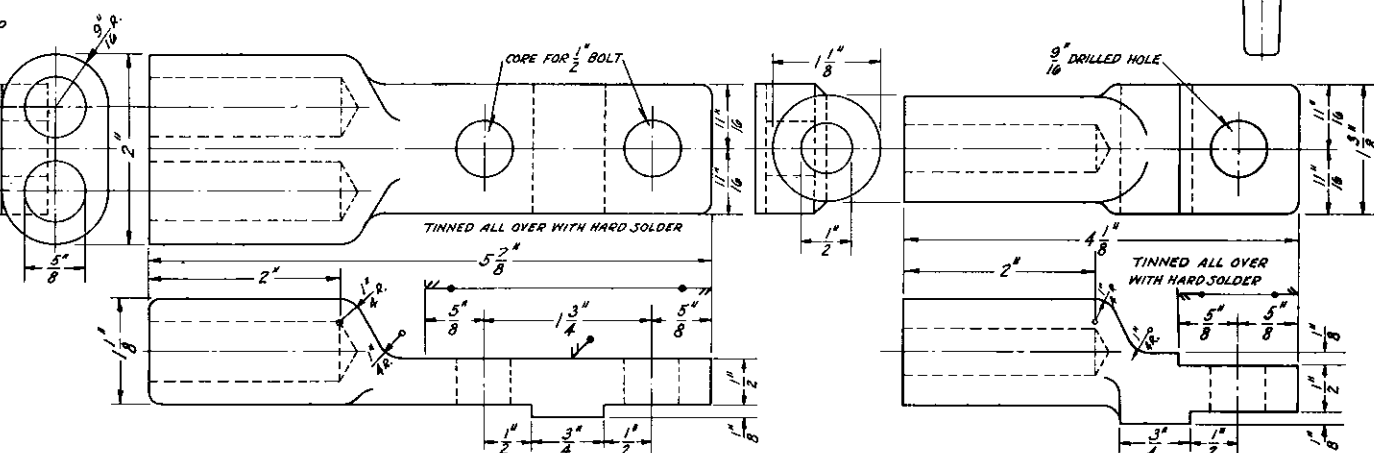
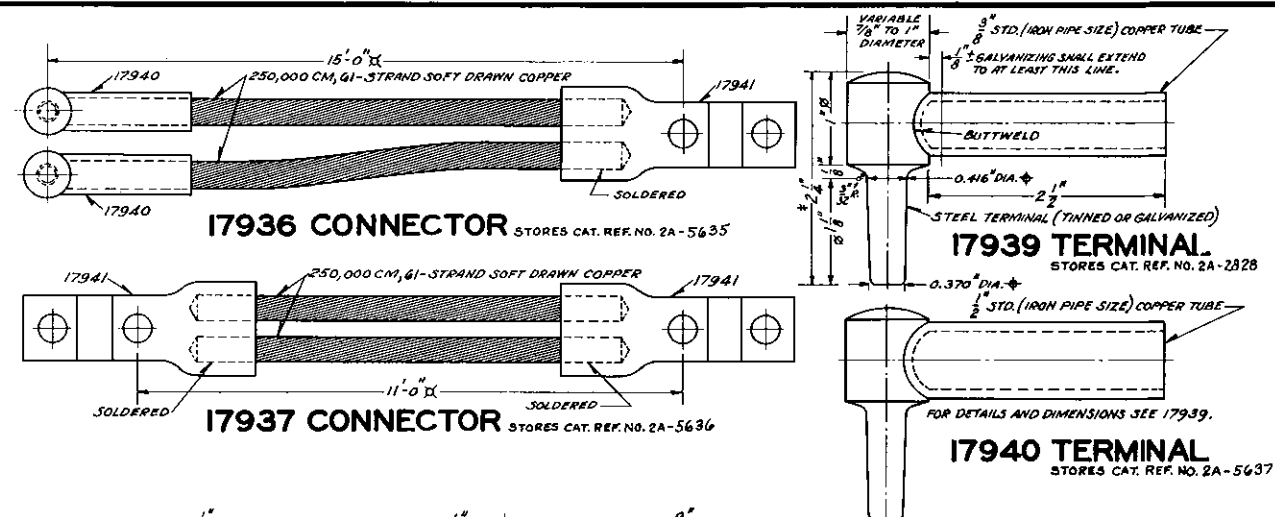
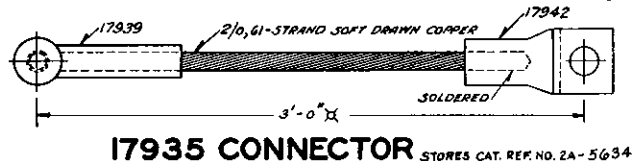
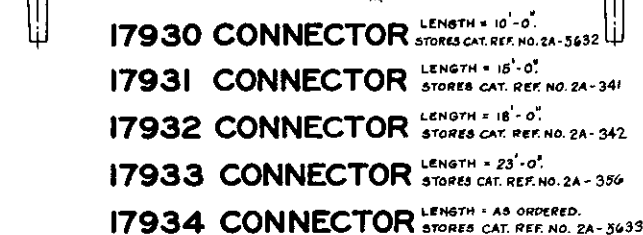
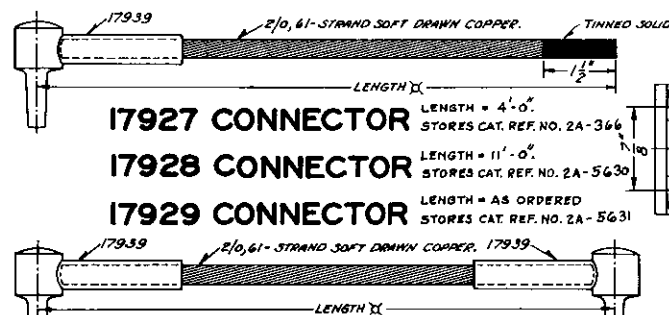
H. G. Smith

Chief Engineer



17924 RAIL BOND (FOR 24 INCH JOINT BAR)
STORES CAT. REF. NO. 2A-349

17925 RAIL BOND (FOR 36 1/2 INCH JOINT BAR)
STORES CAT. REF. NO. 2A-352



17942 TERMINAL CAST BRASS
STORES CAT. REF. NO. 2A-5639

APPLICATION OF RAIL BONDS AND CONNECTORS

ITEM	APPLIED
17924, 17925	AROUND RAIL JOINTS AND FOR OTHER USES AS SPECIFIED ON DRAWINGS.
17927, 17928, 17929	FOR SHUNTING WITH T-20 MECH'S, H. D. CONTROLLERS, AND STRUCTURE GROUNDING.
17930, 17931, 17932	FOR FOUling PROTECTION AND OTHER USES AS SPECIFIED ON DRAWINGS.
17933, 17934	BETWEEN RAIL AND IMPEDANCE BOND (SPEC. 1754)
17935, 17936	BETWEEN IMPEDANCE BONDS (SPEC. 1754) (NEUTRAL CONNECTION).
17937	

NOTES:

- AFTER BUTT WELDING, THE 2/0, 61-STRAND CABLE OR THE 250,000 CM, 61-STRAND CABLE SHALL BE PROPERLY SOLDERED INTO TERMINALS 17939 OR 17940.
- THE 3/8 AND 1/2 INCH COPPER SLEEVES OF 17939 AND 17940 SHALL BE TINNED INSIDE AND OUTSIDE.
- PARAGRAPHS 2, 3, 4, 5, 6, 7, 8 & 10 OF FIELD WORK AND PARAGRAPH 5 OF REQUISITES ON SHEET 1 OF THIS DRAWING SHALL APPLY TO BONDS AND CONNECTIONS INCLUDED ON THIS SHEET.
- WELDING AND SOLDERING OF TERMINALS 17939 AND 17940 SHALL BE SUCH THAT, WHEN GIVEN A TENSILE TEST, THE CABLE SHALL FAIL WITHOUT PULLING OUT OF THE SLEEVE AND WITHOUT FAILURE OF THE SLEEVE OR WELD.
- FOR TOLERANCES SEE SHEET 1 OF THIS DRAWING.
- FOR RAIL HEAD TYPE OF RAIL BONDS SEE DRAWING 3-180.
- MATERIAL, WORKMANSHIP, TINNING, GALVANIZING, TESTS AND GENERAL SPECIFICATIONS SHALL BE IN ACCORDANCE WITH P. R. R. SPECIFICATION C. E. 48.

CONNECTORS 17935, 17936 AND 17937 ARE FOR USE WITH IMPEDANCE BOND SPECIFICATION 1754.

REVISIONS
THIS DRAWING SUPERSEDES M. P. DRAWINGS ET-249-D-9, F-412914, AND F-31084. TERMINAL 17939 IS IN ACCORDANCE WITH M. P. DRAWING F-404717. IN FIRST ISSUE THIS SHEET.

SHEET 2 OF 2.



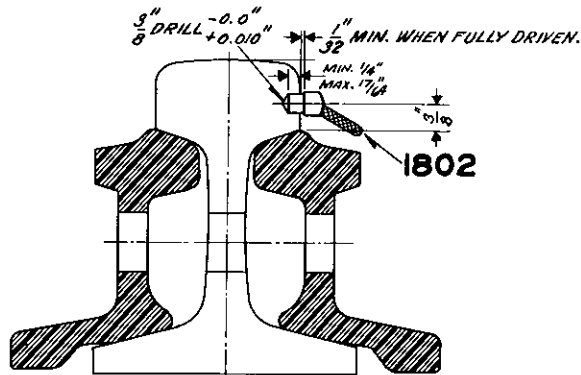
S-179-M

THE PENNSYLVANIA RAILROAD
STANDARD
RAIL BONDS AND CONNECTORS

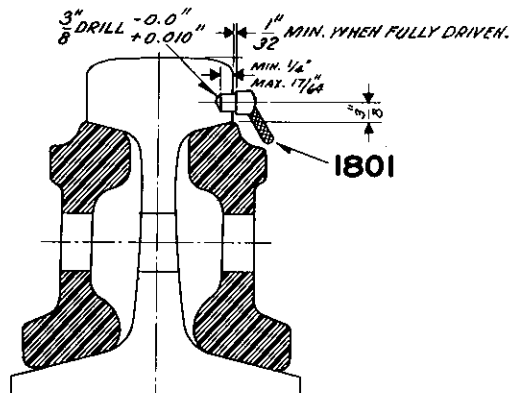
A-C ELECTRIFIED TERRITORY
OFFICE OF CHIEF ENGINEER, PHILA., PA., DECEMBER 28, 1948.

Approved
H. C. Griffith
Assistant Chief Engineer - T, C & S

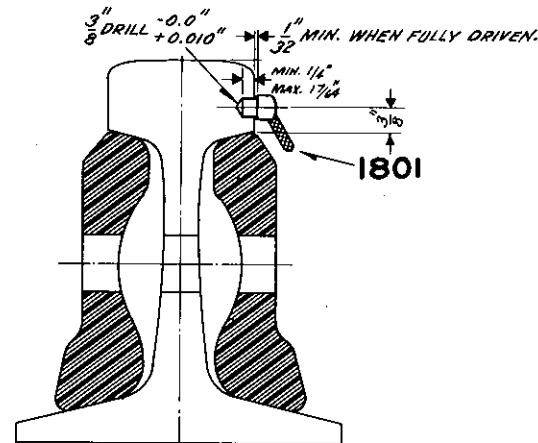
Approved
W. H. Griffith
Chief Engineer



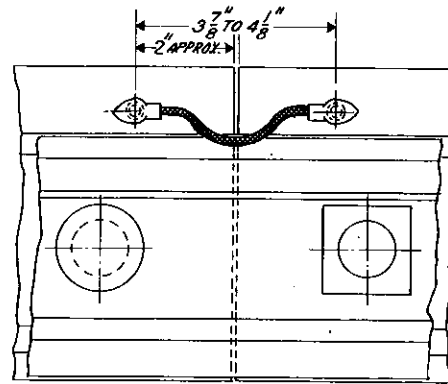
130 P.S. RAIL - 130 P.S. L-3 JOINT BARS.



131 R.E. RAIL - 131 R.E. F-7 JOINT BARS.

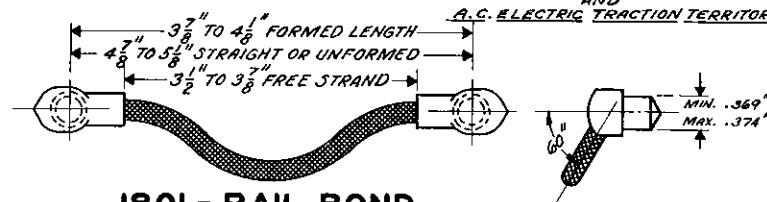


152 P.S. RAIL - 152 P.S. F-2 JOINT BARS.

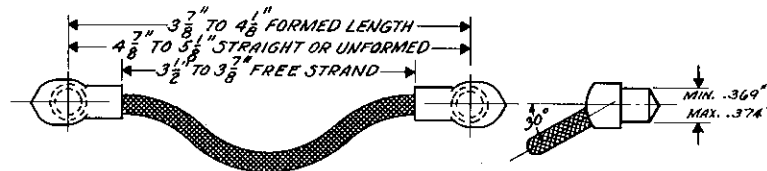


APPLICATION OF BOND
AND DRILLING OF RAIL.

STEAM ROAD TERRITORY
AND
A.C. ELECTRIC TRACTION TERRITORY.



1801 - RAIL BOND STORES CAT. REF. NO. 2A-3707



1802 - RAIL BOND STORES CAT. REF. NO. 2A-3708

- NOTE:-
1. BOND 1801 OR 1802 SHOULD BE ORDERED, AND USED (1 BOND PER JOINT), FOR BOTH STEAM AND A.C. ELECTRIFIED TERRITORY, WHEN MAKING RAIL RENEWALS OR GENERAL REPLACEMENTS. THE USE OF THE WEB TYPE DOUBLE STRAND LONG BOND PLAN S-179 (FOR STEAM ROAD) OR PLAN M.R. 412914 (FOR A.C. ELECTRIFIED TERRITORY) SHOULD BE CONFINED TO LOCATIONS WHERE FLANGE WORN RAILS DO NOT PERMIT SATISFACTORY APPLICATION OF THE RAIL HEAD TYPE BOND.
 2. BONDS SHALL BE IN ACCORDANCE WITH A. A. R. SIGNAL SECTION SPECIFICATION 179-42 AND DRAWING 1048-B.
 3. AT POINTS WHERE JOINTS IN ROAD CROSSINGS AND STATION PLATFORMS CANNOT BE AVOIDED THE PLANKING SHALL BE CUT BACK 3/4 OF AN INCH TO ALLOW FOR INSPECTION OF BONDS.
 4. HOLES FOR BONDS SHALL BE DRILLED FROM OUTSIDE OF TRACK AND NOT FROM GAUGE SIDE OF RAIL. HOLES SHALL BE PLUGGED SAME DAY AS DRILLED.
 5. AFTER RAIL BONDS ARE INSTALLED, THEY SHALL BE GIVEN A PROTECTIVE COATING OF "NO-OX-10," CONSISTENCY "A-SPECIAL" OR NO. 2 SLUSHING OIL.

REVISIONS

B-SEPTEMBER 11, 1940. CO
NOTE 4 CHANGED AND NOTE 0
ADDED
C-AUGUST 25, 1948. C.O.
MIN. & MAX. DIM. OF BOND RAIL ADDED
NOTE 1 ADDED. NOTES 2, 3, 4 & 5
FORMERLY 1, 2, 3 & 4. DRAWINGS
SHOWING APPLICATION OF BOND
FORMERLY SPECIFIED FOR STEAM
ROAD ONLY. LOCATION OF 3/8" HOLE
IN RAIL FORMERLY FROM TOP OF
RAIL.
APPROVED AS STANDARD SEPT. 19-1948

1 SHEET



S-180-C

THE PENNSYLVANIA RAILROAD

STANDARD

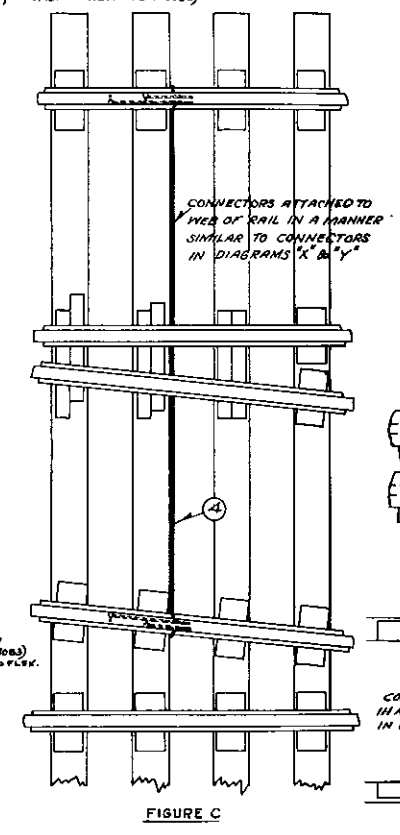
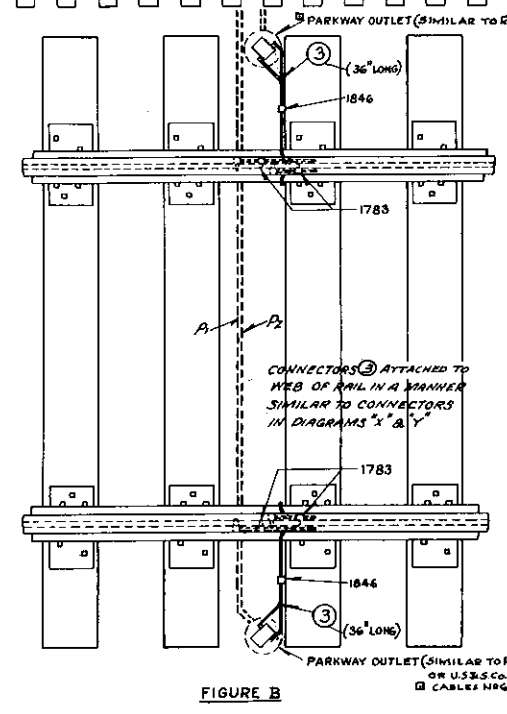
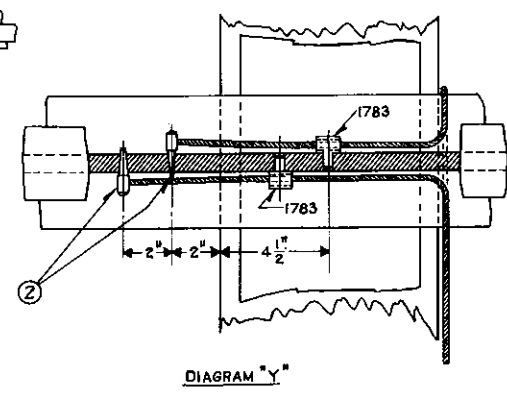
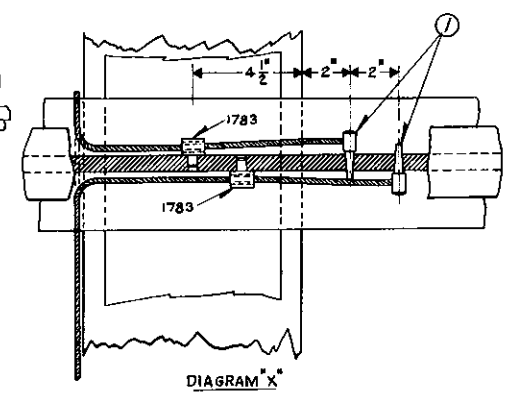
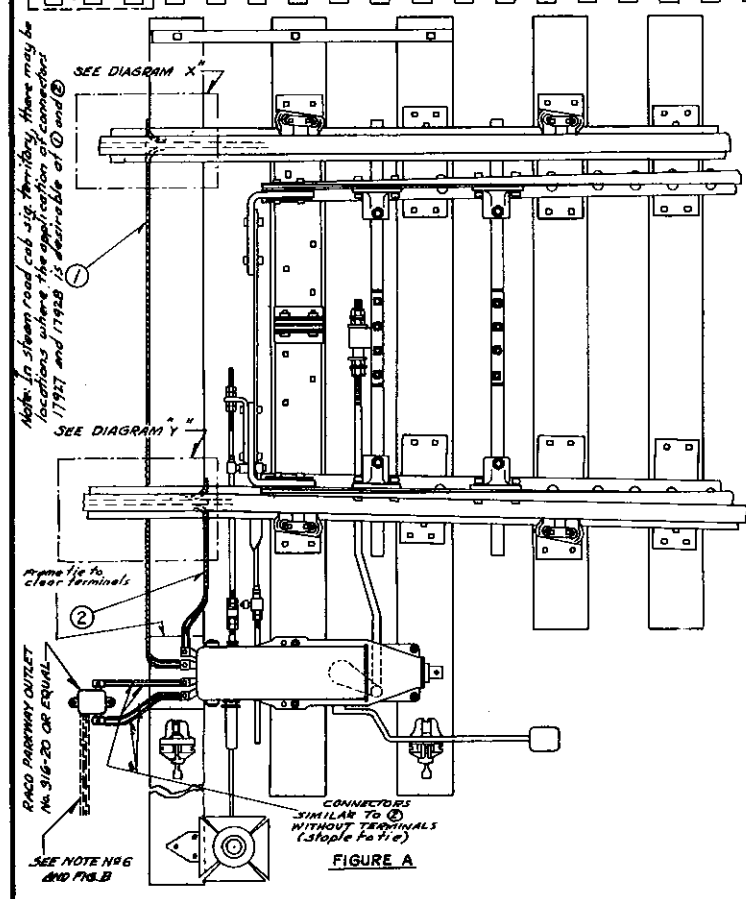
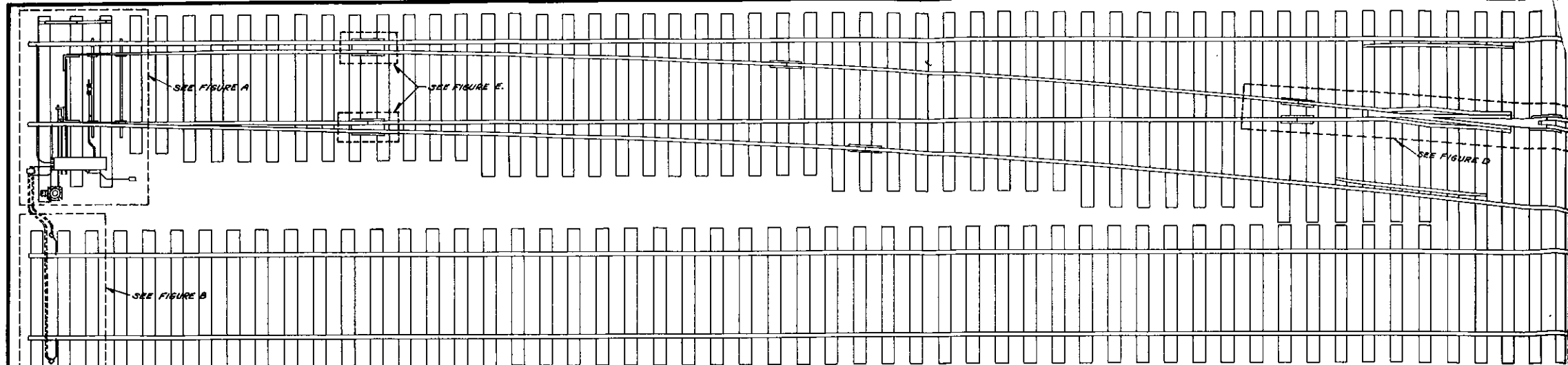
RAIL BOND

RAIL HEAD TYPE

OFFICE OF CHIEF ENGINEER, PHILA., PA., MAY 12, 1939.

Approved
N. C. Stanton
Assistant Chief Engineer-Signals

Approved
W. J. Higgins
Chief Engineer



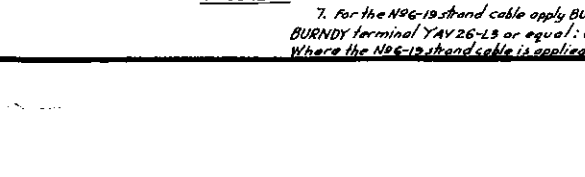
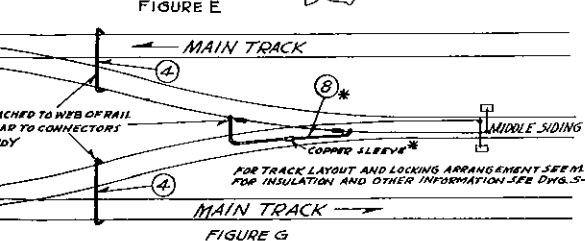
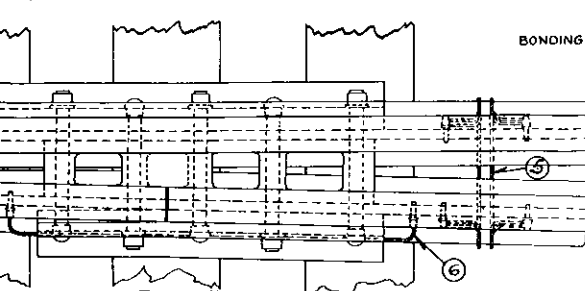
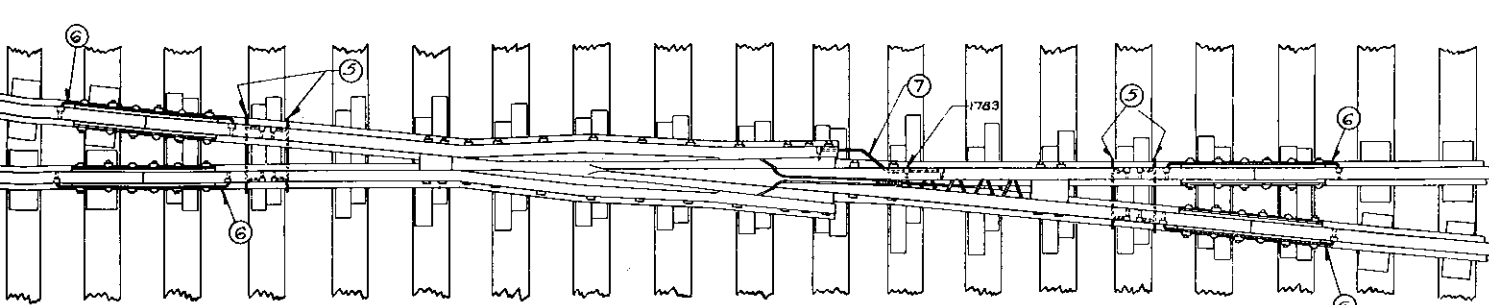
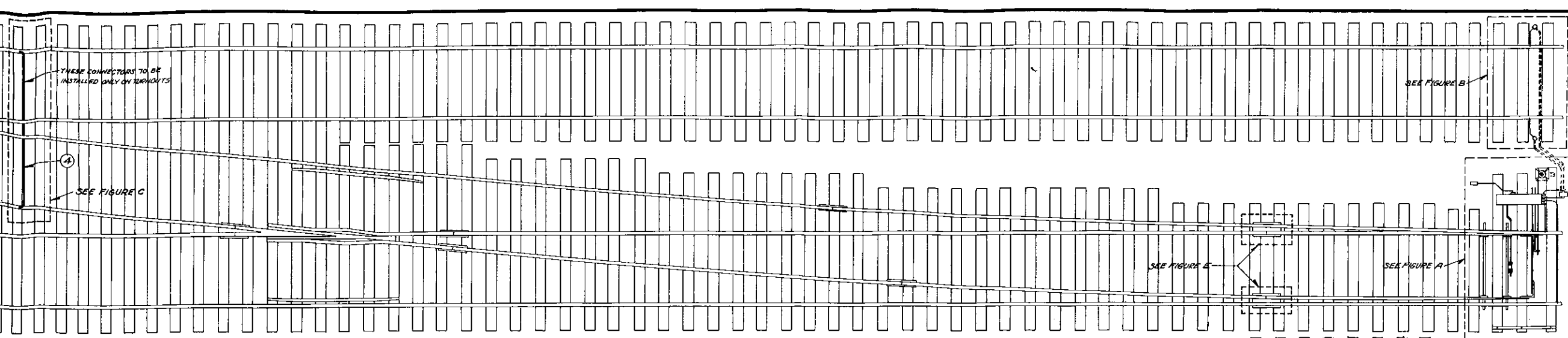


FIGURE D
BONDING OF RAIL BOUND MANGANESE STEEL FROM.

- NOTES:-
- (a) Shunt and Fouling Connectors for turnout shall be arranged similar to one end of crossover. At derail or clearance point in Cab Signal Territory, arrangement shall be in accordance with Figure. For H (see note 3).
 - (b) At clearance point of turnout, where derail is not used, locate Circuit Controller as indicated by Mark on tie of Main Track and pipe connect it to T-20 Mechanism.
 - (c) At clearance point of turnout, where derail is used, locate Circuit Controller as indicated by S or J.
 2. Shunt and Fouling Connectors where passing along ties shall be stapled near top of tie.
 3. In Non-Cab Signal Territory, or trailing point switch in Cab Signal Territory, shunt connections in Figs. F & H are not necessary.
 4. For Standard Circuits showing bonding and insulation of switches see Drawing S-803.
 5. In Fig. H, pipe line to be arranged as indicated in full lines; where derail is in service apply controller as at L, where derail is not used apply controller as at K near clearance point. Cables P₁ and P₂ shall each be 2-NP6 single conductor non-metallic parkway cables, S. Cat. Ref. 2A-3751 for steam territory, and 2-NP6 single conductor non-metallic parkway cables, S. Cat. Ref. 2A-3031, for A-C electrified territory. Apply copper sleeve S. Cat. Ref. 25E-2047 for 17921 and 17922, and 25E-1945 for 17929.

REFERENCE TABLE		
ITEM NO	IN STEAM ROAD TERRITORY APPLY CONNECTOR DWG. S-179 SHEET 1	IN A.C. TRACTION TERRITORY APPLY CONNECTOR DWG. S-179 SHEET 2
1	2-17912 OR 2-17913	2-17928
2	2-17910 OR 2-17911	2-17927
3	2-17921 OR 2-17922	2-17929
4	2-17914	2-17931
5	2-RAIL BONDS	2-RAIL BONDS
6	1-RAIL BOND	1-RAIL BOND
7	1-RAIL BOND	1-RAIL BOND
8	4-17921 OR 4-17922 *	4-17929 *

*LENGTH AS REQUIRED—EACH PAIR OF CONNECTORS 17921, 17922 OR 17929 SHALL BE JOINED BY SOLDERING INTO COPPER SLEEVE AT CENTER BETWEEN TERMINALS. APPLY COPPER SLEEVE S. CAT. REF. 25E-2047 FOR 17921 AND 17922, AND 25E-1945 FOR 17929.

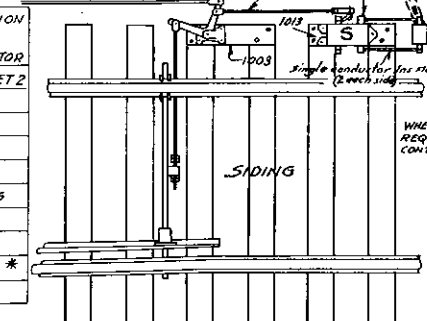
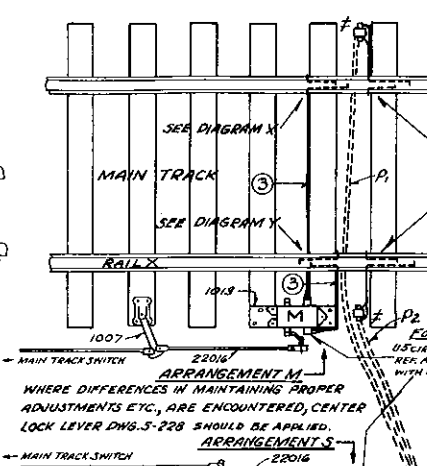


FIGURE F.
SHUNTING MAIN TRACK AT
DERAIL OR CLEARANCE POINT.
(FIGS. F AND H APPLY TO TURNOUTS ONLY)

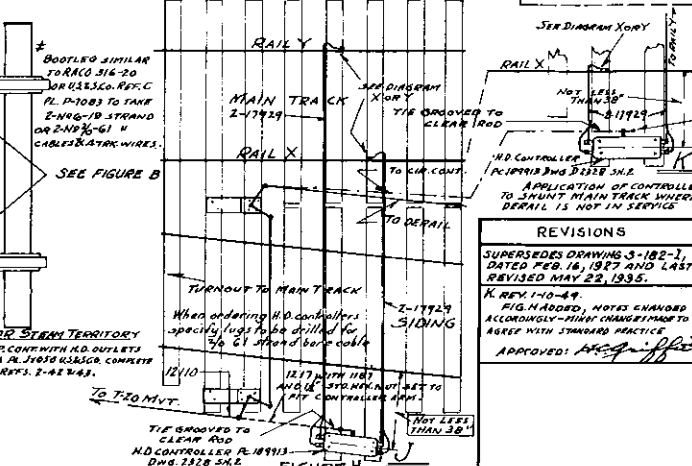


FIGURE H.
FOR A-C ELECTRIFIED TERRITORY, AND
FOR SVCS. IN CAB SIG. TERRITORY STEAM ROAD
IF REQUIRED.

SHEET 1 OF 2.

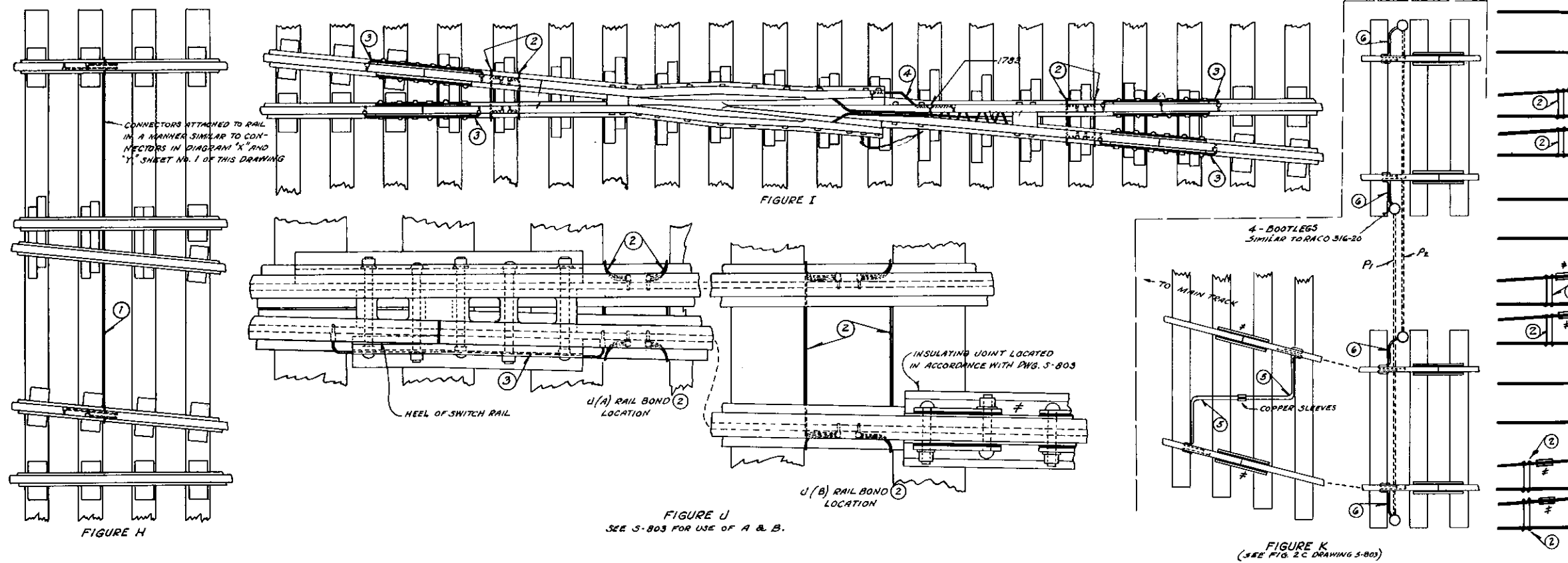
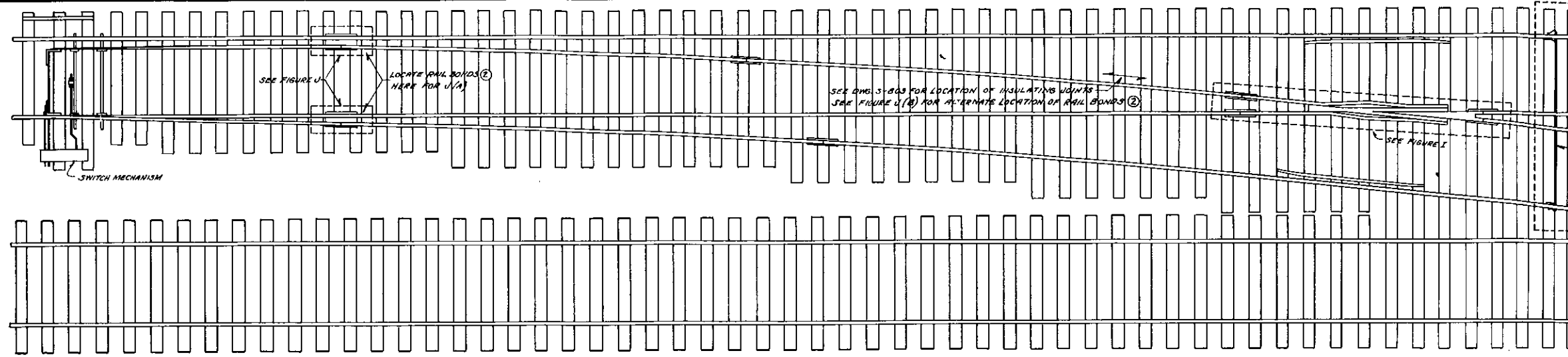
S-182-K

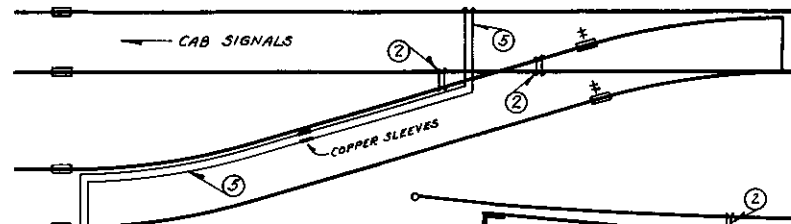
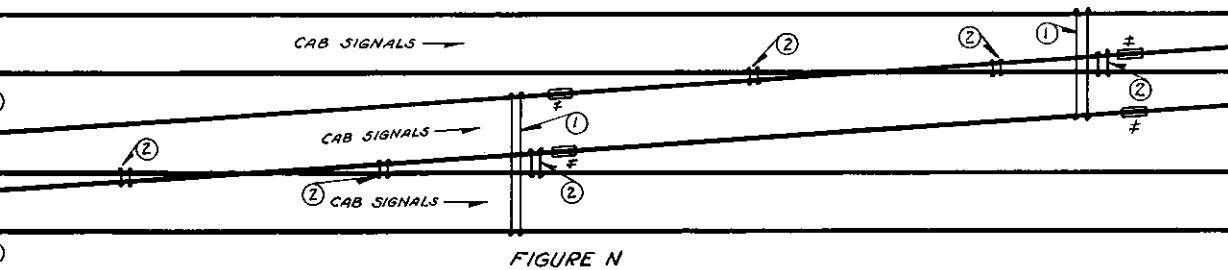
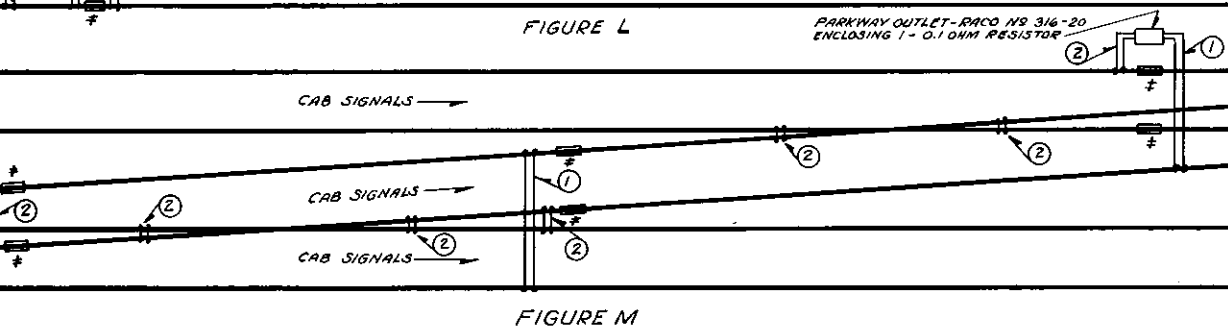
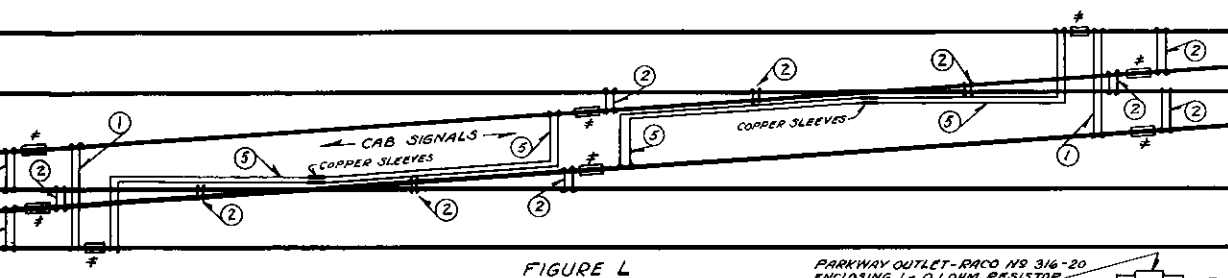
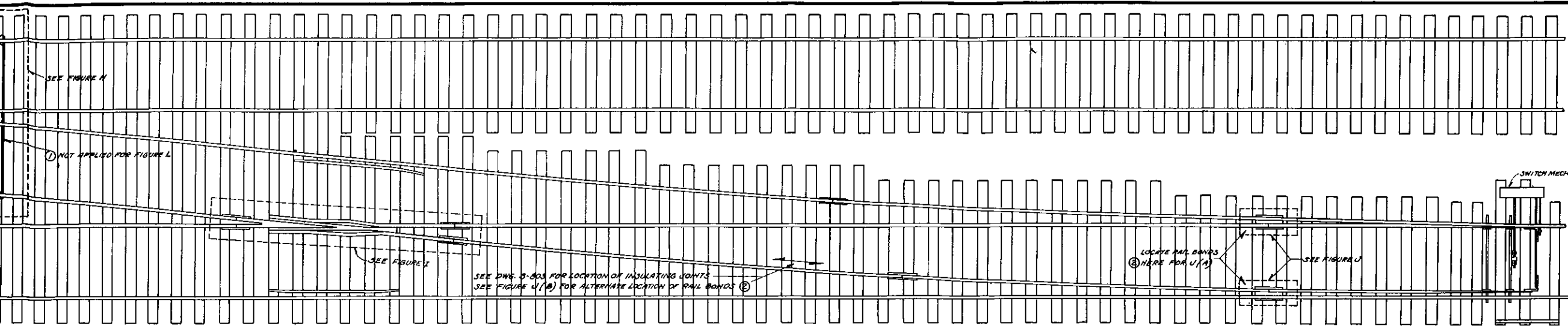
THE PENNSYLVANIA RAILROAD
STANDARD
TRACK CIRCUIT CONNECTIONS
NON-INTERLOCKED SWITCHES STEAM OR A-C ELECTRIFIED TERRITORY

OFFICE OF CHIEF ENGINEER, PHILA., PA., APRIL 27, 1948.

Approved *[Signature]* Assistant Chief Engineer-T, C & S

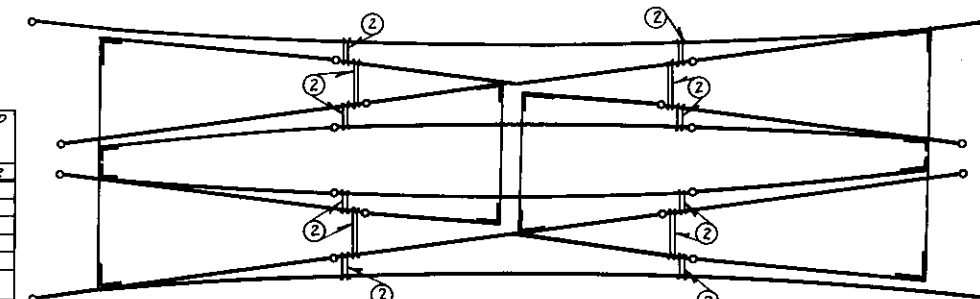
Approved *[Signature]* Chief Engineer





REFERENCE TABLE

ITEM NO.	IN STEAM ROAD TERRITORY APPLY RAIL BONDS CONNECTORS ETC. DWG. S-179, SHEET 1	IN A-C ELECTRIFIED TERRITORY APPLY RAIL BONDS CONNECTORS ETC. DWG. S-179, SHEET 2
1	2-17914	2-17931
2	2- RAIL BONDS	2- RAIL BONDS
3	1- RAIL BOND	1- RAIL BOND
4	1- RAIL BOND	1- RAIL BOND
5	2-17921, OR 2-17922	2-17929
6	2-17921, OR 2-17922 36 IN. LONG	2-17929 36 IN. LONG



APPLY THE PROPER RAIL BOND TO FIT LOCAL CONDITIONS.
 * LENGTH AS REQUIRED - EACH PAIR OF CONDUCTORS 17921, 17922, OR 17929 SHALL BE JOINED BY SOLDERING INTO A COPPER SLEEVE AT CENTER BETWEEN TERMINALS.
 APPLY SLEEVE S.C. REF. 25E-2647 FOR 17921 AND 17922.
 " " S.C. REF. 25E-1945 " 17929.

- NOTES:-
1. SHUNT AND FOULING CONNECTORS WHERE PASSING ALONG TIES SHALL BE STAPLED NEAR TOP OF TIE.
 2. CONNECTORS (3) SHALL BE STAPLED TO TOP OF TIES ALONG BASE OF RAIL INVOLVED, BUT MUST BE FREE FROM MAKING CONTACT WITH RAIL BETWEEN TERMINALS. APPLIES TO FIGS. L AND O ONLY.
 3. RAIL BONDS (2) AND CONNECTORS (1), (3), (4) SHALL BE CONNECTED TO RAIL IN A MANNER SIMILAR TO DIAGRAMS "X" AND "Y" SHEET NO. 1.
 4. FOR CIRCUITS SHOWING BONDING AND INSULATION OF SWITCHES SEE DRAWING S-803.
 5. INSULATING JOINTS MARKED # SHALL BE LOCATED IN ACCORDANCE WITH DRAWING S-803.
 6. CABLES P₁ AND P₂ SHALL EACH BE 2-NO. 6 SINGLE CONDUCTOR NON-METALLIC PARKWAY CABLES, S.C. REF. 2A-5751 FOR STEAM TERRITORY, AND 2-NO. 3/8 SINGLE CONDUCTOR NON-METALLIC PARKWAY CABLES, S.C. REF. 2A-3091, FOR A-C ELECT. TERRITORY.

SHEET 2 OF 2



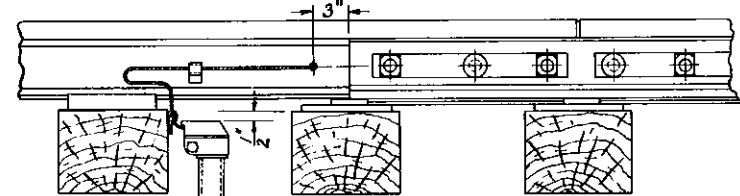
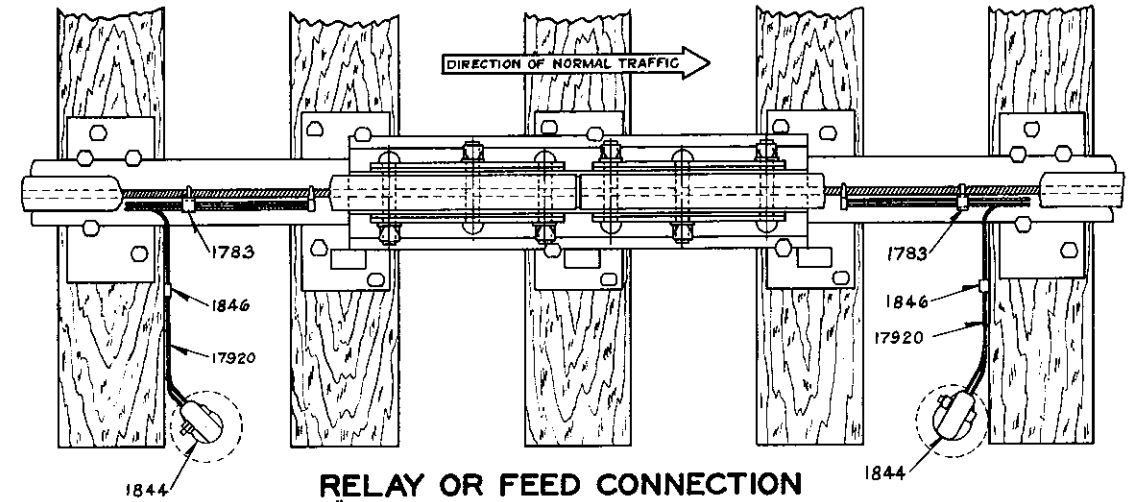
S-182-K

THE PENNSYLVANIA RAILROAD STANDARD TRACK CIRCUIT CONNECTIONS

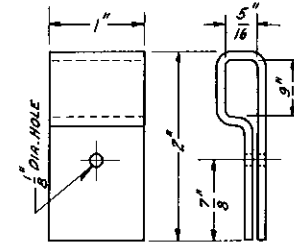
INTERLOCKED SWITCHES STEAM OR A-C ELECTRIFIED TERRITORY.
OFFICE OF CHIEF ENGINEER, PHILA., PA.,

Approved
H. G. Gifford
Assistant Chief Engineer - T, C & S

Approved
W. H. Smith
Chief Engineer



1844 PARKWAY OUTLET COMPLETE
STORES CAT. REF. NO. 2A-1544 OR EQUAL.



1846 CLIP #12 U.S. STD. GAGE
SHEET LEAD OR ALUMINUM.
STORES CAT. REF. NO. 2A-398

FIELD WORK

1. NO. 6 A.W.G. SINGLE CONDUCTOR PARKWAY CABLE SHALL BE USED FOR LEAD WIRES OF ALL TRACK CIRCUITS. NON-INDUCTIVE COVERING SHALL BE USED IN A.C. TRACK CIRCUIT TERRITORY.
2. WHEN IN PLACE, CONNECTOR AND TOP OF HEAD AT PARKWAY OUTLET SHALL BE GIVEN A HEAVY COAT OF A RUST PREVENTIVE APPROVED BY THE ASSISTANT CHIEF ENGINEER-T-C & S.
3. PARKWAY OUTLETS SHALL BE FILLED WITH SAND OR COMPOUND.
4. PARKWAY CABLE SHALL BE NOT LESS THAN 2 FEET 6 INCHES BELOW THE BOTTOM OF THE.
5. THE FILL AROUND PARKWAY CABLE SHALL BE FREE FROM CINDERS.
6. FIBRE INSULATION IN PARKWAY OUTLETS SHALL MEET THE REQUIREMENTS OF THE ELECTRICAL AND ABSORPTION TEST OF P.R.R. SPEC. C.E. 50(6).
7. WHERE CONNECTOR 17920 IS USED, CLIP 1783 PLAN NO. S-178 SHALL BE INSTALLED TO KEEP THE STRANDED CONDUCTORS IN PLACE ALONG THE WEB OF RAIL.
8. PARKWAY OUTLET SHALL BE INSTALLED AS SHOWN WITH TOP OF OUTLET APPROX. $\frac{1}{2}$ " BELOW TOP OF THE.
9. CONNECTORS 17916 & 17920 FOR USE BETWEEN PARKWAY OUTLET AND RAIL. (CONNECTOR 17916 FOR OLD LOCATION OF PARKWAY OUTLET).

REVISIONS

REDRAWN FROM APPROVED PLAN S-184-H, DATED MAY 16, 1938, LAST REVISED MARCH 6, 1939 AND CHANGED AS FOLLOWS: NUT ON BOLT OF 1843 REMOVED & CONNECTION 1845 ADDED. LOCATION OF PARKWAY OUTLETS CHANGED. NOTE & FIELD WORK ADDED. CLIPS FOR HOLDING CONNECTIONS IN PLACE ADDED.

I NOVEMBER 12, 1946 CONNECTORS 1841, 1842, 1843 & 1845 AND NOTES REFERRING THERE TO REMOVED, INCLUDED ON S-179-H. FIELD NOTES CHANGED ACCORDINGLY.

APPROVED *H.C. Griffith*

1 SHEET



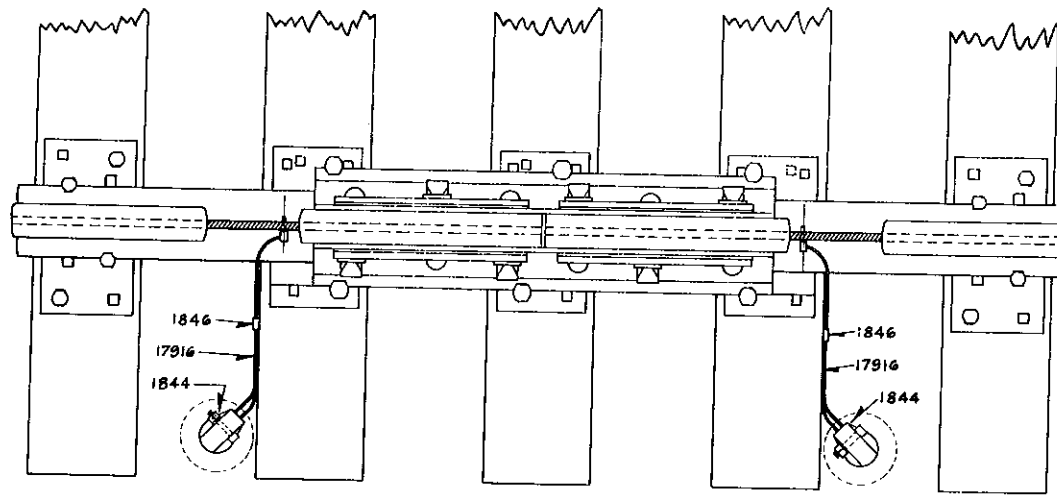
S-184-H

THE PENNSYLVANIA RAILROAD
STANDARD
TRACK CIRCUIT CONNECTIONS
PARKWAY CABLE

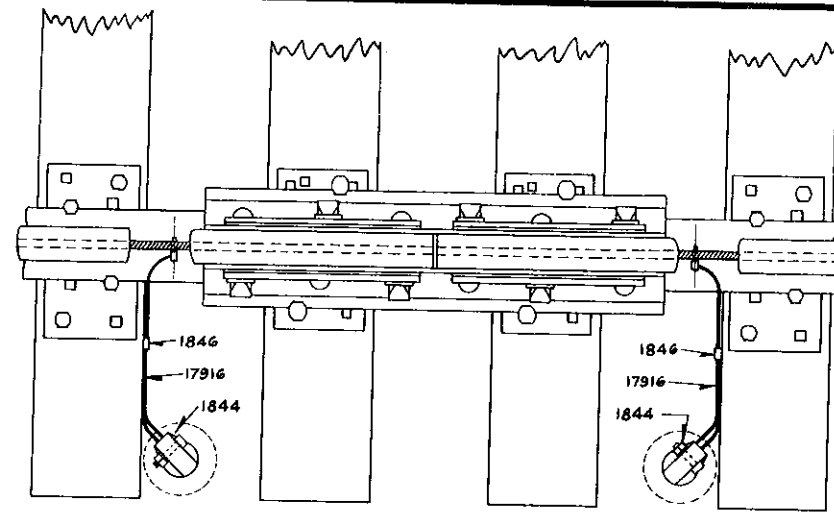
OFFICE OF CHIEF ENGINEER, PHILA., PA., APRIL 18-1946

Approved *H.C. Griffith*
Assistant Chief Engineer T-C & S

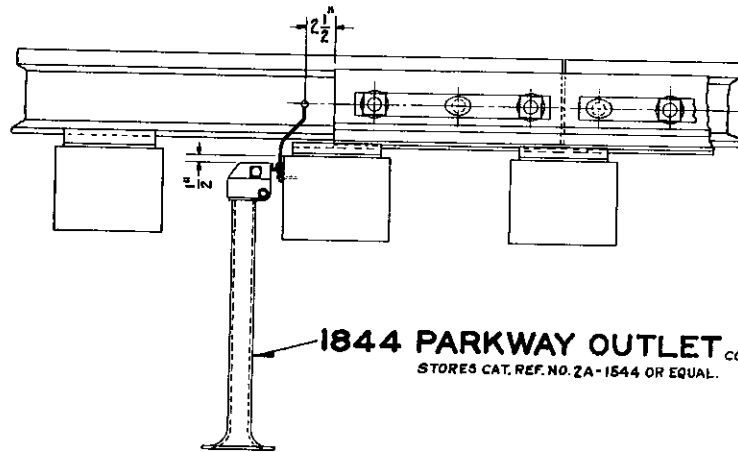
Approved *J. H. ...*
Chief Engineer



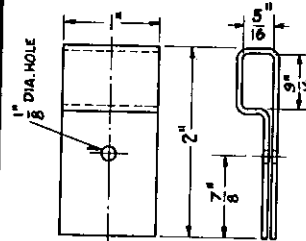
SUPPORTED JOINT



SUSPENDED JOINT



1844 PARKWAY OUTLET COMPLETE
STORES CAT. REF. NO. 2A-1844 OR EQUAL.



1846 CLIP #12 U.S. STD. GAGE SHEET LEAD
OR ALUMINUM.
STORES CAT. REF. NO. 2A-398

NOTES:-

1. NO. 6 A.W.G. SINGLE CONDUCTOR PARKWAY CABLE SHALL BE USED FOR LEAD WIRES OF ALL TRACK CIRCUITS. NON-INDUCTIVE COVERING SHALL BE USED IN A.C. TRACK CIRCUIT TERRITORY.
2. WHEN IN PLACE, CONNECTOR AND CLAMP IN PARKWAY OUTLET SHALL BE GIVEN A HEAVY COAT OF A RUST PREVENTIVE APPROVED BY THE ASSISTANT CHIEF ENGINEER - SIGNALS.
3. PARKWAY OUTLETS MAY BE FILLED WITH SAND OR COMPOUND.
4. PARKWAY CABLE SHALL BE NOT LESS THAN TWO (2) FEET, SIX (6) INCHES BELOW THE BOTTOM OF TIES.
5. THE FILL AROUND PARKWAY CABLE SHALL BE FREE OF CINDERS.
6. FIBRE INSULATION IN PARKWAY OUTLETS SHALL MEET THE REQUIREMENTS OF A.R. SIGNAL SECTION SPECIFICATION NO. 13 FOR HARD FIBRE.
7. PARKWAY OUTLET SHALL BE INSTALLED AS SHOWN WITH TOP OF OUTLET ONE-HALF ($\frac{1}{2}$) INCH BELOW TOP OF TIE.
8. WHEN INSTALLING, CARE SHOULD BE EXERCISED TO ARRANGE CONNECTOR SO THAT IT WILL NOT MAKE CONTACT WITH THE RAIL OR TIE PLATE.

REVISIONS

REDRAWN FROM APPROVED PLAN S-184-1, DATED APRIL 18, 1946, LAST REVISED NOV. 12, 1946 AND CHANGED AS FOLLOWS: SUSPENDED JOINT LAYOUT ADDED. LOCATION OF OUTLETS CHANGED. TERMINALS FORMERLY 3" FROM ENDS OF JOINT BARS, CLIPS 1793 SECURING CONNECTOR TO WEB OF RAIL, REMOVED. NOTES 7 & 8 REMOVED. NOTE 7 FORMERLY 8 & NEW NOTE 8 ADDED.

1 SHEET



S-184-J

THE PENNSYLVANIA RAILROAD

STANDARD

TRACK CIRCUIT CONNECTIONS

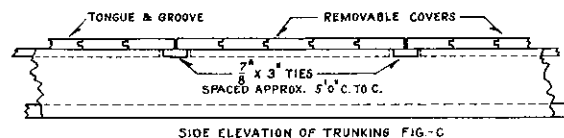
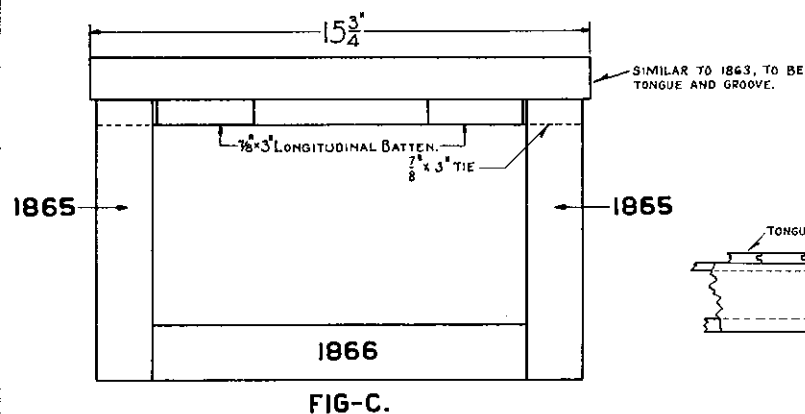
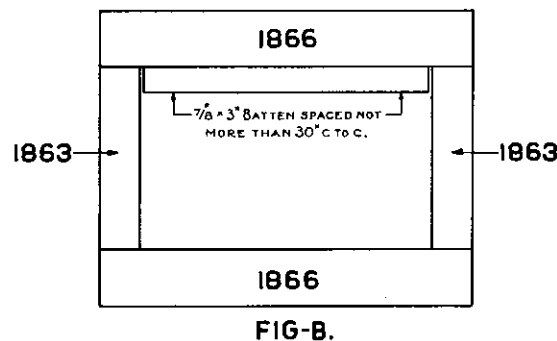
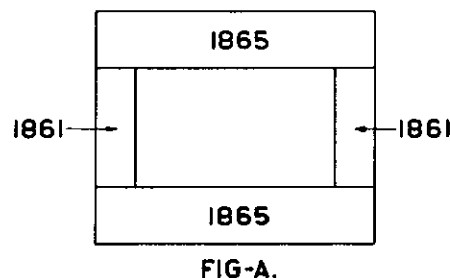
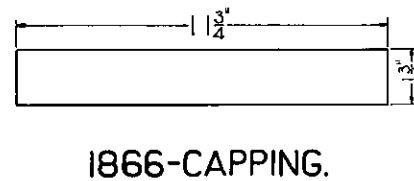
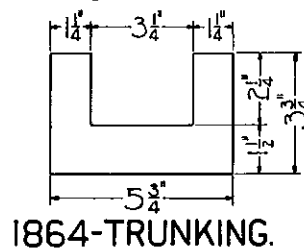
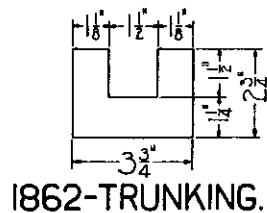
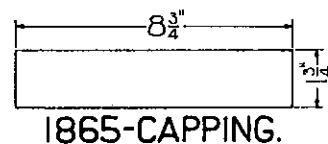
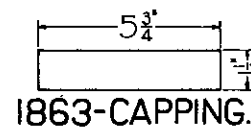
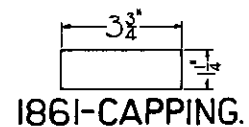
PARKWAY CABLE

OFFICE OF CHIEF ENGINEER, PHILA., PA., DECEMBER 27, 1951.

Approved
H. G. Salmonson

Assistant Chief Engineer-Signals

Approved
J. H. ...
Chief Engineer



NOTE:—
FIGURES A-B & C SHOW METHOD OF ASSEMBLING BUILT UP TRUNKING.
UNLESS OTHERWISE SPECIFIED, PARTS SHOWN IN FIGURES A, B & C SHALL
BE ORDERED SEPARATELY IN LINEAL FEET AND SHIPPED KNOCKED-DOWN.
TONGUE & GROOVE, WHEN USED AS ASSEMBLED IN FIG. C MAY BE CUT IN
LENGTHS OF 15 3/4 AT THE MILL, IF SO ORDERED.

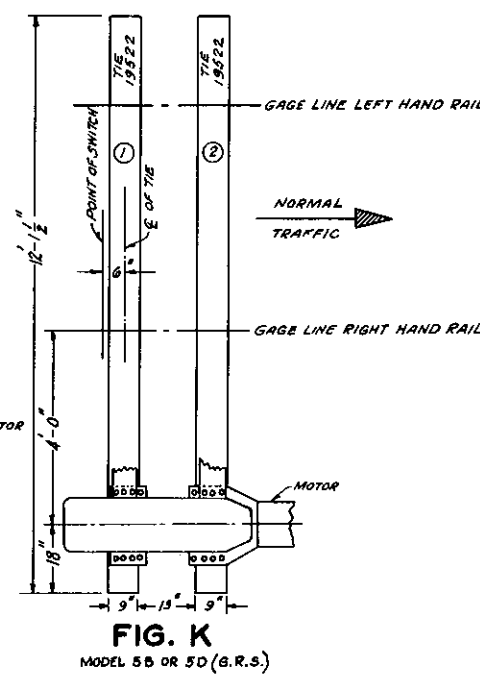
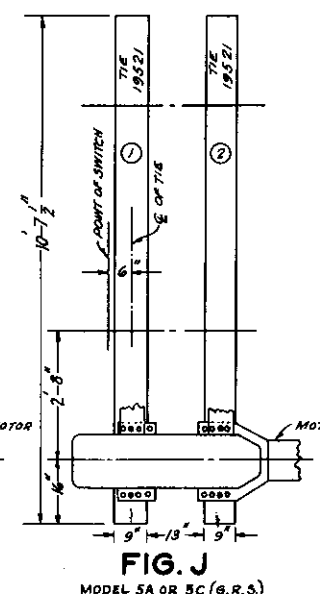
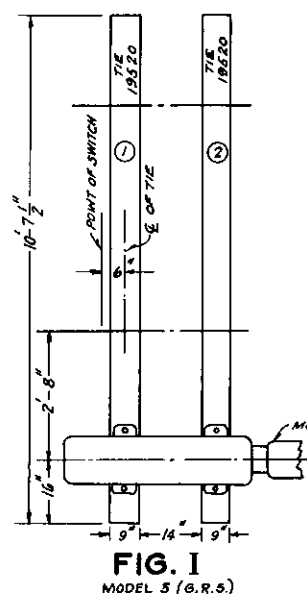
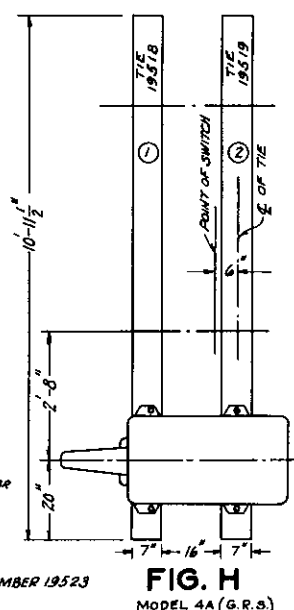
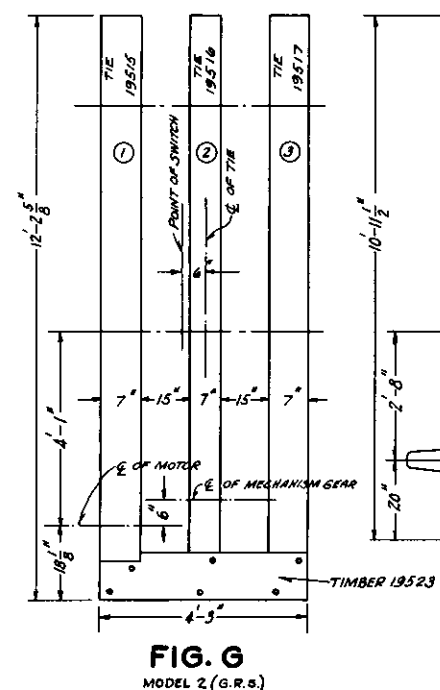
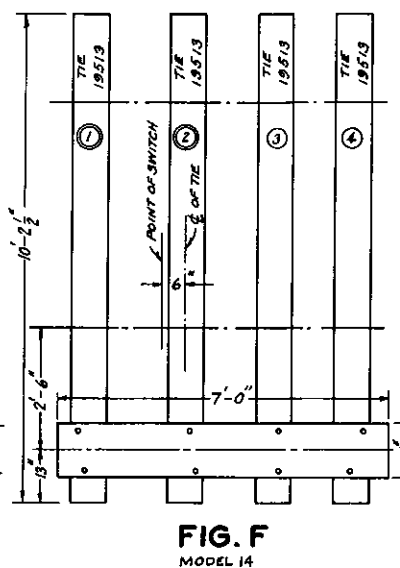
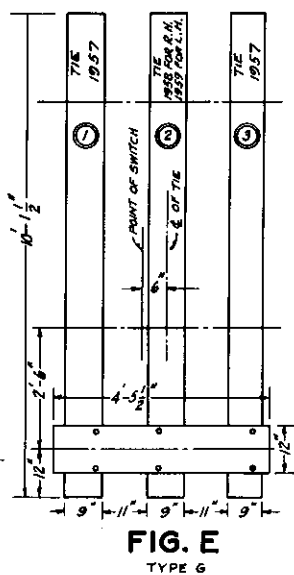
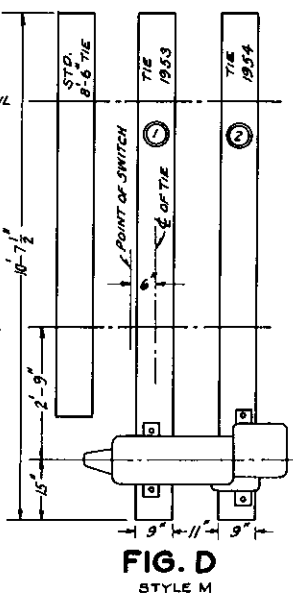
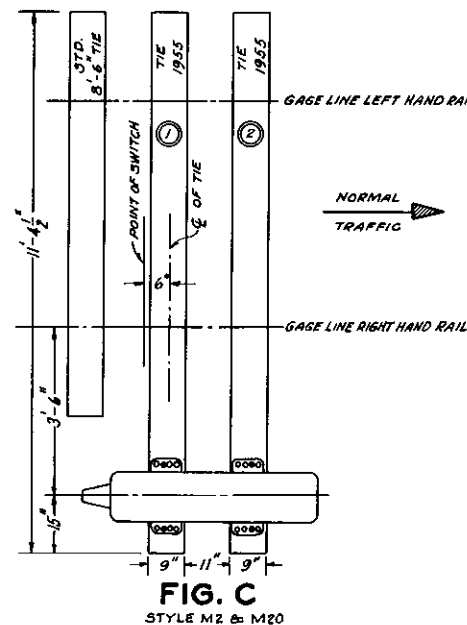
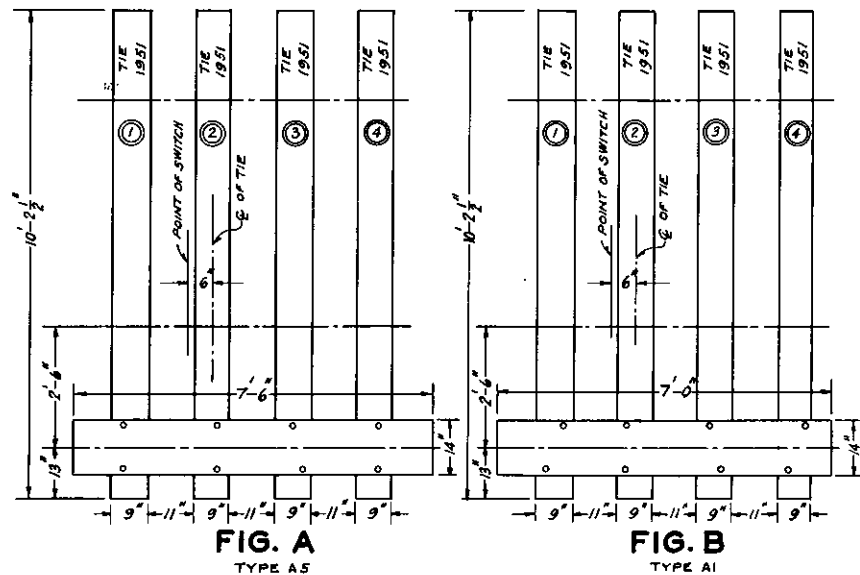
- SPECIFICATION**
- MATERIAL**
- PURPOSE:**
The purpose of this specification is to provide material adequate for the protection of insulated wires.
 - KIND OF WOOD:**
Red cypress, cedar, or redwood.
 - GENERAL QUALITY:**
 - Trunking and capping shall be free from any defects which will impair the durability, strength or water tightness of the piece, such as decay, holes, splits, shakes, large, loose or numerous knots, or wane, and be free of sap wood elsewhere than on bottom corners of trunking.
 - Sapwood shall not be wider than 1 1/2 inches, measured across the face of sap.
 - STRENGTH:**
Trunking and capping shall be of compact wood, and have an average of six (6) or more rings of annual growth per inch.
 - DIMENSIONS:**
All trunking and capping shall conform to the dimensions specified, and may be 8 to 20 feet long; but 50 per cent. of each shipment shall be 16 to 20 feet in length; 35 per cent. shall be 10 feet and over.
 - MANUFACTURE:**
All trunking and capping shall be straight, well manufactured and surfaced on all exterior planes, with ends sawed square.
 - INSPECTION:**
 - Trunking and capping will be rejected when decayed, or split more than 1/4 inch deep and 6 inches in length.
 - A shake is a separation of one ring of annual growth from another.
 - A large knot is one more than 1 inch in diameter in capping and more than 2 inches in diameter in trunking.
 - A loose knot is one not firmly held in place by growth or position.
 - Numerous knots are any number equalling a large knot in damaging effect.
 - Wane is bark, or lack of wood from any cause on corners.
 - Trunking and capping is not well sawed and surfaced, and trunking is not well grooved, when their surfaces are not even.
 - All dimension requirements are minimum measurements. An excess of 1/4 inch in outside dimensions, and of 1/8 inch in groove dimensions are maximum tolerances.
 - Trunking and capping will be inspected at points of shipment by Pennsylvania Railroad System Inspectors. The Manufacturer shall afford the Inspector, free of cost, all reasonable facilities to satisfy him that the trunking and capping supplied is in accordance with this specification.

- FIELD WORK**
- Top of trunking, inside of ballast line, shall be level with the surface of the ballast.
 - Where trunking and capping is above ground, the exposed surface shall be given not less than two (2) coats of SLATE COLORED FIRE RETARDING PAINT that meets the approval of the Chief Signal Engineer.
 - After fire retarding paint is applied, the top of capping for cross runs, running under tracks, other than for track connections, shall be covered, from the ballast line, with sheet steel of number 16 U. S. Standard gauge, except under and two inches each side of the rail.
 - Capping, where run lengthwise, shall be secured to built up trunking by 3/8" x 3 1/2" lag screws with flat washers.
 - The joints in capping and bottom of built up trunking, shall be staggered not less than 1 foot in relation to the joints in the sides.
 - All joints in grooved trunking shall be reinforced on the bottom with a piece of capping ten inches long and the width of the trunking.
 - Nails shall not be driven through the trunking from the inside of the groove, nor shall they be driven into the groove from the outside.
 - Inside corner of trunking at turns shall be rounded to prevent injury to wire insulation.

REVISIONS.
REBORN FROM APPROVED PLAN S-186-A
DATED 4-23-21 AND REVISED
C. SEPTEMBER 6, 1923.
APPROVED: *Arthur*

1 SHEET
S-186-C

PENNSYLVANIA RAILROAD SYSTEM
STANDARD
TRUNKING AND CAPPING
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., MAR. 8, 1923
Correct *Arthur* Chief Signal Engineer
Approved *Arthur* Chief Engineer



REVISIONS
8 MAY 26, 1948 SHEETS 1 AND 3 CHANGED. ITEMS 19515 TO 19519 INCL. CHANGED TO STD. 7"x9" TIMBERS.
APPROVED <i>H.C. Griffith</i>

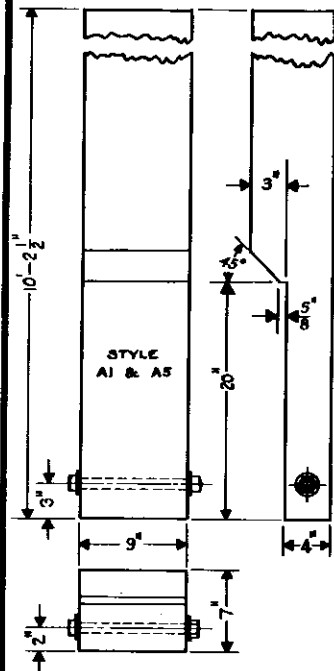
FOR DETAILS OF TIES SEE SHEETS 2 & 3.
SHEET 1 OF 3.

THE PENNSYLVANIA RAILROAD
STANDARD
SWITCH TIES
FOR INTERLOCKED SINGLE SWITCHES.
OFFICE OF CHIEF ENGINEER, PHILA., PA., DECEMBER 4, 1947.

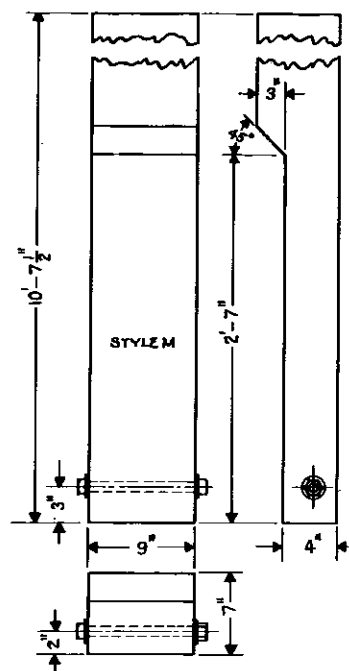
Approved *H.C. Griffith*
Assistant Chief Engineer - T.C. & S.

Approved *J. H. ...*
Chief Engineer

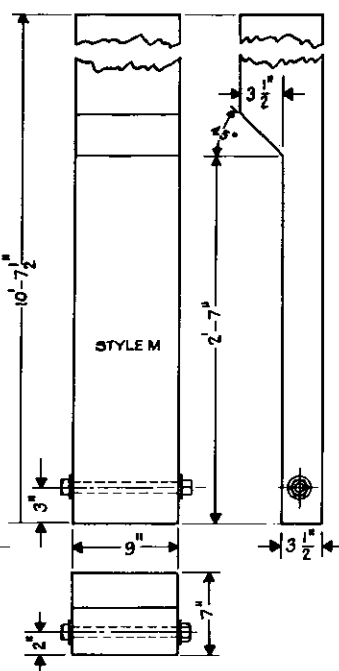
S-195-B



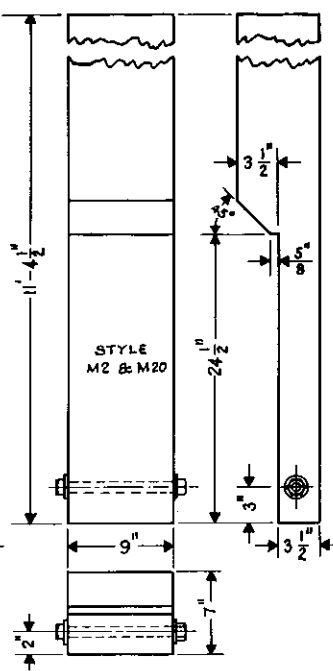
1951 SWITCH TIE.
STORES CAT. REF. NO. 5A-80



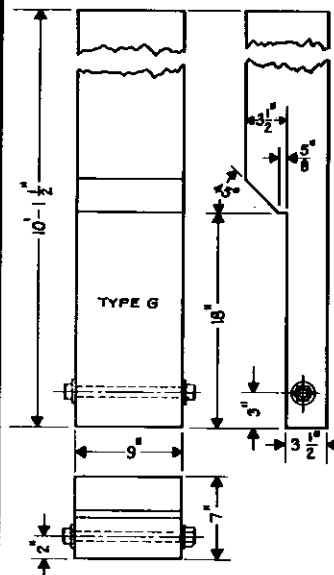
1953 SWITCH TIE.
STORES CAT. REF. NO. 5A-81



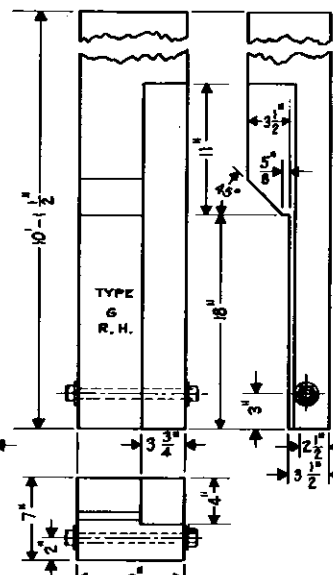
1954 SWITCH TIE.
STORES CAT. REF. NO. 5A-82



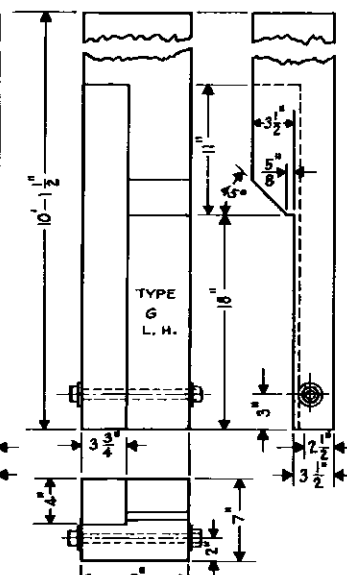
1955 SWITCH TIE.
STORES CAT. REF. NO. 5A-83



1957 SWITCH TIE.
STORES CAT. REF. NO. 5A-84



1958 SWITCH TIE.
STORES CAT. REF. NO. 5A-85



1959 SWITCH TIE.
STORES CAT. REF. NO. 5A-86

NOTES:-

1. ALL TIES FOR INTERLOCKED SWITCHES SHALL MEET THE REQUIREMENTS OF C.E. 23, WITH THE ADDITIONAL REQUIREMENT THAT THE FRAMED END OF ALL TIES SHALL BE STRAIGHT GRAIN WOOD WITHOUT KNOTS, DECAY, SHAKES, SPLITS, OR HOLES OF ANY KIND, AND SHALL BE CREOSOTED IN ACCORDANCE WITH PARAGRAPH 25, C.E. 23 AFTER FRAMING HAS BEEN COMPLETED.
2. BEFORE CREOSOTING, EACH TIE SHALL BE DRILLED FOR $\frac{3}{8}$ IN. BOLT, LOCATED AS INDICATED. AFTER CREOSOTING, BUT BEFORE SHIPMENT, EACH TIE SHALL BE PROVIDED WITH $\frac{3}{8}$ IN. GALVANIZED SQ. HD. BOLT WITH HEX. NUT, AND FLAT WASHER EACH SIDE OF TIE. PULL BOLT UP TIGHT.
3. UNLESS OTHERWISE INDICATED, TIES ARE ADAPTABLE FOR EITHER RIGHT OR LEFT HAND LAYOUT.
4. FOR LOCATIONS OF TIES SEE SHEET 1 OF THIS DRAWING.

SHEET 2 OF 3.



S-195-B

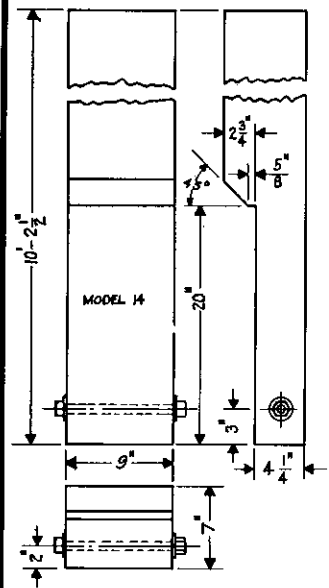
THE PENNSYLVANIA RAILROAD
STANDARD
SWITCH TIES

FOR INTERLOCKED SINGLE SWITCHES

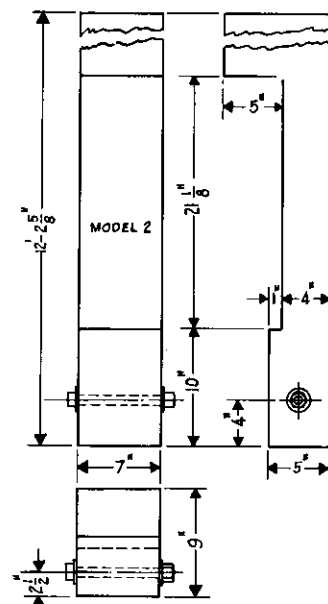
OFFICE OF CHIEF ENGINEER, PHILA., PA., DECEMBER 4, 1947.

Approved
W. Griffith
Assistant Chief Engineer-T.C. & S.

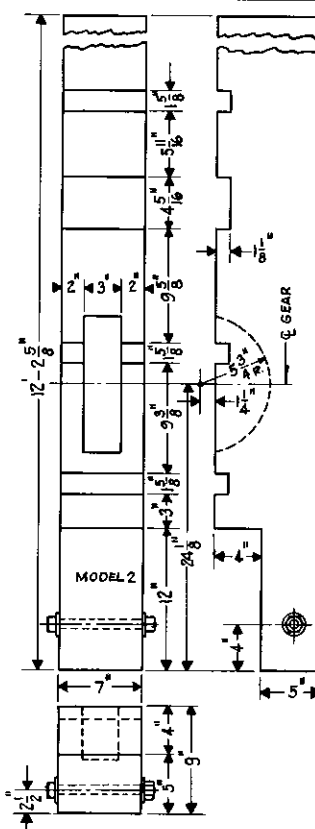
Approved
W. H. H. H.
Chief Engineer



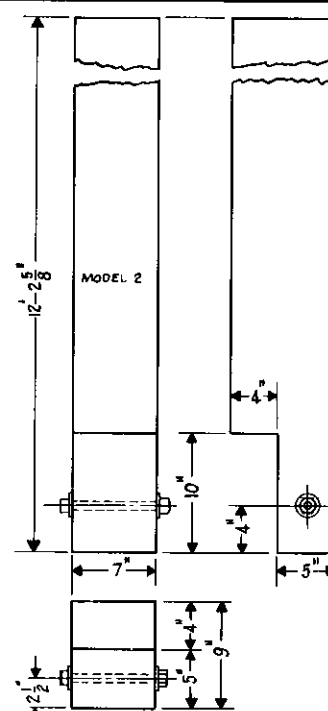
19513 SWITCH TIE.
STORES CAT. REF. NO. 5A-87



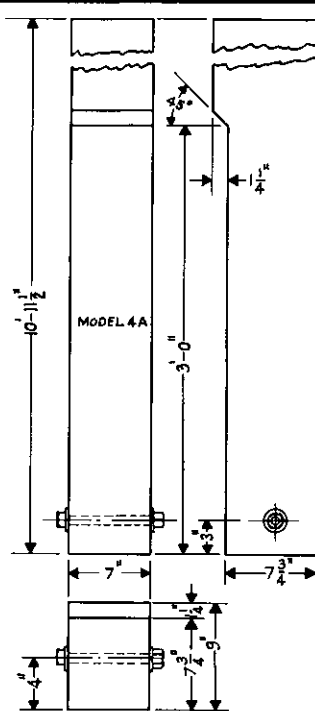
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STORES CAT. REF. NO. 5A-88



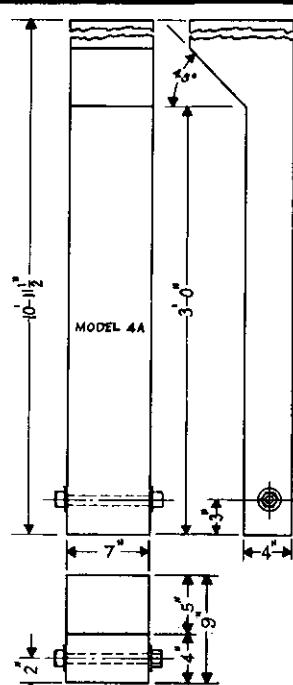
19516 SWITCH TIE.
STORES CAT. REF. NO. 5A-89



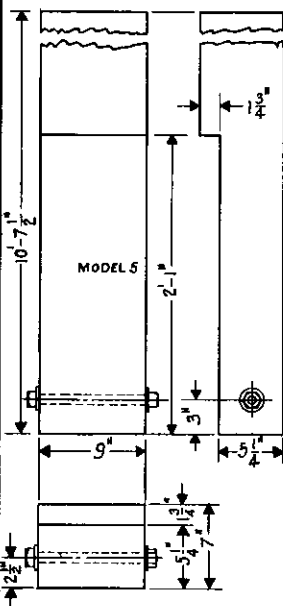
19517 SWITCH TIE.
STORES CAT. REF. NO. 5A-90



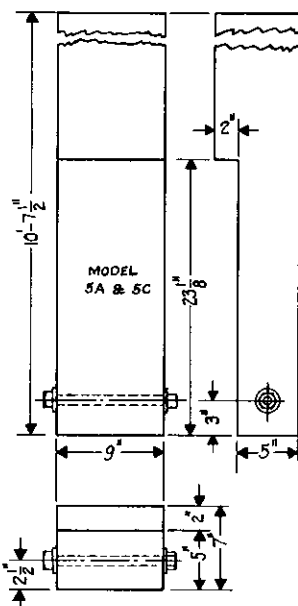
19518 SWITCH TIE.
STORES CAT. REF. NO. 5A-91



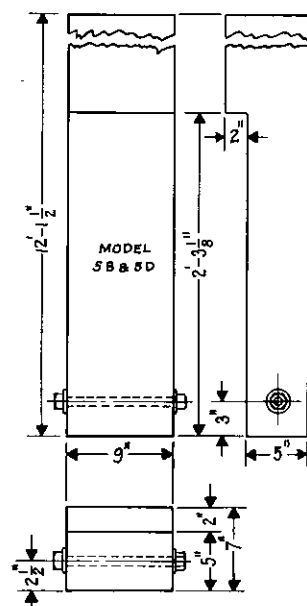
19519 SWITCH TIE.
STORES CAT. REF. NO. 5A-92



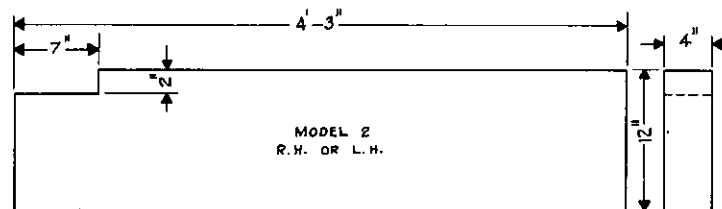
19520 SWITCH TIE.
STORES CAT. REF. NO. 5A-93



19521 SWITCH TIE.
STORES CAT. REF. NO. 5A-94



19522 SWITCH TIE.
STORES CAT. REF. NO. 5A-95



19523 TIMBER.
STORES CAT. REF. NO. 5A-96

FOR NOTES SEE SHEET 2.

SHEET 3 OF 3.



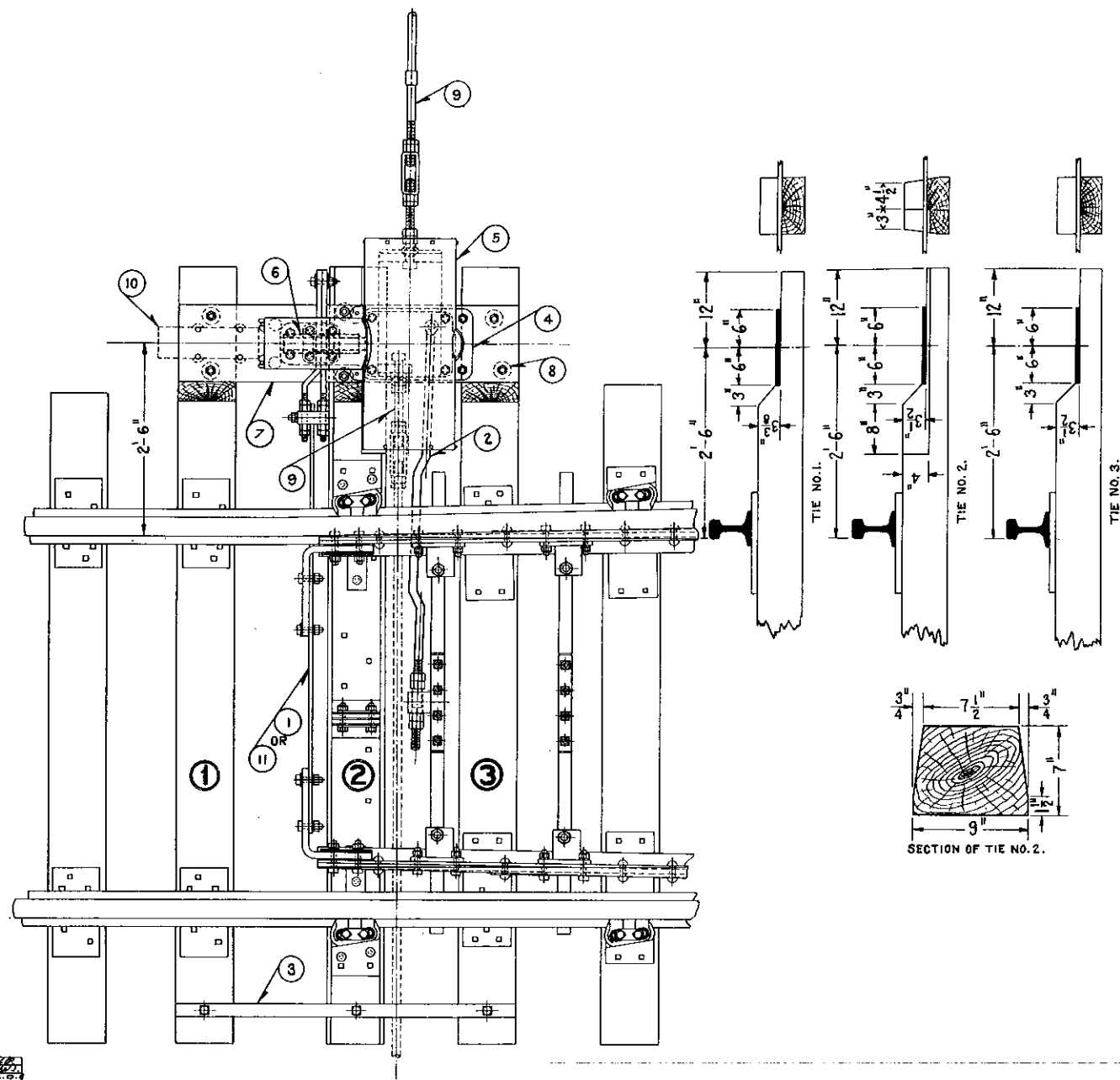
S-195-B

THE PENNSYLVANIA RAILROAD
STANDARD
SWITCH TIES

FOR INTERLOCKED SINGLE SWITCHES.
OFFICE OF CHIEF ENGINEER, PHILA., PA., DECEMBER 4, 1947.

Approved
W. C. Pfeiffer
Assistant Chief Engineer-T.C. & S.

Approved
W. C. Pfeiffer
Chief Engineer



ASSEMBLAGE

ITEM	REQD.	NAME	FIG.	PLAN
1	1	FRONT & LOCK ROD 100 & 130 LB. RAIL.	3054	S-305
2	1	OPERATING ROD.	3312	S-331
3	1	TIE STRAP.	2002	S-200
4	1	L.H. TYPE "G" SWITCH MECHANISM.	2582	S-258
5	1	L.H. MECHANISM COVER.	25818	S-258
6	1	INDICATION BOX.		
7	1	BASE PLATE.	2586	S-258
8	6	WASHERS	2161	S-216
9	1	MECHANISM ROD.	25816	S-258
10	1	ELECTRIC LOCK (WHEN REQUIRED).		
11	1	FRONT & LOCK ROD 131 & 152 LB. RAIL.	30538	S-305

NOTE:- SWITCH RODS, GAUGE PLATE AND RAIL BRACES SHALL BE FURNISHED WITH SWITCH POINTS; FOR DETAILS SEE STANDARD M.W. MATERIAL PLANS. WHERE NO DETAIL REFERENCE IS GIVEN, THE MANUFACTURER'S STANDARD APPARATUS SHOULD BE FURNISHED.

REVISIONS

REDRAWN FROM APPROVED PLAN
S-201-B, DATED 11-24-20, LAST
REVISION 10-18-22 AND REVISED.
D-AUGUST 21, 1934.

APPROVED:-

1 SHEET

S-201-D

THE PENNSYLVANIA RAILROAD STANDARD LAYOUT

SINGLE SWITCH, TYPE "C" MECHANISM

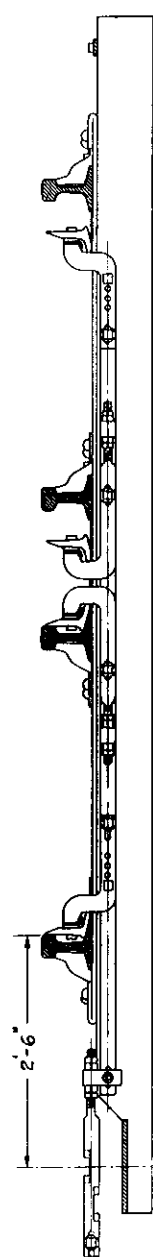
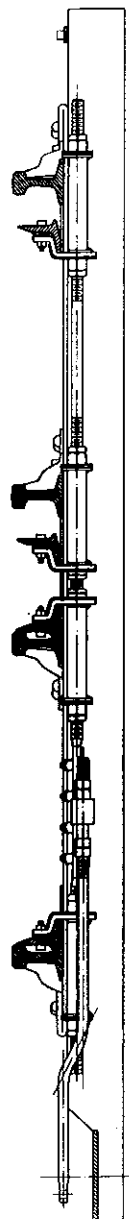
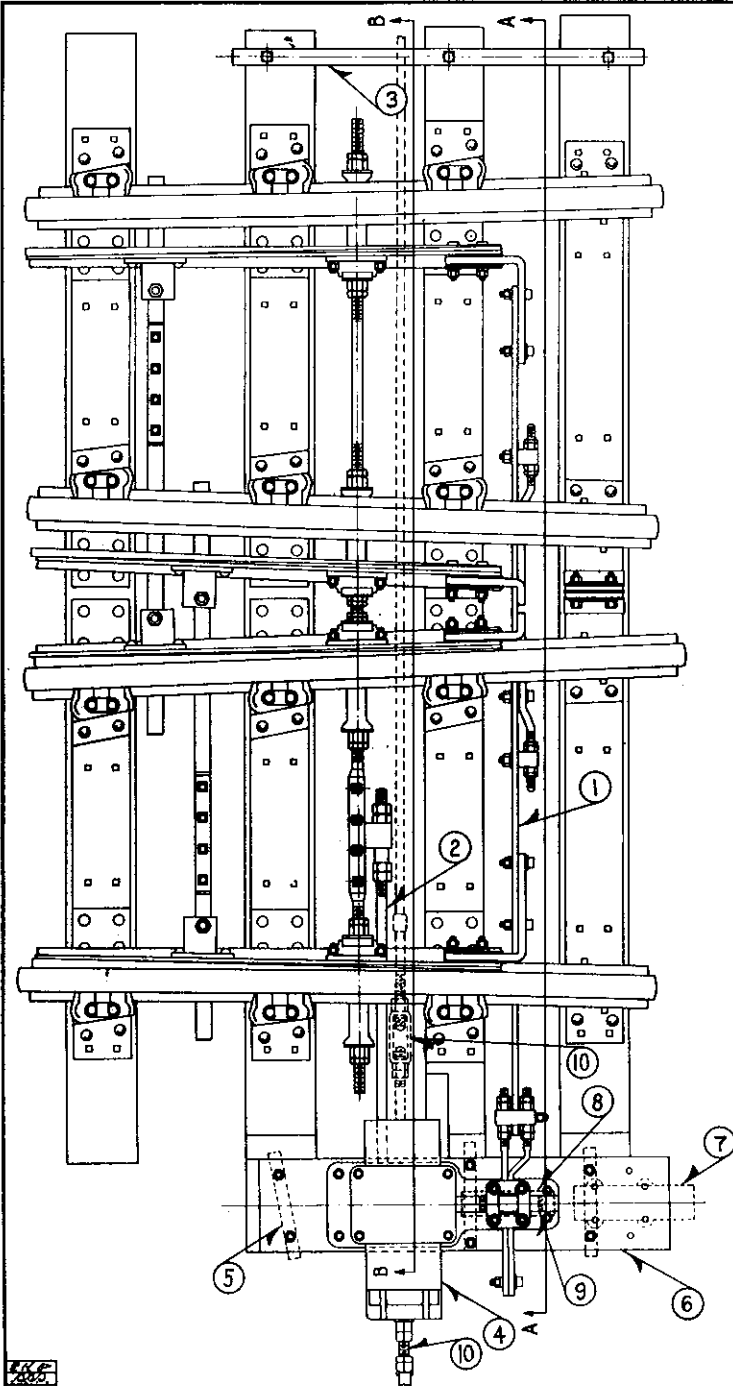
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., APRIL 18, 1920

Approved

Arthur H. Kuss
Chief Signal Engineer

Approved

[Signature]
Chief Engineer



ASSEMBLAGE				
ITEM	REQD.	NAME	FIGURE	PLAN
1	1	FRONT AND LOCK ROD.	30821	S-308
2	1	OPERATING ROD.	3331	S-333
3	1	TIE STRAP	2002	S-200
4	1	L. H. MECHANISM.	2581	S-258
5	3	WASHER PLATES.	2001	S-200
6	1	BASE PLATE.	2586	S-258
7	1	ELECTRIC LOCK (WHEN REQUIRED).		
8	1	INDICATION BOX.	25812	S-258
9	2	CONTACT BLOCKS.	25819	S-258
10	1	MECHANISM ROD	25816	S-258

Note:-

Switch Rods, Gauge Plates and Rail Braces to be furnished with Switch Points: for details see Standard M.W. Plans.

Where no detail reference is given, the Manufacturer's Standard Apparatus should be furnished.

Mechanism for facing point switch in main track, shall be located on the normally closed side of the switch.

For details and parts of Mechanism see Plan S-258.
For framing of Timbers see Plan S-200.

REVISIONS
B-DEC., 3, 1928
APPROVED: *Art. Head*

1 SHEET

S-202-B



PENNSYLVANIA RAILROAD SYSTEM
STANDARD

LAYOUT

DOUBLE SLIP SWITCH TYPE "Q" MECHANISM

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., MAY 13, 1924.

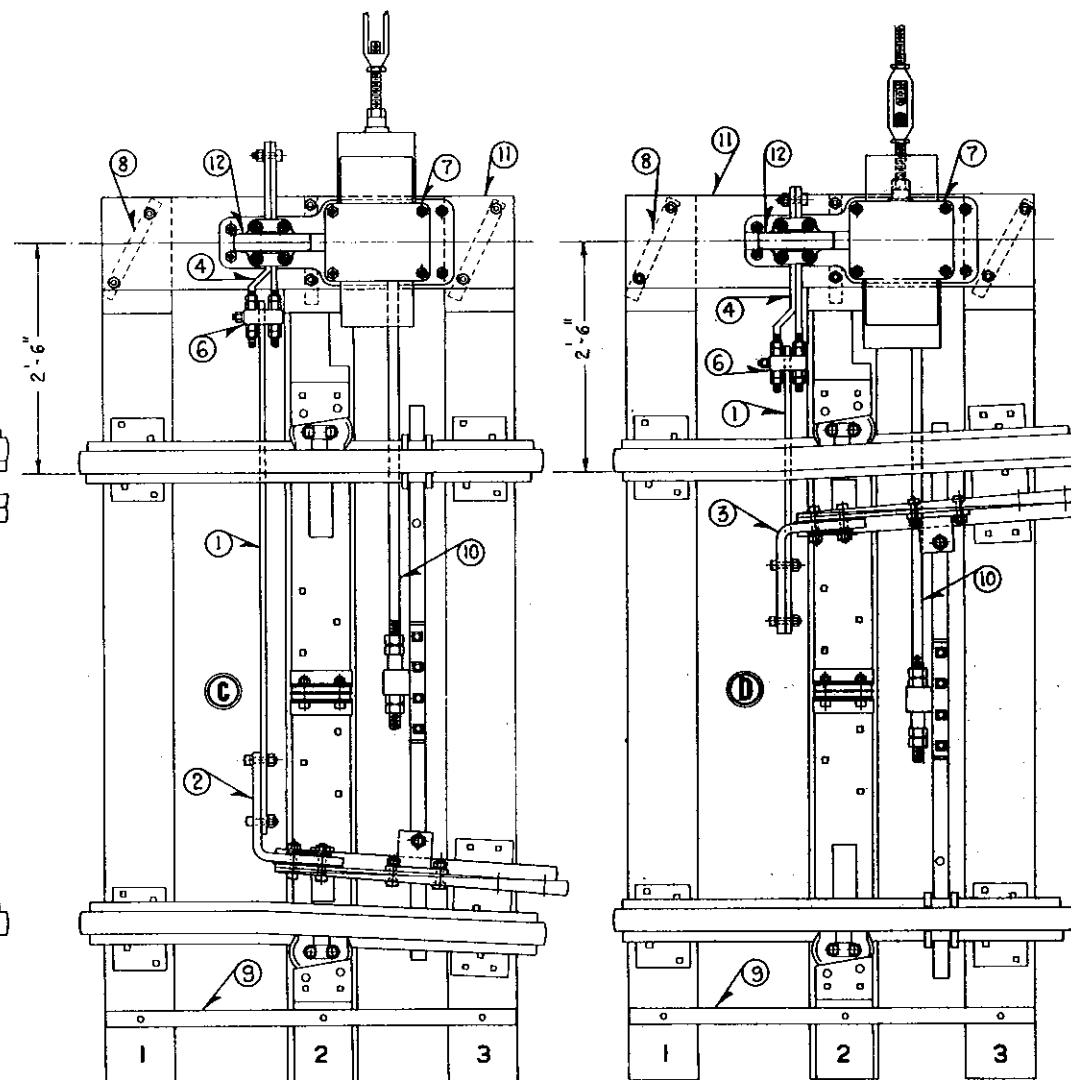
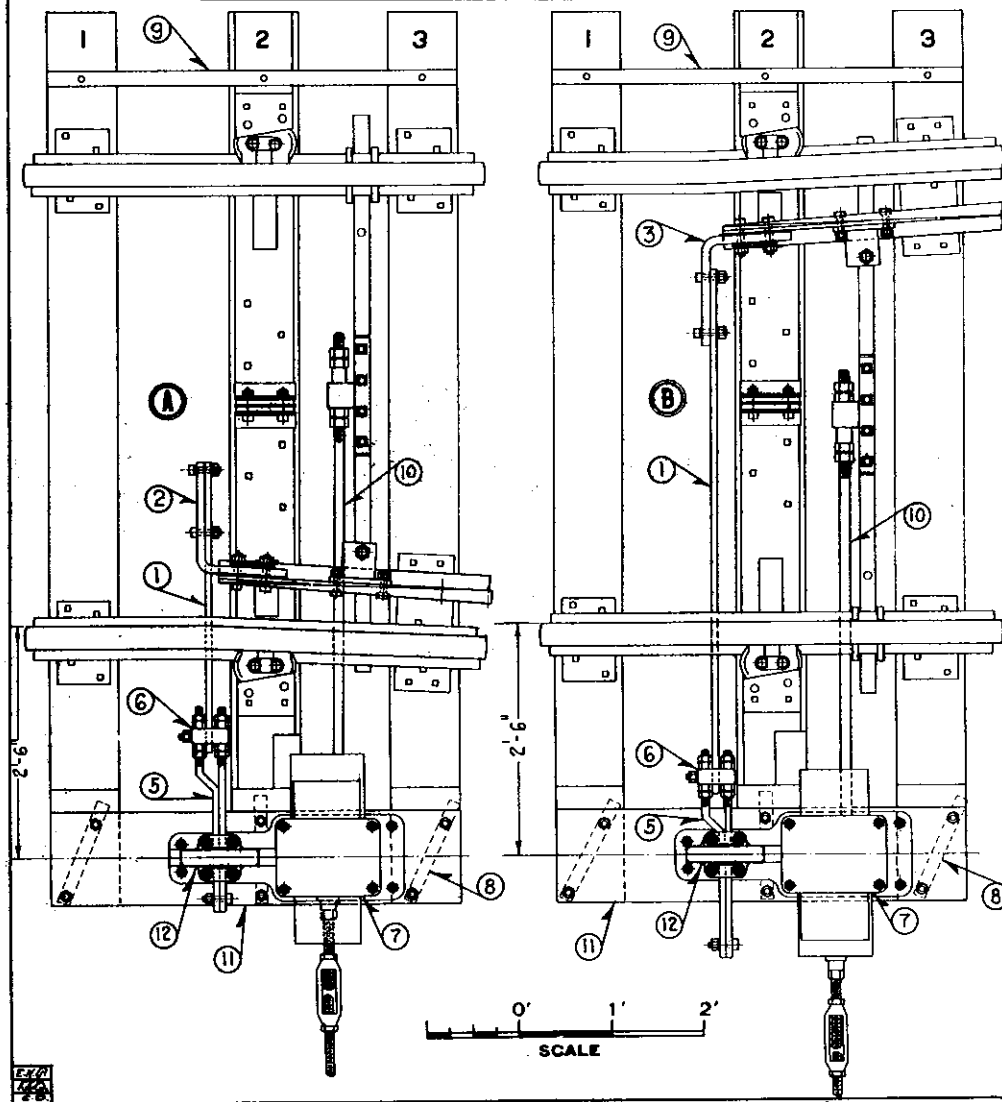
Approved

Art. Head
Chief Signal Engineer

Approved

[Signature]
Chief Engineer

ASSEMBLAGE				
Item	Qty	Name	Figure	Plan
1	1	Bar #3213 with 1-3214, 1-3215, 2-3216, 1-3219	3211	S-321
2	1	Sq. head bolts with hex. nuts and lock washers	...	S-321
3	1	Foot #3212 with 1-3214, 1-3215, 2-3216, 1-3219 and 2-3/4" x 4"	...	S-321
4	1	Sq. head bolts with hex. nuts and lock washers	...	S-321
5	1	Lock rods #3111 and #3113 and 1-3/4" x 2 1/2" Sq. hd. bolts with hex. nuts and flat washers	...	S-311
6	1	Lock rods #3111 and #3112 and 1-3/4" x 2 1/2" Sq. hd. bolts with hex. nuts and flat washers	...	S-311
7	1	Lug	3218	S-321
8	3	Type "G" Switch mechanism	2581	S-258
9	1	Washer plates	2001	S-200
10	1	Tie strap	2002	S-200
11	1	Operating rod	3311	S-331
12	1	Base plate	2586	S-258
13	1	Indication box	...	...



NOTES:

* When movement is located on same side of track as switch point, bar #3211 must be cut to accommodate one foot as shown. For framing of timbers see plan S-200.

Switch Rods, Bridle Plates, Rail Braces and Switch Rod Guides to be furnished with Switch Points; for details see Standard M. W. Material Plans.

Where no detail reference is given, the Manufacturer's Standard Apparatus should be furnished.

Ties Nos. 1, 2 and 3 are 19'-6" long.

REVISIONS

1 SHEET

S-206-A

PENNSYLVANIA SYSTEM

STANDARD
LAYOUTS

FOR DERAILS, TYPE "C" MECHANISM

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., MAY 31, 1922

Correct

Arthur
Chief Signal Engineer

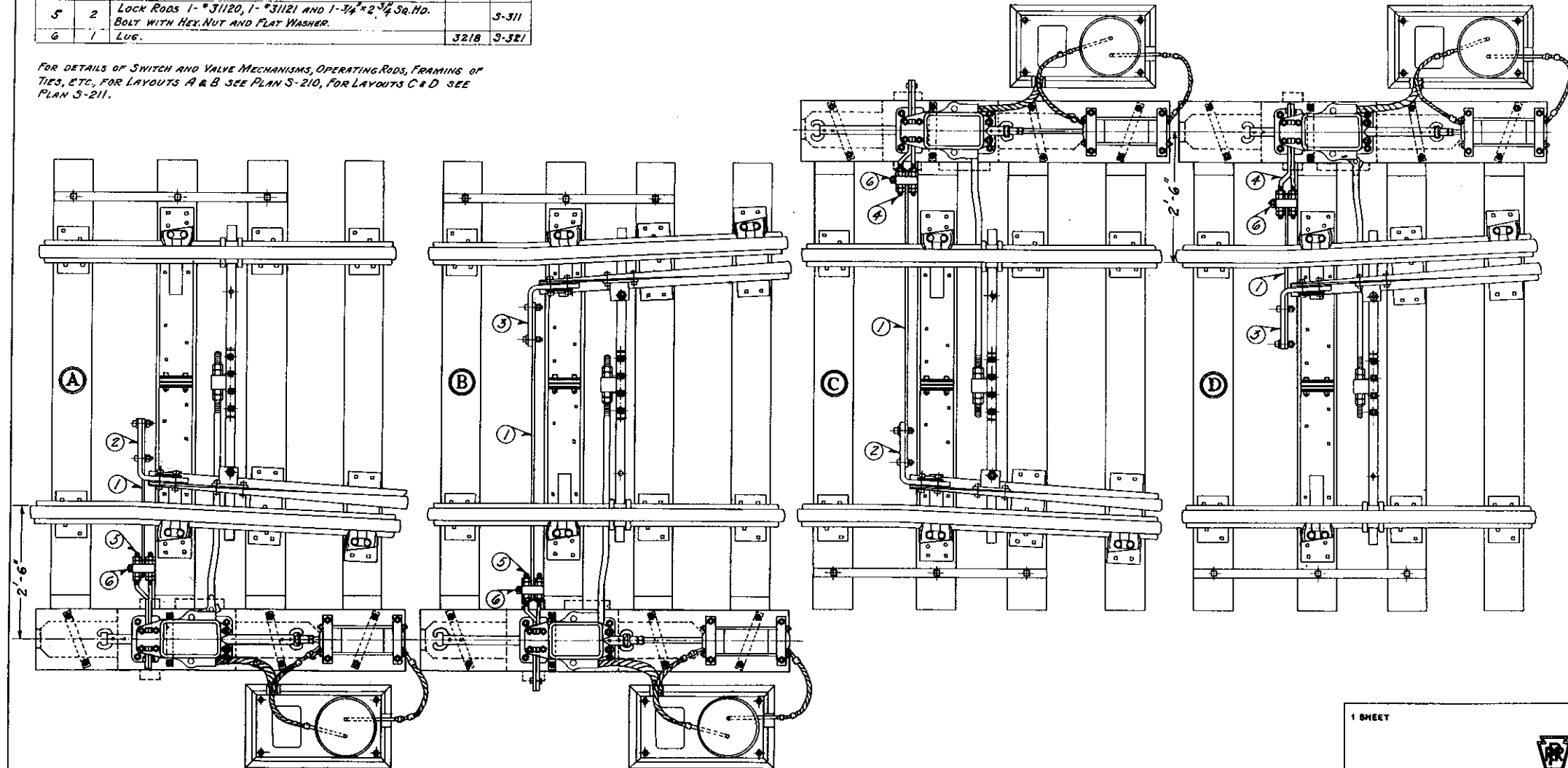
Arthur
Chief Engineer

ASSEMBLAGE.			
ITEM	REQD.	NAME	FIGURE PLAN
1	1	BAR	3211 S-321
2	1	FOOT # 3213 WITH 1-3214, 1-3215, 2-3216, 1-3219 AND 2-3/4" x 4" Sq. Hd. BOLTS WITH HEX. NUTS AND LOCK WASHERS.	S-321
3	1	FOOT # 3212 WITH 1-3214, 1-3215, 2-3216, 1-3219 AND 2-3/4" x 4" Sq. Hd. BOLTS WITH HEX. NUTS AND LOCK WASHERS.	S-321
4	2	LOCK RODS 1-3/1120, 1-3/1122 AND 1-3/4" x 2-3/4" Sq. Hd. BOLT WITH HEX. NUT AND FLAT WASHER.	S-311
5	2	LOCK RODS 1-3/1120, 1-3/1121 AND 1-3/4" x 2-3/4" Sq. Hd. BOLT WITH HEX. NUT AND FLAT WASHER.	S-311
6	1	LUG.	3218 S-321

FOR DETAILS OF SWITCH AND VALVE MECHANISMS, OPERATING RODS, FRAMING OF TIES, ETC., FOR LAYOUTS A & B SEE PLAN S-210, FOR LAYOUTS C & D SEE PLAN S-211.

NOTE:-

* WHEN MOVEMENT IS LOCATED ON SAME SIDE OF TRACK AS SWITCH POINT, BAR # 3211 MUST BE CUT TO ACCOMMODATE ONE FOOT AS SHOWN.
SWITCH RODS, RAIL BRACES, BRIDLE PLATES & SW. ROD GUIDES TO BE FURNISHED WITH SWITCH POINTS, FOR DETAILS SEE STANDARD M. W. MATERIAL PLANS.



REVISIONS

1 SHEET

S-207-A

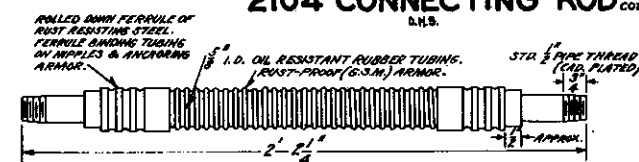
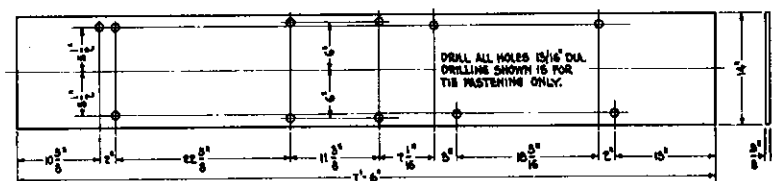
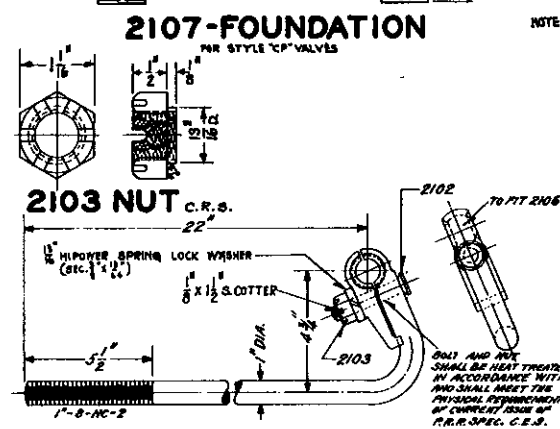
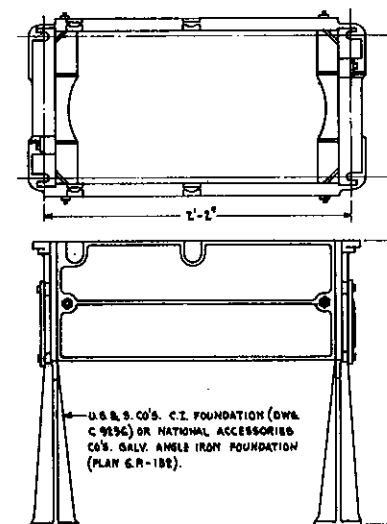
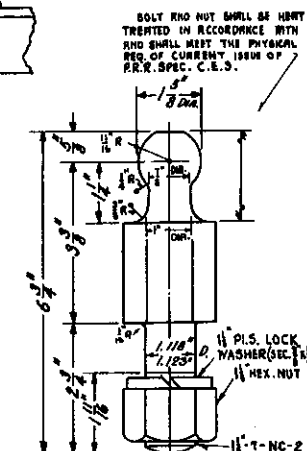
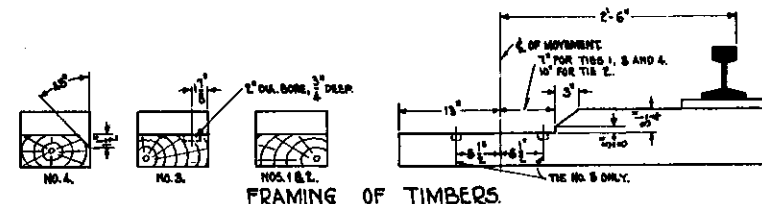
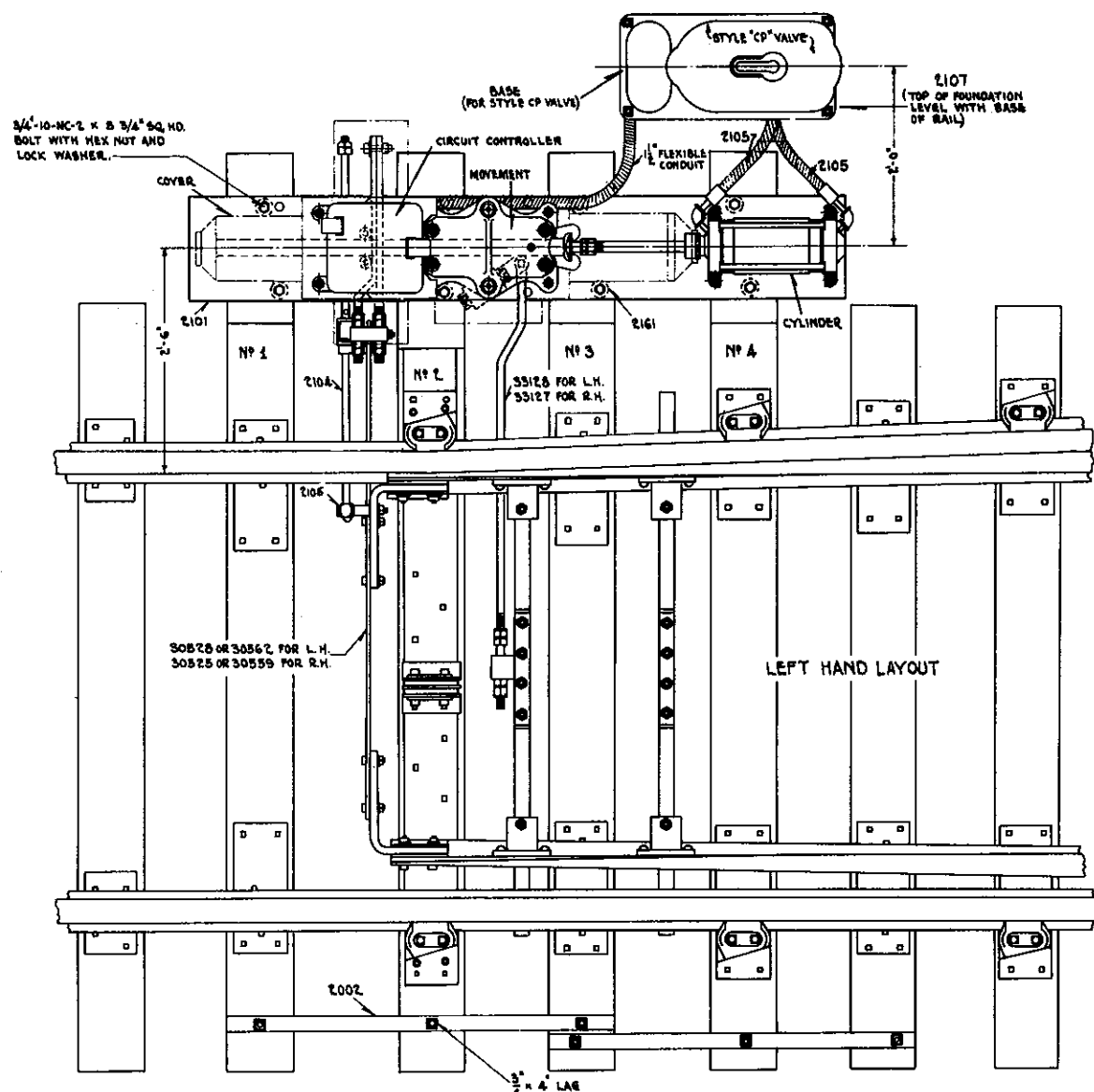


PENNSYLVANIA RAILROAD SYSTEM
STANDARD
LAYOUTS
FOR DERAILS, TYPE "AI" MECHANISM

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., JUNE 8, 1928.

Approved
Art. R.
Chief Signal Engineer

Approved
E. B. Temple
Asst. Chief Engineer



REVISIONS EDUCATION FROM APPROVED PLAN 6-210-B DATED 10-19-16 AND REVISED. D AUGUST 28, 1933. c.o. APPROVED <i>A.H. [Signature]</i> E JAN. 15, 1934. APPROVED - <i>A.H. [Signature]</i> F JULY 20, 1934. APPROVED:- <i>A.H. [Signature]</i>	
--	--

2102 BOLT C.R.S.

NOTE:

1. DIMENSIONS OF BOLT HEADS AND NUTS SHALL BE IN ACCORDANCE WITH A.S.A. ROOM OR SEAL FINISH SIZES.
2. SPRING LOCK WASHERS SHALL MEET THE REQUIREMENTS IN CURRENT ISSUE OF PER. SPEC. CAT.
3. SWITCH RODS, GUIDE PLATE AND RAIL BRACES TO BE FURNISHED WITH SWITCH POINTS; FOR DETAILS SEE STANDARD M.M. MATERIAL PLANS.
4. WHERE NO DETAIL REFERENCE IS GIVEN, THE MANUFACTURER'S STANDARD APPARATUS SHALL BE FURNISHED.
5. WHEN DIRECTION MOVEMENT WITH OR WITHOUT CIRCUIT CONTROLLER OR COMPLETE WITH CYLINDER AND COVER - SPECIFY RIGHT OR LEFT HAND.

1 SHEET

S-210-F

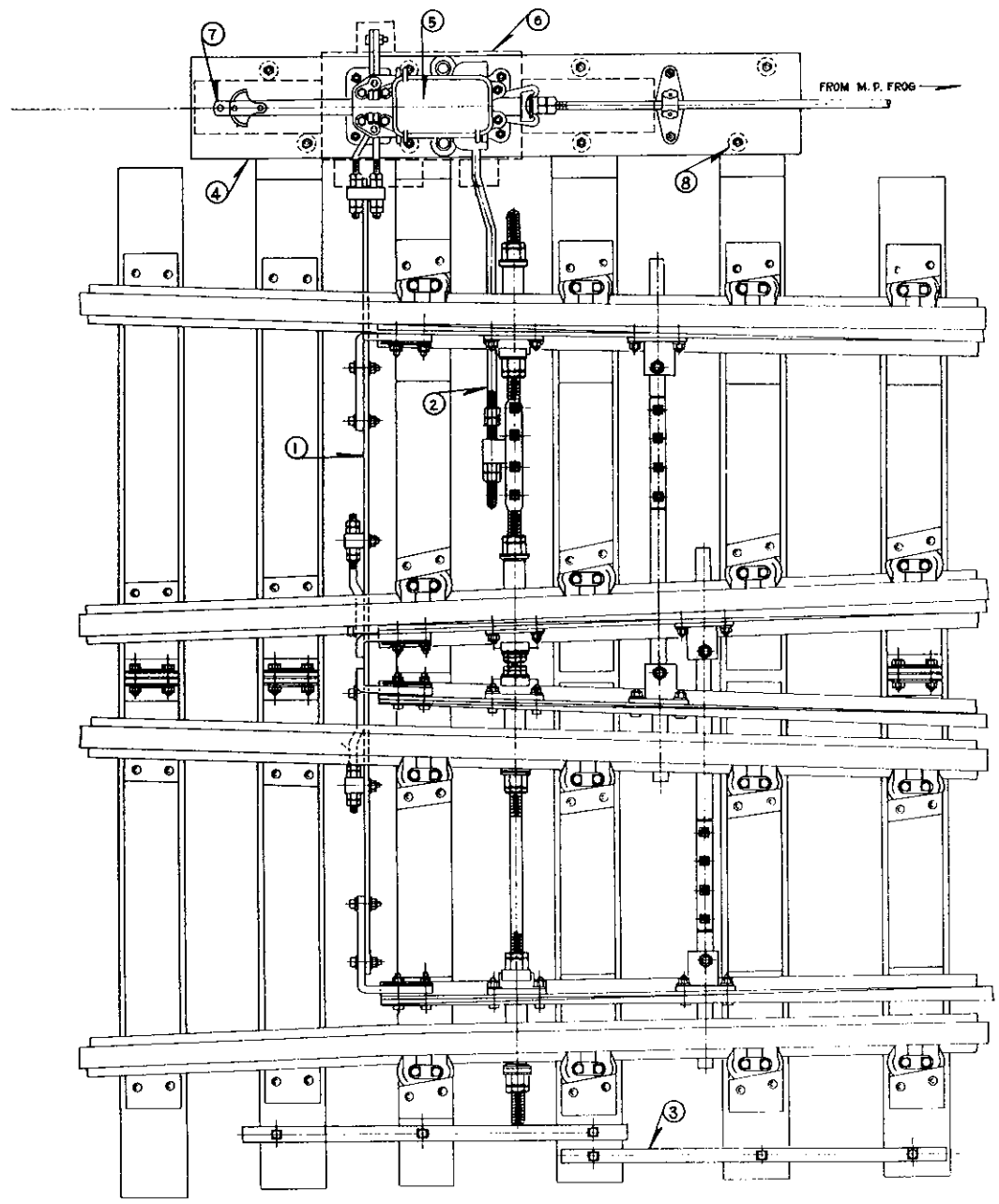


THE PENNSYLVANIA RAILROAD
STANDARD
LAYOUT

SINGLE SWITCH - TYPE "A-5" MECHANISM
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA. OCT. 11, 1952

Approved  Chief Signal Engineer

Approved  Chief Engineer



ASSEMBLAGE			
ITEM	REQD	NAME	FIGURE PLAN
1	1	FRONT AND LOCK ROD.	30822 5-308
2	1	OPERATING ROD.	3333 5-333
3	2	TIE STRAPS.	2002 5-200
4	1	BASE PLATE.	
5	1	MOVEMENT COMPLETE WITH CIRCUIT CONTROLLER.	
6	1	COVER COMPLETE.	
7	1	SWITCH MECHANISM COMPLETE WITH 4, 5, & 6.	
8	8	WASHERS.	2161 5-216

NOTE:-
 SWITCH RODS, GAUGE PLATE AND
 RAIL BRACES TO BE FURNISHED WITH
 SWITCH POINTS; FOR DETAILS SEE
 STANDARD M.W. MATERIAL PLANS.
 WHERE NO DETAIL REFERENCE
 IS GIVEN, THE MANUFACTURER'S
 STANDARD APPARATUS SHOULD BE
 FURNISHED.
 FOR FRAMING OF TIMBERS
 SEE PLAN 5-210.

REVISIONS

1 SHEET

S-212-A

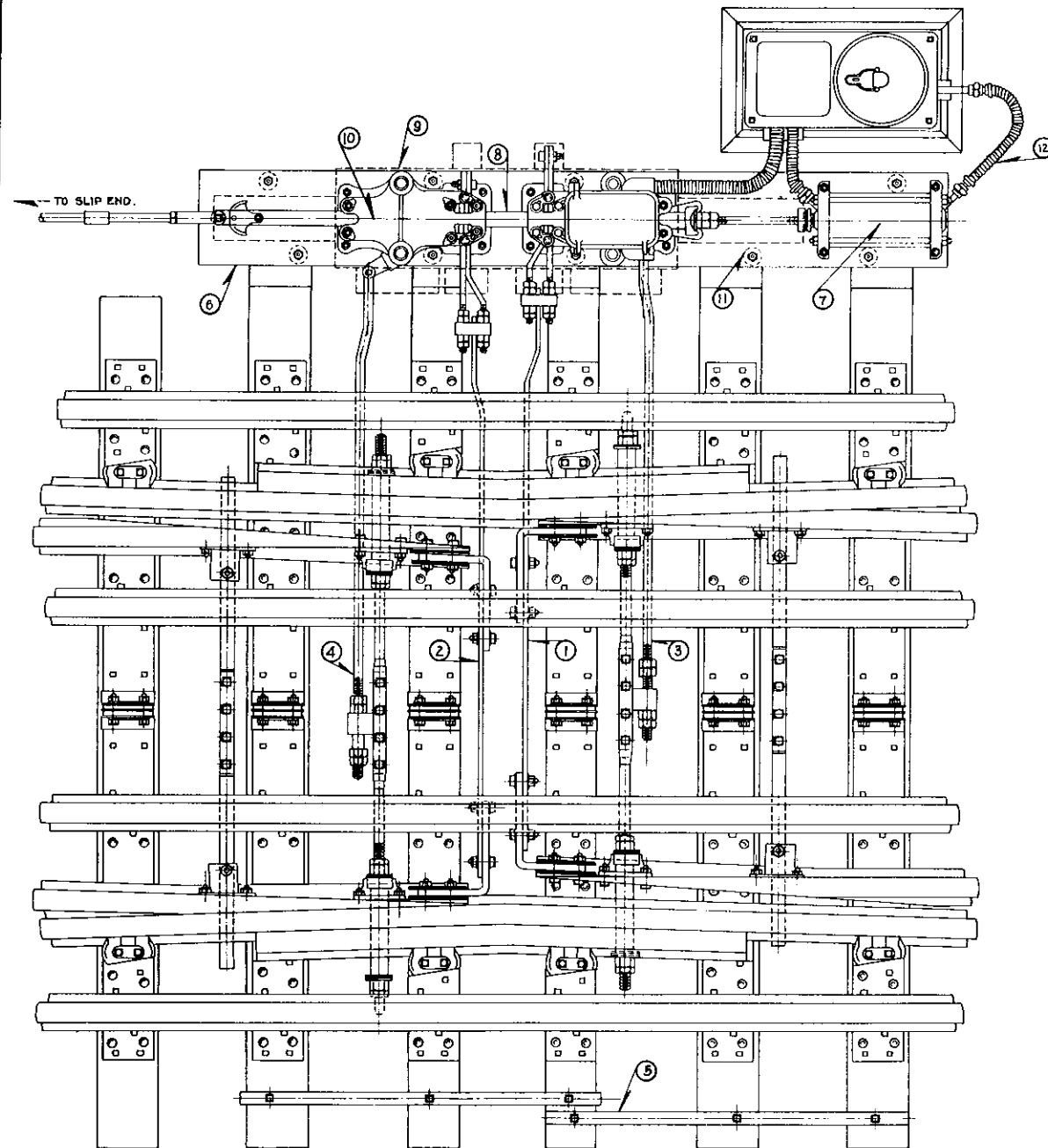


THE PENNSYLVANIA RAILROAD
STANDARD
LAYOUT
SLIP SWITCH - "A" MECHANISM WITHOUT CYLINDER
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA. NOV. 22, 1927

Approved 
 Chief Signal Engineer

Approved 
 Chief Engineer

2100
 2100
 2100



ASSEMBLAGE				
ITEM	REQ'D.	NAME	FIGURE	PLAN
1	1	L.H. FRONT AND LOCK ROD	3087	5-309
2	1	R.H. " "	30810	" "
3	1	OPERATING ROD	3317	5-331
4	1	" "	3318	" "
5	2	TIE STRAPS	2002	5-200
6	1	BASE PLATE		
7	1	CYLINDER		
8	1	TANDEM MOVEMENT COMPLETE WITH SLIDE BAR AND CIRCUIT CONTROLLER		
9	1	COVER COMPLETE		
10	1	SWITCH MECHANISM COMPLETE WITH 6, 7, 8, & 9.		
11	10	WASHERS	2161	5-216
12	2	1/2" ARMORED HOSE CONNECTIONS		

NOTE :-
 SWITCH RODS, GAUGE PLATE AND RAIL BRACES TO BE FURNISHED WITH SWITCH POINTS; FOR DETAILS SEE STANDARD M.V. MATERIAL PLANS.
 WHERE NO DETAIL REFERENCE IS GIVEN, THE MANUFACTURER'S STANDARD APPARATUS SHOULD BE FURNISHED.
 FOR DETAILS OF VALVE AND FRAMING OF TIMBERS SEE PLAN S-210.

REVISIONS

1 SHEET

S-213-A

THE PENNSYLVANIA RAILROAD
 STANDARD
 LAYOUT

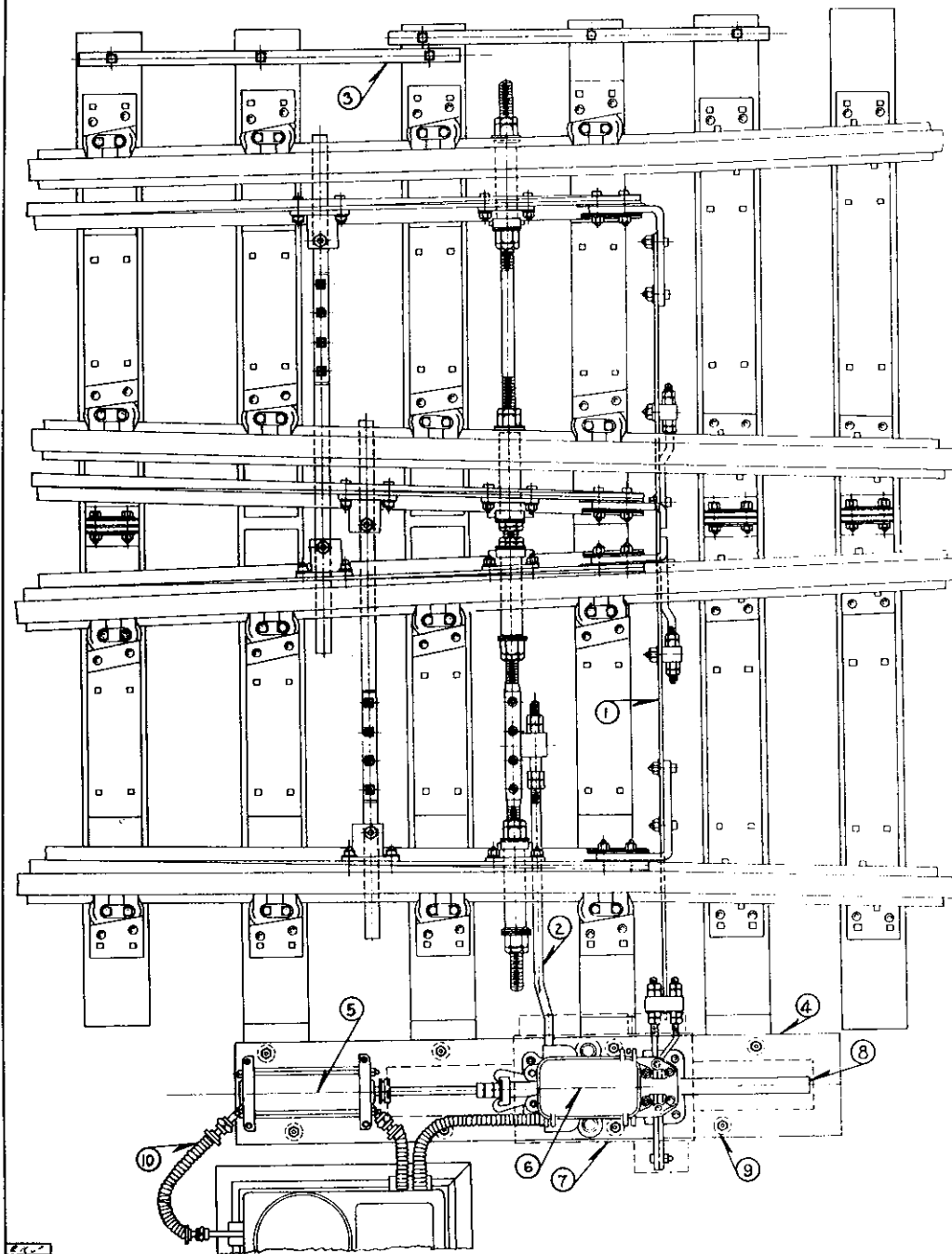
M. P. FROGS - TYPE "AI" MECHANISM
 OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA. NOV. 22, 1927.

Approved

[Signature]
 Chief Signal Engineer

Approved

[Signature]
 Chief Engineer



		ASSEMBLY		FIGURE	PLAN
ITEM	REQD.	NAME			
1	1	FRONT AND LOCK ROD		30822	S-308
2	1	OPERATING ROD		3553	S-353
3	2	TIE STRAPS		2002	S-200
4	1	BASE PLATE			
5	1	CYLINDER			
6	1	MOVEMENT COMPLETE WITH CIRCUIT CONTROLLER			
7	1	COVER COMPLETE			
8	1	SWITCH MECHANISM COMPLETE WITH 4, 5, 6 & 7.			
9	8	WASHERS		2161	S-216
10	2	1/2" ARMORED HOSE CONNECTIONS			

NOTE :-
 SWITCH RODS, GAUGE PLATE AND
 RAIL BRACES TO BE FURNISHED WITH
 SWITCH POINTS; FOR DETAILS SEE
 STANDARD M.W. MATERIAL PLANS.
 WHERE NO DETAIL REFERENCE
 IS GIVEN, THE MANUFACTURER'S
 STANDARD APPARATUS SHOULD BE
 FURNISHED.
 FOR DETAILS OF VALVE AND
 FRAMING OF TIMBERS SEE PLAN
 S-210.

REVISIONS

1 SHEET

S-214-A

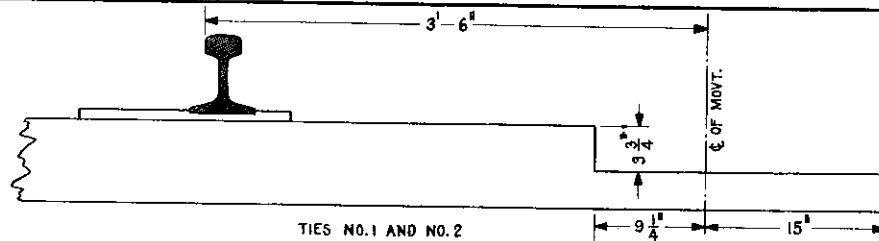
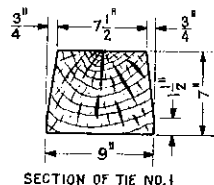
THE PENNSYLVANIA RAILROAD
 STANDARD
 LAYOUT
 SLIP SWITCH "A" MECHANISM WITH CYLINDER
 OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA. NOV. 22, 1927.

Approved

[Signature]
 Chief Signal Engineer

Approved

[Signature]
 Chief Engineer



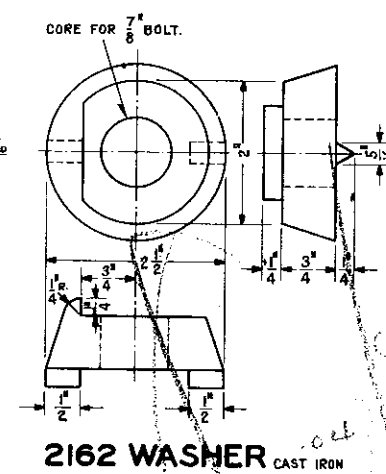
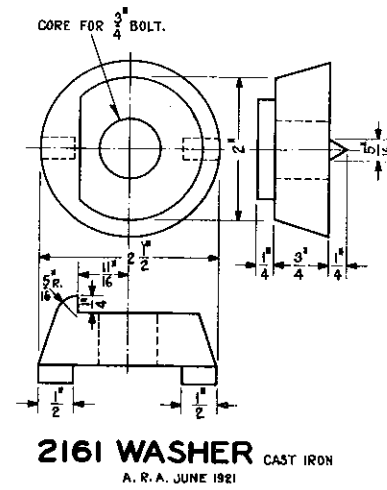
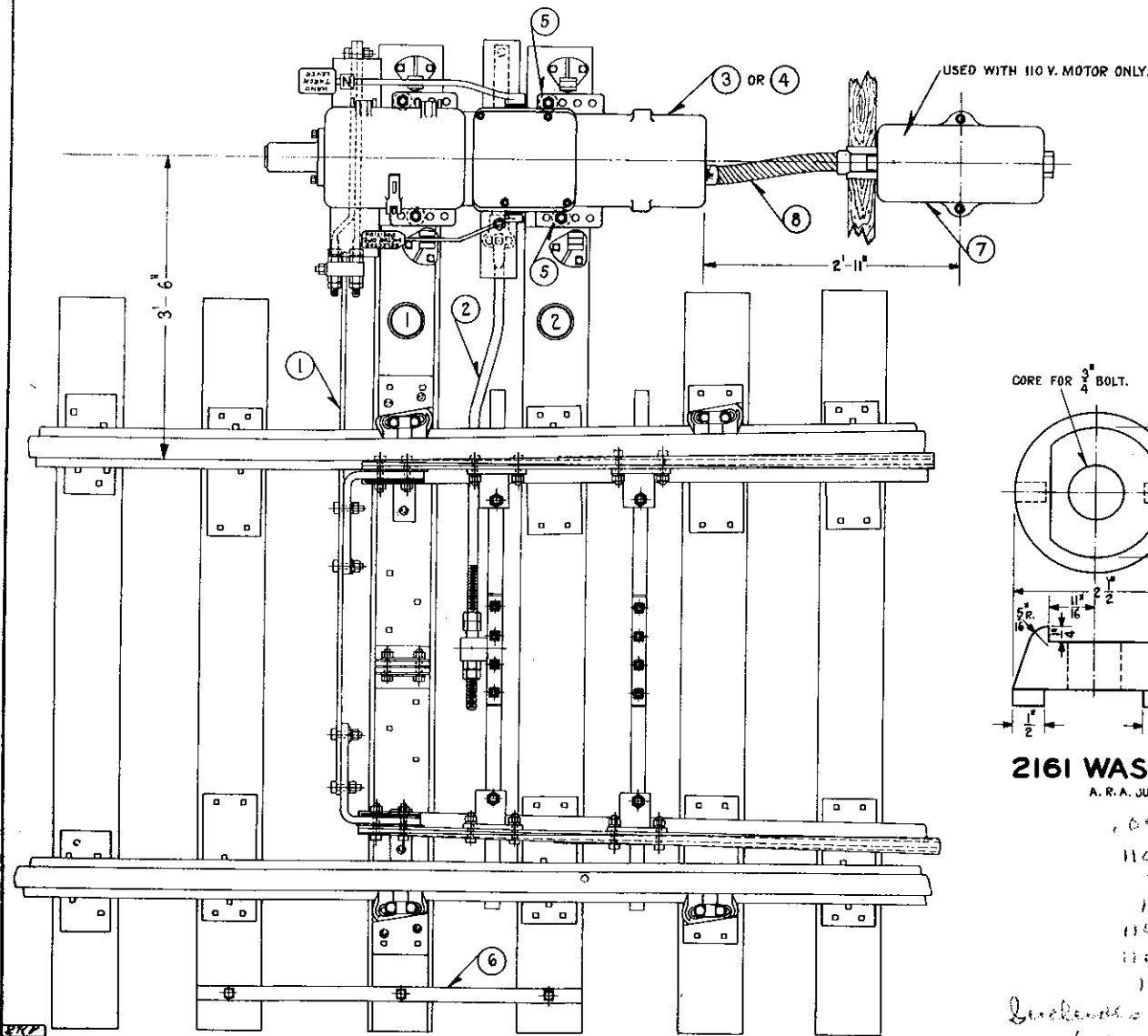
NOTE:-
SWITCH RODS, GAUGE PLATE AND RAIL BRACES SHALL BE FURNISHED WITH SWITCH POINTS; FOR DETAILS SEE STANDARD M.W. MATERIAL PLANS.
WHERE NO DETAIL REFERENCE IS GIVEN, THE MANUFACTURER'S STANDARD APPARATUS SHOULD BE FURNISHED.
LOW VOLTAGE MECHANISM TO OPERATE IN 16 SEC. SHALL BE FURNISHED, UNLESS OTHERWISE SPECIFIED.
TYPE "F" CIRCUIT CONTROLLER FOR 110V. MOTOR SHALL BE FURNISHED, UNLESS OTHERWISE SPECIFIED.

ASSEMBLAGE LEFT HAND LAYOUT AS SHOWN

ITEM	REQ'D.	NAME	FIG.	PLAN
1	1	FRONT AND LOCK ROD	30522	S-305
2	1	OPERATING ROD	33116	S-331
3	1	L.H. STYLE "M-20" DUAL CONTROL MECH. COMPLETE		
4	1	L.H. STYLE "M-2" MECH. COMPLETE		
5	4	WASHERS	2162	S-216
6	1	TIE STRAP	2002	S-200
7	1	TYPE "F" SWITCH CIRCUIT CONTROLLER COMPLETE		
8	1	GAL. DOUBLE STRIP FLEXIBLE STEEL CONDUIT, 2" I.D. x 2 3/16" O.D. x 2'-3" LONG.		

RIGHT HAND LAYOUT

ITEM	REQ'D.	NAME	FIG.	PLAN
1	1	FRONT AND LOCK ROD	30510	S-305
2	1	OPERATING ROD	33114	S-331
3	1	R.H. STYLE "M-20" DUAL CONTROL MECH. COMPLETE		
4	1	R.H. STYLE "M-2" MECH. COMPLETE		
5	4	WASHERS	2162	S-216
6	1	TIE STRAP	2002	S-200
7	1	TYPE "F" SWITCH CIRCUIT CONTROLLER COMPLETE		
8	1	GAL. DOUBLE STRIP FLEXIBLE STEEL CONDUIT, 2" I.D. x 2 3/16" O.D. x 2'-3" LONG.		



108
110V D.C. M2 \$550.00
" A.C. M2 775.00
101V D.C. M2 600.00
110V D.C. M20 750.00
110V A.C. M20 775.00
10V D.C. M20 800.00
Includes Front, Lock, and Operating Rod & also not include Controller Type F

REVISIONS
REDRAWN FROM APPROVED PLAN S-216A, DATED JULY 5, 1927 AND REVISED.

1 SHEET

S-216-B

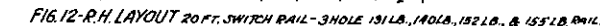
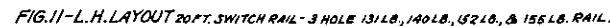
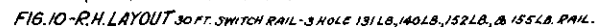
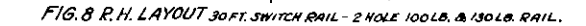
THE PENNSYLVANIA RAILROAD
STANDARD
LAYOUT
SINGLE SWITCH, STYLE "M-2" & "M-20" MECHANISMS
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA. MAY 7, 1929.

Approved

Chief Signal Engineer

Approved

Chief Engineer



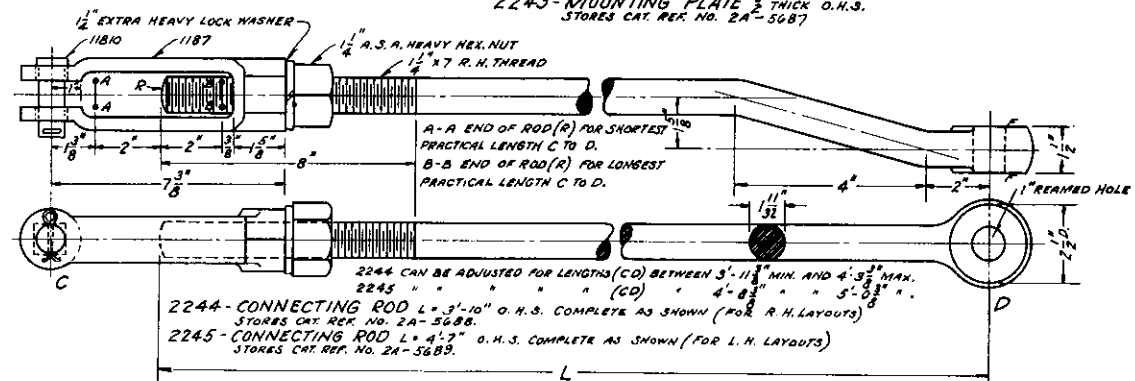
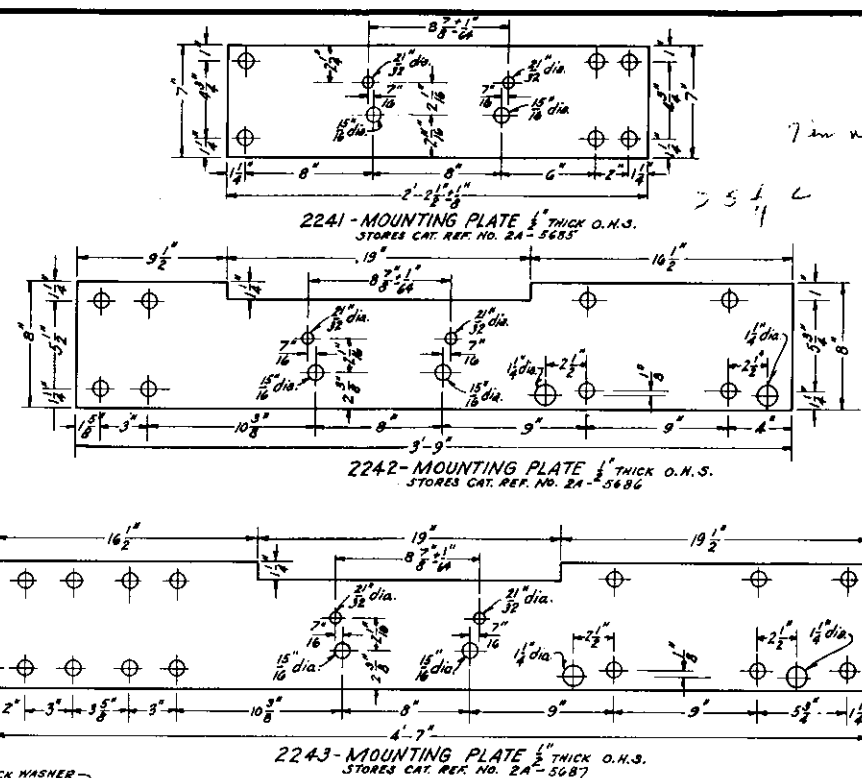
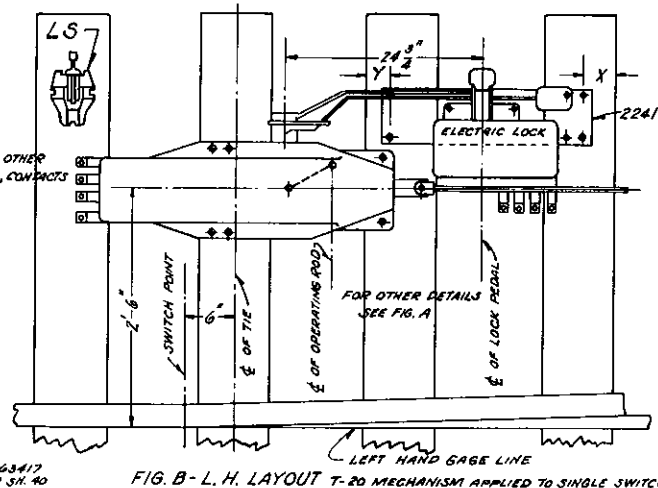
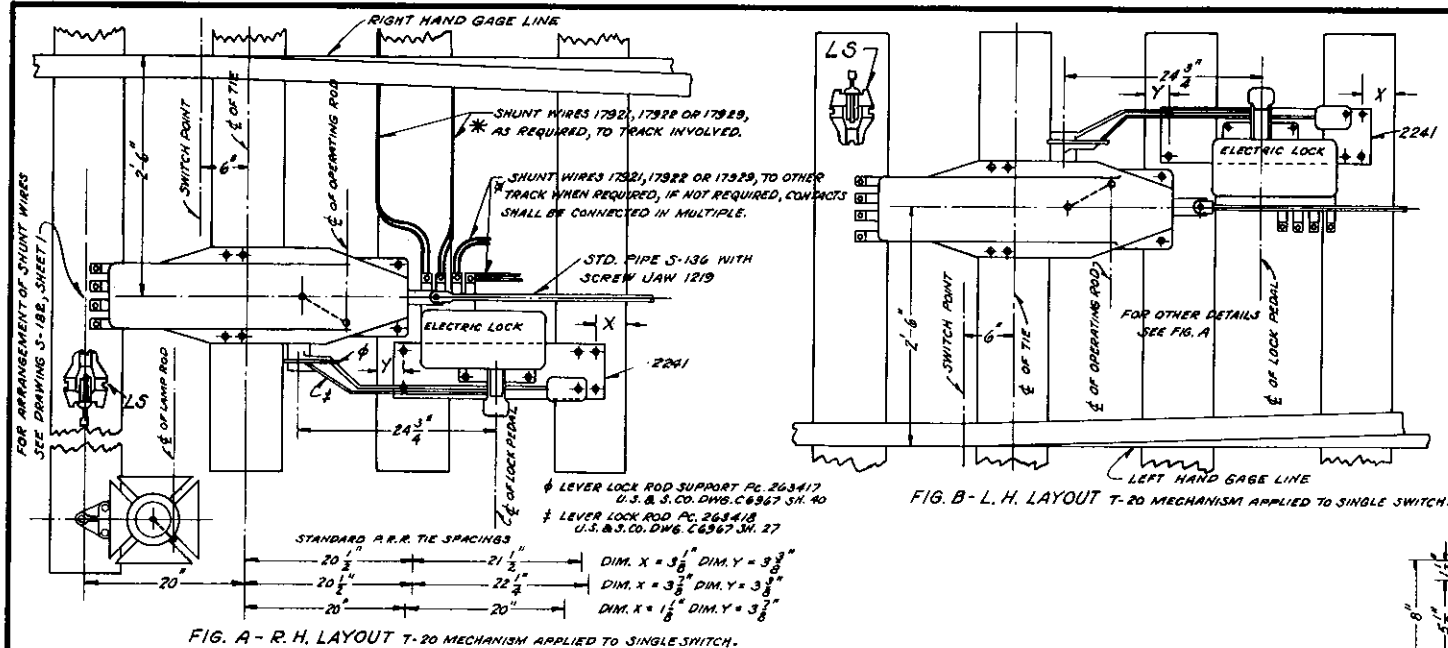
NOTE:-
WHERE ROD 2244 OR 2245 IS APPLIED, PROVIDE EYE BOLT
241990-3H, 243-8034 U.S. & S.CO. AT POINT E ON T-20
SLIDE BAR.

SHEET 2 OF 2

S-224-A

Approved

Chief Engineer



SHEET 1 OF 2

S-224-A

THE PENNSYLVANIA RAILROAD
STANDARD
**MOUNTING OF T-20 H. O. MECHANISM
AND SL-26 ELECTRIC SWITCH LOCK.**

Approved

H.C. Griffith
Assistant Chief Engineer-T. C. & S.

Approved

Phrasitt
Chief Engineer

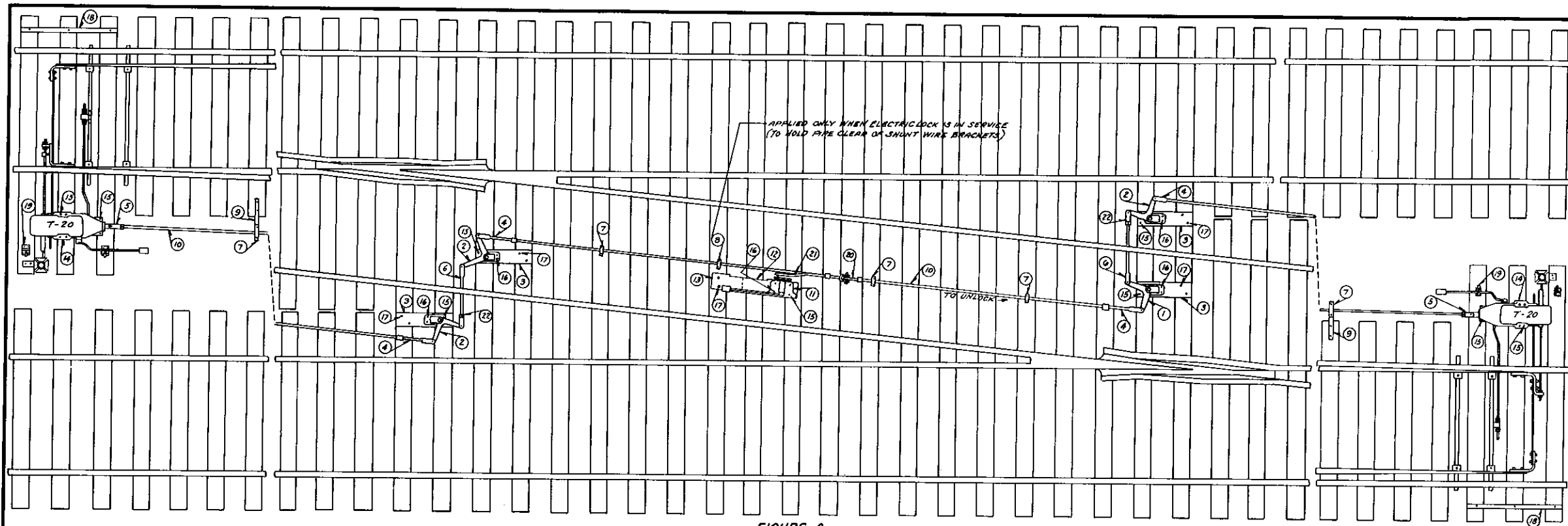


FIGURE A

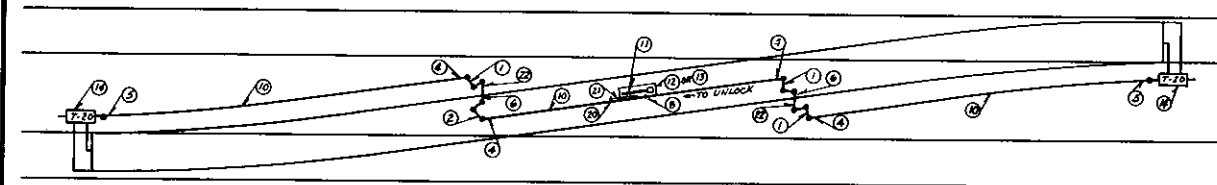


FIGURE B
FOR OTHER DETAILS SEE FIG. A

NOTE:-

1. WHERE SWITCH OR SWITCHES ARE PROTECTED BY SIGNAL:
(a) CROSSOVER BETWEEN MAIN TRACKS, OR BETWEEN MAIN TRACK AND SIDING, SHALL BE EQUIPPED AS SHOWN IN FIGURE A OR B WITH LOCK LEVER IN CENTER OF CROSSOVER.
(b) WHERE FIELD CONDITIONS ARE SUCH THAT FIGURE A OR B CANNOT BE APPLIED, THE ARRANGEMENT MAY BE MODIFIED UPON APPROVAL OF THE CHIEF ENGINEER P.R.R.
2. WHERE SWITCH OR SWITCHES ARE NOT PROTECTED BY SIGNAL:
(a) CROSSOVER BETWEEN MAIN TRACKS, OR BETWEEN MAIN TRACK AND SIDING, MAY BE EQUIPPED IN ACCORDANCE WITH FIGURE A OR B, WHEN APPROVED BY THE GENERAL MANAGER AND CHIEF ENGINEER P.R.R.
(b) WHERE TRACK CIRCUITS ARE NOT IN SERVICE, OR IF NO OTHER CIRCUITS ARE INVOLVED, THE CIRCUIT CONTROLLER FOR T-20 MOVEMENT SHALL BE OMITTED.
3. FOR BONDING AND INSULATING JOINT LOCATIONS, SEE DRAWING S-803.
4. FOR ARRANGEMENT OF SHUNTING TRACK AT T-20 MOVEMENT SEE DRAWING S-182.
5. FOR ARRANGEMENT OF SHUNTING TRACK AT CENTER LOCK LEVER BY ACTUATION OF ELECTRIC SWITCH LOCK, WHERE APPLIED, AND FOR SPACING OF TIMBERS, SEE DRAWING S-226.
6. FOR ARRANGEMENT OF LOCKING T-20 MOVEMENT WHEN LOCK LEVER S-237 IS LOCATED AT EITHER END OF CROSSOVER, SEE DRAWING S-224.
7. FOR SPECIFICATIONS COVERING INSTALLATION OF PIPE LINE, SEE

- INSTRUCTIONS NO 145 TO NO 148 INCL. OF C.E. 223, AND C.S.E. 30.
8. UNLESS OTHERWISE SPECIFIED T-20 MOVEMENTS SHALL BE EQUIPPED WITH POINT DETECTOR AND POINT DETECTOR BAR.
 9. FOR FRONT AND LOCK RODS, OPERATING RODS, ETC. SEE DRAWINGS COVERING THE ITEMS REQUIRED.
 10. WHEN ORDERING SOLID JAW: (a) SPECIFY LENGTH L AND TO BE PROVIDED WITH 7" OF 1 1/4" - 7-NC-2 THREAD.

BILL OF MATERIAL

NO.	FIG. A REQD.	FIG. B REQD.	NAME	FIG.	DWG.	J. C. R.
1	1	3	CRANK AND STAND	1002	S-100	2A-840
2	3	1	CRANK AND STAND	1003	S-100	2A-841
3	4	4	SUPPORTING PLATES	1018	S-101	2A-1770
4	4	4	SOLID JAWS	1213	S-121	2A-1246
5	2	2	SCREW JAWS WITH TANG END	1219	S-121	2A-1238
6	2	2	SOLID JAWS SEE NOTE 10	1217	S-121	2A-1248
7	AS REQUIRED		PIPE CARRIERS	1404	S-140	2A-510
8	1	1	PIPE CARRIER (404 & 804) KIT OF 261776 U.S.B.S.	10216	S-10216	2A-1691
9	AS REQUIRED		PIPE CARRIER SUPPORTS	13810	S-138	2A-2741
10	"	"	STANDARD 1" PIPE	1324	S-136	2A-1711
11	1	1	LEVER AND STAND 2371 OR 2374	237	S-237	2A-4886 2A-4887
12	1	1	SUPPORTING PLATE WHERE ELECT. LOCK IS NOT USED	2372	S-237	2A-4891
13	1	1	SUPPORTING PLATE WHERE ELECT. LOCK IS USED	2242	S-224	2A-5086
14	2	2	T-20 MOVEMENT WITH LOOSE LOCK BAR			2A-3038 2A-3039
15	18	18	3/4" x 8 1/2" SQ. HD. BOLTS, PLATE WASHERS AND HEX. NUTS.			
16	10	10	3/4" x 2" SQ. HD. BOLTS WITH HEX. NUTS AND LOCK WASHERS.			
17	16	16	3/4" x 4 1/2" GALV. LAG SCREWS			
18	2	2	TIE STRAPS	2002	S-200	2A-2687
19	4	4	LEVER STAND FOR T-20 PE 105173 DWG. B-1373 SH. & U.S.B.S. CO.	12111	S-121	2A-1434
20	1	1	PIPE LUG	2373	S-237	2A-4892
21	1	1	CONNECTING ROD	1187	S-118	2A-1237
22	2	2	SCREW JAW			

REVISIONS

REDRAWN FROM APPROVED PLANS
S-228-E, DATED APRIL 2, 1924, LAST
REVISED DEC. 30, 1932 AND S-229-C,
DATED OCT. 2, 1936, LAST REVISED
DEC. 30, 1932 AND REVISED DRAWINGS
S-230-C AND S-231-C OBSOLETE.

1 SHEET



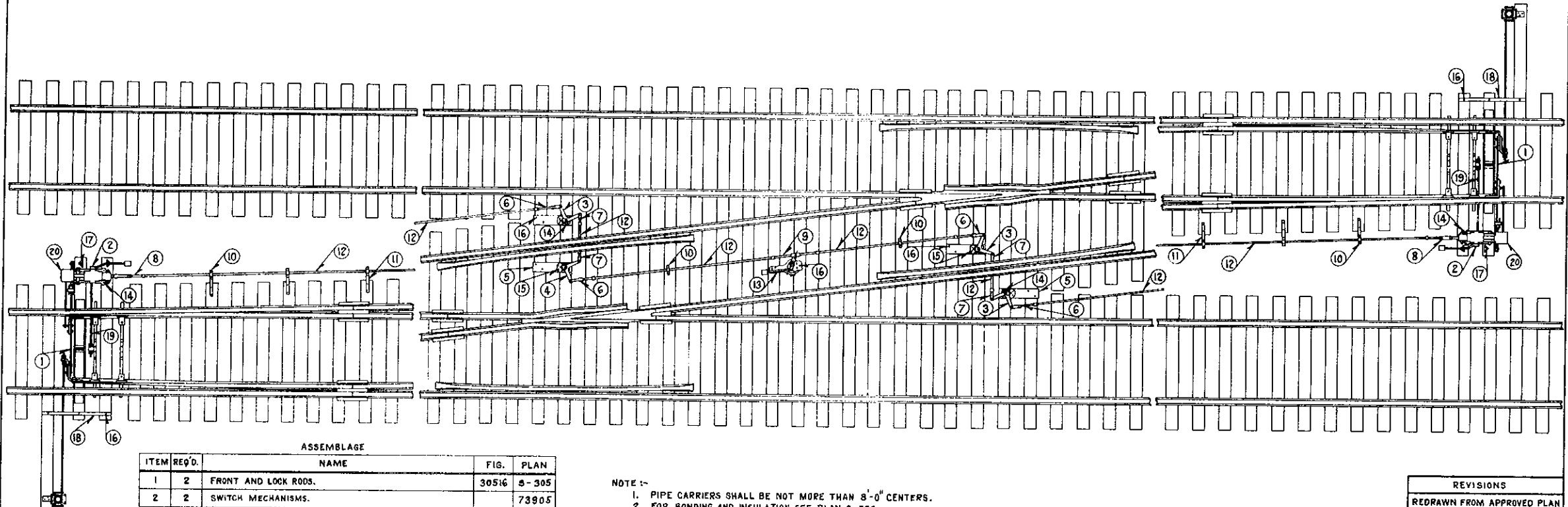
S-228-E

THE PENNSYLVANIA RAILROAD
STANDARD
ARRANGEMENT FOR LOCKING
NON-INTERLOCKED CROSSOVER

OFFICE OF CHIEF ENGINEER, PHILA., PA. FEBRUARY 6, 1950.

Approved, *W. G. Salmonson*
Assistant Chief Engineer-Signals

Approved, *J. H. H. H.*
Chief Engineer



ASSEMBLAGE				
ITEM	REQ'D.	NAME	FIG.	PLAN
1	2	FRONT AND LOCK RODS.	30516	S-305
2	2	SWITCH MECHANISMS.		73905
3	3	CRANKS AND STANDS.	1002	S-100
4	1	CRANK AND STAND.	1003	
5	4	SUPPORTING PLATES.	1013	S-101
6	4	SOLID JAWS.	1213	
7	4	SOLID JAWS.	1214	
8	2	SCREW JAWS.	1219	S-121
9	1	DOUBLE JAW.	1211	
10	22	PIPE CARRIERS - NO. 8 CROSSOVER.	1404	S-140
	26	PIPE CARRIERS - NO. 10 CROSSOVER.		
11	20	PIPE CARRIER SUPPORTS - NO. 8 CROSSOVER.	13810	S-138
	24	PIPE CARRIER SUPPORTS - NO. 10 CROSSOVER.		
12	185	SIGNAL PIPE AND COUPLINGS - NO. 8 CROSSOVER.	1364	S-136
	220	SIGNAL PIPE AND COUPLINGS - NO. 10 CROSSOVER.		
13	1	LEVER AND STAND.	2361	S-236
14	16	3/4" X 8-3/4" S.F. HD. BOLTS WITH HEX. NUTS & PL. WASHERS.		
15	8	3/4" X 2" S.F. HD. BOLTS WITH HEX. NUTS.		
16	18	3/4" X 4-1/2" GAL. IRON LAG SCREWS.		
17	4	LEVER STANDS.	176886	73905
18	2	TIE STRAPS.	2002	S-200
19	2	OPERATING RODS	33114	S-331
20	2	CIRCUIT CONTROLLER WITH POINT DETECTOR AND ROD.		73905

NOTE:-

- PIPE CARRIERS SHALL BE NOT MORE THAN 8'-0" CENTERS.
- FOR BONDING AND INSULATION SEE PLAN S-803.
- WHERE SWITCHES ARE PROTECTED BY SIGNAL:
CROSSOVER BETWEEN MAIN TRACKS SHALL BE EQUIPPED AS SHOWN WITH LOCK LEVER 13 IN CENTER OF CROSSOVER.
- WHERE SWITCHES ARE NOT PROTECTED BY SIGNALS AND MECHANICAL SWITCH LOCKING IS APPROVED BY THE GENERAL MANAGER.
(a) CROSSOVER BETWEEN MAIN TRACK AND SIDING WHERE DERAIL PROTECTION ONLY IS DESIRED, THE PIPE LINE SHALL BE OPERATED BY THE MAIN TRACK SWITCH STAND, OMITTING LOCK LEVER 13.
(b) IF A SWITCH IS LOCATED LESS THAN 200 FT. FROM A SWITCH OF A CROSSOVER BETWEEN MAIN TRACKS, OR MAIN TRACK AND SIDING, AND BECAUSE OF LOCAL CONDITIONS, THESE SWITCH STANDS ARE LOCATED ON SAME SIDE OF TRACK, THE CROSSOVER SWITCH MUST BE LOCKED NORMAL BY THE PIPE LINE OPERATED BY THE SWITCH STAND ON OTHER END OF CROSSOVER, OMITTING LOCK LEVER 13.
(c) CIRCUIT CONTROLLERS SHALL BE OMITTED.

REVISIONS

REDRAWN FROM APPROVED PLAN NO. S-229-A, DATED DEC. 10, 1923 AND REVISED.

C DECEMBER 30, 1932

APPROVED:- *Arthur*

1 SHEET

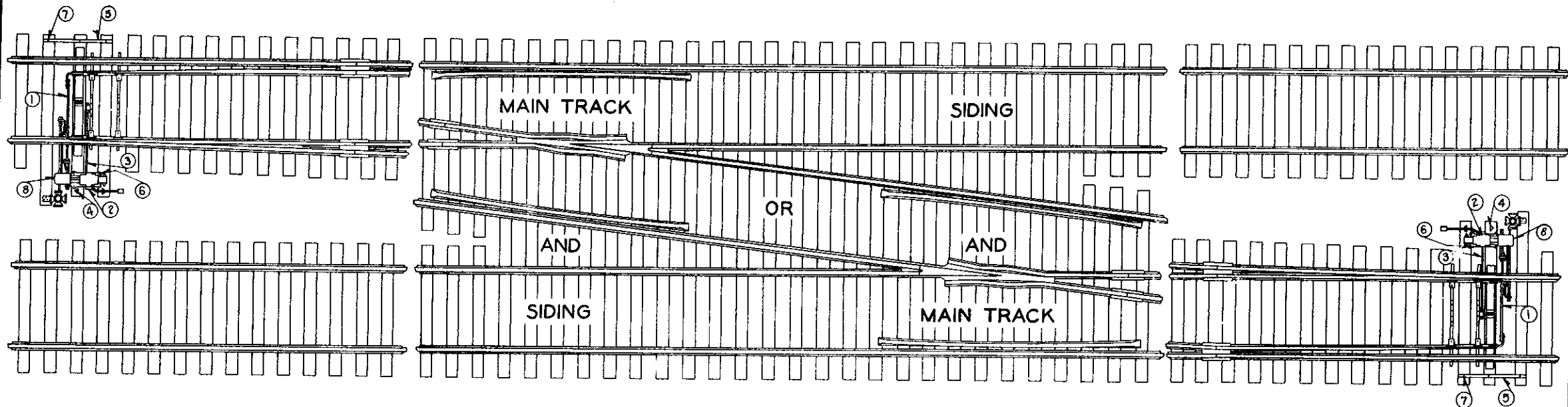
S-229-C



THE PENNSYLVANIA RAILROAD
STANDARD
ARRANGEMENT FOR LOCKING
NON-INTERLOCKED CROSSOVER

OFFICE OF CHIEF SIGNAL ENGINEER, PHILADELPHIA, PA., OCTOBER 9, 1926

Approved: *Arthur* Chief Signal Engineer
Approved: *Arthur* Engineer of Standards
Approved: *Arthur* Chief Engineer



ASSEMBLAGE

ITEM	REQ'D.	NAME	FIGURE	PLAN
1	2	FRONT AND LOCK RODS	30515	S-305
2	2	SWITCH MECHANISMS		73905
3	2	OPERATING RODS	33114	S-331
4	4	LEVER STANDS	176886	73905
5	2	TIE STRAPS	2002	S-200
6	8	$\frac{1}{2} \times 8 \frac{1}{2}$ " SQ. HD. BOLTS WITH PL. WASHERS AND HEX. NUTS		
7	6	$\frac{3}{4} \times 4 \frac{1}{2}$ " GAL. IRON LAG SCREWS		
8	2	CIRCUIT CONTROLLER WITH POINT DETECTOR AND ROD.		73905

NOTE:-

1. FOR BONDING AND INSULATION SEE PLAN S-803.
2. IF LOCAL CONDITIONS WILL NOT PERMIT A SWITCH STAND BEING INSTALLED WITH THROWING ROD IN TENSION WHEN SWITCH POINTS ARE SET NORMAL FOR MAIN TRACK TRAFFIC, AND EITHER SWITCH OF THE CROSSOVER MIGHT BE OPERATED IN ERROR FOR ANOTHER SWITCH WITHIN 200 FT., ARRANGEMENT SHOWN ON PLAN S-228 OR S-229 NOTE 4-(b) SHALL BE INSTALLED.

REVISIONS

REDRAWN FROM APPROVED PLAN S-230-A, DATED 2-20-22 AND REVISED.

C DECEMBER 30, 1932.

APPROVED:- *Arthur*

1 SHEET

S-230-C

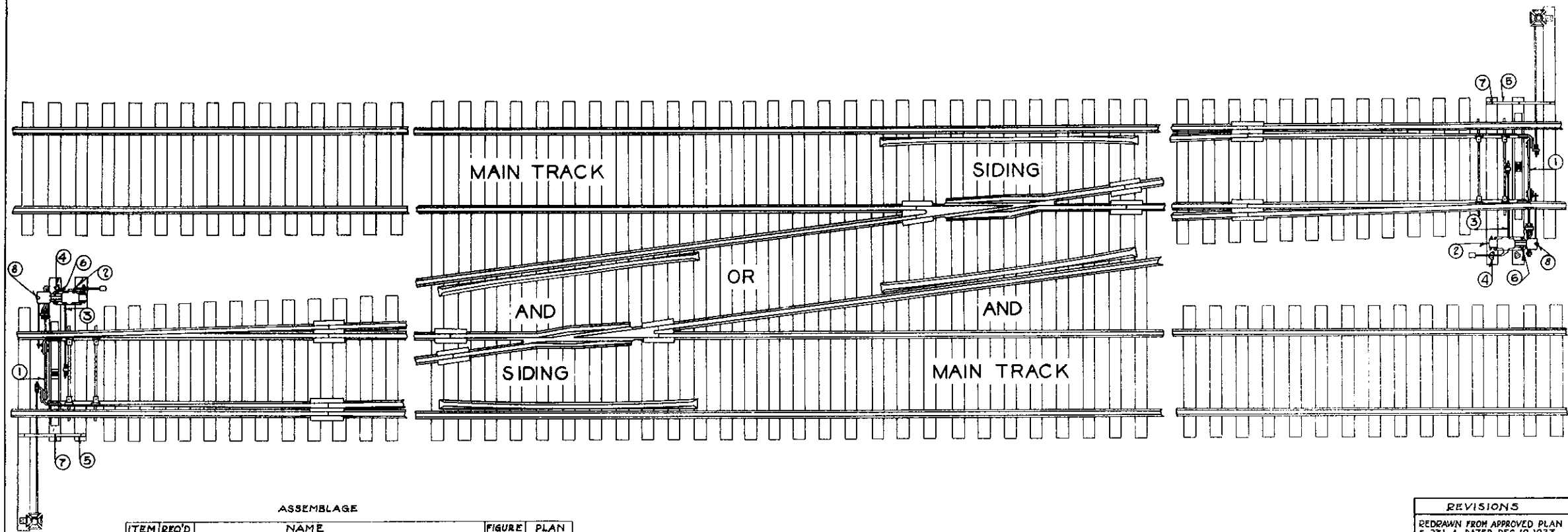


THE PENNSYLVANIA RAILROAD
STANDARD

ARRANGEMENT FOR LOCKING
NON-INTERLOCKED CROSSOVER
PROTECTED BY SIGNAL

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., NOV. 20, 1932

Approved: *Arthur* Chief Signal Engineer
Approved: *W. L. ...* Engineer of Standards
Approved: *...* Chief Engineer



ASSEMBLAGE

ITEM	REQ'D	NAME	FIGURE	PLAN
1	2	FRONT AND LOCK RODS	30516	S-305
2	2	SWITCH MECHANISMS		73905
3	2	OPERATING RODS	33114	S-331
4	4	LEVER STANDS	176886	73905
5	2	TIE STRAPS	2002	S-200
6	8	3/4"x8-3/4" SQ. BOLTS WITH HEX. NUTS & PL. WASHERS		
7	6	3/4"x4 1/2" GAL. IRON SCREWS		
8	2	CIRCUIT CONTROLLER WITH POINT DETECTOR AND ROD.		73905

NOTE:-

1. FOR BONDING AND INSULATION SEE PLAN S-803.
2. IF LOCAL CONDITIONS WILL NOT PERMIT A SWITCH STAND BEING INSTALLED WITH THROWING ROD IN TENSION WHEN SWITCH POINTS ARE SET NORMAL FOR MAIN TRACK TRAFFIC, AND EITHER SWITCH OF THE CROSSOVER MIGHT BE OPERATED IN ERROR FOR ANOTHER SWITCH WITHIN 200 FT., ARRANGEMENT SHOWN ON PLAN S-228 OR S-229 NOTE 4-(b) SHALL BE INSTALLED.

REVISIONS

REDRAWN FROM APPROVED PLAN
S-231-A, DATED DEC. 10, 1923
AND REVISED.
C DECEMBER 30, 1932.
APPROVED: *Arthur*

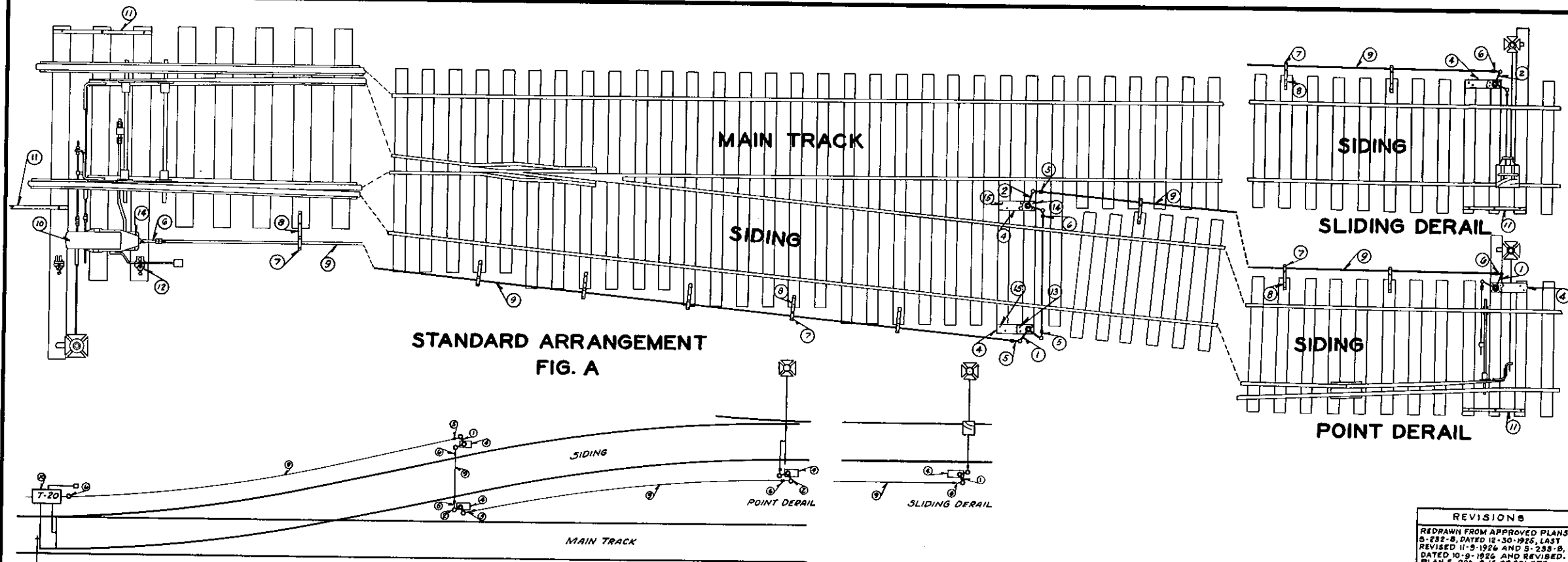
1 SHEET

S-231-C

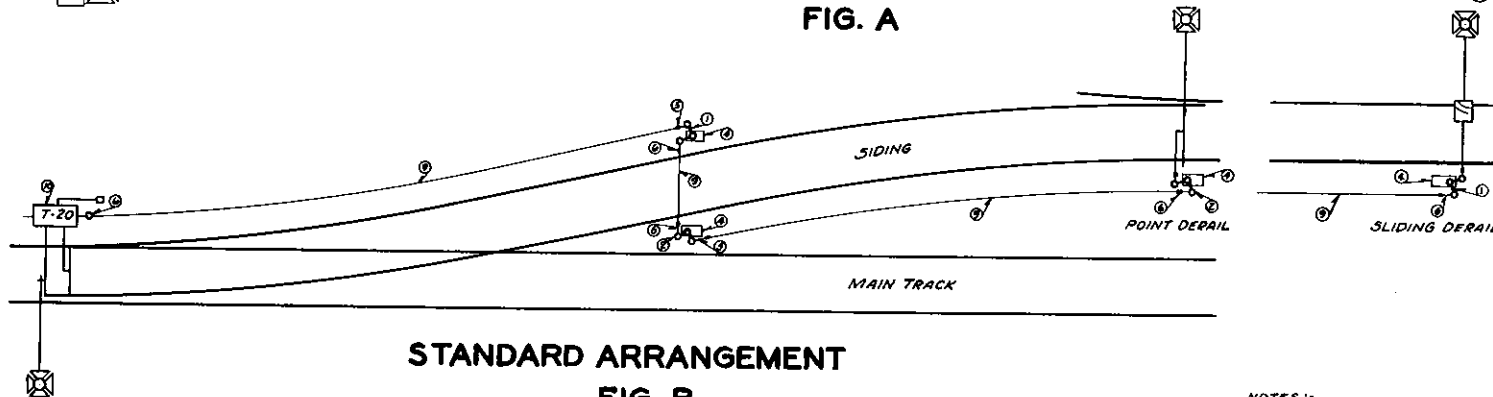


THE PENNSYLVANIA RAILROAD
STANDARD
ARRANGEMENT FOR LOCKING
NON-INTERLOCKED CROSSOVER
PROTECTED BY SIGNAL

OFFICE OF CHIEF SIGNAL ENGINEER PHILA., PA., NOV. 20, 1920
Approved: *Arthur* Chief Signal Engineer
Approved: *Arthur* Engineer of Standards
Approved: *Arthur* Chief Engineer



STANDARD ARRANGEMENT
FIG. A



STANDARD ARRANGEMENT
FIG. B

BILL OF MATERIAL

NO.	FIG. A REQD.	FIG. B REQD.	NAME	FIG. NO.	DWG. NO.	STORES CAT. REF.
1	1	2	CRANK AND STAND (WITH SLIDING DERAIL)			
	2	1	CRANK AND STAND (WITH POINT DERAIL)	1003	3-100	2A-841
2	2	1	CRANK AND STAND (WITH SLIDING DERAIL)			
	1	2	CRANK AND STAND (WITH POINT DERAIL)	1002	3-100	2A-840
4	3	3	SUPPORTING PLATE	1013	3-101	2A-1770
5	3	3	SOLID JAW	1213	3-121	2A-1249
6	3	3	TANG END WITH SCREW JAW	1219	3-121	2A-1238
7	AS REQUIRED		PIPE CARRIERS	1404	3-140	2A-570
8	AS REQUIRED		PIPE CARRIER SUPPORTS	13910	3-138	2A-2741
9	AS REQUIRED		STAND 1 IN. PIPE	1364	3-136	2A-1711
10	1	1	T-20 MOVEMENT			2A-3035
11	3	3	TIE STRAP	2002	3-200	2A-2687
12	2	2	LEVER STAND FOR T-20 PC.105173 DWG. B-8373, SH-6 U. S. & S. CO.			2A-3916
13	6	6	3/4" x 2" SQ. HD. BOLTS WITH HEX. NUTS & LOCK WASHERS			
14	10	10	3/4" x 8 1/2" SQ. HD. BOLTS WITH HEX. NUTS & LOCK WASHERS			
15	15	15	3/4" x 4 1/2" GALV. LAG SCREWS			

NOTES:

- WHERE DIFFICULTIES IN MAINTAINING PROPER ADJUSTMENTS OF PIPE LINE OR OPERATING THE DERAIL ARE ENCOUNTERED, CENTER LOCK LEVER LOCKING IN ACCORDANCE WITH DRAWING S-228 SHOULD BE INSTALLED.
- FOR BONDING AND INSULATING JOINT LOCATIONS, SEE DRAWING S-803.
- FOR ARRANGEMENT OF SHUNTING TRACK AT T-20 MOVEMENT, SEE DRAWING S-182.
- FOR SPECIFICATIONS COVERING INSTALLATION OF PIPE LINE, SEE INSTRUCTIONS 145 TO 148 INCL. OF C.E. 223 AND C. S. E. 30.
- UNLESS OTHERWISE SPECIFIED T-20 MOVEMENTS SHALL BE EQUIPPED WITH POINT DETECTOR.
- FOR FRONT AND LOCK RODS, OPERATING RODS, ETC., SEE DRAWINGS COVERING THE ITEMS REQUIRED.
- WHERE TRACK CIRCUITS ARE NOT IN SERVICE, OR IF NO OTHER CIRCUITS ARE INVOLVED, THE CIRCUIT CONTROLLER FOR T-20 MOVEMENT SHALL BE OMITTED.
- EXCEPT AS INDICATED, ARRANGEMENT FIGURE B SHALL BE SAME AS FOR FIGURE A.

REVISIONS

REDRAWN FROM APPROVED PLANS
S-232-B, DATED 12-30-1925, LAST
REVISED 11-9-1926 AND S-232-B,
DATED 10-9-1926 AND REVISED.
PLAN S-232-B IS OBSOLETE.

1 SHEET



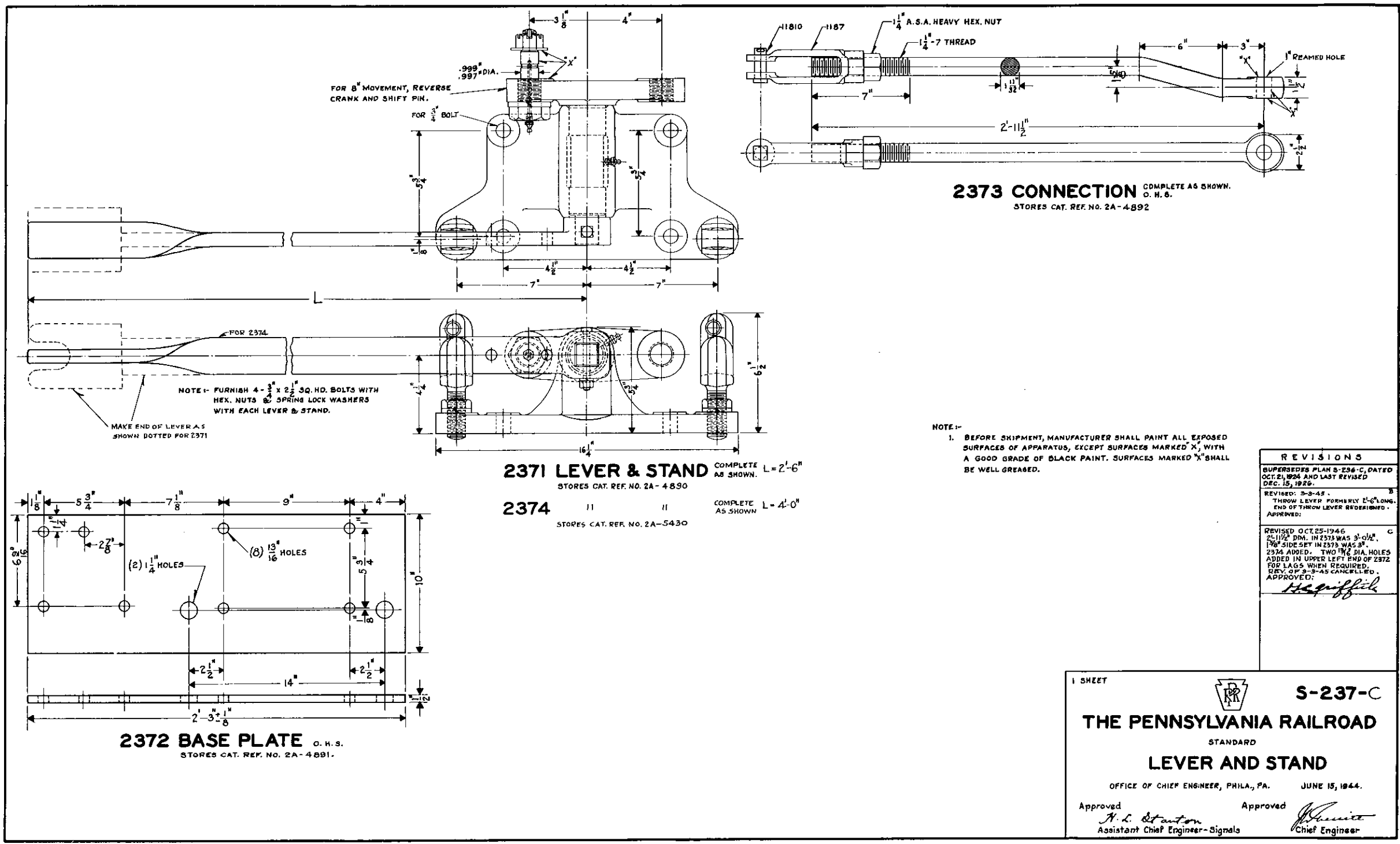
S-232-C

THE PENNSYLVANIA RAILROAD
STANDARD
LOCKING FOR NON-INTERLOCKED
TURNOUTS EQUIPPED WITH DERAIL

OFFICE OF CHIEF ENGINEER, PHILA., PA., JANUARY 25, 1950
Approved

H. G. Salmon
Assistant Chief Engineer-Signals

W. H. Smith
Chief Engineer



1 SHEET

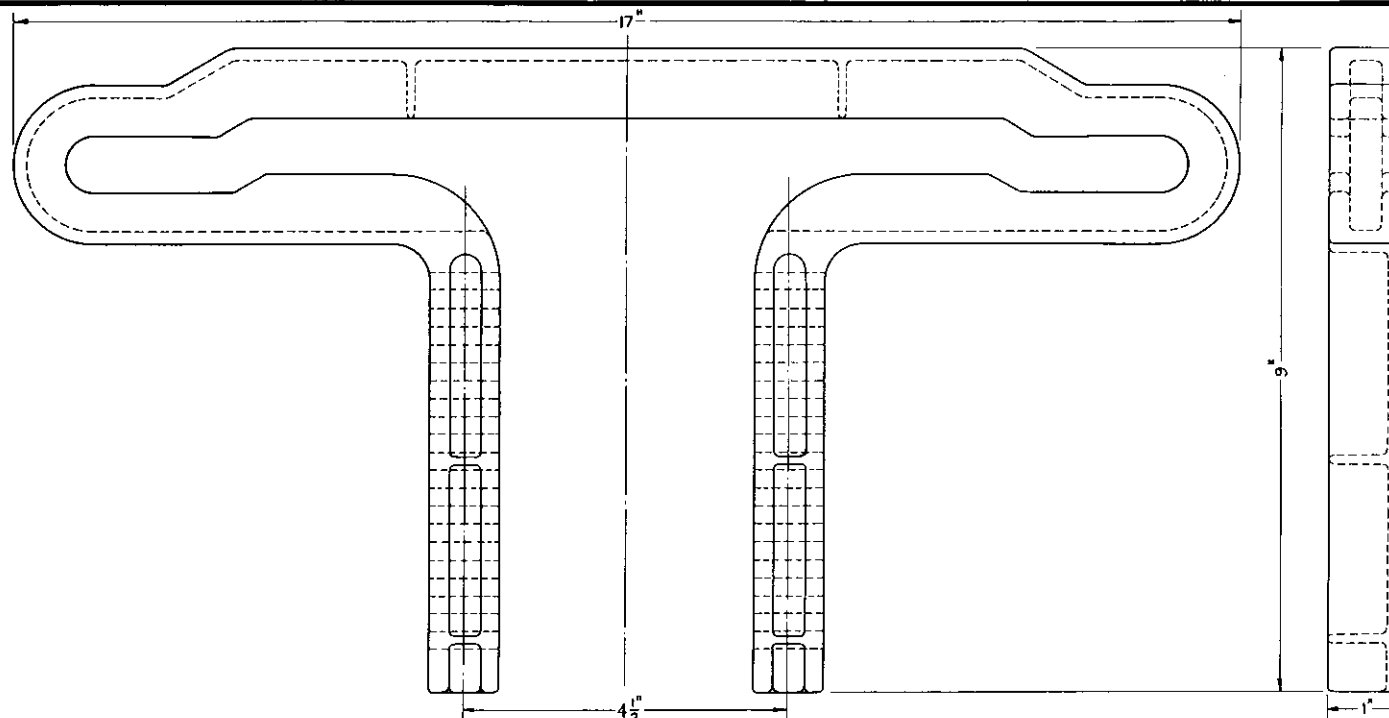
S-237-C

THE PENNSYLVANIA RAILROAD
STANDARD
LEVER AND STAND

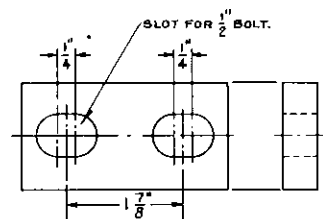
OFFICE OF CHIEF ENGINEER, PHILA., PA.
JUNE 15, 1944.

Approved
H. L. Stanton
Assistant Chief Engineer-Signals

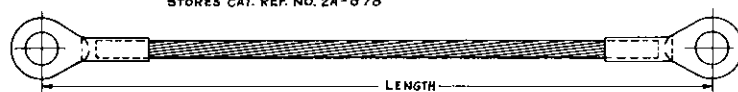
Approved
W. H. Smith
Chief Engineer



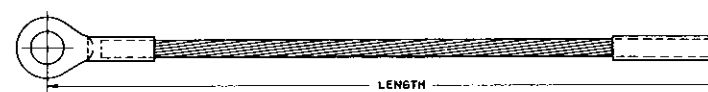
2411 DETECTOR ARM GALVANIZED.
GRAY CAST IRON A.S.T.M. SPEC. A48-3T CLASS 25.
STORES CAT. REF. NO. 2A-856



2414 CAP O.H. STEEL GALVANIZED.
STORES CAT. REF. NO. 2A-878



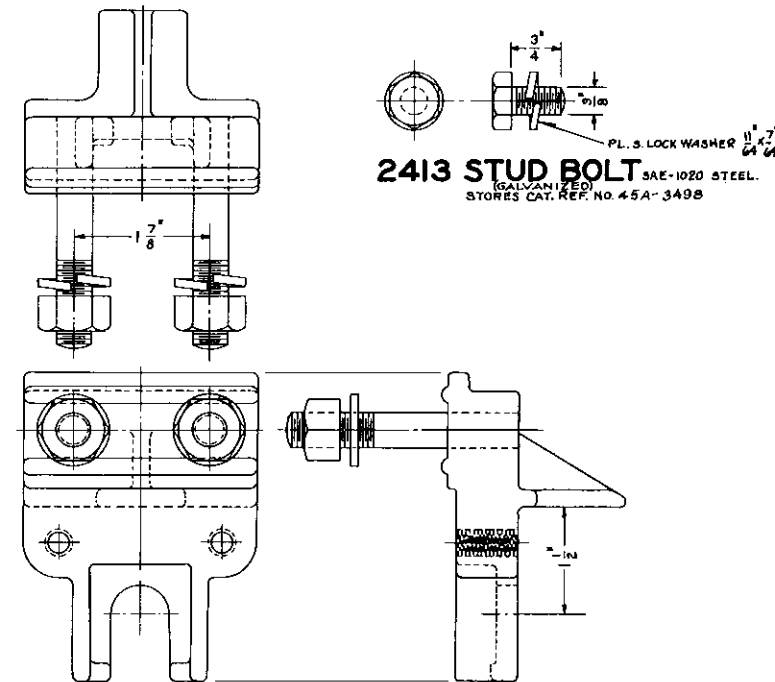
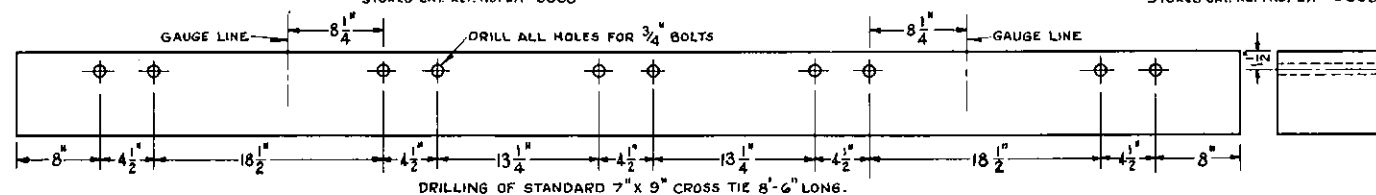
2416 CONNECTOR LENGTH = 12 INCHES
STORES CAT. REF. NO. 2A-5556



2417 CONNECTOR LENGTH = 14 INCHES
STORES CAT. REF. NO. 2A-5557

2418 CONNECTOR LENGTH = 16 INCHES
STORES CAT. REF. NO. 2A-5558

2419 CONNECTOR LENGTH = 10 FEET
STORES CAT. REF. NO. 2A-5559



2412 SUPPORT GALVANIZED
MALLEABLE IRON
STORES CAT. REF. NO. 2A-2751

REVISIONS

SUPERSEDES PLAN S-241-J, DATED
FEB. 18, 1941, LAST REVISED JUNE 5,
1942. DESIGN OF ALL PARTS CHANGED.

FOR ORDERING AND INSTALLATION SEE SHEET 2.

SHEET 1 OF 2



S-241-K

THE PENNSYLVANIA RAILROAD
STANDARD
DRAGGING EQUIPMENT DETECTOR

PARTS AND DETAILS.
OFFICE OF CHIEF ENGINEER, PHILA., PA., AUG. 20-1947

Approved
McGriffith
Assistant Chief Engineer-T.C.&S.

Approved
Whitcomb
Chief Engineer

BILL OF MATERIAL FOR 1 TRACK.

ITEM	NUMBER REQUIRED	NAME	STORES CAT. REF. NUMBER	FIGURE	PLAN
1	5	DETECTOR ARM	2A-856	2411	S-241
2	10	SUPPORT	2A-2751	2412	S-241
3	10	CAP	2A-878	2414	S-241
4	10	STUD BOLT	45A-3498	2413	S-241
5	10	3/4" X 11" STD. SQ. HD. BOLT WITH HEK. NUT & PLATE WASHER.			
6	2	CONNECTOR	2A-5556	2416	S-241
7	2	CONNECTOR	2A-5558	2418	S-241
8	1 FOR FIG. A 2 FOR FIG. B	CONNECTOR	2A-5557	2417	S-241
9	1 FOR FIG. A	CONNECTOR	2A-5559	2419	S-241
10	10 FOR FIG. A 4 FOR FIG. B	CLIP	2A-398	1846	S-184
11	1 FOR FIG. A	PARKWAY OUTLET	2A-336	24115	S-241
12	2 FOR FIG. B	PARKWAY OUTLET	2A-1544	1844	S-184

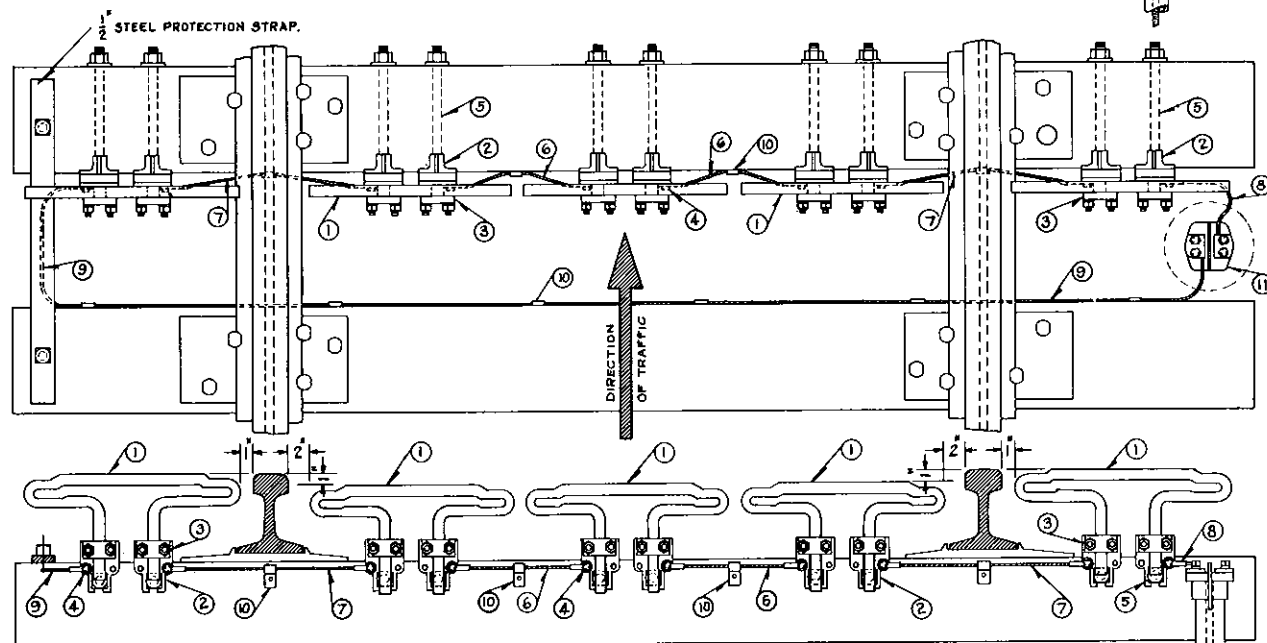


FIGURE A

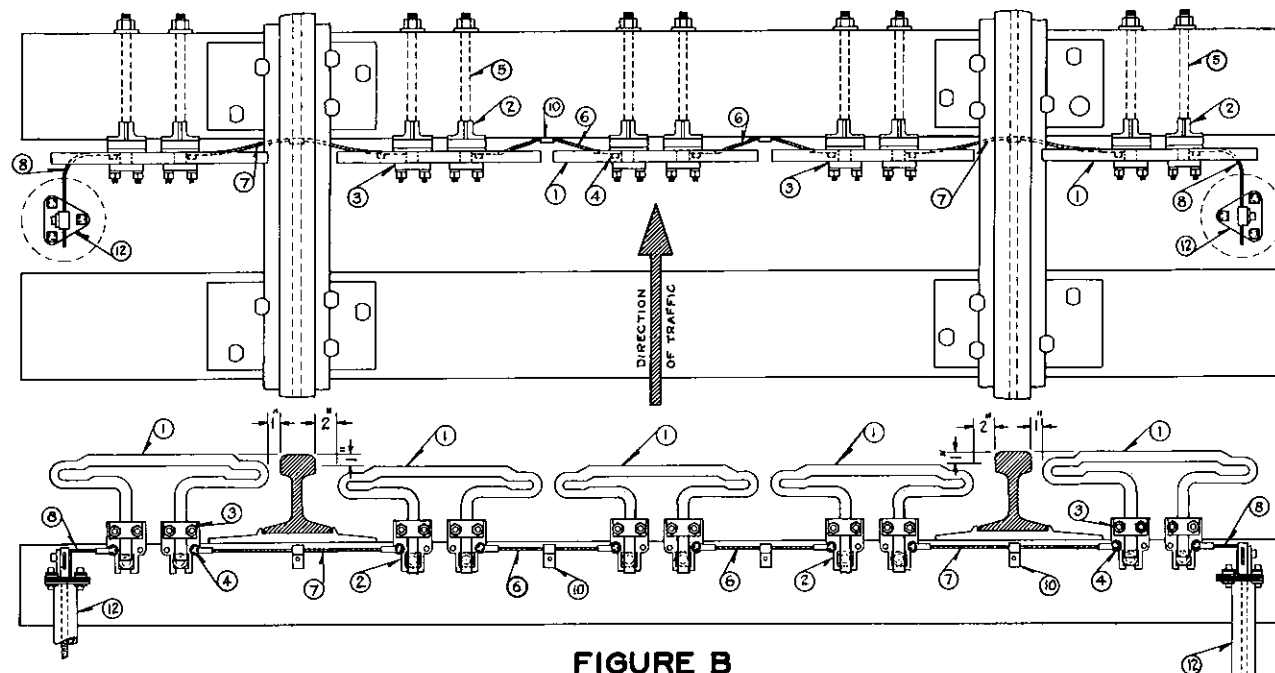


FIGURE B

- NOTES:-
1. AT LOCATIONS WHERE SNOW AND ICE DEFLECTORS ARE REQUIRED THEY SHALL BE INSTALLED IN ACCORDANCE WITH SKETCH DATED NOV. 17-1945, LAST REVISED SEPT. 16, 1947.
 2. FIBRE INSULATION IN PARKWAY OUTLETS SHALL MEET THE REQUIREMENTS OF THE ELECTRICAL AND ABSORPTION TEST OF P.R.R. SPEC. C.E. 80 (b).
 3. FOR TYPICAL CIRCUITS SEE STANDARD CIRCUIT PLAN S-879.
 4. DETECTOR ARMS SHALL BE SHIPPED IN LOTS OF NOT EXCEEDING 5, AND PREPARED FOR SHIPMENT TO PROTECT AGAINST BREAKAGE.
 5. SUPPORTS WITH CAPS SHALL BE SHIPPED IN LOTS OF NOT EXCEEDING 10 AND PREPARED FOR SHIPMENT TO PROTECT AGAINST BREAKAGE.
 6. WHEN IN PLACE, CONNECTOR AND TOP OF HEAD OF PARKWAY OUTLET SHALL BE GIVEN A HEAVY COAT OF A RUST PREVENTIVE APPROVED BY THE ASSISTANT CHIEF ENGINEER-T.C. & S.
 7. PARKWAY OUTLETS SHALL BE INSTALLED AS SHOWN WITH TOP OF OUTLET 1/2 INCH BELOW TOP OF TIE.
 8. THE FILL AROUND PARKWAY CABLE SHALL BE FREE OF CINDERS.
 9. PARKWAY CABLE SHALL BE NOT LESS THAN 2 FEET 6 INCHES BELOW THE BOTTOM OF TIE.
 10. PARKWAY OUTLETS SHALL BE FILLED WITH SAND OR COMPOUND.
- FOR PARTS AND DETAILS SEE SHEET 1.

SHEET 2 OF 2.



S-241-K

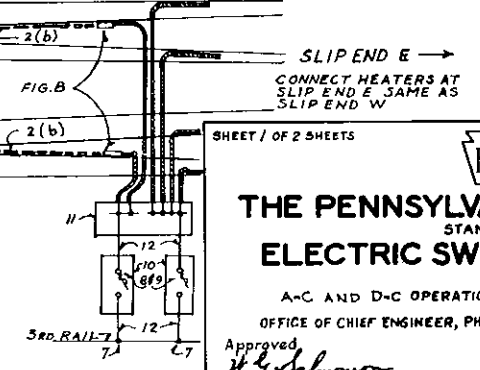
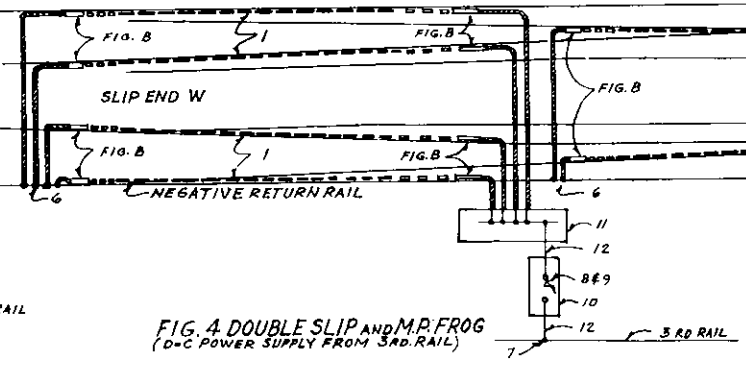
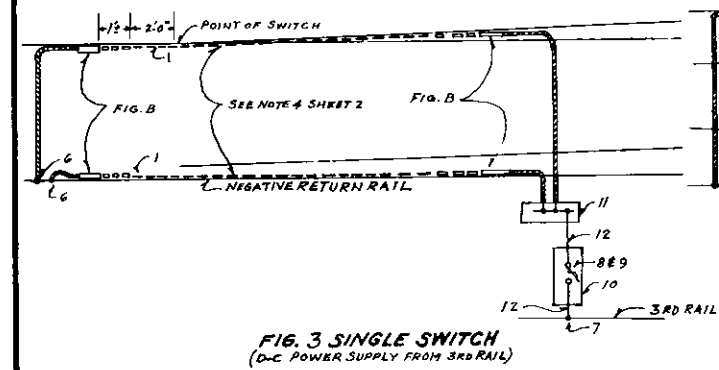
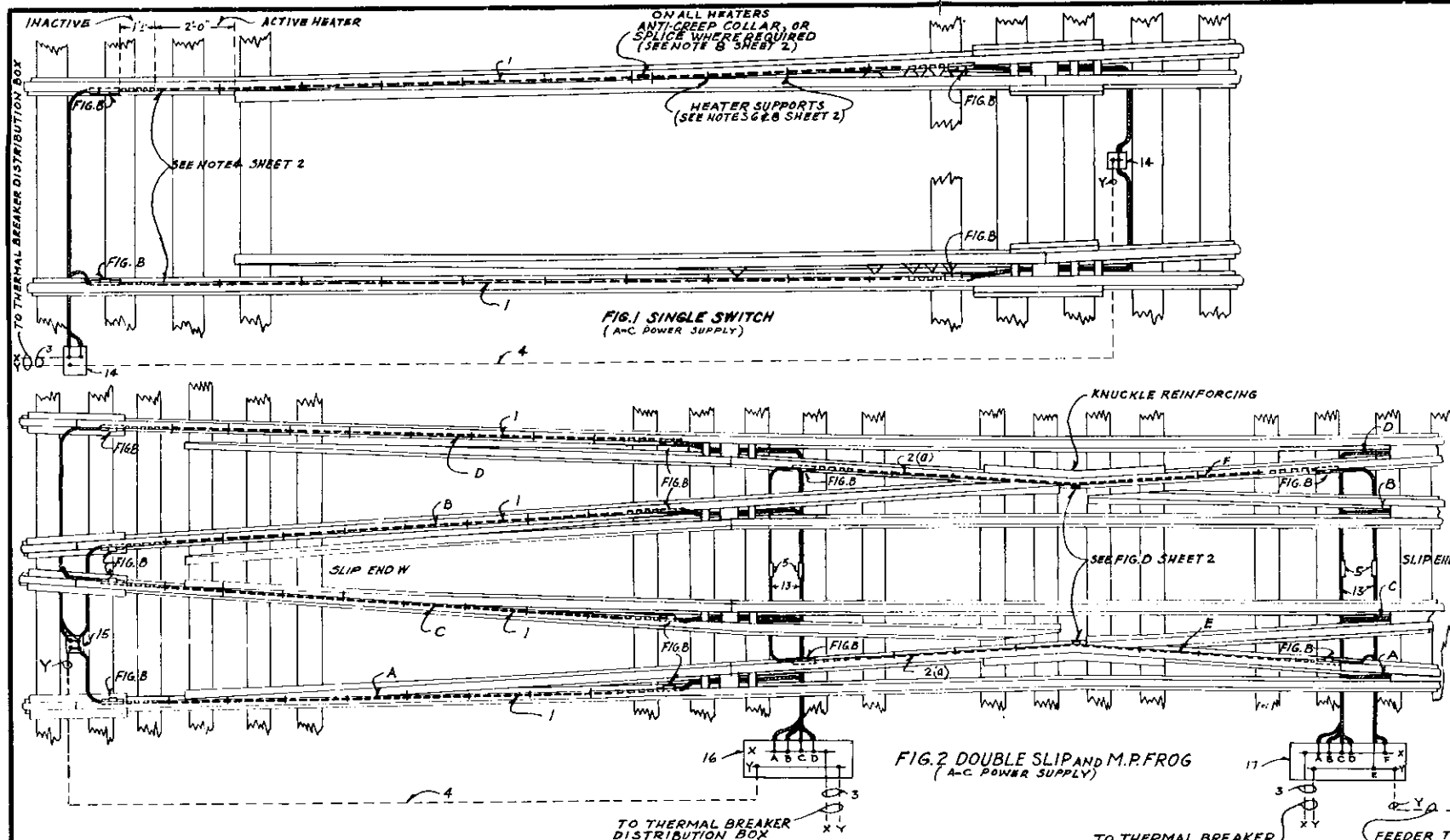
THE PENNSYLVANIA RAILROAD
STANDARD
DRAGGING EQUIPMENT DETECTOR

LAYOUTS
OFFICE OF CHIEF ENGINEER, PHILA., PA., AUG. 20-1947

Approved
W. C. Hoff
Assistant Chief Engineer-T.C. & S.

Approved
W. C. Hoff
Chief Engineer

24115 PARKWAY OUTLET COMPLETE
STORES CAT. REF. NO. 2A-336



- ## NOTES, PARTS, & SYMBOLS
- FOR DETAILS AND NOTES RELATING TO INSTALLATION, SEE SHEET NO. 2.
- 1 — TUBULAR HEATER: FOR ORDERING INFORMATION, SEE NOTE 1 ON SHEET 2 OF THIS DRAWING.
 - 2(a) — TUBULAR HEATER: FOR ORDERING INFORMATION SEE NOTE 2 (a) ON SHEET 2 OF THIS DRAWING.
 - 2(b) — TUBULAR HEATER: FOR ORDERING INFORMATION SEE NOTE 2 (b) ON SHEET 2 OF THIS DRAWING.
 - 3 — 2A-SPECIAL. CABLE, TWO-CONDUCTOR NON-METALLIC, UNDERGROUND (SIZE TO BE DETERMINED IN FIELD), STRANDED, ANNEALED COPPER, INSULATION IN ACCORDANCE WITH SPECIFICATION C.E. 210 OR I12C—SECT. 601 FOR CIRCUITS OF 600 VOLTS OR LESS.

" " " " " *1 " " 230 "

" " " " " *4 " " 440 "

" " " " " 3/8 " " 230 "
 - 4 — 2A-SPECIAL. CABLE, SINGLE-CONDUCTOR, NON-METALLIC, UNDERGROUND, STRANDED, ANNEALED COPPER, INSULATION IN ACCORDANCE WITH SPECIFICATION C.E. 210 OR I12C—SECT. 601 FOR CIRCUITS OF 600 VOLTS OR LESS.
SIZE AS FOLLOWS: UP TO 30-FOOT SWITCHES USE #6 AWG FOR 460 VOLTS

" " " " " *1 " " 230 "

" " " " " *4 " " 440 "

" " " " " 3/8 " " 230 "
 - 5 — BURNDY HYLINK YSGC-L OREGUAL. (TO APPLY, USE BURNDY HYTLOL MR-4-C OR MY29-3, OREGUAL.) WRAP RUBBER TAPE ADEHSIVE TAPE AND COMPLETE JOINT
 - 6 — 2A-590 CONNECTORS, TRACK CIRCUIT 24" LONG, STEEL STANDS WITH CENTER STRAND COPPER, AAR S16 SPEC. 151-50, DET. 17918, PL. S-179-M, SH. 1. (USE SOLDER-TYPE LUG ON HEATER CABLE LEAD). (FOR ALTERNATE CADWELD CABLE LEAD CONNECTION - SEE FIGURES F&G ON SHEET 2 OF THIS DRAWING).
 - 7 — 25E-1B2. CLAMP CASTINGS M.T., 3/4" HOLE, 150-LB 3RD RAIL. ITEM A, L.I.R.R. SWG. C-7700-HS. ALTERNATE CLAMP 25E-148 CLAMPS, BRASS WITHOUT SCREWS 3RD-RAIL LIGHTING, MACHINED AND TAPPED FOR SET SCREWS. L.I.R.R. DWG. 7710-IG (FOR ALTERNATE CADWELD CABLE CONNECTION - SEE FIGURES F&G ON SHEET 2 OF THIS DRAWING.)
 - 8 — 25E-G7G3. SWITCH, HEATER, 600-V, 60 AMPS, FUSED UNDER BLADE, QUICK BREAK, REF. G32-2, DWG. 1054, SHIELD ELECTRIC CO.
 - 9 — 25E-1274. FUSE, ENCLOSED, FERRULE CONTACT NEAR STANDARD, 60 AMPS, 600 VOLTS
 - 10 — NON-METALLIC BOX, WITH HINGED LID, TO BE MADE BY FIELD FORCES.
 - 11 — NON-METALLIC BOX TO BE MADE BY FIELD FORCES.
 - 12 — 2A-SPECIAL. CABLE, SINGLE-CONDUCTOR, NON-METALLIC, UNDERGROUND, #6AWG, 7-STRAND, ANNEALED COPPER, INSULATION IN ACCORDANCE WITH SPECIFICATION C.E. 210 OR I12C—SECT. 601 FOR 750-VOLT SERVICE.
 - 13 — HEATERS ARE FURNISHED WITH TEN-FOOT LEADS UNLESS OTHERWISE SPECIFIED IN THE PURCHASE ORDER. WHEN NECESSARY TO SPlice ADDITIONAL CABLE TO THE HEATER CABLE LEADS, THE ADDITIONAL CABLE SHALL BE:
FOR A-C SERVICE: — 2A-SPECIAL CABLE, SINGLE-CONDUCTOR, NON-METALLIC, UNDERGROUND, #6AWG, 7-STRAND, ANNEALED COPPER, INSULATION IN ACCORDANCE WITH SPECIFICATION C.E. 210 OR I12C—SECT. 601 FOR CIRCUITS OF 600 VOLTS OR LESS.
FOR D-C SERVICE: USE CABLE SAME AS ITEM 12.
 - 14 — 2A-SPECIAL. RACO TERMINAL BOX #463-108, OR EQUAL, WITH TWO WATER-PROOF BOX CONNECTORS TO FIT CABLE SIZE.
 - 15 — 2A-SPECIAL. RACO TERMINAL BOX #463-107, OR EQUAL, WITH FOUR WATER-PROOF BOX CONNECTORS TO FIT CABLE SIZE.
 - 16 — 2A-SPECIAL. RACO TERMINAL BOX #428-74, OR EQUAL, WITH FOUR WATER-PROOF BOX CONNECTORS ON BACK SIDE TO FIT CABLE SIZE. PROVIDE ONE SIX-POST #390 RACO UNIVERSAL TERMINAL, OR EQUAL.
 - 17 — 2A-SPECIAL. RACO TERMINAL BOX #428-72, OR EQUAL, WITH SIX WATER-PROOF BOX CONNECTORS (FOUR ON BACK SIDE AND TWO ON FRONT SIDE) TO FIT CABLE SIZE. PROVIDE TWO SIX-POST #390 RACO UNIVERSAL TERMINALS, OR EQUAL.
== INACTIVE PORTION OF TUBULAR HEATER
--- ACTIVE " " "
===== HEATER CABLE LEADS

REVISIONS B. AUG. 12, 1984 RACO BOX# 12-30 FORMERLY #428-40 S.C.R. ADDED FOR 250L FEEDER TO SLIP ENDS FORMERLY SHOWN WITH TWO CAMS APPROVED: W.G. SALMONSON C. JAN. 8, 1982 GENERAL REVISIONS CHANGE SHEET NO 2 TO 1 APPROVED: <i>J. H. Chatter</i>
--

SHEET / OF 2 SHEETS

 S-250- C

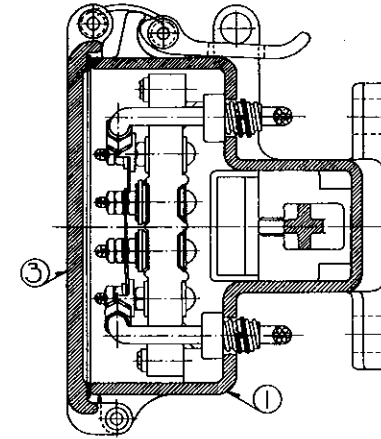
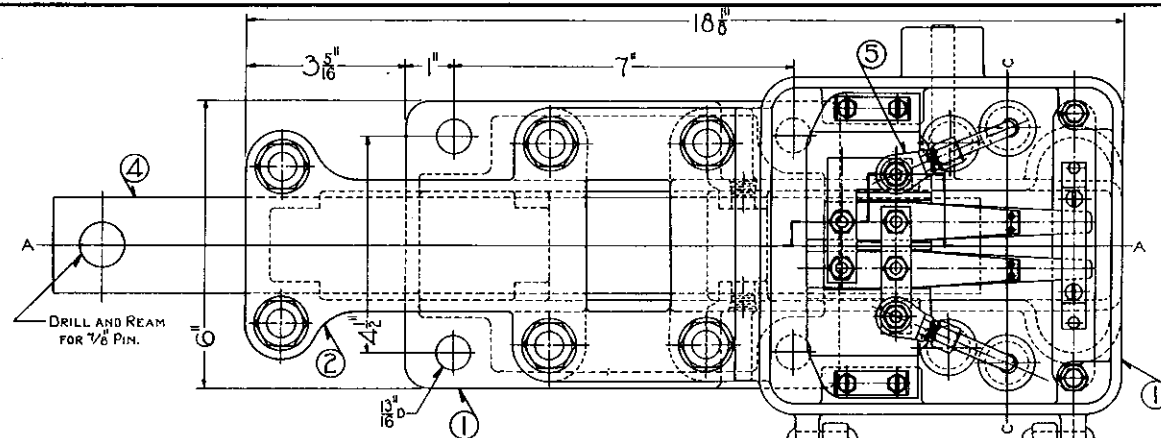
THE PENNSYLVANIA RAILROAD
STANDARD
ELECTRIC SWITCH HEATERS

A-C AND D-C OPERATION ANY LENGTH

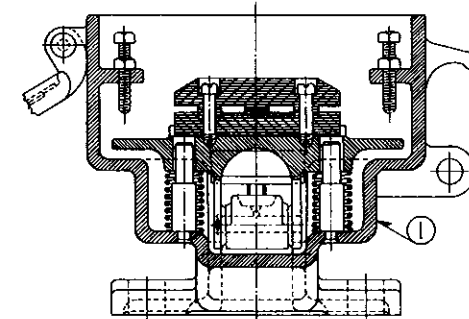
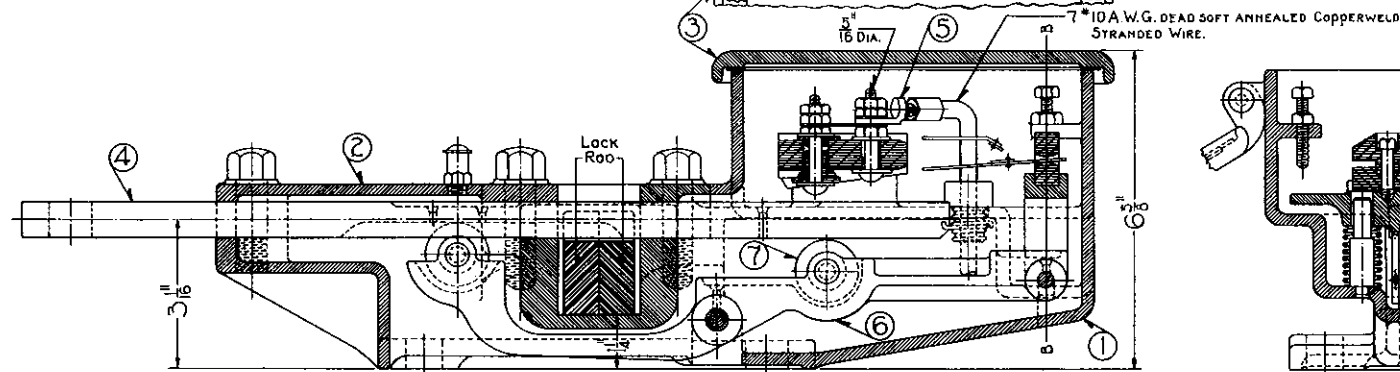
OFFICE OF CHIEF ENGINEER, PHILA., PA., DECEMBER 12, 1950.

Approved *H. S. Johnson*
Assistant Chief Engineer-Signals

Approved *J. H. Schmitt*
Chief Engineer

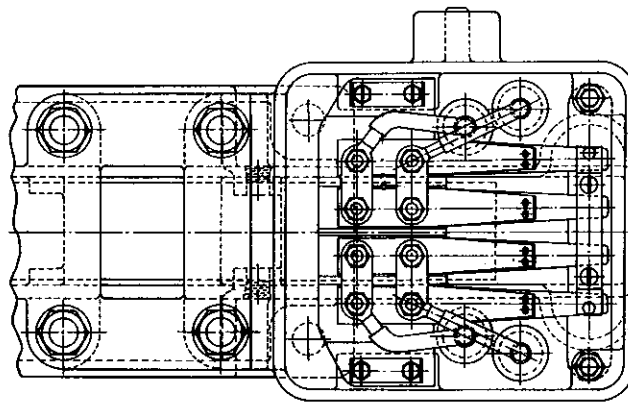


ORDER NO.	NAME.	ITEM.
2353	CASE.	1
2354	LOCK COVER.	2
2355	CIRCUIT CONTROLLER COVER.	3
2356	PLUNGER.	4
2357	DOSSERT CONNECTING LUG.	5
2358	OPERATING CRANK.	6
2359	ROLLER.	7



2551-PLUNGER LOCK COMPLETE AS SHOWN.
2552- " " " SEE NOTE.*

NOTE:-
PARTS NOT ITEMIZED SHOULD BE ORDERED FROM
CATALOG OR MFG'S. DWG. REF.
FOR BASE PLATE SEE PLAN S-256.
* ARRANGE CIRCUIT CONTROLLER AS SHOWN IN
PLAN D.



PLAN D.
SHOWING CIRCUIT CONTROLLER ARRANGED
FOR 4 CONTACTS.



1 SHEET

S-255-A

PENNSYLVANIA SYSTEM

STANDARD

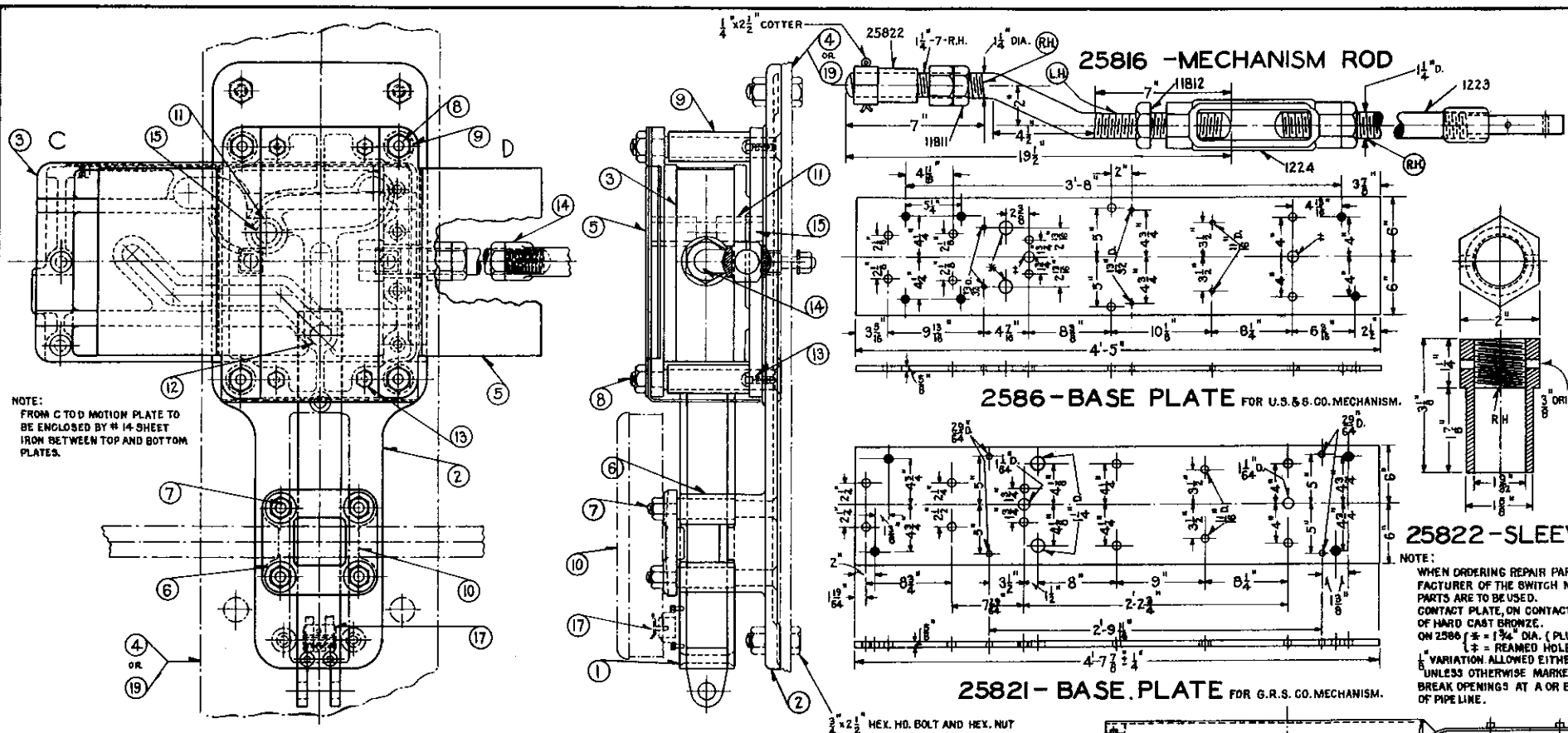
PLUNGER LOCK AND CIRCUIT CONTROLLER

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., FEB. 11, 1922

Correct

Chief Signal Engineer

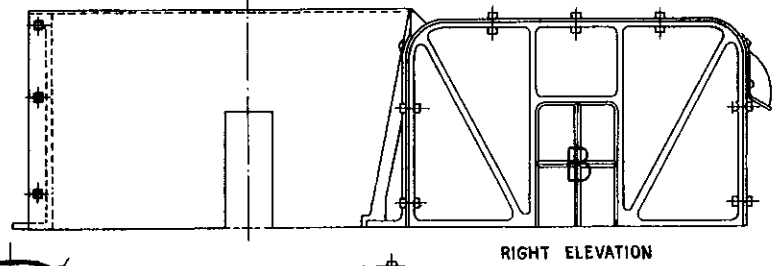
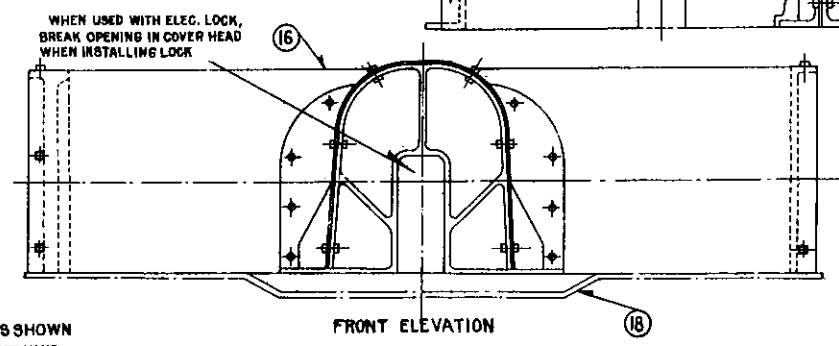
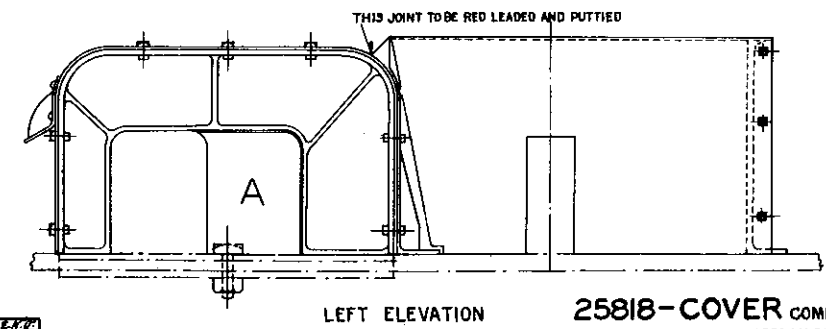
Chief Engineer



ORDERING REFERENCE

ORDER NO.	ITEM	NAME
2583	1	SLIDE BAR
2584	2	BASE
2585	3	MOTION PLATE
2586	4	BASE PLATE
2587	5	TOP PLATES
2588	6	ROLLER
2589	7	STUD WITH HEX. NUT
2590	8	STUD WITH HEX. NUT
2591	9	ROLLER
2592	10	INDICATION BOX COMPLETE
2593	11	ROLLER
2594	12	ROLLER
2595	13	CAP BOLT
2596	14	MECHANISM ROD
2597	15	PIN
2598	16	COVER COMPLETE AS SHOWN
2599	17	CONTACT BLOCK
2600	18	COVER SUPPORT
2601	19	BASE PLATE
2602	20	SLEEVE FOR MECHANISM ROD

2581-MECHANISM COMPLETE AS SHOWN WITH 25818
2582- " " " " WITHOUT 25818
SPECIFY RIGHT OR LEFT HAND



REVISIONS
REDRAWN FROM APPROVED PLAN
S-258-C, DATED 10-8-28, AND
REVISED.

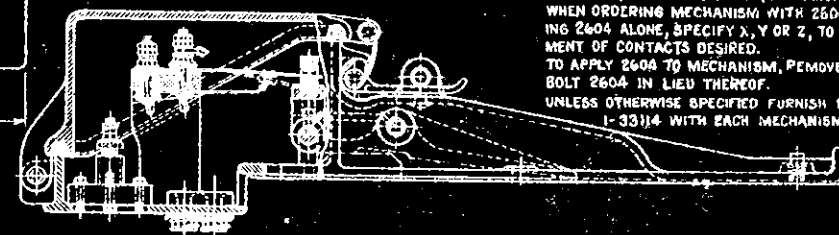
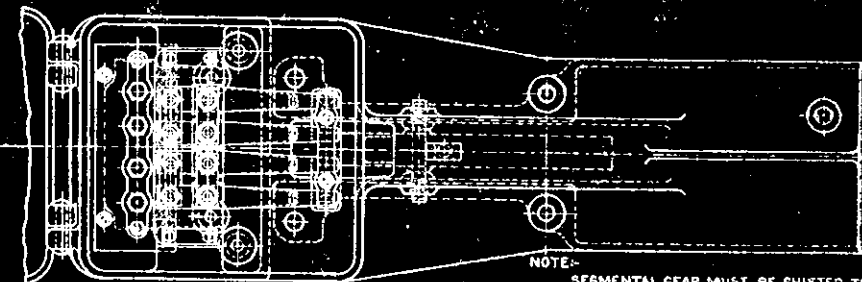
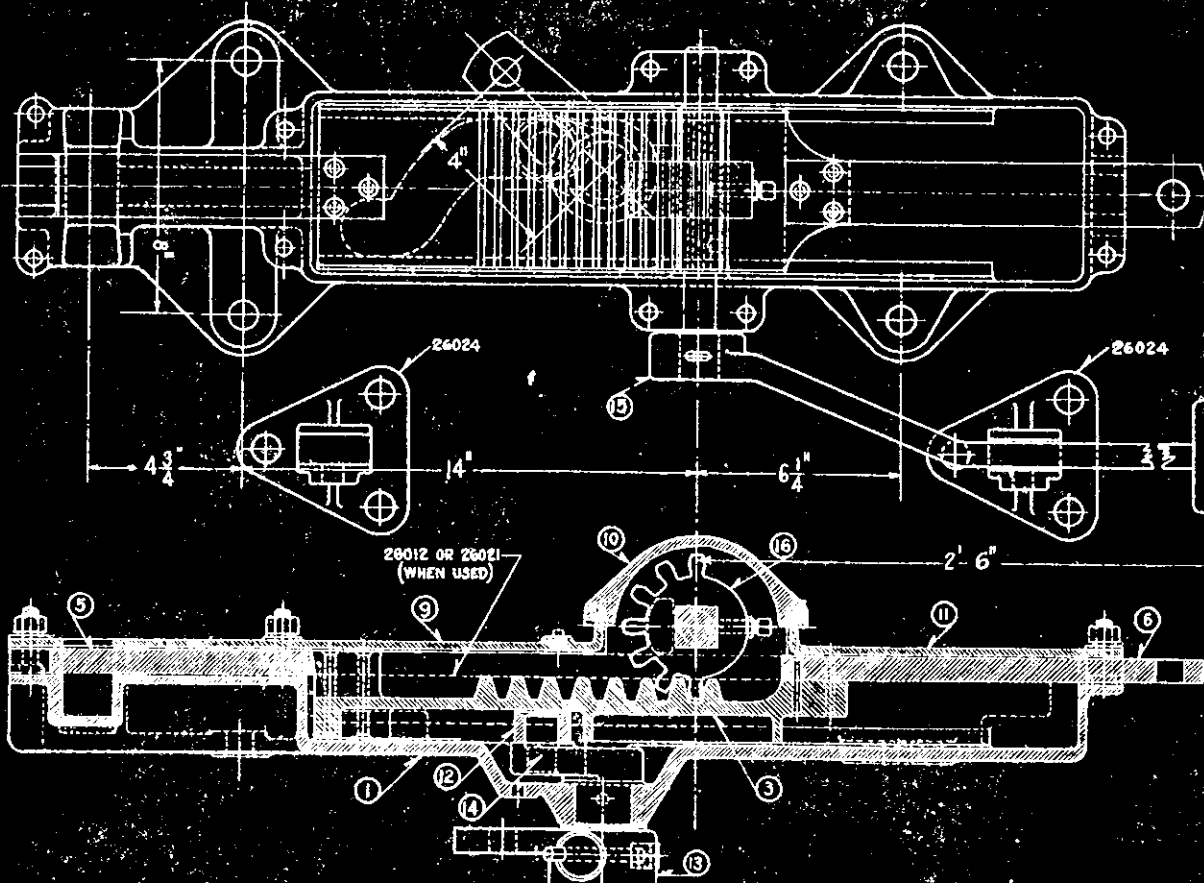
1 SHEET 9-258-D

THE PENNSYLVANIA RAILROAD
STANDARD
SWITCH MECHANISM
TYPE "G"

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., DEC. 27, 1928

Approved *A. H. R.* Chief Signal Engineer

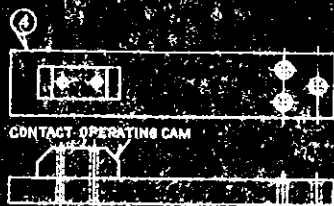
Approved *V. H. M.* Chief Engineer



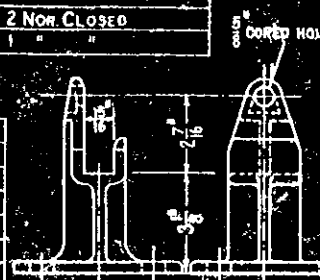
CIRCUIT CONTROLLER

2604 X	4 NOR OPEN
" Y	2 " " AND 2 NOR CLOSED
" Z	3 " " " " " "

REVISIONS



2601-MACHINE COMPLETE AS SHOWN
2602- " " WITH 2604, 2606.
2603- " " 26011, 26012, 2604.
26031- " " , 26021.

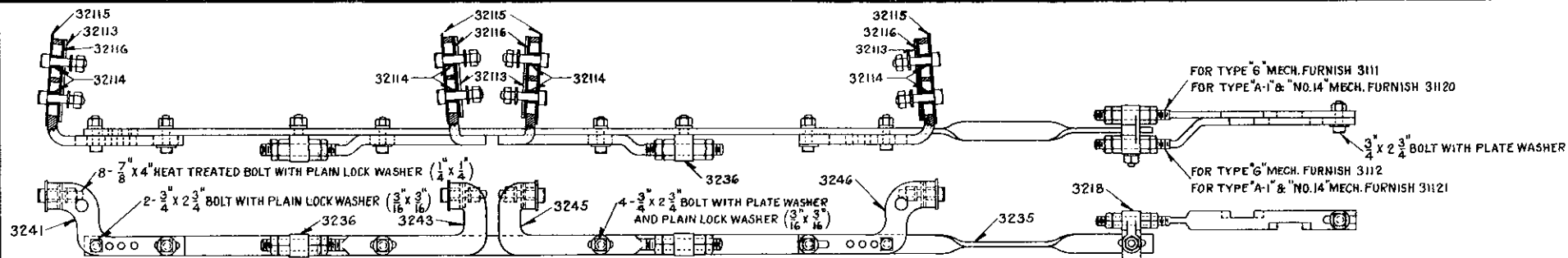


26024-PADLOCK STAND

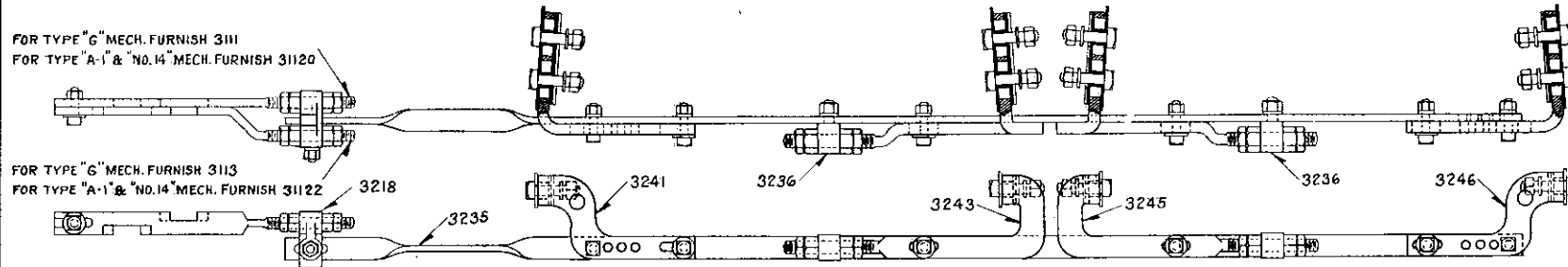
ORDERING REFERENCE		
Order No.	Item	NAME
2605	1	MACHINE CASE
2606	2	MOTION PLATE WITH 4 AND 6
2607	3	" " WITH 5 AND 6
2608	4	LOCK BAR WITH CONTACT OPERATING CAM
2609	5	" " WITHOUT "
26010	6	CONNECTING BAR
26011	7	MOTION PLATE WITHOUT 4, 5 AND 6
26012	8	LOCK AND CONNECTING BAR WITH CAM
26013	9	COVER
26014	10	COVER
26015	11	COVER
26016	12	ROLLER
26017	13	SWITCH CRANK
26018	14	OPERATING CHAIN
26019	15	LEVER AND SHAFT
26020	16	SEGMENTAL GEAR WITH SET SCREW
26021	17	SWITCH CRANK WITHOUT CAM

THE PENNSYLVANIA RAILROAD
STANDARD
SWITCH MECHANISM
HAND OPERATED

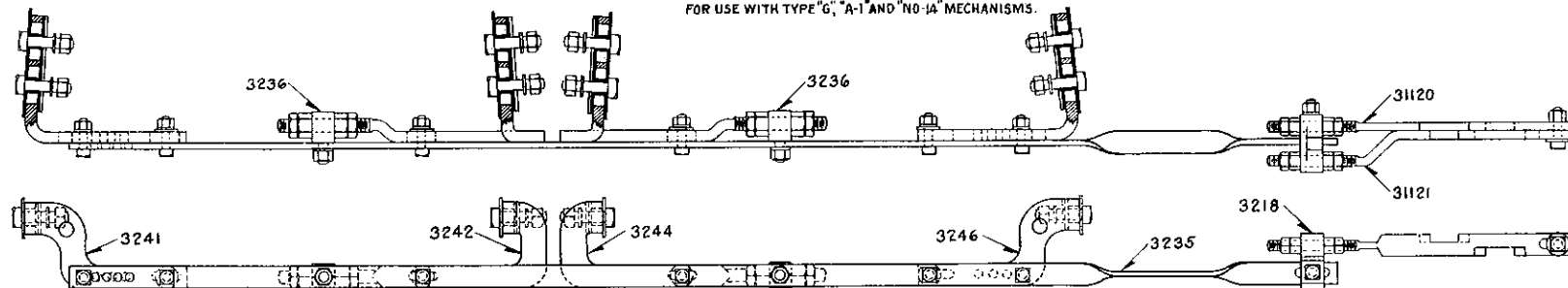
REPLACES 1914 STANDARD SWITCH MECHANISM, PUBLISHED OCTOBER 22, 1914



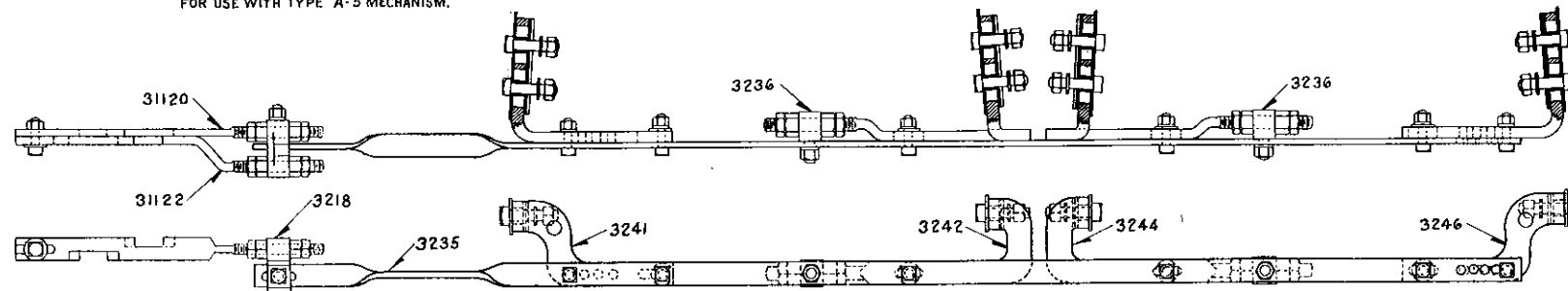
3071-R.H. ROD COMPLETE AS SHOWN. **3072-R.H. ROD** AS SHOWN WITHOUT LUG 3218 AND LOCK RODS.
FOR USE WITH TYPE "G", "A-1" AND "NO. 14" MECHANISMS.



3073-L.H. ROD COMPLETE AS SHOWN. **3074-L.H. ROD** AS SHOWN WITHOUT LUG 3218 AND LOCK RODS.
FOR USE WITH TYPE "G", "A-1" AND "NO. 14" MECHANISMS.



3075-R.H. ROD COMPLETE AS SHOWN. **3076-R.H. ROD** AS SHOWN WITHOUT LUG 3218 AND LOCK RODS 31120 & 31121.
FOR USE WITH TYPE "A-5" MECHANISM.



3077-L.H. ROD COMPLETE AS SHOWN. **3078-L.H. ROD** AS SHOWN WITHOUT LUG 3218 AND LOCK RODS 31120 & 31122.
FOR USE WITH TYPE "A-5" MECHANISM.

NOTE:-

1. RODS SHOWN ARE FOR DOUBLE SLIP SWITCHES, FOR RODS FOR SINGLE SLIP SWITCHES ORDER AS FOR DOUBLE SLIP SWITCHES AND OMIT FEET NOT REQUIRED ON REQUISITION.
2. SPECIFY ON REQUISITION TYPE OF SWITCH MECHANISM.
3. FOR BOLTS, NUTS, WASHERS, INSULATION ETC. REQUIRED WITH ALL RODS SEE 3071.
4. BOLTS SHALL BE AMERICAN STANDARD REGULAR SQUARE HEAD WITH HEX. NUTS. THREAD TO BE NC-2.
5. HEAT TREATED BOLTS AND NUTS SHALL CONFORM TO AND SHALL BE MARKED © OR ® IN ACCORDANCE WITH CURRENT ISSUE OF P.R.R. SPECIFICATION NO. C.E.9.

REVISIONS

1 SHEET

S-307-A



THE PENNSYLVANIA RAILROAD

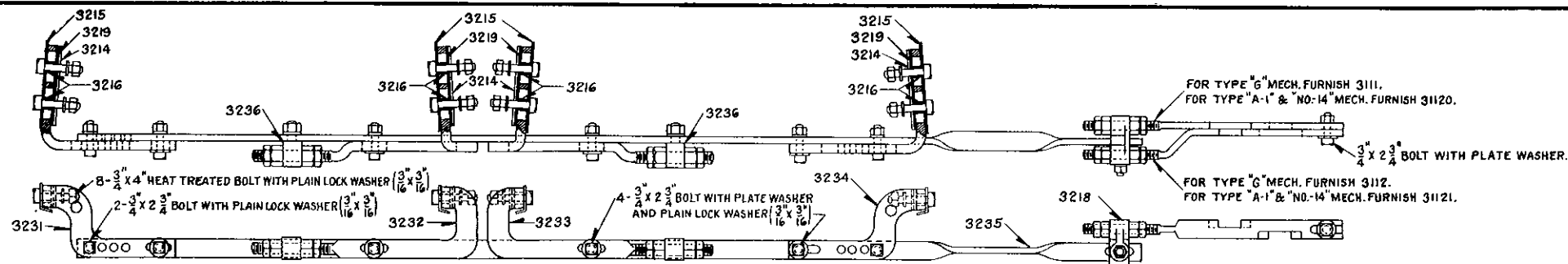
STANDARD

FRONT AND LOCK RODS

FOR SLIP SWITCHES 131 LB. R.E. AND 152 LB. P.S. RAIL.
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., AUGUST 12, 1935.

Approved *A. H. R.*
Chief Signal Engineer

Approved *M. J. Higgins*
Acting Chief Engineer

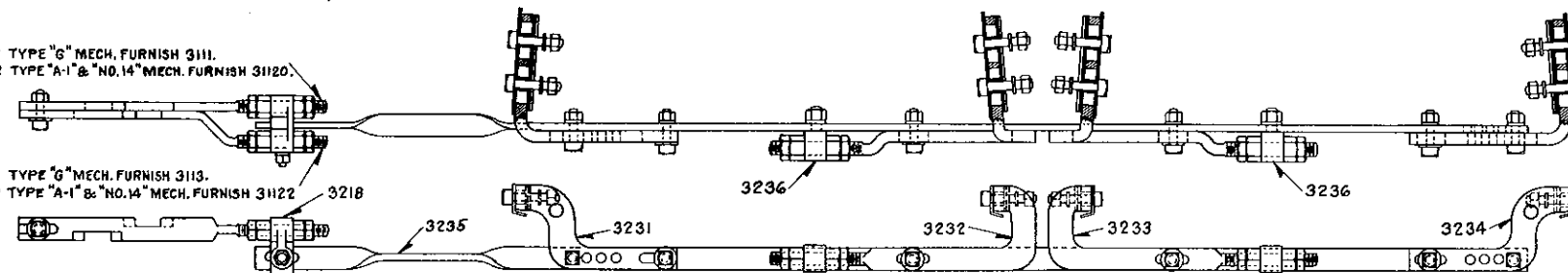


3081-R.H.ROD COMPLETE AS SHOWN.
FOR USE WITH TYPE "G", "A-1" AND "NO. 14" MECHANISMS.

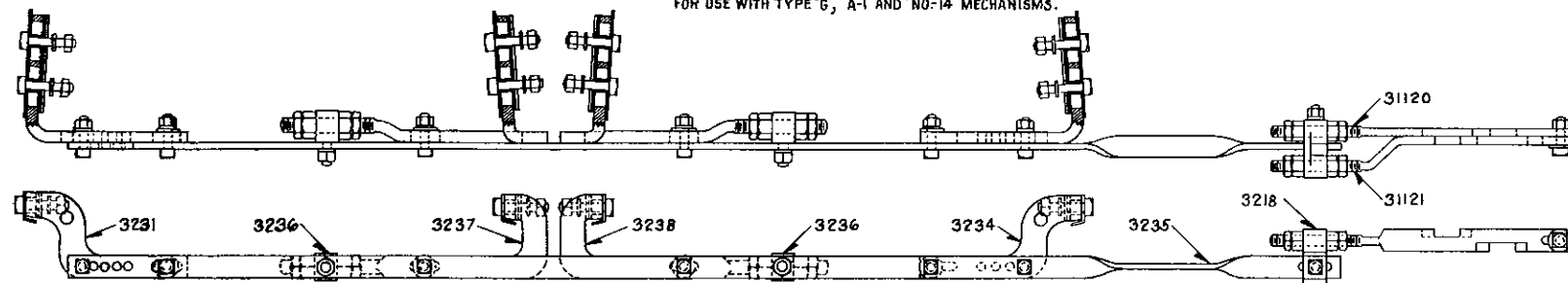
3082-R.H.ROD AS SHOWN WITHOUT LUG 3218 AND LOCK RODS.

FOR TYPE "G" MECH. FURNISH 3111.
FOR TYPE "A-1" & "NO. 14" MECH. FURNISH 31120.

FOR TYPE "G" MECH. FURNISH 3113.
FOR TYPE "A-1" & "NO. 14" MECH. FURNISH 31122.

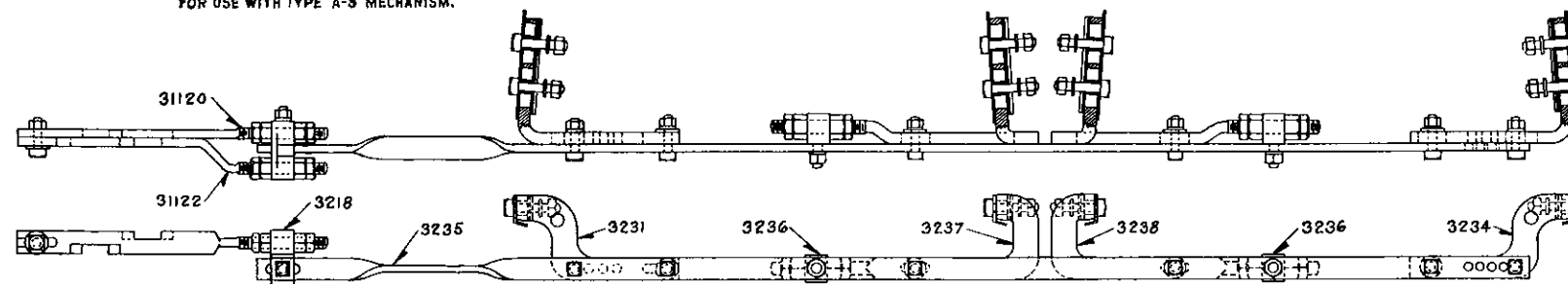


3083-L.H.ROD COMPLETE AS SHOWN. **3084-L.H.ROD** AS SHOWN WITHOUT LUG 3218 AND LOCK RODS.
FOR USE WITH TYPE "G", "A-1" AND "NO. 14" MECHANISMS.



3085-R.H.ROD COMPLETE AS SHOWN.
FOR USE WITH TYPE "A-5" MECHANISM.

3086-R.H.ROD AS SHOWN WITHOUT LUG 3218 AND LOCK RODS 31120 & 31121.



3087-L.H.ROD COMPLETE AS SHOWN.
FOR USE WITH TYPE "A-5" MECHANISM.

3088-L.H.ROD AS SHOWN WITHOUT LUG 3218 AND LOCK RODS 31120 & 31122.

NOTE 1:-

1. RODS SHOWN ARE FOR DOUBLE SLIP SWITCHES, FOR RODS FOR SINGLE SLIP SWITCHES ORDER AS FOR DOUBLE SLIP SWITCHES AND OMIT FEET NOT REQUIRED ON REQUISITION.
2. SPECIFY ON REQUISITION TYPE OF SWITCH MECHANISM.
3. FOR BOLTS, NUTS, WASHERS, INSULATION ETC. REQUIRED WITH ALL RODS SEE 3081.
4. BOLTS SHALL BE AMERICAN STANDARD REGULAR SQUARE HEAD WITH HEX. NUTS. THREAD TO BE NC-2.
5. HEAT TREATED BOLTS AND NUTS SHALL CONFORM TO AND SHALL BE MARKED (C) OR (H) IN ACCORDANCE WITH CURRENT ISSUE OF P.R.R. SPECIFICATION NO. C.E.9.

REVISIONS

REDRAWN FROM APPROVED
PLAN S-308-A, DATED 7-11-1923
AND REVISED.

1 SHEET



S-308-B

THE PENNSYLVANIA RAILROAD

STANDARD

FRONT AND LOCK RODS

FOR SLIP SWITCHES 100 LB. P.S. AND 130 LB. P.S. RAIL.
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., AUGUST 17, 1935.

Approved *[Signature]*
Chief Signal Engineer

Approved *[Signature]*
Acting Chief Engineer



FOR TYPE "A-1" MECHANISM USE SAME RODS AS FOR TYPE "A-5" MECHANISM.
FOR NO. 14 MECHANISM, FRONT RODS SHALL BE SAME AS FOR TYPE "6" MECHANISM, LOCK
RODS SHALL BE SAME AS FOR TYPE "A-5" MECHANISM.

1. BOLTS SHALL BE AMERICAN STANDARD REGULAR SQUARE HEAD WITH HEX. NUTS. THREAD TO BE NC-2.
2. FOR BOLTS, NUTS, WASHERS, INSULATION ETC. REQUIRED WITH ALL RODS SEE 309I.
3. HEAT TREATED BOLTS AND NUTS SHALL CONFORM TO AND SHALL BE MARKED (C) OR (N) IN ACCORDANCE WITH CURRENT ISSUE OF P.R. SPECIFICATION NO. C.9.

REVISIONS
Redrawn from approved plan S-309-8, dated July 11, 1923, last revised April 3, 1924 and revised.

1 SHEET

S-309-C

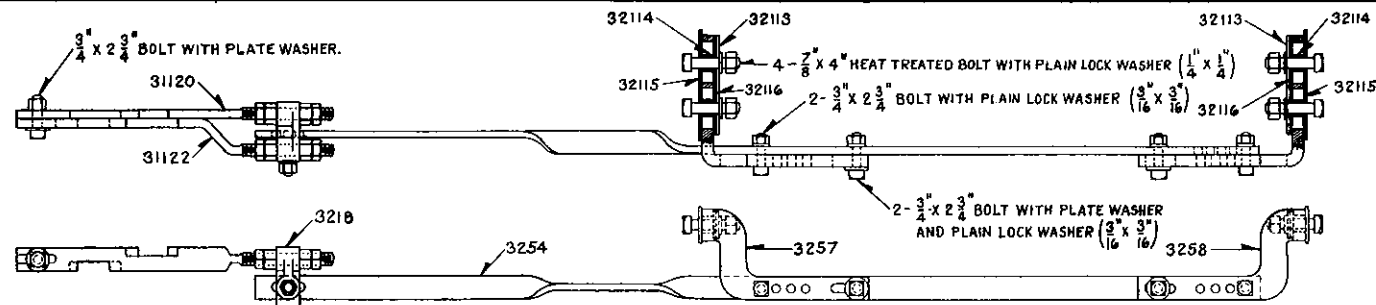


THE PENNSYLVANIA RAILROAD
STANDARD

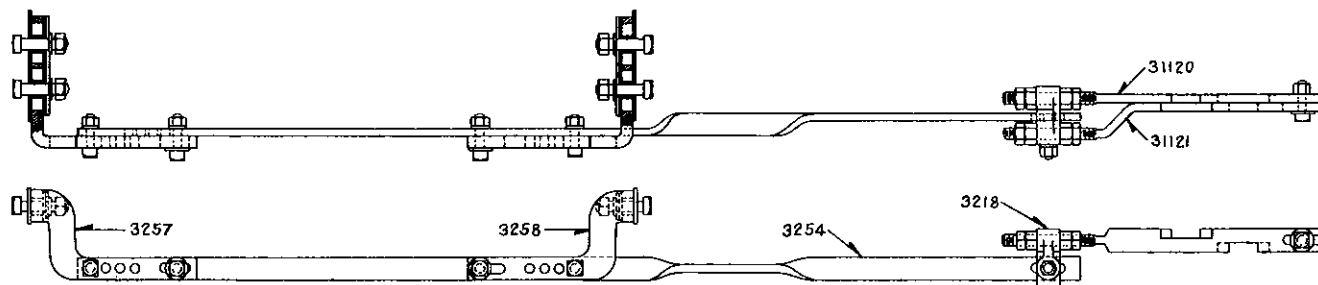
FOR MOVABLE POINT FROGS 100 LB. P.S. AND 130 LB. P.S. RAIL.
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., MARCH 25, 1935.

Approved 
Chief Signal Engineer

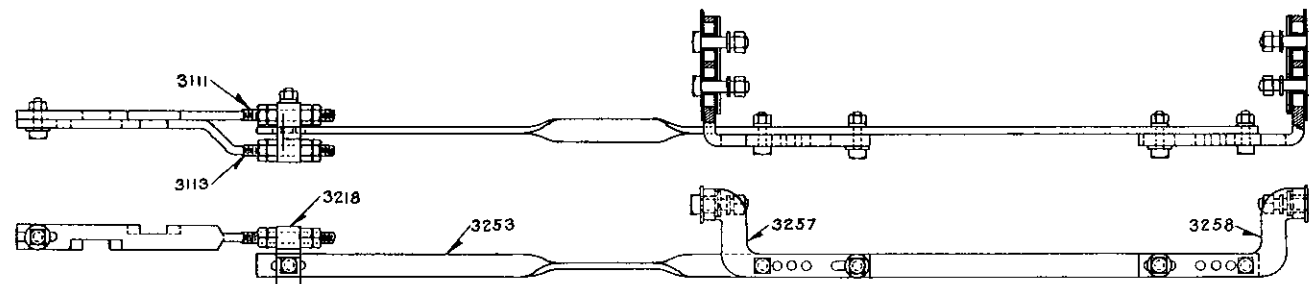
Approved
Acting Chief Engineer



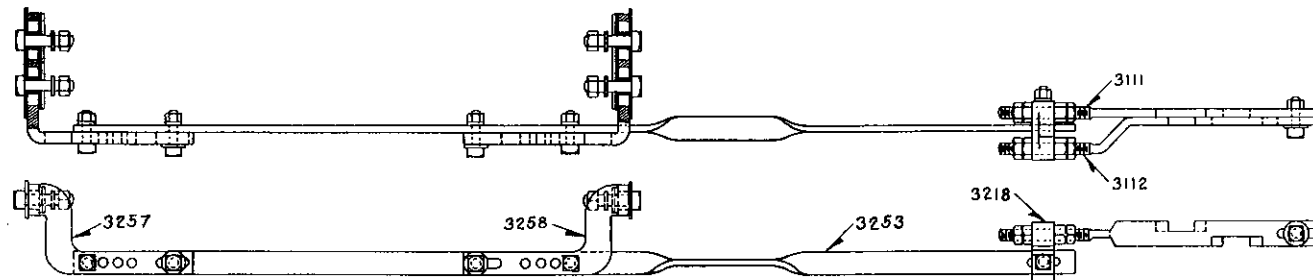
3101-L.H. ROD COMPLETE.



3103-R.H. ROD COMPLETE.



3105-L.H. ROD COMPLETE.



3107-R.H. ROD COMPLETE.

ORDERING REFERENCE

ORDER NO.	APPLICATION	FURNISH
3101	L.H. ROD FOR TYPE "A-5" MECHANISM.	AS SHOWN.
3102	" " " " " " " "	" " WITHOUT 31120, 31122 & 3218.
3103	R.H. " " " " " " " "	" " " "
3104	" " " " " " " "	" " WITHOUT 31120, 31121 & 3218.
3105	L.H. " " " " " " " "	" " " "
3106	" " " " " " " "	" " WITHOUT 3111, 3113 & 3218.
3107	R.H. " " " " " " " "	" " " "
3108	" " " " " " " "	" " WITHOUT 3111, 3112 & 3218.

FOR TYPE "A-1" MECH. USE SAME FRONT AND LOCK RODS AS FOR TYPE "A-5" MECH.
 FOR TYPE "NO. 14" MECH. USE SAME FRONT RODS AS FOR TYPE "G" MECH. AND SAME LOCK RODS AS FOR TYPE "A-5" MECH.

NOTE:-

- BOLTS SHALL BE AMERICAN STANDARD REGULAR SQUARE HEAD WITH HEX. NUTS. THREAD TO BE NC-2.
- FOR BOLTS, NUTS, WASHERS, INSULATION ETC. REQUIRED WITH ALL RODS SEE 3101.
- HEAT TREATED BOLTS AND NUTS SHALL CONFORM TO AND SHALL BE MARKED (C) OR (M) IN ACCORDANCE WITH CURRENT ISSUE OF P.R.R. SPECIFICATION NO. C.E. 9.

REVISIONS

13 SHEET

S-310-A

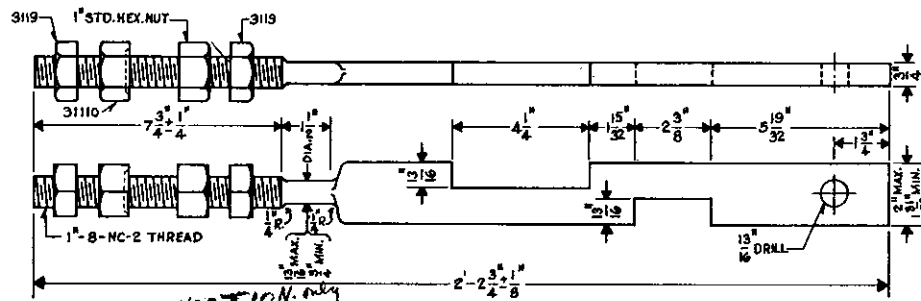


THE PENNSYLVANIA RAILROAD STANDARD FRONT AND LOCK RODS

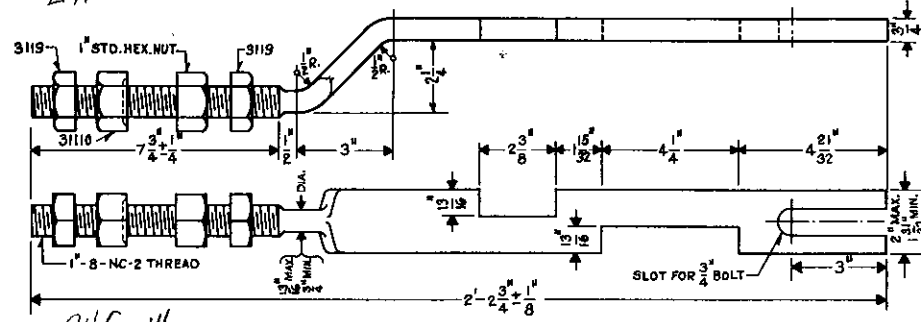
FOR MOVABLE POINT FROGS 131 LB. R.E. AND 152 LB. P.S. RAIL.
 OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., MAR. 30, 1935.

Approved *[Signature]*
 Chief Signal Engineer

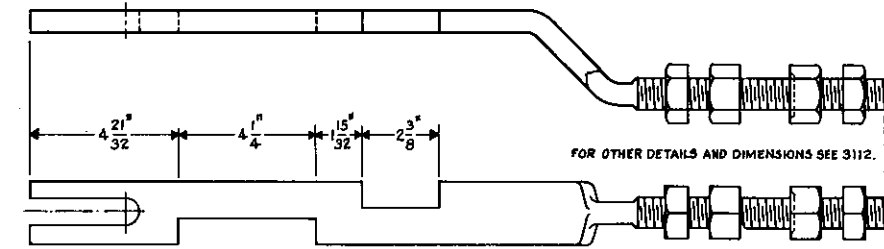
Approved *[Signature]*
 Acting Chief Engineer



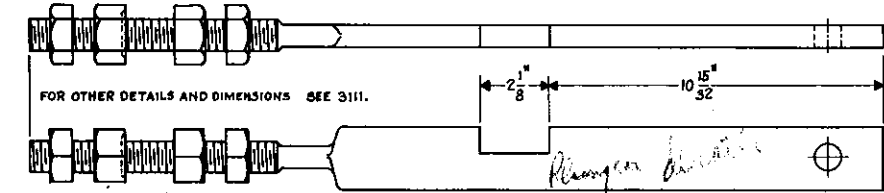
3111 LOCK ROD RIGHT OR LEFT HAND.
STORES CAT. REF. NO. 2A-2117



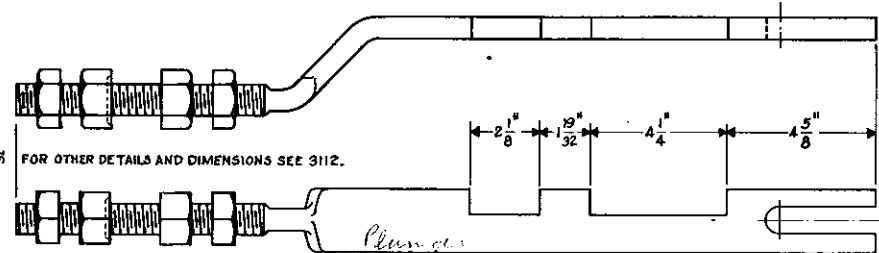
3112 LOCK ROD RIGHT HAND.
STORES CAT. REF. NO. 2A-2118-R



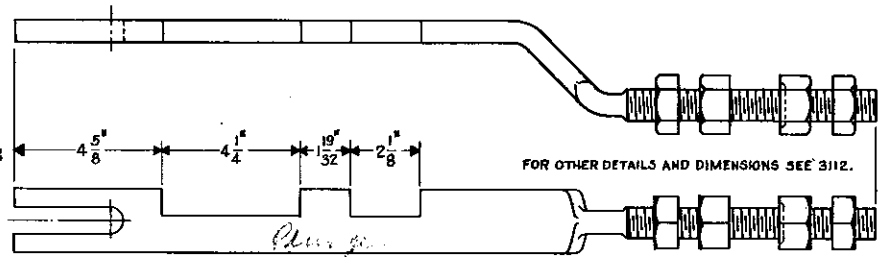
3113 LOCK ROD LEFT HAND.
STORES CAT. REF. NO. 2A-2118-L



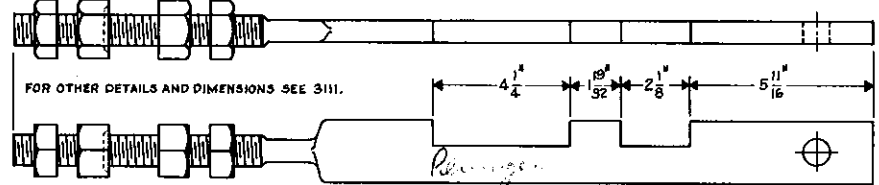
3114 LOCK ROD RIGHT OR LEFT HAND.
STORES CAT. REF. NO. 2A-2120



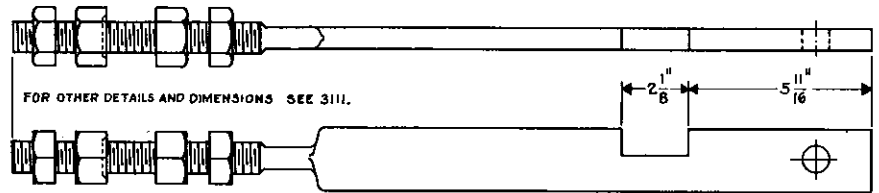
3115 LOCK ROD RIGHT HAND.
STORES CAT. REF. NO. 2A-2121-R



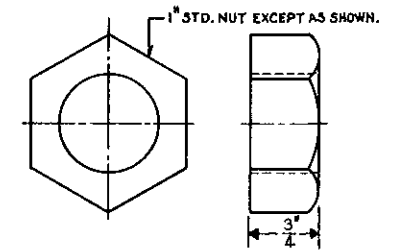
3116 LOCK ROD LEFT HAND.
STORES CAT. REF. NO. 2A-2121-L



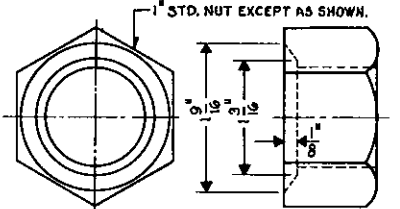
3117 LOCK ROD RIGHT OR LEFT HAND.
STORES CAT. REF. NO. 2A-2123



3118 LOCK ROD RIGHT OR LEFT HAND.
STORES CAT. REF. NO. 2A-2124



3119 NUT O. H. S.
STORES CAT. REF. NO. 2A-1596.



3110 NUT O. H. S.
STORES CAT. REF. NO. 2A-1597.

- NOTES:
- ALL RODS SHALL BE MADE OF FORGING STEEL CONTAINING 0.30 PER CENT TO 0.40 PER CENT CARBON, WITH A MAXIMUM OF 0.045 PER CENT PHOSPHORUS. THEY SHALL BE HEATED TO A TEMPERATURE OF 1550°F., QUENCHED IN OIL, REHEATED TO 1200°F. AND ALLOWED TO COOL SLOWLY.
 - MANUFACTURER SHALL PAINT EACH LOCK ROD WITH ONE COAT OF A GOOD GRADE BLACK PAINT.

REVISIONS
REDRAWN FROM APPROVED PLAN S-311-F, DATED JULY 5, 1927, LAST REVISED MAR. 20, 1929 AND REVISED AS FOLLOWS—SHEETS 1 & 2 FORMERLY 1 SHEET. RODS 31123, 31124, 31125 & 31126 FORMERLY 2 1/2" LONG. SHEET 3, NOTE 2 SHEET 1, AND STORES CAT. REF. NUMBERS ADDED. RODS 31127 & 31128, SH. 2, ADDED.

FOR DETAIL OF LOCK RODS 31120 TO 31128 INCL., SEE SHEET NO. 2 OF THIS PLAN.

TO DETERMINE CORRECT LOCK RODS FOR USE WITH EACH TYPE OF OPERATING MECHANISM, SEE SHEET NO. 3 OF THIS PLAN.

SHEET 1 OF 3



S-311-G

THE PENNSYLVANIA RAILROAD

STANDARD

LOCK RODS

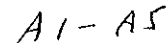
OFFICE OF CHIEF ENGINEER, PHILA., PA., MAY 10, 1945.

Approved

McGriffith
Assistant Chief Engineer-T.C.&S.

Approved

Whitcomb
Chief Engineer



FOR OTHER DETAILS AND DIMENSIONS SEE 3112.

4 $\frac{1}{4}$ " 1 $\frac{15}{32}$ " 2 $\frac{3}{8}$ " 5 $\frac{19}{32}$ "

A1-A5

Technical drawing of a pipe fitting assembly. The drawing shows a side view of a pipe with a flange and a flange nut. The dimensions are as follows:

- Overall length: $5 \frac{19}{32}$ "
- Distance from end to first flange: $2 \frac{3}{8}$ "
- Distance between flanges: $1 \frac{15}{32}$ "
- Distance from last flange to end: $4 \frac{1}{4}$ "

FOR OTHER DETAILS AND DIMENSIONS SEE 3112.

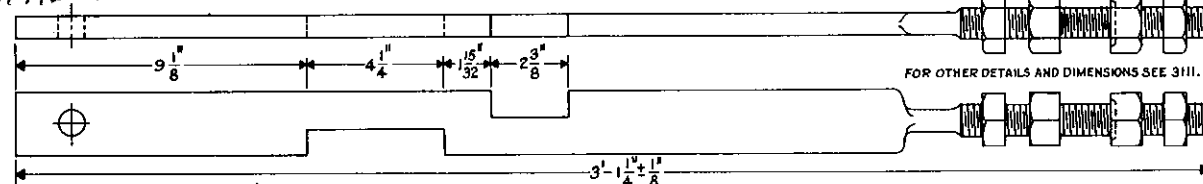
A1-A5

FOR OTHER DETAILS AND DIMENSIONS SEE 3111.

4 $\frac{1}{4}$ " 15 $\frac{1}{32}$ " 2 $\frac{3}{8}$ " 10 $\frac{1}{16}$ "

3' - 1 $\frac{1}{2}$ " $\frac{1}{8}$ "

M-M2-M22-M22A-M23



M-M2-A-22-M22A

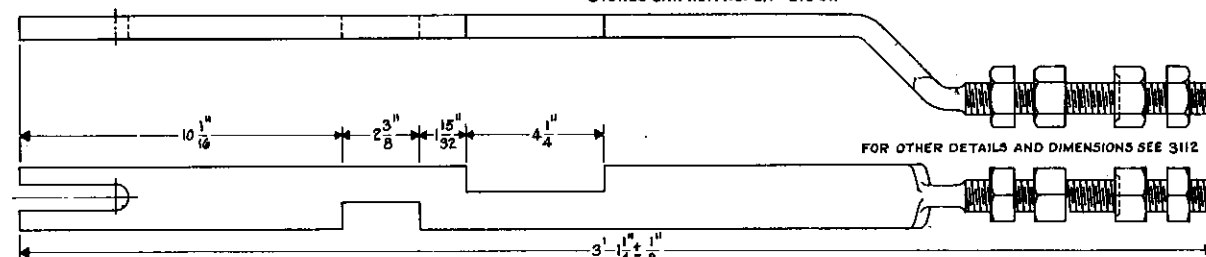
FOR OTHER DETAILS AND DIMENSIONS SEE 3112.

2 $\frac{3}{8}$ " 1 $\frac{15}{32}$ " 4 $\frac{1}{4}$ " 9 $\frac{1}{8}$ "

3 - 1 $\frac{1}{4}$ " + $\frac{1}{8}$ "

FOR OTHER DETAILS AND DIMENSIONS SEE 3112.

M-103 - 1/22-1/22A



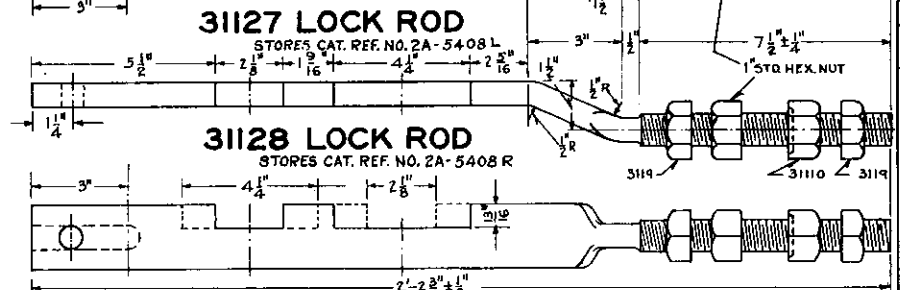
$A_1 A_2 A_3 \dots A_{22} A$

31125 LOCK ROD LEFT HAND
STORES CAT. REF. NO. 2A-2130L

4 $\frac{15}{16}$ " 4 $\frac{1}{4}$ " 1 $\frac{1}{16}$ " 2 $\frac{5}{8}$ " 2 $\frac{3}{8}$ " 7" OF PERFECT THREAD 3119 3110 3119

31127 LOCK ROD

STORES CAT. REF. NO. 2A-5408 L
2 1/2" - 1 9/16" - 4 1/2" - 2 5/8"



SIDE ELEVATION OF 31127 & 31128
 NOTCHES IN FULL LINES APPLY TO 31128.
 " " DOTTED LINES APPLY TO 31127.

NOTES:-
1. ALL RODS SHALL BE MADE OF FORGING STEEL CONTAINING 0.30 PER CENT TO 0.40 PER CENT CARBON, WITH A MAXIMUM OF 0.045 PER CENT PHOSPHOROUS. THEY SHALL BE HEATED TO A TEMPERATURE OF 1550° F., QUENCHED IN OIL, REHEATED TO 1200° F. AND ALLOWED TO COOL SLOWLY.
2. MANUFACTURER SHALL PAINT EACH LOCK ROD WITH ONE COAT OF A GOOD GRADE BLACK PAINT.

FOR DETAILS OF LOCK RODS 3111 TO 3118 INCLUSIVE, SEE SHT. 1 OF THIS DWG. TO DETERMINE CORRECT LOCK RODS FOR USE WITH EACH TYPE OPERATING MECHANISM, SEE SHEET 3 OF THIS DRAWING.

SHEET 2 OF 3.



S-311-G

THE PENNSYLVANIA RAILROAD

STANDARD

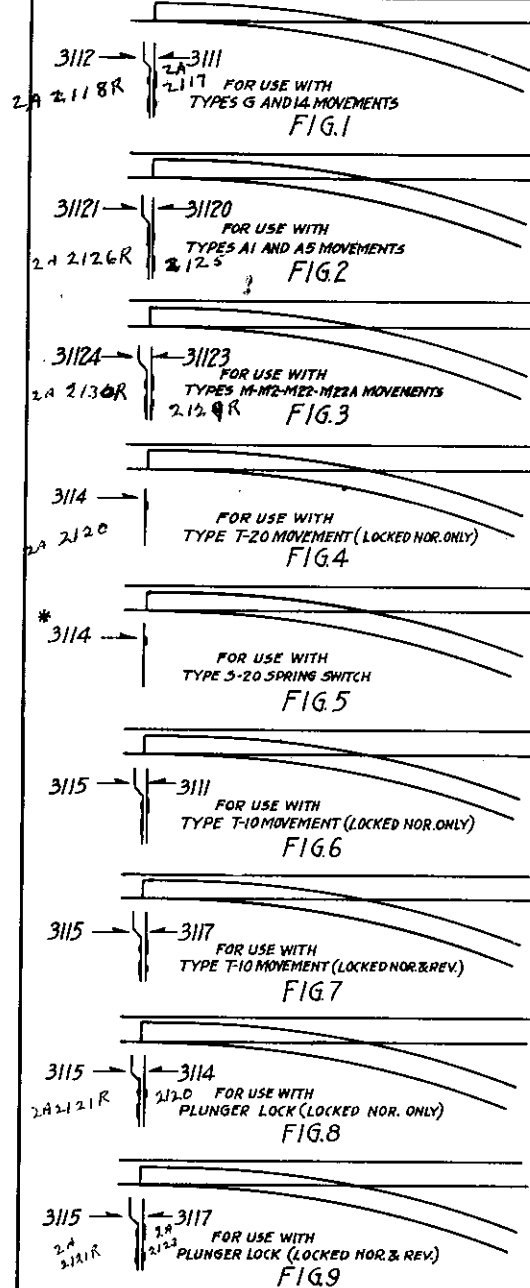
LOCK RODS

OFFICE OF CHIEF ENGINEER, PHILA., PA., MAY 10, 1945.

Approved
W. C. Griffith
Assistant Chief Engineer - T. C. & S.

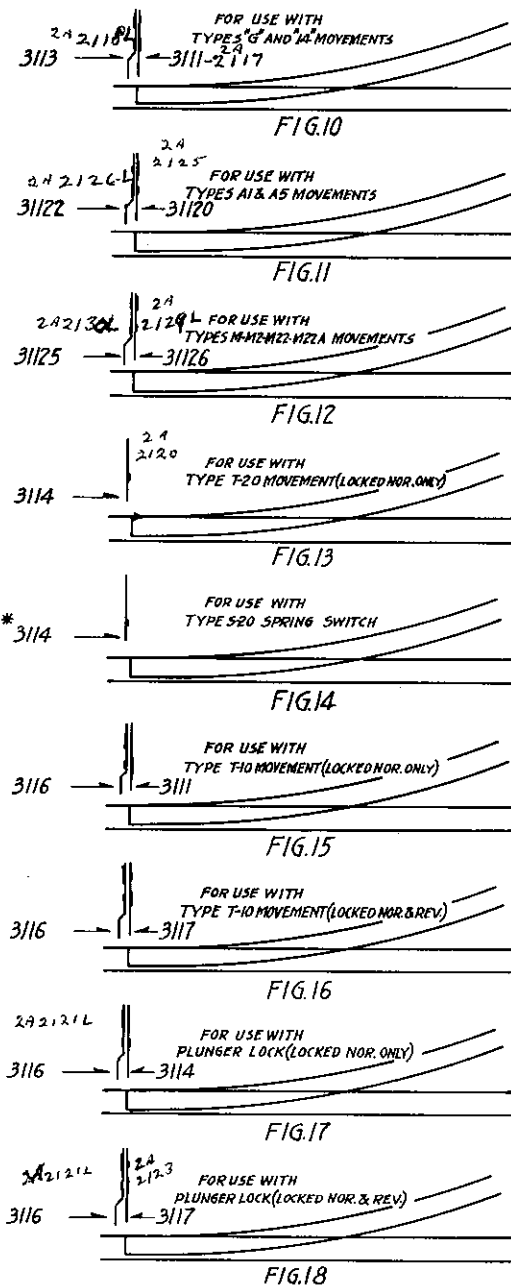
Approved *J. H. Hessitt*
Chief Engineer

LAYOUTS FOR SINGLE SWITCHES RIGHT HAND

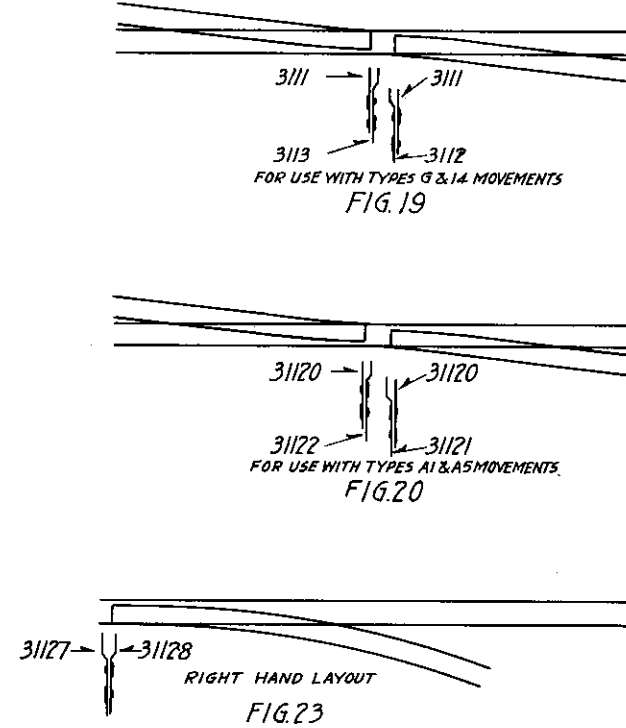


* WHEN 3114 IS TO BE USED FOR SPRING SWITCH, SPECIFY ON ORDER THAT NOTCH IS TO BE WIDENED $\frac{1}{16}$ " ON FIELD SIDE, BOTH FACES OF NOTCH TO BE TORCH HARDENED.

LAYOUTS FOR SINGLE SWITCHES LEFT HAND



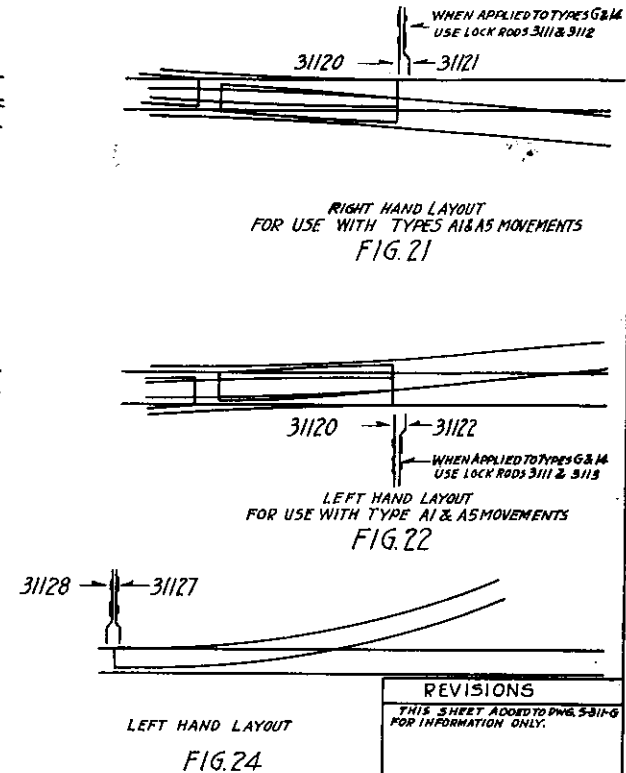
LAYOUTS FOR MOVABLE POINT FROGS



WHEN A T-20 MOVEMENT IS EQUIPPED WITH SEPARATE LOCK BAR, LOCKING THE LOCK ROD WITH SWITCH IN BOTH NORMAL AND REVERSE POSITIONS, USE LOCK RODS AS SHOWN IN FIGS. 23 AND 24.

- NOTES:
1. PLUNGER OR LOCKING DOG FOR LOCKING LOCK RODS FOR SWITCH MOVEMENTS, WILL ENTER LOCK RODS AS FOLLOWS:-
 2. FOR A1 AND A5, FIRST INTO TOP SMALL NOTCH IN STRAIGHT LOCK ROD FOR BOTH LEFT HAND AND RIGHT HAND LAYOUTS WHEN SWITCH IS IN THE NORMAL POSITION.
 3. FOR M-M2-M22-M22A, FIRST INTO BOTTOM SMALL NOTCH IN BENT LOCK ROD FOR RIGHT HAND LAYOUT, AND INTO TOP SMALL NOTCH IN STRAIGHT LOCK ROD FOR LEFT HAND LAYOUT, BOTH WITH SWITCH IN THE NORMAL POSITION.
 4. FOR MODEL 14, FIRST INTO TOP LARGE NOTCH IN STRAIGHT LOCK ROD FOR BOTH R.H. AND L.H. LAYOUTS WHEN SWITCH IS IN THE NORMAL POSITION.
 5. FOR T-20 OR S-20 WITH SWITCH LOCKED NOR. ONLY, LOCK BAR ENTERS SMALL NOTCH IN LOCK ROD, WHICH IS LOCATED IN FAR LOCK ROD SPACE, FOR BOTH R.H. & L.H. LAYOUTS.
 6. FOR T-20 WITH SWITCH LOCKED BOTH NOR. AND REV., SEE FIGS. 23 & 24, LOCK BAR ENTERS LARGE OR SMALL NOTCH FIRST, DEPENDING UPON CONDITIONS.
 7. FOR T-10 WITH SWITCH LOCKED NORMAL ONLY, FIRST INTO TOP LARGE NOTCH IN STRAIGHT LOCK ROD FOR BOTH RIGHT HAND AND LEFT HAND LAYOUTS, WHEN IN THE NOR. POSITION.
 8. FOR T-10 WITH SWITCH LOCKED BOTH NOR. AND REV., FIRST INTO TOP LARGE NOTCH IN STRAIGHT LOCK ROD, FOR BOTH RIGHT HAND AND LEFT HAND LAYOUTS, WHEN IN THE NOR. POSITION.
 9. FOR TYPE G, FIRST INTO TOP SMALL NOTCH IN BENT LOCK ROD FOR BOTH RIGHT HAND AND LEFT HAND LAYOUTS WHEN SWITCH IS IN THE NORMAL POSITION.
 10. FOR PLUNGER LOCK WITH SWITCH LOCKED NORMAL ONLY, FIRST INTO TOP SMALL NOTCH IN STRAIGHT LOCK ROD, WHEN IN THE NORMAL POSITION.
 11. FOR PLUNGER LOCK WITH SWITCH LOCKED NORMAL AND REVERSE, FIRST INTO TOP LARGE NOTCH IN STRAIGHT LOCK ROD, FOR BOTH RIGHT HAND AND LEFT HAND LAYOUTS, WHEN SWITCH IS IN THE NORMAL POSITION.
 12. OTHER COMBINATIONS OF LOCK RODS ARE SPECIAL. RODS SHOULD BE SELECTED FOR EACH INDIVIDUAL CASE.

LAYOUTS FOR DOUBLE SLIP SWITCHES



REVISIONS
THIS SHEET ADDED TO DWG. S-311-G FOR INFORMATION ONLY.

THIS SHEET FOR INFORMATION ONLY, ORDER LOCK RODS FROM SHEETS 1 & 2 DRAWING S-311-G. FOR DETAILS OF LOCK RODS 3111 TO 3118 INCL., SEE SHEET 1 OF DRAWING S-311-G. FOR DETAILS OF LOCK RODS 31120 TO 31128 INCL., SEE SHEET 2 OF DRAWING S-311-G.

SHEET 3 OF 3.



S-311-G

THE PENNSYLVANIA RAILROAD

STANDARD

LOCK RODS

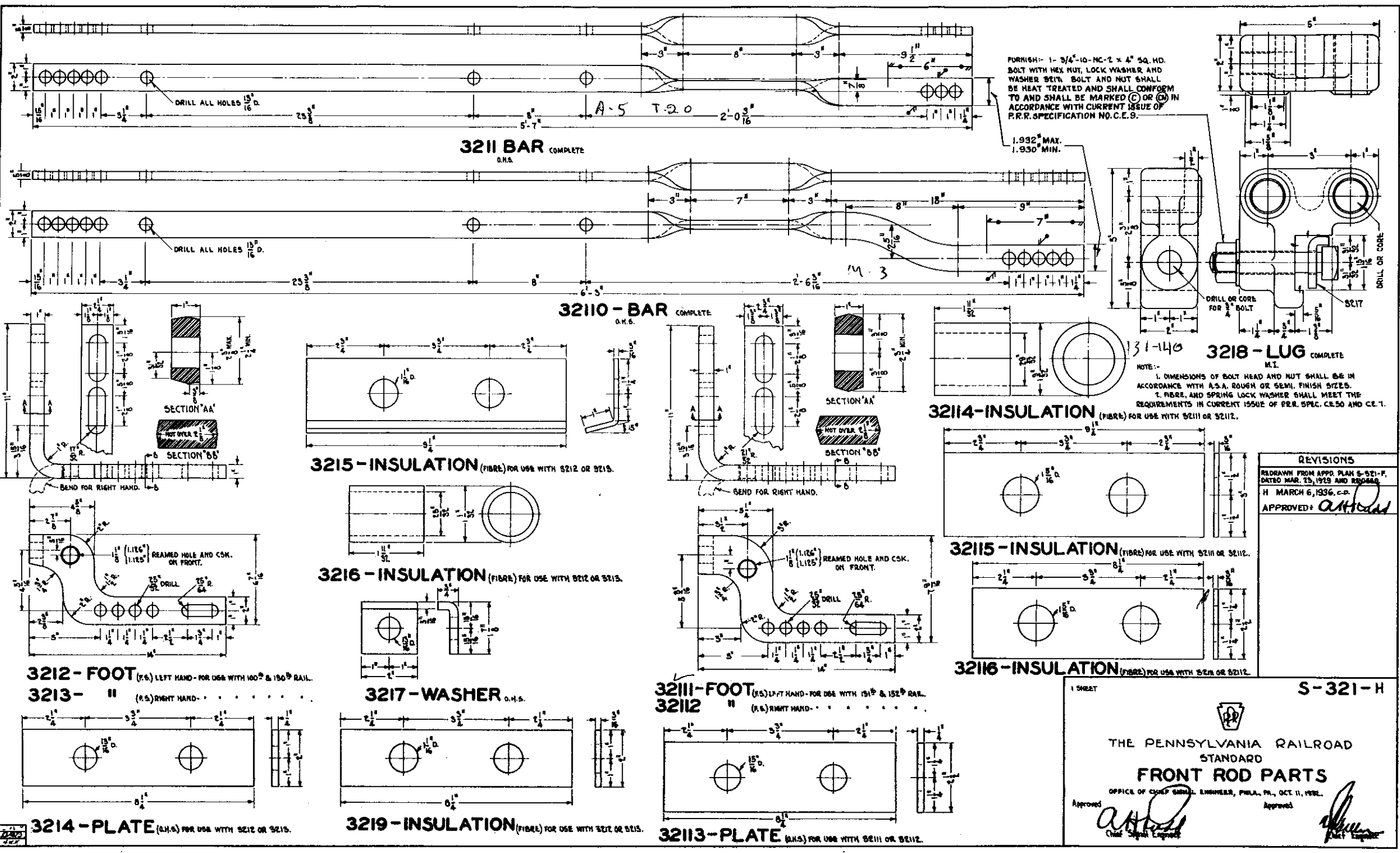
OFFICE OF CHIEF ENGINEER, PHILA., PA., MAY 10, 1945.

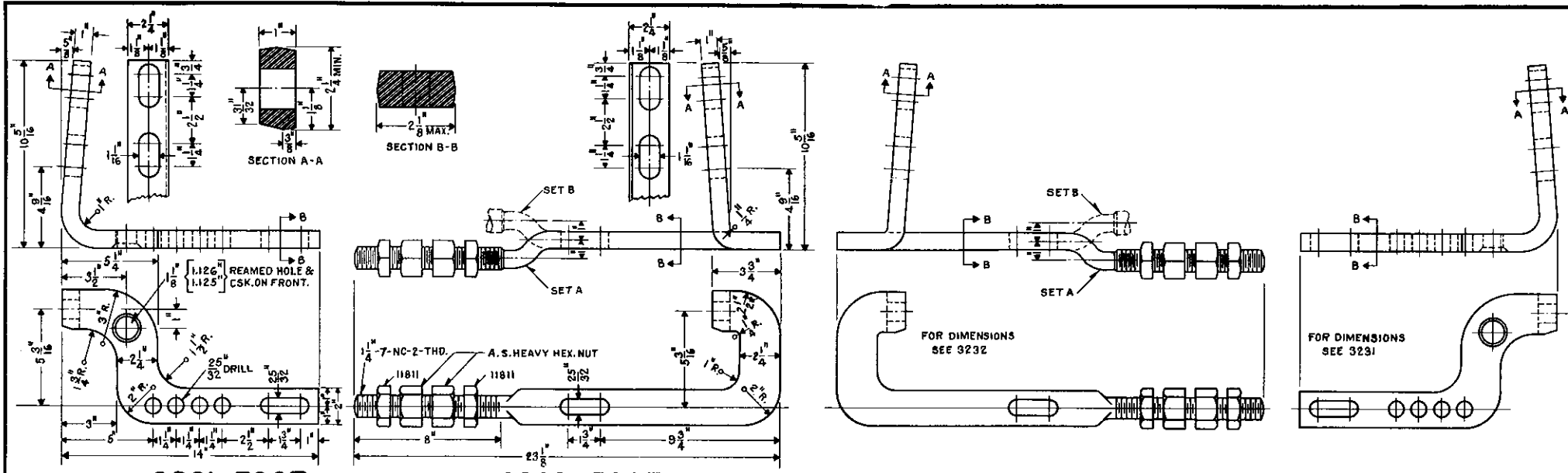
Approved

Assistant Chief Engineer - T. C. A. S.

Approved

Chief Engineer



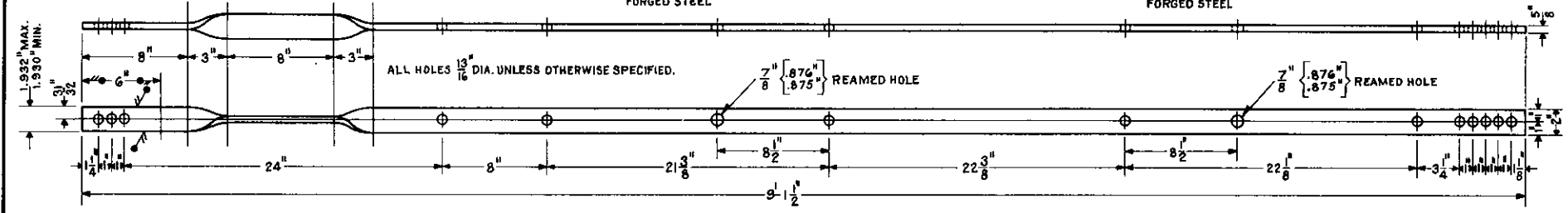


3231-FOOT
FORGED STEEL

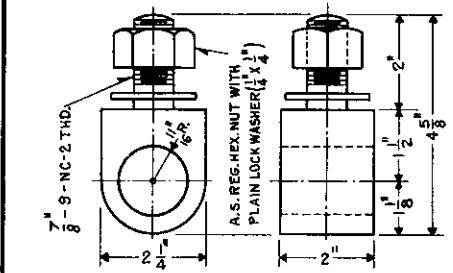
3232-FOOT SET A
3237-FOOT SET B
FORGED STEEL

3233-FOOT SET A
3238-FOOT SET B
FORGED STEEL

3234-FOOT
FORGED STEEL



3235-BAR O.H. STEEL



3236-LUG O.H. STEEL
HEAT TREATED

REVISIONS
REDRAWN FROM APPROVED PLAN
S-323-6, DATED JULY 11, 1923,
LAST REVISED SEPT. 18, 1925 AND
REVISED.

1 SHEET



S-323-H

THE PENNSYLVANIA RAILROAD

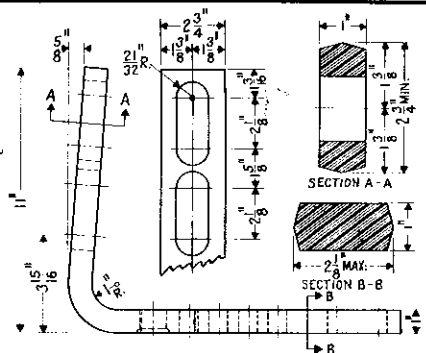
STANDARD

FRONT ROD PARTS

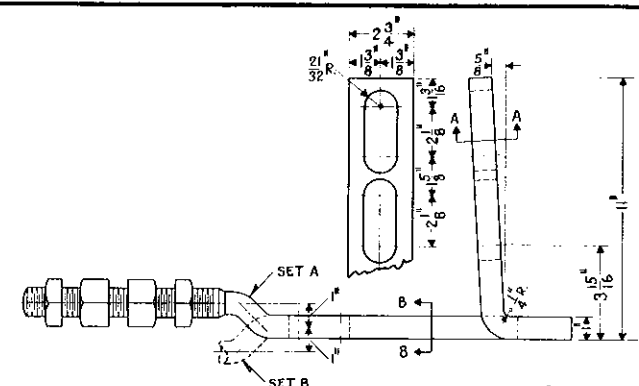
FOR SLIP SWITCHES 100 LB. P.S. AND 130 LB. P.S. RAIL.
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., AUGUST 27, 1935.

Approved *[Signature]*
Chief Signal Engineer

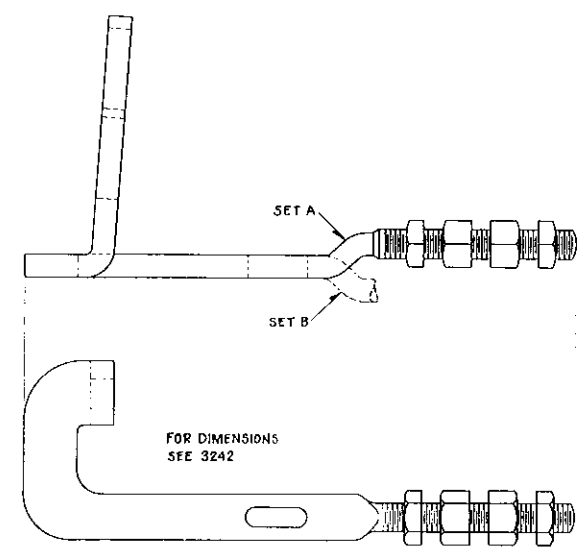
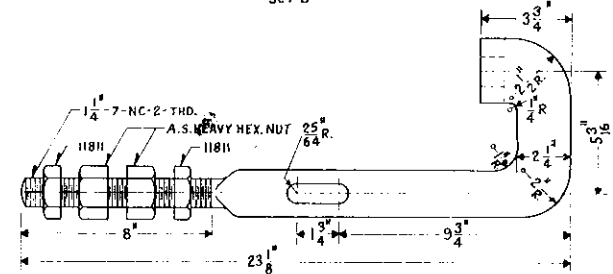
Approved *[Signature]*
Acting Chief Engineer



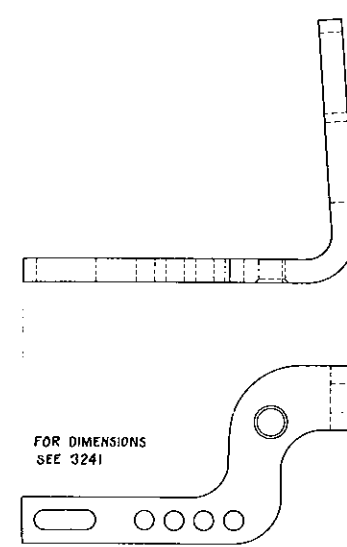
3241 FOOT
FORGED STEEL



3242 FOOT SET A
3243 FOOT SET B
FORGED STEEL



3244 FOOT SET A
3245 FOOT SET B
FORGED STEEL



3246 FOOT
FORGED STEEL

REVISIONS

1 SHEET



S-324-A

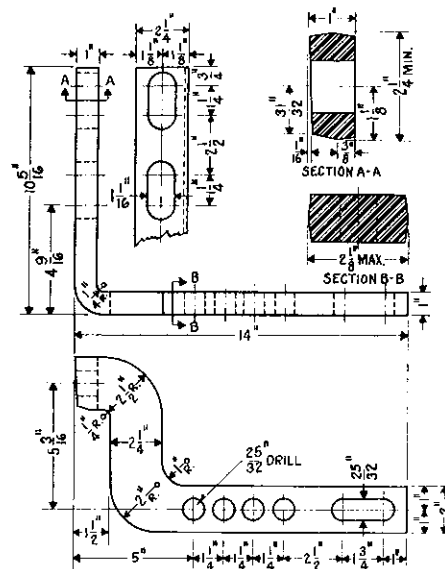
THE PENNSYLVANIA RAILROAD
STANDARD

FRONT ROD PARTS

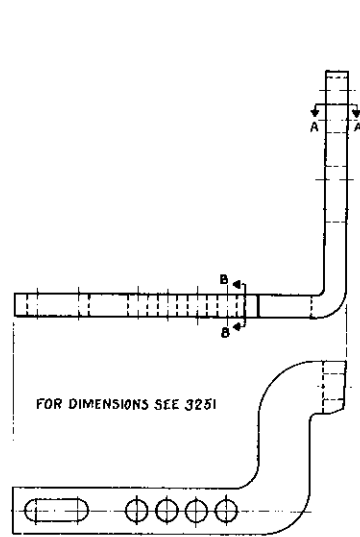
FOR SLIP SWITCHES 131LB. R.E. AND 152LB. P.S. RAIL.
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., JULY 10, 1935.

Approved *[Signature]*
Chief Signal Engineer

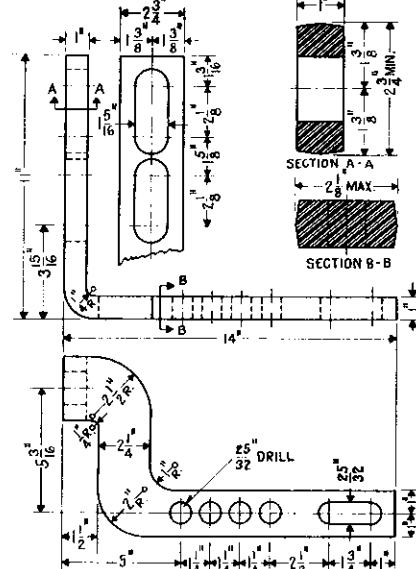
Approved *[Signature]*
Acting Chief Engineer



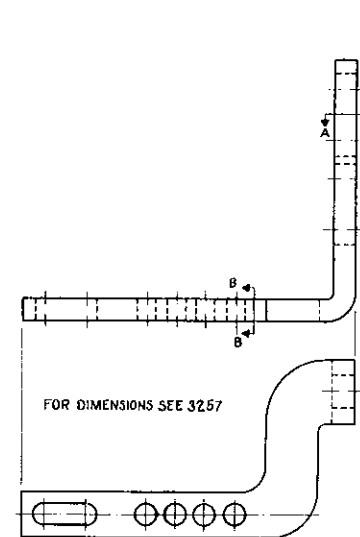
3251 FOOT FORGED STEEL
FOR #100 P.S. & #130 P.S. RAIL.



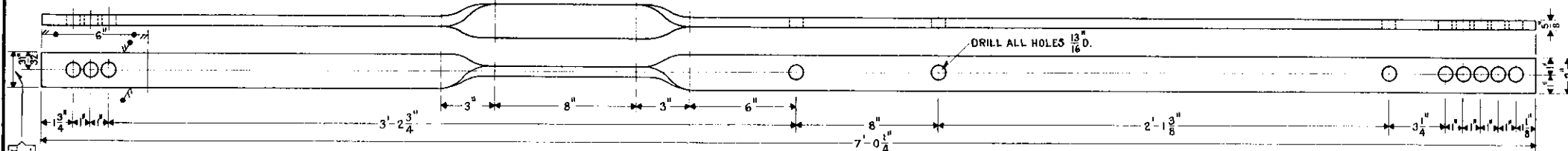
3252 FOOT FORGED STEEL
FOR #100 P.S. & #130 P.S. RAIL.



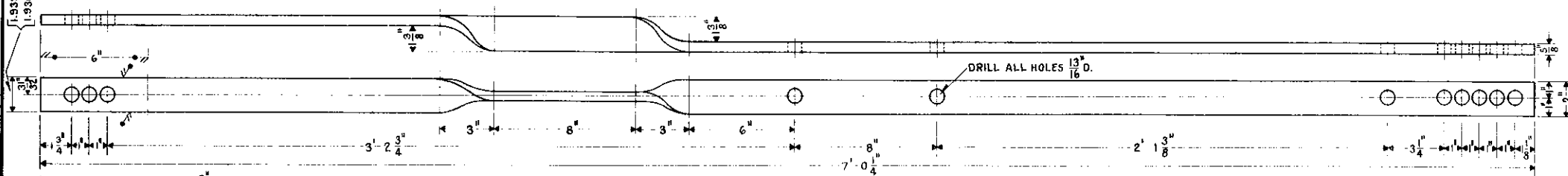
3257 FOOT FORGED STEEL
FOR #131 R.E. & #152 P.S. RAIL.



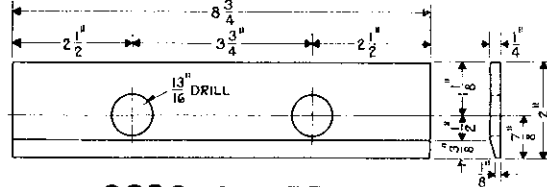
3258 FOOT FORGED STEEL
FOR #131 R.E. & #152 P.S. RAIL.



3253 BAR O.H.S.



3254 BAR O.H.S.



3256 FILLER O.H.S.

REVISIONS
Redrawn from approved plan S-325-B, dated July 11, 1923, last revised April 3, 1924 and revised.

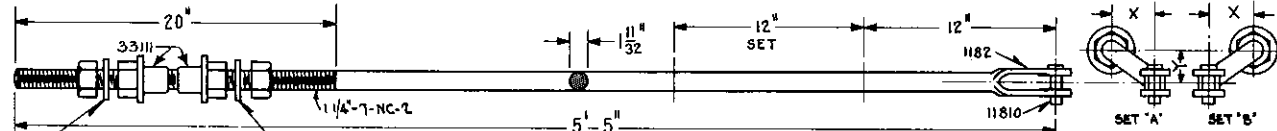
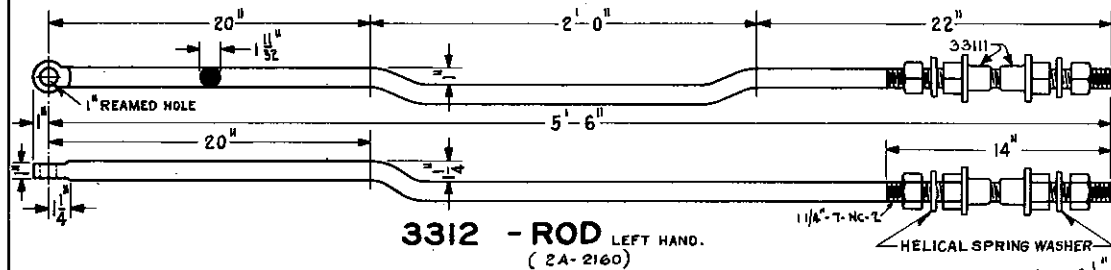
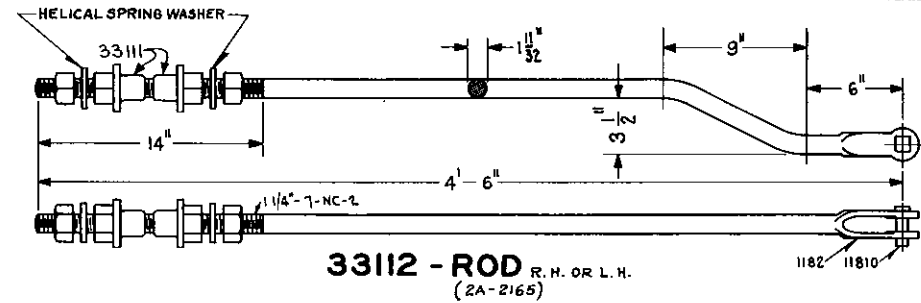
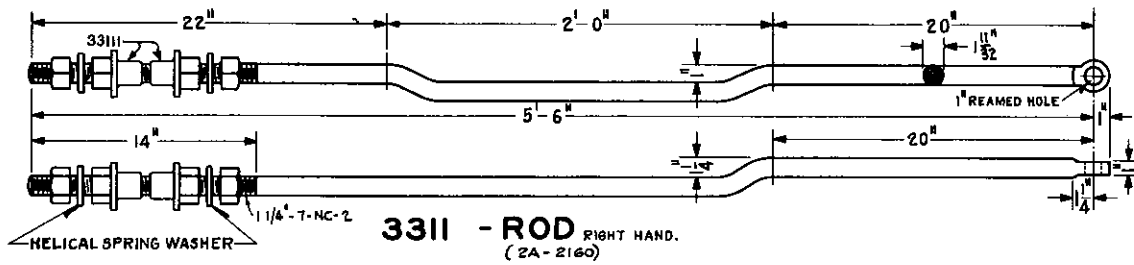
1 SHEET

S-325-C

THE PENNSYLVANIA RAILROAD
STANDARD
FRONT ROD PARTS
FOR MOVABLE POINT FRAMES
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., FEB. 20, 1935.

Approved *Arthur*
Chief Signal Engineer

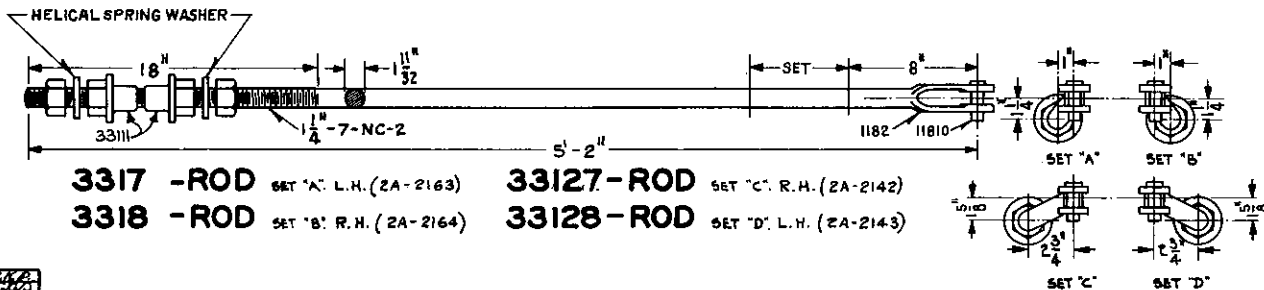
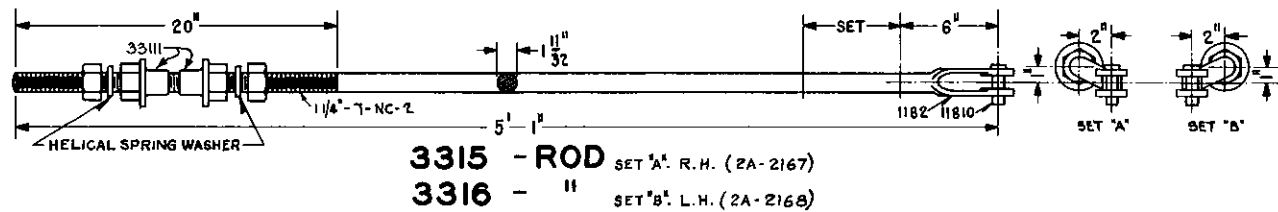
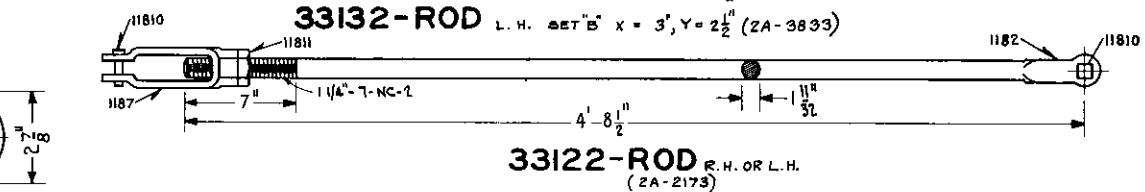
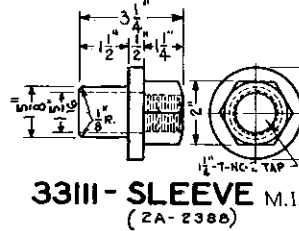
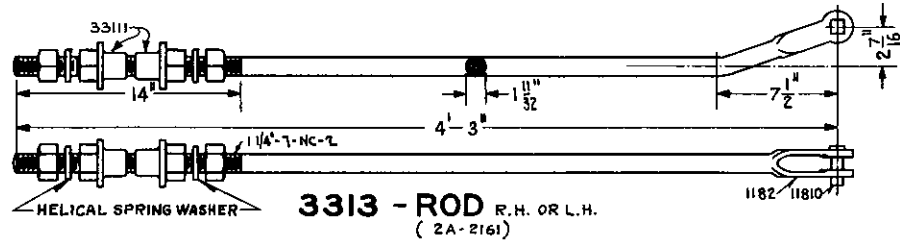
Approved *W. J. ...*
Acting Chief Engineer



33116 - ROD L.H. SET 'B' X = 2 3/4", Y = 2" (2A-2172)

33131 - ROD R.H. SET 'A' X = 3", Y = 2 1/2" (2A-3038)

33132 - ROD L.H. SET 'B' X = 3", Y = 2 1/2" (2A-3833)



33127 - ROD SET 'C' R.H. (2A-2142)
33128 - ROD SET 'D' L.H. (2A-2143)

NOTE:

1. OPERATING RODS HAVING A SET OF 1 INCH OR MORE SHALL BE HEAT TREATED TO GIVE A MINIMUM TENSILE STRENGTH OF 85,000 LBS. PER SQ. IN. AND STENCILED © FOR IDENTIFICATION. THE MARKING © TO BE PLACED ON ONE OF THE JAWS NEAR THE CENTER OF THE OUTSIDE FACE.
2. NUTS NOT OTHERWISE SPECIFIED SHALL BE 1 1/4" - 7-NC-2 AMERICAN STANDARD HEAVY.
3. ALL RODS SHALL BE MADE OF OPEN HEARTH STEEL.
4. RODS 3311 AND 3312 FOR USE WITH TYPE 'G' SWITCH & LOCK MECHANISM.
5. ROD 3313 FOR USE WITH E.P. DIRECT ACTING SWITCH MECHANISM.
6. RODS 3315 AND 3316 FOR USE WITH STYLE 'M' SWITCH & LOCK MECHANISM.
7. RODS 3317 AND 3318 FOR USE WITH STYLE 'A1' SWITCH & LOCK MECHANISM.
8. ROD 33112 FOR USE WITH MODEL 'S' SWITCH & LOCK MECHANISM.
9. ROD 33114 FOR USE WITH STYLE 'T-10' HAND OPERATED SWITCH MECHANISM.
10. HELICAL SPRING WASHERS MUST CONFORM TO THE CURRENT ISSUE OF THE PENNA. R.R. CO'S SPECIFICATION NO. C.E. 7.

11. RODS 33131 & 33132 FOR USE WITH STYLE 'T-20' HAND OPERATED SWITCH MECHANISM.
12. RODS 33114 AND 33116 FOR USE WITH STYLE 'M2' SWITCH AND LOCK MOVEMENTS.
13. ROD 33122 FOR USE WITH 'HAYES' SLIDING DERAILS.
14. ROD 33124 FOR USE WITH SPLIT SWITCH DERAILS.
15. RODS 33127, 33128 FOR USE WITH STYLE 'A5' SWITCH AND LOCK MECHANISM.
16. MANUFACTURER SHALL PAINT EACH ROD WITH ONE COAT OF A GOOD GRADE BLACK PAINT.

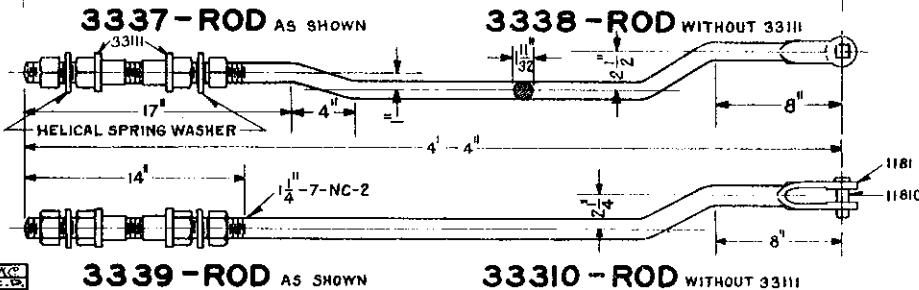
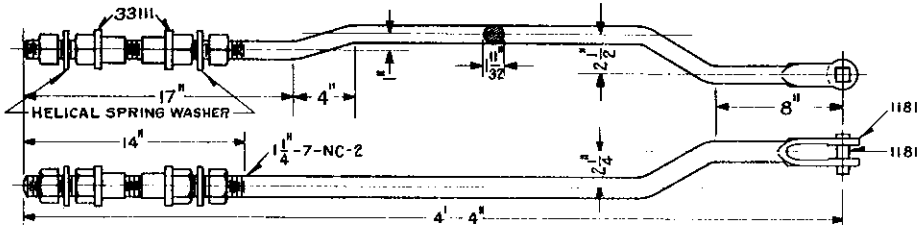
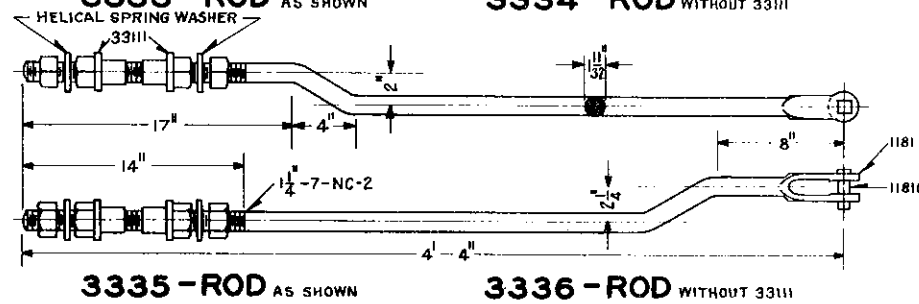
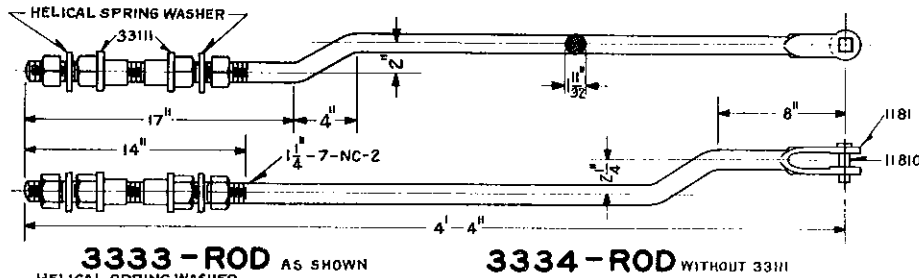
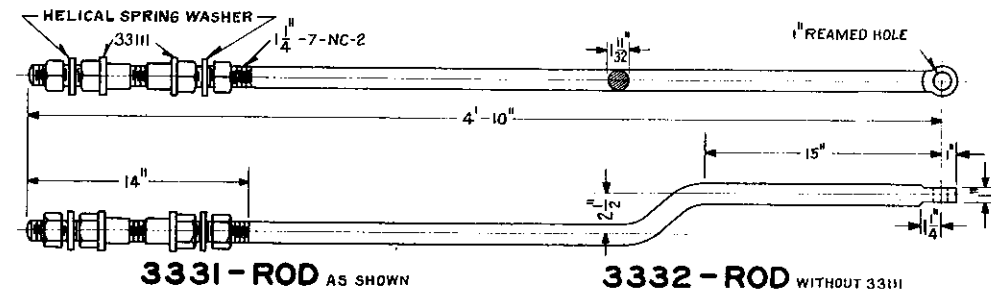
REVISIONS	
REDRAWN FROM APPROVED PLAN S-331-C, DATED MAY 14, 1927 AND REVISED.	
E MARCH 30, 1928.	
APPROVED: <i>Arthur</i>	
F OCT. 11, 1932.	
APPROVED: <i>Arthur</i>	
G JUNE 20, 1933.	
APPROVED: <i>Arthur</i>	
H DECEMBER 6, 1937.	
APPROVED: <i>Arthur</i>	
I SEPT. 5, 1944.	
RODS 3314, 3315, 3316, 3317, 3318, 3319, 3320, 3321, 3322, 3323, 3324, 3325, 3326 & 3327 REMOVED. 33111 REVISOR'S NOTE 69738-C IS OBSOLETE. NOTES 12, 13, 14, 15 HEREIN, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.	

THE PENNSYLVANIA RAILROAD
STANDARD
OPERATING RODS
FOR SINGLE SWITCHES

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA. FEB. 16, 1928

Approved: *Arthur*
Chief Signal Engineer

Approved: *Arthur*
Chief Engineer



NOTE:-

1. OPERATING RODS HAVING A SET OF 1 INCH OR MORE SHALL BE HEAT TREATED TO GIVE A MINIMUM TENSILE STRENGTH OF 85,000 LBS. PER SQ. IN. AND STENCILED © FOR IDENTIFICATION. THE MARKING © TO BE PLACED ON ONE OF THE JAWS NEAR THE CENTER OF THE OUTSIDE FACE.
2. ALL RODS SHALL BE MADE OF OPEN HEARTH STEEL.
3. NUTS NOT OTHERWISE SPECIFIED SHALL BE 1 1/4 - 7-NC-2 AMERICAN STANDARD HEAVY.
4. RODS 3331 & 3332 FOR USE WITH TYPE "G" MECH.
5. RODS 3333, 3334, 3335 & 3336 FOR USE WITH TYPE "A-1" MECH.
6. RODS 3337, 3338, 3339 & 33310 FOR USE WITH TYPE "A-5" MECH.
7. HELICAL SPRING WASHERS MUST CONFORM TO THE CURRENT ISSUE OF THE PENNA. R.R. CO'S. SPECIFICATION NO. C.E. 7.

REVISIONS

REDRAWN FROM APPROVED PLAN
S-333-A, DATED MAY 12, 1924 AND
REVISED.

C DEC. 6, 1937.

APPROVED: *N. C. Stanton*

1 SHEET

S-333-C



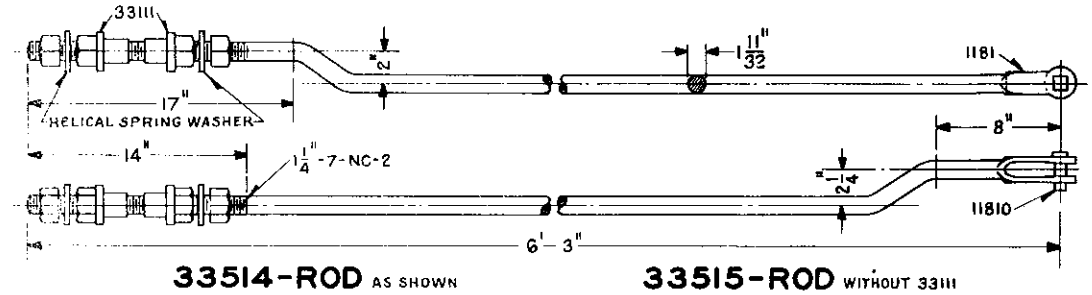
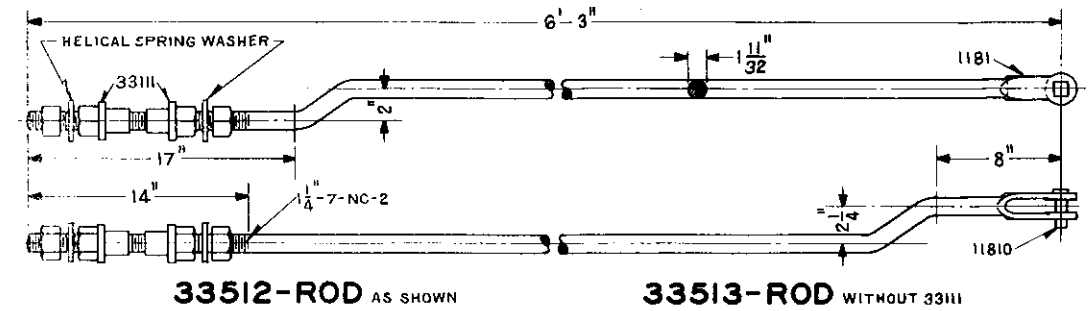
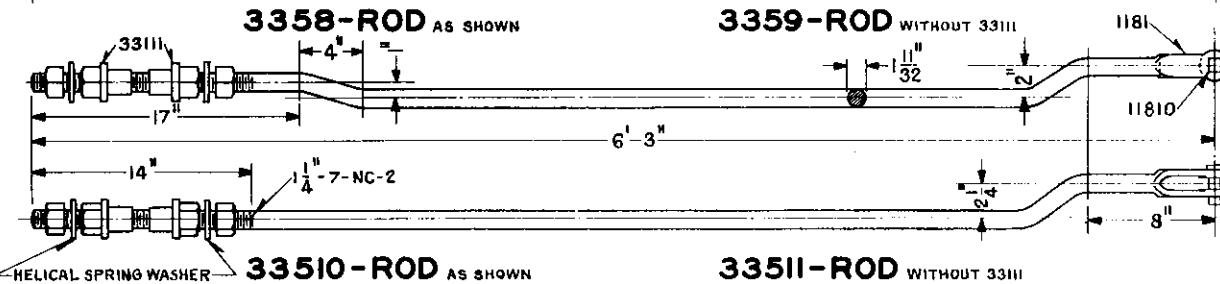
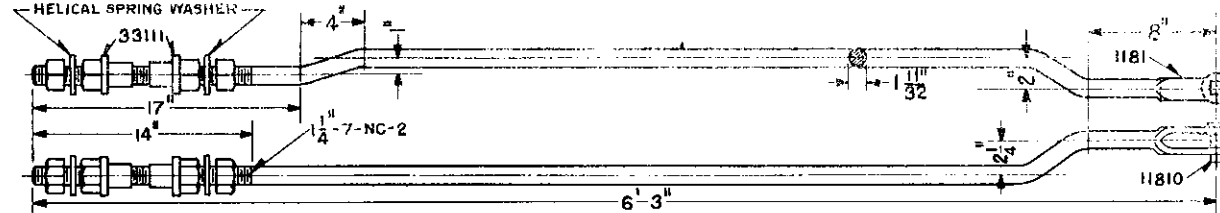
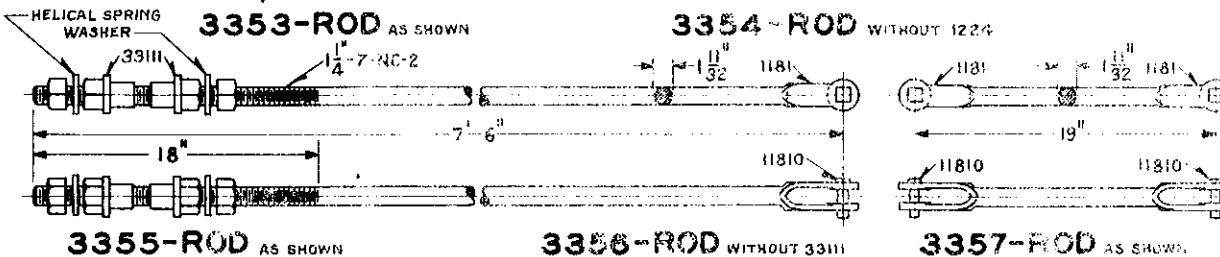
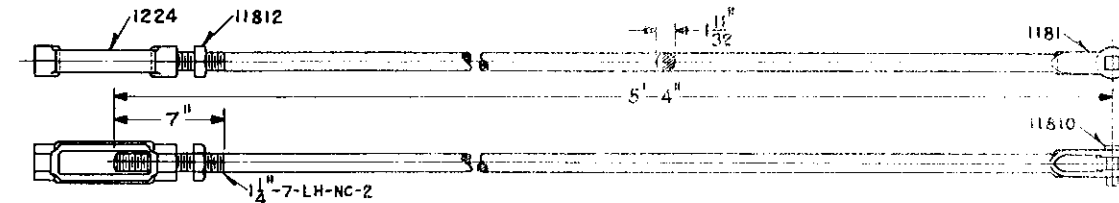
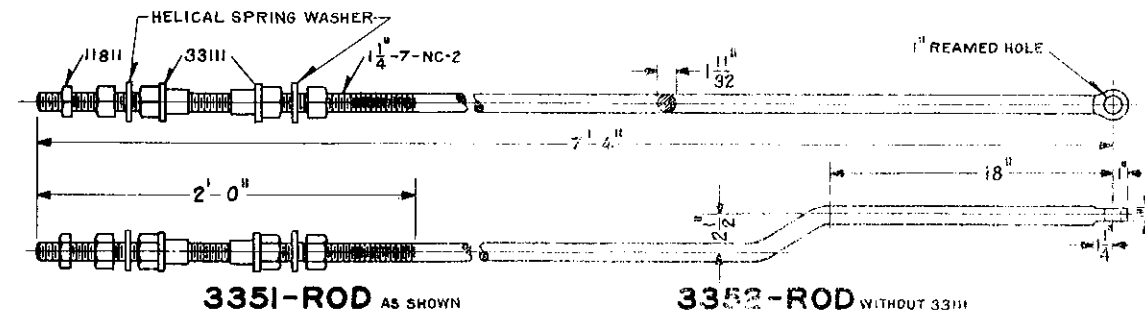
THE PENNSYLVANIA RAILROAD
STANDARD
OPERATING RODS

FOR DOUBLE SLIP SWITCHES

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., NOV. 12, 1936

Approved *A. H. Hays*
Chief Signal Engineer

Approved *W. J. Higgins*
Chief Engineer



- NOTE:-
1. OPERATING RODS HAVING A SET OF 1 INCH OR MORE SHALL BE HEAT TREATED TO GIVE A MINIMUM TENSILE STRENGTH OF 85,000 LBS. PER SQ. IN. AND STENCILED © FOR IDENTIFICATION. THE MARKING © TO BE PLACED ON ONE OF THE JAWS NEAR THE CENTER OF THE OUTSIDE FACE.
 2. ALL RODS SHALL BE MADE OF OPEN HEARTH STEEL.
 3. NUTS NOT OTHERWISE SPECIFIED SHALL BE 1 1/4\"/>

REVISIONS
REDRAWN FROM APPROVED PLAN S-335-A DATED MAY 12, 1924 AND REVISED.
C DECEMBER 6, 1937.
APPROVED: <i>A.C. [Signature]</i>

1 SHEET

S-335-C

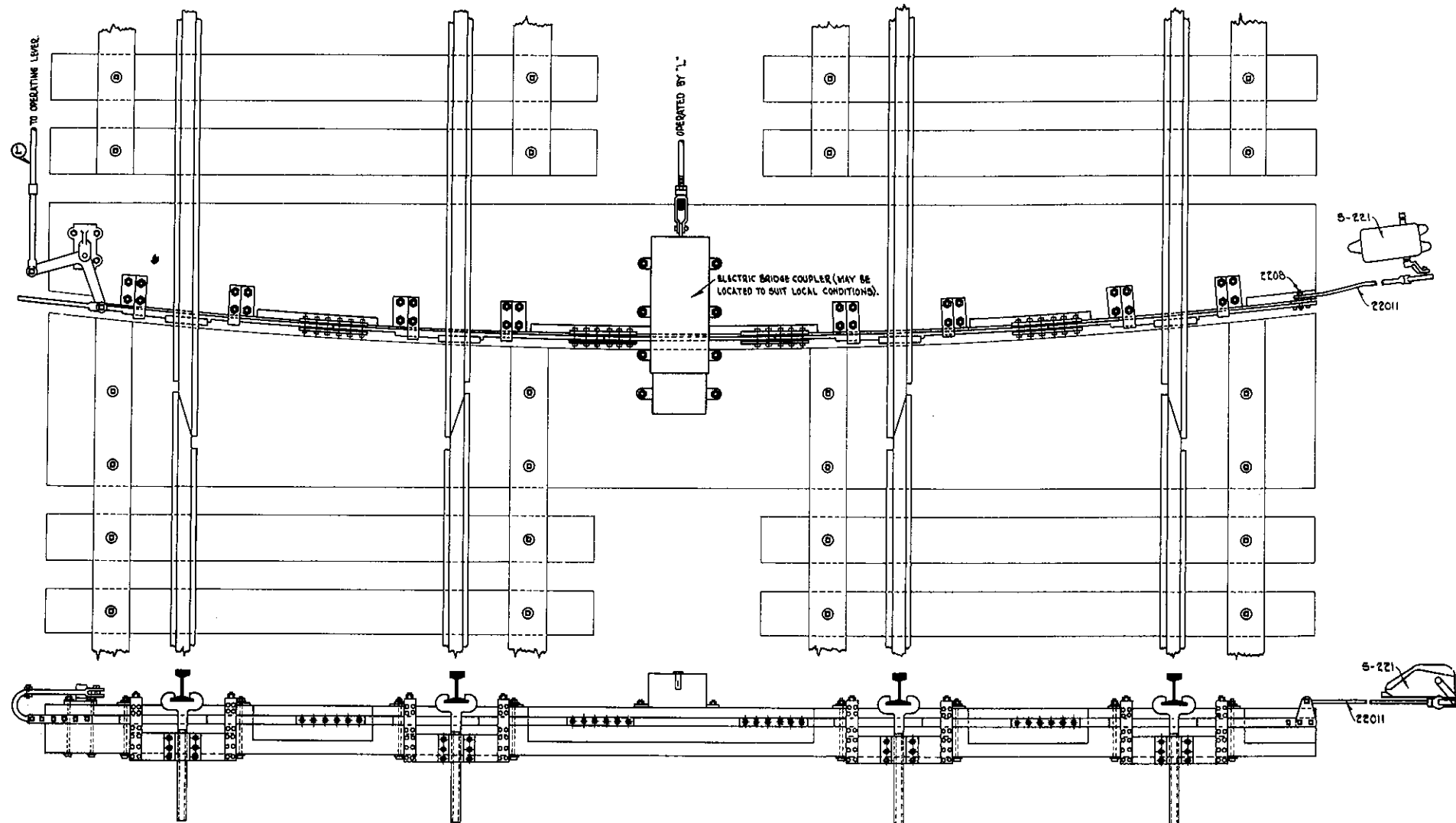


THE PENNSYLVANIA RAILROAD
STANDARD
OPERATING RODS
FOR M.P. RODS

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., NOV. 12, 1936.

Approved *A.H. [Signature]* Chief Signal Engineer

Approved *W. [Signature]* Chief Engineer



FIELD WORK:-

1. A CIRCUIT CONTROLLER, PLAN S-221, SHALL BE CONNECTED TO AND OPERATED BY EACH DRAW WEDGE, DRAW LATCH, RAIL LIFT BEAM AND RAIL LOCK BAR. THE CIRCUIT CONTROLLER OPERATED BY RAIL LOCK BAR MUST BE CONNECTED AT FARTHEST POINT FROM OPERATING LEVER.

2. WHEN LOCKED, THE LOCKING BLOCK ON RAIL LOCK BAR, SHALL PASS 4" BEYOND FAR SIDE OF LOCKING TONGUE, WHEN UNLOCKED IT SHALL CLEAR LOCKING TONGUE.

3. CIRCUIT CONTROLLERS OPERATED BY DRAW WEDGES, DRAW LATCHES AND RAIL LOCK BARS SHALL BE ADJUSTED TO MAKE CONTACTS IN BOTH LOCKED AND UNLOCKED POSITIONS, CONTROLLERS OPERATED BY RAIL LIFT BEAM SHALL MAKE CONTACTS IN COMPLETE RAISED POSITION ONLY.

4. INSULATION SHALL BE PLACED IN PIPE LINES AND CONNECTIONS, IF NECESSARY, TO PREVENT THE GROUNDING OR SHUNTING OF TRACK CIRCUITS.

ENGINEERING REQUIREMENTS:-

1. (a) FOR SINGLE TRACK DRAW, USE ONE LEVER FOR LOCKING RAILS BOTH ENDS OF DRAW AND OPERATING ELECTRIC BRIDGE COUPLERS.

(b) FOR TWO TRACK DRAW, USE SEPARATE LEVER FOR LOCKING RAILS AND OPERATING ELECTRIC

BRIDGE COUPLERS FOR EACH END.

2. (a) CIRCUITS THRU CIRCUIT CONTROLLERS SHALL BE SO ARRANGED THAT ALL RAILS MUST BE UNLOCKED (ELECTRIC BRIDGE COUPLERS BEING WITHDRAWN AT SAME TIME) BEFORE DRAW WEDGES AND DRAW LATCHES CAN BE WITHDRAWN AND RAIL LIFT BEAM CAN BE RAISED. DRAW WEDGES MUST BE ENTIRELY WITHDRAWN AND DRAW LATCHES AND RAIL LIFT BEAM RAISED PROPERLY BEFORE POWER CAN BE APPLIED TO SWING DRAW.

(b) IN RETURNING DRAW TO NORMAL POSITION CIRCUITS SHALL BE SO ARRANGED THAT DRAW MUST BE CENTERED WITH DRAW LATCH ENTIRELY DOWN BEFORE DRAW WEDGES CAN BE DRAWN; DRAW WEDGES MUST BE DRAWN PROPERLY AND RAIL LIFT BEAM DROPPED IN PLACE BEFORE LEVER OPERATING RAIL LOCKS AND ELECTRIC BRIDGE

COUPLERS CAN BE OPERATED.

(c) TO MAKE THIS PROCEDURE IMPERATIVE, THE LOCK AND INDICATION CIRCUITS SHALL BE SO INTERCONNECTED WITH THE DRAW WEDGE AND SWING CONTROLS THAT ALL OPERATIONS OF SIGNAL AND DRAW MACHINERY MUST SUCCEED EACH OTHER IN THE PROPER PREDETERMINED ORDER.

3. THE CONTROLLING FUNCTIONS OF OTHER TYPES OF DRAWBRIDGES SHALL CONFORM TO THESE SAME GENERAL PRINCIPLES.

REVISIONS

1 SHEET

S-371-A



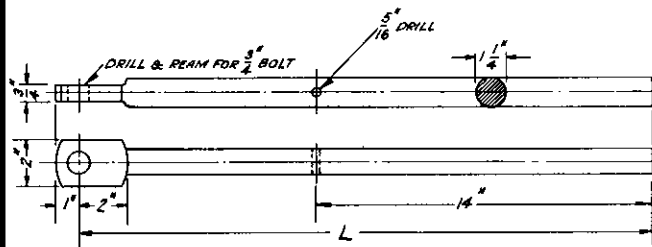
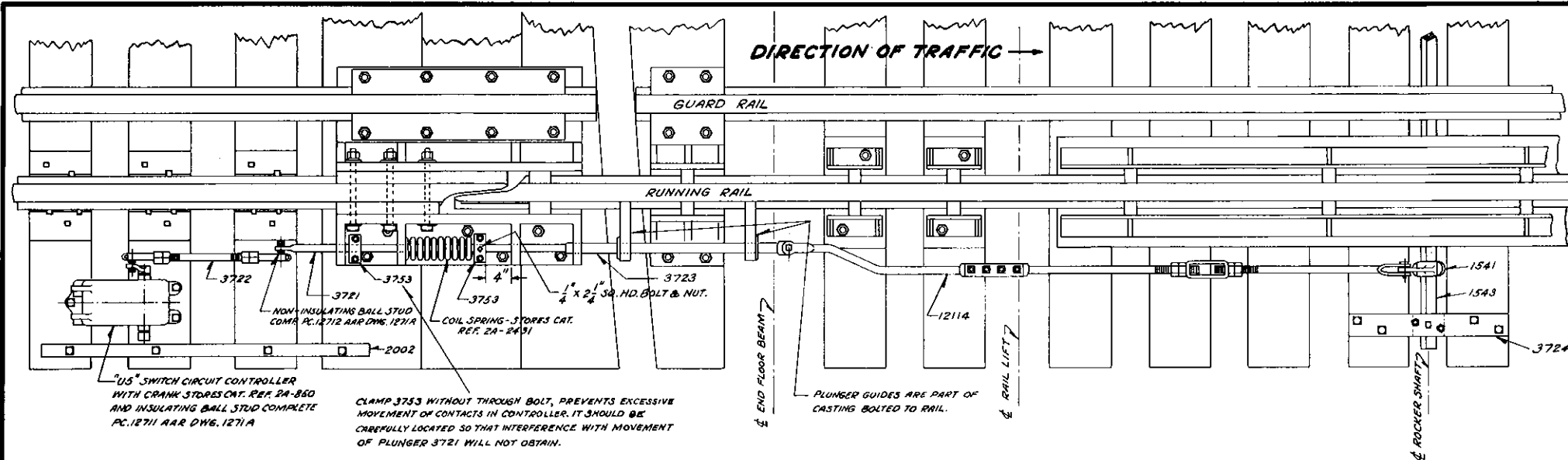
THE PENNSYLVANIA RAILROAD

**STANDARD
DRAWBRIDGE LOCKING
FOR CENTER PIVOT DRAW**

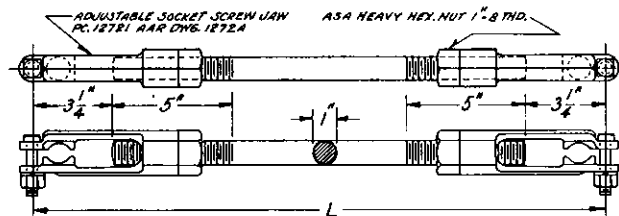
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA. MAY 22, 1929

Approved
[Signature]
Chief Signal Engineer

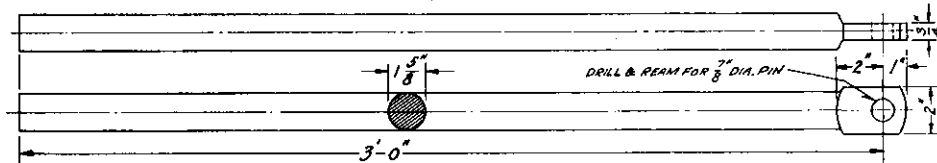
Approved
[Signature]
Chief Engineer



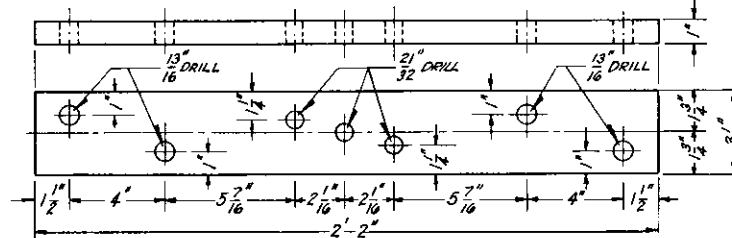
3721 PLUNGER L = LENGTH AS ORDERED.
SAE - 1020 STEEL FORGED.
STORES CAT. REF. NO. 2A-3864



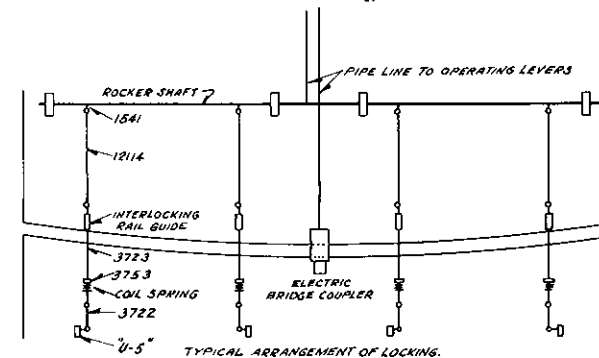
3722 CONNECTOR L = LENGTH AS ORDERED.
1" ROD SAE-1020 STEEL FORGED.
STORES CAT. REF. NO. 2A-3865



3723 PLUNGER SAE - 1020 STEEL FORGED.
STORES CAT. REF. NO. 2A-4378



3724 PLATE SAE - 1020 STEEL
STORES CAT. REF. NO. 2A-4228



TYPICAL ARRANGEMENT OF LOCKING.

- REQUISITES.**
1. OPERATIONS OF SIGNAL AND DRAW MACHINERY MUST SUCCEED EACH OTHER IN THE FOLLOWING PREDETERMINED SEQUENCE. CIRCUITS SHALL BE ARRANGED TO INSURE THE SEQUENCE INDICATED.
 - (1) SIGNALS IN STOP POSITION & SMASHBOARDS LOWERED.
 - (2) OPEN TROLLEY COUPLERS.
 - (3) WITHDRAW ELECTRIC BRIDGE COUPLERS.
 - (4) WITHDRAW RAIL LOCKS.
 - (5) WITHDRAW WEDGES, RAISE LIFT RAILS AND LATCHES.
 - (6) SWING BRIDGE OPEN.
 2. (a) CIRCUITS SHALL BE SO ARRANGED THAT WITH ALL SIGNALS AND SMASHBOARDS INVOLVED AT STOP, TROLLEY COUPLERS MUST BE OPEN, ELECTRIC BRIDGE COUPLERS WITHDRAWN AND ALL RAILS UNLOCKED BEFORE POWER CAN BE APPLIED TO WITHDRAW WEDGES, RAISE LATCHES AND LIFT RAILS. WITH WEDGES PROPERLY WITHDRAWN, LATCHES AND LIFT RAILS PROPERLY RAISED, POWER MAY BE APPLIED TO SWING DRAW OPEN.
 - (b) CIRCUITS SHALL BE SO ARRANGED THAT DRAW MUST BE PROPERLY ALIGNED AND AT LEAST 1 LATCH ENTIRELY IN LATCHED POSITION BEFORE POWER CAN BE APPLIED TO DRIVE WEDGES AND LOWER LIFT RAILS. ALL LATCHES MUST BE PROPERLY SEATED, WEDGES FULLY DOWN, LIFT RAILS DOWN IN PLACE BEFORE RAILS CAN BE LOCKED AND THE ELECTRIC BRIDGE COUPLERS CAN BE DRIVEN. THEN WITH TROLLEY COUPLERS CLOSED & SMASHBOARDS CLEARED, SIGNALS MAY INDICATE PROCEED.
 3. FOR MECHANICAL OPERATION OF RAIL LOCKING.
 - (a) USE ONE LEVER FOR EACH FOUR RAIL LOCKS AND ONE LEVER FOR ALL BRIDGE COUPLERS.
 - (b) PROVIDE MECHANICAL OR ELECTRIC LOCKING TO INSURE THAT THE LEVER OPERATING THE BRIDGE COUPLERS MUST BE NORMAL (COUPLERS WITHDRAWN) BEFORE RAILS CAN BE UNLOCKED.
 4. FOR POWER OPERATION OF RAIL LOCKING.
 - (a) USE ONE LEVER FOR ALL RAIL LOCKS AND ALL BRIDGE COUPLERS.
 5. WHEN RAILS ARE LOCKED, PLUNGER 3723 SHALL PASS ENTIRELY THROUGH THE LOCKING HOLE OF RAIL SHOE. WHEN RAILS ARE UNLOCKED, THE END OF PLUNGER 3723 SHALL CLEAR THE RAIL SHOE NOT LESS THAN 3 INCHES.
 6. ADDITIONAL INSULATION SHALL BE PROVIDED IN PIPE LINES AND CONNECTIONS, IF NECESSARY, TO PREVENT GROUNDING OR SHUNTING OF TRACK CIRCUITS.
 7. WHEN NECESSARY, COMPENSATION SHALL BE PROVIDED IN THE PIPE LINES TO MINIMIZE EFFECTS OF EXPANSION AND CONTRACTION, PARTICULARLY TO PRESERVE POSITION OF PLUNGER 3723.

- FIELD WORK**
1. CIRCUIT CONTROLLERS SHALL BE CONNECTED TO AND INDICATE AS FOLLOWS:-
 - (a) WEDGES, DRIVEN AND WITHDRAWN.
 - (b) LATCHES, LOWERED AND RAISED.
 - (c) LIFT RAILS, LOWERED AND RAISED.
 - (d) RAIL LOCK PLUNGERS, DRIVEN AND WITHDRAWN.
 - (e) TROLLEY DEVICES, OPEN AND CLOSED.
 - (f) ELECTRIC BRIDGE COUPLERS, DRIVEN AND WITHDRAWN. (CONTACTS WITHIN COUPLER, IF PROVIDED, MAY BE USED IN LIEU OF CIRCUIT CONTROLLER).
 2. ADJUSTMENTS OF ABOVE CONTROLLERS SHALL BE IN ACCORDANCE WITH C.E. 227.

REVISIONS

1 SHEET



S-372-D

THE PENNSYLVANIA RAILROAD STANDARD DRAWBRIDGE LOCKING

FOR CENTER PIVOT DRAW

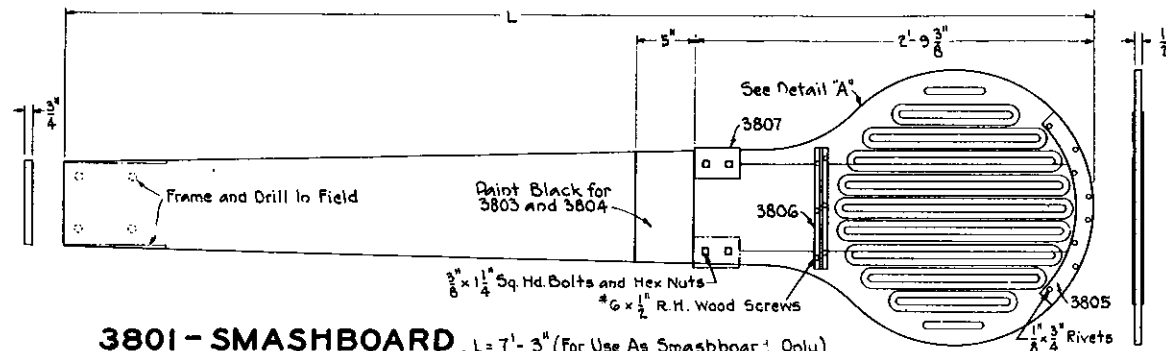
OFFICE OF CHIEF ENGINEER, PHILA., PA., DECEMBER 30, 1948.

Approved

McGriffith
Assistant Chief Engineer-T. C. & S.

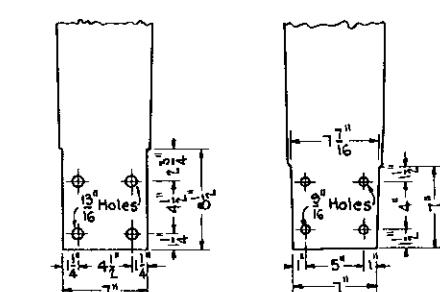
Approved

W. H. Smith
Chief Engineer

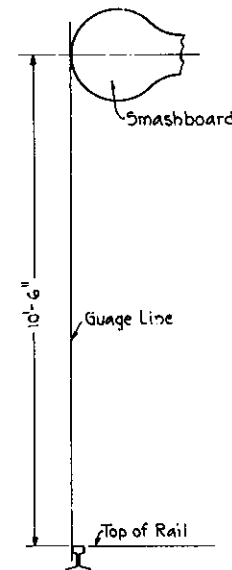


- 3801 - SMASHBOARD**, $L = 7' - 3"$ (For Use As Smashboard Only)
3802 - " , $L =$ As Specified (For Use As Smashboard Only)
3803 - " , $L = 7' - 3"$ (For Use As Combined Signal and Smashboard)
3804 - " , $L =$ As Specified (For Use As Combined Signal and Smashboard)

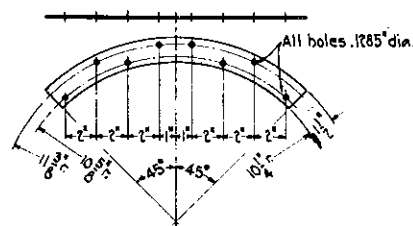
Paint 3801 and 3802 - Black all over.
 Paint 3803 and 3804 - (Front, Medium Chrome Yellow with Black Stripes.
 Back and Edges, Black.
 When installed as 3803 or 3804, the usual semaphore lamp must be provided showing Green when board is Clear, Red for all other positions.



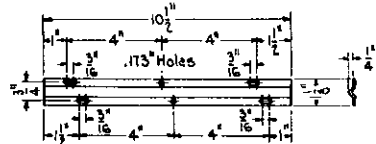
Old Style Semaphore A.R. Sig. Sec. Semaphore
 FRAMING AND DRILLING OF BOARDS



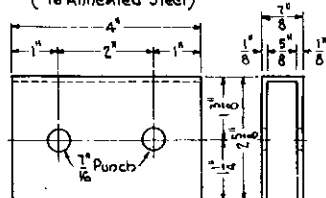
TYPICAL INSTALLATION



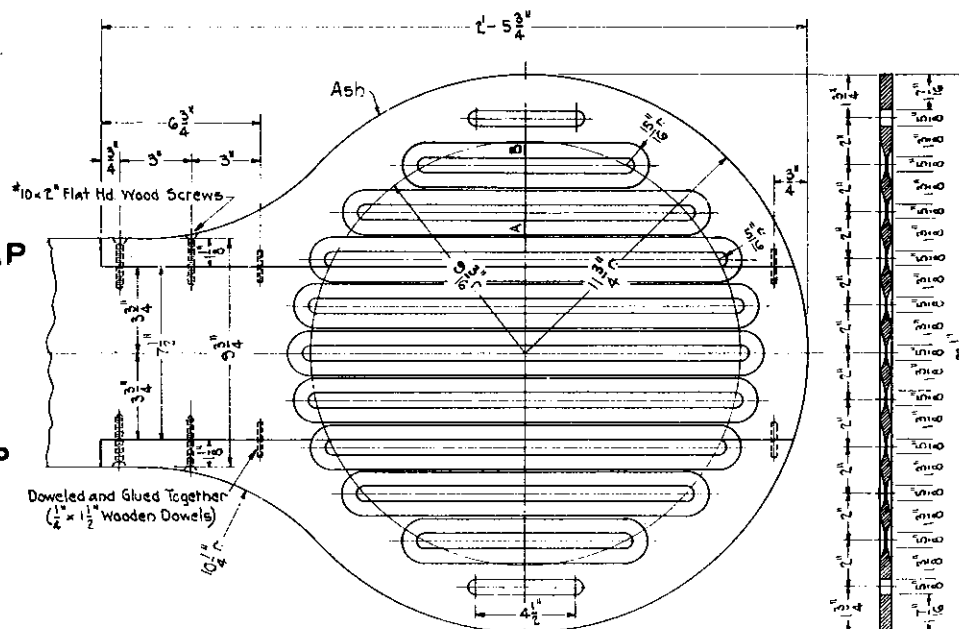
3805 - REINFORCING STRAP
 (#14 Galv. Iron)



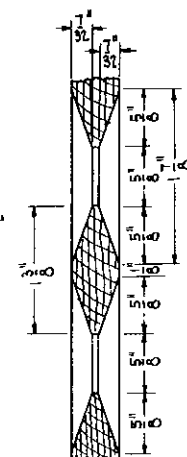
3806 - REINFORCING STRAP
 (#16 Annealed Steel)



3807 - CLAMP (Sheet Steel)



DETAIL "A"



SECTION "AB"
 (Enlarged)

Revisions

1 Sheet

5-380-A



THE PENNSYLVANIA RAILROAD
 STANDARD

SMASHBOARDS

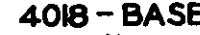
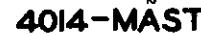
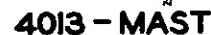
Office of Chief Signal Engineer, Phila., Pa., July 23, 1936.

Approved:

Approved:

W. H. Hays
 Chief Signal Engineer

W. H. Hays
 Acting Chief Engineer



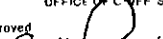
1 SHEET

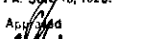
S-401-I

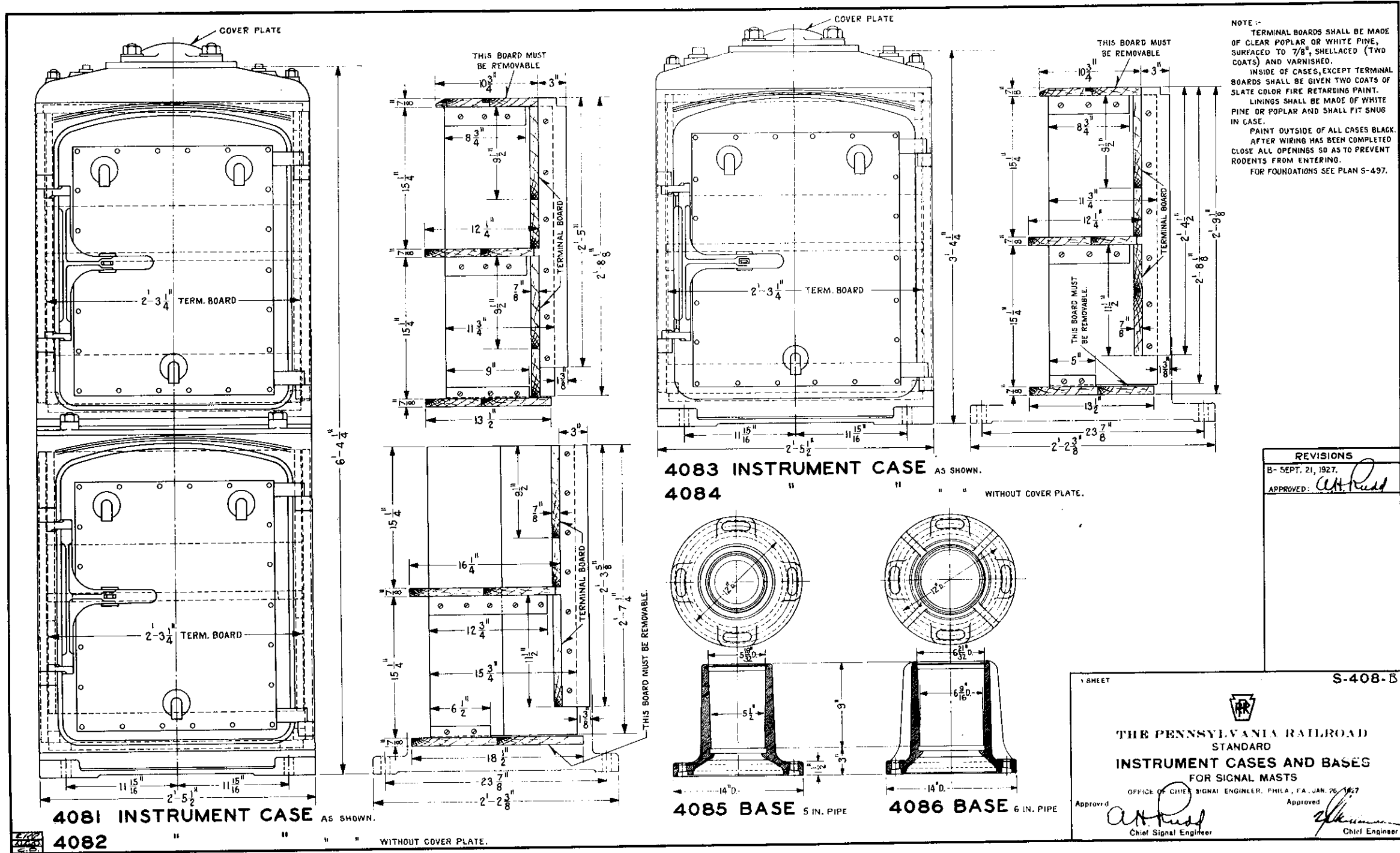


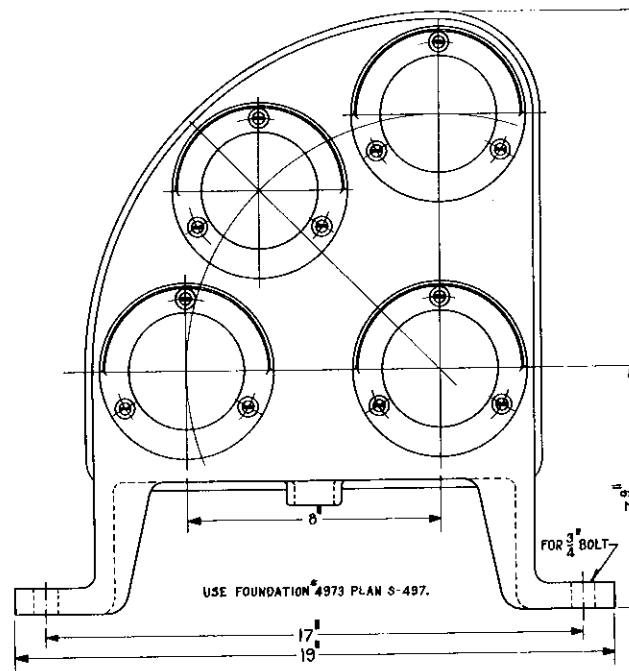
THE PENNSYLVANIA RAILROAD
STANDARD
POSITION LIGHT SIGNAL PARTS

OFFICE OF CHIEF SIGNAL ENGINEER PHILA., PA. JUN 16, 1928.

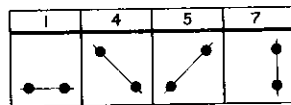
Approved: 
Chief Signal Engineer

Approved: 
Chief Engineer

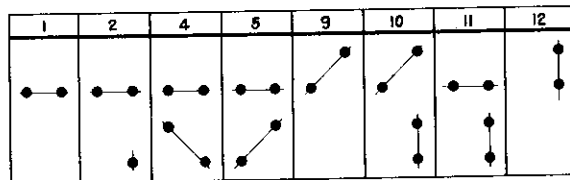




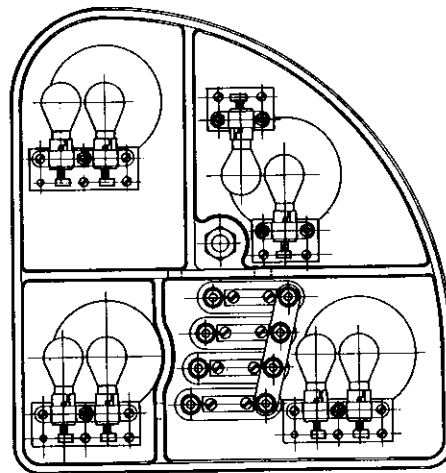
4101-DWARF SIGNAL



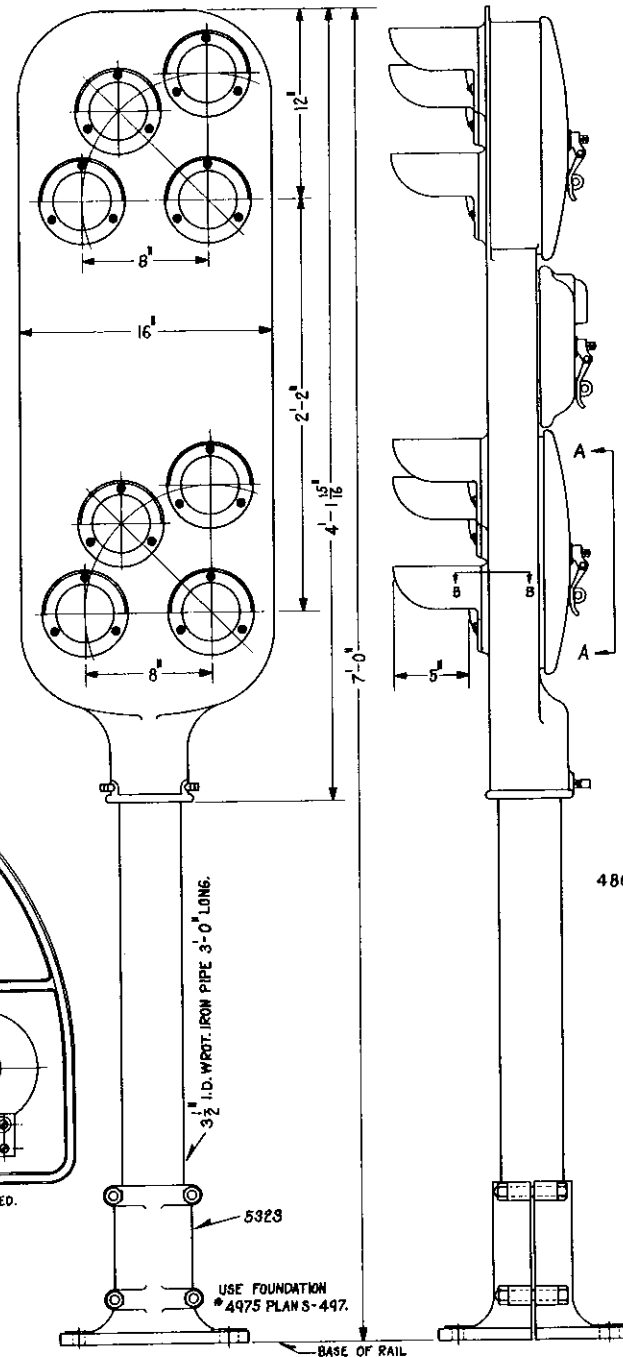
ASPECTS FOR SIGNAL 4101.



ASPECTS FOR SIGNAL 4102

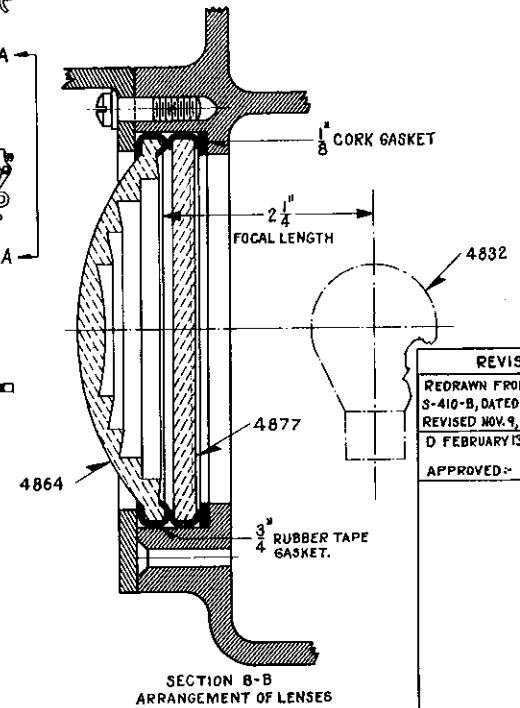


VIEW A-A WITH BACK COVER PLATE REMOVED.



4102-PEDESTAL SIGNAL

- NOTE:-
1. WHEN ORDERING SIGNALS, SPECIFY FIGURE NUMBER, TOGETHER WITH ASPECTS DESIRED.
 2. SIGNALS SHALL BE FURNISHED COMPLETE AS SHOWN WITHOUT LAMPS.
 3. WHEN INSTALLING, SIGNALS SHALL BE WIRED IN ACCORDANCE WITH STANDARD PLAN S-868.
 4. ALL INDICATIONS NOT USED SHALL BE BLANKED.



REVISIONS
 REDRAWN FROM APPROVED PLAN
 S-410-B, DATED FEB. 11, 1922, LAST
 REVISED NOV. 9, 1926 AND REVISED
 D FEBRUARY 13, 1934.
 APPROVED: *A.H. Reed*

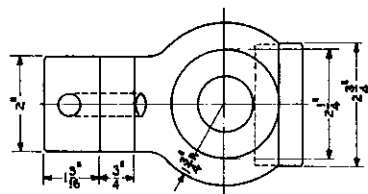
1 SHEET

S-410-D

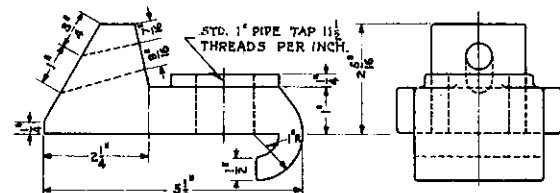


THE PENNSYLVANIA RAILROAD
 STANDARD
SIGNALS
 POSITION LIGHT

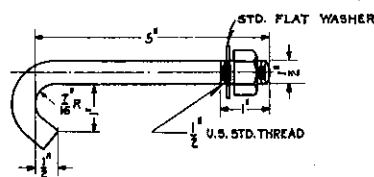
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., FEB. 2, 1938.
 Approved: *A.H. Reed* Chief Signal Engineer
 Approved: *Wm. H. ...* Chief Engineer



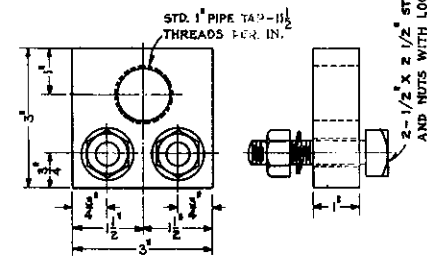
4291 - FLANGE



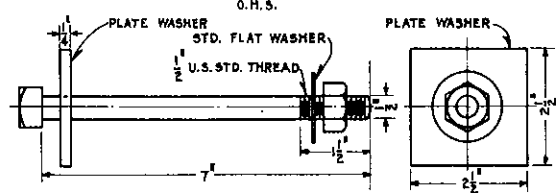
4292 - " WITH 4293.
C. I.



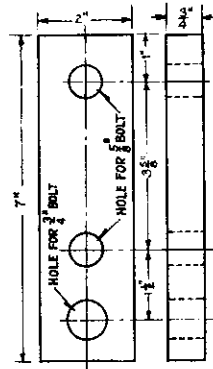
4293 - BOLT
O. H. S.



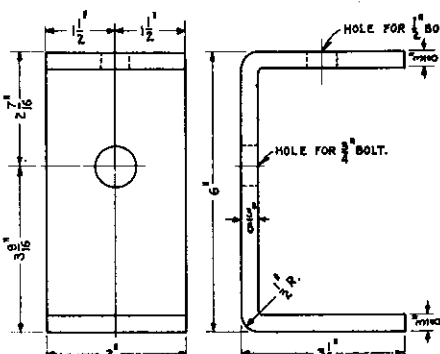
4294 - FLANGE
O. H. S.



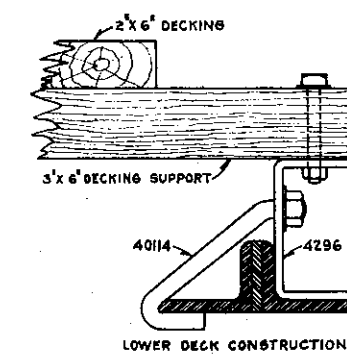
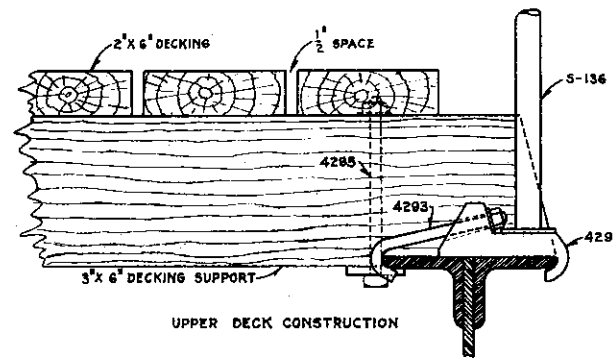
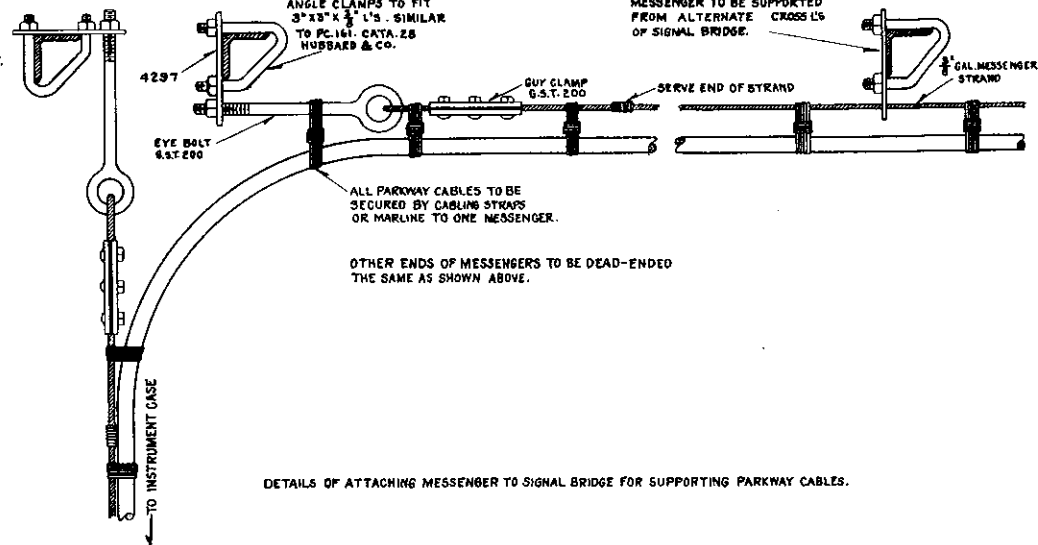
4295 - BOLT
O. H. S.



4297 - ANGLE CLAMP WASHER
O. H. S.



4296 - FILLER
O. H. S.



REVISIONS
REDRAWN FROM APPROVED PLAN S-429-B, DATED 2-11-22, LAST REVISED 1-26-27, AND REVISED D AUGUST 26, 1931.
APPROVED: <i>A.H. Duff</i>

1 SHEET

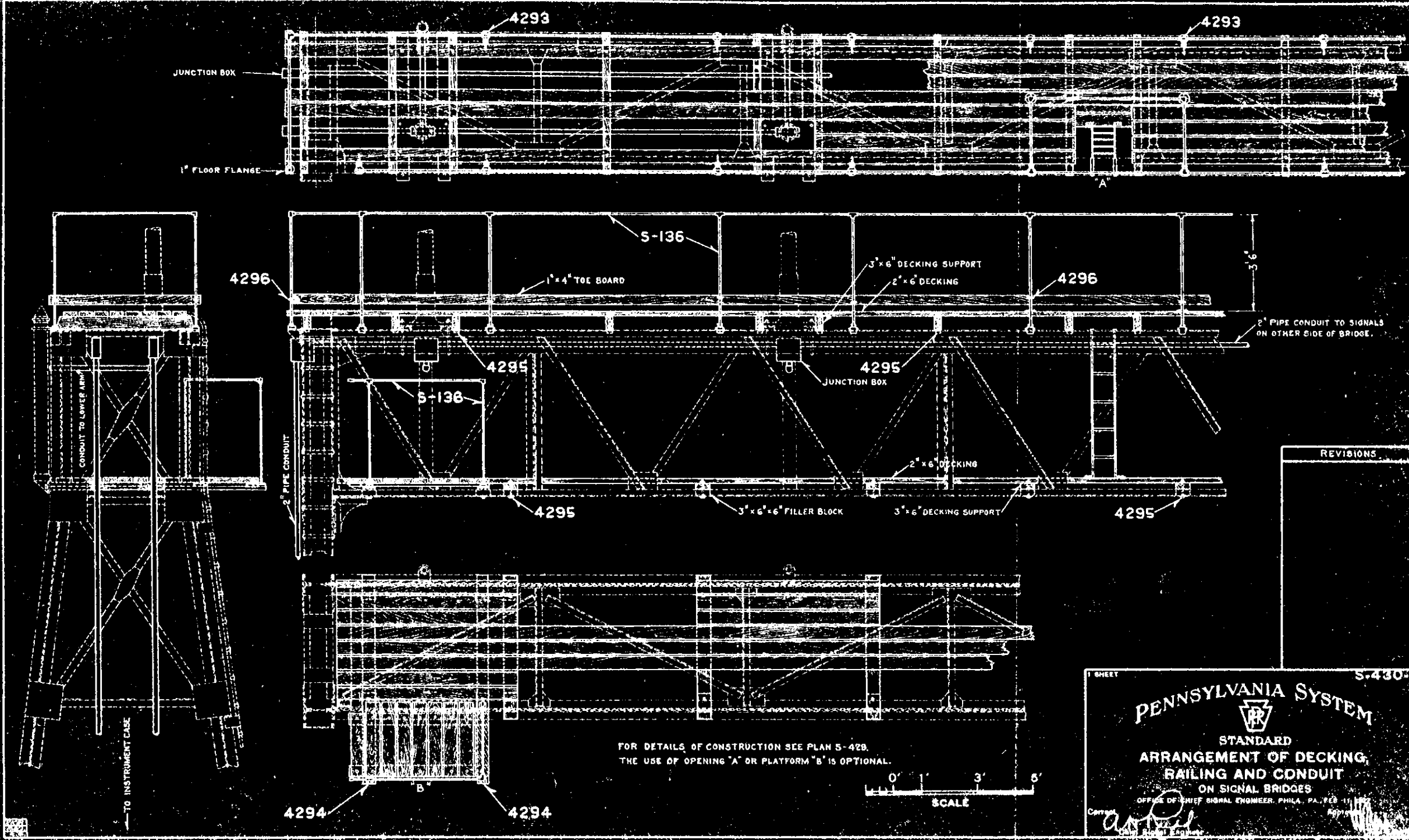
S-429-D

THE PENNSYLVANIA RAILROAD
STANDARD
PARTS FOR DECKING, RAILING
AND CABLE SUPPORTS
FOR SIGNAL BRIDGES AND CANTILEVERS

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA. MAY 22 1929

Approved *A.H. Duff* Chief Signal Engineer

Approved *W. H. ...* Chief Engineer



REVISIONS

FOR DETAILS OF CONSTRUCTION SEE PLAN 5-429.
THE USE OF OPENING "A" OR PLATFORM "B" IS OPTIONAL.



1 SHEET

S-430-A

PENNSYLVANIA SYSTEM

STANDARD

ARRANGEMENT OF DECKING,

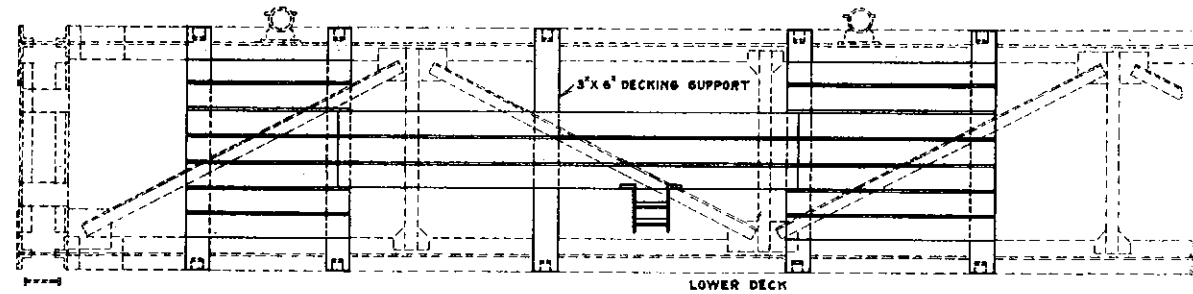
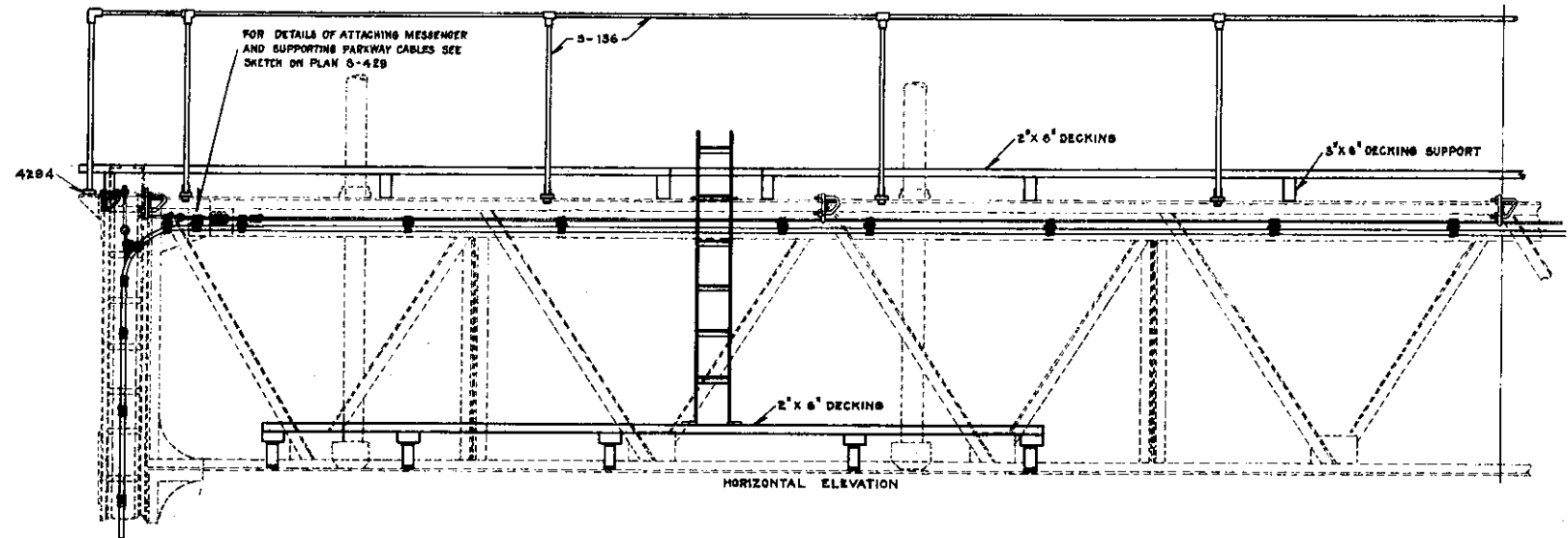
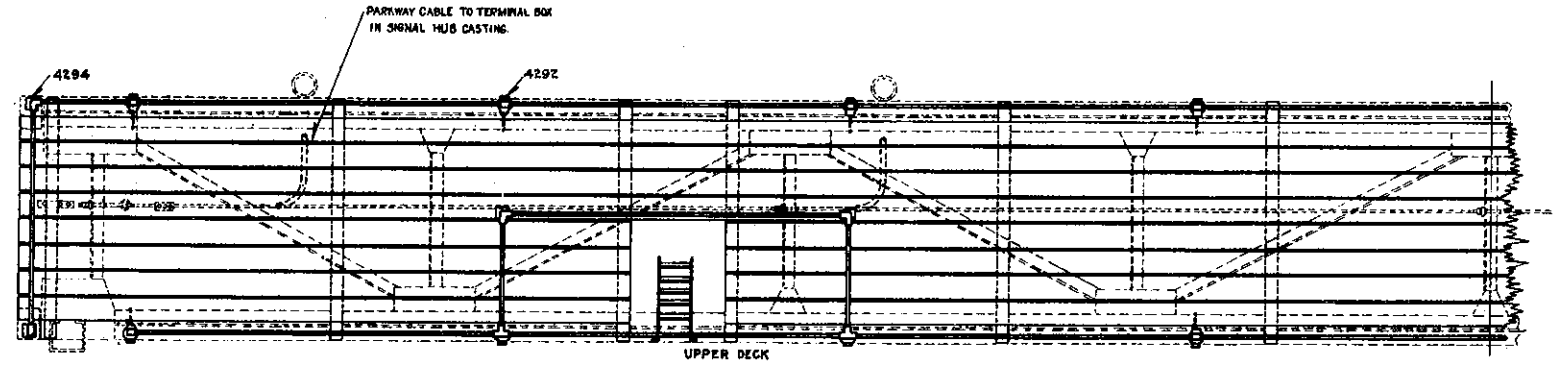
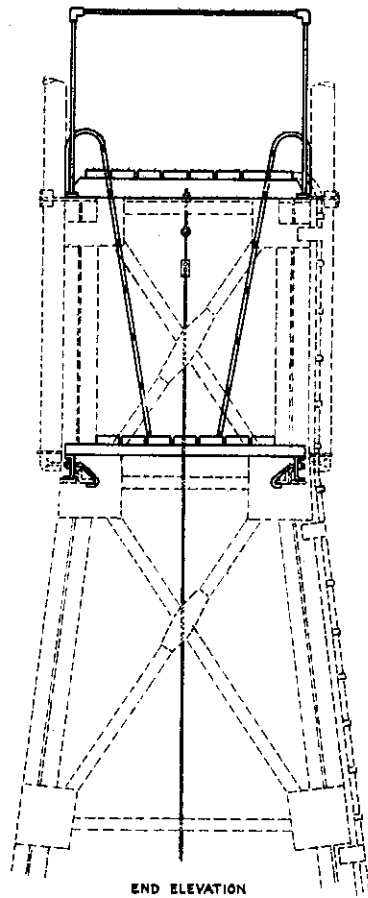
RAILING AND CONDUIT

ON SIGNAL BRIDGES

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., FEB. 11, 1911

Chief Signal Engineer

NOTE:-
DECKING SHALL BE PAINTED WITH NOT LESS THAN
TWO COATS OF SLATE COLORED FIRE RETARDING PAINT
APPROVED BY THE CHIEF SIGNAL ENGINEER.



REVISIONS
REVISION IN PART FROM APPROVED PLAN S-430-A, DATED 2-11-22, AND REVISED.
B AUGUST 26, 1921. S.E.
APPROVED: <i>AKP</i>

1 SHEET
S-432-B

THE PENNSYLVANIA RAILROAD
STANDARD
ARRANGEMENT OF DECKING
RAILING AND CABLE SUPPORTS
ON SIGNAL BRIDGES

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA. MAY 22, 1922

Approved: *AKP* Chief Signal Engineer

Approved: *W. H. H.* Chief Engineer

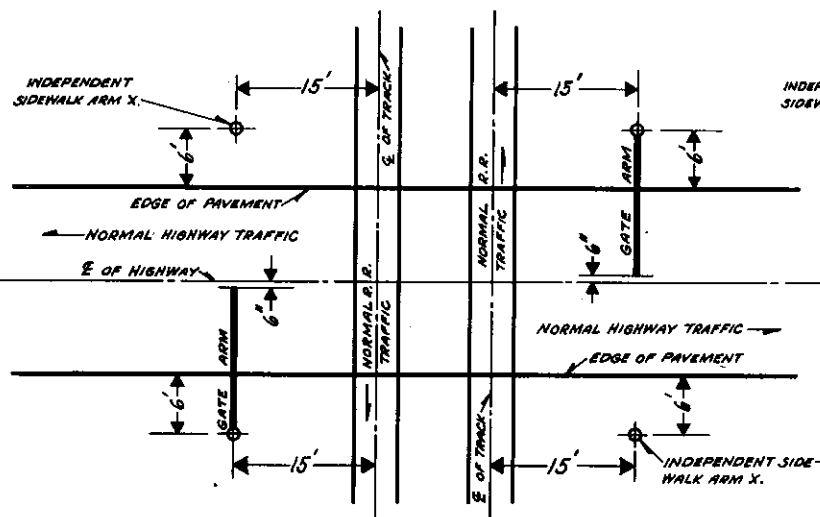


FIGURE 1.

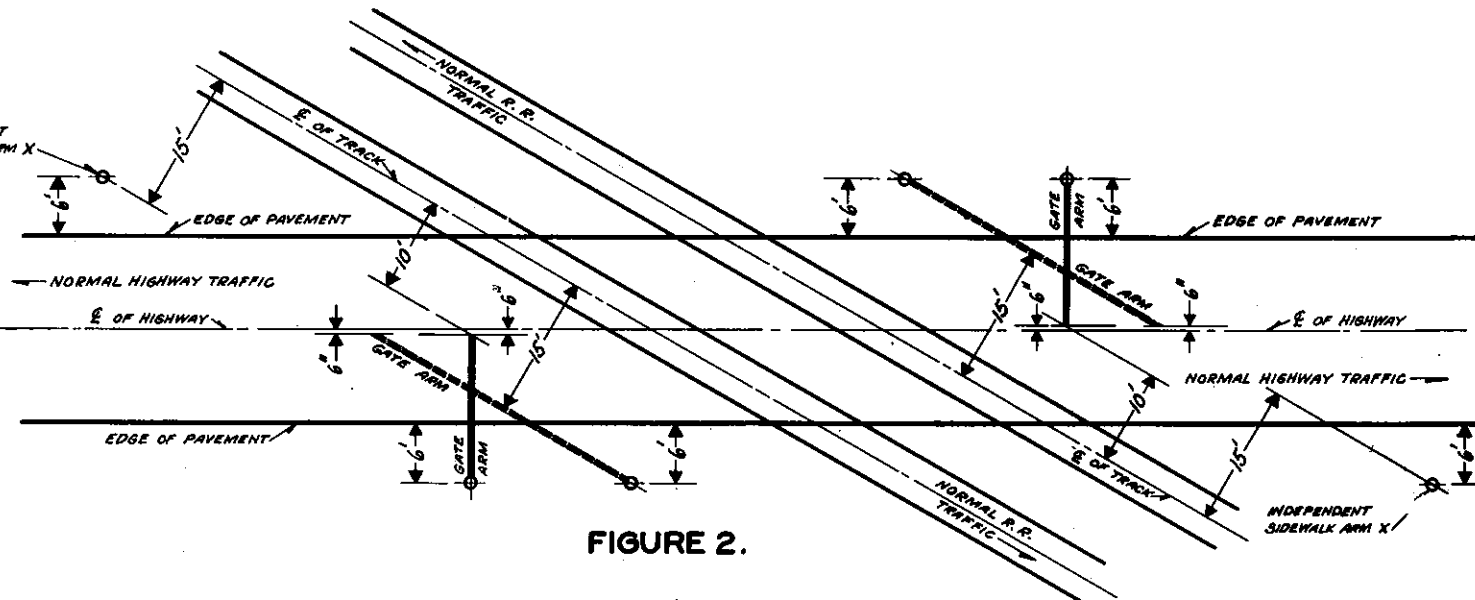


FIGURE 2.

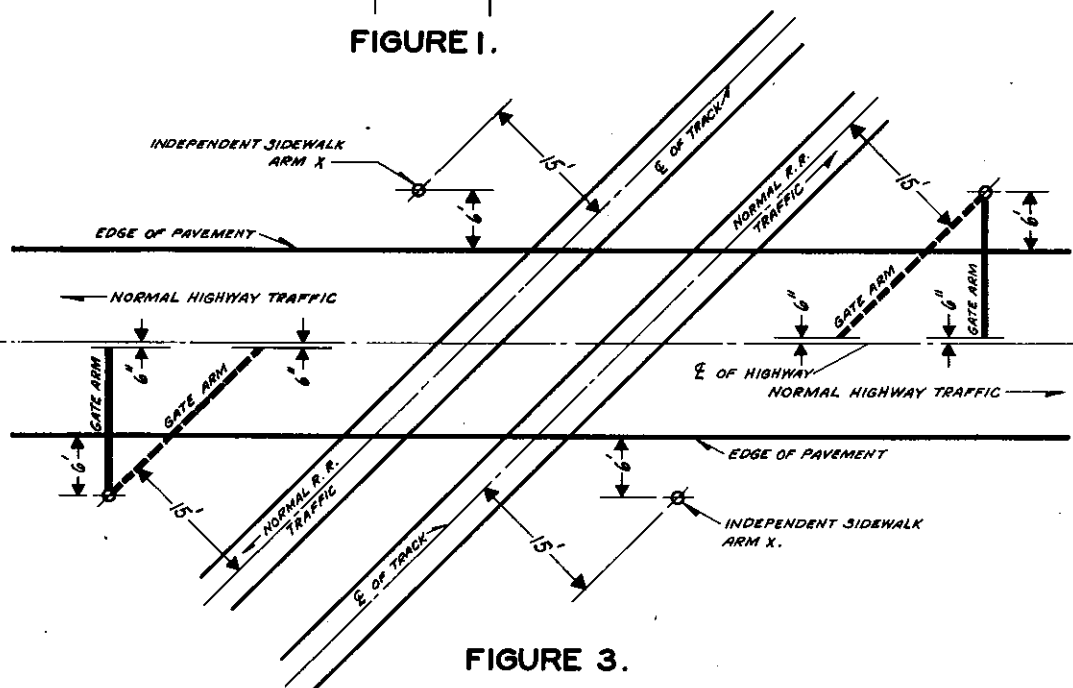


FIGURE 3.

NOTES:-

1. AUTOMATIC CROSSING GATE ARMS SHALL BE INSTALLED AT RIGHT ANGLES TO THE HIGHWAY, EXCEPT:-
 - (a) WHERE PHYSICAL CHARACTERISTICS DO NOT PERMIT. (CARE MUST BE EXERCISED TO AVOID INTERFERENCE WITH OVER-HEAD WIRES).
 - (b) WHEN REQUIRED OTHERWISE BY STATE OR LOCAL AUTHORITY.
2. AUTOMATIC CROSSING GATE ARMS SHOULD NOT EXCEED 34 FEET IN LENGTH. GATE ARMS EXCEEDING 34 FEET IN LENGTH WHEN REQUIRED BY THE STATE, LOCAL AUTHORITY, OR OTHER CONDITIONS, OR WHERE TROUBLE MIGHT BE EXPECTED DUE TO SNOW, ICE OR WIND, SHOULD BE EQUIPPED WITH DRIVE-DOWN MECHANISM.
3. ADDITIONAL FLASHING TIME SHALL BE PROVIDED WHERE THE LOCATION OF GATE ARM MATERIALLY INCREASES THE DISTANCE BETWEEN GATE ARM AND CENTER OF TRACK INVOLVED (SEE DRAWING NO. S-860).
4. WHERE PROTECTION FOR SIDEWALK IS REQUIRED BY STATE OR LOCAL AUTHORITY:-
 - (a) WHERE PRACTICABLE, HIGHWAY GATE ARM MECHANISM SHALL BE SO LOCATED AS TO PROVIDE PROTECTION TO BOTH SIDEWALK AND HIGHWAY.
 - (b) WHERE NOT PRACTICABLE TO FOLLOW (a), ADDITIONAL SIDEWALK ARM ATTACHED TO AND OPERATED BY HIGHWAY ARM MECHANISM SHALL BE PROVIDED.
 - (c) INDEPENDENT SIDEWALK ARMS X TO BE PROVIDED ONLY WHEN REQUIRED AS PORTION OF PROTECTION AT ANY PARTICULAR CROSSING.

REVISIONS

1 SHEET



S-462-A

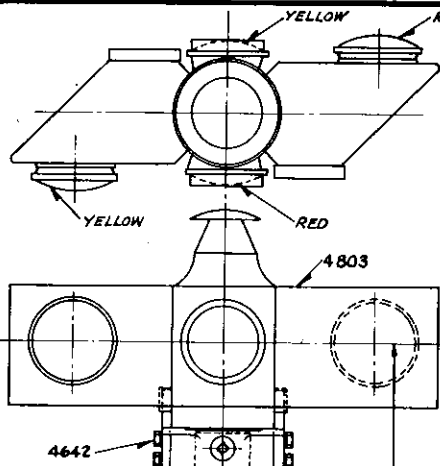
THE PENNSYLVANIA RAILROAD
STANDARD
LAYOUT

FOR AUTOMATIC HIGHWAY CROSSING GATES.

OFFICE OF CHIEF ENGINEER, PHILA., PA., SEPTEMBER 30, 1947.

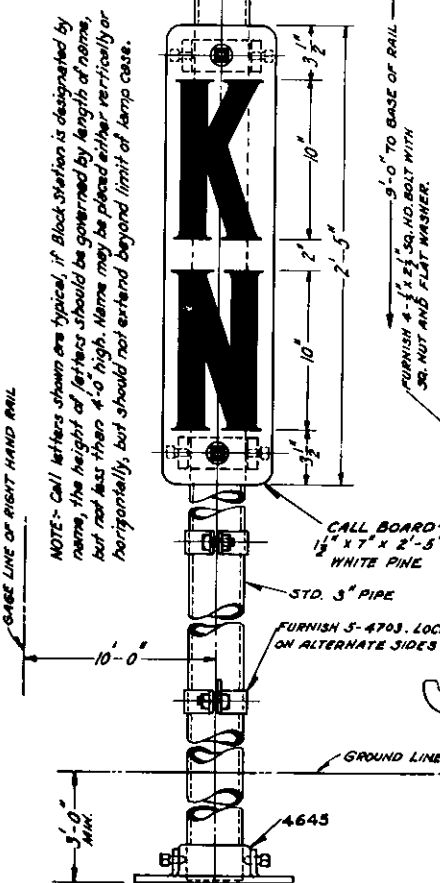
Approved
H. C. Griffith
Assistant Chief Engineer - T.C. & S.

Approved
J. H. Smith
Chief Engineer

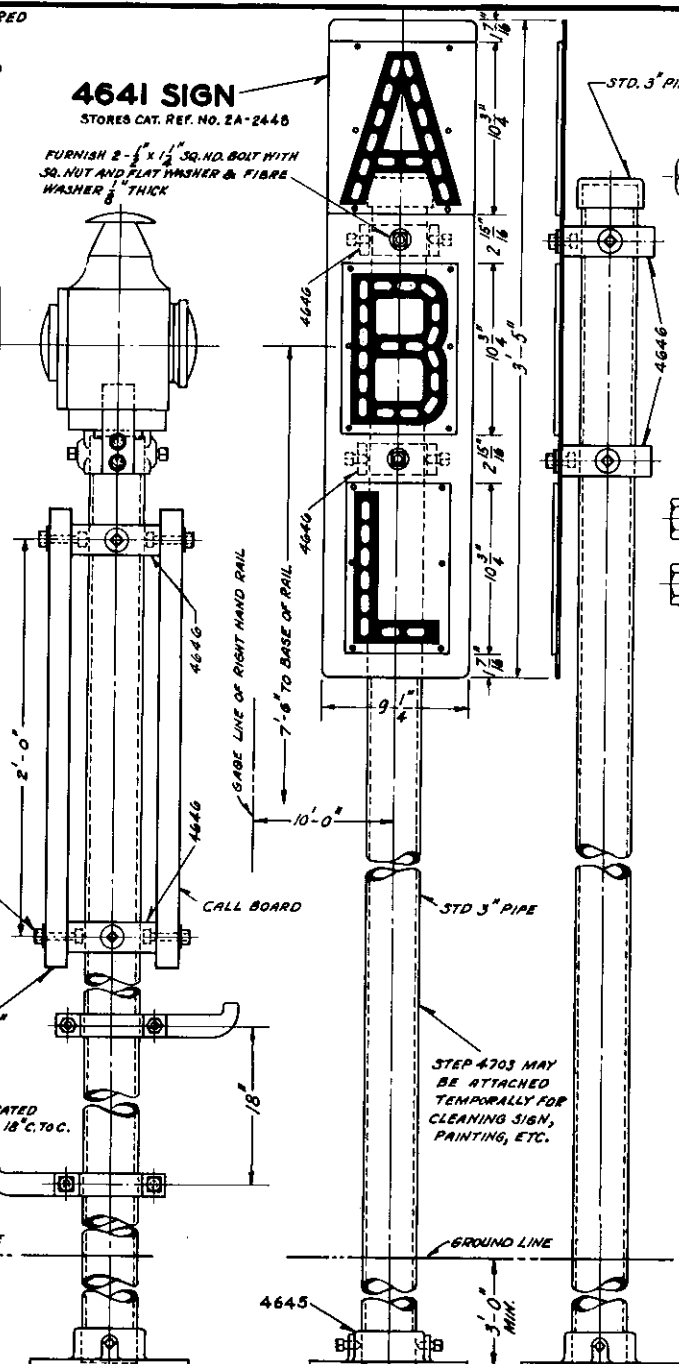


4641 SIGN
STORES CAT. REF. NO. 2A-2448

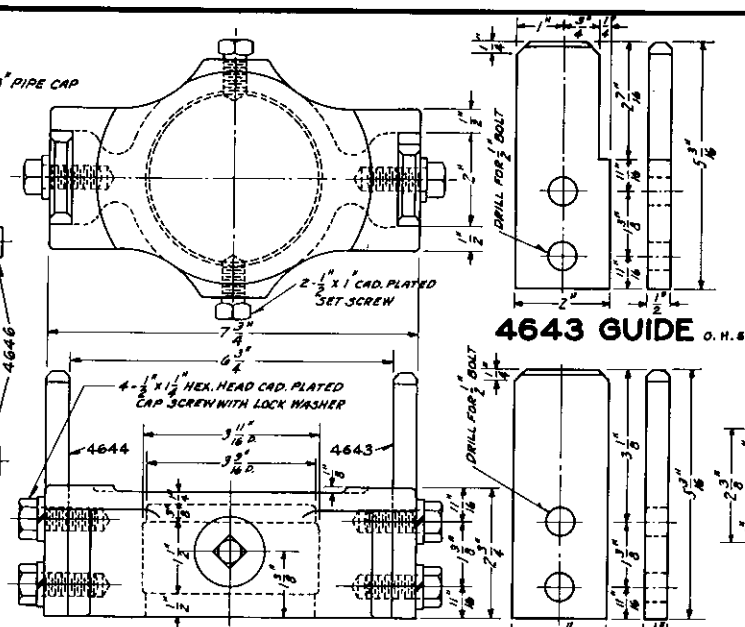
FURNISH 2- $\frac{1}{2}$ " x $\frac{1}{2}$ " SQ. HD. BOLT WITH SQ. NUT AND FLAT WASHER & FIBRE WASHER $\frac{1}{8}$ " THICK



BLOCK-LIMIT SIGNAL

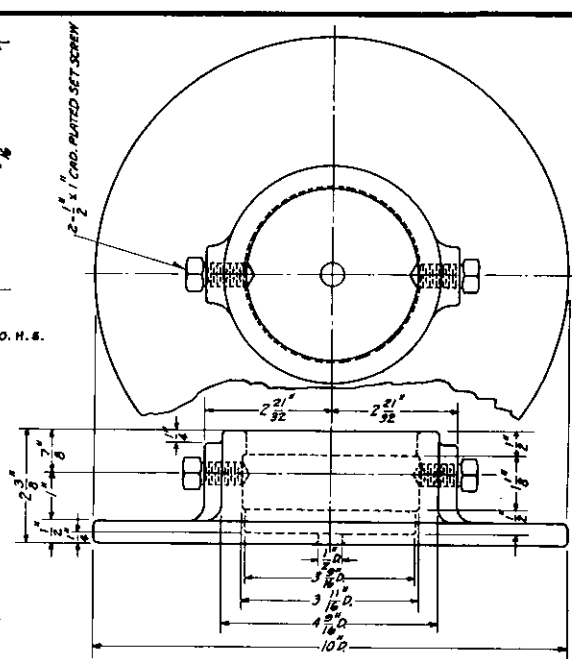


APPROACH BLOCK-LIMIT SIGNAL



4642 BRACKET COMPLETE
CAST IRON
STORES CAT. REF. NO. 2A-4680

4644 GUIDE O.H.S.

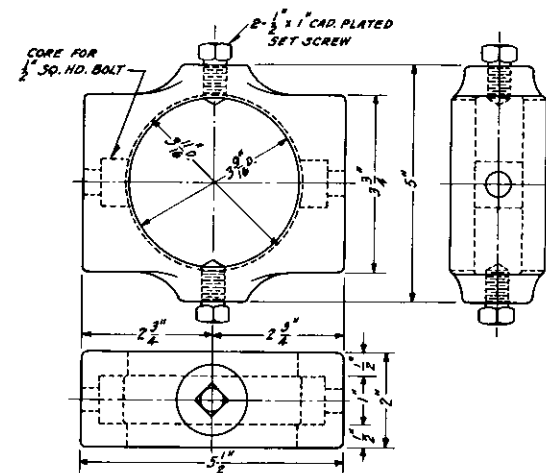


4645 BASE CAST IRON
STORES CAT. REF. NO. 2A-4681

NOTES:-

- BLOCK-LIMIT SIGNAL**
1. PAINT FRONT, BACK AND EDGES OF CALL BOARD BLACK AND THE LETTERS WHITE (ENAMELED LETTERS, SIMILAR TO 4893, MAY BE APPLIED WHERE REQUIRED BY LOCAL CONDITIONS).
 2. LETTERS SHALL BE CONDENSED TYPE IN ACCORDANCE WITH M.W. DRAWING 78000-C.
 3. PAINT MAST AND LAMP CASE BLACK.
 4. WHEN INSTALLING, COAT ALL PARTS UNDERGROUND, WITH NO-OK-ID OR EQUAL.

- APPROACH BLOCK-LIMIT SIGNAL**
1. LETTERS SHALL BE $\frac{9}{16}$ " HIGH, WITH $\frac{1}{2}$ " STROKE, WIDTH OF LETTERS, A - $7\frac{1}{2}$ ", B - 0", L - $5\frac{1}{2}$ ".
 2. MATERIAL OF SIGN 4641 SHALL BE GALVANNEAL STEEL, OR STEEL PARKERIZED AFTER FABRICATION, WITH BAKED-ON ENAMEL (COLOR AS SPECIFIED IN NOTE 3).
 3. ENTIRE SIGN, FRONT, BACK AND EDGES, SHALL BE YELLOW, EXCEPT LETTERS, WHICH SHALL BE BLACK.
 4. REFLECTOR UNITS SHALL BE OVAL, OF THE PRISMATIC TYPE $\frac{3}{4}$ " x $1\frac{1}{2}$ ".
 5. SIGNAL MAY BE ATTACHED TO BUILDING, OR OTHER STRUCTURE TO SUIT LOCAL CONDITIONS, (BUT NOT TO OTHER SIGNAL MAST).
 6. WHEN INSTALLING, COAT ALL PARTS UNDERGROUND, WITH NO-OK-ID OR EQUAL.
 7. PAINT MAST AND CLAMPS BLACK.



4646 CLAMP CAST IRON
STORES CAT. REF. NO. 2A-4682

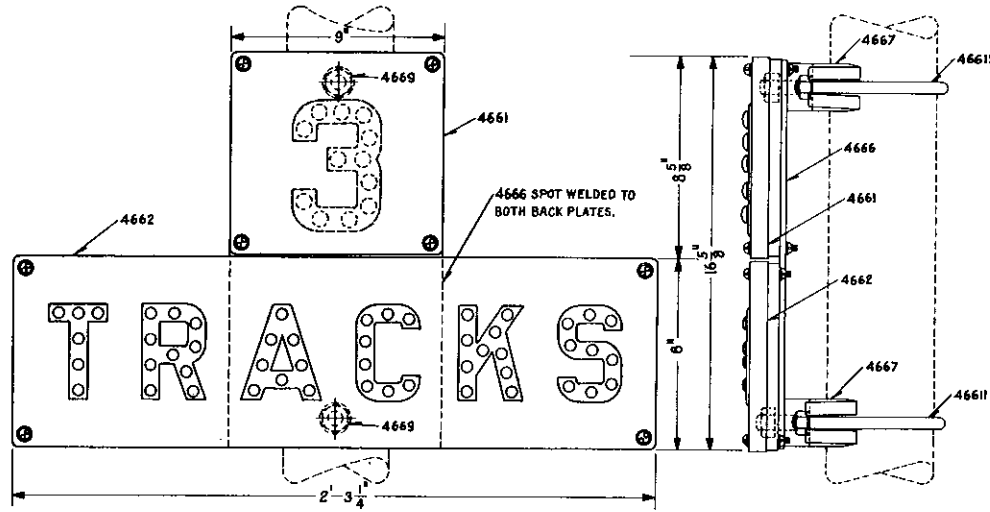
REVISIONS
SUPERSEDES DRAWING S-464-D, DATED JUNE 18, 1943 AND LAST REVISED MAY 17, 1944.

1 SHEET

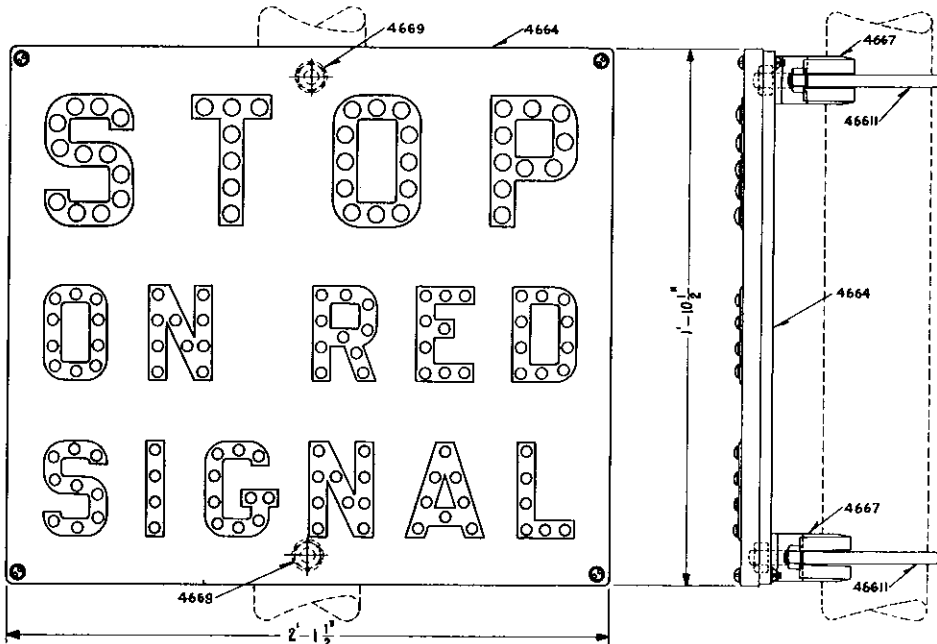


S-464-G

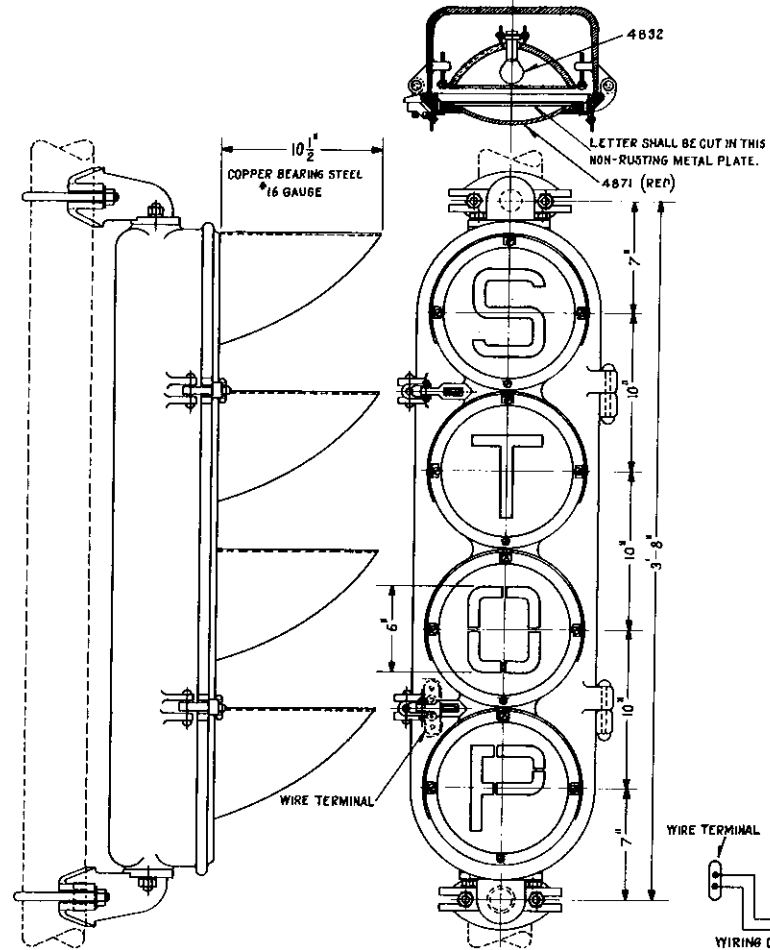
THE PENNSYLVANIA RAILROAD
STANDARD
BLOCK-LIMIT SIGNAL
AND
APPROACH BLOCK-LIMIT SIGNAL
OFFICE OF CHIEF ENGINEER, PHILA., PA., APRIL 23, 1948.
Approved *W. C. Gifford* Assistant Chief Engineer T.C.&S.
Approved *J. H. Mott* Chief Engineer



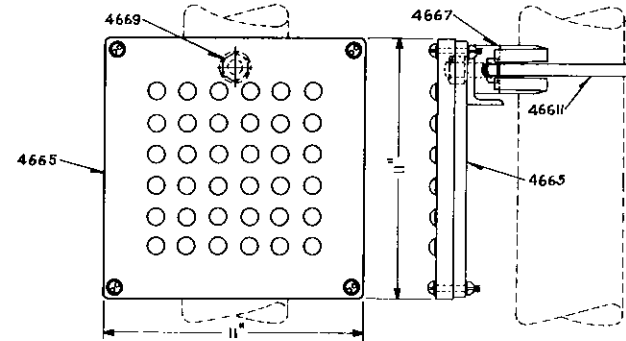
4651 REFLECTOR TRACKS SIGN COMPLETE
SPECIFY NUMERAL REQUIRED ON REQUISITION.
A. R. A. MANUAL MAY 1933.



4652 REFLECTOR STOP ON RED SIGNAL SIGN COMPLETE
A. R. A. MANUAL MAY 1933

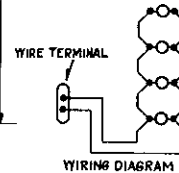


4653 ILLUMINATED STOP SIGN COMPLETE



4654 REFLECTOR CROSSING SIGNAL MARKER COMPLETE
A. R. A. MANUAL MAY 1933

- NOTE:-
1. WHERE NO DETAIL REFERENCE IS GIVEN, THE MANUFACTURER'S STANDARD APPARATUS SHALL BE FURNISHED.
 2. SIGN 4653 SHALL BE WIRED IN ACCORDANCE WITH DIAGRAM SHOWN.
 3. LIGHT UNITS OF SIGN 4653 SHALL BE EQUIPPED WITH INSULATED RECEPTACLES FOR SINGLE CONTACT BAYONET CANDELABRA BASES AND WIRE TERMINAL.
 4. FOR CONTROL CIRCUITS FOR SIGN 4653 SEE PLAN NO. S-860.
 5. UNLESS OTHERWISE SPECIFIED, SIGNS SHALL BE FURNISHED ASSEMBLED COMPLETE WITH ALL PARTS FOR ATTACHING TO 4\" O.D. PIPE POST.
 6. FOR APPLICATION OF SIGNS SEE PLAN NO. 66207.
 7. FOR SPECIFICATIONS FOR REFLECTOR SIGNS AND REFLECTOR BUTTONS SEE PLAN S-467.
 8. FOR DETAILS OF REFLECTOR SIGNS SEE PLAN S-466.



REVISIONS

REDRAWN FROM APPROVED PLAN
S-465-A, DATED JUNE 28, 1932
AND REVISED.

1 SHEET

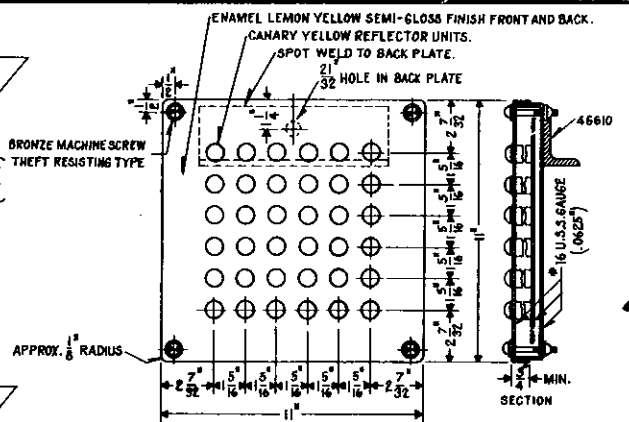
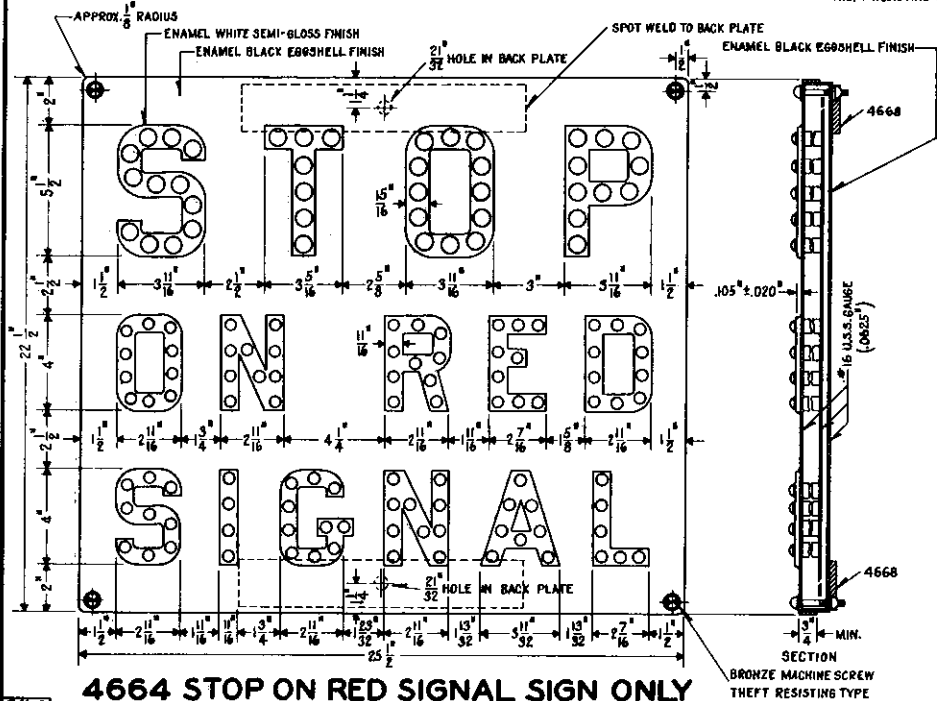
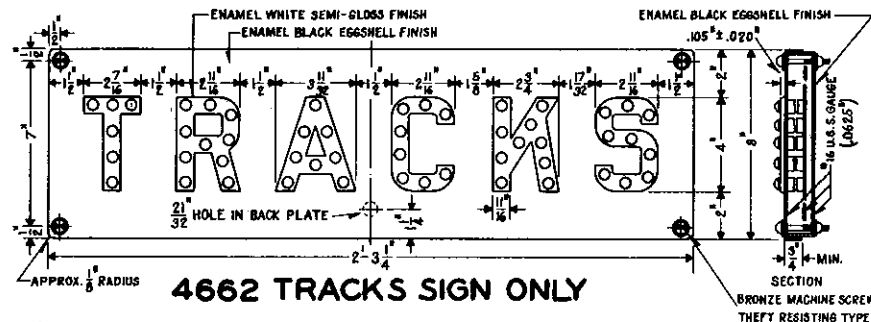
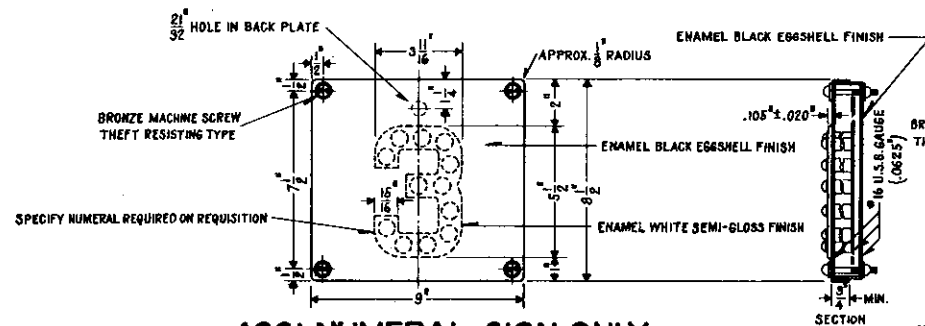
S-465-B

THE PENNSYLVANIA RAILROAD
STANDARD
SIGNS
ILLUMINATED AND REFLECTING
FOR HIGHWAY CROSSINGS

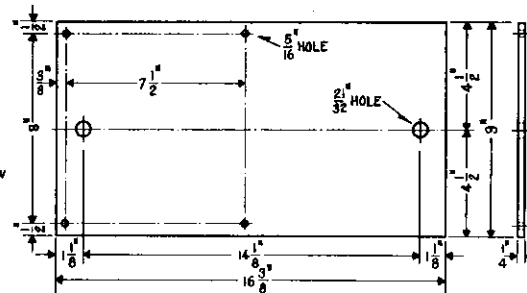
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., OCTOBER 31, 1933.

Approved
Chief Signal Engineer

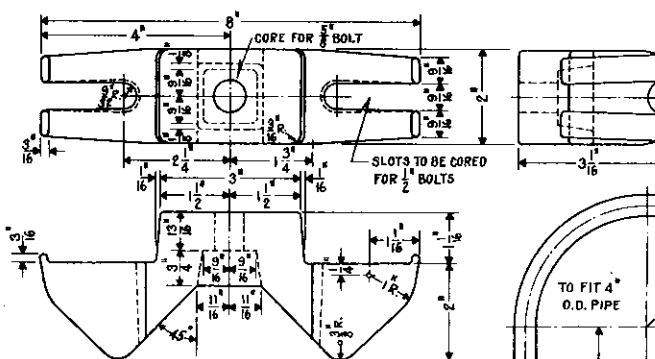
Approved
Chief Engineer



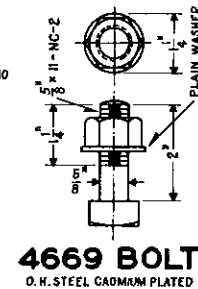
4665 CROSSING SIGNAL MARKER ONLY



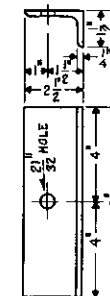
4666 SUPPORTING PLATE



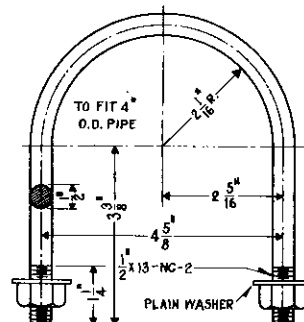
4667 ADAPTER CLAMP



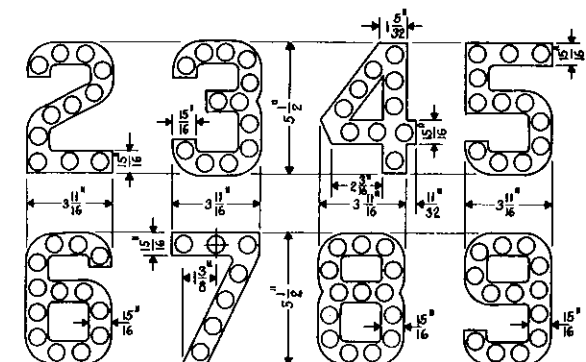
4669 BOLT



46610 ANGLE



46611 "U" BOLT



OUTLINES OF NUMERALS FOR SIGN 4661

- NOTE:-
1. NUMBER AND SPACING OF REFLECTOR UNITS SHALL BE AS SHOWN.
 2. FOR SPECIFICATIONS FOR REFLECTOR SIGNS AND REFLECTOR UNITS SEE PLAN S-467.
 3. FOR ASSEMBLY OF REFLECTOR SIGNS SEE PLAN S-466.

A. R. A. MANUAL MAY 1933.

REVISIONS

1 SHEET

S-466-A

THE PENNSYLVANIA RAILROAD

STANDARD

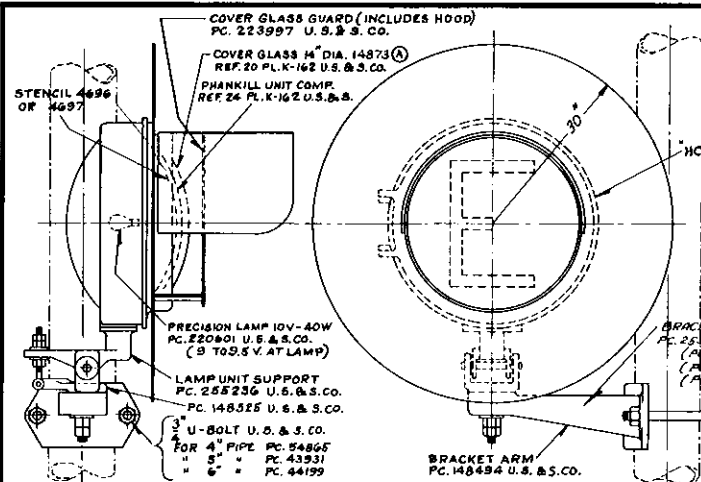
SIGNS

DETAILS OF REFLECTOR SIGNS FOR HIGHWAY CROSSINGS

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., OCTOBER 31, 1933.

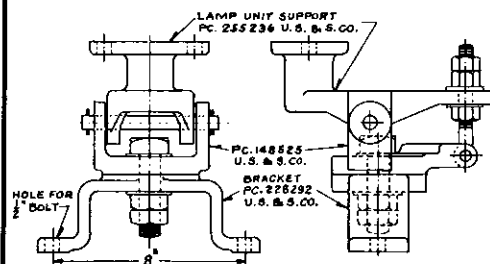
Approved: *A. H. H. H.* Chief Signal Engineer

Approved: *W. H. H. H.* Chief Engineer

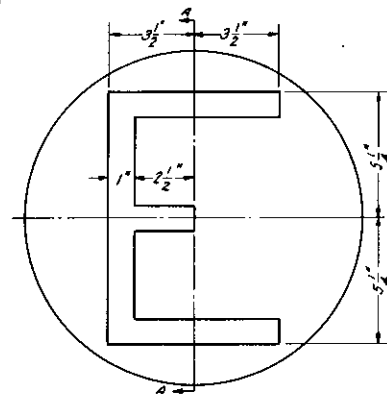


4691 ILLUMINATED SIGN COMPLETE AS SHOWN FOR POLE MOUNTING. (SEE NOTE 10)
STORES CAT. REF. NO. 2A-5691

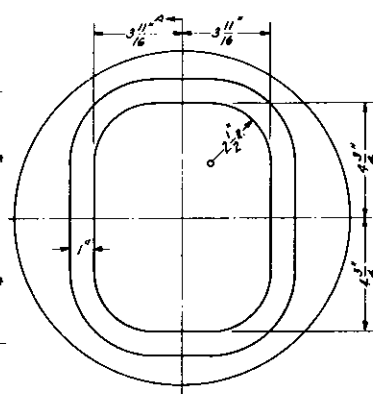
4692 ILLUMINATED SIGN WITH BRACKET 4693 FOR PLATFORM MOUNTING. (SEE NOTE 10)
STORES CAT. REF. NO. 2A-5692



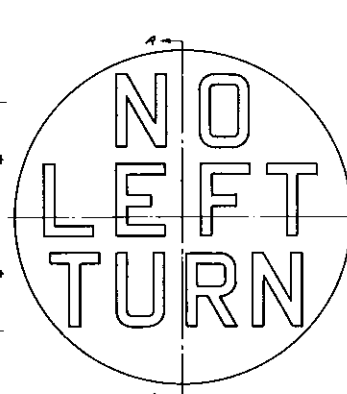
4693 BRACKET COMPLETE (PC 202682 U.S. & S. CO.) FOR PLATFORM MOUNTING
STORES CAT. REF. NO. 2A-5693



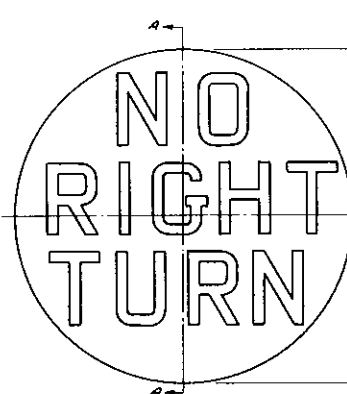
4696 STENCIL
STORES CAT. REF. NO. 2A-5656



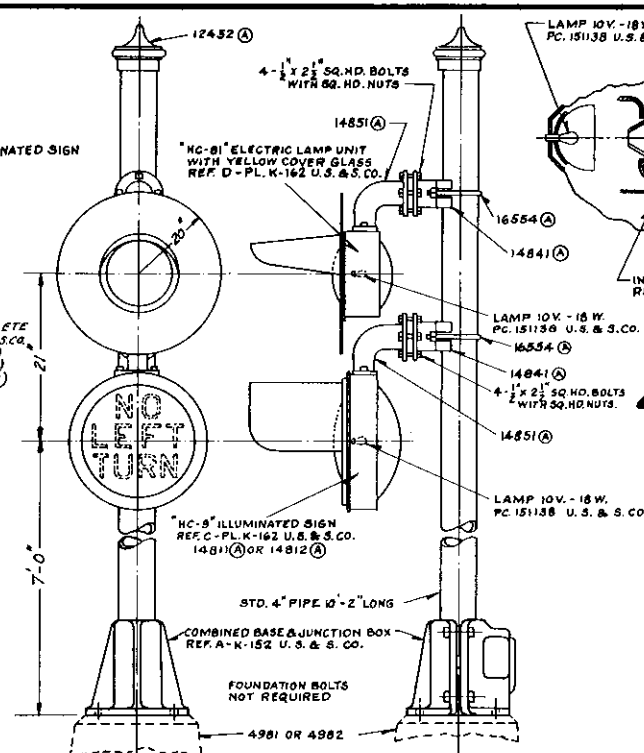
4697 STENCIL
STORES CAT. REF. NO. 2A-5657



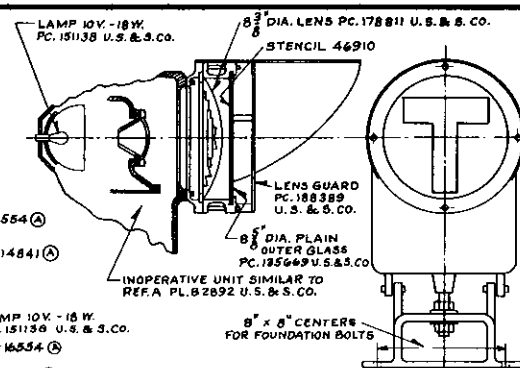
4698 STENCIL
STORES CAT. REF. NO. 2A-5658
14872(6)



4699 STENCIL
STORES CAT. REF. NO. 2A-5659
14871(6)

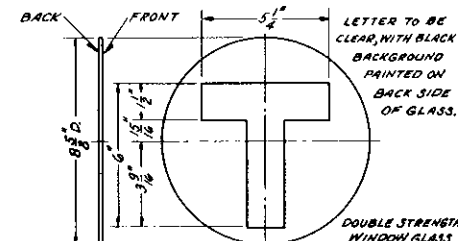


4694 ILLUMINATED SIGN COMPLETE AS SHOWN. (SEE NOTE 11)
STORES CAT. REF. NO. 2A-2375



4695 T-SIGN COMPLETE AS SHOWN
STORES CAT. REF. NO. 2A-5655

- NOTES:-
1. OUTER COVER GLASS OF 4691, 4692 AND 4693 IS CLEAR ON OUTSIDE AND SAND-BLASTED ON INSIDE.
 2. STENCIL 4696 IS FOR USE IN CONNECTION WITH DRAGGING EQUIPMENT DETECTOR DEVICE IN ACCORDANCE WITH ADJUNCT AS RECOMMENDED BY S.T.R.C. DOCKET 38-2, REVISED.
 3. STENCIL 4697 IS FOR USE AS TRAIN ORDER SIGNAL.
 4. STENCILS 4698 AND 4699 ARE FOR USE IN CONNECTION WITH "NO LEFT TURN AND NO RIGHT TURN" SIGNS AT HIGHWAY CROSSINGS WHERE REQUIRED.
 5. STENCIL 46910 IS FOR USE IN CONNECTION WITH TORPEDO PLACING MACHINE.
 6. ITEM NUMBERS SHOWN WITH (A) REFER TO A.A.R. SIG. SEC. DRAWINGS.
 7. WHERE LOCAL CONDITIONS REQUIRE PHANKILL UNIT FOR "HC-81" UNIT, REQUESTION SHOULD SPECIFY WITH PHANKILL UNIT PC.207075 U.S. & S. CO.
 8. SIGNS 4691 AND 4692 SHALL BE LOCATED TO THE LEFT OF THE SIGNAL GOVERNING MOVEMENTS ON TRACK INVOLVED.
 - (a) WHERE SIGN 4691 IS LOCATED ON GROUND MAST 7'-6" FROM GAGE LINE OF RIGHT HAND RAIL, BRACKET ARMS SHALL BE ARRANGED TO POSITION THE "HC-9" UNIT WITH FRONT FACING TRAFFIC SO THAT THE EDGE OF THE BACKGROUND WILL BE NOT MORE THAN 21" NEARER THE GAGE LINE THAN THE CENTER LINE OF MAST. IF MAST IS LOCATED 10'-0" FROM GAGE LINE AS INDICATED BY P.R.R. CLEARANCE DIAGRAM 70050-A, BRACKET SHOULD BE MOUNTED TOWARDS TRACK WITH "HC-9" UNIT POSITIONED ON TRACK PARALLEL WITH SIGNAL UNIT.
 - (b) 1. WHERE LOCATED ON SIGNAL BRIDGE 1-SIGN 4692, WHEN USED AS A TRAIN ORDER SIGNAL SHALL BE LOCATED IN 30 FAR AS PRACTICABLE ON A LINE HORIZONTALLY BELOW THE BOTTOM LIGHT OF THE BOTTOM ARM SIGNAL.
 - (b) 2. SIGN 4692, WHEN USED AS AN INDICATOR LIGHT FOR A DRAGGING EQUIPMENT DETECTOR, SHALL BE LOCATED ABOVE THE TOP CHORD OF BRIDGE TRUSS, FLUSH WITH THE FACE OF TRUSS AND MOUNTED TO SUIT THE PARTICULAR REQUIREMENTS OF INSTALLATION AND WIRING CONDITIONS.
 9. "NO LEFT TURN" AND "NO RIGHT TURN" SIGNS SHALL BE LOCATED TO BEST MEET THE PHYSICAL CHARACTERISTICS AND VISIBILITY CONDITIONS IN THE FIELD.
 10. WHEN ORDERING 4691 SPECIFY PIPE SIZE, STENCIL 4696 OR 4697, AND COVER GUARD IF REQUIRED. WHEN ORDERING 4692 SPECIFY STENCIL 4696 OR 4697, AND COVER GLASS GUARD IF REQUIRED.
 11. WHEN ORDERING 4694 OR "HC-9" UNIT FOR 4694, SPECIFY WITH STENCIL 4698 OR 4699 AS REQUIRED.
 12. 10V.-18W. LAMPS INDICATED IN 4694 AND 4695 SHALL BE BURNED 9.0 TO 9.6 VOLTS AT LAMPS.



46910 STENCIL
STORES CAT. REF. NO. 2A-5660

REVISIONS
8. REDRAWN FROM APPROVED PLAN S-469-A, DATED 1-21-48 AND REVISED.

1 SHEET

S-469-B

THE PENNSYLVANIA RAILROAD

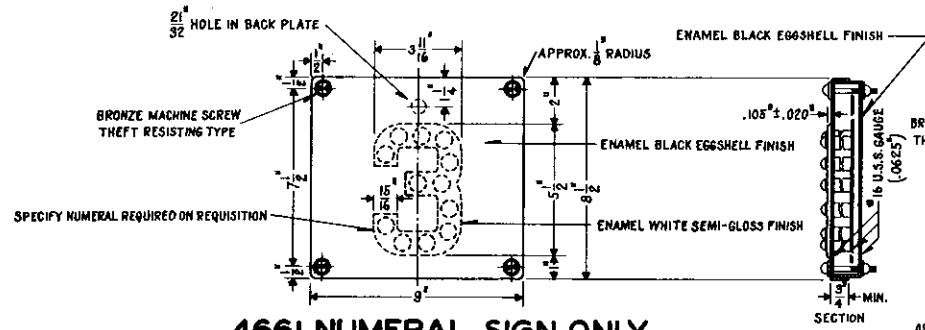
STANDARD
SIGNS
ILLUMINATED

OFFICE OF CHIEF ENGINEER, PHILA., PA., AUGUST 9, 1949.

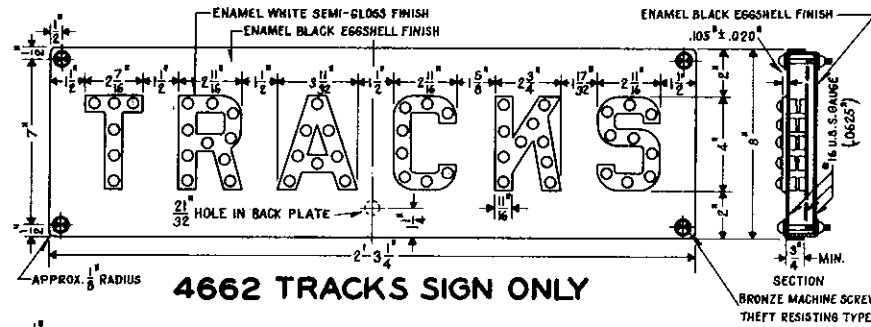
Approved *H. G. Salmonson* Approved *J. H. Whitt*

Assistant Chief Engineer-Signals Chief Engineer

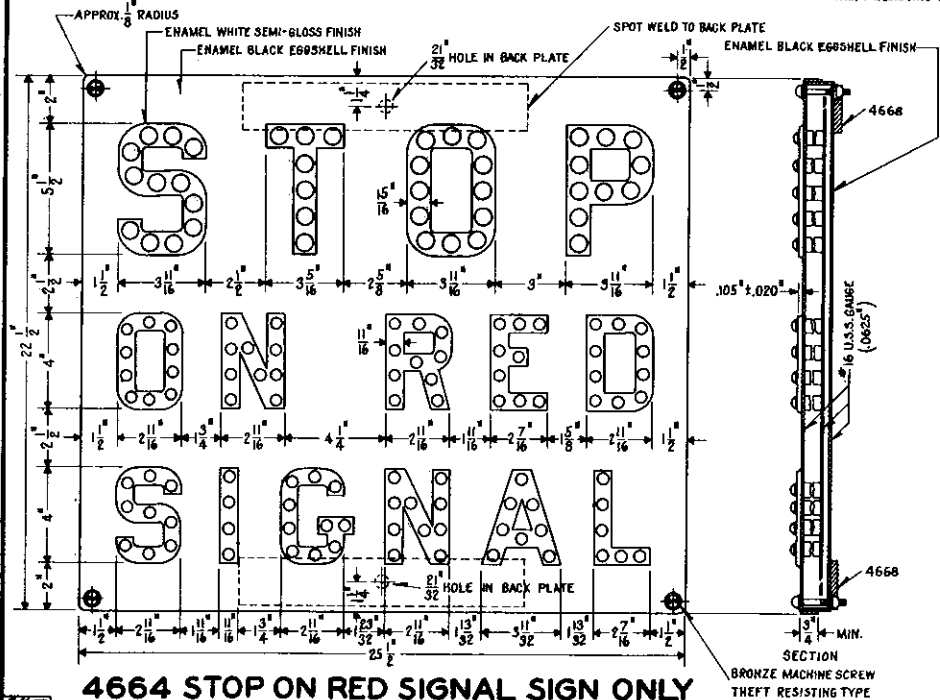
DRAGGING EQUIP., TRAIN ORDER



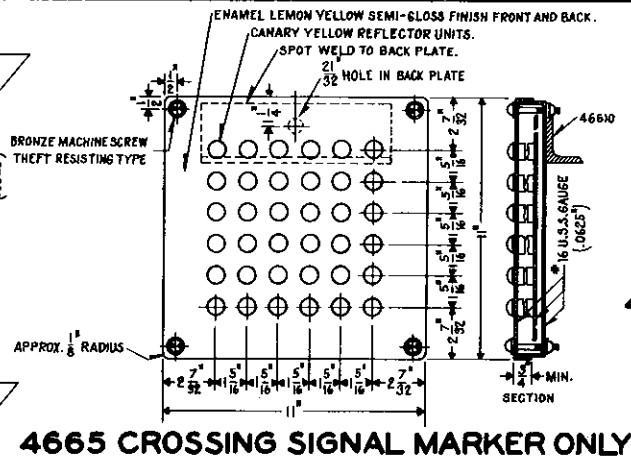
4661 NUMERAL SIGN ONLY



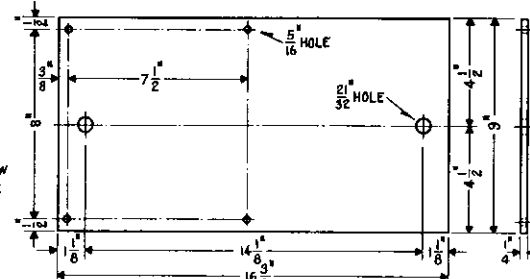
4662 TRACKS SIGN ONLY



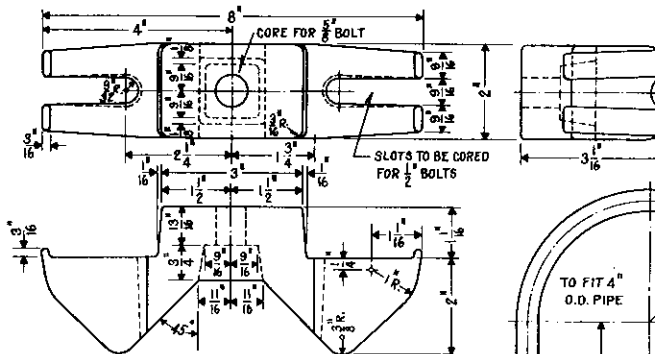
4664 STOP ON RED SIGNAL SIGN ONLY



4665 CROSSING SIGNAL MARKER ONLY



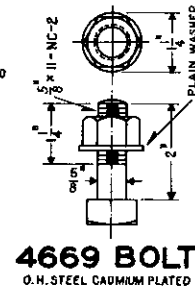
4666 SUPPORTING PLATE
O.H. STEEL



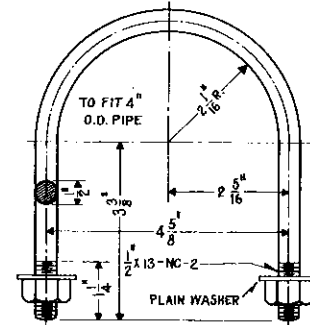
4667 ADAPTER CLAMP
CAST IRON



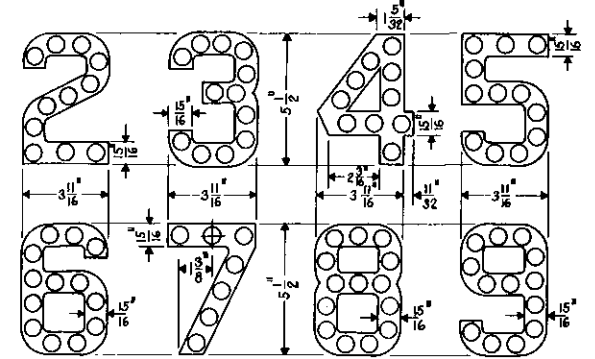
4668 STRAP
O.H. STEEL



46610 ANGLE
O.H. STEEL



46611 U BOLT
O.H. STEEL
NOT A.R.A. STD.



OUTLINES OF NUMERALS FOR SIGN 4661

- NOTE 1-
1. NUMBER AND SPACING OF REFLECTOR UNITS SHALL BE AS SHOWN.
 2. FOR SPECIFICATIONS FOR REFLECTOR SIGNS AND REFLECTOR UNITS SEE PLAN S-467.
 3. FOR ASSEMBLY OF REFLECTOR SIGNS SEE PLAN S-465.

A.R.A. MANUAL MAY 1933.

REVISIONS

1 SHEET

S-466-A

THE PENNSYLVANIA RAILROAD
STANDARD
SIGNS
DETAILS OF REFLECTOR SIGNS
FOR HIGHWAY CROSSINGS

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., OCTOBER 31, 1933.
Approved: *A. H. H. H.*
Chief Signal Engineer

Approved: *W. H. H. H.*
Chief Engineer

SPECIFICATION FOR REFLECTOR UNITS.
(A. R. A. SIGNAL SECTION SPECIFICATION 155-33.)

1. PURPOSE.
 - (a) THE PURPOSE OF THIS SPECIFICATION IS TO PROVIDE A REFLECTOR UNIT FOR REFLECTOR SIGNS FOR RAILROAD HIGHWAY GRADE CROSSING PROTECTION.
2. TENDER.
 - (a) THE TENDER SHALL BE FOR APPARATUS MEETING THE REQUIREMENTS OF THIS SPECIFICATION. IF THE CONTRACTOR WISHES TO VARY FROM THE SPECIFICATION, A TENDER MAY BE SUBMITTED COVERING THE APPARATUS HE DESIRES TO FURNISH. THIS TENDER SHALL BE ACCOMPANIED BY FULL INFORMATION SHOWING WHEREIN THE REQUIREMENTS OF THIS SPECIFICATION ARE NOT MET.
3. MATERIAL AND WORKMANSHIP.
 - (a) MATERIAL AND WORKMANSHIP SHALL BE FIRST-CLASS IN EVERY RESPECT.
4. TYPE.
 - (a) THE REFLECTOR UNIT SHALL BE OF THE SINGLE OR DOUBLE REFRACTION TYPE AND SHALL BE IN ACCORDANCE WITH PURCHASER'S REQUIREMENTS.
5. LENSES.
 - (a) THE LENS SHALL BE MADE OF CLEAR COLORLESS OR CANARY YELLOW GLASS OF UNIFORM REFLECTING POWER. IT SHALL BE ACCURATELY FORMED AND FREE FROM ALL DEFECTS WHICH WOULD AFFECT ITS OPTICAL OR PHYSICAL PROPERTIES. IT SHALL BE PRACTICALLY FREE FROM CHROMATIC ABERRATION WHEN VIEWED WITHIN AN ANGLE OF 30 DEG. FROM ITS AXIS.
 - (b) THE LENS SHALL BE SO DESIGNED THAT A LIGHT AT ANY POINT WITHIN 30 DEG. OF THE AXIS OF THE LENS WILL BE REFLECTED TO A POINT 40 IN. ABOVE THE SOURCE WITH SATISFACTORY INTENSITY. THE SOURCE OF LIGHT SHALL BE AN APPROVED TYPE OF AUTOMOBILE HEADLIGHT AND SHALL BE LOCATED 300 FT. FROM REFLECTOR UNIT.
6. REFLECTOR UNITS.
 - (a) THE REFLECTOR UNIT SHALL BE OF SUBSTANTIAL DESIGN, ACCURATELY FORMED AND CONSTRUCTED FOR CORRECT FOCUS.
 - (b) IF THE REFLECTOR UNIT IS OF THE DOUBLE REFRACTION TYPE, IT SHALL BE ACCURATELY FITTED TO THE LENS AND THE TWO SHALL BE SEALED INTO A CORROSION RESISTING RETAINER SO AS TO FORM A JOINT THAT WILL PREVENT THE ADMISSION OF LIQUID OR GAS BETWEEN THE REFLECTOR AND LENS.
 - (c) IF THE REFLECTOR UNIT IS OF THE SINGLE REFRACTION TYPE, THE REFLECTOR BACKING SHALL CONSIST OF A HEAVY COAT OF METALLIC SILVER. IT SHALL BE UNIFORM, EVENLY APPLIED TO THE SURFACE OF THE GLASS AND BE SO FITTED AS TO FORM AN AIR-TIGHT JOINT BETWEEN IT AND THE GLASS. THE BACKING SHALL BE SUCH THAT IT WILL PREVENT THE ADMISSION OF AIR OR ANY FOREIGN SUBSTANCE BETWEEN IT AND THE GLASS. OVER THE REFLECTIVE BACKING SHALL BE PLACED A PROTECTIVE BACKING OF ONE HEAVY COAT OF METALLIC COPPER, AND OVER THIS COPPER PLATE A COATING OF PROTECTIVE MATERIAL WHICH SHALL SO SEAL THE BACKING AS TO RENDER IT WATERPROOF AND AIR-TIGHT.
7. MOUNTING.
 - (a) THE REFLECTOR UNIT SHALL BE DESIGNED SO AS TO ENTER THE APERTURE IN THE FACE OF SIGN FROM THE REAR AND SHALL BE HELD IN A FIXED RELATION TO THE FACE OF SIGN WITH ITS AXIS NORMAL TO THE APERTURE.
 - (b) THE REFLECTOR UNIT SHALL BE SO CONSTRUCTED THAT NOT MORE THAN 1/32 IN. OF THE RETAINER OR HOUSING SHALL BE EXPOSED TO VIEW WHEN THE REFLECTOR UNIT IS ASSEMBLED IN THE SIGN.
8. INSPECTION.
 - (a) PURCHASER MAY INSPECT MATERIAL AT ALL STAGES OF MANUFACTURE.
 - (b) PURCHASER MAY INSPECT THE COMPLETED PRODUCT TO DETERMINE THAT THE REQUIREMENTS OF THIS SPECIFICATION HAVE BEEN MET.
 - (c) IF MATERIAL HAS NOT BEEN ACCEPTED AT POINT OF PRODUCTION AND, UPON ARRIVAL AT DESTINATION, IT DOES NOT MEET THE REQUIREMENTS OF THIS SPECIFICATION, IT MAY BE REJECTED, AND THE CONTRACTOR, UPON REQUEST, SHALL ADVISE THE PURCHASER WHAT DISPOSITION IS TO BE MADE OF THE DEFECTIVE MATERIAL. CONTRACTOR SHALL PAY ALL FREIGHT CHARGES.
 - (d) IF PURCHASER IS TO MAKE INSPECTION AT POINT OF PRODUCTION IT SHALL BE SO STATED.
9. TESTS.
 - (a) TESTS MAY BE MADE AT POINT OF PRODUCTION, OR ON SAMPLES SUBMITTED, AND MAY ALSO BE MADE AT DESTINATION.
 - (b) CONTRACTOR SHALL GIVE THE PURCHASER SUFFICIENT NOTICE OF TIME WHEN MATERIAL WILL BE READY FOR TESTING.
 - (c) CONTRACTOR SHALL PROVIDE, AT POINT OF PRODUCTION, APPARATUS AND LABOR FOR MAKING REQUIRED TESTS UNDER SUPERVISION OF THE PURCHASER.
 - (d) IF TESTS ARE TO BE MADE AT POINT OF PRODUCTION, THE PURCHASER SHALL SO STATE AND ALSO INDICATE WHICH OF THE TESTS HEREIN SPECIFIED ARE TO BE MADE AND WHAT PORTION OF THE MATERIAL SHALL BE TESTED.
 - (e) THE FOLLOWING TESTS SHALL BE MADE:
 1. ABILITY TO RESIST CORROSION.
 2. INTEGRITY OF SEALING.
 - (a) IMMERSION TEST.
 - (b) HYDRAULIC PRESSURE.

- (f) SAMPLING.
 1. ONE HUNDRED REFLECTOR UNITS WILL BE SELECTED BY THE PURCHASER AT RANDOM FROM A LOT OF AT LEAST 2500.
 2. FROM THE GROUP OF 100 UNITS, 25 WILL BE SELECTED AT RANDOM FOR TESTS.
10. DESCRIPTION OF TESTS.
 - (a) SALT-WATER SPROY (CORROSION TEST).
 1. THE COMPLETE REFLECTOR UNITS AS USED IN THE SIGN SHALL BE SPROYED WITH A 20 PER CENT SALT-WATER SOLUTION FOR 48 HOURS. REFLECTOR UNITS SHALL THEN BE EXAMINED FOR EVIDENCE OF CORROSION; IF ANY APPEAR THE LOT REPRESENTED BY THE SAMPLES SHALL BE REJECTED.
 - (b) IF THE REFLECTOR UNIT IS OF THE DOUBLE REFRACTION TYPE:
 1. THE REFLECTOR UNIT SHALL BE ALTERNATELY IMMERSED FOR TEN MINUTES IN TWO BATHS OF COLORED WATER, ONE AT A TEMPERATURE APPROXIMATELY 53 DEG. F., THE OTHER 170 DEG. F. REPEAT THIS ALTERNATE IMMERSION TEN TIMES, AFTER WHICH THE REFLECTOR UNITS SHALL BE EXAMINED FOR LEAKAGE. IF LEAKAGE HAS OCCURRED THE LOT REPRESENTED BY THE SAMPLES SHALL BE REJECTED.
 2. THE SEALING BETWEEN THE LENS AND THE LAP OF THE REFLECTOR UNIT SHALL BE SUCH AS TO BE WATER-TIGHT UNDER A HYDRAULIC PRESSURE OF 10 LBS. PER SQUARE INCH IN COLORED WATER FOR A PERIOD OF 1 MINUTE. AFTER THE REFLECTOR UNITS HAVE BEEN SUBJECTED TO THIS TEST THEY SHALL BE EXAMINED FOR LEAKAGE. IF LEAKAGE HAS OCCURRED THE LOT REPRESENTED BY THE SAMPLES SHALL BE REJECTED.
 - (c) IF THE REFLECTOR UNIT IS OF THE SINGLE REFRACTION TYPE:
 1. THE BACKING SHALL NOT BE AFFECTED BY EITHER 10 PER CENT SALT-WATER SOLUTION AT ROOM TEMPERATURE, FRESH WATER AT 170 DEG. F., OR A DRY TEMPERATURE OF 170 DEG. F. THE BACKING SHALL BE SUBJECTED TO THE SALT WATER FOR A PERIOD OF 24 HOURS AND TO THE FRESH WATER FOR A PERIOD OF 4 HOURS IMMEDIATELY FOLLOWING THE SALT-WATER IMMERSION AND THEN KEPT AT A DRY TEMPERATURE OF 170 DEG. F. FOR 4 HOURS. THE PROTECTIVE COATING SHALL BE OF SUCH MATERIAL AND SO APPLIED AS NOT TO BE EASILY RUBBED OFF AFTER THE ABOVE TESTS HAVE BEEN MADE CONSECUTIVELY. IF GLASS HAS CRACKED DURING THE TEST OR IF REFLECTIVE BACKING HAS BEEN DAMAGED OR IF PROTECTIVE COATING IS EASILY RUBBED OFF, THE LOT REPRESENTED BY THE SAMPLES SHALL BE REJECTED.
11. PACKING.
 - (a) MATERIAL SHALL BE SO PREPARED AS TO PERMIT CONVENIENT HANDLING AND TO PROTECT AGAINST LOSS OR DAMAGE DURING SHIPMENT.
12. MARKING.
 - (a) PURCHASER'S ORDER, REQUISITION AND PACKAGE NUMBER, NAME OF CONSIGNOR, AND NAME AND ADDRESS OF CONSIGNEE, SHALL BE PLAINLY MARKED ON OUTSIDE OF PACKAGE.
13. WARRANTY.
 - (a) CONTRACTOR SHALL WARRANT THE MATERIAL COVERED BY THIS SPECIFICATION TO BE FREE FROM DEFECTS IN MATERIAL AND WORKMANSHIP UNDER ORDINARY USE AND SERVICE, HIS OBLIGATION UNDER THIS WARRANTY BEING LIMITED TO MAKING, AT POINT OF PRODUCTION, ANY PART OR PARTS TO REPLACE THOSE WHICH SHALL BE FOUND DEFECTIVE WITHIN TWO YEARS AFTER SHIPMENT TO PURCHASER. THIS WARRANTY SHALL NOT APPLY TO ANY APPARATUS WHICH SHALL HAVE BEEN REPAIRED OR ALTERED IN ANY WAY BY ANYONE OTHER THAN THE MANUFACTURER THEREOF, SO AS TO AFFECT, IN THE CONTRACTOR'S JUDGEMENT, ITS PROPER FUNCTIONING OR RELIABILITY, OR WHICH HAS BEEN SUBJECT TO MISUSE, NEGLIGENCE OR ACCIDENT.

SPECIFICATION FOR REFLECTOR SIGNS.
(A. R. A. SIGNAL SECTION SPECIFICATION 155-33.)

1. PURPOSE.
 - (a) THE PURPOSE OF THIS SPECIFICATION IS TO PROVIDE SIGNS OF VARIOUS DESIGNS FOR RAILROAD HIGHWAY GRADE CROSSING PROTECTION.
2. TENDER.
 - (a) THE TENDER SHALL BE FOR APPARATUS MEETING THE REQUIREMENTS OF THIS SPECIFICATION. IF THE CONTRACTOR WISHES TO VARY FROM THE SPECIFICATION, A TENDER MAY BE SUBMITTED COVERING THE APPARATUS HE DESIRES TO FURNISH. THIS TENDER SHALL BE ACCOMPANIED BY FULL INFORMATION SHOWING WHEREIN THE REQUIREMENTS OF THIS SPECIFICATION ARE NOT MET.
3. MATERIAL AND WORKMANSHIP.
 - (a) MATERIAL AND WORKMANSHIP SHALL BE FIRST-CLASS IN EVERY RESPECT.
4. SHEET STEEL.
 - (a) SHEET STEEL SHALL BE CORROSION RESISTING. THE TOTAL AMOUNT OF CARBON, MANGANESE, PHOSPHORUS, SULPHUR AND SILICON SHALL NOT EXCEED 0.20 PER CENT. IF THE TOTAL AMOUNT OF THESE FIVE ELEMENTS EQUALS OR EXCEEDS 0.20 PER CENT THE METAL SHALL CONTAIN NOT LESS THAN 0.17 PER CENT COPPER AND NOT MORE THAN 0.06 PER CENT SULPHUR. IF THE TOTAL OF THESE FIVE ELEMENTS IS LESS THAN 0.20 PER CENT AND SULPHUR IS NOT GREATER THAN 0.04 PER CENT THE PRESENCE OF COPPER IS OPTIONAL.
 - (b) THE BASE METAL SHALL BE UNIFORMLY COATED WITH A GOOD QUALITY OF ZINC AND THE SURFACE OF THE COATED METAL SHALL BE OF SUCH QUALITY THAT
5. REFLECTOR UNITS.
 - (a) REFLECTOR UNITS SHALL CONFORM TO SPECIFICATION SHOWN ON THIS SHEET.
 - (b) REFLECTOR UNITS, ASSEMBLED IN SIGNS WHICH CARRY A LEGEND, SHALL BE COLORLESS.
 - (c) REFLECTOR UNITS, ASSEMBLED IN MARKER SIGN WHICH CARRIES NO LEGEND, SHALL BE CANARY YELLOW.
 - (d) REFLECTOR UNITS HAVING AN EXPOSED DIAMETER OF 0.40 TO 0.50 IN. SHALL BE USED IN LETTERS 4 INCHES IN HEIGHT. REFLECTOR UNITS HAVING AN EXPOSED DIAMETER OF 0.50 TO 0.60 IN. SHALL BE USED IN LETTERS AND NUMERALS 5 1/2 INCHES IN HEIGHT AND ALSO IN MARKER SIGN.
 - (e) REFLECTOR UNITS SHALL BE HELD IN A FIXED RELATION TO THE APERTURE WITH THEIR AXES NORMAL TO THE FACE OF SIGN.
 - (f) REFLECTOR UNITS SHALL BE HELD IN POSITION IN FRONT PLATE BY MEANS OF AN INTERMEDIATE PLATE. THE INTERMEDIATE PLATE SHALL BE EASILY REMOVABLE AND REPLACEABLE WITHOUT THE USE OF TOOLS AND WHEN REMOVED SHALL RELEASE REFLECTOR UNITS.
 - (g) REFLECTOR UNITS SHALL PROJECT NOT MORE THAN 1/4 IN. OUTSIDE OF APERTURE.
 - (h) A DURABLE WATERPROOFING GASKET OF NON-CORROSIVE MATERIAL SHALL BE USED BETWEEN REFLECTOR UNITS AND FRONT PLATE.
6. DESIGN, SHEET STEEL SIGNS.
 - (a) THE FRONT, BACK, AND INTERMEDIATE PLATES SHALL BE NO. 16 U.S. STANDARD GAUGE (0.0625 IN.).
 - (b) REINFORCING METAL PARTS OR SUPPORTING PLATES USED IN BACK OF SIGNS SHALL BE 1/4 INCH IN THICKNESS.
 - (c) THE EDGES OF THE SIGN SHALL BE FLANGED TO A DEPTH OF NOT LESS THAN 3/4 IN.
 - (d) FLANGES SHALL BE WELDED AT CORNERS.
 - (e) THE FRONT PLATE SHALL BE SLIGHTLY LARGER THAN THE BACK PLATE SO THAT IT WILL FREELY TELESCOPE OVER THE FLANGES OF THE BACK PLATE.
 - (f) THE FRONT PLATE SHALL HAVE THE LEGEND OF THE SIGN EMBOSSED UPON IT. THE EMBOSSED NUMERALS AND LETTERS SHALL BE RAISED NOT LESS THAN 0.085 IN. NOR MORE THAN 0.125 IN.
 - (g) THE DIMENSION, INSIDE, BETWEEN THE FRONT AND BACK PLATES SHALL BE SUCH AS IS NECESSARY TO MEET THE REQUIREMENTS OF THIS SPECIFICATION AND THE PARTICULAR REFLECTOR UNIT ASSEMBLED IN THE SIGN.
 - (h) THE FRONT PLATE SHALL BE ATTACHED TO THE BACK PLATE BY BRONZE SCREWS OF SPECIAL DESIGN WHICH CANNOT BE REMOVED WITH AN ORDINARY SCREW DRIVER. IF NUTS ARE USED THEY SHALL BE SO DESIGNED THAT THEY CANNOT BE REMOVED WITH ORDINARY PLIERS, WRENCH, OR SCREW DRIVER.
7. ENAMELING, SHEET STEEL SIGNS.
 - (a) METAL SHALL BE THOROUGHLY CLEANED IN ORDER TO SECURE A PERFECT SURFACE FOR PAINTING.
 - (b) ONE COAT OF SUITABLE IRON OXIDE PRIMER OF THE LONG OIL TYPE SHALL BE APPLIED TO ALL SURFACES.
 - (c) SUBSEQUENT TO THE PRIMING COAT ON SIGNS BEARING A LEGEND, ALL SURFACES SHALL BE GIVEN THREE COATS OF BLACK EGG-SHELL FINISH HIGH GRADE SYNTHETIC ENAMEL.
 - (d) SUBSEQUENT TO THE PRIMING COAT ON MARKER SIGN BEARING NO LEGEND, ALL SURFACES SHALL BE GIVEN THREE COATS OF SEMI-GLOSS PERMANENT LEMON YELLOW HIGH GRADE SYNTHETIC ENAMEL.
 - (e) THREE COATS OF SEMI-GLOSS PERMANENT WHITE HIGH GRADE SYNTHETIC ENAMEL SHALL BE APPLIED TO THE EMBOSSED PORTION OF THE SIGN.
 - (f) MATERIALS USED IN THE ENAMEL SHALL BE SUCH THAT PREMATURE CHALKING WILL NOT TAKE PLACE. EACH COAT SHALL BE THOROUGHLY DRY BEFORE SUBSEQUENT COAT IS APPLIED.
 - (g) THE FINISHED DESIGN SHALL BE CLEAR CUT AND SHARP AND THE LINES EVEN AND TRUE.
 - (h) THE FINISH PRODUCED ON THE SIGNS SHALL BE A TOUGH FLEXIBLE COATING, FREE FROM CRACKS, SHRINKAGE, WRINKLES, BUSTERS, OR OTHER BLEMISHES AND SHALL WITHSTAND THE FOLLOWING TESTS:
 1. THE FINISH SHALL NOT CHIP NOR FLAKE WHEN TESTED WITH THE POINT OF A KNIFE.
 2. THE FINISH SHALL WITHSTAND A GASOLINE TEST MADE BY RUBBING WITH A CLEAN WHITE RAG SOAKED IN GASOLINE.
 3. THE FINISH SHALL POSSESS SUCH ELASTICITY AND ADHERING QUALITIES THAT IT WILL NOT CRACK NOR SEPARATE FROM THE SIGN WHEN STRUCK A LIGHT BLOW WITH A HAMMER.
8. IDENTIFICATION.
 - (a) INSIDE OF SIGN SHALL BE PLAINLY MARKED WITH NAME OF MANUFACTURER.
9. INSPECTION.
 - (a) PURCHASER MAY INSPECT MATERIAL AT ALL STAGES OF MANUFACTURE.
 - (b) PURCHASER MAY INSPECT THE COMPLETED PRODUCT TO DETERMINE THAT THE REQUIREMENTS OF THIS SPECIFICATION HAVE BEEN MET.
 - (c) IF MATERIAL HAS NOT BEEN ACCEPTED AT POINT OF PRODUCTION AND, IF, UPON ARRIVAL AT DESTINATION, IT DOES NOT MEET THE REQUIREMENTS OF THIS SPECIFICATION, IT MAY BE REJECTED, AND THE CONTRACTOR, UPON REQUEST, SHALL ADVISE THE PURCHASER WHAT DISPOSITION IS TO BE MADE OF THE DEFECTIVE MATERIAL. CONTRACTOR SHALL PAY ALL FREIGHT CHARGES.
 - (d) IF PURCHASER IS TO MAKE INSPECTION AT POINT OF PRODUCTION IT SHALL BE SO STATED.
10. TESTS.
 - (a) TESTS MAY BE MADE AT POINT OF PRODUCTION, OR ON SAMPLES SUBMITTED, AND MAY ALSO BE MADE AT DESTINATION.
 - (b) CONTRACTOR SHALL GIVE THE PURCHASER SUFFICIENT NOTICE OF TIME WHEN

11. PACKING.
 - (a) MATERIAL SHALL BE SO PREPARED AS TO PERMIT CONVENIENT HANDLING AND TO PROTECT AGAINST LOSS OR DAMAGE DURING SHIPMENT.
12. MARKING.
 - (a) PURCHASER'S ORDER, REQUISITION AND PACKAGE NUMBER, NAME OF CONSIGNOR, AND NAME AND ADDRESS OF CONSIGNEE, SHALL BE PLAINLY MARKED ON OUTSIDE OF PACKAGE.
 - (b) DETAIL LIST OF LOOSE PIECES, CONTAINERS AND THEIR CONTENTS SHALL BE FURNISHED FOR EACH SHIPMENT.
13. WARRANTY.
 - (a) CONTRACTOR SHALL WARRANT THE MATERIAL COVERED BY THIS SPECIFICATION TO BE FREE FROM DEFECTS IN MATERIAL AND WORKMANSHIP UNDER ORDINARY USE AND SERVICE, HIS OBLIGATION UNDER THIS WARRANTY BEING LIMITED TO MAKING, AT POINT OF PRODUCTION, ANY PART OR PARTS TO REPLACE THOSE WHICH SHALL BE FOUND DEFECTIVE WITHIN TWO YEARS AFTER SHIPMENT TO PURCHASER. THIS WARRANTY SHALL NOT APPLY TO ANY APPARATUS WHICH SHALL HAVE BEEN REPAIRED OR ALTERED IN ANY WAY BY ANYONE OTHER THAN THE MANUFACTURER THEREOF, SO AS TO AFFECT, IN THE CONTRACTOR'S JUDGEMENT, ITS PROPER FUNCTIONING OR RELIABILITY, OR WHICH HAS BEEN SUBJECT TO MISUSE, NEGLIGENCE OR ACCIDENT.

A. R. A. MANUAL MAY 1933

REVISIONS

1 SHEET

S-467-A



THE PENNSYLVANIA RAILROAD

STANDARD

SPECIFICATIONS

FOR REFLECTOR SIGNS AND REFLECTOR UNITS.

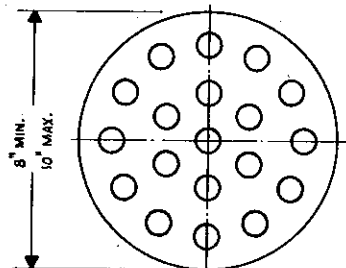
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., OCTOBER 31, 1933.

Approved

A. H. H. H.
Chief Signal Engineer

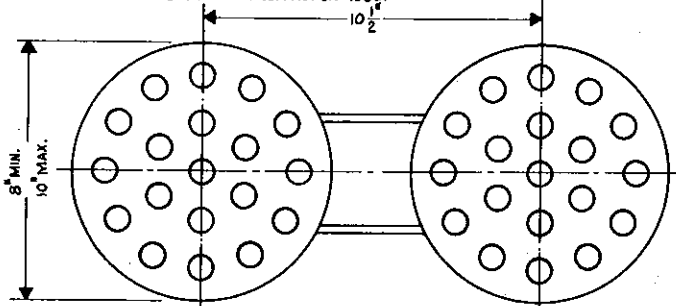
Approved

W. H. H. H.
Chief Engineer



4681 MARKER FOR SEMAPHORE SIGNALS.
RED REFLECTOR UNITS, RED FACE PLATE.
STORES CAT. REF. NO. 2A-1417

4682 MARKER FOR SEMAPHORE SIGNALS.
YELLOW REFLECTOR UNITS, YELLOW FACE PLATE.
STORES CAT. REF. NO. 2A-1930.

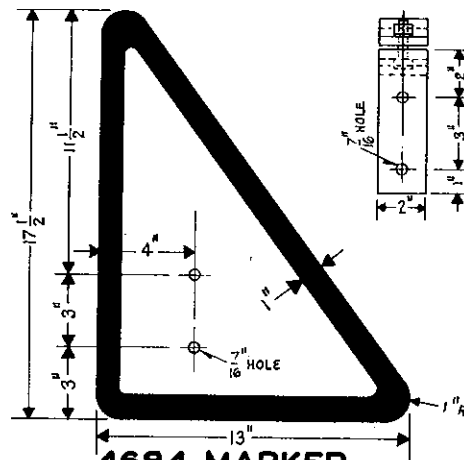


4683 MARKER FOR SEMAPHORE SIGNALS.
RED REFLECTOR UNITS, RED FACE PLATE.
STORES CAT. REF. NO. 2A-1419.

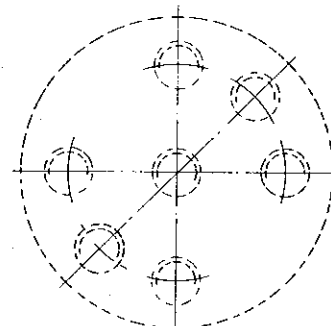
ATTACHMENT TO LAMP BRACKET SHALL BE SO THAT THE CENTER OF THE LEFT HAND MARKER (4683) WILL BE $11\frac{1}{16}$ INCHES FROM CENTER LINE OF SIGNAL MAST.

SPECIFICATION FOR MARKERS (SEMAPHORE SIGNALS)

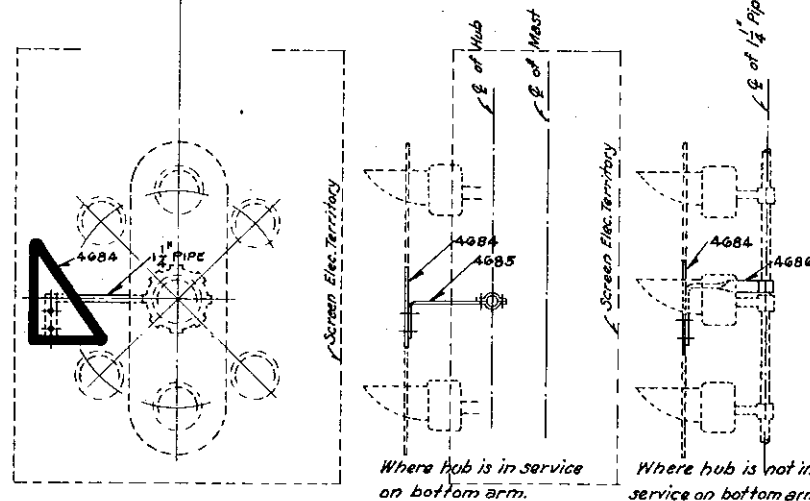
1. **PURPOSE:**
 - (a) THE PURPOSE OF THIS SPECIFICATION IS TO PROVIDE SINGLE AND DOUBLE MARKER UNITS OF THE REFLECTOR TYPE FOR SEMAPHORE SIGNALS.
2. **TENDER:**
 - (a) THE TENDER SHALL BE FOR APPARATUS MEETING THE REQUIREMENTS OF THIS SPECIFICATION. IF THE CONTRACTOR WISHES TO VARY FROM THE SPECIFICATION, A TENDER MAY BE SUBMITTED COVERING THE APPARATUS HE DESIRES TO FURNISH.
3. **MATERIAL AND WORKMANSHIP:**
 - (a) MATERIAL AND WORKMANSHIP SHALL BE FIRST-CLASS IN EVERY RESPECT.
4. **GENERAL REQUIREMENTS:**
 - (a) MARKERS SHALL BE FURNISHED COMPLETE WITH ALL NECESSARY PARTS FOR SECURING TO LAMP BRACKET AS SHOWN ON A.A.R. SIGNAL SECTION DRAWING 1049-A.
 - (b) MARKERS SHALL BE CIRCULAR IN SHAPE AND SHALL HAVE NOT LESS THAN 19 REFLECTOR UNITS.
 - (c) THE DIAMETER OF EACH MARKER SHALL BE 8 INCHES MINIMUM, 10 INCHES MAXIMUM.
 - (d) DOUBLE MARKERS SHALL BE SPACED HORIZONTALLY $10\frac{1}{2}$ INCHES, FROM CENTER TO CENTER.
5. **COLOR:**
 - (a) THE COLOR OF THE REFLECTOR UNITS AND FACE PLATE SHALL BE THE SAME.
 - (b) EDGES AND BACK OF THE HOUSING SHALL BE BLACK.
6. **REFLECTOR UNIT HOUSING:**
 - (a) THE REFLECTOR UNIT HOUSING SHALL BE IN ACCORDANCE WITH SIGNAL SECTION SPECIFICATION 155-42 FOR RAILROAD HIGHWAY GRADE CROSSING SIGNS AS FAR AS APPLICABLE. THE FINISH SHALL BE ACID RESISTING VITREOUS ENAMEL.
7. **REFLECTOR UNITS:**
 - (a) THE REFLECTOR UNITS SHALL BE IN ACCORDANCE WITH A.A.R. SIGNAL SECTION SPECIFICATION 156-40 FOR REFLECTOR UNIT. $\frac{7}{16}$ INCH DIAMETER REFLECTOR UNITS MAY BE FURNISHED.



4684 MARKER
*12 U.S. STD. GAUGE (.103") ENAMELING STEEL.
STORES CAT. REF. NO. 2A-5200



APPLICATIONS OF MARKER 4684.



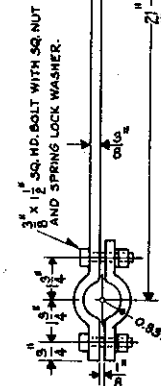
4685 BRACKET O. H. S.
STORES CAT. REF. NO. 2A-5201

FURNISH 2- $\frac{3}{8}$ " X 1" CADMIUM PLATED ROUND HEAD MACHINE SCREWS WITH 1-LEAD WASHER AND 1-SPRING LOCK WASHER WITH EACH BRACKET 4685 AND 4686.

SPECIFICATION FOR MARKER 4684.

1. MARKER 4684 IS FOR USE IN CONJUNCTION WITH HOME AND DISTANT SIGNALS PERMITTING TRAINS TO MAKE DIVERTING MOVES AT 45 MILES PER HOUR.
2. MATERIAL SHALL BE IN ACCORDANCE WITH A. A. R. SIGNAL SECTION SPECIFICATION NO. 155-42
3. MARKER 4684 SHALL BE COATED WITH ACID-RESISTING VITREOUS ENAMEL (SEMI-GLOSS FINISH) IN ACCORDANCE WITH A. A. R. SIGNAL SECTION SPECIFICATION NO. 155-42. THE FACE OF THE MARKER SHALL BE ENAMELED MEDIUM-CHROME YELLOW WITH THE EDGES AND BACK ENAMELED BLACK.
4. ALL PARTS OF BRACKETS 4685 AND 4686 SHALL BE THOROUGHLY CLEANED, THEN GIVEN A PRIMARY COAT OF RED LEAD AND A FINISH COAT OF FIRST CLASS BLACK PAINT.

4686 BRACKET O. H. S.
STORES CAT. REF. NO. 2A-5202



REVISIONS

REDRAWN FROM APPROVED PLAN S-468-A, DATED SEPT. 28, 1937. MARKER 4684 AND BRACKETS 4685 AND 4686 ADDED.

1 SHEET



S-468-B

THE PENNSYLVANIA RAILROAD

STANDARD

MARKERS

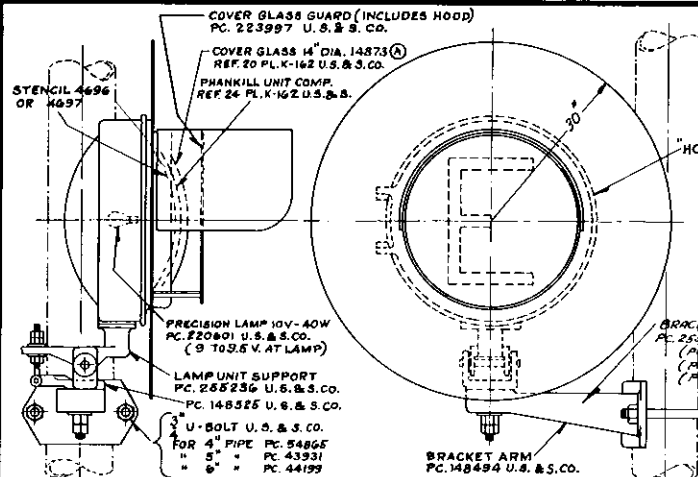
OFFICE OF CHIEF ENGINEER, PHILA., PA. AUG. 25, 1944.

Approved

H. C. Stanton
Assistant Chief Engineer-Signals

Approved

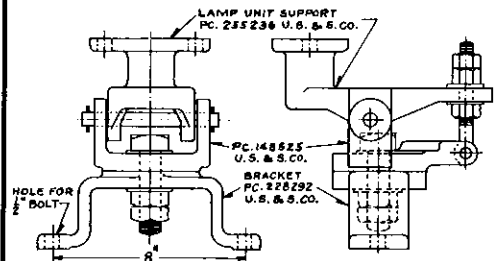
W. H. Hestitt
Chief Engineer



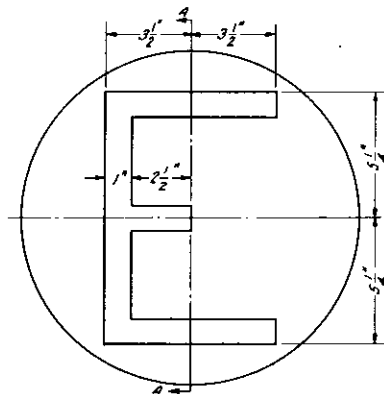
4691 ILLUMINATED SIGN
STORES CAT. REF. NO. 2A-5691

4692 ILLUMINATED SIGN
STORES CAT. REF. NO. 2A-5692

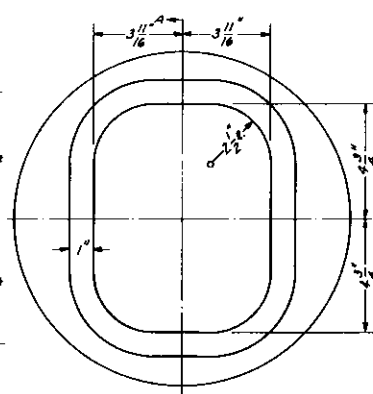
WITH BRACKET 4693
FOR PLATFORM MOUNTING.
(SEE NOTE 10)



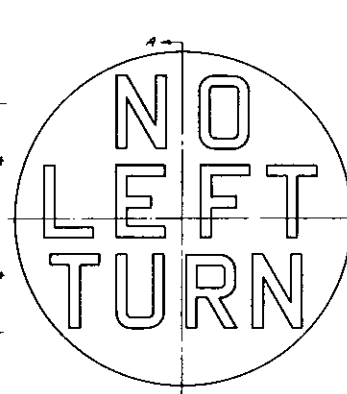
4693 BRACKET
COMPLETE (PC 202682 U.S. & S.CO.)
STORES CAT. REF. NO. 2A-5693



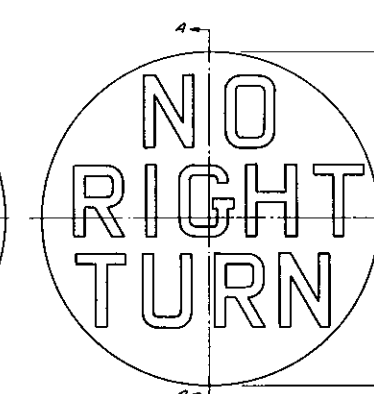
4696 STENCIL
STORES CAT. REF. NO. 2A-5656



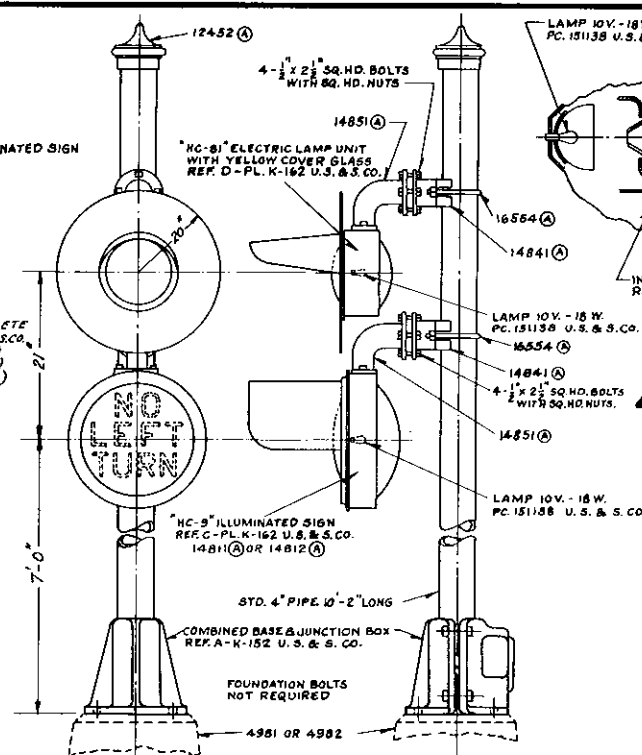
4697 STENCIL
STORES CAT. REF. NO. 2A-5657



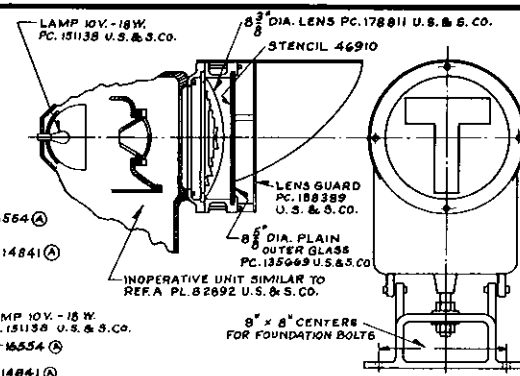
4698 STENCIL
STORES CAT. REF. NO. 2A-5658
14872(A)



4699 STENCIL
STORES CAT. REF. NO. 2A-5659
14871(A)

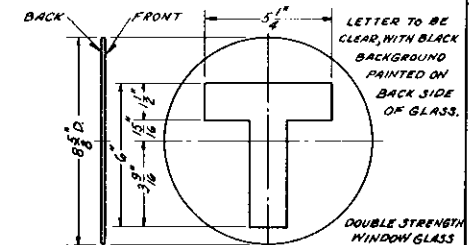


4694 ILLUMINATED SIGN
COMPLETE AS SHOWN.
(SEE NOTE 11)
STORES CAT. REF. NO. 2A-2375



4695 T-SIGN
COMPLETE AS SHOWN
STORES CAT. REF. NO. 2A-5655

- NOTES:-**
1. OUTER COVER GLASS OF 4691, 4692 AND 4695 IS CLEAR ON OUTSIDE AND SAND-BLASTED ON INSIDE.
 2. STENCIL 4696 IS FOR USE IN CONNECTION WITH DRAGGING EQUIPMENT DETECTOR DEVICE IN ACCORDANCE WITH ADJUNCT AS RECOMMENDED BY S.T.R.C. DOCKET 38-2, REVISED.
 3. STENCIL 4697 IS FOR USE AS TRAIN ORDER SIGNAL.
 4. STENCILS 4698 AND 4699 ARE FOR USE IN CONNECTION WITH "NO LEFT TURN" AND "NO RIGHT TURN" SIGNS AT HIGHWAY CROSSINGS WHERE REQUIRED.
 5. STENCIL 46910 IS FOR USE IN CONNECTION WITH TORPEDO PLACING MACHINE. ITEM NUMBERS SHOWN WITH (A) REFER TO A.R. SIG. SEC. DRAWINGS.
 6. WHERE LOCAL CONDITIONS REQUIRE PHANKILL UNIT FOR "HC-9" UNIT, REQUISITION SHOULD SPECIFY WITH PHANKILL UNIT PC. 207075 U.S. & S.CO.
 7. SIGNS 4691 AND 4692 SHALL BE LOCATED TO THE LEFT OF THE SIGNAL GOVERNING MOVEMENTS ON TRACK INVOLVED.
 8. (a) WHERE SIGN 4691 IS LOCATED ON GROUND MAST 7'-6" FROM GAGE LINE OF RIGHT HAND RAIL, BRACKET ARMS SHALL BE ARRANGED TO POSITION THE "HC-9" UNIT WITH FRONT FACING TRAFFIC SO THAT THE EDGE OF THE BACKGROUND WILL BE NOT MORE THAN 2" NEARED THE GAGE LINE THAN THE CENTER LINE OF MAST. IF MAST IS LOCATED 10'-0" FROM GAGE LINE AS INDICATED BY R.R. CLEARANCE DIAGRAM 70030-A, BRACKET SHOULD BE MOUNTED TOWARDS TRACK WITH "HC-9" UNIT POSITIONED ON BRACKET PARALLEL WITH SIGNAL UNIT.
 9. (b) 1. WHERE LOCATED ON SIGNAL BRIDGE 1-SIGN 4692, WHEN USED AS A TRAIN ORDER SIGNAL SHALL BE LOCATED IN 30' FAR AS PRACTICABLE ON A LINE HORIZONTALLY BELOW THE BOTTOM LIGHT OF THE BOTTOM ARM SIGNAL.
 2. SIGN 4692, WHEN USED AS AN INDICATOR LIGHT FOR A DRAGGING EQUIPMENT DETECTOR, SHALL BE LOCATED ABOVE THE TOP CHORD OF BRIDGE TRUSS, FLUSH WITH THE FACE OF TRUSS AND MOUNTED TO SUIT THE PARTICULAR REQUIREMENTS OF INSTALLATION AND WIRING CONDITIONS.
 10. "NO LEFT TURN" AND "NO RIGHT TURN" SIGNS SHALL BE LOCATED TO BEST MEET THE PHYSICAL CHARACTERISTICS AND VISIBILITY CONDITIONS IN THE FIELD.
 11. WHEN ORDERING 4691 SPECIFY PIPE SIZE, STENCIL 4696 OR 4697, AND COVER GUARD IF REQUIRED. WHEN ORDERING 4692 SPECIFY STENCIL 4696 OR 4697, AND COVER GLASS GUARD IF REQUIRED.
 12. WHEN ORDERING 4694 OR "HC-9" UNIT FOR 4694, SPECIFY WITH STENCIL 4698 OR 4699 AS REQUIRED.
 13. 10 V. - 18 W. LAMPS INDICATED IN 4694 AND 4695 SHALL BE BURNED 9.0 TO 9.6 VOLTS AT LAMPS.



46910 STENCIL
STORES CAT. REF. NO. 2A-5660

REVISIONS
B. REDRAWN FROM APPROVED PLAN
S-469-A, DATED 1-21-48 AND REVISED

1 SHEET

S-469-B

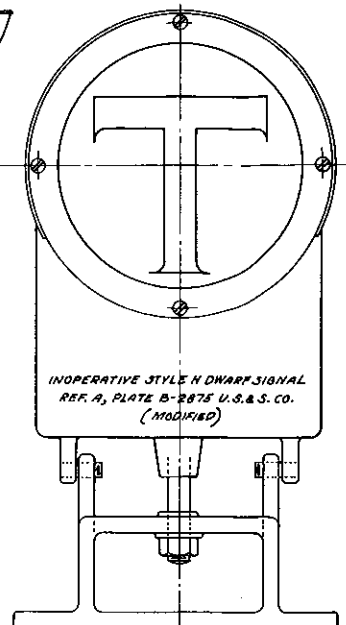
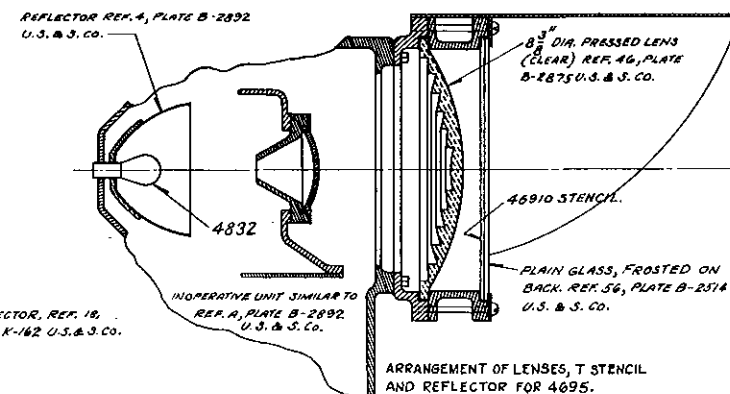
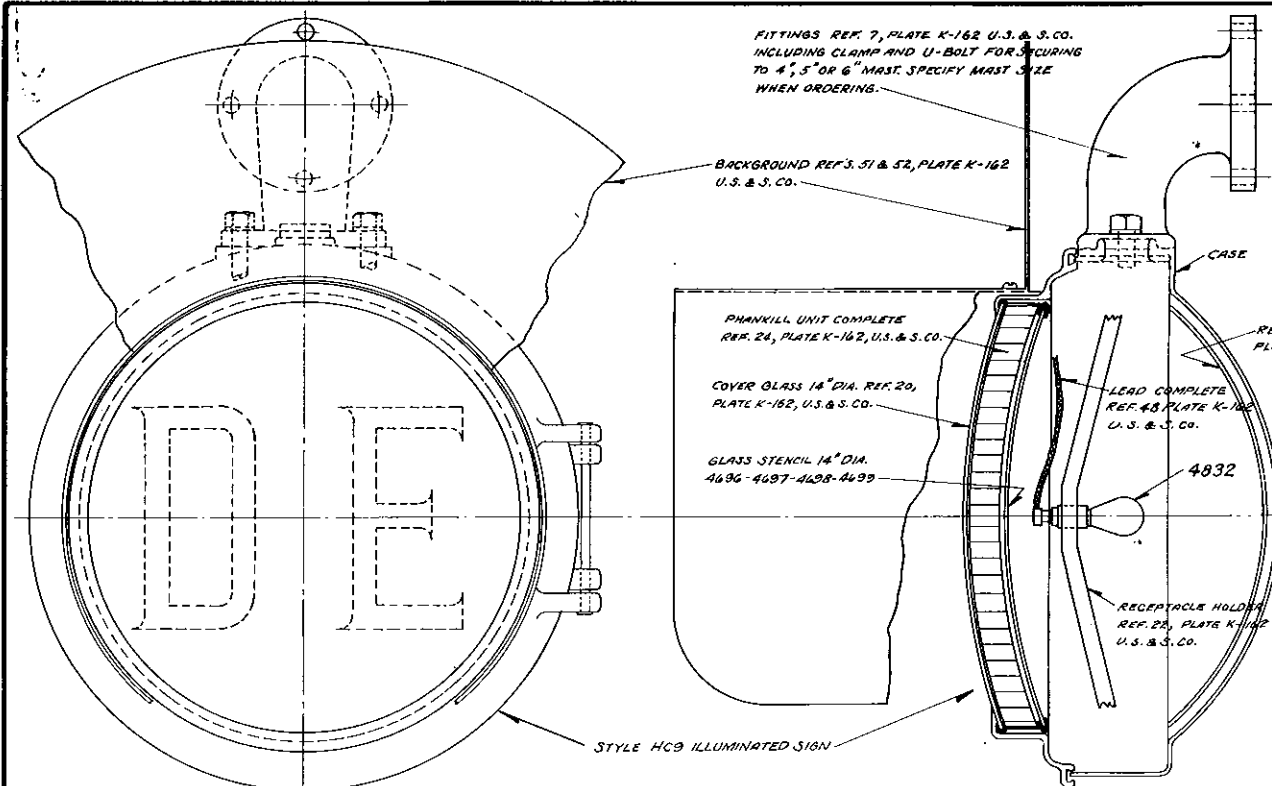
THE PENNSYLVANIA RAILROAD

STANDARD
SIGNS
ILLUMINATED

OFFICE OF CHIEF ENGINEER, PHILA., PA., AUGUST 9, 1949.

Approved *H. G. Salmonson* Approved *J. H. Whitt*
Assistant Chief Engineer-Signals Chief Engineer

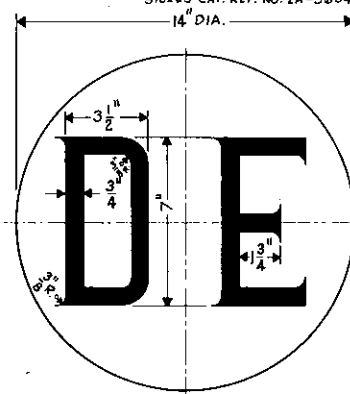
DRAGGING EQUIP. TRAIN ORDER



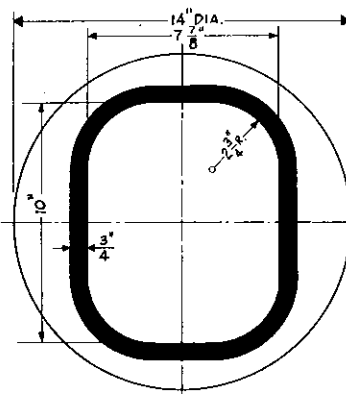
4695 T-SIGN COMPLETE
STORES CAT. REF. NO. 2A-5655

- NOTE:**
1. OUTER COVER GLASS OF 4691, 4692, 4693 & 4694 IS CLEAR ON OUTSIDE AND SAND BLASTED ON INSIDE.
 2. STENCILS 4696, 4697, 4698 & 4699 ARE CLEAR ON CONCAVE SIDE, AND PAINTED BLACK ON CONVEY SIDE, EXCEPT LETTERS WHICH ARE CLEAR.
 3. STENCIL 46910 IS CLEAR GLASS, PAINTED BLACK ON SIDE TOWARD LENS, EXCEPT LETTER T WHICH REMAINS CLEAR.
 4. STENCIL 4696 IS FOR USE IN CONNECTION WITH DRABBING EQUIPMENT DETECTOR DEVICE.
 5. STENCIL 4697 IS FOR USE AS TRAIN ORDER SIGN.
 6. STENCILS 4698 AND 4699 ARE FOR USE IN CONNECTION WITH NO RIGHT TURN AND NO LEFT TURN SIGNS AT HIGHWAY CROSSINGS, WHERE REQUIRED.
 7. STENCIL 46910 IS FOR USE IN CONNECTION WITH TORPEDO PLACING MACHINE.
 8. THE USE OF PHANKILL UNIT IS OPTIONAL, DEPENDING UPON LOCAL CONDITIONS. IF IT IS NOT DESIRED, REQUISITION SHOULD STATE "WITHOUT PHANKILL UNIT".
 9. "DE" STENCIL 4696 TO BE USED AS INDICATOR, IN ACCORDANCE WITH ADJUNCT AS RECOMMENDED BY S.T.R.C. DOCKET 38-2, REVISED.
 10. WHERE THE HC9 ILLUMINATED SIGN IS LOCATED UPON A PLATFORM, IT MAY BE APPLIED IN ACCORDANCE WITH U.S. & S. CO. DRAWING NO. B 8912 SHEET 198.

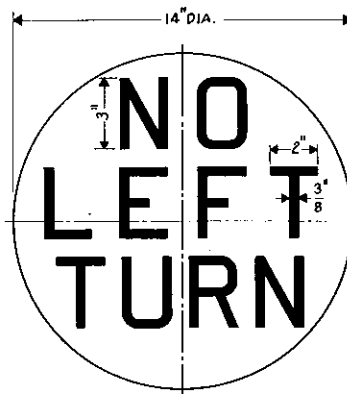
- 4691 SIGN WITH BACKGROUND Complete with Attachment Ref. 7, Pl. K-162. Specify pipe size and Stencil 4696 or 4697 as required.
STORES CAT. REF. NO. 2A-5651
- 4692 SIGN WITH BACKGROUND and without Attachment Ref. 7, Pl. K-162 but with Stencil 4696 or 4697 as required.
STORES CAT. REF. NO. 2A-5652
- 4693 SIGN WITHOUT BACKGROUND Complete with Attachment Ref. 7, Pl. K-162. Specify pipe size and Stencil 4698 or 4699 as required.
STORES CAT. REF. NO. 2A-5653
- 4694 SIGN WITHOUT BACKGROUND and without Attachment Ref. 7, Pl. K-162 but with Stencil 4698 or 4699 as required.
STORES CAT. REF. NO. 2A-5654



4696 STENCIL
GLASS
STORES CAT. REF. NO. 2A-5656



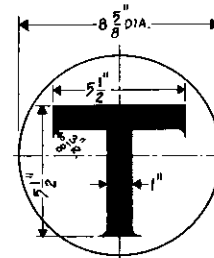
4697 STENCIL
GLASS
STORES CAT. REF. NO. 2A-5657



4698 STENCIL
GLASS
STORES CAT. REF. NO. 2A-5658



4699 STENCIL
GLASS
STORES CAT. REF. NO. 2A-5659



46910 STENCIL
GLASS
STORES CAT. REF. NO. 2A-5660

REVISIONS

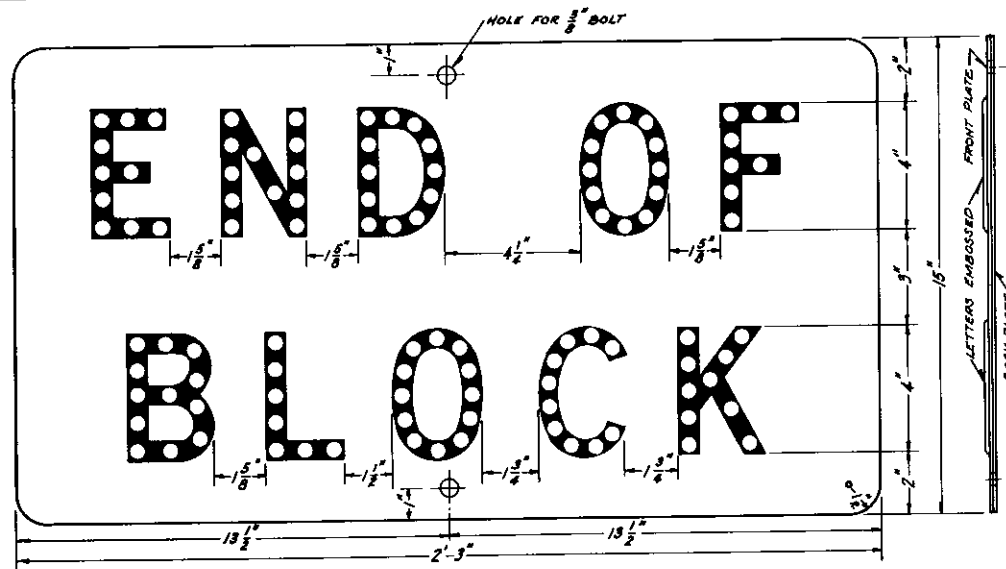
1 SHEET



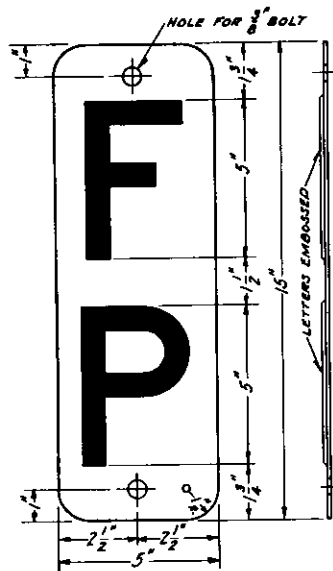
S-469-A

THE PENNSYLVANIA RAILROAD
STANDARD
SIGNS
ILLUMINATED

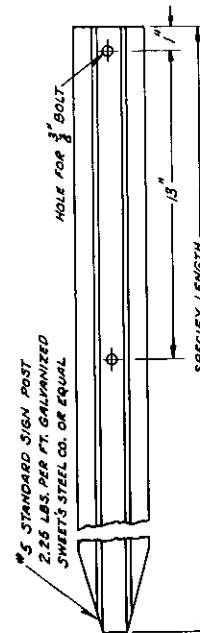
OFFICE OF CHIEF ENGINEER, PHILA., PA. JANUARY 21, 1948.
Approved *Macguffin* Assistant Chief Engineer - T.C. & S.
Approved *Shurt* Chief Engineer



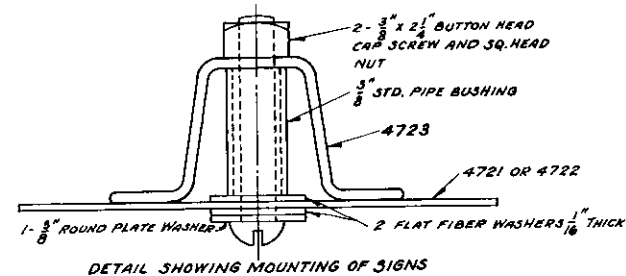
4721 SIGN COMPLETE WITH BACK PLATE.
STORES CAT. REF. NO. 2A-5597



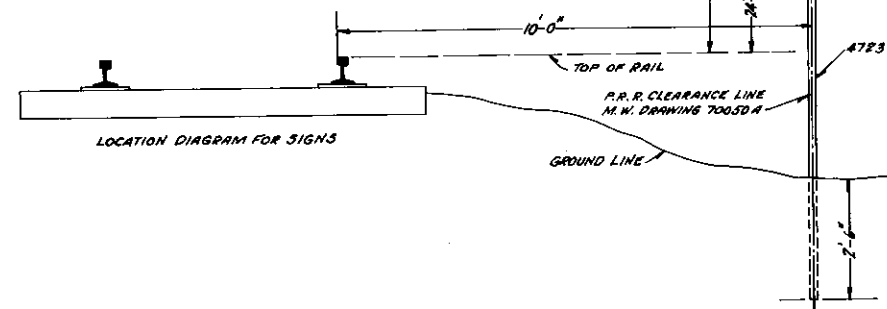
4722 SIGN
STORES CAT. REF. NO. 2A-5598



4723 SIGN POST HIGH CARBON RAIL STEEL.
STORES CAT. REF. NO. 2A-5599



DETAIL SHOWING MOUNTING OF SIGNS



LOCATION DIAGRAM FOR SIGNS

NOTES:-

1. MATERIAL FOR FRONT PLATE AND BACK PLATE OF SIGN 4721 AND SIGN PLATE OF SIGN 4722 SHALL BE #16 GAGE GALVANNEALED STEEL, OR STEEL PARKERIZED AFTER FABRICATION. LETTERS ON BOTH SIGNS SHALL BE EMBOSSED.
2. FOR SIGN 4721, THE COLOR OF BACKGROUND AND BACK OF FRONT PLATE SHALL BE BLACK BAKED-ON ENAMEL. COLOR OF LETTERS SHALL BE WHITE BAKED-ON ENAMEL. FRONT AND BACK OF BACK PLATE SHALL BE BLACK BAKED-ON ENAMEL.
3. FOR SIGN 4722, THE COLOR OF BACKGROUND AND BACK OF SIGN SHALL BE WHITE BAKED-ON ENAMEL. COLOR OF LETTERS SHALL BE BLACK BAKED-ON ENAMEL.
4. REFLECTOR BUTTONS FOR SIGN 4721 SHALL BE ROUND, OF THE PRISMATIC TYPE 1/2 INCH IN DIAMETER, #5 CLEAR FLAT STIMSONITE, ALL PLASTIC, MOUNTED BETWEEN FRONT AND BACK PLATES. NUMBER OF BUTTONS AS INDICATED.
5. MANUFACTURER OF SIGNS SHALL FURNISH SIGN 4721 OR SIGN 4722 ONLY.
6. LETTERS OF SIGNS SHALL BE PROPORTIONED IN ACCORDANCE WITH UNITED STATES PUBLIC ROADS ADMINISTRATION, FEDERAL WORKS AGENCY DESIGN, SERIES D, BOOK-LET P-3378.
7. SIGN 4722 SHALL BE LOCATED, LONGITUDINALLY, 10 FEET BACK OF A POINT, WHERE TRACK CENTERS BETWEEN MAIN TRACK AND TRACK TO WHICH SIGN APPLIES ARE SEPARATED AT LEAST 12 FEET-2 INCHES.
8. SIGNS SHALL BE ATTACHED TO SIGN POST 4723 ONLY.
9. SIGN POST 4723 SHALL BE DRIVEN INTO GROUND AT LOCATION SELECTED, AFTER WHICH SIGN 4721 OR SIGN 4722 SHALL BE MOUNTED THEREON AS SHOWN IN DETAIL ON THIS DRAWING.
10. THE 3/8" BUSHING INDICATED IN DETAIL OF MOUNTING, SHALL BE OF SUCH LENGTH THAT SIGN WILL BEAR FIRMLY AGAINST POST, BUT NOT TO BEND SIGN.
11. FRONT AND BACK PLATES OF SIGN 4721 SHALL BE FIRMLY HELD TOGETHER WITH TWELVE 10/24 x 3/8" ALUMINUM ASSEMBLY BOLTS WITH VANDAL RESISTING NUTS.

REVISIONS

1 SHEET



S-472-A

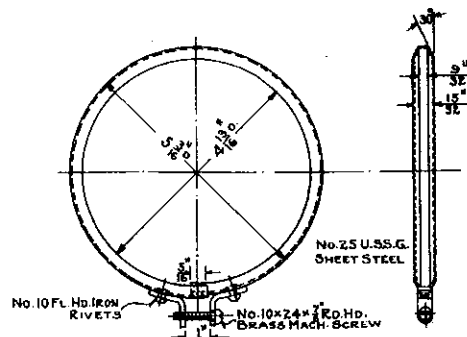
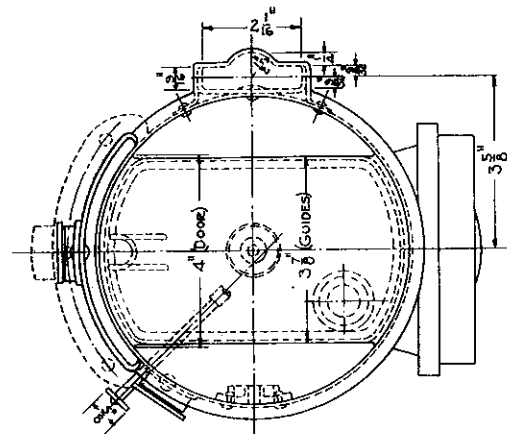
THE PENNSYLVANIA RAILROAD
STANDARD
SIGNS

END OF BLOCK AND FOULING POINT

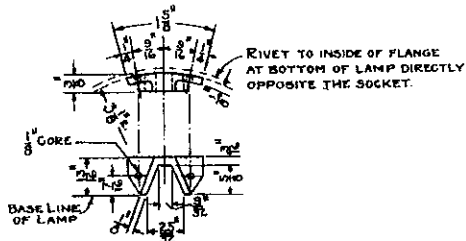
OFFICE OF CHIEF ENGINEER, PHILA., PA., SEPTEMBER 27, 1949.

Approved *H. L. Salmon*
Assistant Chief Engineer-Signals

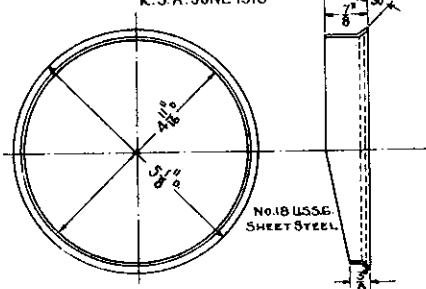
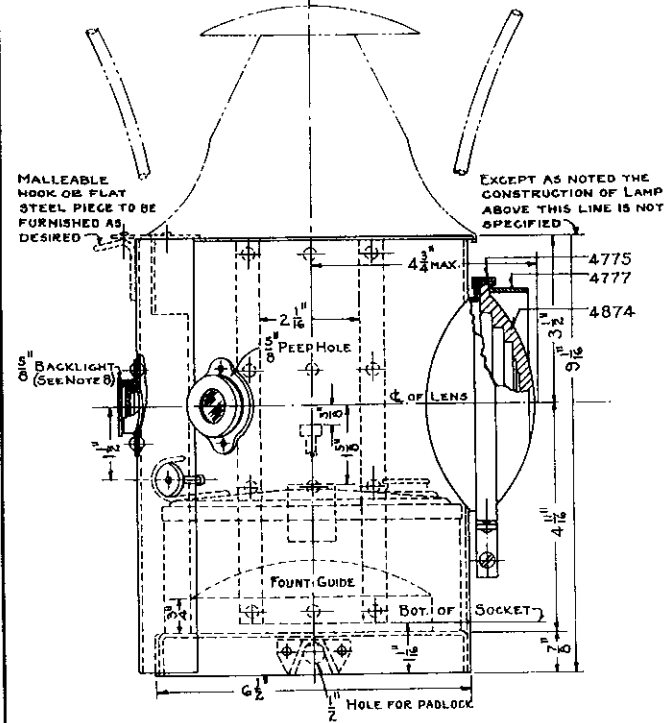
Approved *J. H. Smith*
Chief Engineer



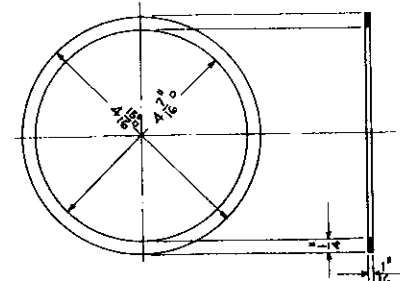
4775-LENS COUPLING RING
R.S.A. MAR. 1920



4776-MALLEABLE POCKET
TO RECEIVE POINTED LUG OF LAMP BRACKET
R.S.A. JUNE 1918



4777-LENS HOOD
R.S.A. MAR. 1920



4778-GASKET
RED SHEET PACKING

- 4771-LAMP COMPLETE WITH WHITE LENS
- 4772-LAMP COMPLETE WITH RED LENS
- 4773-LAMP COMPLETE WITH YELLOW LENS
- 4774-LAMP BODY WITHOUT LENS

SPECIFICATION.

1. Body of Lamp shall be made of No. 18 sheet steel, tinned.
2. Rivets shall be used in the construction of the body of the Lamp for holding the parts together.
3. Handle of Lamp shall be No. 4 B. W. G. steel wire.
4. Door shall have water-shed so arranged as to prevent rain entering the Lamp, and door shall raise high enough to make the opening six and five-eighths (6 5/8) inches.
5. Lamp shall have top draft ventilation. (Ventilation will be tested, when required, at the factory as follows: (A) Wind velocity equivalent to eighty (80) m. p. h. for two (2) minutes; (B) Still air temperature, one hundred and ten (110) degrees Fahr. for two (2) hours. If either of the above tests extinguishes flame, Lamp will be rejected.)
6. Lens shall be five (5) inches in diameter, with three and one-half (3 1/2) inch focus.
7. Lens Coupling Ring shall be arranged so that Lens can be easily removed and shall completely encircle the Lens.
8. Back-light and peep-hole glasses shall be held in place by screw retaining rings. Back-light glass shall be covered with a metal disc placed between the glass and retaining ring.

REVISIONS

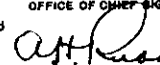
REDRAWN FROM APPROVED PLANS 477-A
DATED AUG. 2, 1920 AND REVISED.

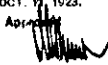
1 SHEET
S-477-B

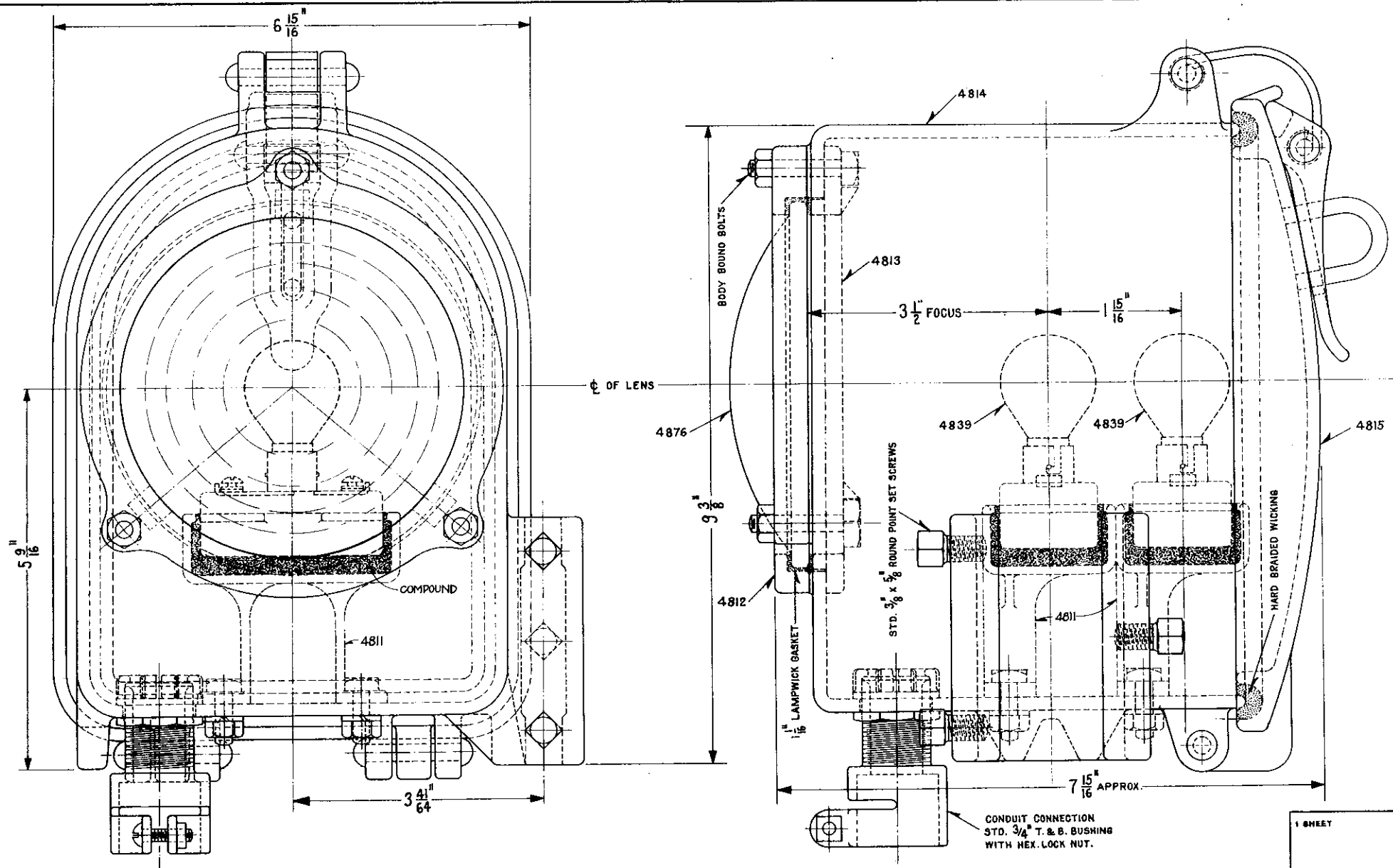


PENNSYLVANIA RAILROAD SYSTEM
STANDARD
LAMP
OIL LIGHTED SIGNAL

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., OCT. 17, 1923.

Approved 
Chief Signal Engineer

Approved 
Chief Engineer



- 4781 LAMP CASE COMPLETE WITH CLEAR LENS.
 4782 " " " " RED " "
 4783 " " " " YELLOW " "
 4784 " " WITHOUT LENS.

NOTE:-
 LAMPS 4839 SHALL BE FURNISHED SEPARATELY.
 PAINT OUTSIDE BLACK, INSIDE WHITE ENAMEL.

REVISIONS
 SUPERSEDES APPROVED PLAN NO.
 S-478-8, DATED AUGUST 2, 1920.
 LAST REVISED JANUARY 24, 1925.

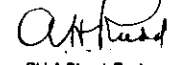
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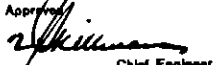
S-478-C

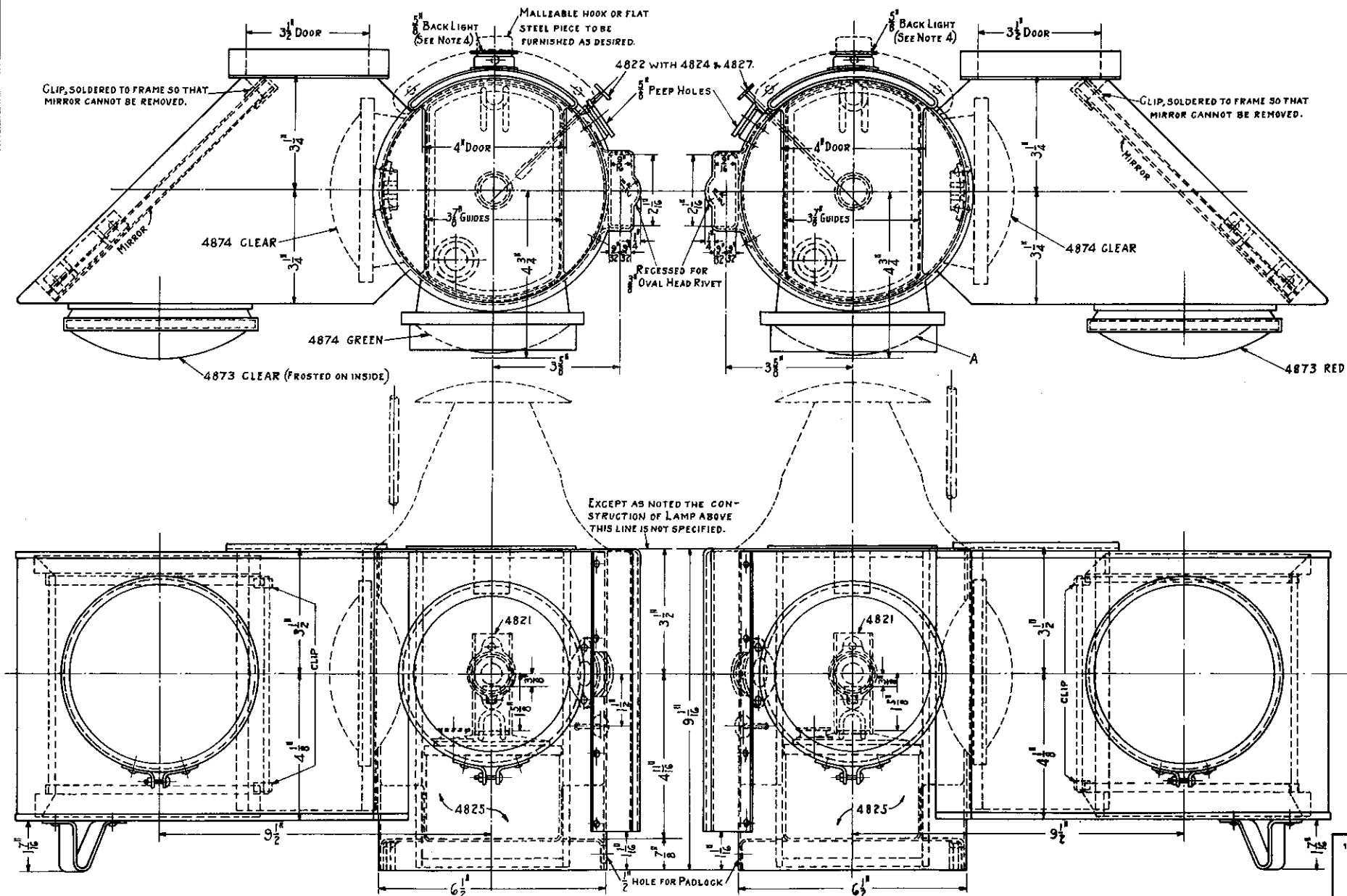


**THE PENNSYLVANIA RAILROAD
 STANDARD
 ELECTRIC LAMP
 FOR SEMAPHORE SIGNALS**

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., SEPTEMBER 7, 1926

Approved  Chief Signal Engineer

Approved  Chief Engineer



NOTE:-

1. LENSES AND ROUNDLS SHALL BE IN ACCORDANCE WITH PENNSYLVANIA RAILROAD SYSTEM PLAN AND SPECIFICATIONS FOR LENSES AND ROUNDLS.
2. WHEN NO DETAIL PLAN REFERENCE IS SHOWN, THE MANUFACTURER'S STANDARD APPARATUS, IF APPROVED BY THE PURCHASER, SHALL BE FURNISHED.
3. LAMP TOP MUST OPEN PARALLEL TO SIGNAL CASTING.
4. BACK-LIGHT AND PEEP-HOLE GLASSES SHALL BE HELD IN PLACE BY SCREW RETAINING RINGS. BACK-LIGHT GLASS SHALL BE COVERED WITH A METAL DISC PLACED BETWEEN THE GLASS AND THE RETAINING RING.

REVISIONS.
 REDRAWN FROM APPROVED PLANS 5-479-B
 DATED 2-7-21, LAST REVISED 4-2-21,
 AND REVISED.

ONE-WAY FLAG STATION LAMP

ORDER No.	NAME	ORDERING REFERENCE	REQUIRED
4791	LAMP COMPLETE	AS SHOWN	
4792	LAMP ONLY	WITHOUT 4821-4822-4824-4825-4827	

BLOCK SIGNAL MARKER LAMP

ORDER No.	NAME	ORDERING REFERENCE	REQUIRED
4793	LAMP COMPLETE	AS SHOWN	A= 4874 (CLEAR)
4794	LAMP ONLY	WITHOUT 4821-4822-4824-4825-4827	
4795	LAMP COMPLETE	AS SHOWN	A= 4874 (RED)
4796	LAMP ONLY	WITHOUT 4821-4822-4824-4825-4827	

1 SHEET

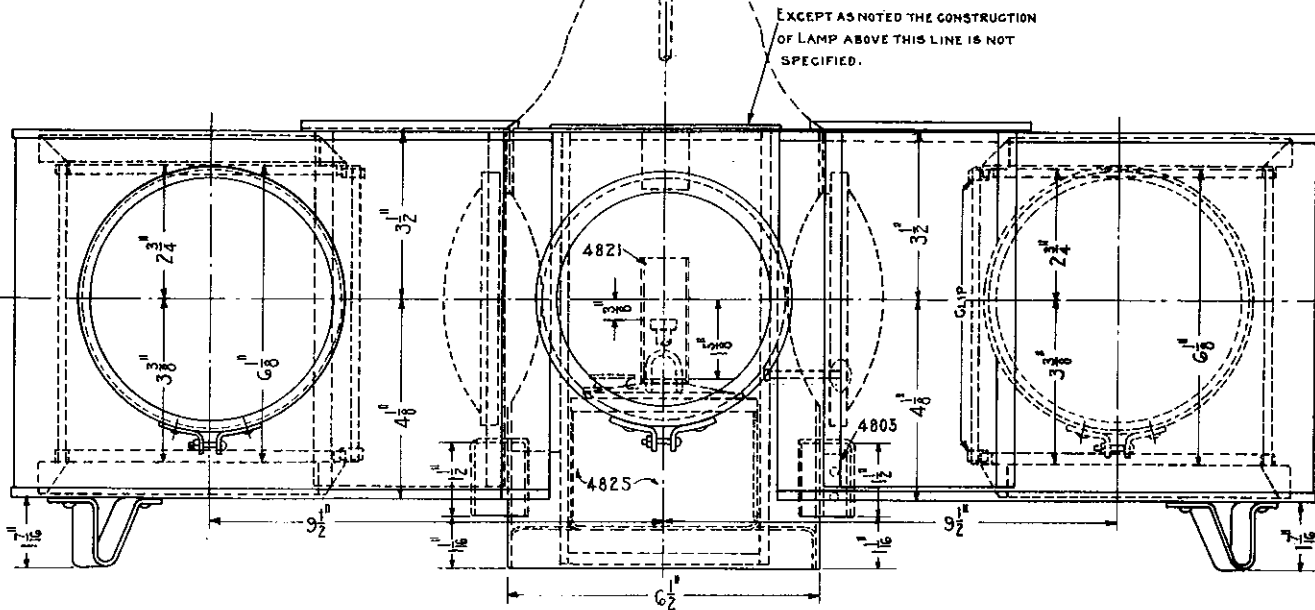
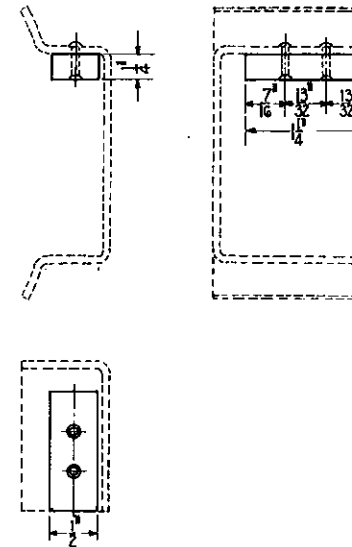
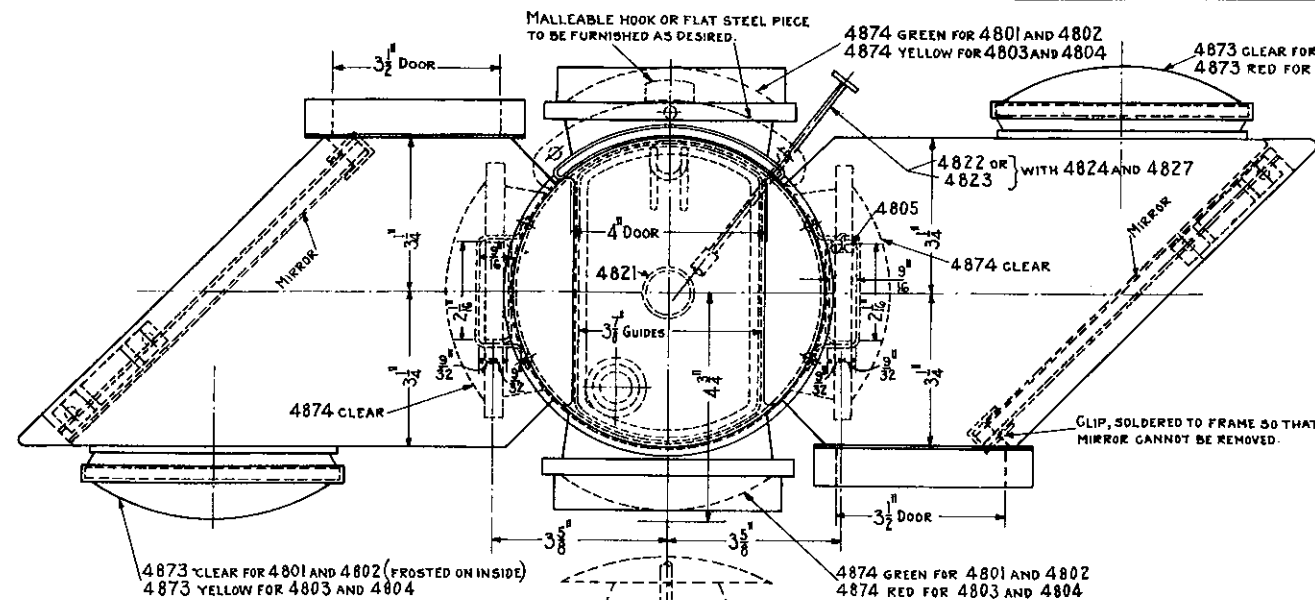
S-479-C

**PENNSYLVANIA RAILROAD SYSTEM
STANDARD
LAMPS**

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., JAN. 20, 1926

Approved *at Rood*
Chief Signal Engineer

Approved *[Signature]*
Chief Engineer



- 4801- LAMP COMPLETE WITHOUT 4805.
 4802- " ONLY " 4805.
 4803- " COMPLETE WITH 4805.
 4804- " ONLY " 4805.

NOTE:- FURNISH BURNER, FOUNT AND CHIMNEY WITH 4801 AND 4803.

NOTE:-
 LENSES AND ROUNDLS SHALL BE IN ACCORDANCE WITH PENNSYLVANIA RAILROAD SYSTEM PLAN AND SPECIFICATIONS FOR LENSES AND ROUNDLS.
 WHEN NO DETAIL PLAN REFERENCE IS SHOWN, THE MANUFACTURER'S STANDARD APPARATUS, IF APPROVED BY THE PURCHASER, SHALL BE FURNISHED.
 LAMP TOP MUST OPEN PARALLEL TO SIGNAL CASTING.
 4801 AND 4802 FOR TWO-WAY FLAG STATION SIGNAL.
 4803 AND 4804 FOR UNATTENDED BLOCK STATION SIGNAL.

REVISIONS
REDRAWN FROM APPROVED PLANS 4808 DATED 2-7-21, LAST REVISED 4-2-21, AND REVISED.

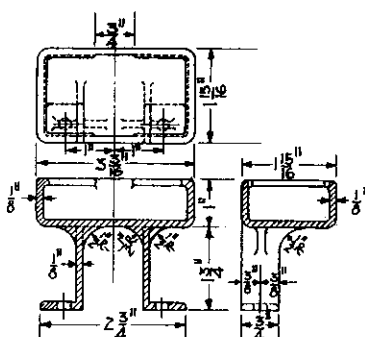
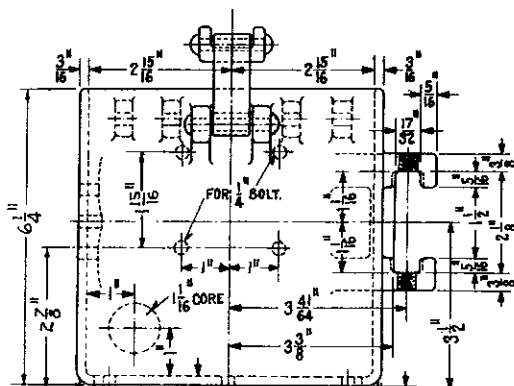
1 SHEET S-480-G

**PENNSYLVANIA RAILROAD SYSTEM
 STANDARD
 LAMP**

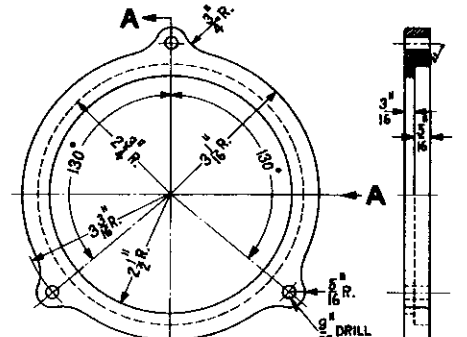
**FOR FLAG STATION AND
 UNATTENDED BLOCK STATION SIGNALS**

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., JULY 25, 1924.

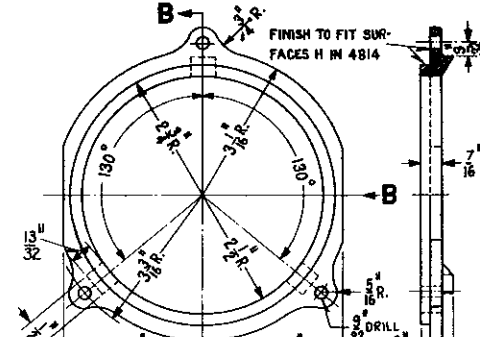
Approved Chief Signal Engineer Approved Chief Engineer



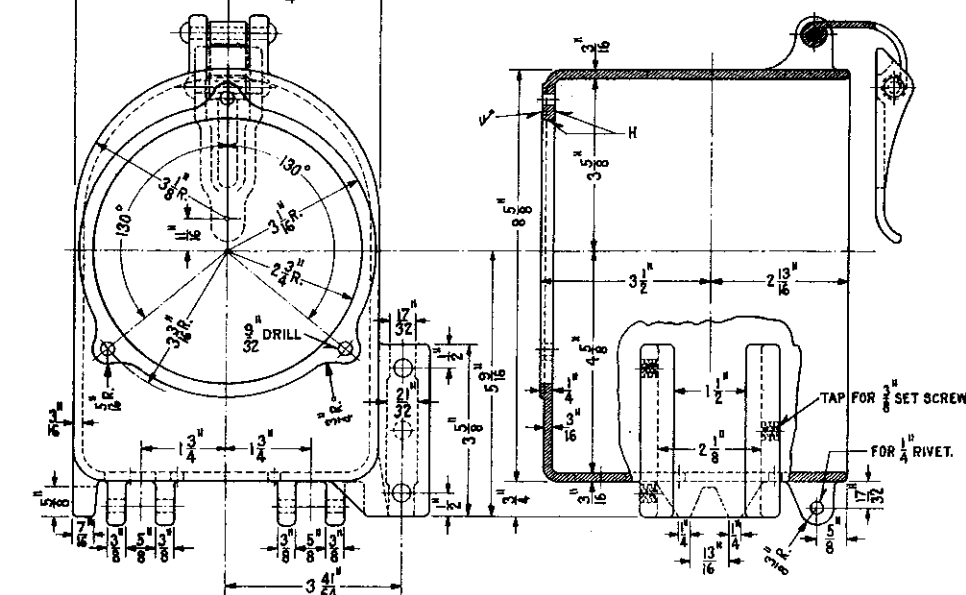
4811-BRACKET.
CAST IRON



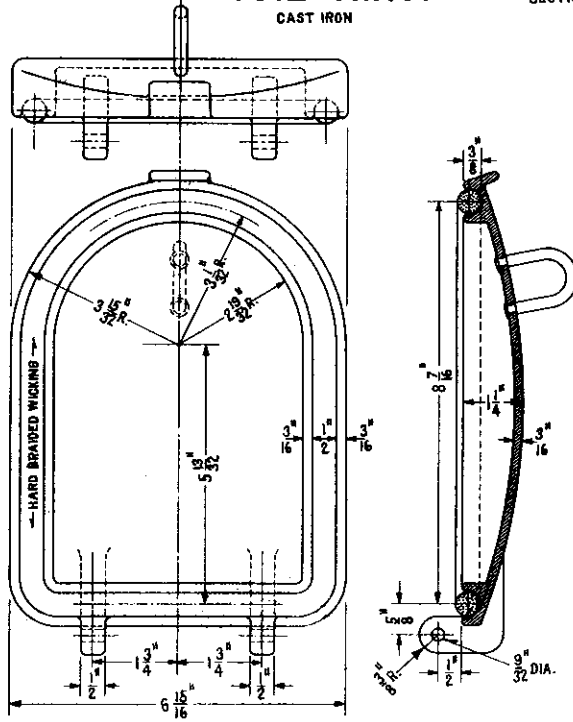
4812-RING.
CAST IRON



4813-RING.
CAST IRON



4814-CASE.
CAST IRON



4815-DOOR.
CAST IRON

REVISIONS

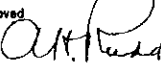
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S-481-A

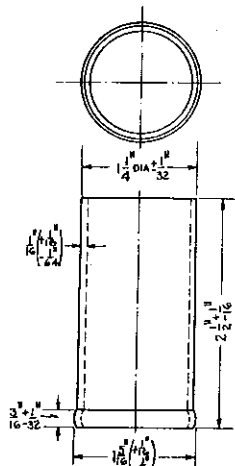


THE PENNSYLVANIA RAILROAD
STANDARD
ELECTRIC LAMP PARTS

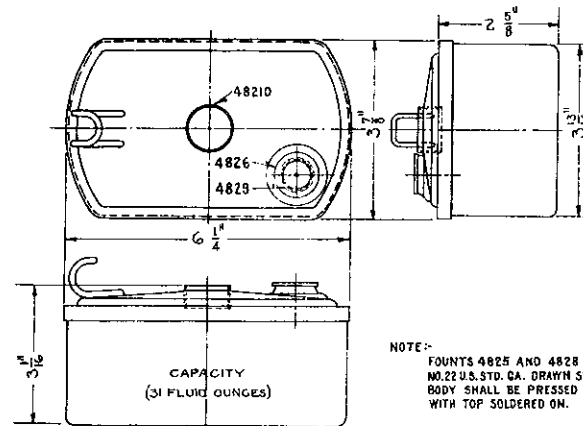
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., SEPTEMBER 7, 1920

Approved  Chief Signal Engineer

Approved  Chief Engineer

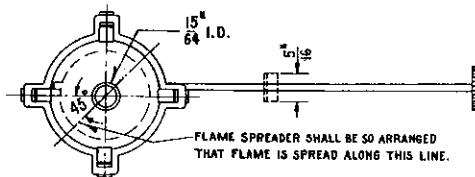


4821-CHIMNEY

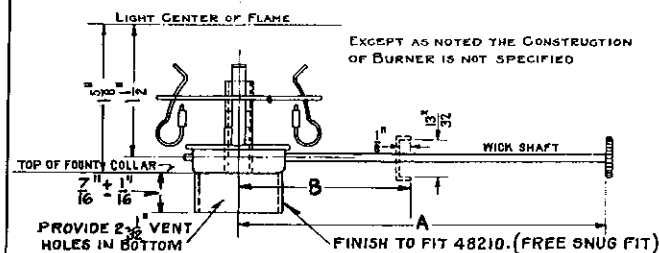


4825-FOUNT

R.S.A. APR. 1914

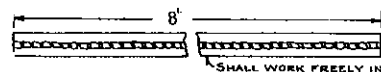


4826-FEEDER CAP
NO. 20 A.W.G. BRASS

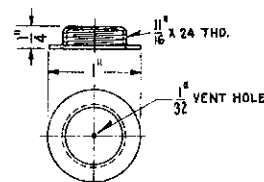


4822-BURNER A- 4"

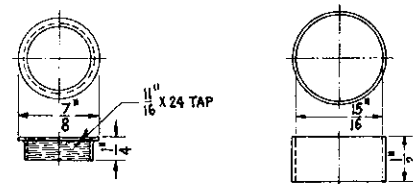
4823-BURNER B- 1 7/8"



4824-WICK
(CENTER CORE FELT)

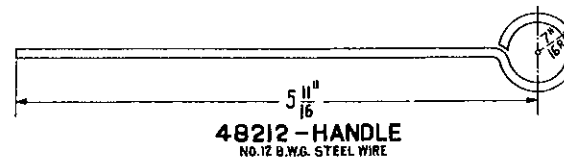


4829-FEEDER COLLAR
NO. 20 A.W.G. BRASS



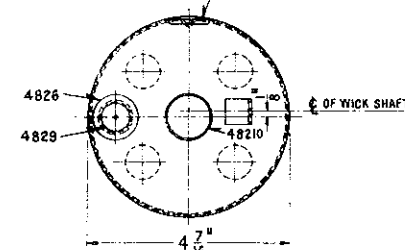
48210-FOUNT COLLAR
NO. 20 A.W.G. BRASS TUBING

48211-WICK SHAFT LOCK



48212-HANDLE
NO. 12 B.W.G. STEEL WIRE

HANDLE, WHEN SOLDERED IN PLACE SHALL NOT EXTEND BEYOND DIAMETER OF BODY.



4828-FOUNT

SPECIFICATIONS FOR CHIMNEYS

1. GENERAL DESCRIPTION:
This specification covers Long Time Burner Chimneys.
2. KIND OF GLASS:
Chimneys shall be made of LOW EXPANSION HEAT RESISTING GLASS.
3. ORDERING:
As far as possible Chimneys shall be ordered in multiples of standard package quantities.
4. BOILING WATER TEST:
Chimneys shall stand immersion in boiling water (distilled) for two (2) hours without showing any disintegration.
5. CHILLING TESTS:
(a) In making this test the Chimney is placed on a suitable Burner and the flame is turned up as far as possible without smoking. The lamp is then tilted to an angle of forty-five (45) degrees, in a direction parallel to the slot in the Burner, and allowed to remain in this position for five (5) minutes. During this period the flame shall be regulated, if necessary, so that a strip not to exceed three-eighths (3/8) of an inch wide running the length of the Chimney and parallel to its axis is smoked. The Chimney is then removed from the Burner, and immediately dropped, top downward, into a vessel of ice water, maintained at a temperature of between forty-three (43) and fifty (50) degrees Fabr., care being taken that the Chimney does not strike the ice.
(b) Chimneys tested as described in 5a shall not show breakage in excess of three (3) in twenty-four (24) tests.
(c) If the first twenty-four (24) samples fail to pass the Chilling test, an additional twenty-four (24) samples shall be taken for a second test, and if the average of breakage of the two (2) tests does not exceed twelve and one-half (12 1/2) per cent. the material is acceptable.
6. PERMISSIVE VARIATIONS:
Chimneys shall conform to approved drawings.
7. MARKING:
Chimneys shall show the Manufacturer's Trade Mark.
8. PACKING:
Chimneys shall be carefully packed, each package containing twelve (12) dozen Chimneys, in suitable containers, marked to show quantity, requisition number, order number, and, name and address of Consignee.
9. WORKMANSHIP:
Chimneys shall be clear, of smooth surface, and have both ends finished without sharp edges.
10. REHEARING:
When tests are made at the Purchaser's laboratory, samples of rejected material will be held for one month from the date of test report. In case the Manufacturer is dissatisfied with results of test, he may make claim for rehearing within that time. Failure to raise a question within one month, will be construed as evidence of satisfaction with results of test. The samples will be scrapped and claim for a rehearing will not be considered.
11. FREIGHT CHARGES:
Rejected material will be returned to the Manufacturer, who shall pay freight charges both ways.

REVISIONS

B - JANUARY 7, 1926.
APPROVED: *W. L. Edwards*
C - JUNE 23, 1937. c.o.
APPROVED: *W. L. Edwards*

SHEET

S-482-C

THE PENNSYLVANIA RAILROAD
STANDARD
LAMP DETAILS
FOR OIL LIGHTED SWITCH AND SIGNAL LAMPS
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., OCT. 4, 1923.
Approved: *W. L. Edwards* Chief Signal Engineer
Approved: *W. L. Edwards* Engr. of Standards

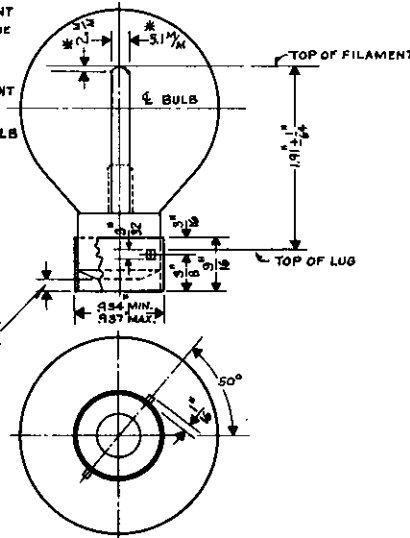
NOTE:- THE AXIAL ALIGNMENT OF LIGHT CENTER MUST BE TRUE WITHIN PLUS OR MINUS $\frac{1}{64}$ "

C-2R TUNGSTEN FILAMENT
G-16 $\frac{1}{2}$ GAS FILLED BULB

* APPROXIMATE

SLEEVE SOLDERED TO BASE AT TOP 3 POINTS 120° BOTTOM 2 POINTS 180° OUTSIDE OF SLEEVE TO BE PERFECTLY CLEAN.

1" MAX.
0" MIN.



4831 LAMP 12 VOLTS 9 WATTS
STORES CAT. REF. NO. 25E-4209.

CT-7 CLEAR GAS FILLED BULB.

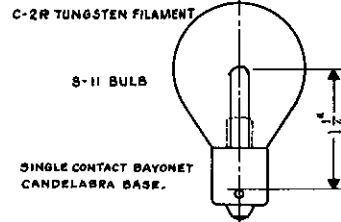
NOTE 1:- C-2V CENTER SUPPORTED TUNGSTEN FILAMENT.

NOTE 2:- WIDTH OF LIGHT SOURCE AT OPEN END 0.080" MAX.

NOTE 3:- AXIAL ALIGNMENT OF FILAMENT MUST BE TRUE WITHIN $\frac{1}{64}$ "

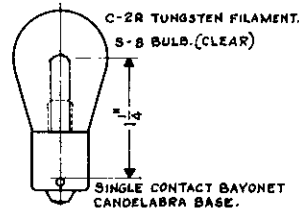
NOTE 4:- THE BASE PINS MUST BE AT RIGHT ANGLES TO THE FILAMENT WITHIN A TOLERANCE OF 2 10°

SINGLE CONTACT BAYONET CANDELABRA BASE.

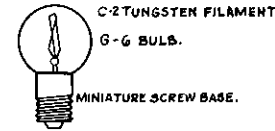


4839 LAMP 12 VOLTS 0.25 AMPS.
STORES CAT. REF. NO. 25E-4263.

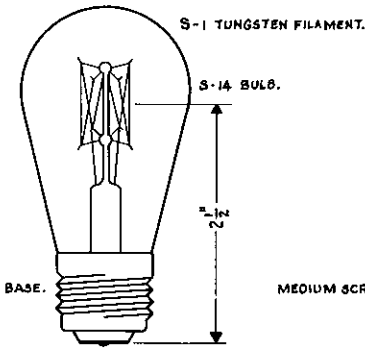
48313 LAMP 2.5 VOLTS .150 AMPS.
STORES CAT. REF. NO. 25E-4131.



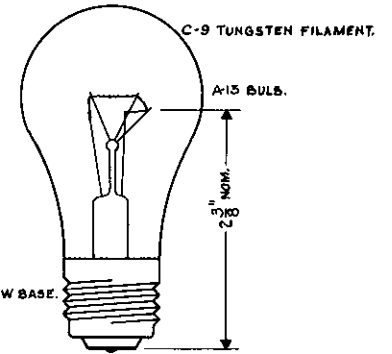
4832 LAMP 12-16 VOLTS 21 C.P.
STORES CAT. REF. NO. 25E-4211.



4833 LAMP 18-24 VOLTS 3 C.P.
STORES CAT. REF. NO. 25E-4207.



4836 LAMP 12 VOLTS 2.5 WATTS.
STORES CAT. REF. NO. 25E-1596.



4837 LAMP 115 VOLTS 15 WATTS.
STORES CAT. REF. NO. 25E-4322.



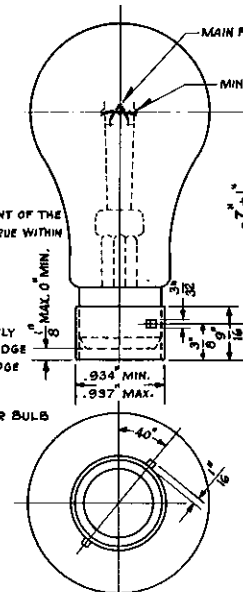
4835 ADAPTER
(MINIATURE BASE TO CANDELABRA BASE)
STORES CAT. REF. NO. 2A-12.

NOTE:- THE AXIAL ALIGNMENT OF THE FILAMENT MUST BE TRUE WITHIN PLUS OR MINUS $\frac{1}{64}$ "

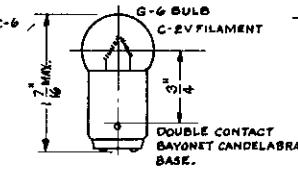
MAIN FILAMENT C-2V
MINOR FILAMENT CC-6

COLLAR SHALL BE SECURELY SOLDERED TO BASE; TOP EDGE 3 POINTS AND BOTTOM EDGE 2 POINTS.

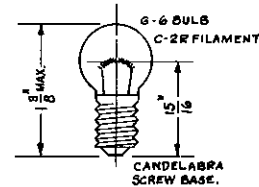
A-15 CLEAR BULB



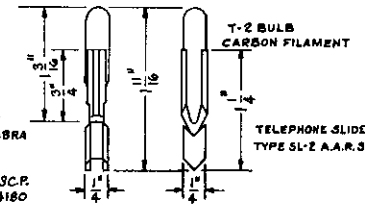
48314 LAMP 10V. 18 + 3.5W.
STORES CAT. REF. NO. 25E-4140



48315 LAMP 18-24V. 3C.P.
STORES CAT. REF. NO. 25E-4180



48316 LAMP 12-16V. 6C.P.
STORES CAT. REF. NO. 25E-7870



48317 LAMP 09-12A 18V.
STORES CAT. REF. NO. 25E-7609

NOTE:- LAMPS SHOWN HEREON SHALL BE CONSTRUCTED IN ACCORDANCE WITH AND SHALL BE SUBJECT TO THE INSPECTIONS AND TESTS AS REQUIRED BY PENNSYLVANIA RAILROAD STANDARD SPECIFICATIONS BASIC NO. M.P. 54.

REVISIONS

REDRAWN FROM APPROVED PLAN S-483-D, DATED NOV. 8, 1926, LAST REVISED JULY 14, 1930 AND THE FOLLOWING CHANGES MADE. VERTICAL BEND OF FILAMENT AND OTHER MINOR CHANGES MADE IN 4831. DESIGN OF FILAMENT IN 4837 CHANGED LAMP 4830 REMOVED. LAMP 48311 TO 4834 INCL. ADDED. BULB OF 4837 FORMERLY 3-16. TABLE CHANGED & STORES CAT. REF. NO. ADDED.

LAMP	FOR USE WITH
4831	POSITION LIGHT HIGH, SCALE AND FLAG STATION SIGNALS.
4832	POSITION LIGHT DWARF, PEDESTAL AND HIGHWAY CROSSING SIGNALS.
4833	INDICATION AND MODEL BOARD LIGHTS.
4836	SEMAPHORE SIGNALS.
4837	SEMAPHORE SIGNALS. PILOT LIGHTS AT HIGHWAYS.
4839	SEMAPHORE SIGNALS (APPROACH LIGHTING).
48311	POSITION LIGHT HIGH SIGNALS (STYLE PL-3).
48312	POSITION LIGHT HIGH SIGNALS (STYLE PL-3).
48313	SEMAPHORE SIGNALS AND SWITCH LAMPS. (CONTINUOUS LIGHTING) PRIMARY BATTERY.
48314	STYLE "R" AND STYLE "P" COLOR LIGHT SIGNALS.
48315	INDICATOR LIGHTS IN INTERLOCKING MACHS. & TRACK MODELS
48316	INDICATOR LIGHTS IN INTERLOCKING MACHS. & TRACK MODELS
48317	INDICATOR LIGHTS IN C.T.C. MACHINES

1 SHEET



S-483-E

THE PENNSYLVANIA RAILROAD STANDARD LAMPS

INCANDESCENT ELECTRIC

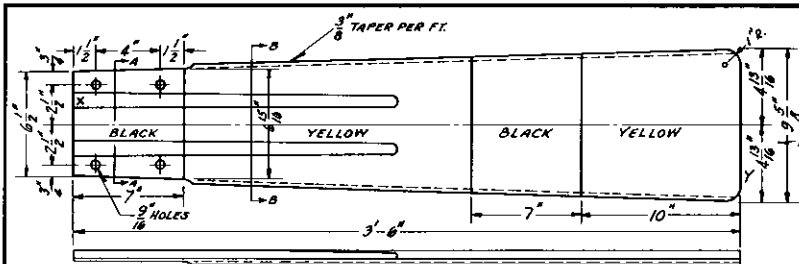
OFFICE OF CHIEF ENGINEER PHILA., PA., DECEMBER 4, 1945.

Approved

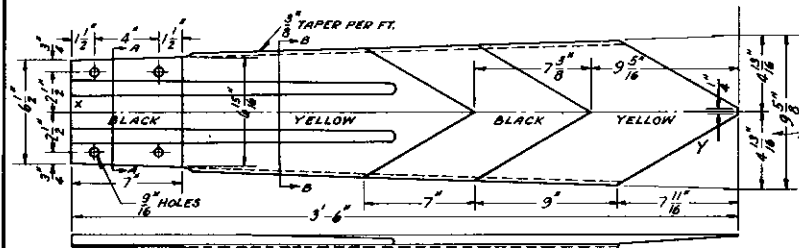
W. C. Griffith
Assistant Chief Engineer-T.C. & S.

Approved

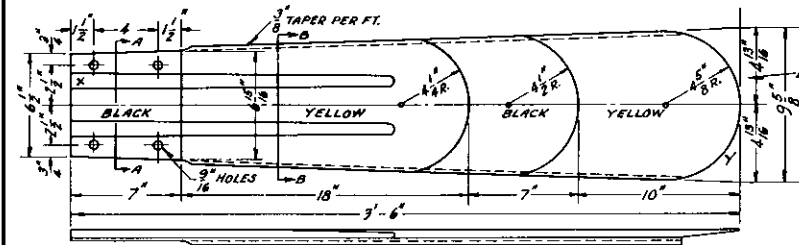
J. H. Smith
Chief Engineer



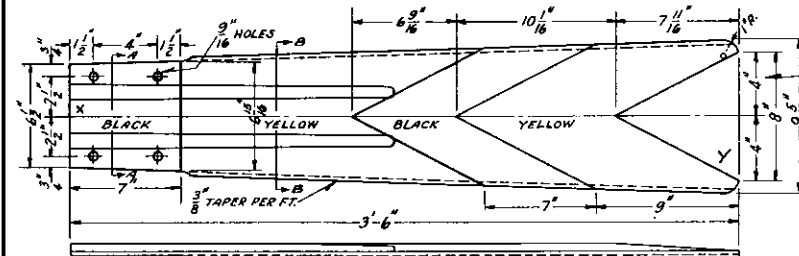
4841 BLADE #15 U.S. STD. GAGE
STORES CAT. REF. NO. 24-197



4842 BLADE #15 U.S. STD. GAGE
STORES CAT. REF. NO. 24-194



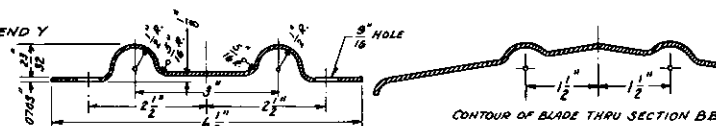
4843 BLADE #15 U.S. STD. GAGE
STORES CAT. REF. NO. 24-198



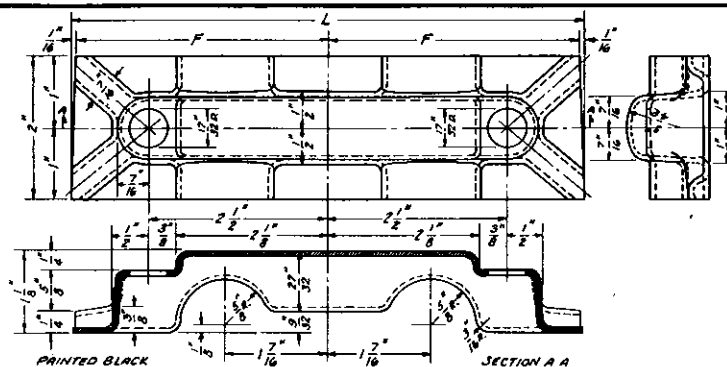
4844 BLADE #15 U.S. STD. GAGE
STORES CAT. REF. NO. 24-195



VIEW E SHOWING CONTOUR OF BLADE ENDS.

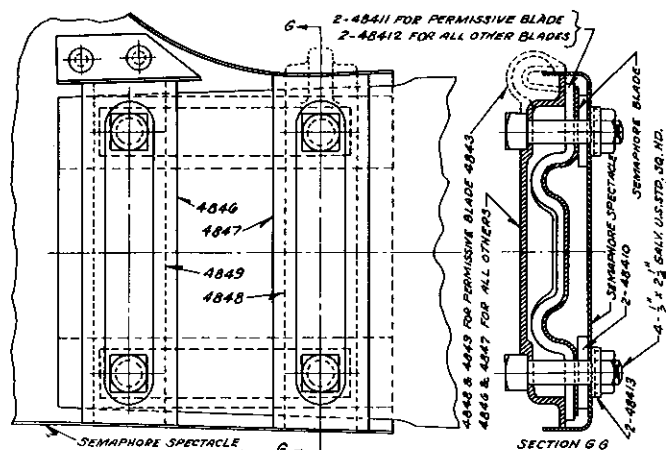


CONTOUR OF END X OF BLADE & THRU SECTION A A

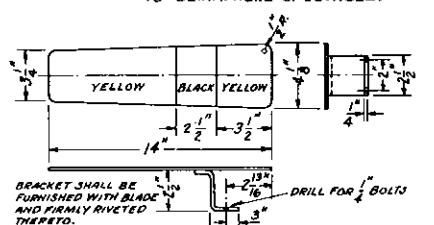


4846 BLADE GRIP REAR - PRESSED STEEL - L = 7 1/8", F = 3 1/2"

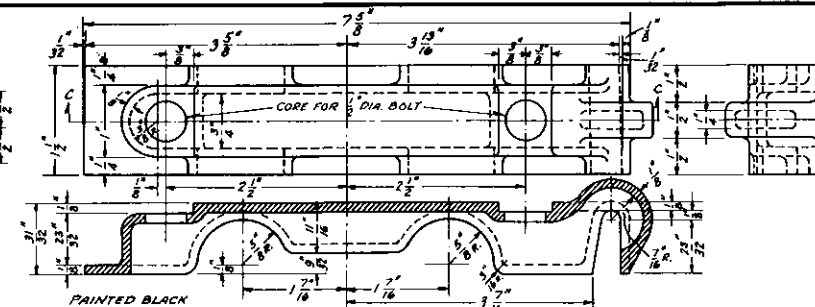
4847 BLADE GRIP FRONT - PRESSED STEEL - L = 7 1/8", F = 3 1/2"



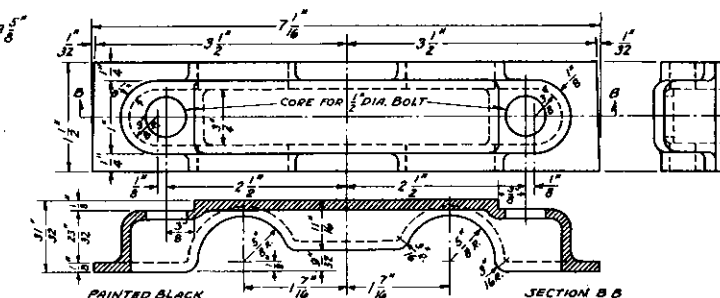
APPLICATION OF BLADE AND BLADE GRIPS TO SEMAPHORE SPECTACLE.



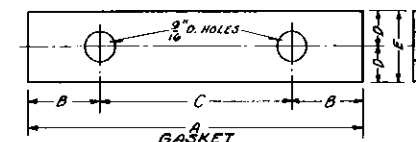
4845 BLADE #12 U.S. STD. GAGE
STORES CAT. REF. NO. 24-196



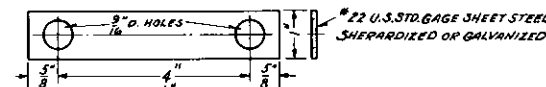
4848 BLADE GRIP FRONT - MALLEABLE IRON



4849 BLADE GRIP REAR - MALLEABLE IRON



ORDER NUMBER	NAME	NUMBER REQ'D.	A	B	C	D	E	MATERIAL
48410	PLAIN GASKET	2	7"	1 1/2"	4"	1 1/2"	1 1/2"	3 PLY COW-HAIR
48411	CORRUGATED GASKET	2	8 1/2"	1"	6 1/2"	1 1/2"	1 1/2"	3 PLY COW-HAIR
48412	CORRUGATED GASKET	2	8 1/2"	1"	6 1/2"	1"	2"	3 PLY COW-HAIR



4843 NUT LOCK

- NOTES:-
1. BLADES SHALL BE MADE OF OPEN-HEARTH ENAMELING STEEL & ENAMELED WITH NOT LESS THAN 3 COATS OF ACID RESISTING VITREOUS ENAMEL, COLORS AS INDICATED.
 2. ENAMEL BACK OF ALL BLADES BLACK.
 3. YELLOW ENAMEL SHALL BE MEDIUM CHROME.
 4. GRIPS, BOLTS, AND GASKETS SHALL BE ORDERED SEPARATELY FROM BLADES, INDICATING ORDER NUMBER.
 5. WIND PRESSURE TEST SHALL BE AS PER A.R.S. SEC. DNG. 1548.

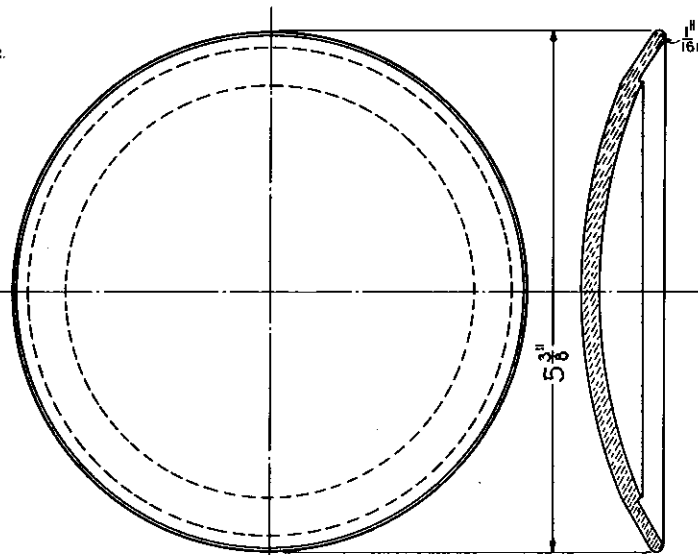
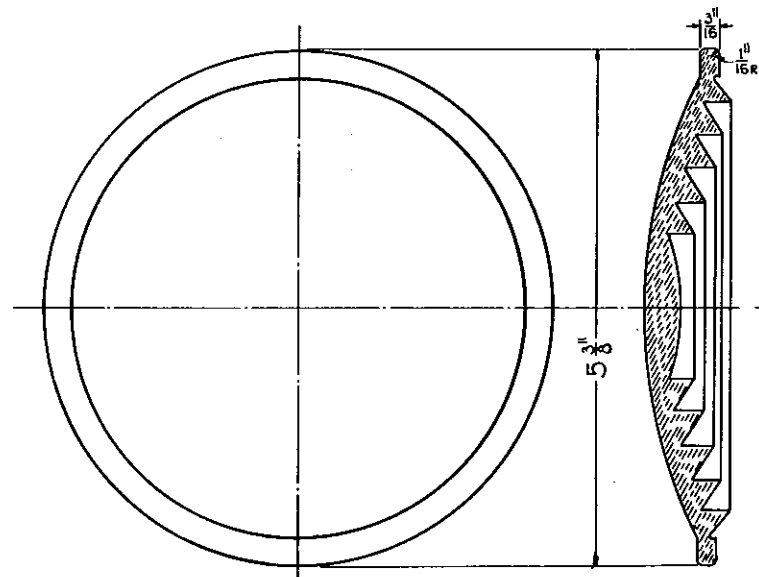
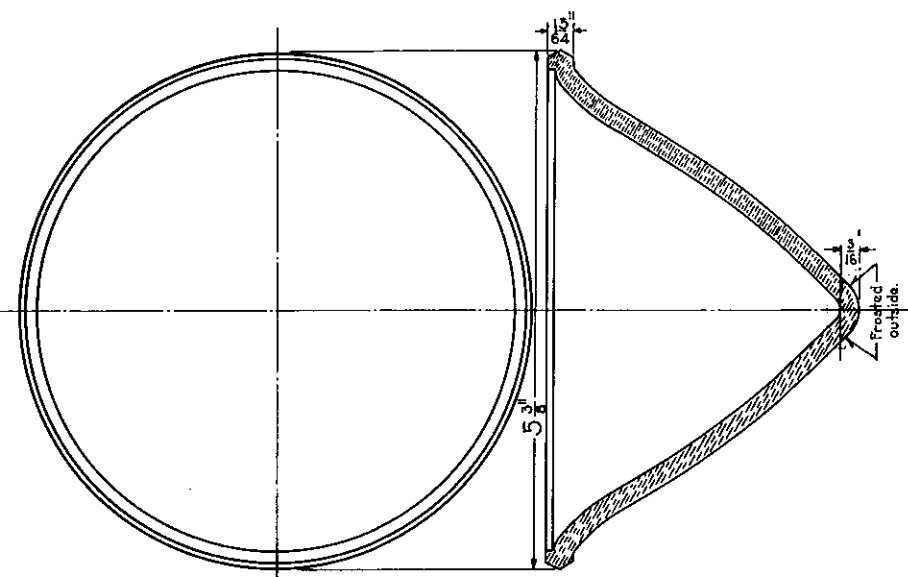
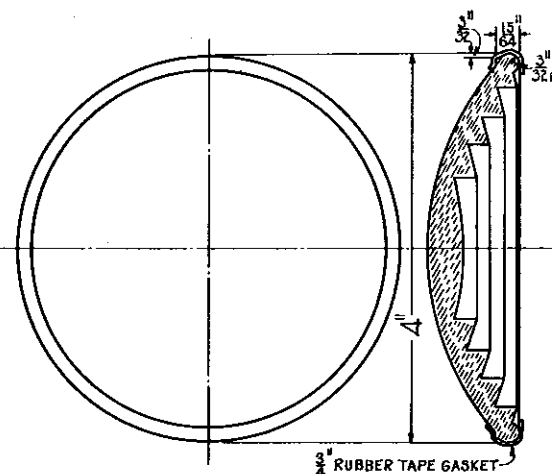
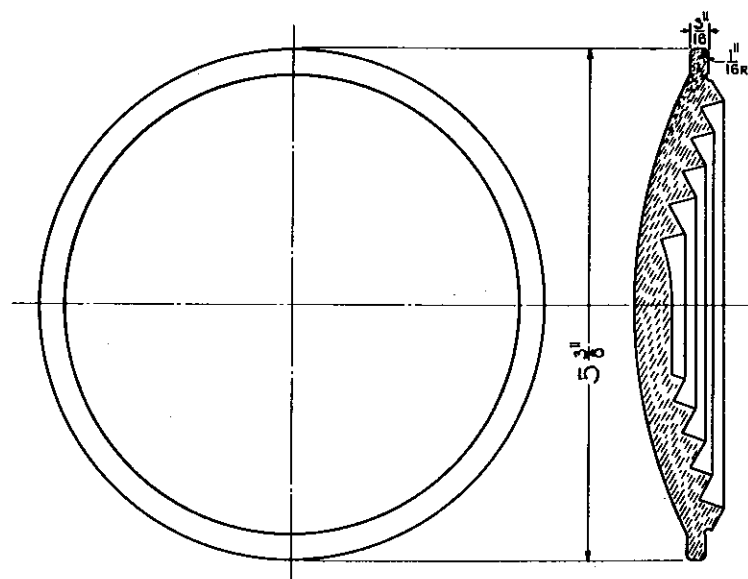
REVISIONS
REDRAWN FROM APPROVED PLAN S-484-C, DATED JUNE 2, 1924 AND REVISED TO SHOW FORMING OF BLADE GRIPS ADDED TO PLAN.

1 SHEET

THE PENNSYLVANIA RAILROAD
STANDARD
BLADES
FOR SEMAPHORE SIGNALS
OFFICE OF CHIEF ENGINEER, PHILA., PA., MAY 9, 1949.

Approved *H. S. Selmonson*
Assistant Chief Engineer - Signals

Approved *J. H. Whitt*
Chief Engineer



4866-COVER GLASS(NOGLARE) Transmission value shall fall within the light and dark limits of samples held by Corning Glass Works and Chief Signal Engineer Penna. System.

48612- :
48613- :

(GREEN) Trans. Lts-ITS-Std-ISO-Dx-ID.
(YELLOW) " " " " " " " " " " " "

Note: Bottom of Lens 4861 shall be marked "Bottom".
Focal Length of Lenses 4861, 4862 and 4864 shall
be 2 3/4", and shall be pressed on the outer zone,
together with the name or trade mark of the
Manufacturer.

4861I- For use on curves.

REVISIONS.	
B-MAR. 6, 1924.	Approved: <i>att. P</i>
C-FEB. 27, 1929.	Approved: <i>att. P</i>
D-FEB. 5, 1934.	APPROVED:- <i>att. P</i>

FIG.	USE.
4861	High Position Light Signals.
4862	Flag Station and Scale Signals.
4864	Dwarf & Pedestrial Position Light Signals.
4866	High Position Light Signals.
4869	Flag Station and Scale Signals.
48610	Flag Station.
48612	Distant Switch Indicator
48613	

1 SHEET

S-486-D

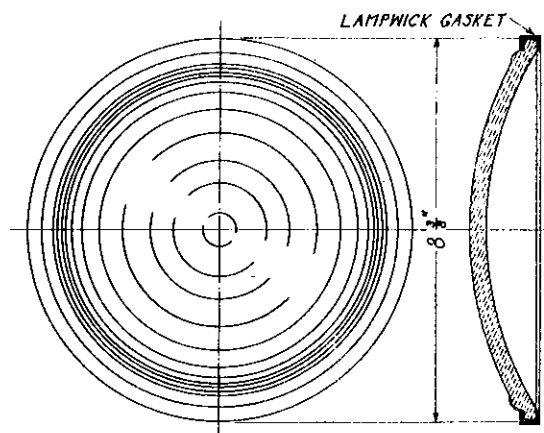
**THE PENNSYLVANIA RAILROAD
STANDARD**

COVER GLASSES AND LENSES FOR POSITION AND OTHER LIGHT SIGNALS

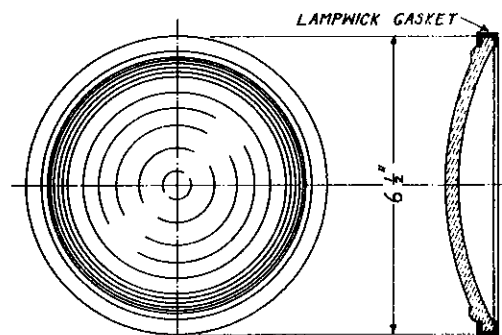
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., MARCH 15, 1921

Correct
A. H. [Signature]
Chief Signal Engineer

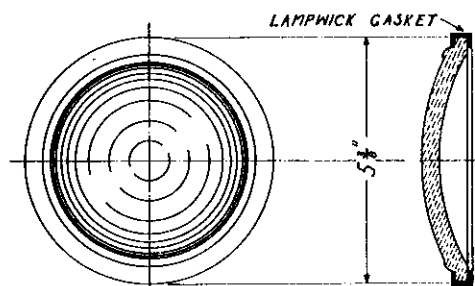
Approved: _____
Chief Engineer



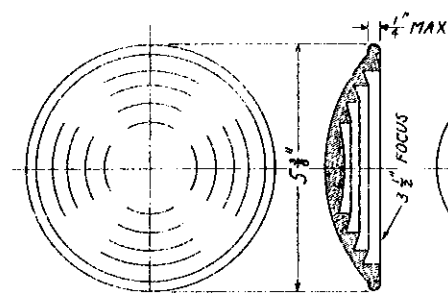
4871 - ROUNDEL



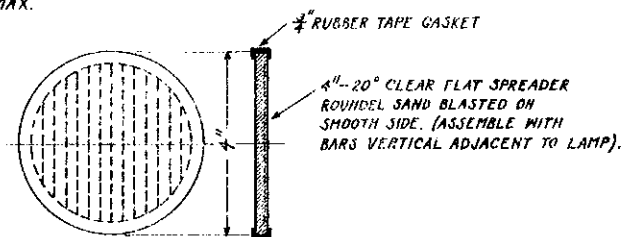
4872 - ROUNDEL



4873 - ROUNDEL

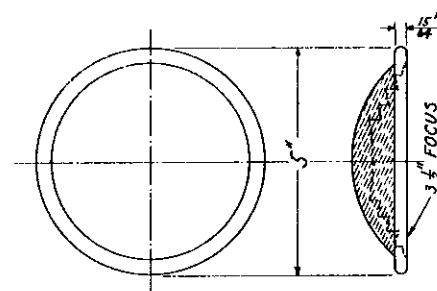


4876 - LENS



4877 - ROUNDEL

FURNISHED BY U.S. & S. Co.



4874 - LENS

4875 - " SPREDLITE

4875 USED IN CONNECTION WITH PURPLE ROUNDEL.

NOTE:-
SPECIFY COLOR WHEN ORDERING
ROUNDELS AND LENSES.
FURNISH GASKET WITH EACH ROUNDEL.

SIGNAL ROUNDELS AND LENSES SHALL BE IN ACCORDANCE WITH
A. A. R. SIGNAL SECTION SPECIFICATION 69-35.

REVISIONS
REDRAWN FROM APPROVED PLAN
S-487-E, DATED 11-3-20, AND
REVISED.

1 SHEET

S-487-E



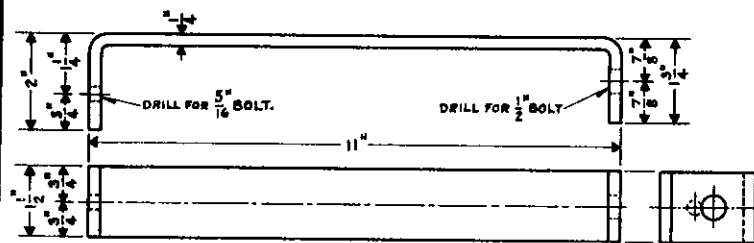
THE PENNSYLVANIA RAILROAD
STANDARD

ROUNDELS & LENSES

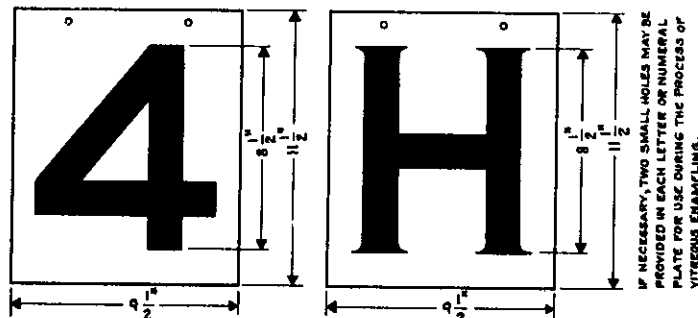
OFFICE OF ASST. CHIEF ENGINEER-SIGNALS, PHILA., PA. JULY 24, 1937.

APPROVED:
N. C. Stanton
ASST. CHIEF ENGINEER-SIGS.

APPROVED:
W. J. Higgins
CHIEF ENGINEER

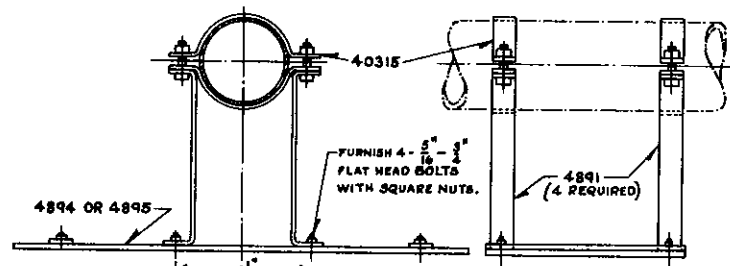


4891 SUPPORT
O. H. STEEL

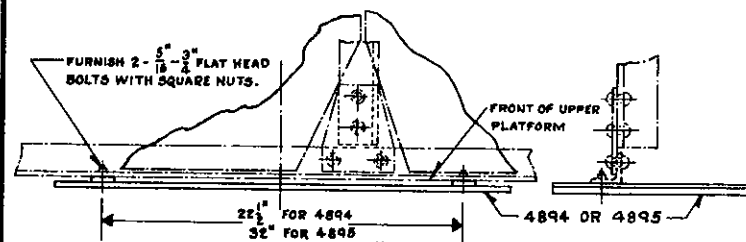


4892 PLATE
16 U.S. STD. GAUGE ENAMELING STEEL.

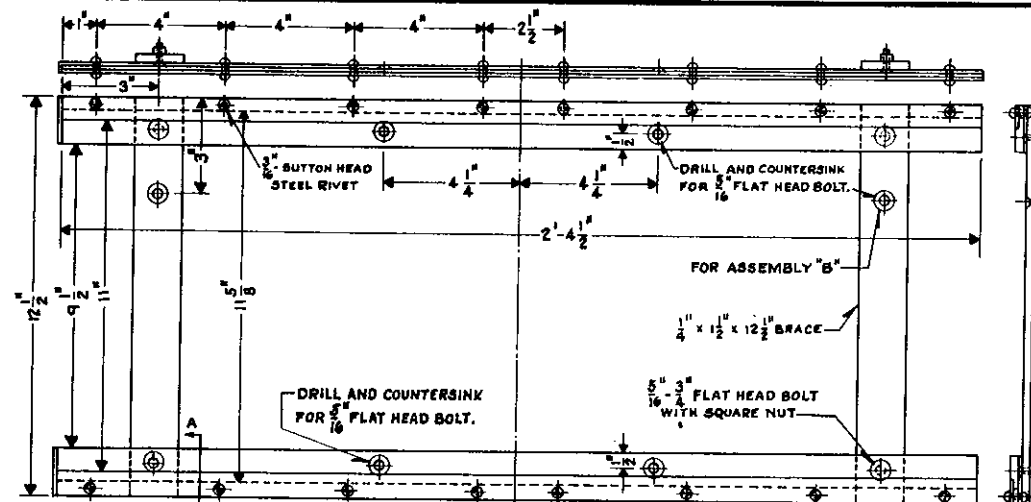
4893 PLATE
16 U.S. STD. GAUGE ENAMELING STEEL.



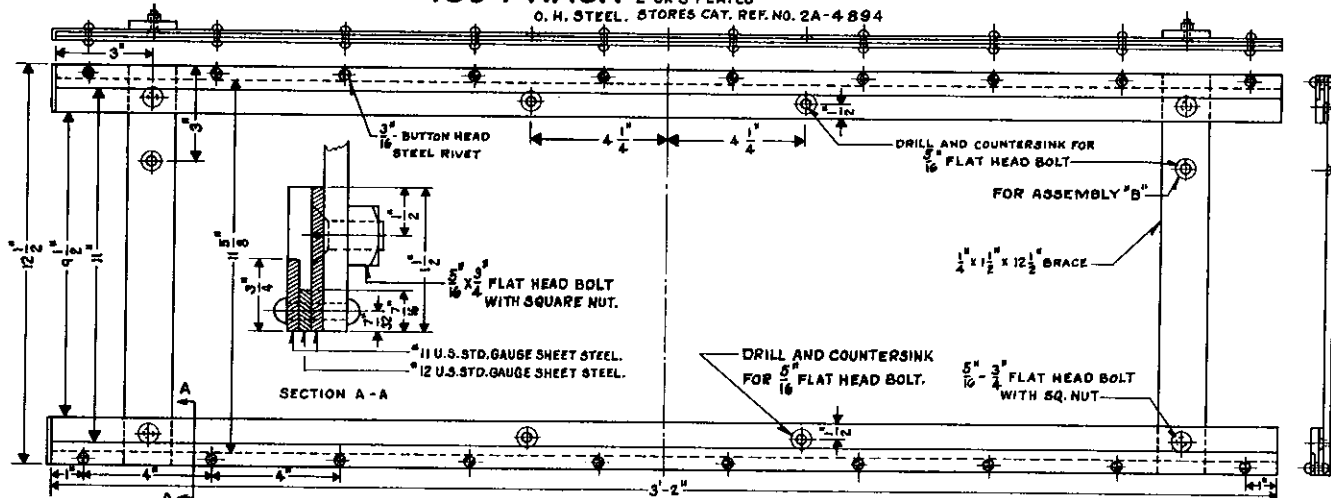
ASSEMBLY "A" FOR DIAGRAMS B & C.



ASSEMBLY "B" FOR DIAGRAM A.



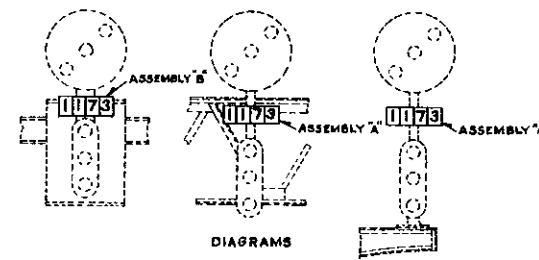
4894 RACK 2 OR 3 PLATES
O. H. STEEL. STORES CAT. REF. NO. 2A-4894



4895 RACK 4 PLATES
O. H. STEEL
STORES CAT. REF. NO. 2A-4895

ORDERING REFERENCE FOR BRACKETS COMPLETE

ORDER NUMBER	STORES CAT. REF. NUMBER	BRACKET ONLY FOR	ASSEMBLY
4896	2A-4896	2 OR 3 PLATES	"A" DIAGRAM B OR C
4897	2A-4897	4 PLATES	"A" DIAGRAM B OR C
4898	2A-4898	2 OR 3 PLATES	"B" DIAGRAM A
4899	2A-4899	4 PLATES	"B" DIAGRAM A



APPLIED TO SIGNAL ON BEAM TYPE SIGNAL BRIDGE.

APPLIED TO SIGNAL ON STANDARD TYPE SIGNAL BRIDGE.

APPLIED TO SIGNAL ON CANTILEVER.

NOTE 1-

1. FRONT AND BACK OF ALL PLATES SHALL BE BLACK ACID RESISTING VITREOUS ENAMELED WITH NUMERALS AND LETTERS WHITE ACID RESISTING VITREOUS ENAMELED.
2. NUMERALS AND LETTERS SHALL BE PROPORTIONED IN ACCORDANCE WITH STANDARD M.W. PLAN BASIC NUMBER 78000.
3. WHEN ORDERING SPECIFY NUMERALS OR LETTERS DESIRED.
4. POSITION LIGHT SIGNALS WHOSE MOST RESTRICTIVE INDICATION IS MORE FAVORABLE THAN STOP, SHALL BE NUMBERED.
5. ALL PARTS OF RACKS AND CLAMPS SHALL BE THOROUGHLY CLEANED, GIVEN A PRIMARY COAT OF RED LEAD AND A FINISHING COAT OF FIRST CLASS BLACK PAINT.
6. IN ACCORDANCE WITH C. E. 58-A, A LETTER MAY BE PREFIXED TO THE SIGNAL NUMBER FOR DESIGNATING BRANCH LINE SIGNALS.
7. FOR NUMERALS AND LETTERS APPLIED TO GROUND MASTS, SEE PLAN NO. 3-490.

REVISIONS

REDRAWN FROM APPROVED PLAN S-489-G, DATED JUNE 27, 1924, LAST REVISED FEB. 19, 1935 AND REVISED AS FOLLOWS - VERTICAL NUMBER RACK ELIMINATED, ENAMELING OF PLATES MADE VITREOUS ENAMEL, NOTE 7 & STORES CAT. REF. NUMBERS ADDED, CLAMP CHANGED AND SUPPORT 4891 added.
G REVISED JANUARY 23, 1944. ALL 5/16" BOLTS FORMERLY 3/16". NOTE 1 CHANGED.

APPROVED: *N. C. [Signature]*

1 SHEET



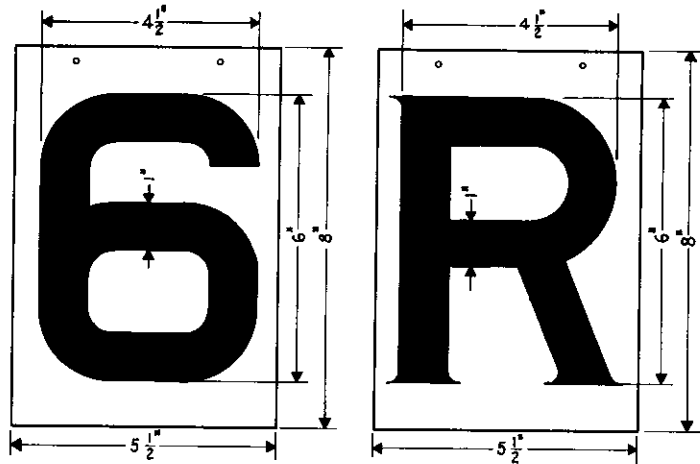
S-489-G

THE PENNSYLVANIA RAILROAD
STANDARD
NUMERALS & LETTERS
ENAMELED

FOR SIGNAL NUMBERING
OFFICE OF CHIEF ENGINEER, PHILA., PA., NOV. 27, 1942.

Approved *N. C. [Signature]*
Assistant Chief Engineer-Signals

Approved *[Signature]*
Chief Engineer

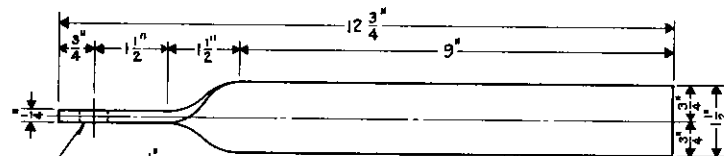


4901 NUMERAL PLATE

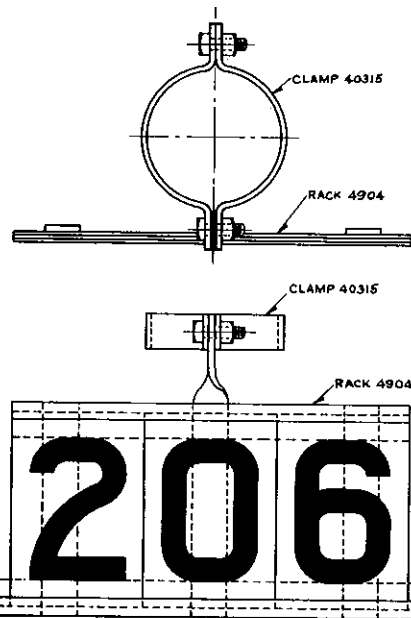
16 U.S. STD. GAUGE ENAMELING STEEL.
STORES CAT. REF. NO. 2A-5591

4902 LETTER PLATE

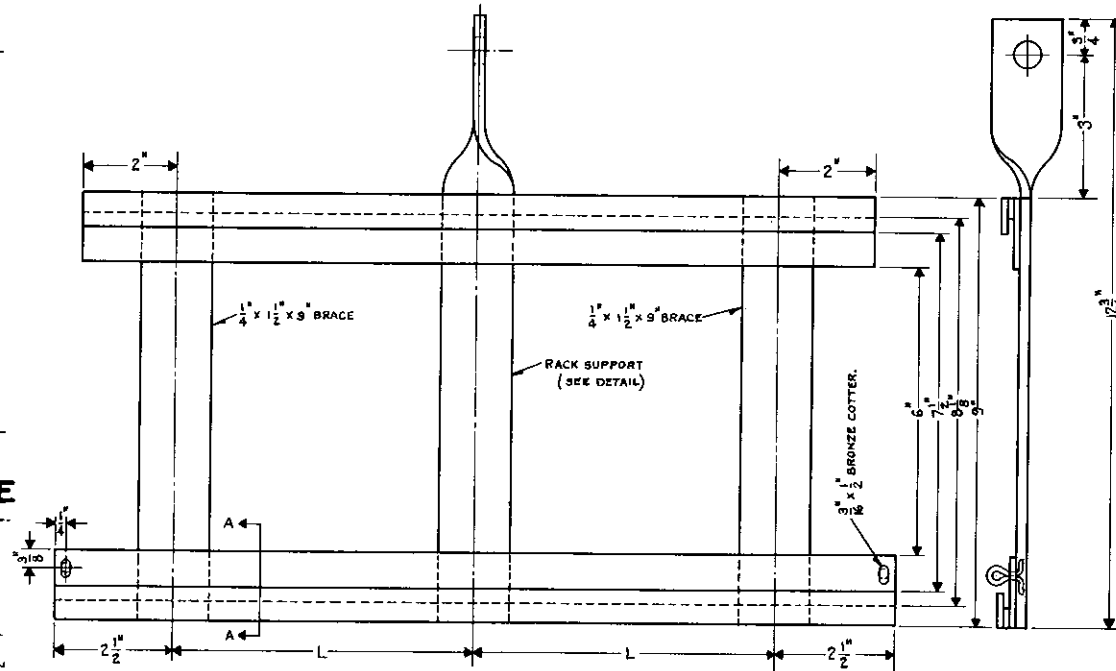
16 U.S. STD. GAUGE ENAMELING STEEL.
STORES CAT. REF. NO. 2A-5592



DETAIL OF RACK SUPPORT.
WROUGHT IRON



ASSEMBLY OF CLAMP, RACK & NUMBER PLATES.



4903 RACK COMPLETE FOR 2 PLATES.
L = 3 1/2"

STORES CAT. REF. NO. 2A-5593

4904 RACK COMPLETE FOR 3 PLATES.
L = 6 1/2"

STORES CAT. REF. NO. 2A-5594

4905 RACK COMPLETE FOR 4 PLATES.
L = 9"

STORES CAT. REF. NO. 2A-5595

4906 RACK COMPLETE FOR 5 PLATES.
L = 11 3/4"

STORES CAT. REF. NO. 2A-5596

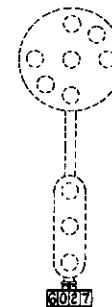
WROUGHT IRON

NOTE:-

1. FRONT AND BACK OF NUMERAL AND LETTER PLATES SHALL BE BLACK ACID RESISTING VITREOUS ENAMELED WITH NUMERALS AND LETTERS WHITE ACID RESISTING VITREOUS ENAMELED.
2. WHEN ORDERING, SPECIFY NUMERALS AND LETTERS DESIRED. ORDER RACKS AND CLAMPS SEPARATELY.
3. ALL PARTS OF RACKS AFTER WELDING AND CLAMPS, SHALL BE THOROUGHLY CLEANED, GIVEN A PRIMARY COAT OF RED LEAD AND A FINISHING COAT OF FIRST CLASS BLACK PAINT.
4. POSITION LIGHT SIGNALS WHOSE MOST RESTRICTIVE INDICATION IS MORE FAVORABLE THAN STOP, SHALL BE NUMBERED.
5. IN ACCORDANCE WITH C.E. 88-A, A LETTER MAY BE PREFIXED TO THE SIGNAL NUMBER FOR DESIGNATING BRANCH LINE SIGNALS.
6. FOR NUMBERING OF SIGNALS LOCATED ON BRIDGES SEE CURRENT ISSUE OF PLAN 3-489.
7. NUMERALS AND LETTERS SHALL BE PROPORTIONED IN ACCORDANCE WITH STANDARD M. OF W. PLAN BASIC NUMBER 78000.

REVISIONS

REDRAWN FROM APPROVED PLAN S-490-A, DATED NOV. 27, 1942 AND REVISED AS FOLLOWS:- FORMERLY A.A.R. 816, SEC. STANDARD. NUMERAL AND LETTER PLATES WERE CAST IRON, PAINTED. RACKS REDESIGNED AND ALL PARTS WERE BOLTED TOGETHER. ORDERING REFERENCES AND STORES CAT. REF. NUMBERS CHANGED.



APPLICATION TO STANDARD
POSITION LIGHT GROUND SIGNAL.

1 SHEET



S-490-C

THE PENNSYLVANIA RAILROAD
STANDARD
NUMERALS AND LETTERS
ENAMELED

FOR SIGNAL NUMBERING

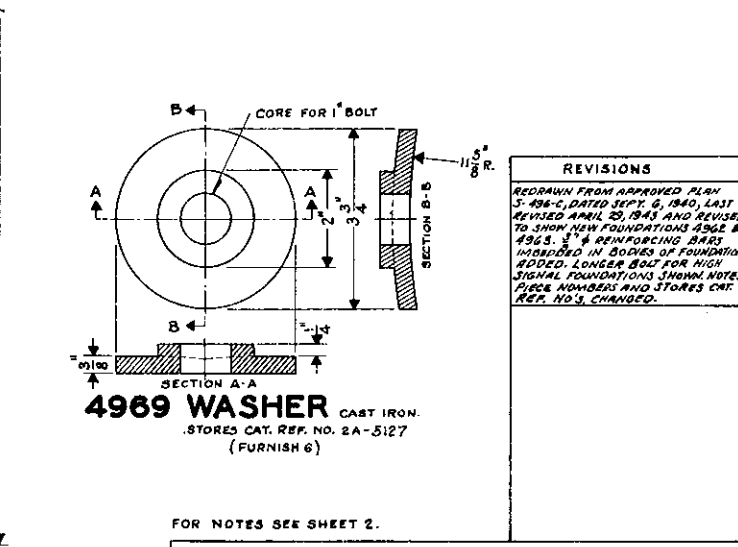
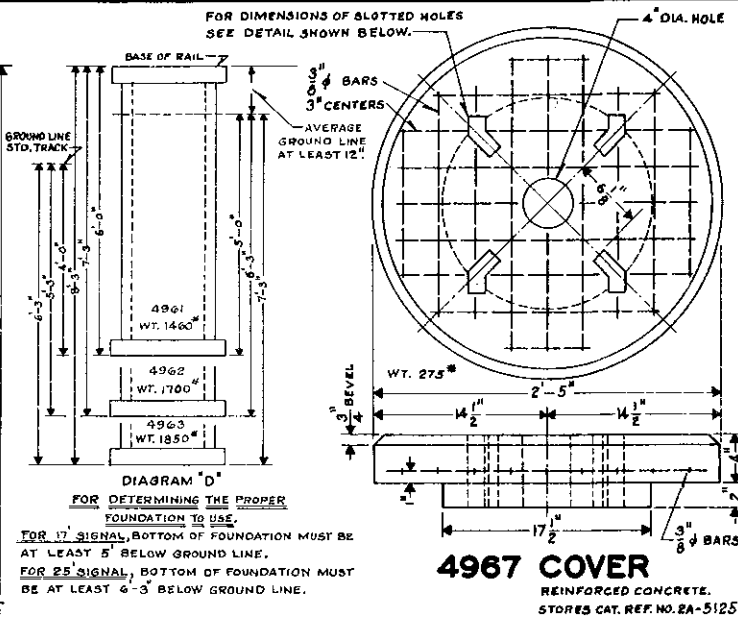
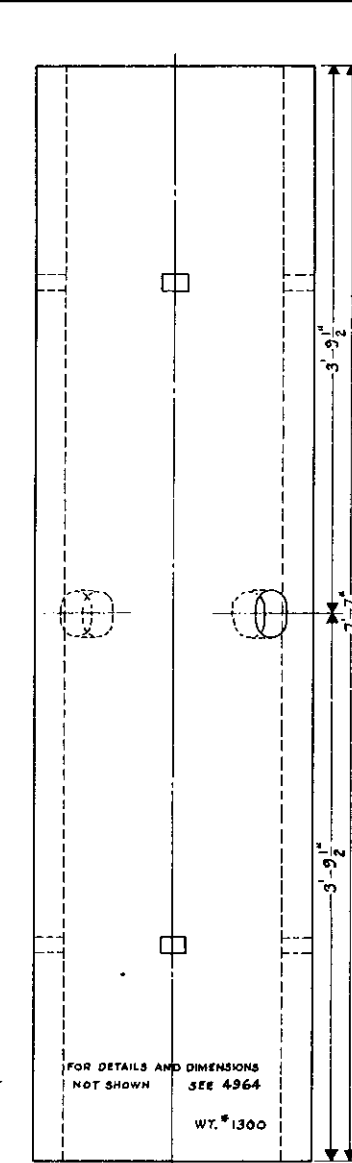
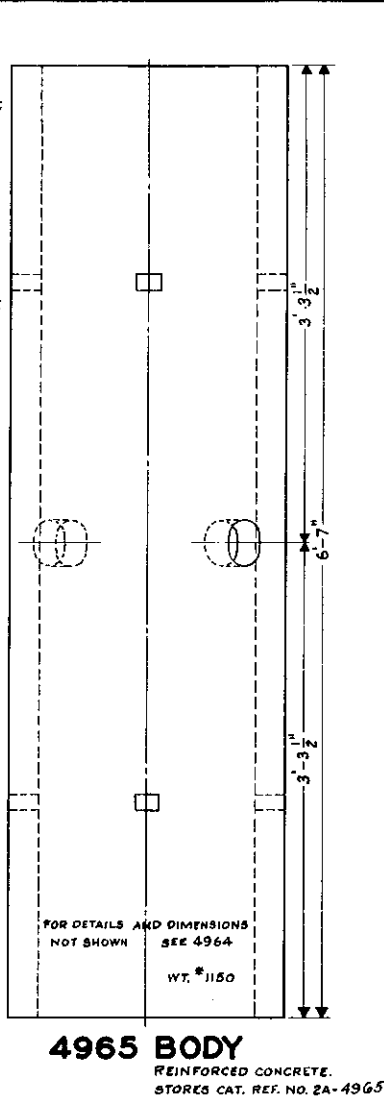
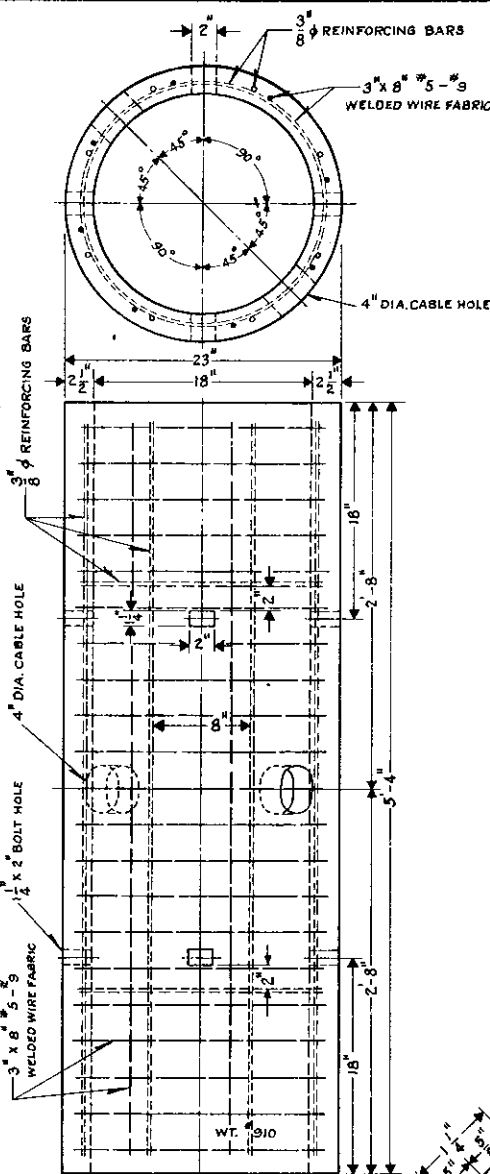
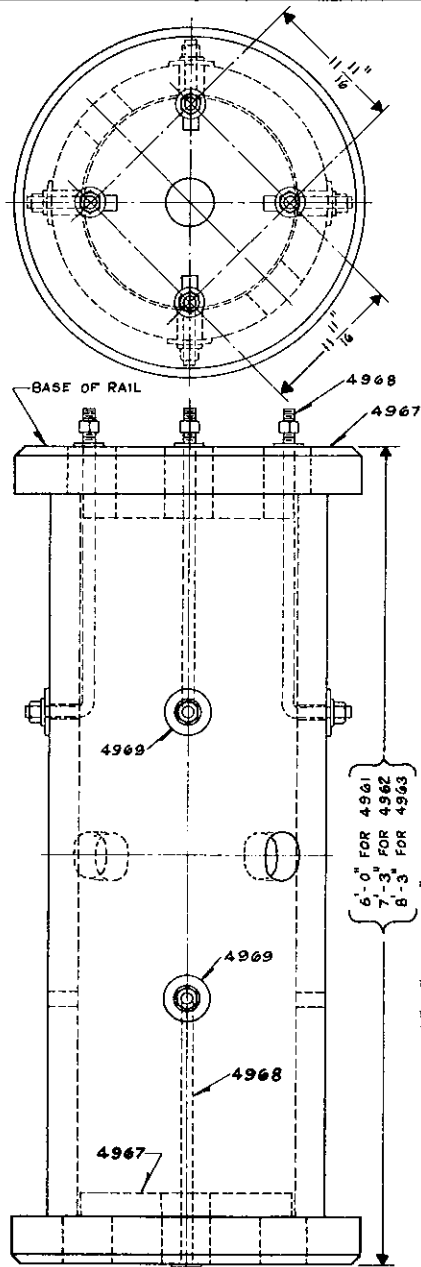
OFFICE OF CHIEF ENGINEER, PHILA., PA., APRIL 25, 1947.

Approved

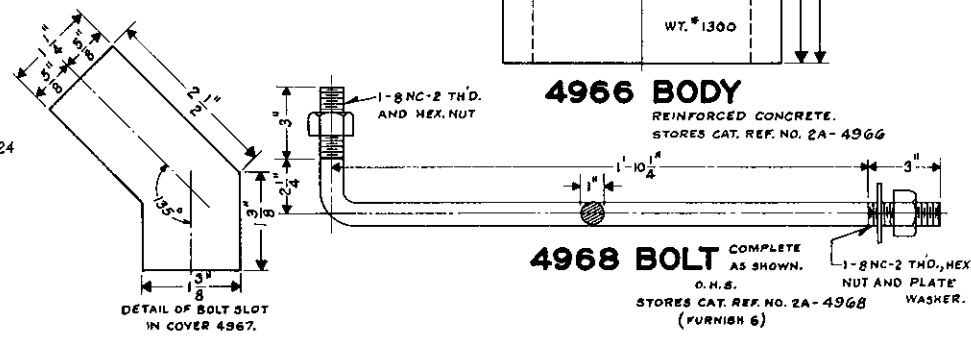
W. J. Griffith
Assistant Chief Engineer-T.C. & S.

Approved

W. J. Griffith
Chief Engineer



REVISIONS
REDRAWN FROM APPROVED PLAN S-496-D, DATED SEPT. 8, 1940, LAST REVISED APRIL 23, 1943 AND REVISED TO SHOW NEW FOUNDATIONS 4962 & 4963. 3/8" REINFORCING BARS WERE ADDED IN BODIES OF FOUNDATIONS 4962 & 4963. LONGER BOLT FOR HIGH SIGNAL FOUNDATIONS SHOWN. NOTES, PIECE NUMBERS AND STORES CAT. REF. NO.'S CHANGED.



FOR NOTES SEE SHEET 2.

SHEET 1 OF 2 SHEETS.

S-496-D

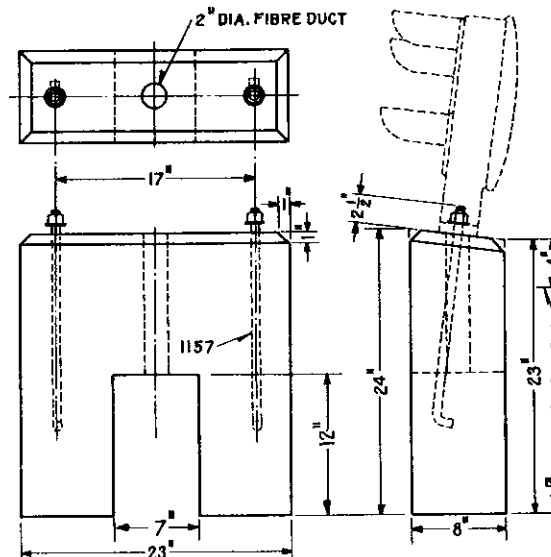
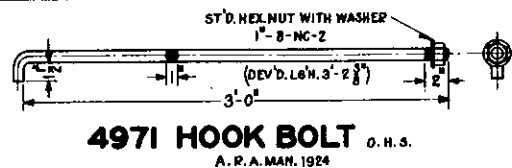
THE PENNSYLVANIA RAILROAD

STANDARD
FOUNDATIONS
PRE-CAST CONCRETE
FOR POSITION LIGHT SIGNALS

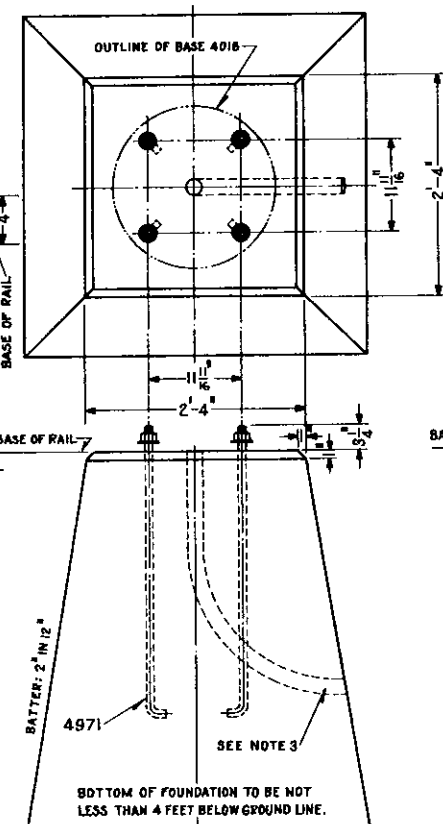
OFFICE OF CHIEF ENGINEER, PHILA., PA. JUNE 26, 1944.

Approved *N. L. Stanton* Assistant Chief Engineer-Signals

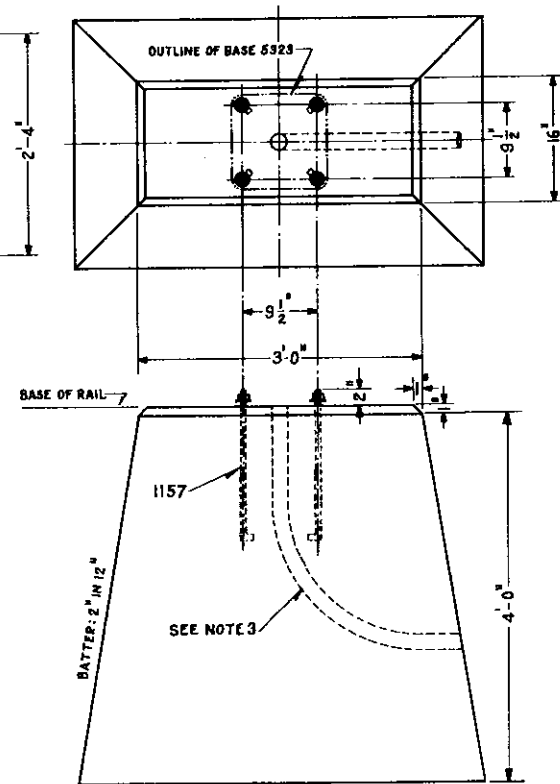
Approved *W. H. ...* Chief Engineer



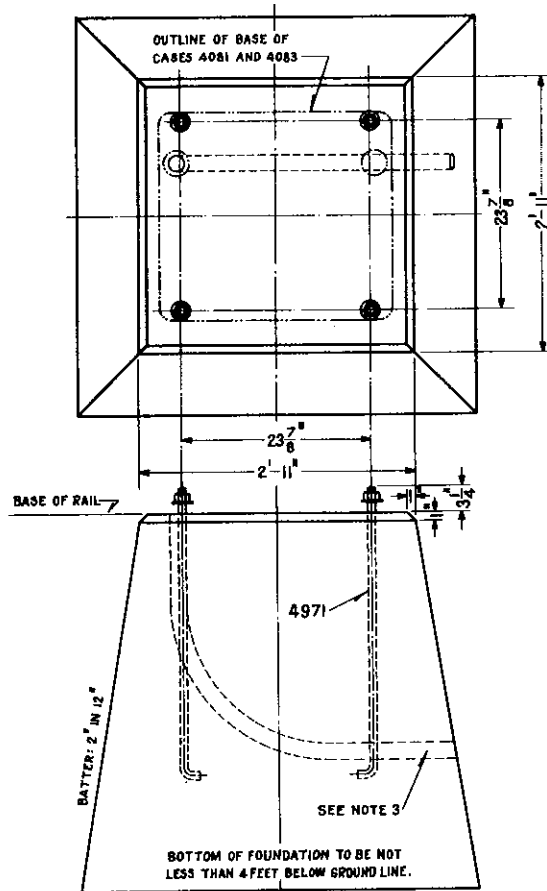
4973 FOUNDATION



4974 FOUNDATION



4975 FOUNDATION



4972 FOUNDATION

FOUNDATION	FOR USE WITH
4972	SIGNALS 4062, 4063 INSTRUMENT CASES 4081, 4083
4973	SIGNAL 4101
4974	SIGNALS 4001, 4061
4975	SIGNAL 4102

- NOTE:-
1. CENTER OF FOUNDATIONS 4972, 4974 AND 4975 SHALL BE 7 FEET 6 INCHES MIN. FROM GAUGE LINE OF RIGHT HAND RAIL OF TRACK GOVERNED.
 2. CENTER OF FOUNDATION 4973, WHEN BETWEEN TRACKS, SHALL BE LOCATED ON THE CENTER-LINE OF INTER-TRACK SPACE; WHEN OUTSIDE OF TRACK NOT LESS THAN 4 FEET 3 INCHES FROM GAUGE LINE OF RIGHT HAND RAIL OF TRACK GOVERNED.
 3. 2 INCH DIA. FIBRE DUCT WITH 18 INCH RAD. BEND. THE LOCATION OF DUCT MAY BE CHANGED TO SUIT LOCAL CONDITIONS.
 4. CONCRETE SHALL BE IN ACCORDANCE WITH A. R. A. SIGNAL SECTION SPECIFICATION NO. 1111.

REVISIONS
REDRAWN FROM APPROVED PLAN S-497-C, DATED JAN. 28, 1927 AND REVISED.
E JULY 20, 1934.
APPROVED <i>A.H. Pugh</i>

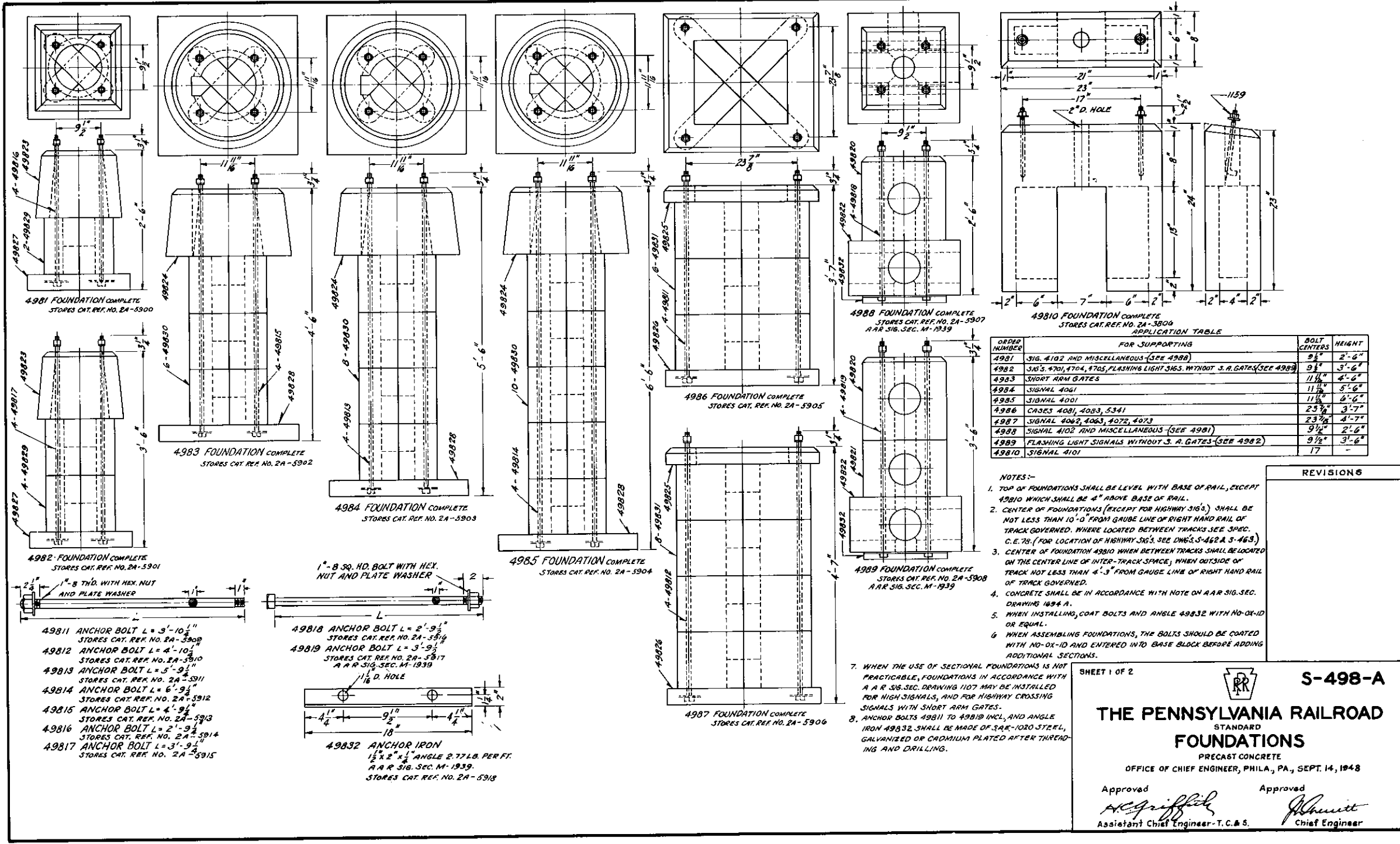
1 SHEET

S-497-E

THE PENNSYLVANIA RAILROAD
STANDARD
FOUNDATIONS
FOR POSITION LIGHT SIGNALS AND INSTRUMENT CASES
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., FEB. 15, 1934

Approved *A.H. Pugh* Chief Signal Engineer

Approved *[Signature]* Chief Engineer



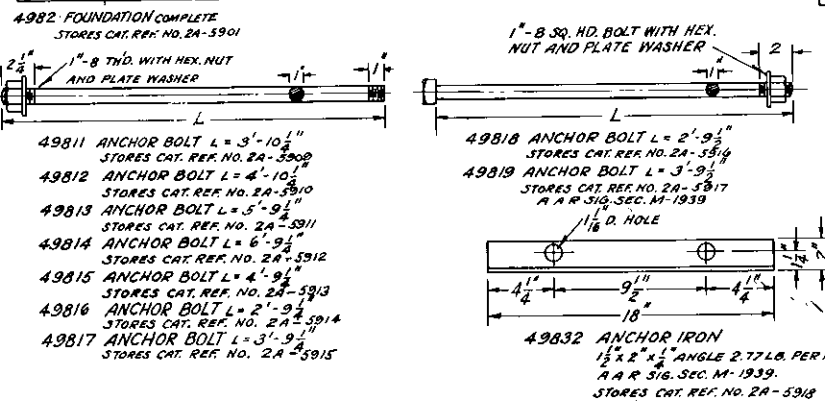
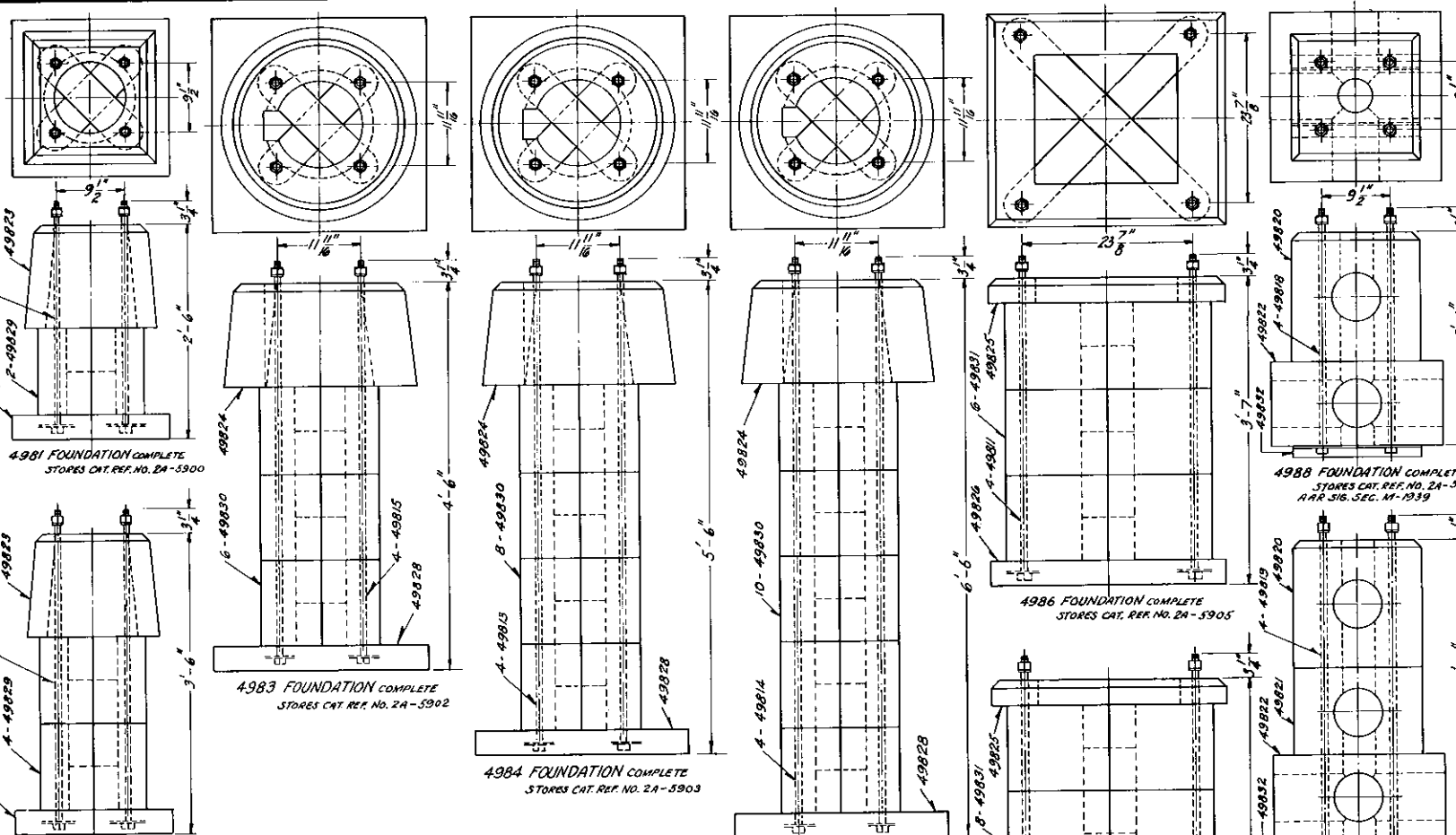
SHEET 1 OF 2

S-498-A

THE PENNSYLVANIA RAILROAD
STANDARD
FOUNDATIONS
PRECAST CONCRETE
OFFICE OF CHIEF ENGINEER, PHILA., PA., SEPT. 14, 1948

Approved *AC Griffith*
Assistant Chief Engineer-T.C. & S.

Approved *W. H. Smith*
Chief Engineer



ORDER NUMBER	FOR SUPPORTING	BOLT CENTERS	HEIGHT
4981	SIG. 4102 AND MISCELLANEOUS (SEE 4988)	9 1/2"	2'-6"
4982	SIG. 4701, 4704, 4705, FLASHING LIGHT SIGS. WITHOUT S.A. GATES (SEE 4989)	9 1/2"	3'-6"
4983	SHORT ARM GATES	11 1/2"	4'-6"
4984	SIGNAL 4061	11 1/2"	5'-6"
4985	SIGNAL 4001	11 1/2"	6'-6"
4986	CASES 4081, 4083, 5341	23 3/4"	3'-7"
4987	SIGNAL 4062, 4063, 4072, 4073	23 3/4"	4'-7"
4988	SIGNAL 4102 AND MISCELLANEOUS (SEE 4981)	9 1/2"	2'-6"
4989	FLASHING LIGHT SIGNALS WITHOUT S.A. GATES (SEE 4982)	9 1/2"	3'-6"
4990	SIGNAL 4101	17"	-

- NOTES:-
1. TOP OF FOUNDATIONS SHALL BE LEVEL WITH BASE OF RAIL, EXCEPT 49810 WHICH SHALL BE 4" ABOVE BASE OF RAIL.
 2. CENTER OF FOUNDATIONS (EXCEPT FOR HIGHWAY SIGS.) SHALL BE NOT LESS THAN 10'-0" FROM GAUGE LINE OF RIGHT HAND RAIL OF TRACK GOVERNED. WHERE LOCATED BETWEEN TRACKS SEE SPEC. C.E. 78. (FOR LOCATION OF HIGHWAY SIGS. SEE DWG. S-462A S-463.)
 3. CENTER OF FOUNDATION 49810 WHEN BETWEEN TRACKS SHALL BE LOCATED ON THE CENTER LINE OF INTER-TRACK SPACE; WHEN OUTSIDE OF TRACK NOT LESS THAN 4'-3" FROM GAUGE LINE OF RIGHT HAND RAIL OF TRACK GOVERNED.
 4. CONCRETE SHALL BE IN ACCORDANCE WITH NOTE ON A R R SIG. SEC. DRAWING 1694 A.
 5. WHEN INSTALLING, COAT BOLTS AND ANGLE 49832 WITH NO-OX-ID OR EQUAL.
 6. WHEN ASSEMBLING FOUNDATIONS, THE BOLTS SHOULD BE COATED WITH NO-OX-ID AND ENTERED INTO BASE BLOCK BEFORE ADDING ADDITIONAL SECTIONS.

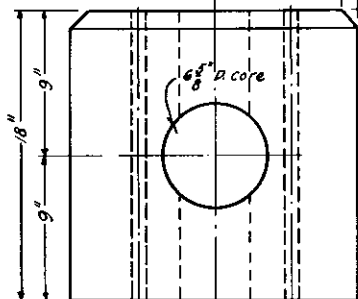
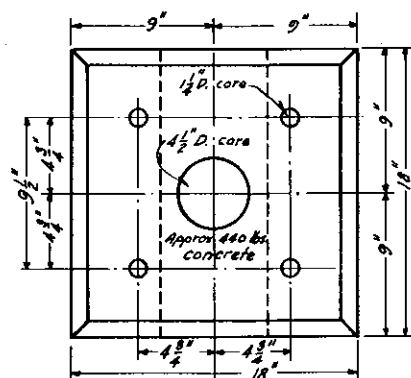
7. WHEN THE USE OF SECTIONAL FOUNDATIONS IS NOT PRACTICABLE, FOUNDATIONS IN ACCORDANCE WITH A R R SIG. SEC. DRAWING 1107 MAY BE INSTALLED FOR HIGH SIGNALS, AND FOR HIGHWAY CROSSING SIGNALS WITH SHORT ARM GATES.
8. ANCHOR BOLTS 49811 TO 49819 INCL. AND ANGLE IRON 49832 SHALL BE MADE OF SAE-1020 STEEL, GALVANIZED OR CADMIUM PLATED AFTER THREADING AND DRILLING.

SHEET 1 OF 2

S-498-A

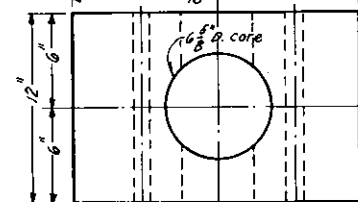
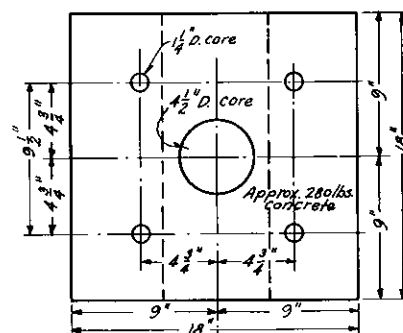
THE PENNSYLVANIA RAILROAD
STANDARD
FOUNDATIONS
PRECAST CONCRETE
OFFICE OF CHIEF ENGINEER, PHILA., PA., SEPT. 14, 1948

Approved *W.C. Griffith* Assistant Chief Engineer-T.C.&S.
Approved *J.H. Smith* Chief Engineer



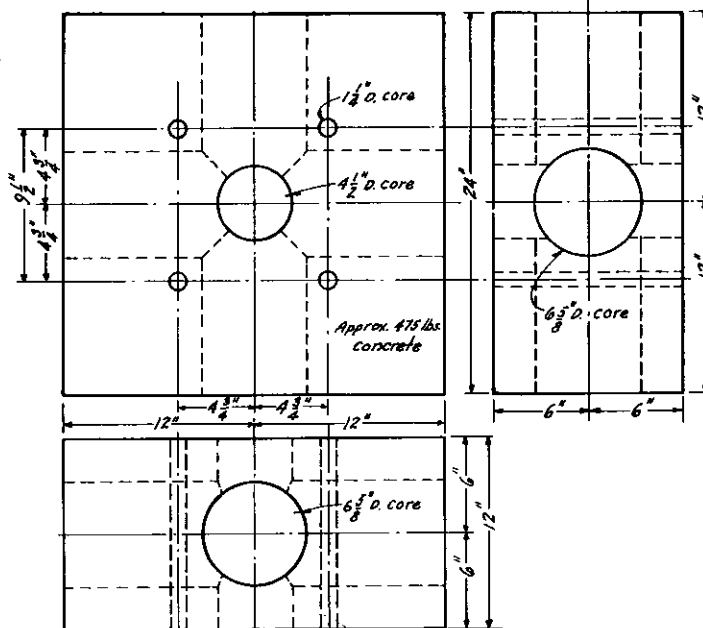
49820 TOP BLOCK

AAR SIG. SEC. M-1939
STORES CAT. REF. NO. 2A-5919



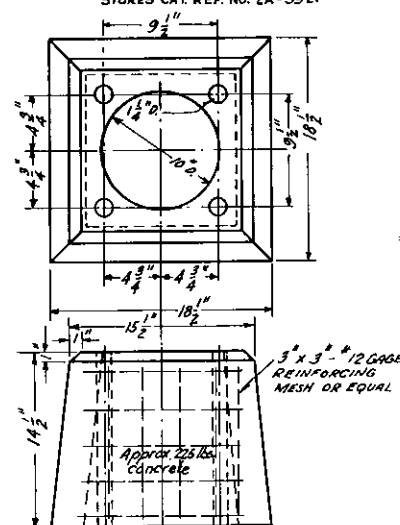
49821 INTERMEDIATE BLOCK

AAR SIG. SEC. M-1939
STORES CAT. REF. NO. 2A-5920



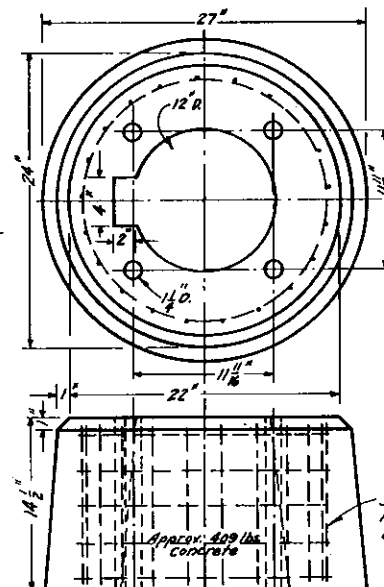
49822 BASE BLOCK

AAR SIG. SEC. M-1939
STORES CAT. REF. NO. 2A-5921



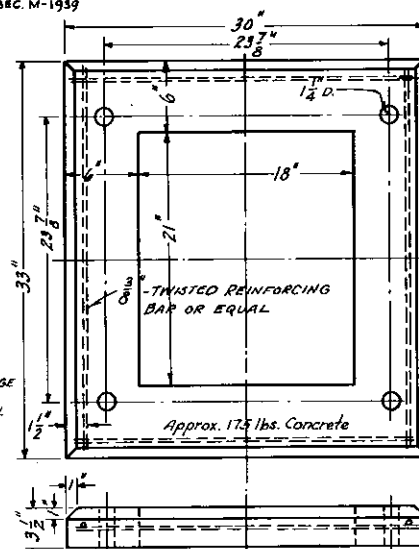
49823 TOP BLOCK

STORES CAT. REF. NO. 2A-5922



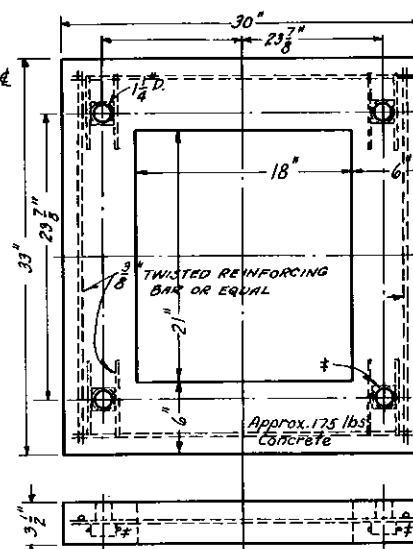
49824 TOP BLOCK

STORES CAT. REF. NO. 2A-5923



49825 TOP BLOCK

STORES CAT. REF. NO. 2A-5924



49826 BASE BLOCK

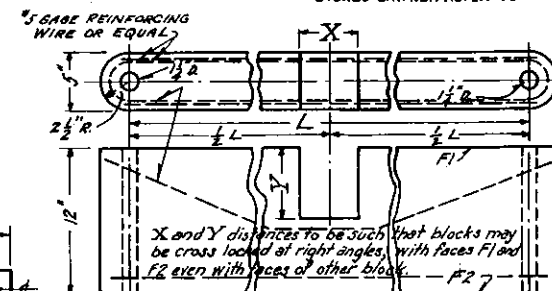
STORES CAT. REF. NO. 2A-5925

49827 BASE BLOCK

STORES CAT. REF. NO. 2A-5926

49828 BASE BLOCK

STORES CAT. REF. NO. 2A-5927



49829 FILLER BLOCK

STORES CAT. REF. NO. 2A-5928

49830 FILLER BLOCK

STORES CAT. REF. NO. 2A-5929

49831 FILLER BLOCK

STORES CAT. REF. NO. 2A-5930

NOTE: 1-
THREADED FOR 1" BOLT AND WELDED TO REINFORCING BAR.

SHEET 2 OF 2



S-498-A

THE PENNSYLVANIA RAILROAD

**STANDARD
FOUNDATIONS**

**PRECAST CONCRETE
DETAILS**

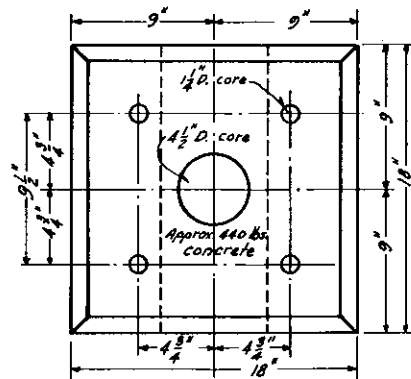
OFFICE OF CHIEF ENGINEER, PHILA., PA., SEPT. 14, 1948

Approved

W. G. Griffith
Assistant Chief Engineer-T.C.&S.

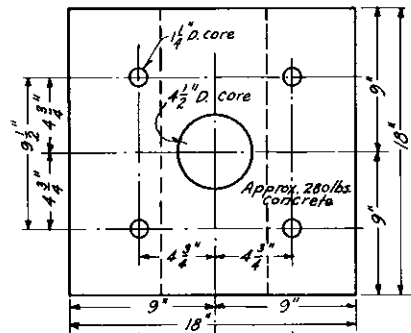
Approved

J. H. Smith
Chief Engineer



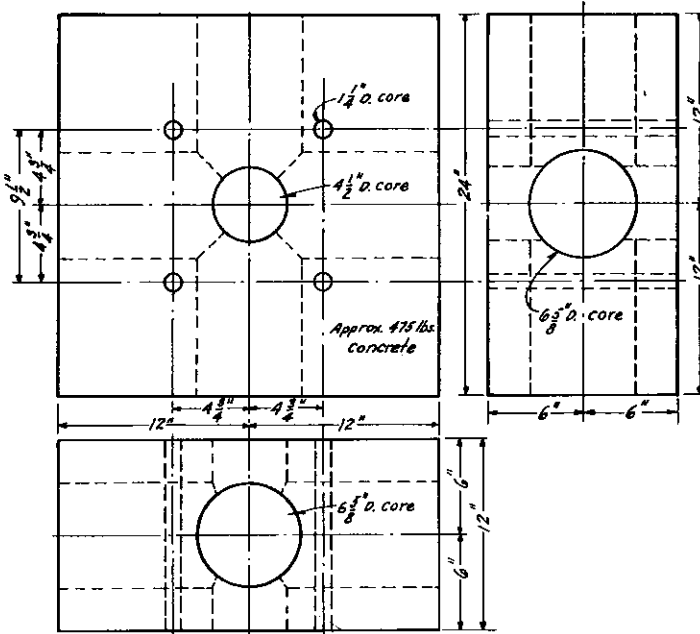
49820 TOP BLOCK

AAR SIG. SEC. M-1939
STORES CAT. REF. NO. 2A-5919



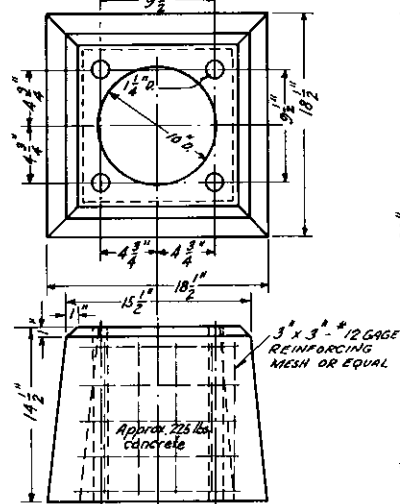
49821 INTERMEDIATE BLOCK

AAR SIG. SEC. M-1939
STORES CAT. REF. NO. 2A-5920



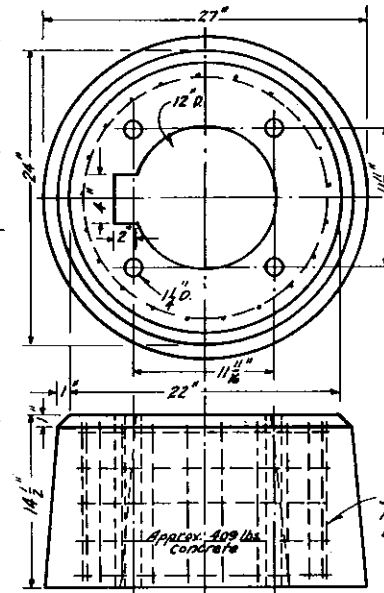
49822 BASE BLOCK

AAR SIG. SEC. M-1939
STORES CAT. REF. NO. 2A-5921



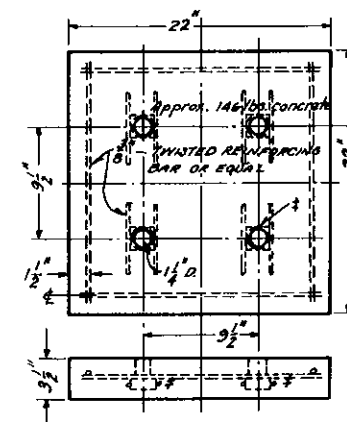
49823 TOP BLOCK

STORES CAT. REF. NO. 2A-5922



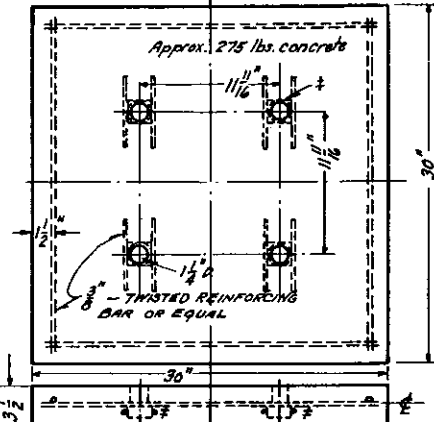
49824 TOP BLOCK

STORES CAT. REF. NO. 2A-5923



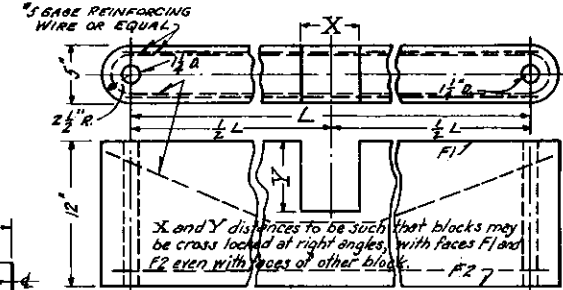
49827 BASE BLOCK

STORES CAT. REF. NO. 2A-5926



49828 BASE BLOCK

STORES CAT. REF. NO. 2A-5927



49829 FILLER BLOCK

L = 13.5" APPROX. 75 LBS. CONCRETE
STORES CAT. REF. NO. 2A-5928

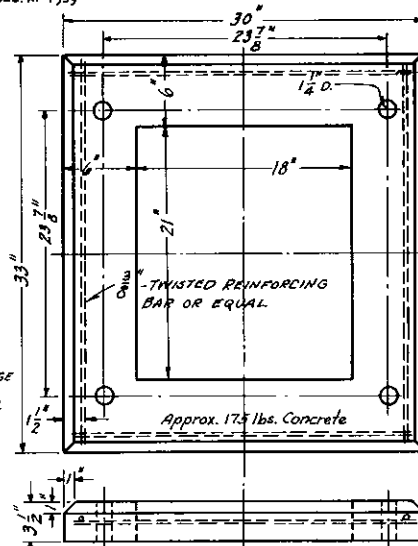
49830 FILLER BLOCK

L = 16.5" APPROX. 93 LBS. CONCRETE
STORES CAT. REF. NO. 2A-5929

49831 FILLER BLOCK

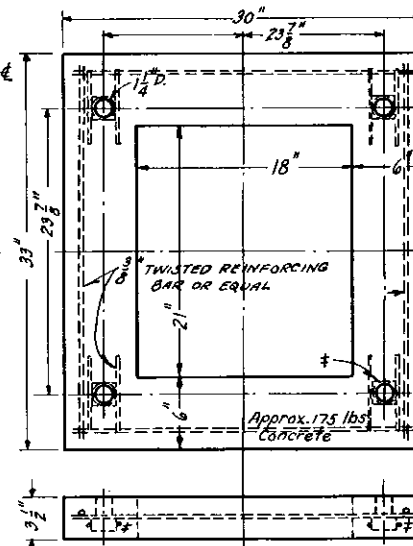
L = 33.5" APPROX. 174 LBS. CONCRETE
STORES CAT. REF. NO. 2A-5930

NOTE: * THREADED FOR 1" BOLT AND WELDED TO REINFORCING BAR.



49825 TOP BLOCK

STORES CAT. REF. NO. 2A-5924



49826 BASE BLOCK

STORES CAT. REF. NO. 2A-5925

SHEET 2 OF 2



S-498-A

THE PENNSYLVANIA RAILROAD
STANDARD
FOUNDATIONS

PRECAST CONCRETE

DETAILS

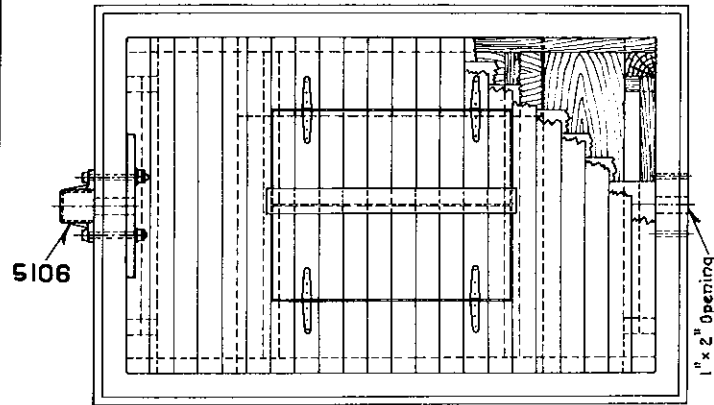
OFFICE OF CHIEF ENGINEER, PHILA., PA., SEPT. 14, 1948

Approved

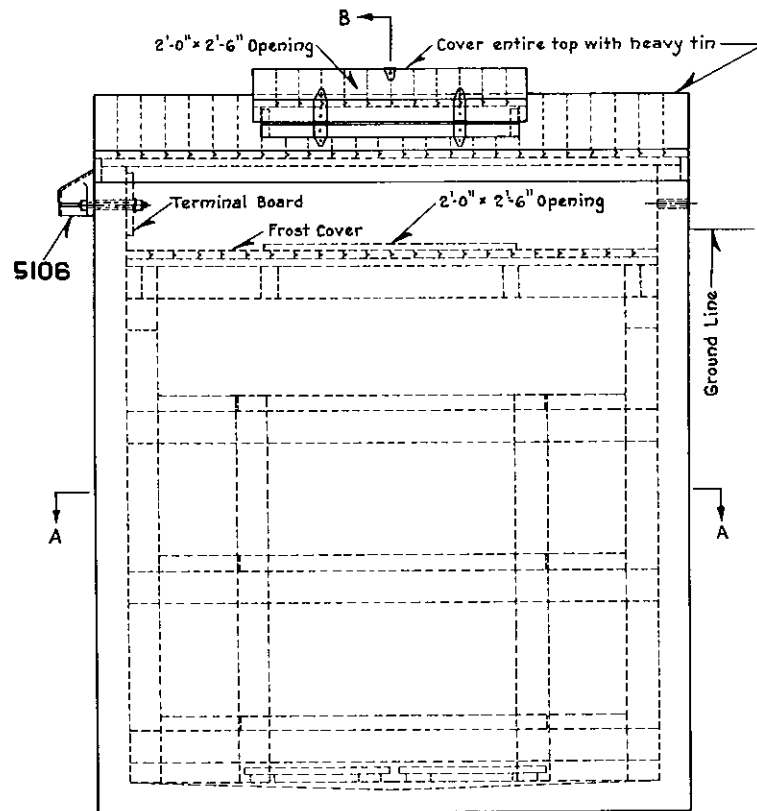
W. Griffith
Assistant Chief Engineer-T.C.&S.

Approved

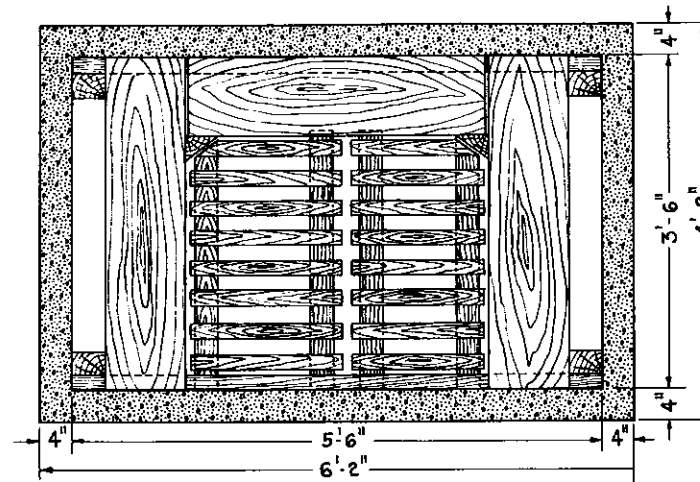
J. Schmitt
Chief Engineer



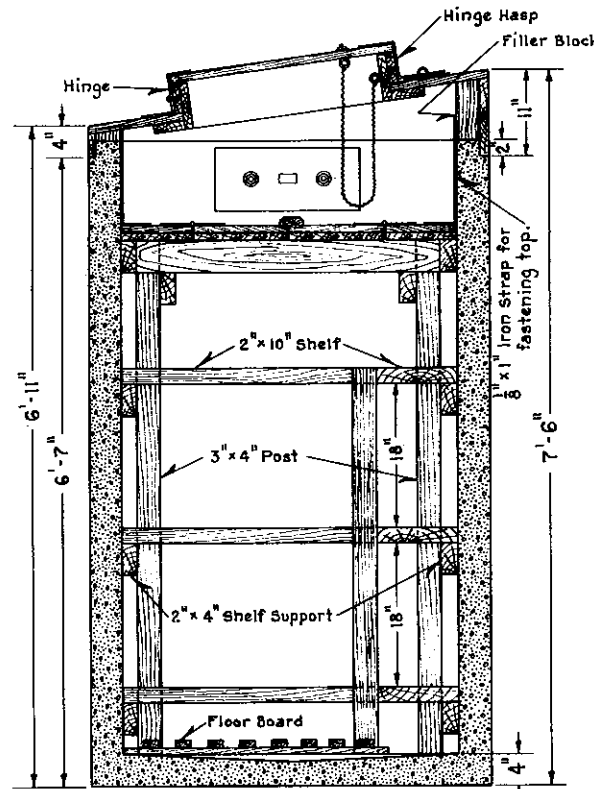
PLAN SHOWING FROST COVER



FRONT ELEVATION

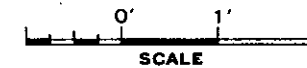


SECTION A-A



SECTION B-B

Note:
Well shall be constructed in place.
Well shall be placed so that door opens
away from Main Tracks.



REVISIONS

1 SHEET

S-508-A

PENNSYLVANIA SYSTEM

STANDARD
BATTERY WELL

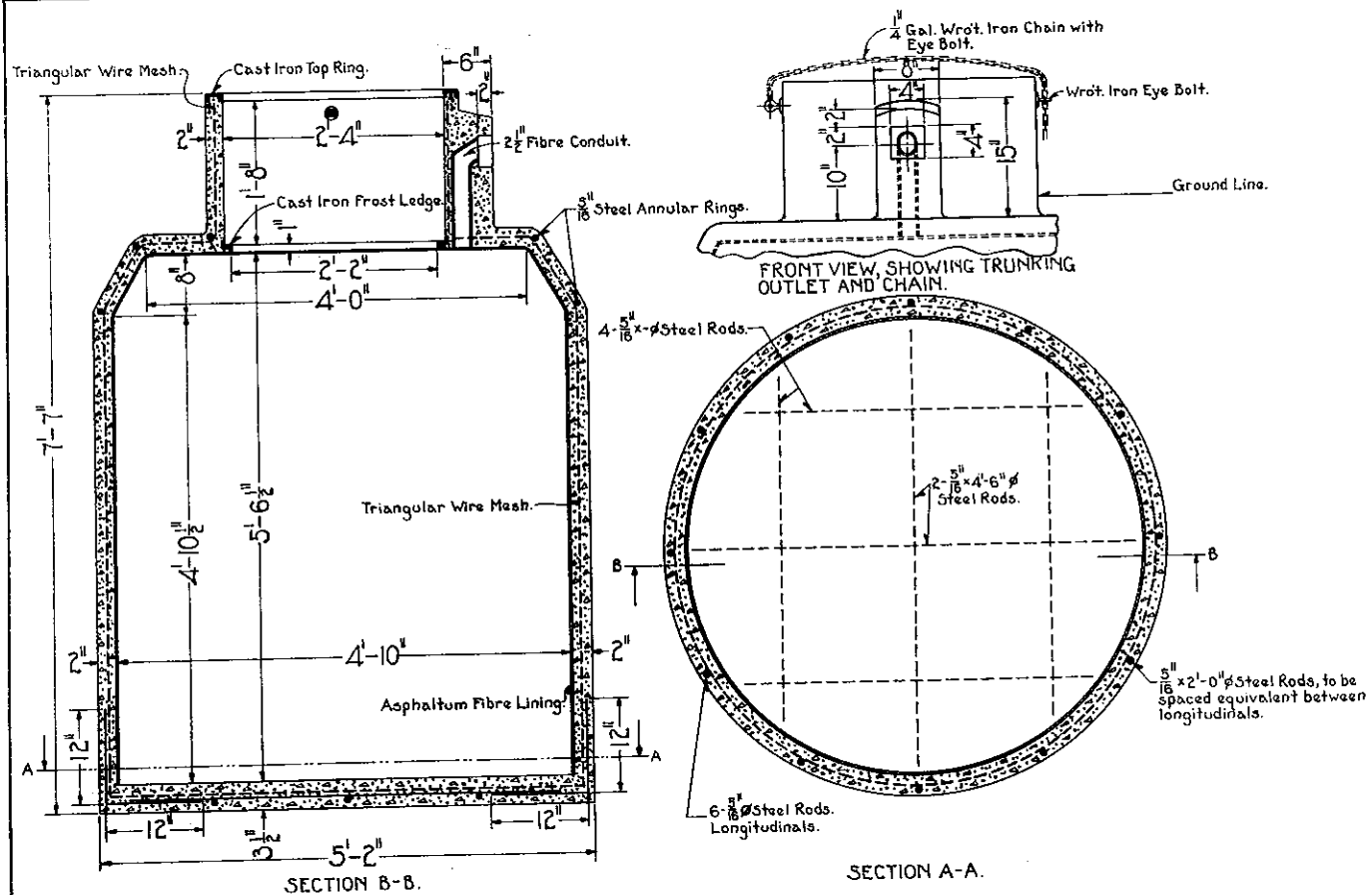
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., MARCH, 6, 1922

Correct

Arthur
Chief Signal Engineer

Approved

J. P. Murray
Chief Engineer



509I-WELL. Max. capacity { 48 Cells 500 A.H.
42 " 1000 "

Note:-
Battery Well 509I shall be provided with three complete circular shelves with 17" clearance between them, and slot flooring.

ASSEMBLAGE.	
No. Req.	NAME.
1	Well Body.
1	Pressed Steel Cover.
1	Eye Bolt with 1-Sq. nut and 2 washers.
1	Chain with Eye Bolt with 1-Sq. nut and 2 washers.
1	Frost Cover.
1	Ladder.
18	Shelf Segments.
18	" Blocks.
18	" Strips.
12	" Uprights.
1	Slot Floor.

REVISIONS
B- JUNE 12, 1934.
Approved: *A. H. Paul*

1 SHEET

S-509-B

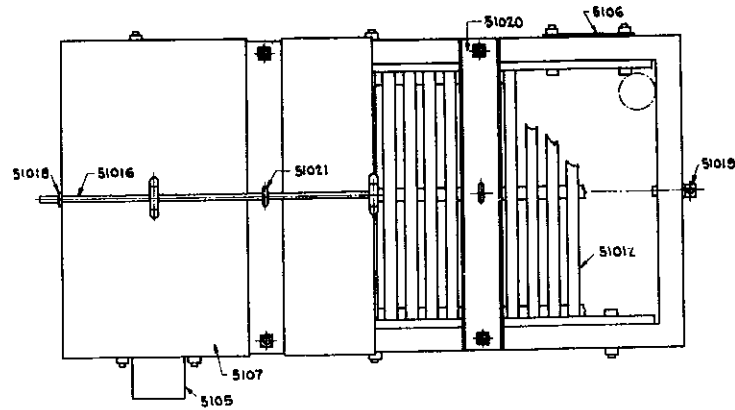
PENNSYLVANIA SYSTEM

STANDARD BATTERY WELL

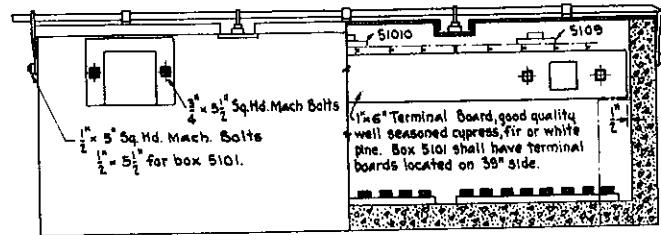
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., SEPT. 2, 1921.

Correct *A. H. Paul* Chief Signal Engineer.

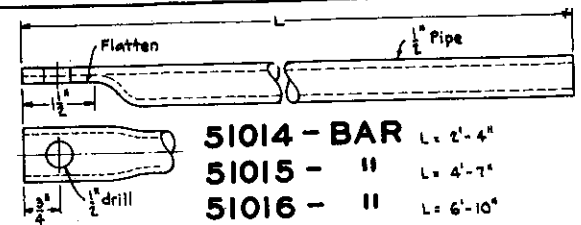
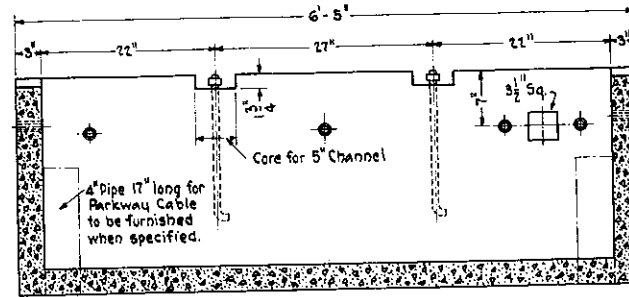
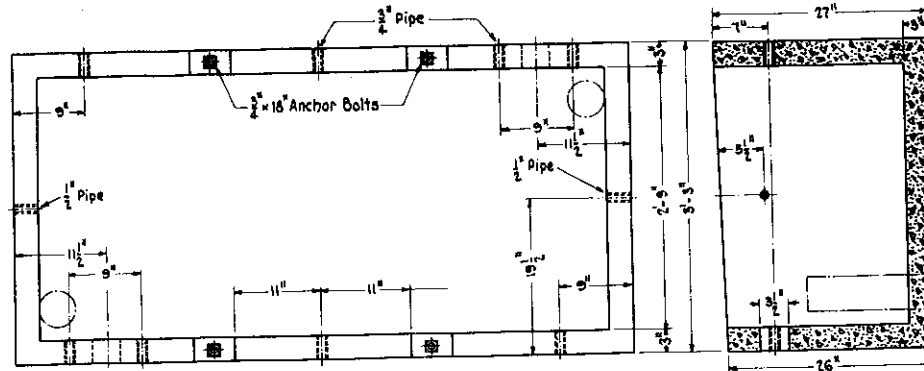
[Signature] Chief Engineer.



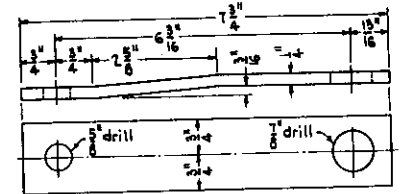
Quarter Section of Complete Battery Box



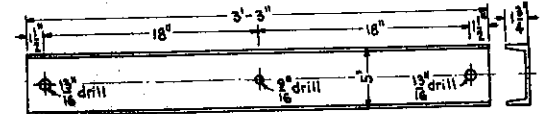
Half Section of Battery Box With Dimensions



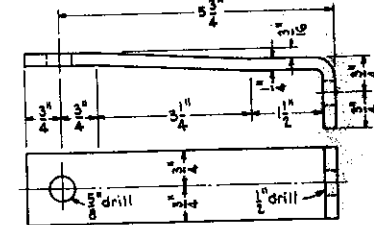
51014 - BAR L = 2'-4"
51015 - " L = 4'-7"
51016 - " L = 6'-10"
51017 - " L = 9'-11"



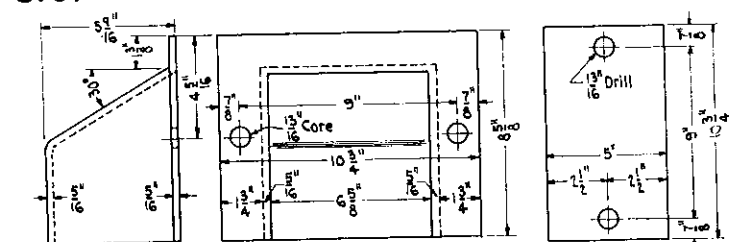
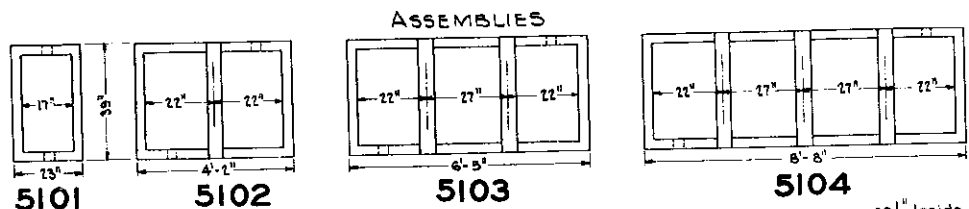
51018 - BRACKET O.H. Steel



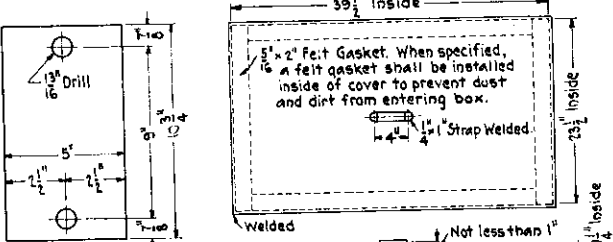
51020 - CHANNEL Carnegie Sec. No. C-8, 6.7 lbs. per ft.



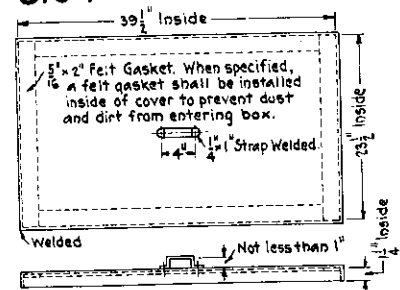
51019 - HASP O.H. Steel



5105 - OUTLET CAP Cast Iron

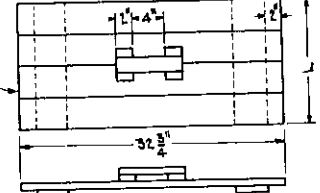


5106 - OUTLET COVER No. 12 U.S. Std. Sheet Steel



5107 - COVER No. 12 U.S. Std. Sheet Steel

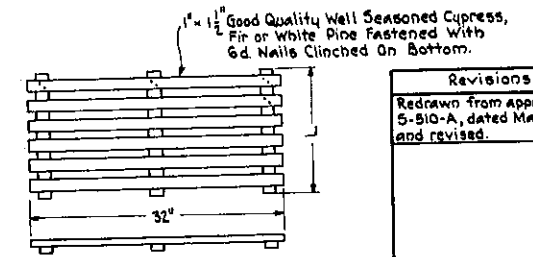
7" x 4" T & G Good Quality Well Seasoned Cypress, Fir or White Pine Fastened With 6d. Nails Clinched On Bottom.



5108 - FROST BOARD L = 16 3/4"

5109 - " " L = 21 7/8"

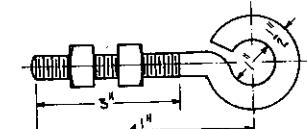
51010 - " " L = 22"



51011 - SLAT FLOOR L = 16'

51012 - " " L = 19 1/2"

51013 - " " L = 26"



51021 - EYE BOLT O.H. Steel

Notes:-
1. One piece of thirty five mesh copper screen, the size of the outlet cover, shall be provided for one outlet of each box housing lead type battery.
2. The entire surface and top edges of box and all surfaces of terminal boards, slat floor and frost boards shall be given two coats of asphaltum paint before installation.
3. Iron work shall be thoroughly cleaned and given a priming brush or dipping coat of red oxide or graphite paint and two coats of light gray paint.
4. Interior iron work in boxes shall be protected with acid proof compound.

5. Box shall be made of Portland cement concrete in accordance with Association of American Railroads Specification.
6. Coarse Aggregate shall consist of 3/4 inch maximum size stone or gravel.
7. Not less than 7 sacks of cement shall be used per cu. yd. of concrete.
8. Water cement ratio to produce a compressive strength of 3000 pounds per square inch after 28 days shall be used.

Revisions
Redrawn from approved plan S-510-A, dated Mar. 6, 1922, and revised.

A.A.R. Manual - Mar. 1936.

1 Sheet

S-510-B

THE PENNSYLVANIA RAILROAD STANDARD

BATTERY BOX

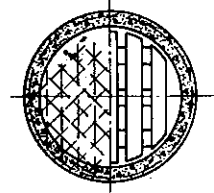
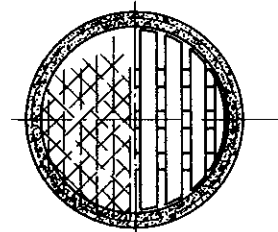
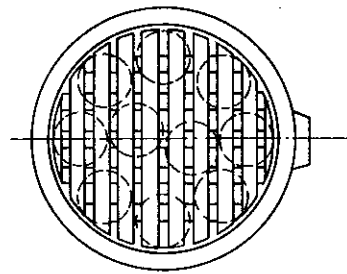
Office of Chief Signal Engineer, Phila., Pa., June 10, 1936.

Approved:

Approved:

Chief Signal Engineer

Acting Chief Engineer

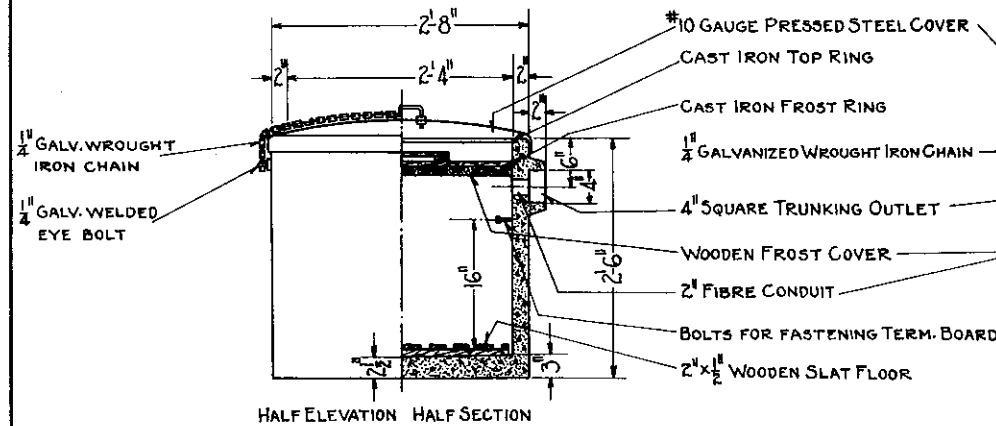


HALF SECTION
SHOWING REINF.
IN BOTTOM

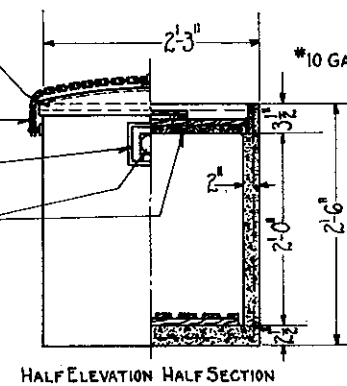
HALF SECTION
SHOWING SLATS
IN FLOOR

HALF SECTION
SHOWING REINF.
IN BOTTOM

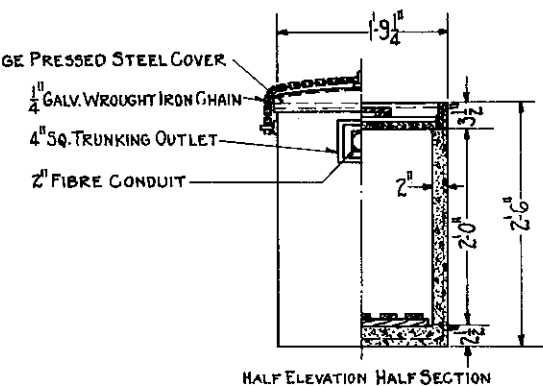
HALF SECTION
SHOWING SLATS
IN FLOOR



5111-BOX REINF. CONCRETE
CAP. 10 CELLS 500 A.H.
CAP. 7 CELLS 1000 A.H.



5112-BOX REINF. CONCRETE
CAP. 6 CELLS 500 A.H.
CAP. 4 CELLS 1000 A.H.

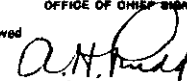


5113-BOX REINF. CONCRETE
CAP. 3 CELLS 500 A.H.
CAP. 2 CELLS 1000 A.H.

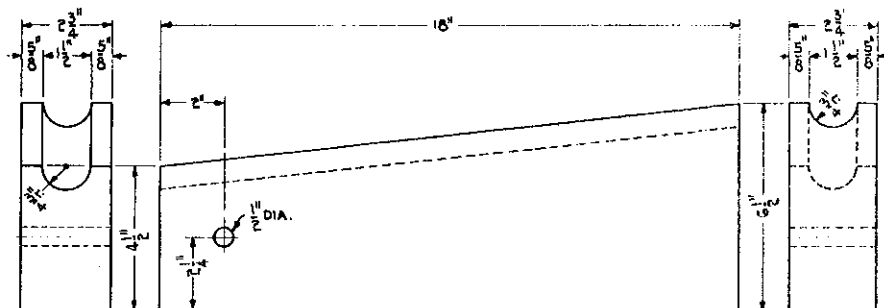
REVISIONS

1 SHEET S-511-A

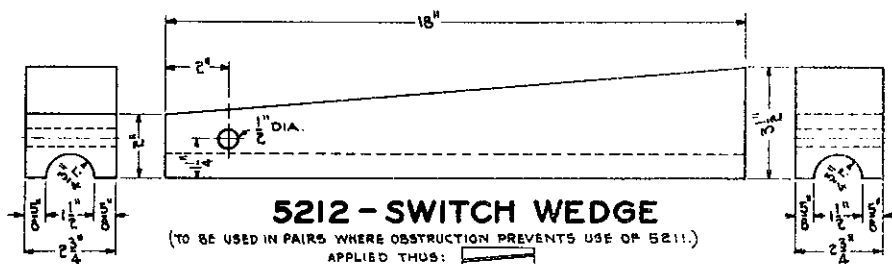

PENNSYLVANIA RAILROAD SYSTEM
STANDARD
BATTERY BOXES
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA. PA., JUNE 28, 1924.

Approved  Chief Signal Engineer

Approved  Chief Engineer



5211 - SWITCH WEDGE



5212 - SWITCH WEDGE

(TO BE USED IN PAIRS WHERE OBSTRUCTION PREVENTS USE OF 5211.)

APPLIED THUS: [diagram showing two wedges applied to a rail]

— SPECIFICATION —

MATERIAL: SWEET BIRCH, DOGWOOD, HORNBEEAN, LOCUST, HARD MAPLE, OAK (EXCEPT SO-CALLED SWAMP OR WATER OAKS).
 PHYSICAL REQUIREMENTS: SWITCH WEDGES SHALL BE FREE FROM DECAY, HOLES, KNOTS, SHAKES, SPLIT, WANE, GRAIN WITH SLANT GREATER THAN ONE IN TWENTY AND MOISTURE IN EXCESS OF 20%.
 DESIGN: SWITCH WEDGES SHALL CONFORM TO THE SHAPES AND SIZES SPECIFIED. ALL DIMENSIONS SHOWN ARE MINIMA.
 MANUFACTURE: SWITCH WEDGES SHALL BE STRAIGHT, CUT SQUARE AT THE ENDS, HAVE SMOOTH GROOVE, AND BE SURFACED ON ALL PLANES.

— FIELD NOTES —

WHERE SWITCH POINT OPENING IS SUCH THAT WEDGE 5211 CANNOT BE DRIVEN BETWEEN STOCK RAIL AND SWITCH POINT A SUFFICIENT DISTANCE TO INSURE A SAFE WEDGE, THAT SURFACE OF WEDGE WHICH IS PLACED AGAINST STOCK RAIL MAY BE CUT BACK TO OBTAIN THE DESIRED RESULTS.
 WHERE UNUSUAL OBSTRUCTIONS, SUCH AS BOLT HEADS, ETC., PREVENT THE APPLICATION OF WEDGE 5212 AS INTENDED, THE LENGTH MAY BE REDUCED TO NOT LESS THAN NINE INCHES, BY SAWING OFF THE ENDS, TO MEET LOCAL CONDITIONS.
 PRECAUTIONS MUST BE TAKEN TO INSURE WEDGES ALTERED TO MEET AN UNUSUAL CONDITION, SUCH AS OUTLINED ABOVE, ARE NOT USED WHERE STANDARD WEDGES 5211 OR 5212 CAN BE APPLIED.

REVISIONS

1 SHEET

S-521-A



THE PENNSYLVANIA RAILROAD
 STANDARD
 SWITCH WEDGES

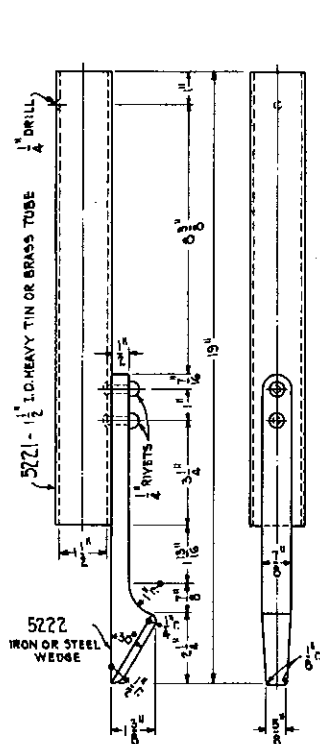
Office of Chief Signal Engineer, Phila., Pa., July 10, 1935

Approved:

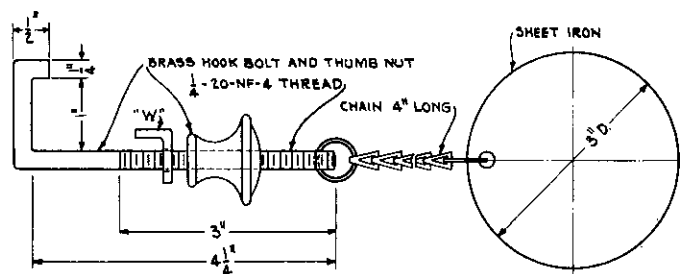
Approved:

A. S. Knapp
 Chief Signal Engineer

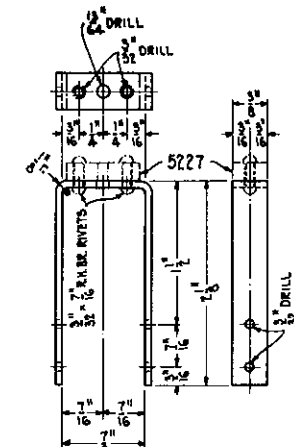
W. S. Shugart
 Actg. Chief Engineer



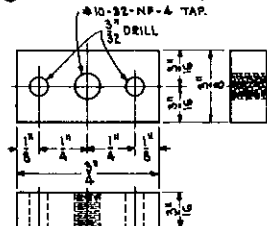
5221-TUBE ONLY.
5222-WEDGE ONLY.
5223-BLOCK COMPLETE.
 FOR MECHANICAL MACHINE.



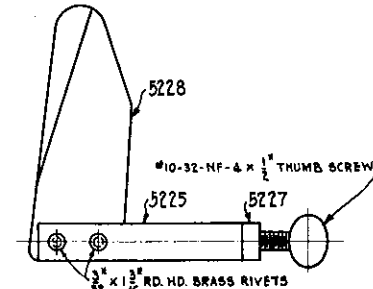
5224-BLOCK
 FOR G.R.S. MODEL 2 UNIT LEVER TYPE ELECTRIC MACH.



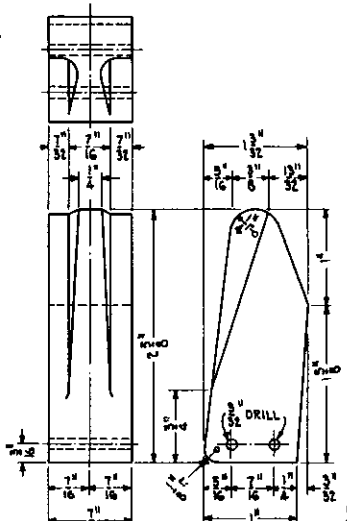
5225-'U' STRAP ONLY (NO. 14 AWG. BRASS).
5226 ASSEMBLED WITH 5227.



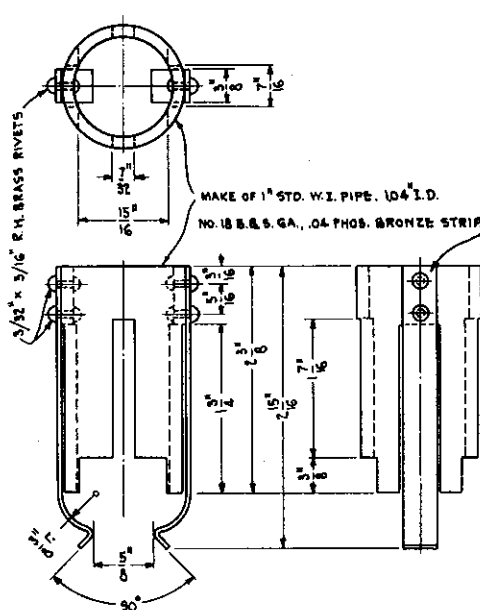
5227-BLOCK (BRASS)



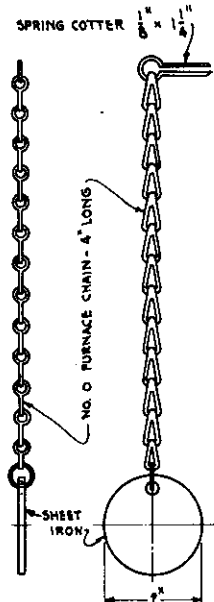
5228-BLOCK COMPLETE
 FOR U.S. & S. CO. TYPE S-B AND P-3 MACHINES



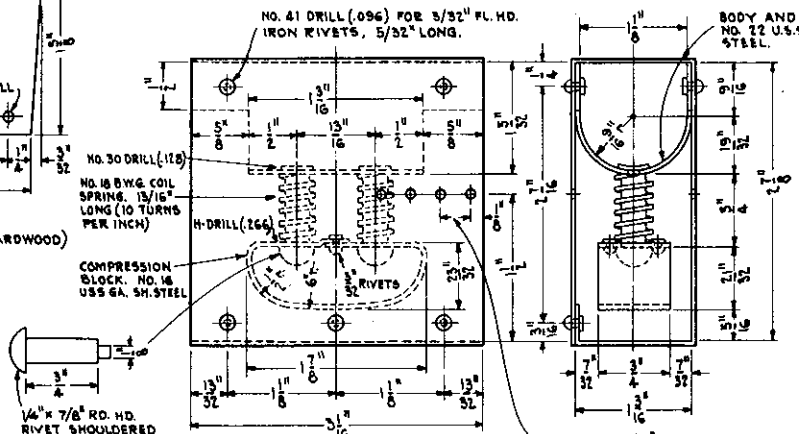
5228-BLOCK (HARDWOOD)



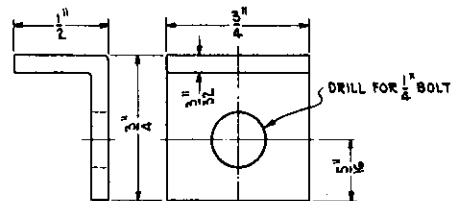
52210-BLOCK
 FOR U.S. & S. CO. POWER MACHINES.



52211-BLOCK
 FOR ELECTRICALLY LOCKED SEMAPHORE INDICATOR AND CIRCUIT CONTROLLER.



52212-BLOCK
 FOR G.R.S. MODEL 2 ELECTRIC MACHINE.



DETAIL OF WASHER 'W'

REVISIONS
REDRAWN FROM APPD. PLAN S-522-F DATED 9-22-12, LAST REVISED 7-14-34, AND REVISED.

ALL EXPOSED PORTIONS, EXCEPT THREADED PARTS, ENAMELED VERMILION.

1 SHEET

S-522-F

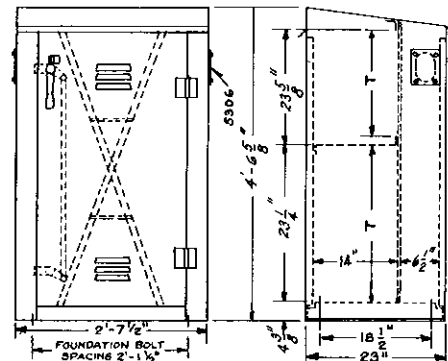
THE PENNSYLVANIA RAILROAD
 STANDARD
 BLOCKING DEVICES
 FOR INTERLOCKING MACHINE LEVERS

Office of Chief Signal Engr., Phila., Pa., January 10, 1935

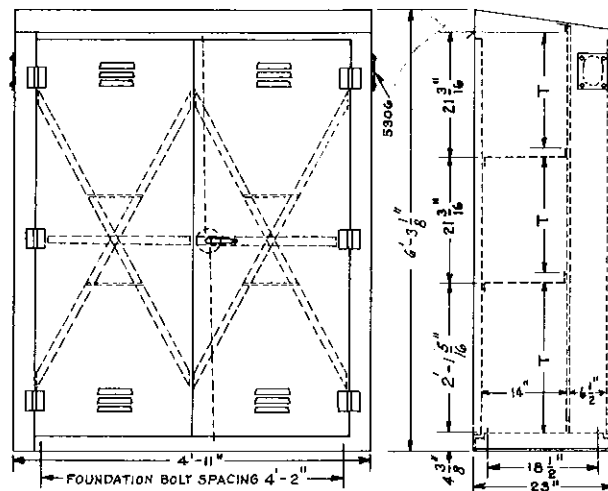
Approved *A.H. Reed*
 Chief Signal Engineer

Approved *Thurman*
 Chief Engineer

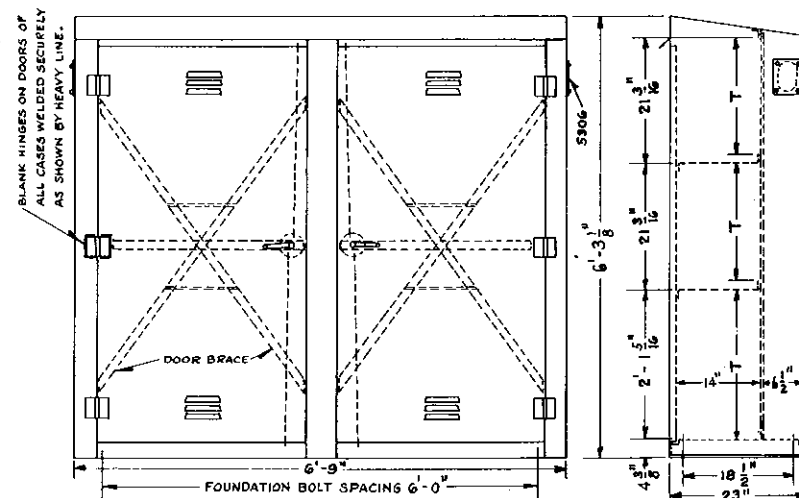
J. H. Russell
Chief Engineer



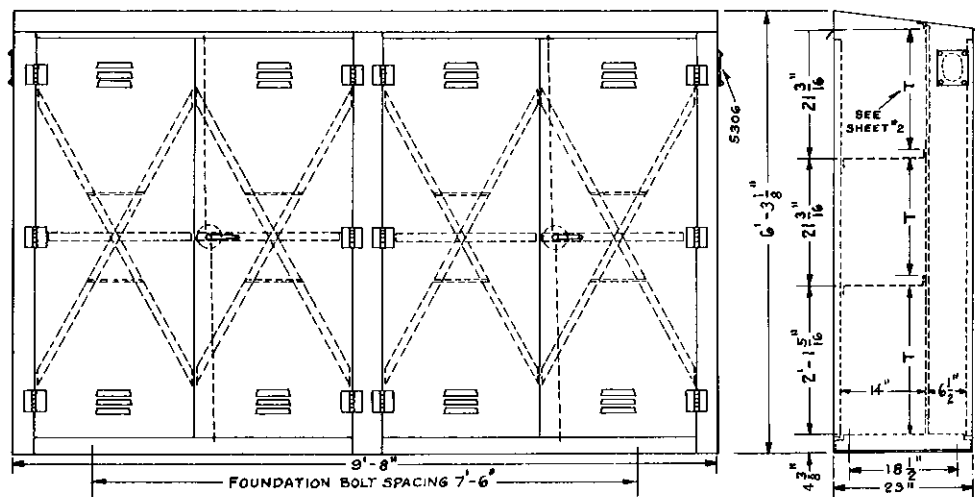
5301 CASE. STORES CAT. REF. NO. 2A-4177.



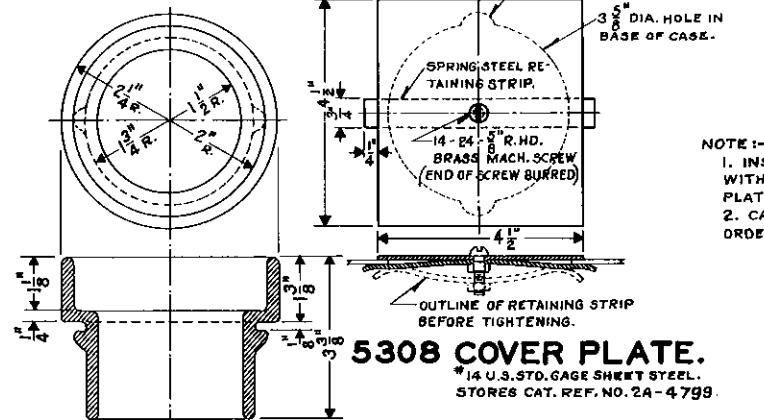
5302 CASE. STORES CAT. REF. NO. 2A-531.



5303 CASE. STORES CAT. REF. NO. 2A-4702.

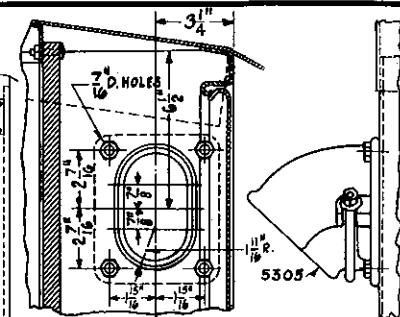


5304 CASE. STORES CAT. REF. NO. 2A-530.

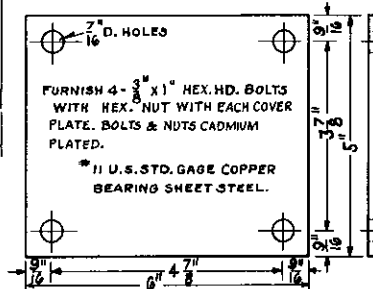


5307 CABLE OUTLET.

CAST IRON.
STORES CAT. REF. NO. 2A-4798.

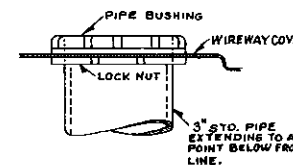


5305 CABLE OUTLET.
STORES CAT. REF. NO. 2A-1389



5306 COVER PLATE.
STORES CAT. REF. NO. 2A-4797.

- NOTE 1:-**
- INSTRUMENT CASES WILL BE FURNISHED WITH CABLE OPENINGS EQUIPPED WITH COVER PLATES AS SHOWN.
 - CABLE OUTLETS 5305 AND 5307 SHALL BE ORDERED SEPARATELY. (NOT WITH CASE)



THIS METHOD MAY BE USED WHERE THERE IS NO PROBABILITY OF GROUND SINKING AND PULLING DOWNWARD ON PIPE.

FOR SPECIFICATIONS AND OTHER DETAILS SEE SHEET NO. 2.

SHEET 1 OF 2



S-530-H

THE PENNSYLVANIA RAILROAD
STANDARD
INSTRUMENT CASES

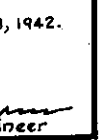
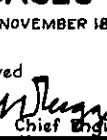
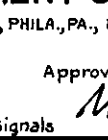
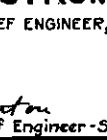
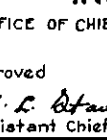
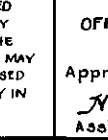
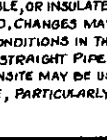
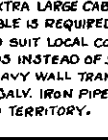
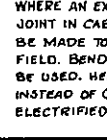
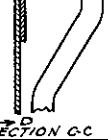
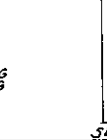
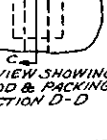
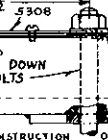
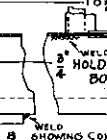
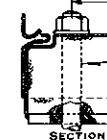
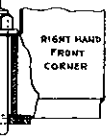
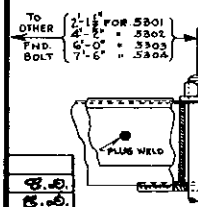
OFFICE OF CHIEF ENGINEER, PHILA., PA., NOVEMBER 18, 1942.

Approved

H. C. Stanton
Assistant Chief Engineer-Signals

Approved

M. J. McGinnis
Chief Engineer



SPECIFICATIONS

1. GENERAL:

(a) INSTRUMENT CASES UNDER THESE SPECIFICATIONS SHALL BE MADE IN FOUR SIZES. THE OVERALL LENGTH, WIDTH AND HEIGHT AND THE FOUNDATION BOLT HOLE SPACING SHALL BE AS SHOWN ON DRAWING S-530 SHEET NO. 1 BASIC NUMBER.

(b) INSIDE OF EACH CASE SHALL BE ARRANGED AS SHOWN ON DRAWING S-530 SHEET NO. 1 BASIC NUMBER SO THAT WITH THE ROOF FORMED IN ACCORDANCE WITH SECTION 4 OF THESE SPECIFICATIONS, TERMINAL WALL SHALL HAVE A CLEAR SPACE "T", FREE OF METAL BETWEEN SHELVES, AND EXTENDING THE ENTIRE LENGTH OF THE CASE.

(c) A CLEAR SPACE APPROXIMATELY 6 1/2 INCHES WIDE EXTENDING THE FULL LENGTH OF CASE SHALL BE PROVIDED BETWEEN THE TERMINAL WALL AND REAR PANELS.

(d) EACH CASE SHALL BE PROVIDED WITH SHELVES AS SHOWN ON DRAWING S-530 SHEET NO. 1 BASIC NUMBER, THE FULL INSIDE LENGTH OF CASE AND EXTENDING BACK TO THE TERMINAL WALL.

(e) ALL SHEET METAL PARTS SHALL BE MADE OF COPPER BEARING STEEL, PATENT LEVELED. ROOF AND WEATHER EXPOSED WALLS SHALL BE MADE OF #14 U.S. STD. GAGE. SHELVES, TERMINAL WALL SUPPORTS ETC. SHALL BE MADE OF #16 U.S. STD. GAGE. MATERIAL FOR BASE SHALL BE AS SPECIFIED UNDER SECTION 2 OF THIS SPECIFICATION.

(f) THE DESIGN AND CONSTRUCTION OF CASE WHICH MANUFACTURER PROPOSES TO FURNISH SHALL MEET THE APPROVAL OF THE ASSISTANT CHIEF ENGINEER-T. C. & S.

2. BASE:

(a) THE BASE SHALL BE FORMED TO SPECIAL CHANNEL CROSS SECTION BY BENDING AS INDICATED BY SECTION B SHOWN ON SHEET 1 OF THIS PLAN.

(b) THE REQUIRED END PLATES AND CROSS RIBS ARE TO BE ASSEMBLED WITH THE LONGEST RECTANGULAR SECTION IN A VERTICAL POSITION WITH RESPECT TO THE FOUNDATION AND SUITABLY WELDED IN PLACE TO PROVIDE THE NECESSARY STRENGTH AND RIGIDITY.

(c) EACH BASE SHALL BE PROVIDED WITH CABLE ENTRANCE OPENINGS COVERED WITH PLATE 5308, THE NUMBER OF OPENINGS FOR EACH CASE SHALL BE AS SHOWN ON PLAN S-530 SHEET NO. 2 BASIC NUMBER.

3. UPRIGHTS AND WALLS:

(a) THE END WALLS SHALL EACH BE OF ONE PIECE, OF CHANNEL-SECTION, OF A SIZE SUFFICIENT TO FORM END OF CASE AND SIDE OF FRAME FOR DOORS AND BACK PANELS. THEY SHALL BE MOUNTED AGAINST OUTSIDE OF BASE SUBSTANTIALLY ATTACHED BY WELDING.

(b) UPRIGHT SUPPORTS OF FORMED CHANNEL-SECTION ARE TO BE ASSEMBLED IN FRONT AND REAR OF CASES 5303 AND 5304 AT CENTER TO FORM A PART OF DOOR AND PANEL FRAMES, AND TO PROVIDE THE NECESSARY RIGIDITY OF CASE. UPRIGHT SUPPORTS SHALL BE SECURELY WELDED TO ROOF AND BASE.

(c) EACH END WALL SHALL BE PROVIDED WITH A CABLE OPENING APPROX. 13 SQ. INCHES AREA. A COVER PLATE 5306 SHALL BE ASSEMBLED WITH SUITABLE SEALING COMPOUND BETWEEN THE PLATE AND WALL, AND HELD IN PLACE BY FOUR 3/8" x 1" HEX. HEAD CAP. PLATED TAP BOLTS ASSEMBLED WITH THE NUT INSIDE THE CASE.

4. ROOF:

(a) ROOF, WATERSHED OVER DOORS, AND REAR PANELS SHALL BE FORMED FROM ONE PIECE OF SHEET METAL WITH A ROOF SLOPE DOWNWARD TO THE REAR, OF 1 1/2 INCHES TO THE FOOT.

(b) ENDS AND FRONT SHALL BE STRUCK DOWN VERTICALLY AND SECURELY WELDED TO WALL WITH FILLET WELDS 1/2" LONG, ON 10 1/2" CENTERS.

(c) BACK OF ROOF SHALL BE STRUCK DOWN AT AN ANGLE, AS INDICATED ON DRAWING S-530 SHEET NO. 1 BASIC NUMBER TO A POINT 1 1/2 INCHES FROM CASE TO PRODUCE A SUBSTANTIAL WATERSHED.

(d) FRONT OF ROOF SHALL BE FORMED DIRECTLY OVER DOORS WITH A SLOPE OF 45 DEGREES AS SHOWN AND EXTEND TO A POINT NOT LESS THAN 1 INCH FROM CASE, TO PRODUCE A SUBSTANTIAL WATERSHED.

(e) CORNERS OF ROOF SHALL BE WELDED TO PRODUCE A WATERPROOF SEAM.

5. DOOR AND PANEL FRAMES:

(a) SUITABLY FORMED HORIZONTAL ANGULAR SHAPES, FORMING DOOR AND PANEL FRAME, SHALL BE SECURELY WELDED TO BASE, ROOF AND UPRIGHTS, FRONT AND BACK.

(b) ALL JOINTS AT THE JUNCTION OF SHAPES, FORMING DOOR AND PANEL FRAMES SHALL BE SEAM-WELDED TO PRODUCE A ONE-PIECE WATERPROOF JOINT.

6. DOORS:

(a) EACH DOOR SHALL BE FORMED TO A CHANNEL SECTION FROM ONE PIECE WITH CORNERS WELDED. SATISFACTORY RIGIDITY OF THE DOOR SHALL BE PROVIDED WITH A SUITABLE DESIGN OF X-BRACE WELDED TO THE CHANNEL-FORMED SECTION.

(b) EACH DOOR SHALL BE PROVIDED WITH 2 THREE-LOUVER VENTILATORS AND SLIDING REMOVABLE BRASS SCREENS (0.0135 INCH WIRE, 24 WIRES PER INCH) AS INDICATED ON DRAWING S-530 SHEET NO. 1 BASIC NUMBER. LOUVRES SHALL BE PUNCHED 1 INCH HIGH AND 6 INCHES WIDE ON APPROXIMATELY 1 1/2 INCH CENTERS.

(c) EACH DOOR SHALL BE SUPPORTED BY SUITABLE HEAVY BLANK HINGES, SECURELY WELDED TO DOOR AND FRAME AS SHOWN ON DRAWING S-530 SHEET NO. 1 BASIC NUMBER.

(d) EACH PAIR OF DOORS FOR CASES 5302 AND 5304 AND EACH DOOR FOR CASE 5303 SHALL BE PROVIDED WITH A SUBSTANTIAL THREE POINT LOCKING DEVICE, LOCKING AT TOP, BOTTOM AND CENTER OF DOOR. DOOR FOR CASE 5301 SHALL BE PROVIDED WITH A SUBSTANTIAL TWO POINT LOCKING DEVICE.

(e) EACH DOOR SHALL BE EQUIPPED WITH A DEVICE FOR SECURING IT IN THE OPEN POSITION. DEVICE SHALL BE APPROVED BY THE ASST. CHIEF ENGR. T. C. & S.

(f) HANDLE, OPERATING LOCKING DEVICE, SHALL BE SO MADE AND ASSOCIATED WITH AN ANGLE PLATE OR EQUIVALENT, WELDED TO THE DOOR, THAT A PADLOCK HAVING A 3/4 INCH GAIL MAY BE APPLIED.

(h) EACH DOOR SHALL BE SO CONSTRUCTED THAT WHEN IT IS CLOSED AGAINST A SUITABLE FABRICATED PACKING SECURELY MOUNTED TO DOOR FRAME, IT SHALL BE PRACTICALLY WATERPROOF.

7. PANELS:

(a) BACK OF CASE SHALL BE PROVIDED WITH REMOVABLE PANELS, EACH FORMED TO CHANNEL-SECTION FROM ONE PIECE WITH CORNERS WELDED. EACH CASE SHALL HAVE THE SAME NUMBER OF PANELS AS DOORS.

(b) EACH REAR PANEL SHALL BE POSITIONED VERTICALLY BY ONE SUPPORT WELDED TO THE LOWER INSIDE OF THE PANEL AT THE CENTER TO LOCATE THE PANEL VERTICALLY FOR ALIGNMENT OF ATTACHMENT SCREWS. EACH PANEL SHALL BE SECURED TO THE CASE WITH FOUR 3/8" CAP SCREWS, ONE LOCATED ON EACH SIDE APPROX. 10" FROM THE TOP, AND ONE ON EACH SIDE APPROX. 10" FROM THE BOTTOM OF THE PANEL. CAP SCREWS ARE TO HAVE NUTS ASSEMBLED INSIDE THE PANEL, SECURED AGAINST LOOSENING SO THE CAP SCREWS WILL BE RETAINED AS A PART OF THE PANEL ASSEMBLY.

8. SHELVES:

(a) SHELVES 14" WIDE ± 1/4" SHALL BE FORMED TO HAVE 1 1/2" TURN-DOWN IN FRONT AND 1 1/2" TURN-UP IN BACK, AND ARE TO BE SECURELY WELDED TO END WALLS AND UPRIGHTS.

(b) BACK TURN-UP SHALL BE PROVIDED WITH SUITABLE HOLES FOR 1/2" STOVE BOLTS PROPERLY SPACED FOR SUPPORTING THE TERMINAL WALL, AS SHOWN IN SKETCH "A" ON THIS PLAN.

(c) ALL SHELVES, EXCEPT BOTTOM OF CASE, SHALL BE PROVIDED WITH VENTILATION OPENINGS AS SHOWN ON THIS PLAN.

9. TERMINAL WALL:

(a) TERMINAL WALL SHALL CONSIST OF 1/2" THICK TRANSITE ASBESTOS BOARD OR EQUIVALENT (IF APPROVED BY ASST. CHIEF ENGR. T. C. & S.) THE FULL LENGTH AND HEIGHT OF CASE AS INDICATED ON SHEET NO. 1 OF THIS PLAN. THE SECTIONS OF ASBESTOS BOARD SHALL RUN HORIZONTALLY, JOINING THE SECTIONS AT BACK OF EACH SHELF, AND SHALL BE SECURELY BOLTED TO BACK OF SHELVES, ALSO TOP AND BOTTOM HORIZONTAL SHAPES, WITH 1/2" ROUND HEAD STOVE BOLTS IN ACCORDANCE WITH SKETCH "A" SHOWN ON THIS PLAN, EXCEPT CASES 5303 & 5304 ARE PROVIDED WITH A VERTICAL UPRIGHT 3 1/2" WIDE MOUNTED DIRECTLY AGAINST BACK OF SHELVES MIDWAY BETWEEN END WALLS. THE ASBESTOS BOARDS FOR THESE TWO CASES BUTT AGAINST THIS UPRIGHT.

10. PAINTING:

(a) THE ENTIRE CASE SHALL BE THOROUGHLY CLEANED BEFORE PAINTING.

(b) ALL METAL PARTS SHALL BE PRIMED WITH ONE COAT OF RED LEAD OR EQUAL BEFORE ASSEMBLING. AFTER ASSEMBLY, ALL WELDED AND BURNED AREAS SHALL BE THOROUGHLY CLEANED OF SCALE, AND GIVEN ONE COAT OF RUST-INHIBITOR SUCH AS "PARCOLITE B" AND THE WELDED AND BURNED AREAS REPRIMED; THEN APPLY TWO COATS OF A HIGH-GRADE ALUMINUM PAINT INSIDE AND TWO COATS OF A HIGH-GRADE BLACK PAINT OUTSIDE (UNLESS OTHERWISE APPROVED BY THE ASST. CHIEF ENGR. T. C. & S.).

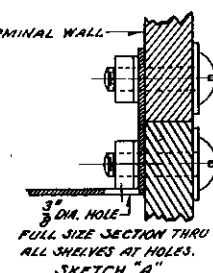
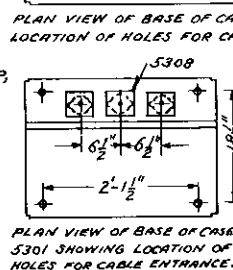
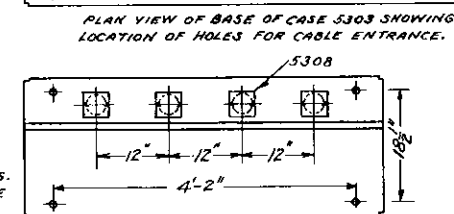
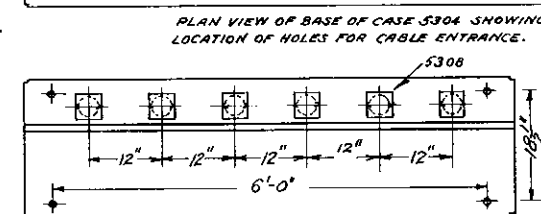
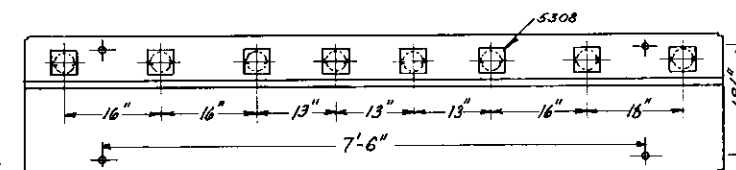
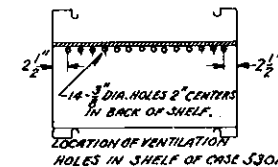
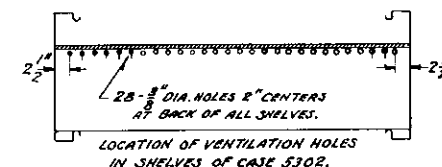
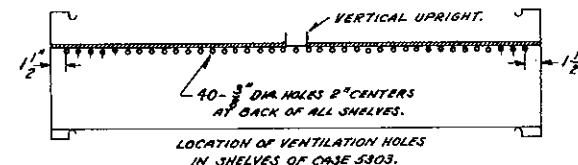
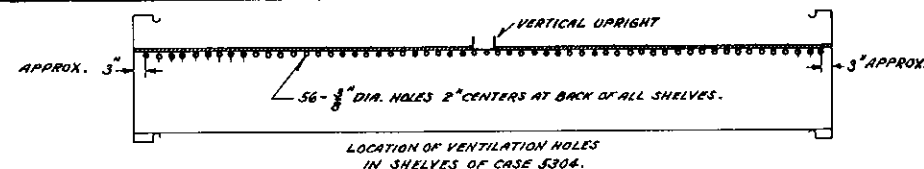
(c) A FINAL COAT OF CLEAR VARNISH SHALL BE GIVEN TO THE INSIDE OF CASE OVER THE LAST COAT OF ALUMINUM PAINT.

(d) TERMINAL WALL SHALL NOT BE PAINTED.

11. SHIPMENT:

(a) ALL CASES SHALL BE SHIPPED MOUNTED ON TWO 2" x 4" WOOD SKIDS.

(b) TWO 1 1/2" x 2" WOOD SKIDS SHALL EXTEND THE FULL LENGTH OF CASE AT TOP, ONE IN BACK AND ONE IN FRONT, AND SHALL BE SECURELY WIRED IN PLACE AS A PROTECTION TO THE TOP OF CASE.



FOR ORDERING REFERENCES AND OTHER DETAILS SEE SHEET NO. 1.

SHEET 2 OF 2



S-530-H

THE PENNSYLVANIA RAILROAD
STANDARD
INSTRUMENT CASES

SPECIFICATIONS AND DETAILS

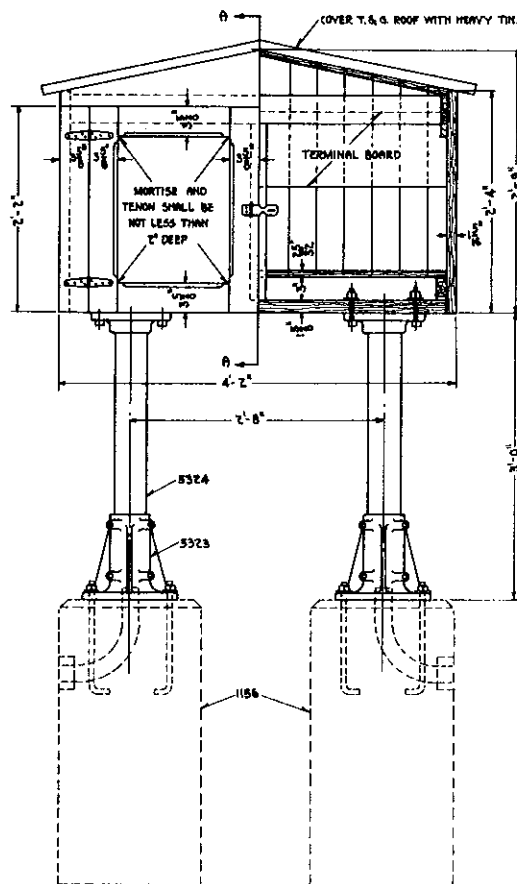
OFFICE OF CHIEF ENGINEER, PHILA., PA., NOVEMBER 18, 1942.

Approved

Approved

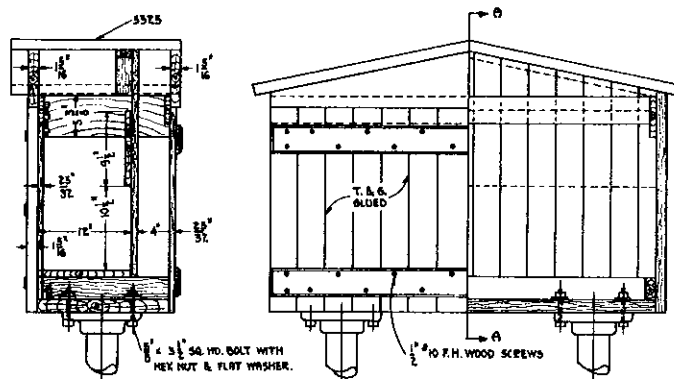
N. C. Stout
Assistant Chief Engineer-Signals

W. Skidmore
Chief Engineer

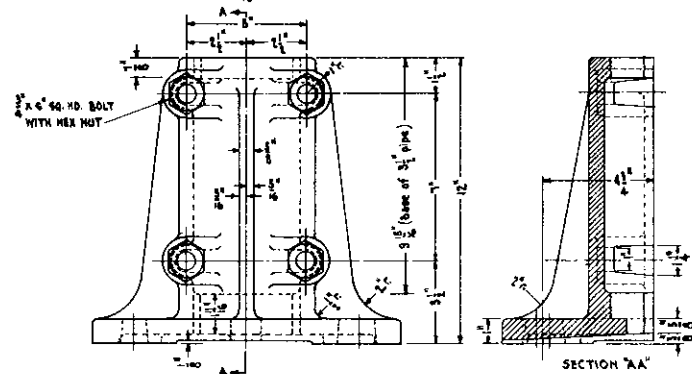
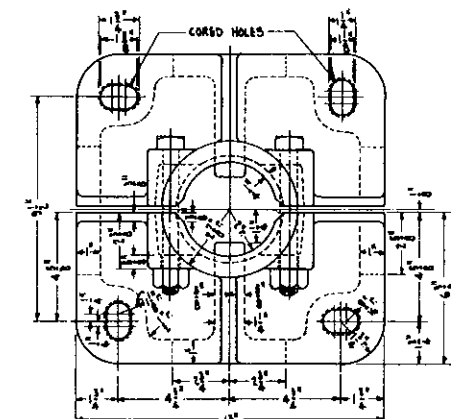


FRONT ELEVATION
(HALF FRONT REMOVED)
5321-CASE

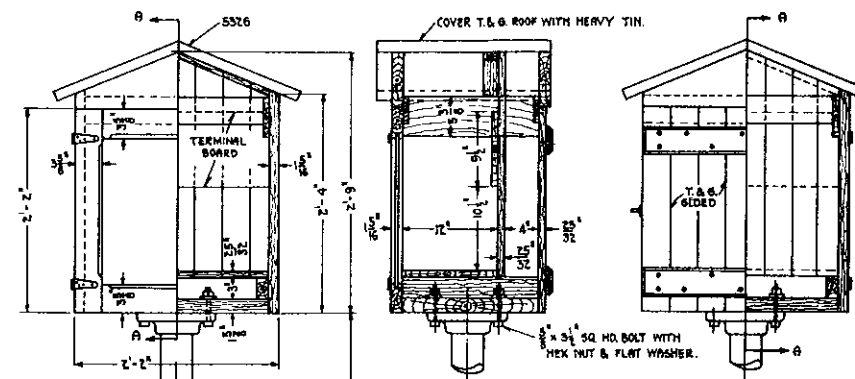
ORD. NO.	ORDERING REFERENCE
5321	CASE 5321 WITH 1-5323 AND 1-5324.
5322	5324 + 1-5323 + 1-5324.
5323	BASE COMPLETE.
5324	GTD. 3 1/2\"/>



SECTION "AA"
REAR ELEVATION
(HALF BACK REMOVED)



5323 - BASE C.I.



SECTION "AA"
REAR ELEVATION
(HALF BACK REMOVED)

FRONT ELEVATION
(HALF FRONT REMOVED)
5322-CASE

- NOTE:-
1. CASING SHALL BE MADE OF NORTHERN WHITE PINE, CEDAR, CYPRESS OR REDWOOD.
 2. TERMINAL BOARDS SHALL BE MADE OF CEDAR, CYPRESS, WHITE PINE (DOUG, NORTHERN OR SUGAR), PONDUSO PINE, SPRUCE (EASTERN OR SITKA) OR REDWOOD, SURFACED TO 15/32", SHALLACED (1 COATS) AND VARNISHED.
 3. TERMINAL BOARDS SHALL BE GRADE B AND BETTER, FREE OF KNOTS.
 4. ALL BOARDS AND STRIPS, OTHER THAN TERMINAL BOARDS, SHALL BE GRADE B AND BETTER, FREE OF SAPWOOD.
 5. TERMINAL BOARDS SHALL BE SURFACED FOUR SIDES (S4S).
 6. CASING SHALL BE SURFACED TWO SIDES (S2S) AND TONGUE AND GROOVE (CM OR SM).
 7. ALL GRADES, SIZES AND WORKING SHALL BE IN ACCORDANCE WITH AMERICAN LUMBER STANDARDS.
 8. ALL JOINTS EXPOSED TO THE WEATHER SHALL BE GLEED.
 9. INSIDE OF CASE, EXCEPT TERMINAL BOARDS, SHALL BE GIVEN TWO COATS OF SLATE COLORED FIRE RETARDING PAINT APPROVED BY THE CHIEF SIGNAL ENGINEER.
 10. PAINT OUTSIDE OF CASE BLACK.

11. WHERE PARIAL CABLES ARE USED, SEPARATE CABLE POST SHOULD BE INSTALLED IN BACK OF CASE.
12. AFTER VARIING HAS BEEN COMPLETED CLOSE ALL OPENINGS SO AS TO PREVENT RODENTS FROM ENTERING.
13. WIRE INLETS MAY BE LOCATED TO SUIT LOCAL CONDITIONS.
14. EACH HINGE SHALL BE SECURED WITH BOLTS AND SCREWS, USING NO LESS THAN FOUR BOLTS.

REVISIONS.

REDESIGNED FROM APPROVED PLAN S-532-E, DATED JAN. 10, 1928.

7-APRIL 16, 1929.

APPROVED: *A.H. Reed*

6-JULY 6, 1934.

APPROVED: *A.H. Reed*

1 SHEET

S-532-G

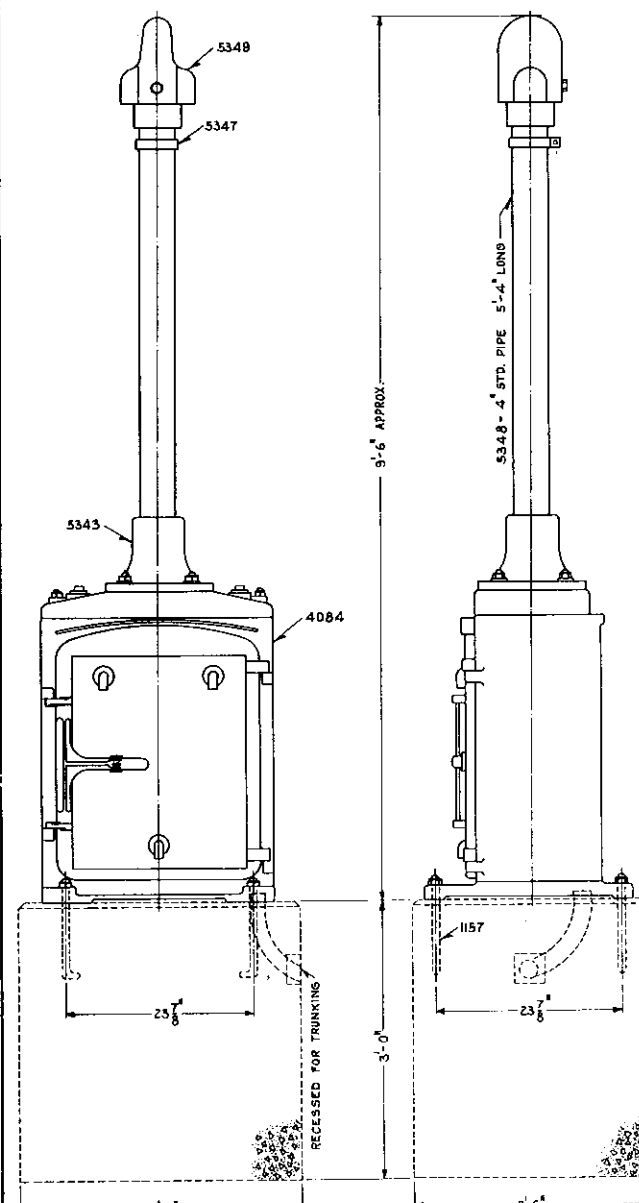


THE PENNSYLVANIA RAILROAD STANDARD INSTRUMENT CASES

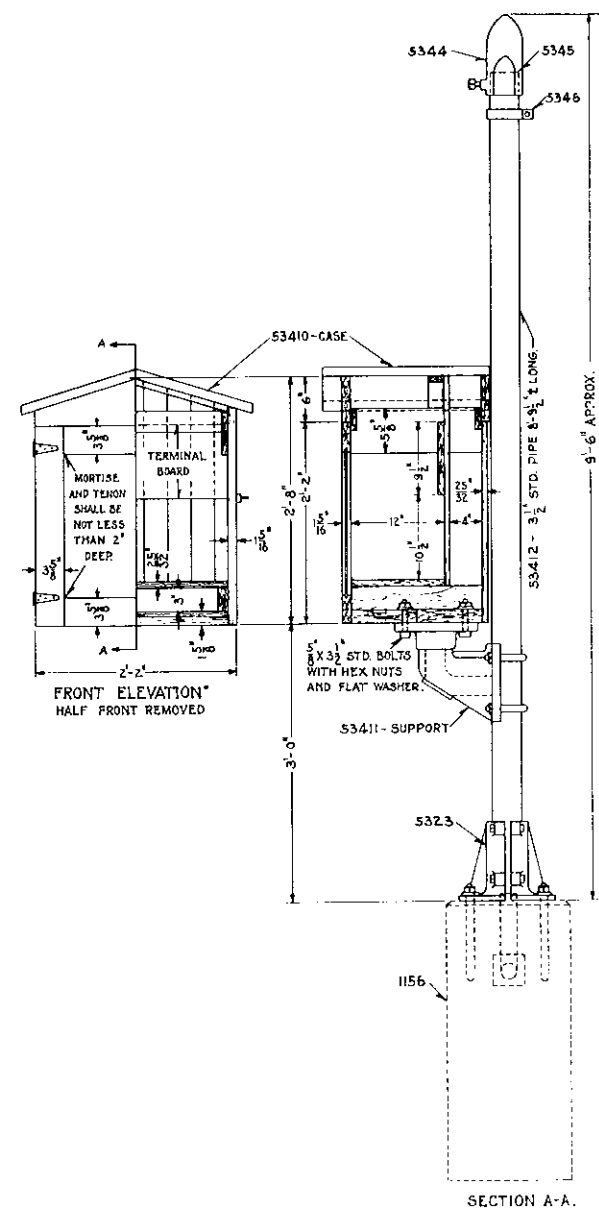
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA., JANUARY 10, 1928

Approved: *A.H. Reed*
Chief Signal Engineer

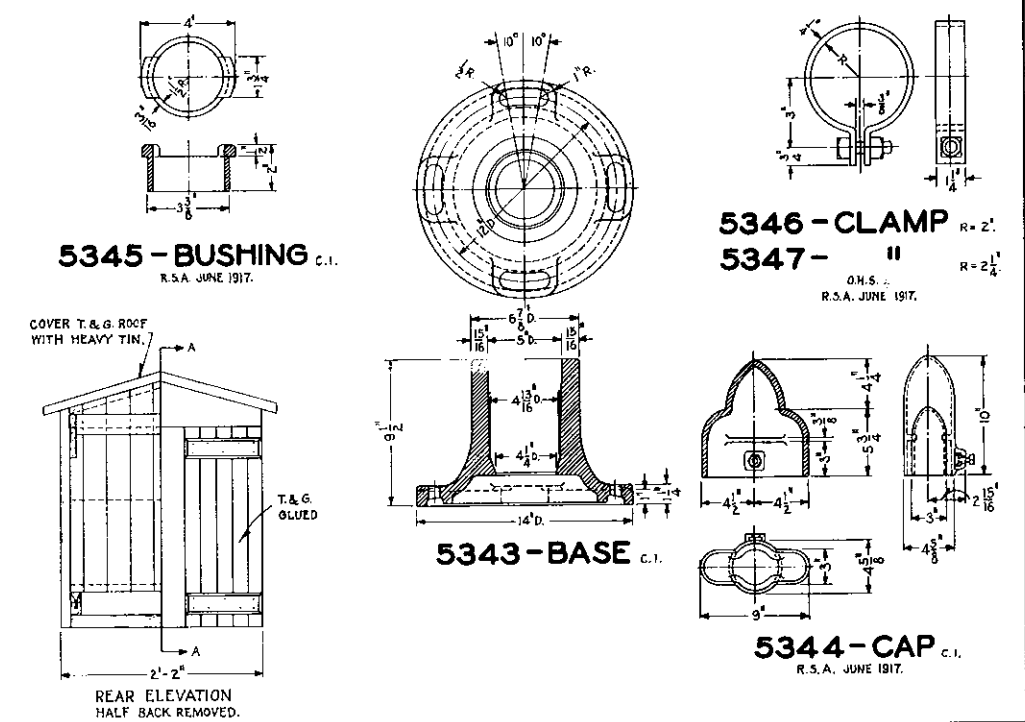
Approved: *E. J. Keenan*
Chief Engineer



5341 - INSTRUMENT CASE



5342 - INSTRUMENT CASE



- NOTE:-
1. CASING FOR 53410 SHALL BE MADE OF NORTHERN WHITE PINE, CEDAR, CYPRESS OR REDWOOD.
 2. TERMINAL BOARDS SHALL BE MADE OF CEDAR, CYPRESS, WHITE PINE (IDAHO, NORTHERN OR SUGAR), PONDOSE PINE, SPRUCE, EASTERN OR SITKA) OR REDWOOD, SURFACED TO 25/32", SHELLACED (2 COATS) AND VARNISHED.
 3. TERMINAL BOARDS SHALL BE GRADE B AND BETTER, FREE OF KNOTS.
 4. ALL BOARDS AND STRIPS, OTHER THAN TERMINAL BOARDS, SHALL BE GRADE B AND BETTER, FREE OF SAPWOOD.
 5. TERMINAL BOARDS SHALL BE SURFACED FOUR SIDES (S45).
 6. CASING FOR 53410 SHALL BE SURFACED TWO SIDES (S25) AND TONGUE AND GROOVE (C.M. OR S.M.).
 7. ALL GRADES, SIZES AND WORKINGS SHALL BE IN ACCORDANCE WITH AMERICAN LUMBER STANDARDS.
 8. ALL JOINTS EXPOSED TO THE WEATHER SHALL BE GLED.
 9. INSIDE OF CASE, EXCEPT TERMINAL BOARDS, SHALL BE GIVEN TWO COATS OF SLATE COLORED FIRE RETARDING PAINT APPROVED BY THE CHIEF SIGNAL ENGINEER.
 10. PAINT OUTSIDE OF CASE BLACK.
 11. EACH HINGE SHALL BE SECURED WITH BOLTS AND SCREWS, USING NOT LESS THAN FOUR BOLTS.
 12. CONCRETE SHALL BE IN ACCORDANCE WITH SPECIFICATION C.E. 76, PROPORTION B.
 13. FOUNDATIONS SHALL BE NOT LESS THAN TWO FEET UNDERGROUND.
 14. AFTER WIRING HAS BEEN COMPLETED, CLOSE ALL OPENINGS SO AS TO PREVENT RODENTS FROM ENTERING.
 15. WIRE INLETS MAY BE LOCATED TO SUIT LOCAL CONDITIONS.

REVISIONS	
REORAWN FROM APPROVED PLAN	
5-534-C, DATED 5-2-22, LAST	
REVISED 8-31-26, AND REVISED.	
E - JULY 6, 1934	
APPROVED:-	<i>A.H. Hudd</i>

S-534-E

THE PENNSYLVANIA RAILROAD
STANDARD

CABLE POST AND INSTRUMENT CASES

DESIGNED BY CHIEF SIGNAL ENGINEER PHILA. PA. MARCH 14, 1908

Approved: *A.H. Hudd* Chief Engineer

GENERAL SPECIFICATIONS

1. DESIGN AND CONSTRUCTION SHALL BE STRONG ENOUGH TO WITHSTAND ANY DETRIMENTAL REACTION FROM HIGH WIND AND STORM.
2. ALL SHEET METAL PARTS SHALL BE CONSTRUCTED OF COPPER BEARING STEEL, OR EQUAL IN RUST RESISTING PROPERTIES.
3. THE HOUSE SHALL BE CONSTRUCTED EITHER IN SECTIONS FOR DISASSEMBLING AT THE FACTORY AND REASSEMBLING IN THE FIELD, OR CONSTRUCTED AS A UNIT IN ACCORDANCE WITH ORDERING INFORMATION CONTAINED IN THE REQUISITION. REQUISITION SHALL CLEARLY INDICATE WHETHER OR NOT A SECTIONAL HOUSE IS DESIRED.
4. ALL METAL PARTS SHALL BE PRIMED WITH ONE COAT OF RED OXIDE OR EQUAL BEFORE ASSEMBLING. TO PERMIT ADHESION OF BOTH PRIMING AND FINISHING COATS OF PAINT, ALL WELDED AND BURNED AREAS SHALL BE PROPERLY TREATED. THE INSIDE SHALL THEN BE GIVEN TWO COATS OF HIGH GRADE ALUMINUM PAINT, AND THE OUTSIDE TWO COATS OF A FIRST GRADE PAINT-COLOR PENNSYLVANIA RAILROAD STANDARD LIGHT, ROOF BLACK, AND TRIM (WHERE PROVIDED) PENNSYLVANIA RAILROAD STANDARD DARK (BUILDING PAINT).
5. ALL JOININGS OF SECTIONS SHALL BE CLOSE FITTING, RIGID AND SECURE, SO THAT THE ENTIRE HOUSE WILL BE WEATHERPROOF.
6. ALL WALLS, ROOF AND DOORS, EXCEPT TRACKMAN'S COMPARTMENT (IF REQUIRED), SHALL BE PROVIDED WITH INSULATION AGAINST TRANSFER OF HEAT EQUIVALENT TO 12 INCHES OF BRICK.
7. DOOR FRAME SHALL PROVIDE NOT LESS THAN 3/4 INCHES CLEAR ENTRANCE SPACE.
8. THICKNESS OF SHEET METAL SHALL BE NOT LESS THAN #22 GAGE FOR PANELS, #18 GAGE FOR ROOF, AND #12 GAGE FOR DOOR FRAME.
9. HOUSES SHALL BE PROVIDED WITH LOUVRES OR EQUIVALENT FOR PROPER VENTILATION.
10. DOOR SHALL BE PROVIDED WITH A SUBSTANTIAL THREE POINT LOCKING DEVICE, LOCKING DOOR AT TOP, BOTTOM AND CENTER. THE HANDLE AT THE CENTER, OPERATING THE DEVICE, TO BE SO ARRANGED AS TO PERMIT IT TO BE LOCKED WITH A SIGNAL DEPARTMENT PADLOCK.
11. PANELS IN BOTH SIDES, AND END OPPOSITE ENTRANCE DOOR, SHALL BE MADE REMOVABLE, FROM THE OUTSIDE.
12. BASE FRAME (WITH OR WITHOUT FLOOR) SHALL BE CONSTRUCTED WITH SUFFICIENT STRENGTH TO SUPPORT THE ENTIRE HOUSE. HOUSES FURNISHED WITHOUT FLOOR SHALL BE PROVIDED WITH BASE ANGLE TO PERMIT SECURING TO FLOOR (FLOOR WILL BE CONSTRUCTED IN THE FIELD). HOUSES FURNISHED WITH FLOOR (SEE NOTE 13) AND TO BE SUPPORTED AS INDICATED IN DIAGRAM F. HOLDS NOT LESS THAN 1 INCH DIA. SHALL BE PROVIDED IN BASE FRAME FOR SECURING BASE FRAME TO FOUNDATION.
13. FLOORS, WHEN PROVIDED AS A PART OF THE HOUSES, SHALL BE CONSTRUCTED TO WITHSTAND A LOADING OF 125 POUNDS PER SQUARE FOOT.
14. OPENINGS IN HOUSES FOR CABLES AND WIRES (WITH OR WITHOUT FLOOR) IF REQUIRED, SHALL BE SPECIFIED ON REQUISITION.
15. THE ENTIRE HOUSE SHALL BE ERRECTED AT THE FACTORY FOR INSPECTION BY PENNSYLVANIA RAILROAD REPRESENTATIVES.
16. CONCRETE WALLS OR PIERS, AND FLOOR (WHEN NOT PROVIDED WITH HOUSE), SHALL BE CONSTRUCTED BY THE PENNSYLVANIA RAILROAD FORCES.
17. MANUFACTURER SHALL SUBMIT DRAWINGS, INDICATING THEIR PROPOSAL, TO THE CHIEF ENGINEER, PENNSYLVANIA RAILROAD FOR APPROVAL.
18. WHEN WINDOW IS DESIRED, REQUISITION SHALL SPECIFY WHETHER IT IS TO BE LOCATED AT X OR Y.
19. REQUISITION SHALL SPECIFY IF TRACKMAN'S COMPARTMENT IS DESIRED. WHEN FURNISHED A LOUVRE FOR VENTILATION SHALL BE PROVIDED IN GABLE OVER DOOR AS INDICATED AT G.

ORDERING REFERENCE

ORDER NUMBER	WITH FLOOR	WITHOUT FLOOR	APPROXIMATE DIMENSIONS	
			A	B
5381	53811		8' 0"	11' 0"
5382	53822		8' 0"	14' 0"
5383	53833		8' 0"	19' 0"
	53844		11' 0"	16' 0"
	53855		14' 0"	16' 0"
	53866		14' 0"	19' 0"
	53877		16' 0"	19' 0"

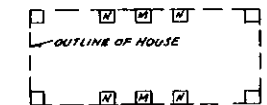
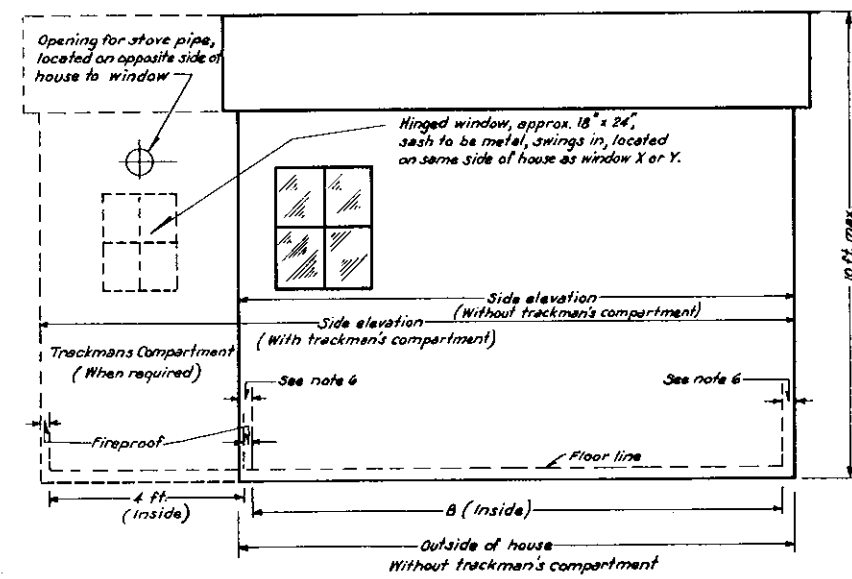
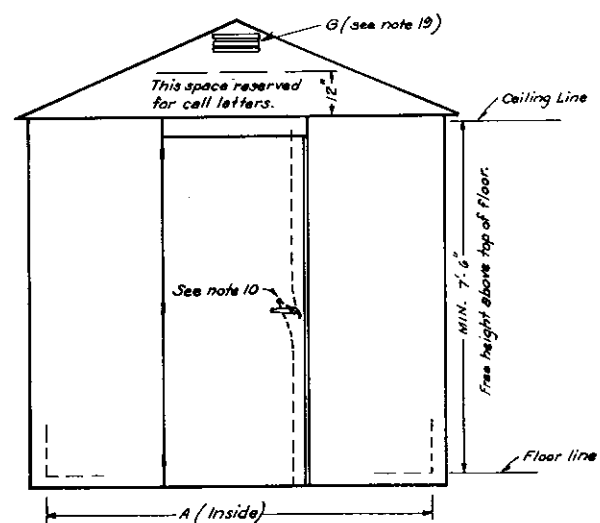
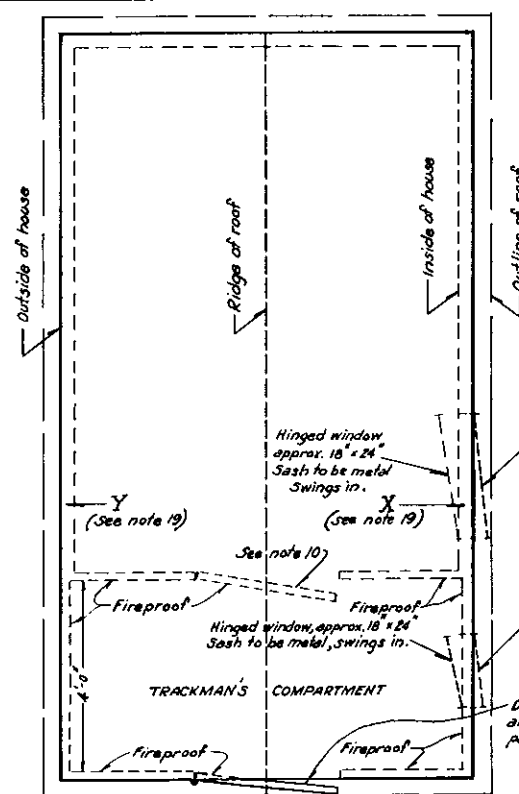
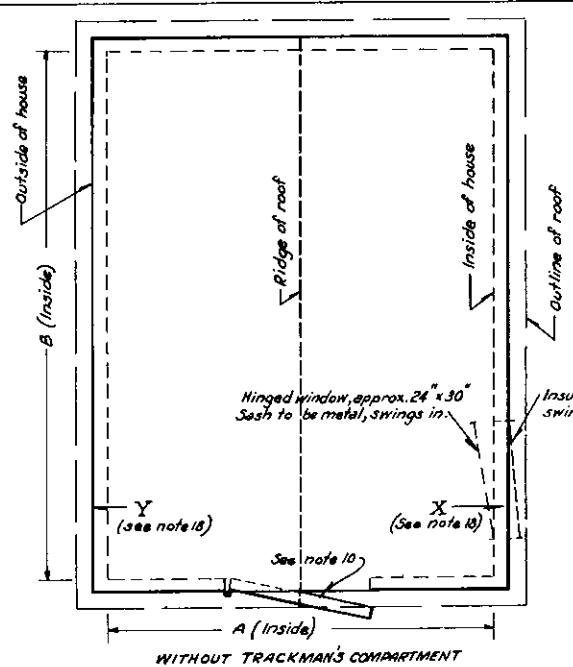


DIAGRAM F
MINIMUM NUMBER OF PIERS (WHEN USED) FOR HOUSES WITH 8 FT. "A" DIMENSION.

Note:-
Provide intermediate piers M when B = 11' or 14'.
Provide intermediate piers N when B = 19'.



REDRAWN FROM UNAPPROVED PLAN S-538- DATED APRIL 18, 1947 AND REVISED

1 SHEET

S-538-E

THE PENNSYLVANIA RAILROAD

STANDARD

INSTRUMENT HOUSES

STEEL INSULATED

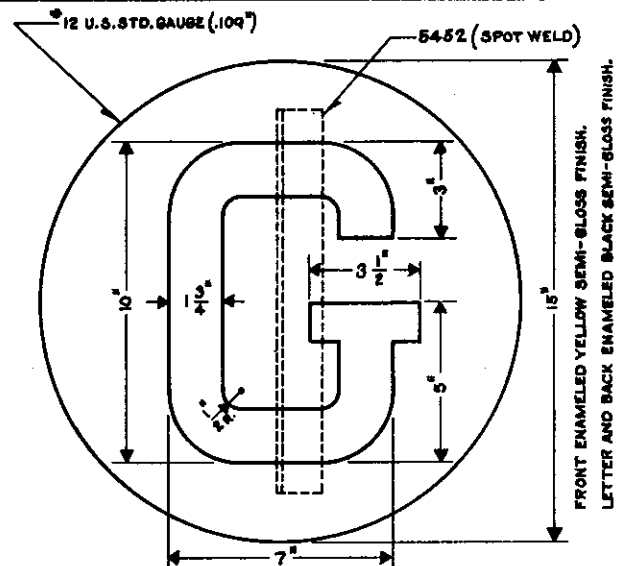
OFFICE OF CHIEF ENGINEER, PHILA., PA., APRIL 28, 1948.

Approved

Assistant Chief Engineer - T, C, & S

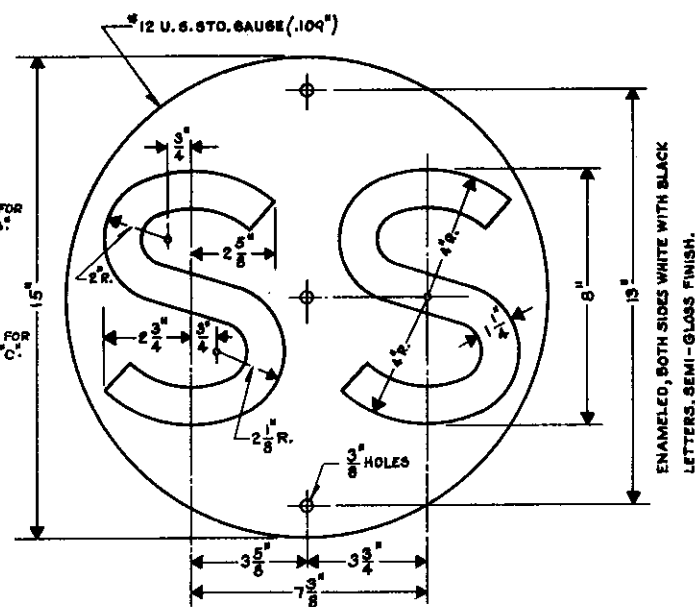
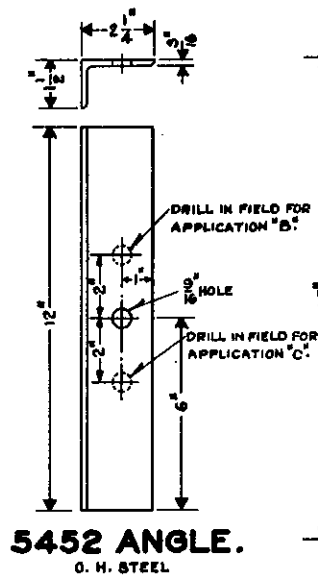
Approved

Chief Engineer



5451 GRADE SIGNAL MARKER ONLY.

A. A. R. SIG. SEC. M-1934.
STORES CAT. REF. NO. 2A-5451.



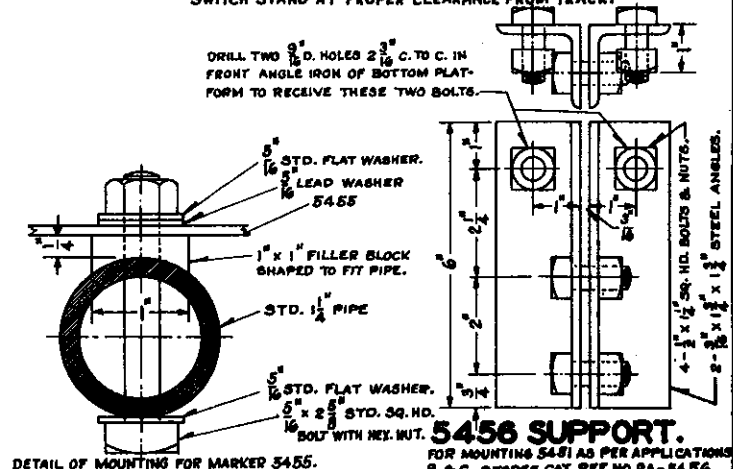
5455 SPRING SWITCH MARKER.

A. A. R. SIG. SEC. M-1934.
STORES CAT. REF. NO. 2A-5455.

NOTE:-

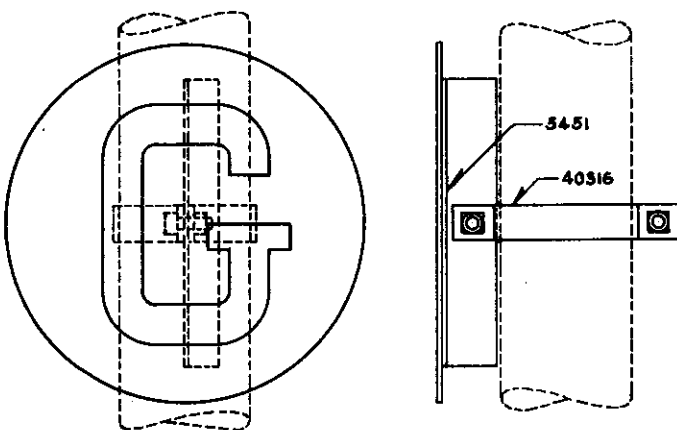
1. MARKERS 5451 AND 5455 SHALL BE VITREOUS ENAMELED IN ACCORDANCE WITH A.A.R. SIG. SEC. SPECIFICATION 155-41.
2. SUPPORT 5454 SHALL BE THOROUGHLY CLEANED, GIVEN A COAT OF RED OXIDE PRIMER AND ONE COAT OF A GOOD GRADE BLACK PAINT.
3. MATERIAL SHALL BE IN ACCORDANCE WITH A.A.R. SIG. SEC. SPECIFICATION 155-41. (THICKNESS OF METAL AS SHOWN HEREON).
4. IN SPECIAL LOCATIONS MARKER 5455 MAY BE MOUNTED ON SWITCH STAND AT PROPER CLEARANCE FROM TRACK.

DRILL TWO 3/8" DIA. HOLES 2 3/8" C. TO C. IN FRONT ANGLE IRON OF BOTTOM PLAT-FORM TO RECEIVE THESE TWO BOLTS.



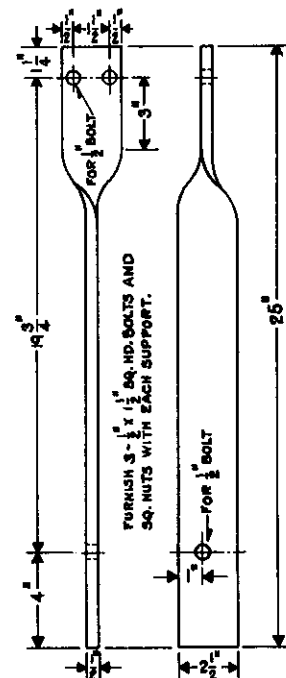
5456 SUPPORT.

FOR MOUNTING 5451 AS PER APPLICATIONS B & C. STORES CAT. REF. NO. 2A-5456.



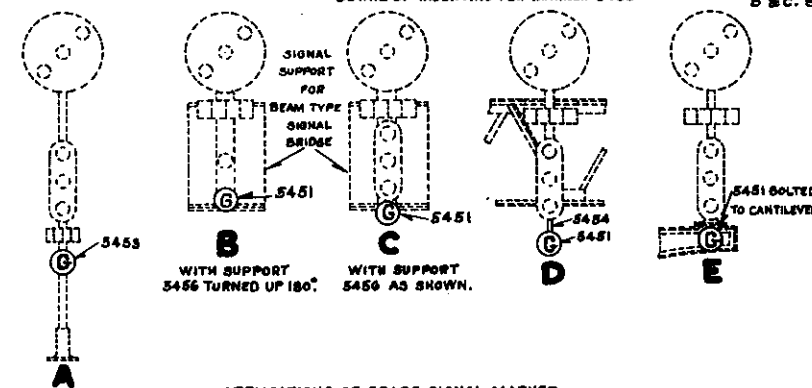
5453 GRADE SIGNAL MARKER COMPLETE.

A. A. R. SIG. SEC. M-1934.
STORES CAT. REF. NO. 2A-5453.

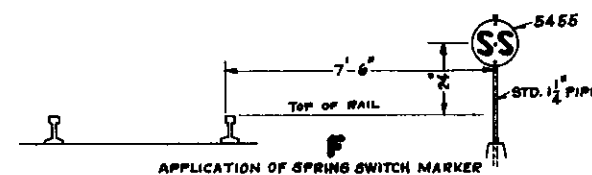


5454 SUPPORT.

O. H. STEEL
STORES CAT. REF. NO. 2A-5454.
(FOR APPLICATION D)



APPLICATIONS OF GRADE SIGNAL MARKER.



APPLICATION OF SPRING SWITCH MARKER

REVISIONS

REDRAWN FROM APPROVED PLAN S-545-F, DATED AUG. 29, 1927, LAST REVISED JULY 31, 1932, AND REVISED TO SHOW 5451 FORMERLY 5456 & CHANGED TO AGREE WITH A.A.R. FORMER PLAN INCLUDED A 24" DIA. 1" MARKER CLAMP 40316 INDICATED IN 5453 FORMERLY 40316. SUPPORT 5454 FORMERLY 5457 WHICH WAS WITHOUT TREST. SUPPORT 5456 AND APPLICATION F ADDED. APPLICATIONS OF MARKERS RE-ARRANGED. NOTES CHANGED.

1 SHEET



S-545-G

THE PENNSYLVANIA RAILROAD
STANDARD
MARKERS

FOR GRADE SIGNAL AND SPRING SWITCH.

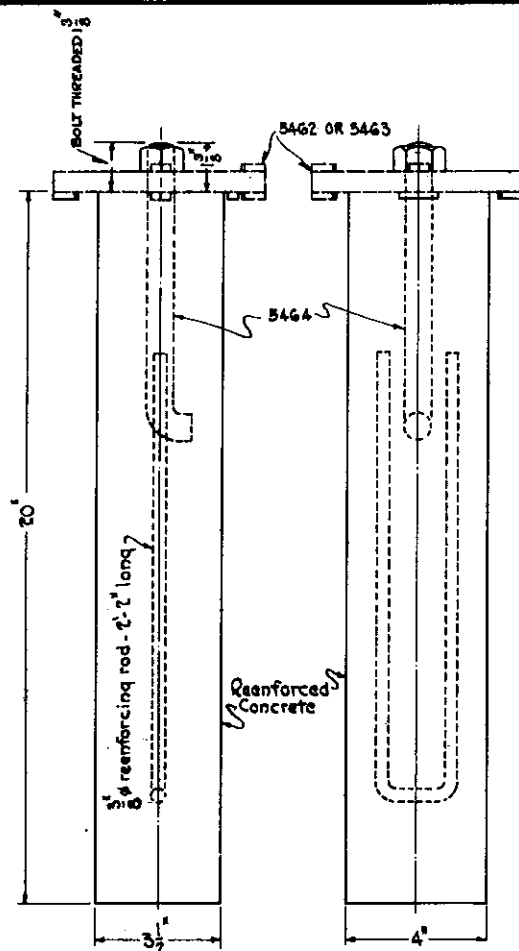
OFFICE OF CHIEF ENGINEER, PHILA., PA., JULY 8, 1942.

Approved

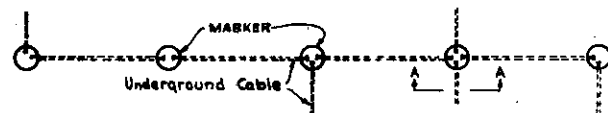
H. S. Stanton
Assistant Chief Engineer-Signals

Approved

M. J. McGinnis
Chief Engineer

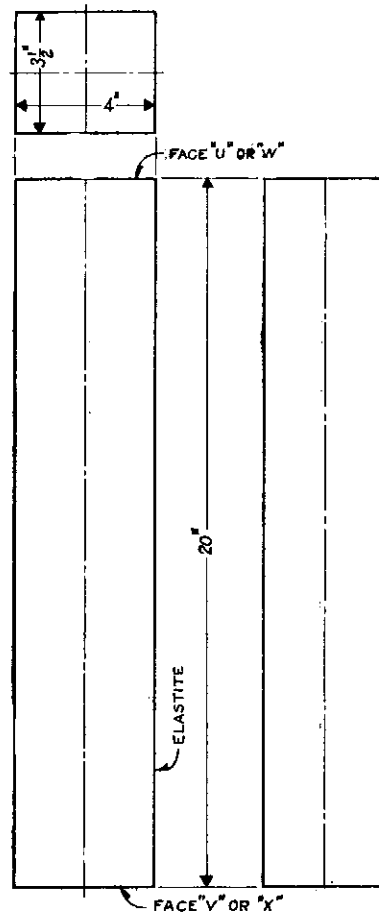


5461-MARKER COMPLETE WITHOUT PLATE.
REINFORCED CONCRETE.
STORES CAT. REF. NO. 2A-1515

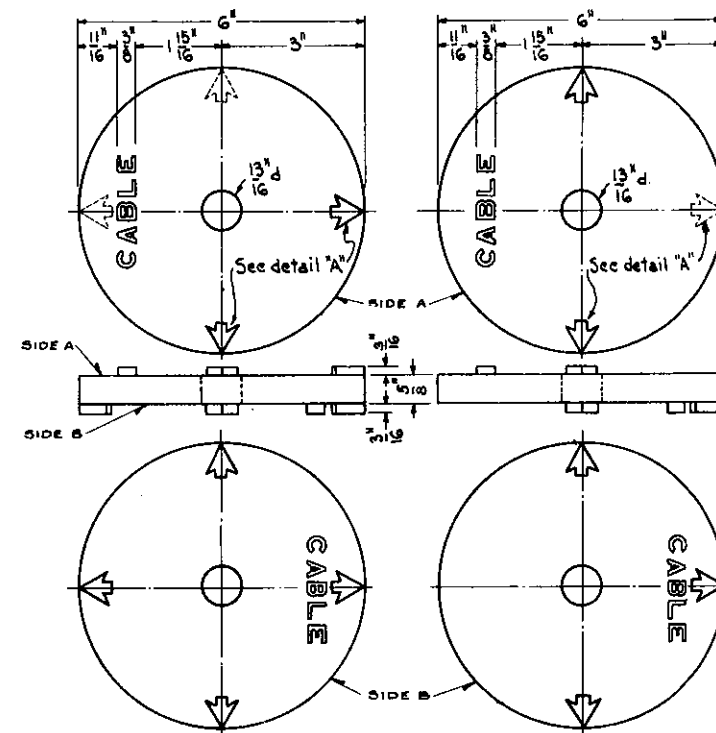
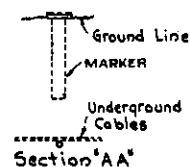


-METHOD OF INSTALLATION

Markers to be arranged to show direction of cable runs as indicated in sketch above.
Maximum distance between markers shall not exceed two hundred feet.
After placing in service, all exposed metal surfaces shall be given a coat of good grade black paint.



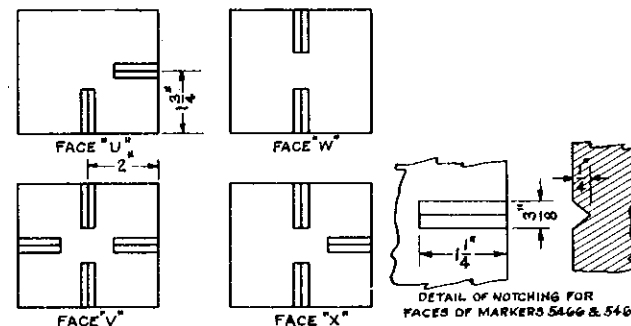
5466-MARKER FACES "U" & "V".
STORES CAT. REF. NO. 2A-1418
5467-MARKER FACES "W" & "X".
STORES CAT. REF. NO. 2A-1423
ELASTITE.



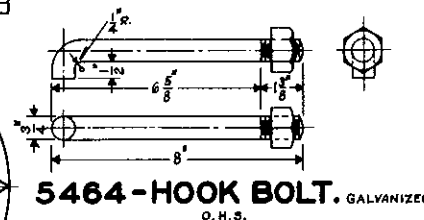
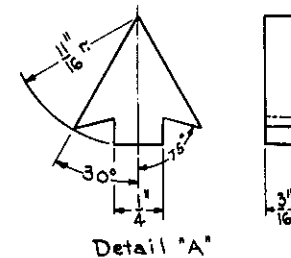
5462-PLATE CAST IRON
STORES CAT. REF. NO. 2A-1743.

5463-PLATE CAST IRON
STORES CAT. REF. NO. 2A-1744.

NOTE:-
1. ORDER 5461, 5462 AND 5463 SEPARATELY.
2. PLATES 5462 AND 5463 SHALL BE GIVEN ONE COAT OF RED OXIDE, THEN ONE COAT OF GOOD GRADE BLACK PAINT.



FACING OF TOP AND BOTTOM
FOR MARKERS 5466 & 5467.



5464-HOOK BOLT. GALVANIZED
O.H.S.

Revisions	
D	SEPTEMBER 8, 1942
APPROVED <i>N. C. Deane</i>	
C	APRIL 14, 1948.
MARKER 5461 FORMERLY SHOWN MADE OF ELASTITE OR CONCRETE. ELASTITE MARKER REDESIGNED AND NUMBERED 5466 & 5467. STORES CAT. REF. NOS. ADDED.	
APPROVED <i>N. C. Deane</i>	

1 Sheet

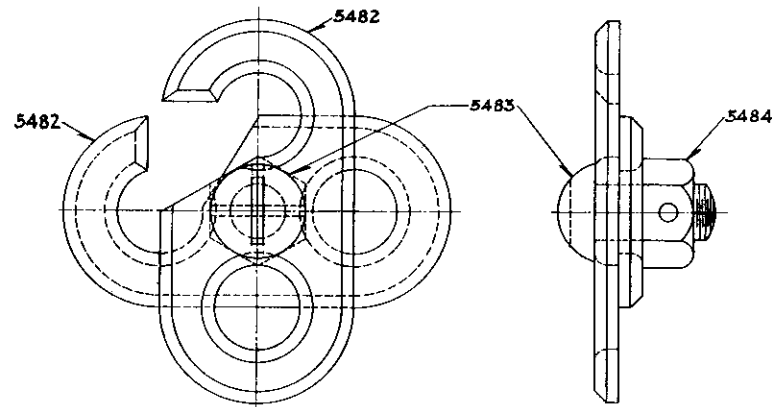
5-546-B

THE PENNSYLVANIA RAILROAD
STANDARD
CABLE MARKER
FOR UNDERGROUND CABLES

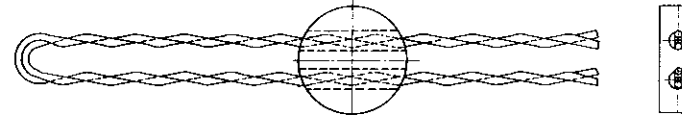
Office of Chief Signal Engineer, Phila., Pa., Nov. 11, 1935.

Approved: *A. H. Dicks* Chief Signal Engineer

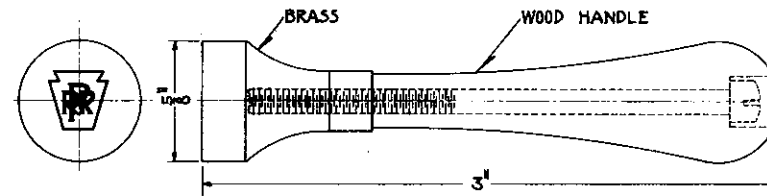
Approved: *W. J. H. Jones* Actg. Chief Engineer.



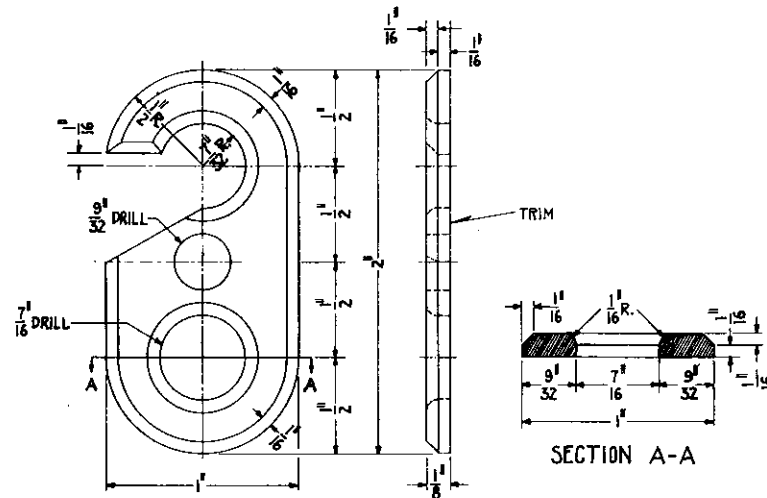
5481 - LOCKING AND SEALING DEVICE



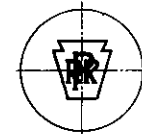
5485 - LEAD SEAL AND WIRE
(SEE NOTES)



5486 - RELAY SEAL
(SEE NOTES)

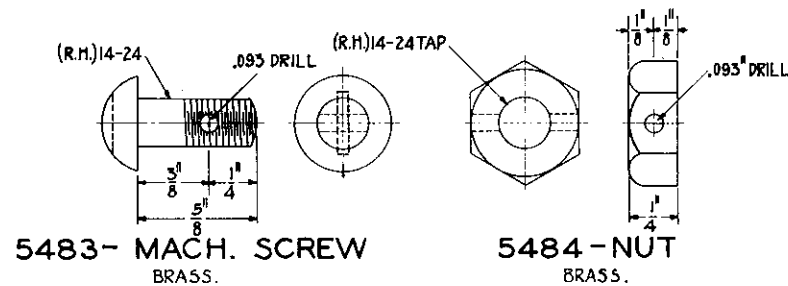


5482 - LOCK PLATE
CAST BRASS.



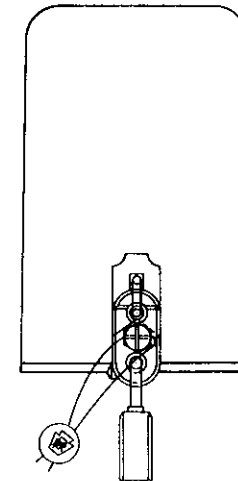
5487 - DIE
(SEE NOTES)

NOTES:-
1. 5485 SHALL BE SIMILAR TO #0 PAGE 48
AND 5487 SHALL BE USED IN SEAL PRESS
SIMILAR TO #3 PAGE 48, CAT. #28, S.M. QUINT'S
SONS CO., 15 S. 4TH. ST., PHILA., PA.
2. MONOGRAM FOR 5486 AND 5487 SHALL
BE IN ACCORDANCE WITH 5473 PLAN S-547.



5483 - MACH. SCREW
BRASS.

5484 - NUT
BRASS.



APPLICATION OF 5481.

REVISIONS

1 SHEET

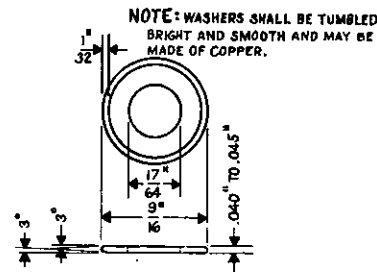
S-548-A

THE PENNSYLVANIA RAILROAD
STANDARD
LOCKING AND SEALING DEVICES

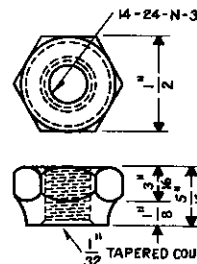
OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA. JUNE 20TH, 1907

Approved
A.H. Reed
Chief Signal Engineer

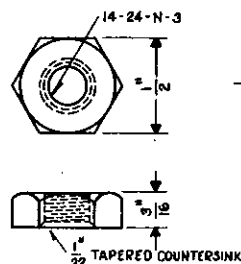
Approved
J.H. Reed
Chief Engineer



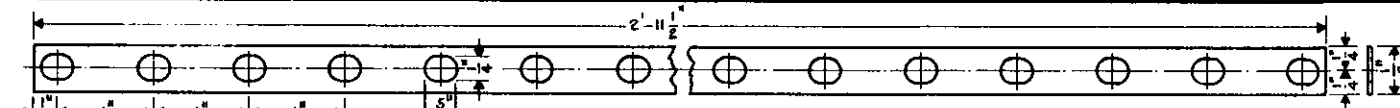
5134 WASHER.
A.A.R. SIG. SEC. M-1936.
STORES CAT. REF. NO. 2-A-2965



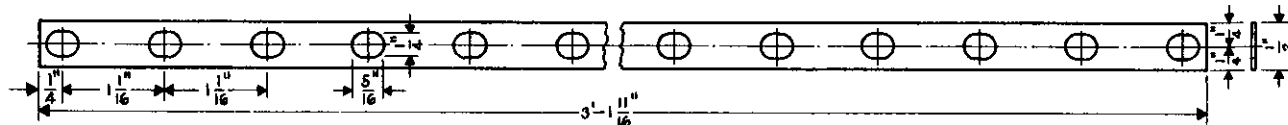
5136 BINDING NUT.
A.A.R. SIG. SEC. M-1936.
STORES CAT. REF. NO. 2-A-1598.



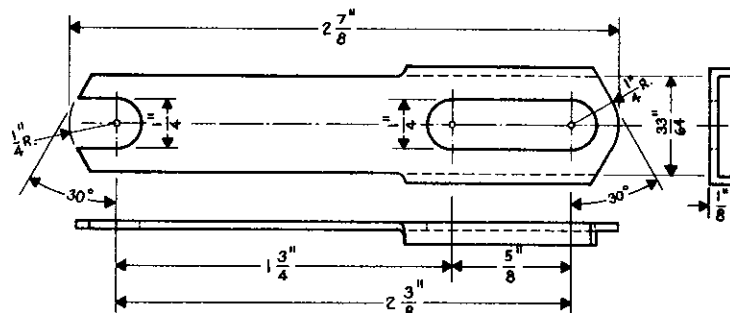
5137 CLAMP NUT.
A.A.R. SIG. SEC. M-1936.
STORES CAT. REF. NO. 2-A-1589.



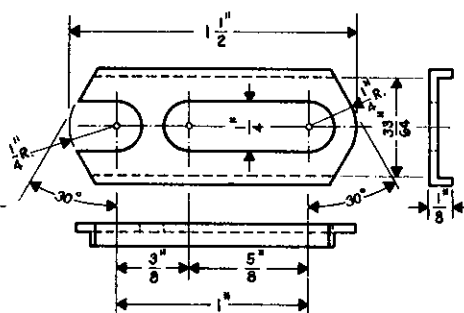
5132 CONNECTOR BUS. FOR 36 TERMINALS
HALF-HARD COPPER NO. 18 A.W.G. (NICKEL OR CHROMIUM PLATED)
A.A.R. SIG. SEC. MAR. 1939.
STORES CAT. REF. NO. 2-A-2694.



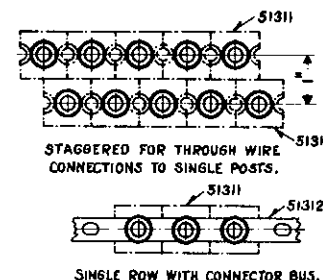
5133 CONNECTOR BUS. FOR 36 TERMINALS
HALF-HARD COPPER NO. 18 A.W.G. (NICKEL OR CHROMIUM PLATED)
STORES CAT. REF. NO. 2-A-4111



5139 CONNECTOR.
HALF-HARD COPPER NO. 18 A.W.G. (NICKEL OR CHROMIUM PLATED)
A.A.R. SIG. SEC. MAR. 1939.
STORES CAT. REF. NO. 2-A-688.

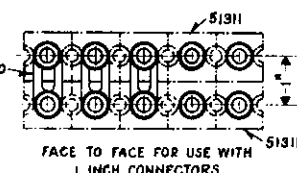


51310 CONNECTOR.
HALF-HARD COPPER NO. 18 A.W.G. (NICKEL OR CHROMIUM PLATED)
A.A.R. SIG. SEC. MAR. 1939.
STORES CAT. REF. NO. 2-A-689.

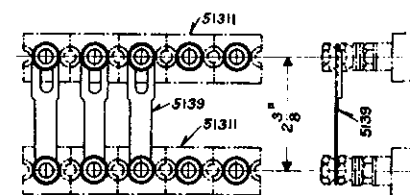


STAGGERED FOR THROUGH WIRE CONNECTIONS TO SINGLE POSTS.

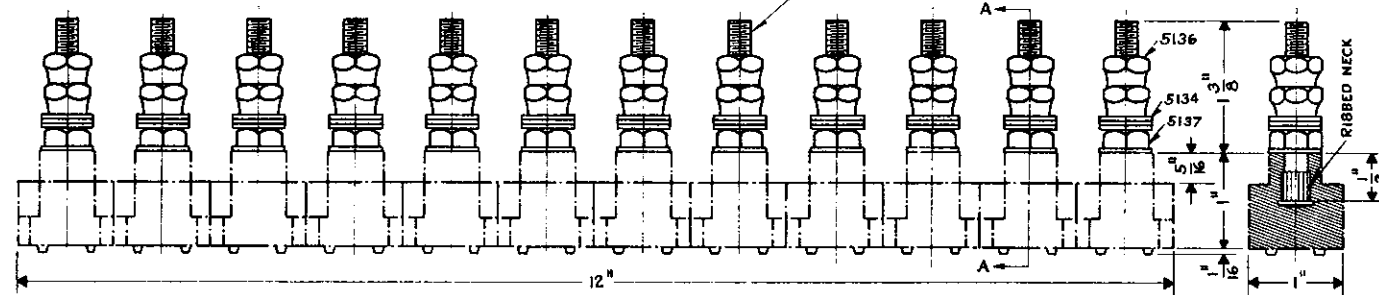
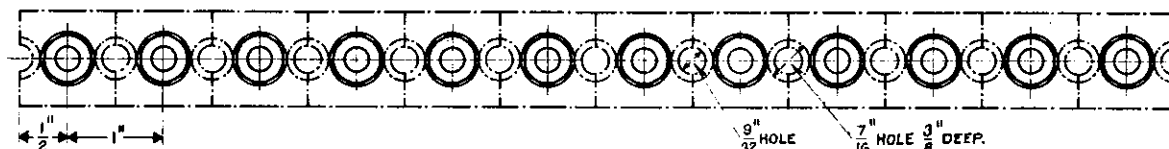
SINGLE ROW WITH CONNECTOR BUS.



FACE TO FACE FOR USE WITH 1 INCH CONNECTORS.



SPACED FOR 2 3/8 INCH CONNECTORS.



51311 MULTIPLE UNIT TERMINAL BLOCK. COMPLETE

A.A.R. SIG. SEC. OCT. 1940
STORES CAT. REF. NO. 2-A-4110

NOTE:
1. MATERIAL FOR TERMINAL BLOCKS, WASHERS, NUTS AND BINDING POSTS SHALL BE IN ACCORDANCE WITH A.A.R. SIG. SEC. SPECIFICATIONS NO. 159 AND NO. 193.

REVISIONS

REDRAWN FROM APPROVED PLAN
S-513-E, DATED AUG. 4, 1920, LAST
REVISED OCT. 23, 1934 AND REVISED.

1 SHEET



S-513-F

THE PENNSYLVANIA RAILROAD

STANDARD

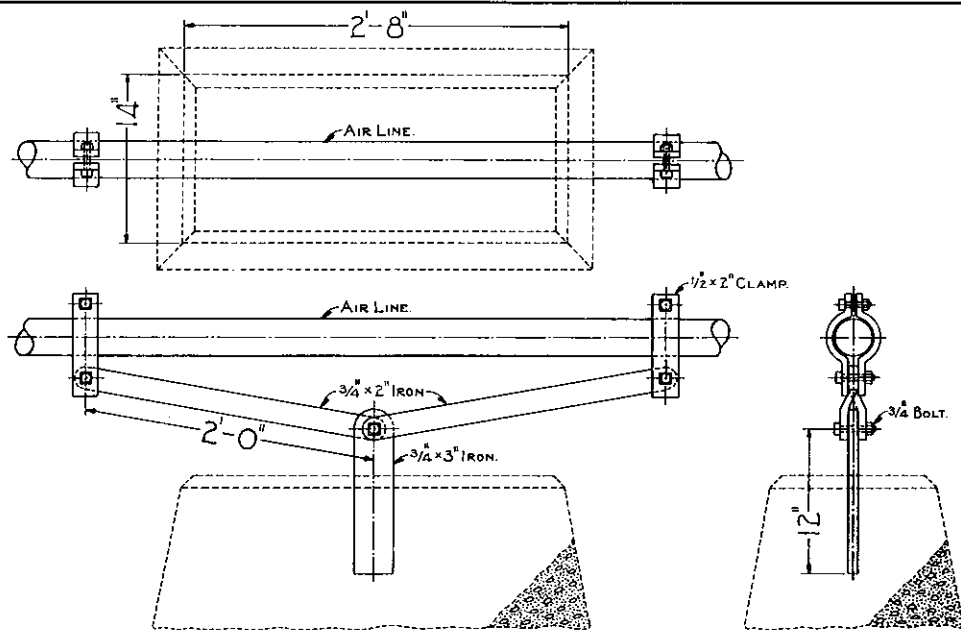
TERMINAL BLOCKS

MULTIPLE UNIT

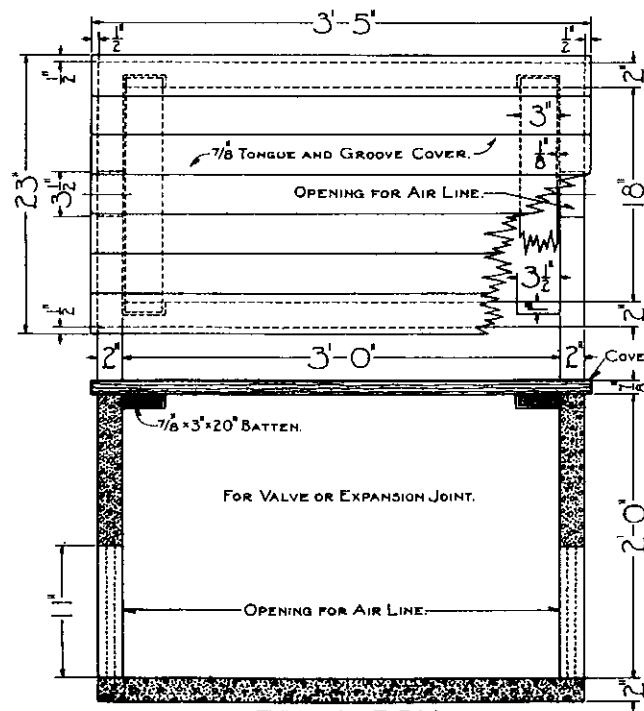
OFFICE OF CHIEF ENGINEER, PHILA., PA. MAY 14, 1940.

Approved
Assistant Chief Engineer-Signals

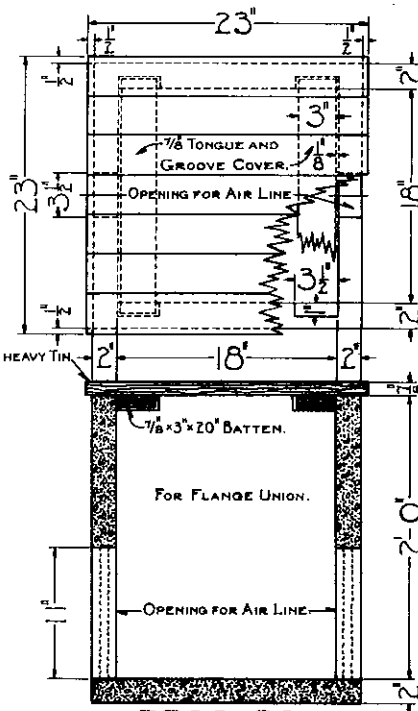
Approved
Chief Engineer



5501-ANCHOR.



5502-BOX.
HALF SECTION.



5503-BOX.
HALF SECTION.

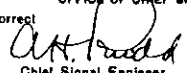
REVISIONS.

1 SHEET

S-550-A

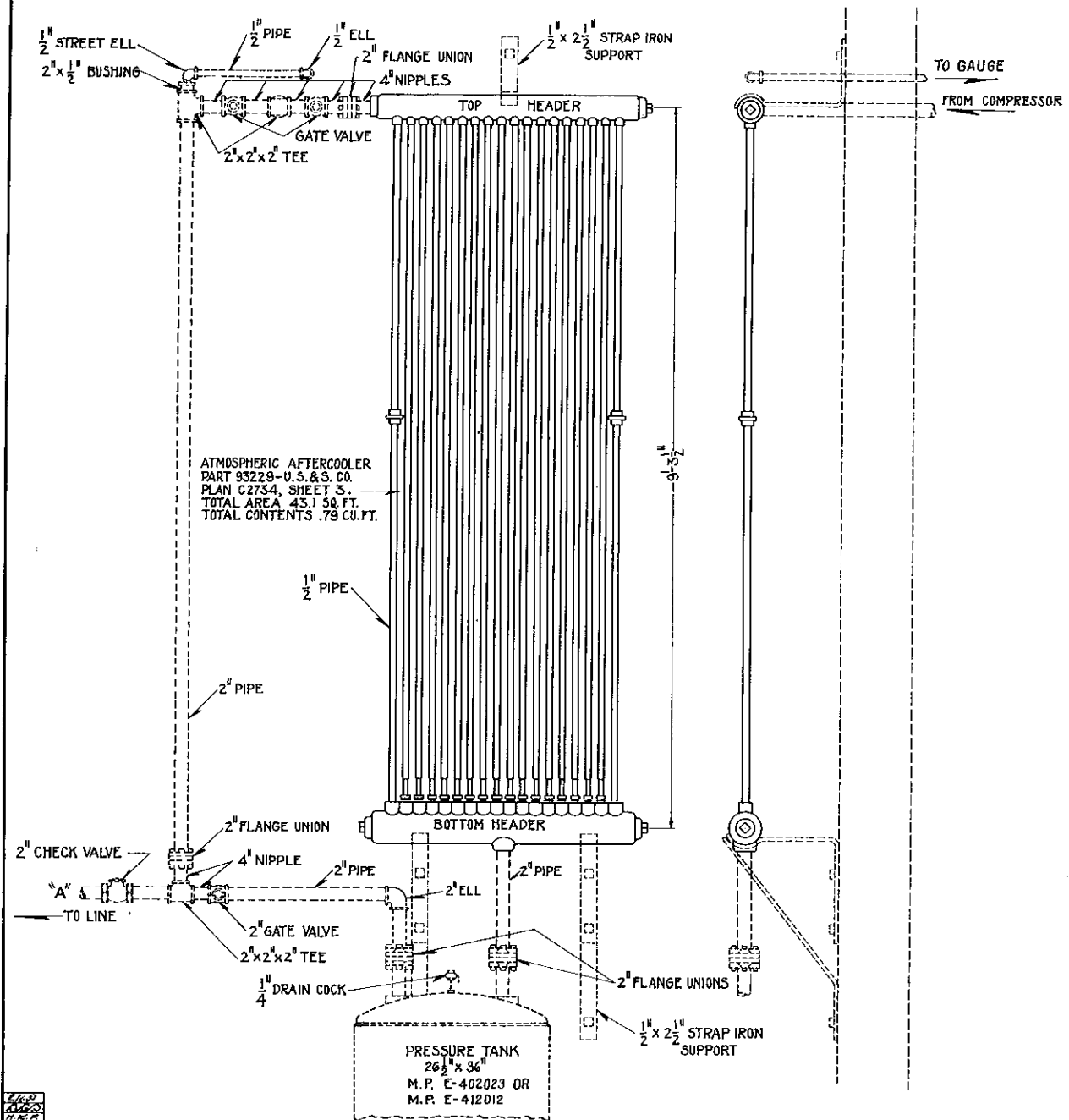

PENNSYLVANIA RAILROAD SYSTEM
STANDARD
ANCHOR AND BOXES
FOR AIR LINE

OFFICE OF CHIEF SIGNAL ENGINEER. PHILA., PA., FEB. 7, 1923

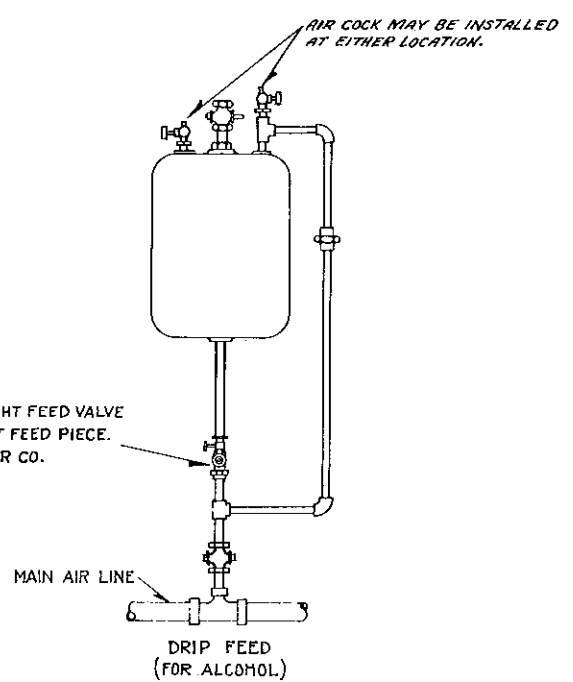
Correct

Chief Signal Engineer

Approved

Chief Engineer



1/2" - FIG. 956 MOD. HEAVY SIGHT FEED VALVE
WITH EXTRA HEAVY SIGHT FEED PIECE.
THE LUNKENHEIMER CO.



NOTE:-
1- PLACE DRIP FEED IN MAIN AIR LINE CLOSE TO POINT 'A'.
2- ATMOSPHERIC AFTERCOOLER SHALL CONSIST OF TOP AND BOTTOM HEADERS WITH 18 CONNECTING 1/2" PIPES, PROPERLY FITTED.
3- AFTERCOOLER SHOWN PROVIDES SUFFICIENT COOLING SURFACE FOR COMPRESSORS HAVING CAPACITY UP TO 50 C.F.M. (PISTON DISPLACEMENT).

REVISIONS
REDRAWN FROM APPROVED PLAN S-558-A DATED 10-23-22 AND REVISED.
C APRIL 23, 1934.
APPROVED: <i>[Signature]</i>
D SEPTEMBER 15, 1937. C.D.
APPROVED: <i>[Signature]</i>

1 SHEET
S-558-D



THE PENNSYLVANIA RAILROAD
STANDARD
**ATMOSPHERIC AFTERCOOLER
AND DRIP FEED**

OFFICE OF CHIEF SIGNAL ENGINEER, PHILA., PA. JUNE 20 1927

Approved: *[Signature]*
Chief Signal Engineer

Approved: *[Signature]*
Chief Engineer

RULE	INDICATION	NAME	FIGURE					
			A	B	C	D	E	F
280	PROCEED; MANUAL BLOCK CLEAR.	CLEAR-BLOCK						
281	PROCEED.	CLEAR						
282	PROCEED APPROACHING NEXT SIGNAL AT MEDIUM SPEED. NOTE-TRAINS MAY PROCEED APPROACHING NEXT SIGNAL AT NOT EXCEEDING 45 MILES PER HOUR AT SIGNALS DISPLAYING A YELLOW TRIANGLE OUTLINED IN BLACK.	APPROACH-MEDIUM						
283	PROCEED; MEDIUM SPEED WITHIN INTERLOCKING LIMITS. NOTE-TRAINS MAY PROCEED AT NOT EXCEEDING 45 MILES PER HOUR AT SIGNALS DISPLAYING A YELLOW TRIANGLE OUTLINED IN BLACK.	MEDIUM-CLEAR						
285	PROCEED PREPARED TO STOP AT NEXT SIGNAL. TRAIN EXCEEDING MEDIUM SPEED MUST AT ONCE REDUCE TO THAT SPEED.	APPROACH						
285 A	TRAIN EXCEEDING MEDIUM SPEED MUST AT ONCE REDUCE TO THAT SPEED. WHERE A FACING SWITCH IS CONNECTED WITH THE SIGNAL, APPROACH THAT SWITCH PREPARED TO STOP. APPROACH NEXT SIGNAL PREPARED TO STOP.	CAUTION						
287	PROCEED; SLOW SPEED WITHIN INTERLOCKING LIMITS.	SLOW-CLEAR						
288	PROCEED PREPARED TO STOP AT NEXT SIGNAL. SLOW SPEED WITHIN INTERLOCKING LIMITS.	SLOW-APPROACH						
289	BLOCK OCCUPIED; FOR PASSENGER TRAINS, STOP; FOR TRAINS OTHER THAN PASSENGER TRAINS, PROCEED AT REDUCED SPEED, BUT NOT EXCEEDING THIRTY MILES PER HOUR.	PERMISSIVE-BLOCK						
290	PROCEED AT RESTRICTED SPEED.	RESTRICTING						
291	STOP; THEN PROCEED AT RESTRICTED SPEED. NOTE-FREIGHT TRAINS OF 90 OR MORE CARS OR HAVING TONNAGE OF 80% OR MORE OF THE PRESCRIBED ENGINE RATING MAY PROCEED AT RESTRICTED SPEED WITHOUT STOPPING AT SIGNALS DISPLAYING A YELLOW DISK ON WHICH IS SHOWN THE LETTER 'G' IN BLACK.	STOP-AND-PROCEED						
292	STOP.	STOP-SIGNAL						
293	LIMIT OF THE BLOCK. NOTE-FIG. A- YELLOW LIGHT TO BE PLACED NEXT TO TRACK GOVERNED.	BLOCK-LIMIT						
293 A	PROCEED PREPARED TO STOP AT NEXT BLOCK-LIMIT SIGNAL. TRAIN EXCEEDING MEDIUM SPEED MUST AT ONCE REDUCE TO THAT SPEED. NOTE- WILL NOT APPLY TO TRAINS AUTHORIZED TO PASS THE BLOCK-LIMIT STATION AS THOUGH CLEAR-BLOCK SIGNAL WERE DISPLAYED.	APPROACH BLOCK-LIMIT						
294	ORDERS. NOTE-FIG. A - BY DAY THE YELLOW LAMP IS NOT DISPLAYED. NOTE-FIG. B - TO APPLY TO TRAINS GOVERNED BY FIXED SIGNAL UNDER WHICH LOCATED.	TRAIN-ORDER						

NOTE:-

IN THE ILLUSTRATION OF TYPICAL ASPECTS, RULES 280 TO 294, INCLUSIVE:

R - RED
P - PURPLE
Y - YELLOW
G - GREEN

SPEEDS

MEDIUM SPEED - NOT EXCEEDING ONE-HALF THE SPEED

AUTHORIZED FOR PASSENGER TRAINS BUT NOT EXCEEDING 30 MILES PER HOUR.

REDUCED SPEED - PREPARED TO STOP SHORT OF TRAIN OR OBSTRUCTION.

SLOW SPEED - NOT EXCEEDING 15 MILES PER HOUR.

RESTRICTED SPEED - NOT EXCEEDING 15 MILES PER HOUR PREPARED TO STOP SHORT OF TRAIN, OBSTRUCTION OR SWITCH NOT PROPERLY LINED AND TO LOOK OUT FOR BROKEN RAIL.

REVISIONS

REDRAWN FROM APPROVED PLAN S-602-P, DATED JANUARY 5, 1938 AND REVISED.
H. SEPTEMBER 10, 1942. INDICATION FOR RULE 285 AMENDED. APPROVED *N. L. Stanton*
I. JUNE 7, 1944. RULE 285 A ADDED. APPROVED *N. L. Stanton*
J. AUGUST 20, 1944. RULES 282 & 283 CORRECTED. NOTE ADDED EFFECTIVE 3-15-45. APPROVED *N. L. Stanton*
K. MARCH 14, 1945. NOTE FOR RULE 283 CORRECTED. APPROVED *N. L. Stanton*

1 SHEET



S-602-K

THE PENNSYLVANIA RAILROAD

STANDARD

SIGNAL ASPECTS

OFFICE OF CHIEF ENGINEER, PHILA., PA., JULY 12, 1941.

Approved *N. L. Stanton*
Assistant Chief Engineer-Signals

Approved *W. J. Senger*
Chief Engineer

INSTRUMENTS AND APPARATUS		DESIGNATION		EXAMPLES & EXPLANATIONS.
		P.R.R.	A.A.R.	
AUXILIARY CIRCUIT CONTROLLERS		SC	CC	15C, 25C — 16C, 26C
AUTOMATIC SHORT ARM GATES		G	XG	16, 26 - 1XG, 2XG (26A, 26B - 2XGA, 2XGB TWO GATES ON SAME SIDE)
AUTOMATIC SHORT ARM GATE LIGHTS		GA, GB, GS		16A, 16B, 16S (5 - STEADILY BURNING LAMP)
BATTERY DESIGNATIONS	CABIN OR CENTRAL LOCATIONS	M, MI, MZ		B(M), C(M), B(MI), C(MI)
	HOME SIGNAL LOCATIONS	HA, HB, 26L		B(HA), C(HA), B(26L), C(26L) - 26L IS DESIGNATION OF INSTRUMENT CASE
	DISTANT & AUTOMATIC SIGNAL LOCATIONS	731, 834		B(731), C(731), B(834), C(834) - NUMBER IS TAKEN FROM SIGNAL NUMBER.
	HIGHWAY CROSSING AND CUT-SECTION LOCATIONS	741, 824		B(741), C(741) - 741, 824 - LOCATION NUMBER TAKEN FROM NEAREST MILE POST
	COMMONS TO DISTANT SIGNAL LOCATION AND BEYOND.	CE	EG	COMMONS TO THE EAST
		CW	WC	" " " WEST
		CN	NC	" " " NORTH
		CS	SC	" " " SOUTH
ELECTRIC SWITCH LOCKS		WK	WL	AWK, 17WK, 19WKA, 19WKB
HIGHWAY CROSSING SIGNALS	CROSSING BELLS	VB	XX	1VB, 2VB - 1XX, 2XX
	FLASHING LIGHT SIGNALS	CL		1CL, 2CL
	LAMP UNITS ON FLASHING LIGHT SIGNALS	CLA, CLB, CLC, CLD		1CLA, 1CLB, 1CLC, 1CLD 2CLA, 2CLB, 2CLC, 2CLD USE ODD NUMBERS NORTH OR WEST OF TRACK, EVEN NUMBERS SOUTH OR EAST OF TRACK.
INDICATION LIGHTS		EL	K	2APEL, 26LEL, 5FL — 2RAK, 26LAK, 5K
INDICATION LOCKS		K	M OR L	2K, 4K - 2M, 4L (SEE SH. 5) WHERE ONE LOCK IS USED ON LEVER
		SK	M	4SK - 4M - SIGNAL INDICATION LOCK
		TK	FL	4TK - 4FL - TRAFFIC LOCK
		NK	NM	3NK - 3NM - NORMAL IND. LOCK
		RK	RM	3RK - 3RM - REVERSE IND. LOCK
		DK	L	3DK - 3L - DETECTOR LOCK
PANEL TYPE BLOCKING DEVICE		W, E, N, S		1W, 1E, 2W, 2E 1S, 1N, 2S, 2N W, E, N, S - WEST, EAST, NORTH OR SOUTH SIDE OF PANEL TURNBUTON IS LOCATED
SIGNALS		A, B, C, D		2RA, 2RB, 2RC 8LA, 8LB 26A, 26B, 26C SIGNAL NUMBER FOLLOWED BY A, B, C, ETC. FOR EACH ARM AND SIGNAL CONTROLLED BY SAME LEVER OPERATION.
SIGNAL LIGHT WIRES		L	E	2RASL, 2RAHL, 2RAJL — 2RARE, 2RAHE, 2RADE
SIGNAL REPEATING INDICATORS		M	GK	1M, 2M, 8RM — 1RGK, 2HGK (SEE SH. 4)
SMASHBOARDS		5B		45B, 65BA, 65BB
SPRING COMBINATION (CROSS REFERENCES WHERE JUMPER'S ARE NOT SHOWN)		X7-22L		X = JUMPER; 7 = LEVER TO WHICH JUMPER GOES; 22 = GROOVE TO WHICH JUMPER GOES; L = SIDE OF BAND JUMPER IS CONNECTED TO.
TIME RELEASES		SR	TE	SR, ASR, BSR, 2SR, 6RSR, 8LSR — 2TE, 6RIE
TORPEDO PLACING MACHINES		TP		1TP, 2TP - 1 & 2-TRACK NUMBERS
TRACK INSTRUMENTS		T, TE, TW		1TE, 1TW - ONE DIRECTION, 1T, 2T - TWO DIRECTIONS
TRACK RELAY LOCALS		TL	TQ	4TL, 7TL, 118TL, 141-3TL — 118TQ, 141-3TQ
TRAFFIC LOCK INSTRUMENTS (WHERE TRAFFIC LEVERS ARE NOT AVAILABLE)		F	FL	1F, 2F, 3EF, 3WF — 1FL, 3EFL
TRAIN ORDER SIGNALS		TO		ATO, BTO
TRAIN STOPS		TS	V	04LTS, W27TS — 04LV, W27V

RELAYS		DESIGNATION		EXAMPLES & EXPLANATIONS
		P.R.R.	A.A.R.	
AIR PRESSURE INDICATION RELAYS		AP20M	AP20PSR	RELAY RELEASES WHEN AIR PRESSURE DROPS BELOW 20 POUNDS.
		AP45M	AP45PSR	RELAY RELEASES WHEN AIR PRESSURE DROPS BELOW 45 POUNDS.
A.P.B. DIRECTIONAL RELAYS		S	SR	269S, 270S, 1E5 — 269SR, 270SR, 1E5R
APPROACH RELAYS		P	AR	2LP - 2LAR (WHERE APPROACH SECTIONS ARE INDICATED INDEPENDENTLY, PREFIX SHALL BE THE SIGNAL NUMBER WHICH RELAY INDICATES APPROACH THERETO: 2LP, 21AP - 2LAR, 21AR)
CALLING-ON RELAYS		CR	CO5R	21CR, 8RCR, 12CR — 21CO5R, 8RCO5R, 12CO5R
DIRECTION SELECTING RELAYS		D5	FR	346DS, 364-DS - 346FR, 364-FR (WHERE MORE THAN ONE RELAY IS REQUIRED IN A BLOCK, 346BSA, 346DSB - 346FRA, 346FRB)
DRAGGING EQUIPMENT DETECTOR RELAYS	DETECTOR RELAY	DTR	DEDR	1DTR, 2DTR - 1DEDR, 2DEDR
	DETECTOR LINE RELAY	DTM	DEDR	1DTM, 2DTM - 1DEDR, 2DEDR
	RESTORE RELAY	DTMU	PB5R	1DTMU, 3DTMU, 1PB5R, 3PB5R
HIGHWAY CROSSING SIGNALS AND AUTOMATIC SHORT ARM GATES	BELL CONTROL RELAY	VBR	XXR	1VBR, 2VBR - 1XXR, 2XXR
	CROSSING SIGNAL CONTROL RELAY	XR	XPR	1XR FOR ONE CROSSING - 2XR AND 3XR FOR SECOND AND THIRD CROSSINGS.
	CUT-OUT RELAYS	COR	PB5R	1COR, 2COR - 1PB5R, 2PB5R
	DIRECTIONAL (SLOW-RELEASE) RELAYS	EM, WM, NM, SM	EX5R, WX5R	2EM, 2WM - 2EX5R, 2WX5R (WHERE MORE THAN ONE CROSSING IS INVOLVED - 2EMA, 2WMA - 2EX5RA, 2WX5RA)
	FLASHER RELAYS	LR	EOR	WHERE MORE THAN ONE CROSSING IS INVOLVED, LRA, LRB - EORA, EORB, ETC.
	GATE CLEARING RELAY	GTNR	XGNR	1GTNR, 2GTNR - 1GNR, 2GNR
	GATE DELAY RELAY	GTR	XGNRPR	1GTR, 2GTR - 1GNRPR, 2GNRPR
	INTERLOCKING RELAYS	EM, WM	EXR, WXR	1EM, 1EMA - 1EXR, 1EXRA (WHERE RELAY IS CONNECTED DIRECT TO TRACK IT SHALL TAKE DESIGNATION OF TRACK SECTION TO WHICH IT IS CONNECTED)
	LINE CONTROL RELAYS	CLR	ETPR, WTPR	1CLR, 1CLR (E INDICATES RELAY CONTROLS FOR EASTWARD MOVEMENT, IETPR, INTPR (E & W - REPEATS SECTIONS EAST AND WEST)
	INDICATION LIGHT RELAYS	ELR	KR	4RKELR, 7TELK, 9ELR - 4RKLR, 7TKR, 9KR

NOTE:
A.A.R. CIRCUIT NOMENCLATURE SHALL BE USED FOR ALL NEW WORK AND EXTENSIVE RENEWALS.
FOR COMPLETE A.A.R. CIRCUIT NOMENCLATURE SEE SHEETS 4 AND 5

REVISIONS

OCTOBER 3, 1949.
A.A.R. CIRCUIT NOMENCLATURE ADDED.
APPROVED:
J. J. Salmon
SUPERSEDES APPROVED PLAN S-802 DATED 4-16-23.

SHEET 1 OF 5

S-802



THE PENNSYLVANIA RAILROAD STANDARD DESIGNATION OF INSTRUMENTS & APPARATUS INDICATED ON SIGNAL CIRCUIT PLANS

OFFICE OF CHIEF ENGINEER,
PHILA., PA., MAY 5, 1947.

APPROVED:
J. J. Salmon
ASST. CHIEF ENGINEER, T.C.S.

APPROVED:
J. J. Salmon
CHIEF ENGINEER

RELAYS		DESIGNATION P.R.R. A.A.R.		EXAMPLES & EXPLANATIONS
OVERLOAD RELAYS		OR		3-OR, 5-OR
POLE-CHANGING RELAYS		PCR		1PCR, 6RPCR, 8LPCR, 10PCR
POWER-OFF RELAYS		POR		POR - (WHERE MORE THAN ONE RELAY IS REQUIRED: PORa, PORb.)
POWER-OFF REPEATING RELAYS		PORM	PORPR	PORM - (WHERE MORE THAN ONE RELAY IS REQUIRED: PORMa, PORMb - PORPRa, PORPRb)
REPEATING RELAYS		M	PR	9TM, 23NM, 23RM - 9TPR, 23NLP, 23RLP 7TMA, 7TMB, 7TMC - 7TPR, 7TPR, 7TPPR
ROUTE LOCKING RELAYS		E W	ESR WSR	3E, 5W - 3ESR, 5WSR. (E AND W INDICATES DIRECTION, LIKEWISE NORTH AND SOUTH)
ROUTE SELECTING RELAYS		HM	BPR	2HM - 2BPR - REPEATER OF TRACK SECTION BEYOND INTERLOCKING WITH NECESSARY SELECTION MAY BE USED WHERE TWO OR MORE SIGNALLED ROUTES ARE INVOLVED.
SIGNAL CONTROL RELAYS	HOME SIGNAL - APPROACH OR PERM.	H	HR	4RAH, 6LAH - 4RAHR, 6LAHR
	HOME SIGNAL - SLOW-APPROACH	HA	HAR	6LBHA - 6LBHAR
	HOME SIGNAL - RESTRICTING	HB	HBR	6LBHB - 6LBHBR
	HOME SIGNAL - STOP & PROCEED	N	NR	4RBN, 6LBN - 4RBNR, 6LBNR
	HOME SIGNAL - CLEAR	J	DR	4RAJ, 4RBJ WHERE SEPARATE RELAY IS USED 4RADR, 4RDDR FOR EACH ARM 4RJ - 4RDR WHERE ONE RELAY IS USED
	DISTANT AND APR-MEDIUM AUTOMATIC SIGNALS OR CLEAR	J	DR	395J, 430-J, 430-2J - 395DR, 430-IDR, 430-2DR
	POLARIZED APPROACH AND CLEAR CONTROL RELAYS	HJ	HDR	169HJ, 170-1HJ, 170-2HJ - 169HDR, 170-1HDR, 170-2HDR
SIGNAL LOCK RELAYS		KR	RGPR	4LKR - 2MARGPR (LINE REPEATING RELAYS)
SLOW ACTING RELAYS		SA	PR	169HJA - 169HDP 395TSA - 395TPR USE FOR BOTH SLOW-RELEASE AND SLOW PICKUP RELAYS, SYMBOL COVERING CHARACTERISTICS.
SMASHBOARD CONTROL RELAYS		SBR		65BNR - FOR NORMAL DRIVE (STOP)
		SBR		65BRR - FOR REVERSE DRIVE (CLEAR)
		SBR		65BR - WHERE CLEAR DRIVE ONLY IS PROVIDED
SPECIAL RELAYS		T	Z	1T, 2T - WHERE USED FOR DESIGNATED TRACK.
		U		6U, 10RU - WHERE USED IN CONNECTION WITH SIGNAL LEVER Z - USE FOR ANY SPECIAL TERM (TO BE NOTED ON PLAN)
SWITCH REPEATING RELAYS		SS	WPR	35S - 3WPR DIRECT REPEATER OF SWITCH.
		SSA, SSB	WPRA, WPB	35SA, 35SB - 3WPRA, 3WPB MULTIPLE REPEATERS
		SSNM	NWPR	355NM - 3NWPR NEUTRAL REPEATERS (N = NORMAL)
		SSRM	RWPR	355RM - 3RWPR REPEATER, R = REVERSE REPEATER
TIME ELEMENT RELAYS		TER		1TER, 4TER, 6TER (L = LONG TIME), 6TER (S = SHORT TIME)
TIME ELEMENT REPEATING RELAYS		TEM	TEPR	1TEM, 4TEM - 1TEPR, 4TEPR
TIME ELEMENT CHECK CONTACT REPEATING STICK RELAYS		TES	TESR	1TES, 4TES - 1TESR, 4TESR
TIME LOCKING STICK RELAYS		KM	MPSR	4RKM, 6LKM, 10KM - 4RMPSR, 6LMPSR, 10MPSR
TORPEDO PLACING MACHINE RELAYS	CONTROL RELAY	TPS		2TPS, 4TPS
	FIRING INDICATION RELAY	TPNM		2TPNM, 4TPNM
	REVERSE MOVEMENT RELAY	E, W		2RE, 6LW
	SIGNAL RETAINING STICK RELAY	TPWS, TPES		2TPWS, 4TPES
TRACK RELAYS		TR		7TR, 395TR, 430-ATR - TRACK RELAYS SHALL TAKE DESIGNATION OF TRACK CIRCUIT TO WHICH THEY ARE CONNECTED. (SEE PLANS 5-801)
TRACK INDICATING RELAYS		A	HSR	2RA, 6LA, 10A - 2RHSR, 6LHSR, 10HSR
STICK RELAY REPEATING TRACK RELAY		TS	TPSR	9TS, 41TS - 9TPSR, 41TPSR
TRAFFIC RELAYS		FR		BEFR, 6WFR, 14EFR, 14WFR
TRAIN ORDER SIGNAL CONTROL RELAYS		TOR		4TOR, 8TOR
TWO-RATE CHARGE RELAYS		TRCR		TRCR - WHERE MORE THAN ONE RELAY IS REQUIRED - TRCRA, TRCRB

INSTRUMENTS & APPARATUS		DESIGNATION P.R.R. A.A.R.		EXAMPLES & EXPLANATIONS
ARC SUPPRESSOR		AS		10TAS, 20TAS
CODE CONTROL RELAY		V	VR	1V, 7TV, 9TV, 9TVW
		H	HR	395H, 430-1H, 430-2H - 395HR, 430-1HR, 430-2HR
		CD	CDR	110LCD -
		SA	TPR	15A, 25A - CUT-SECTION 5
CODE DETECTING RELAYS		BJ	BDR	395BJ, 430-1BJ - 395BDR, 430-1ADR, 120 CODE
		J AJ	DR ADR	15TJ, 430-1AJ, - 157DR, 430-1ADR, 180 CODE
CODE DETECTING UNIT		CDU		1CDU, 2CDU
CODE FOLLOWING TRACK RELAY		TR		7TR, 395TR, 430-ATR
CODE FOLLOWING TRACK REPEATING RELAY		FSA	TFPR	1FSA, 2FSA - FRONT CONTACT REPEATERS
		B5A	TBPR	1B5A, 2B5A - BACK CONTACT REPEATERS
CODE TRANSMITTER		CT		CTA, CTB, 75CT, 120CT, 180CT
CODE TRANSMITTER REPEATER		CTM	CTPR	1CTM, 2CTM
DECODING TRANSFORMER		DT		1DT, 2DT, 430-IDT
DECODING UNIT		DU		120DU, 180DU
FREQUENCY CONVERTER		FC		1FC, 117FC
IMPULSE RELAY		IR		395IR, 430-ATR
IMPULSE TRANSFORMER		IT		395IT, 430-ATR
LOCKOUT RELAY		LOR		395LOR, 430-AILOR
RELAY - RETURN CODE CONTROLLED		AP	ATPR	395TAP
RESONANT TRANSFORMER RECTIFIER UNIT		RTR		4LRT, 25RTR
REVERSIBLE CODED TRACK RELAY		TR		WTR, ETR, 5XTR, NXTR
STEADY ENERGY DETECTOR RELAY		TRA5		67TRAS, 78TRAS
TRACK RELAY - RETURN CODE		AR	ATR	1TAR, 395TAR
TRACK TRANSFORMER		TT		XITT, 395TT
TRACK TRANSFORMER-PRIMARY CODE		TP		XITP, 395TP
TUNED ALTERNATOR		TA		1TA, XITA, 395TA

NOTE:
A.A.R. CIRCUIT NOMENCLATURE SHALL BE USED FOR ALL
NEW WORK AND EXTENSIVE RENEWALS.
FOR COMPLETE A.A.R. CIRCUIT NOMENCLATURE SEE SHEETS 4 AND 5.

REVISIONS

OCTOBER 3, 1949.
A.A.R. CIRCUIT NOMENCLATURE ADDED.
APPROVED:
H. J. Salmon
SUPERSEDES APPROVED
PLAN 5-802, DATED 4-16-23.
DESIGNATIONS FOR CODED
TRACK CIRCUITS ADDED.

SHEET 2 OF 5

5-802



THE PENNSYLVANIA RAILROAD STANDARD DESIGNATION OF INSTRUMENTS & APPARATUS INDICATED ON SIGNAL CIRCUIT PLANS

OFFICE OF CHIEF ENGINEER,
PHILA., PA., MAY 5, 1947.

APPROVED:

H. J. Salmon
ASST. CHIEF ENGINEER, T-C-5.

APPROVED:

H. J. Salmon
CHIEF ENGINEER

C.T.C. AND ALL-RELAY INSTALLATIONS				
INSTRUMENTS & APPARATUS	DESIGNATION		EXAMPLES & EXPLANATIONS	
	P.R.R.	A.A.R.		
CARRIER CONTROL (100 CYCLE) RELAY FOR ELECTRIC SWITCH LOCKS	LWKR	WL R	3LWKR, 7LWKR - 3WLR, 7WLR	
CODE RECEIVING OR LEVER REPEATING STICK RELAYS	SIGNALS	H S	H S R	2RH S, 2LH S, 110RH S, 110LH S - 2RH S R, 2LH S R
	BLOCK SIGNALS (PERM.)	PH S	PH S R	95RPH S, 97LPH S - 95RPH S R
	BLOCK SIGNALS (CLEAR)	CH S	CH S R	95RCH S, 97LCH S - 95RCH S R
	CALLING-ON SIGNALS	CR	COR	2CR, 110CR - 2COR
	D.E.D. RESTORE	DTM S	DED S R	1080DTM S, 1400TM S - 1080DED S R
	ELECTRIC SWITCH LOCKS	WKS	WLS R	89WK S, 121WK S - 89WLS R
	MAINTAINER'S CALL	MC	MCR	59MC, 59MCR
	SWITCHES	NWS, RWS	NWSR, RWSR	3NWS, 3RWS - 3NWSR, 3RWSR (N-NORMAL, R-REVERSE)
	TRAFFIC	F S	F S R	8EFS, 8WFS, 10NFS, 10SFS E, W, N, S = DIRECTION.
	TROLLEY SECTIONALIZING SW'S.	OS, GS		22-OS, 22-GS O = OPEN, C = CLOSED
DIRECTION SELECTION RELAYS	DS	FR	1EDS, 1WD S, 2EDS, 2WD S - 1EFR, 1WFR	
DIRECTION STICK RELAYS	S	SR	82RS, 82LS - 82RSR	
ROUTE CHECK NETWORK	HSM	HSPR	110RHSM, 110LHSM - 110RHSPR	
SIGNAL INDICATION STICK RELAYS	KM	ASR	2RKM, 2LRM, 110RKM, 110LKM - 2RASR, 2LASR	
SPECIAL STICK RELAYS	TS	TKSR	21S, 26TS - 27KSR	
SPECIAL TRAFFIC CHECKING RELAYS	F, FS	FR, FSR	1TWF, 1TWFS, 2TEF 2EFS - 1WFR, 1WFSR	
SPECIAL REPEATING RELAY FOR ELEC. SW. LOCKS	WKS	WLSR	3WKS, 7WK S - 3WLSR, 7WLSR	
SWITCH INDICATION LOCK RELAYS	KM	LR	105KM, 107KM - 105LR, 107LR	
SWITCH (3S & WR) AGREEMENT RELAYS	NM, RM	NWCR, RWCR	3NM, 3NMA, 3NMB, 3RM, 3RMA, 3RMB - 3NWCR, 3RWCR	
TIME ELEMENT CONTROL RELAYS	LRKM	ASPR	2LRKM, 26LRKM - 2ASPR, 26ASPR	
TIME ELEMENT SELECTION RELAYS	S, ST	STR	112S, 112ST (ST = SHORT TIME) - 112STR	
TIME ELEMENT RELAYS	TER, 5TER, LTER		26TER, 265TER (SHORT TIME), 26LTER (LONG TIME)	
TRAFFIC INDICATION LOCK RELAYS	KM	FLR	110KM, 115KM - 110FLR, 115FLR	
TROLLEY SECTIONALIZING SWITCH IND. RELAY	OK, CK		22-OK, 22-CK O = OPEN, C = CLOSED	

G.T.C. MACHINE NETWORK			
INSTRUMENTS & APPARATUS	DESIGNATION		EXAMPLES & EXPLANATIONS
	P.R.R.	A.R.R.	
D.E.D. INDICATING RELAYS	DTK	DEK	124DTK - 124DEK.
"L" SIGNAL CONTROL RELAYS	LG		142LG
"R" SIGNAL CONTROL RELAYS	RG		142RG
NORMAL SIGNAL CONTROL RELAYS	NG		142NG
"L" SIGNAL INDICATING RELAYS	LHK		142LHK
"R" SIGNAL INDICATING RELAYS	RHK		142RHK
SWITCH INDICATING RELAYS	WK		141NWK 141RWK (N= NORMAL, R= REVERSE).
SWITCH LOCK CONTROL RELAYS	WLP		134WLP
SWITCH LOCK INDICATION RELAYS	K	WLK	141K - 141WLK
TRACK INDICATING RELAYS	TK		141TK, 134ETK, 134NTK
TRAFFIC CONTROL RELAYS	LP	FLP	134LP - 134FLP
TRAFFIC INDICATING RELAYS	FK		134EFK, 134WFK

NOTE :
A.A.R. CIRCUIT NOMENCLATURE SHALL BE USED FOR ALL
NEW WORK AND EXTENSIVE RENEWALS.
FOR COMPLETE A.A.R. CIRCUIT NOMENCLATURE SEE SHEETS 4 AND 5.

REVISIONS

OCTOBER 3, 1949.
A.A.R. CIRCUIT NOMENCLATURE ADDED.
APPROVED:
H. G. Salmonson

SHEET 3 OF 5

S-802



THE PENNSYLVANIA RAILROAD
STANDARD

**DESIGNATION OF INSTRUMENTS & APPARATUS
INDICATED ON SIGNAL CIRCUIT PLANS**

OFFICE OF CHIEF ENGINEER,
PHILA. PA. MAY 5, 1947.

APPROVED:

APPROVED:
A. Griffiths

ASST. CHIEF ENGINEER, T.C.-5.

APPROVED

J. H. Henshaw

CHIEF ENGINEER

A.S.D.
RICH.

TABLE OF MEANING OF LETTERS DESCRIPTIVE AND DESIGNATIVE TERMS

A - APPROACH
B - BLOCK - BUTTON - POSITIVE ENERGY - BRIDGE - BACK
C - COMMON - CHANGER - COUNTER - CORRESPONDENCE - CIRCUIT
D - CONTROLLER - CODE - CHECKING - CONTACTS - CHANGE
E - PROCEED INDICATION OF A SIGNAL - DETECTOR - DECODING - DRAGGING
F - EAST - EASTWARD - ELECTRIC LIGHT - ELEMENT - EQUIPMENT - ELECTRONIC
G - TRAFFIC - FRONT - FREQUENCY
H - GREEN - SIGNAL (OPERATING MECHANISM) - GROUND - GATE
I - HOME - APPROACH INDICATION OF A SIGNAL
J - SKATE - DUAL CONTROL
K - INDICATOR
L - LEFT - LOCK PREVENTING INITIAL MOVEMENT OF A LEVER FROM NORMAL OR REVERSE POSITION - LOCKING - LEVER - LIGHT
M - SPLIT BATTERY - LOCK VALVE - LOCK
N - LOCK PREVENTING FINAL OR INDICATING MOVEMENT OF A LEVER - MAGNETIC - MARKER - MANUAL
O - NORMAL - NORTH - NORTHWARD - NEGATIVE
P - ORDER - OPERATION - OFF - OVERLOAD - OUT - OVER
Q - POLE - POWER - PURPLE - PUSH - REPEATING - PRIMARY
R - LOCAL OR SECONDARY COIL (AS IN DOUBLE-ELEMENT RELAY OR MECHANISM)
S - RIGHT - RED - REVERSE - RELAY - POWER OPERATED CONTROLLER OR CONTACTOR - ROUTE - STOP INDICATION ON SIGNAL - RAIL
T - SOUTH - SOUTHWARD - STICK - STORAGE
U - TRACK - TIME - TRAIN - TELEPHONE - TRANSFORMER - TRANSMITTER
V - RETARDER - UNIT
W - TRAIN STOP (TRACK ELEMENT) - ELECTRO-PNEU. STOP VALVE
X - SWITCH (OPERATING MECHANISM) - WEST - WESTWARD - WHITE
Y - CROSSING - INTERLOCKING - BELL - BUZZER - A.C.
Z - SLOT - YELLOW - HOLD CLEAR
Z - USE FOR ANY SPECIAL TERM (TO BE NOTED ON PLAN)

IN ORDER TO DISTINGUISH BETWEEN RIGHT AND LEFT POSITION OF THREE-POSITION LEVERS, USE R (RIGHT) OR L (LEFT) AFTER THE LEVER NUMBER, AS 10R, 10L, WHEN ONE LEVER CONTROLS TWO OR MORE FUNCTIONS, USE LETTERS A, B, C, ETC., AFTER THE LEVER NUMBERS: FOR EXAMPLE, 10A, 10B, 10C, ETC.
IN CASE OF THREE-POSITION LEVERS CONTROLLING TWO OR MORE FUNCTIONS IN EACH POSITION, USE COMBINATIONS AS FOLLOWS: 10RA, 10LA, ETC.

EXAMPLES OF COMBINATIONS USED TO DESIGNATE WIRES AND OPERATED UNITS

ENERGY WIRES

(SUFFIX FIGURE SHOULD BE USED TO INDICATE VOLTAGES: FOR EXAMPLE, CX110 MEANING COMMON A.C. 110 VOLTS.)
C - COMMON D.C.
EC - COMMON EAST, MEANING D.C. FROM SYSTEM EAST, LIKEWISE NORTH, SOUTH AND WEST.
FC - COMMON TRAFFIC LOCKING
CX - COMMON A.C.
ENX - NEGATIVE ENERGY A.C. FROM POR FOR AN ELECTRIC LIGHT, OR EAST NEGATIVE A.C. ENERGY, LIKEWISE NORTH, SOUTH AND WEST.
NX - NEGATIVE A.C. ENERGY
BL - POSITIVE SIDE OF SPLIT BATTERY
NL - NEGATIVE SIDE OF SPLIT BATTERY
CL - COMMON OF SPLIT BATTERY
N - NEGATIVE D.C. ENERGY
B - POSITIVE D.C. ENERGY
EB - POSITIVE ENERGY EAST, LIKEWISE NORTH, SOUTH AND WEST
AB - BATTERY, SECOND BATTERY
BBB - BATTERY, THIRD BATTERY
BX - POSITIVE A.C. ENERGY
EBX - POSITIVE ENERGY A.C. FROM POR FOR AN ELECTRIC LIGHT, OR EAST POSITIVE A.C. ENERGY, LIKEWISE NORTH, SOUTH AND WEST

OPERATED UNITS RELATING TO TRACK CIRCUITS

T - TRACK SECTION
TR - TRACK RELAY
TPR - RELAY REPEATING TRACK RELAY
TPPR - RELAY REPEATING TRACK REPEATING RELAY
T3R - TRACK STICK RELAY
T3PR - RELAY REPEATING TRACK STICK RELAY
T4C - INDICATOR INDICATING CONDITION OF A TRACK CIRCUIT
T4SR - STICK RELAY REPEATING TRACK RELAY
BPR - BLOCK REPEATER RELAY, RELAY REPEATING THE TRACK CIRCUITS IN A BLOCK
BK - BLOCK INDICATOR

WIRES RELATING TO TRACK CIRCUITS

TB - TRACK POSITIVE - POSITIVE ENERGY TO RAIL
TN - TRACK NEGATIVE - NEGATIVE ENERGY TO RAIL
RB - RELAY POSITIVE - WIRE FROM POSITIVE RAIL TO RELAY
RN - RELAY NEGATIVE - WIRE FROM NEGATIVE RAIL TO RELAY
TQ - POSITIVE CONTROL OF LOCAL COIL, DOUBLE ELEMENT A.C. RELAY
WB - POSITIVE RAIL TO SWITCH CIRCUIT CONTROLLER
WN - NEGATIVE RAIL TO SWITCH CIRCUIT CONTROLLER

OPERATED UNITS RELATING TO SWITCHES

W - SWITCH OPERATING MECHANISM OR LOCK VALVE
WR - RELAY, CONTROLLER OR CONTACTOR CONTROLLING BOTH NORMAL AND REVERSE OPERATIONS OF A SWITCH OR AN ELECTRIC SWITCH LOCK.
WNR - RELAY, CONTROLLER OR CONTACTOR CONTROLLING THE NORMAL OPERATION OF A SWITCH OR AN ELECTRIC SWITCH LOCK
WRR - RELAY, CONTROLLER OR CONTACTOR CONTROLLING THE REVERSE OPERATION OF A SWITCH OR AN ELECTRIC SWITCH LOCK
WRPR - RELAY REPEATING WR
WNRPR - RELAY REPEATING WNR OR NORMAL POSITION OF WR
WRRPR - RELAY REPEATING WRR OR REVERSE POSITION OF WR
WPR - RELAY REPEATING POSITION OF SWITCH
WNPR - RELAY REPEATING NORMAL POSITION OF SWITCH OR NORMAL POSITION OF WR
RWPR - RELAY REPEATING REVERSE POSITION OF SWITCH OR REVERSE POSITION OF WR
WK - INDICATOR INDICATING THE POSITIONS OF A SWITCH
WL - SWITCH LOCK OPERATING MECHANISM ON A SWITCH
NWLPR - RELAY REPEATING NORMAL POSITION OF SWITCH LOCK
NJPR - RELAY REPEATING NORMAL POSITION OF DUAL-CONTROL LEVER
RJPR - RELAY REPEATING REVERSE POSITION OF DUAL-CONTROL LEVER
NWK - INDICATOR INDICATING THE NORMAL POSITION OF A SWITCH
RWK - INDICATOR INDICATING THE REVERSE POSITION OF A SWITCH
WAK - INDICATOR INDICATING THE CONDITION APPROACHING A SWITCH
RWLPR - RELAY REPEATING REVERSE POSITION OF A SWITCH LOCK
WGR - SWITCH CORRESPONDENCE RELAY

OPERATING UNITS RELATING TO SIGNALS

HR - RELAY CONTROLLING APPROACH INDICATION OF A THREE-POSITION SIGNAL OR THE PROCEED INDICATION OF A TWO-POSITION SIGNAL IN ONE-ARM SIGNALING
DR - RELAY CONTROLLING PROCEED INDICATION OF A SIGNAL
HDR - RELAY CONTROLLING APPROACH AND PROCEED INDICATION OF A SIGNAL
HPR - RELAY REPEATING HR OR APPROACH INDICATION POSITION OF HDR
H5R - HOME STICK RELAY CONTROLLING THE APPROACH INDICATION OF A SIGNAL
DPR - RELAY REPEATING DR OR PROCEED INDICATION POSITION OF HDR
RGPR - RELAY REPEATING SIGNAL MECHANISM AT STOP
HGPR - RELAY REPEATING SIGNAL MECHANISM AT APPROACH
RHGPR - RELAY REPEATING SIGNAL MECHANISM AT APPROACH AND STOP
DGPR - RELAY REPEATING SIGNAL MECHANISM AT PROCEED
RGK - INDICATOR INDICATING SIGNAL MECHANISM AT STOP
HGK - INDICATOR INDICATING SIGNAL MECHANISM AT APPROACH
DGK - INDICATOR INDICATING SIGNAL MECHANISM AT PROCEED
ETOHR - EAST TRAIN ORDER HR, LIKEWISE WEST, NORTH AND SOUTH
ETOHDR - EAST TRAIN ORDER HDR, LIKEWISE WEST, NORTH AND SOUTH
ETOPHR - EAST TRAIN ORDER REPEATER HR, LIKEWISE WEST, NORTH AND SOUTH
ETOPDR - EAST TRAIN ORDER REPEATER DR, LIKEWISE WEST, NORTH AND SOUTH
HDGPR - RELAY REPEATING SIGNAL MECHANISM IN THE APPROACH AND PROCEED POSITION
HDGK - INDICATOR INDICATING SIGNAL MECHANISM IN THE APPROACH AND PROCEED POSITION
HY - HOLD CLEAR OR RETAINING MECHANISM OF THE APPROACH INDICATION OF A SIGNAL
DY - HOLD CLEAR OR RETAINING MECHANISM OF THE PROCEED INDICATION OF A SIGNAL
HG - APPROACH INDICATION OPERATING MECHANISM OF A SIGNAL
DG - PROCEED INDICATION OPERATING MECHANISM OF A SIGNAL
RG - STOP INDICATION OPERATING MECHANISM OF A SIGNAL

REVISIONS

CIRCUIT NOMENCLATURE IN ACCORDANCE WITH PART 33, A.A.R. SIGNAL SECTION MANUAL, COMPLETE TO 1949.

FOR ALL NEW WORK AND EXTENSIVE RENEWALS

SHEET 4 OF 5

5-802



THE PENNSYLVANIA RAILROAD
STANDARD

DESIGNATION OF INSTRUMENTS & APPARATUS
INDICATED ON SIGNAL CIRCUIT PLANS

OFFICE OF CHIEF ENGINEER,
PHILA., PA., OCTOBER 3, 1949.

APPROVED:

H. G. Salmonson

ASST. CHIEF ENGINEER - SIGNALS

APPROVED:

J. H. Bennett

CHIEF ENGINEER

STICK, TRAFFIC AND DIRECTIONAL OPERATED UNITS

JR - STICK RELAY
 EJR - EAST STICK RELAY, LIKEWISE NORTH, SOUTH AND WEST
 LJR - LOCKING STICK RELAY
 EASR - EAST APPROACH STICK RELAY, LIKEWISE NORTH, SOUTH AND WEST
 ASR - APPROACH STICK RELAY
 FL - TRAFFIC LOCK PREVENTING INITIAL MOVEMENT OF A TRAFFIC LEVER FROM NORMAL OR REVERSE
 FLM - TRAFFIC LOCK PREVENTING INITIAL MOVEMENT OF A TRAFFIC LEVER FROM NORMAL OR REVERSE AND ALSO PREVENTING FINAL OR INDICATION MOVEMENT OF SAME LEVER
 FR - TRAFFIC RELAY
 FLR - TRAFFIC LOCK RELAY CONTROLLING FL
 FLMR - TRAFFIC LOCK RELAY CONTROLLING FLM
 FLK - TRAFFIC LOCK INDICATOR
 FSR - TRAFFIC STICK RELAY
 EFSR - EAST TRAFFIC STICK RELAY, LIKEWISE NORTH, SOUTH AND WEST

OPERATED UNITS RELATING TO INDICATORS, LOCKS, INDICATION MAGNETS, AND RELAYS USED FOR LOCKING PURPOSES

M - LOCK PREVENTING THE FINAL MOVEMENT OF A LEVER
 L - LOCK PREVENTING THE INITIAL MOVEMENT OF A CONTROLLED FUNCTION OR LEVER
 NK - NORMAL INDICATOR INDICATING NORMAL POSITION OF A UNIT
 RK - REVERSE INDICATOR INDICATING REVERSE POSITION OF A UNIT
 TER - TIME ELEMENT RELAY
 NM - LOCK PREVENTING THE FINAL MOVEMENT OF A LEVER TO THE NORMAL POSITION
 RM - LOCK PREVENTING THE FINAL MOVEMENT OF A LEVER TO THE REVERSE POSITION
 NL - LOCK PREVENTING THE MOVEMENT OF A LEVER OR A CONTROLLED FUNCTION FROM ITS NORMAL POSITION
 RL - LOCK PREVENTING THE MOVEMENT OF A LEVER OR A CONTROLLED FUNCTION FROM ITS REVERSE POSITION
 LR - RELAY CONTROLLING L LOCK
 LPR - REPEATER OF L LOCK RELAY
 MR - RELAY CONTROLLING M LOCK
 MPR - REPEATER OF M LOCK RELAY
 TE - TIME ELEMENT
 TEJR - TIME ELEMENT STICK RELAY
 LK - LOCK INDICATOR REPEATING ELECTRIC LOCKING
 TEPR - RELAY REPEATING ENERGIZED POSITION OF TE
 TECPR - RELAY REPEATING CHECKING CONTACT OF TE

OPERATED UNITS RELATING TO HIGHWAY CROSSING SIGNALS

XX - CROSSING BELL
 EXR - EASTWARD INTERLOCKING OR CROSSING RELAY, LIKEWISE NORTH, SOUTH AND WEST
 XG - WIG-WAG MECHANISM - CROSSING GATE MECHANISM
 XY - SLOT FOR WIG-WAG MECHANISM - CROSSING GATE MECHANISM
 EOR - ELECTRIC LIGHT OPERATING RELAY (FLASHER RELAY)
 XSR - DIRECTIONAL RELAY TO HOLD CROSSING SIGNAL CLEAR AS TRAIN RECEDES FROM CROSSING

OPERATED UNITS RELATING TO APPROACH AND ANNUNCIATING OF TRAINS

AX - ANNUNCIATOR INDICATING APPROACH TRAFFIC
 EAX - EASTWARD ANNUNCIATOR INDICATING APPROACH OF EASTWARD TRAFFIC, LIKEWISE NORTH, SOUTH AND WEST
 AER - RELAY USED FOR APPROACH LIGHTING

MISCELLANEOUS OPERATED UNITS

AK - APPROACH INDICATOR
 AR - APPROACH RELAY
 PCR - POLE CHANGING RELAY
 NLPR - RELAY REPEATING THE NORMAL POSITION OF A LEVER
 RLPR - RELAY REPEATING THE REVERSE POSITION OF A LEVER
 E - ELECTRIC LIGHT
 TO - TRAIN ORDER
 WTO - WEST TRAIN ORDER SIGNAL GOVERNING WESTWARD TRAFFIC, LIKEWISE NORTH, SOUTH AND WEST
 RR - ROUTE RELAY
 VR - TRAIN STOP RELAY
 VSR - TRAIN STOP STICK RELAY
 VPR - TRAIN STOP REPEATER RELAY
 VY - TRAIN STOP RETAINING MECHANISM
 XR - INTERLOCKING RELAY
 TOR - TRAIN ORDER RELAY
 POR - POWER OFF RELAY
 LOR - LIGHT OUT RELAY
 ME - MARKER LIGHT
 OR - OVERLOAD RELAY
 GDR - GROUND DETECTOR RELAY
 CT - CODE TRANSMITTER
 DU - DECODING UNIT
 RLNPR - RAIL LOCK NORMAL REPEATING RELAY
 RLPR - RAIL LOCK REVERSE REPEATING RELAY
 DEDR - DRAGGING EQUIPMENT DETECTOR
 FCOR - FREQUENCY CHANGE OVER RELAY

WIRES RELATING TO RELAYS ENDING WITH DESIGNATION SHOWN BELOW MAY BE DESIGNATED AS INDICATED

WIRE	RELAY
BP	BPR
D	DR
H	HR
HD	HDR
P	PR
S	SR
TE	TER
WC	WCR

CIRCUIT NOMENCLATURE IN ACCORDANCE WITH PART 33, A. A. R. SIGNAL SECTION MANUAL, COMPLETE TO 1949.

FOR ALL NEW WORK AND EXTENSIVE RENEWALS

REVISIONS

SHEET 5 OF 5

S-802



THE PENNSYLVANIA RAILROAD
STANDARD

DESIGNATION OF INSTRUMENTS & APPARATUS
INDICATED ON SIGNAL CIRCUIT PLANS

OFFICE OF CHIEF ENGINEER,
PHILA., PA., OCTOBER 3, 1949.

APPROVED

H. J. Salmonson
ASST. CHIEF ENGINEER - SIGNALS

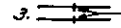
APPROVED

J. H. Smith
CHIEF ENGINEER

NOTES:-

1. RAIL BONDS AND CONNECTORS FOR TRACK CIRCUITS AND SWITCHES SHALL BE IN ACCORDANCE WITH P.R.R. STANDARD PLANS, BASIC NOS. S-179, S-180, S-182 AND S-184, FOR STEAM AND A.C. ELECTRIFIED TERRITORY; AND IN ACCORDANCE WITH CHIEF OF MOTIVE POWER PLANS FOR D.C. ELECTRIFIED TERRITORY. (SEE LIST ON THIS SHEET FOR DETAIL REFERENCES.)

2. THE POLARITY OF TRACK CIRCUIT CONNECTIONS ON CIRCUIT PLANS SHALL BE INDICATED.

3.  INSULATING JOINTS, TRACK CIRCUIT ON BOTH SIDES.

4.  INSULATING JOINTS, TRACK CIRCUIT ON ONE SIDE ONLY.

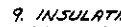
5. ----- TRACK CIRCUIT WIRE.

6. INSULATING JOINTS IN TURNOUTS, CROSSOVERS, MOVABLE POINT CROSSINGS AND DOUBLE SLIP CROSSINGS, MARKED * OR ©, SHALL NOT BE STAGGERED MORE THAN FIVE FEET. AT OTHER LOCATIONS THEY SHALL BE IN ACCORDANCE WITH CURRENT ISSUE OF C.E. 78.

7. INSULATING JOINTS BETWEEN FROGS IN CROSSOVERS, MARKED ©, MAY BE LOCATED AT HEEL END OF FROG WHERE DESIGN OF FROG IS SUCH THAT SINGLE RAIL HEEL JOINTS ARE PROVIDED FOR. THE MINIMUM LENGTH OF RAIL USED SHALL CONFORM TO THAT PRESCRIBED BY THE CURRENT ISSUE OF C.E. 78 EXCEPT SHORTER RAILS OF MINIMUM LENGTH GIVEN IN FOLLOWING TABLE MAY BE LOCATED IN THE CROSSOVER AND CONNECTED TO HEEL OF FROG TO AVOID STAGGERING THE INSULATING JOINTS AT THE CENTER OF THE CROSSOVER MORE THAN FIVE FEET:

CROSSOVER	MINIMUM LENGTH OF RAIL	
	100 LBS. & HEAVIER	131 LBS. & HEAVIER
No. 8	7'-0"	11'-0"
No. 10	8'-0"	11'-0"
No. 15	11'-0"	-

8. INSULATING JOINTS MARKED * SHALL BE LOCATED AS PROVIDED FOR IN CURRENT ISSUE OF C.E. 78, APPENDIX-PLANS OF LEAD RAILS.

9. INSULATING JOINTS MARKED  (ARROW AND NUMBER INDICATING THE SWITCH FOR WHICH FOULING IS PROVIDED) ARE FOR FOULING PROTECTION.

10. INSTRUCTIONS FOR LOCATING INSULATING RAIL JOINTS FOR FOULING PROTECTION:-
INSULATING RAIL JOINTS FOR FOULING PROTECTION SHALL BE LOCATED BY DETERMINING THE POINT WHERE THE DISTANCE BETWEEN TRACKS IS THAT OF THE ESTABLISHED INTER-TRACK SPACING. WHERE TRACKS DIVERGE BACK OF THAT POINT, THE JOINTS SHALL BE LOCATED NOT LESS THAN TEN FEET BACK OF SAID POINT TO PROVIDE FOR THE MAXIMUM OVERHANG OF EQUIPMENT BEYOND THE CONTACT POINT OF THE WHEELS; OR, WHERE TRACKS ARE PARALLEL AT THAT POINT, THE JOINTS SHALL BE LOCATED AT OR BACK OF SAID POINT, TO ESTABLISH THE CLEARANCE POINT.
IN GENERAL, INSULATING RAIL JOINTS FOR FOULING PROTECTION SHALL BE SO LOCATED AS TO AFFORD THE SAME CLEARANCE BETWEEN EQUIPMENT ON THE CONVERGING TRACKS AS IS PROVIDED ON PARALLEL TRACKS WITH THE ESTABLISHED INTER-TRACK SPACING.

REFERENCES FOR DETAIL BONDING

TERRITORY	S-803 SHEET NO.		TRACK CIRCUIT	TRACK BONDS		SWITCH POINT		FROG		FOULING CONNECTION		INTERLOCKED		NON-INTERLOCKED		
	INTER- LOCKED	NON- INTER- LOCKED		CONNECTIONS	RAIL HEAD	LONG BOND	INTER- LOCKED	NON- INTER- LOCKED	INTER- LOCKED	NON- INTER- LOCKED	INTER- LOCKED	NON- INTER- LOCKED	SERIES TRACK CIRCUIT CONN.	DOUBLE SLIP SWITCH	SHUNT CIRCUIT SWITCH POINT	MIDDLE SIDING SW. POS. 12930-A
STEAM ROAD NON-CAB SIGNAL	2	4	S-184	S-180	S-179	S-182, SH. 2, FIG. J (A)	S-182, SH. 1, FIG. E	S-182, SH. 2, FIG. I	S-182, SH. 1, FIG. D	S-182, SH. 2, FIG. H	S-182, SH. 1, FIG. C	S-182, SH. 2, FIG. K	S-182, SH. 1, FIG. P	S-182, SH. 2, FIG. A	S-182, SH. 1, FIG. G	
CAB SIGNAL	3	5	S-184	S-180	S-179	S-182, SH. 2, FIGS. J (A), J (B)	S-182, SH. 1, FIG. E	S-182, SH. 2, FIG. I	S-182, SH. 1, FIG. D	S-182, SH. 2, FIGS. H, L, M, N, O	S-182, SH. 1, FIG. C		S-182, SH. 2, FIG. P	S-182, SH. 1, FIG. A	S-182, SH. 1, FIG. B OR FIG. F	S-182, SH. 1, FIG. G
A.C. ELECTRIFIED NON-CAB SIGNAL	2	4	S-184	S-180	S-179	S-182, SH. 2, FIG. J (A)	S-182, SH. 1, FIG. E	S-182, SH. 2, FIG. I	S-182, SH. 1, FIG. D	S-182, SH. 2, FIG. H	S-182, SH. 1, FIG. C	S-182, SH. 2, FIG. K	S-182, SH. 1, FIG. P	S-182, SH. 2, FIG. A	S-182, SH. 1, FIG. G	
CAB SIGNAL	3	5	S-184	S-180	S-179	S-182, SH. 2, FIGS. J (A), J (B)	S-182, SH. 1, FIG. E	S-182, SH. 2, FIG. I	S-182, SH. 1, FIG. D	S-182, SH. 2, FIGS. H, L, M, N, O	S-182, SH. 1, FIG. C		S-182, SH. 2, FIG. P	S-182, SH. 1, FIG. A	S-182, SH. 1, FIG. B OR FIG. F	S-182, SH. 1, FIG. G
D.C. ELECTRIFIED NON-CAB SIGNAL Δ	2	4	S-184	F 89011		F 407399	F 407399	F 407399	F 407399	F 407399	F 407399	F 407399	F 407399	F 407399	F 407399	
CAB-SIGNAL Δ	3	5	S-184	F 89011		F 407399	F 407399	F 407399	F 407399	F 407399	F 407399	F 407399		F 407399	F 407399	F 407399

Δ = FOR BONDING AND INSULATION OF SWITCHES IN D.C. ELECTRIFIED TERRITORY CHIEF OF MOTIVE POWER PLAN REFERENCES ARE GIVEN. REQUISITES AS SHOWN ON PLAN S-803, AND APPLICATIONS AS SHOWN ON PLAN S-182, SHOULD BE FOLLOWED.

REVISIONS

GENERAL NOTES AND DETAIL REFERENCES

SUPERSEDES S-803, SH. 1, DATED 5-15-38
AND C.O.P. PLAN ET-793-D, DATED 4-1-35

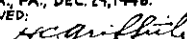
SHEET 1 OF 5

S-803

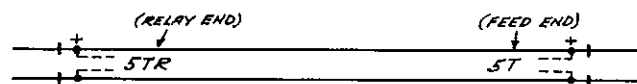


THE PENNSYLVANIA RAILROAD STANDARD BONDING AND INSULATION OF SWITCHES

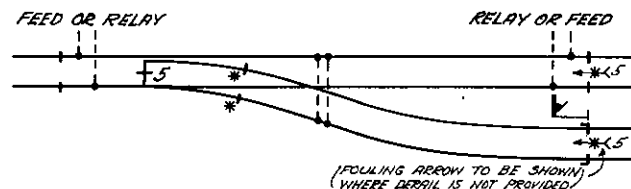
OFFICE OF CHIEF ENGINEER,
PHILA., PA., DEC. 29, 1948.

APPROVED: 
ASST. CHIEF ENGINEER, T.C.S.

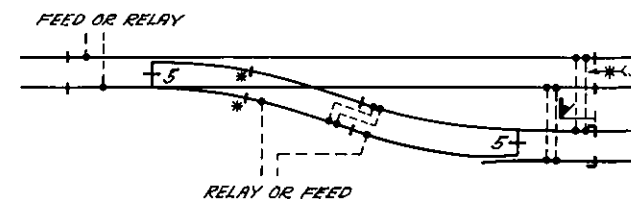
APPROVED: 
CHIEF ENGINEER



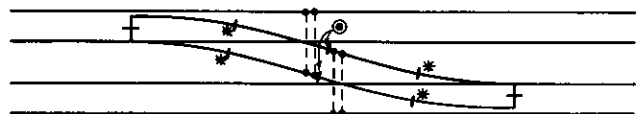
**FEED AND RELAY LEADS FOR TRACK CIRCUITS
FIGURE 2A**



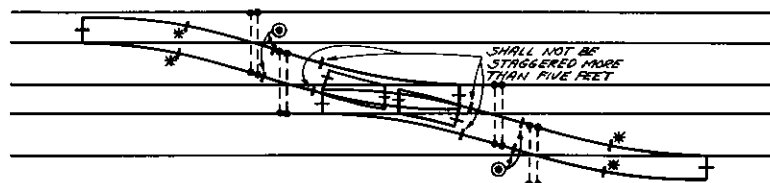
**MULTIPLE TRACK CIRCUIT FOR TURNOUT
FIGURE 2B**



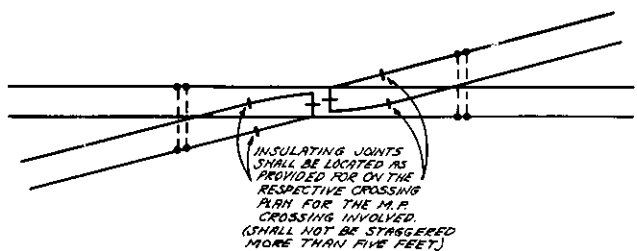
**SERIES TRACK CIRCUIT FOR TURNOUT
FIGURE 2C**



**CROSSOVER
FIGURE 2D**



**DOUBLE SLIP CROSSING
FIGURE 2E**



**MOVABLE POINT CROSSING
FIGURE 2F**

NOTES:-

1. FOR GENERAL NOTES AND DETAIL REFERENCES SEE SHEET NO. 1.
 (C) = SEE SHEET NO. 1, NOTES 6 & 7.
 * = SEE SHEET NO. 1, NOTES 6 & 8.
2. FROGS SHALL BE BONDED IN ACCORDANCE WITH PLAN S-182, SH. 2, FIG. I.
3. SWITCH POINTS SHALL BE BONDED IN ACCORDANCE WITH PLAN S-182, SH. 2, FIG. J USING J(A) RAIL BOND LOCATION.

INTERLOCKED SWITCHES

STEAM ROAD
ELECTRIFIED TERRITORY
NON-CAB SIGNAL TERRITORY
OR WHERE
NO CODE OR CAB SIGNAL
PROTECTION IS REQUIRED
OVER SWITCHES IN CAB
SIGNAL TERRITORY

REVISIONS

SUPERSEDES S-803, SH. 2, DATED 5-10-27.

SHEET 2 OF 5

S-803



**THE PENNSYLVANIA RAILROAD
STANDARD
BONDING AND INSULATION OF SWITCHES**

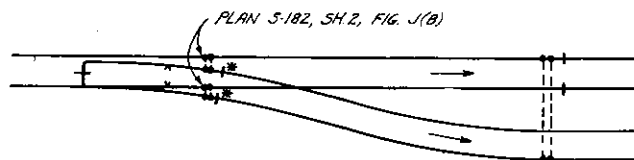
OFFICE OF CHIEF ENGINEER,
PHILA., PA., DEC. 29, 1948.

APPROVED:

APPROVED:

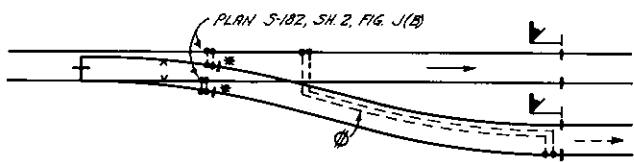
H. Griffith
ASST. CHIEF ENGINEER, T. C. S.

J. H. Smith
CHIEF ENGINEER



TURNOUT - MEDIUM SPEED FACING
WITH INTERVENING TRACK CIRCUIT BETWEEN
TURNOUT AND REVERSE SIGNAL ON EITHER TRACK.

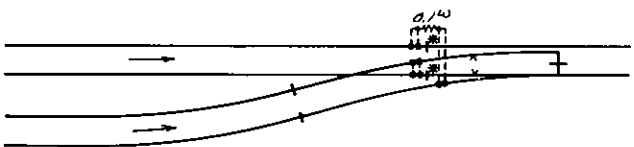
FIGURE 3A



TURNOUT - MEDIUM SPEED FACING
WITH NO INTERVENING TRACK CIRCUIT BETWEEN TURNOUT AND REVERSE SIGNAL.

TURNOUT - MAIN TRACK AND SIDE TRACK
FOR OVERRUN PROTECTION WHERE DERAIL IS NOT PROVIDED ON SIDE TRACK. (SEE PLAN S-881.)

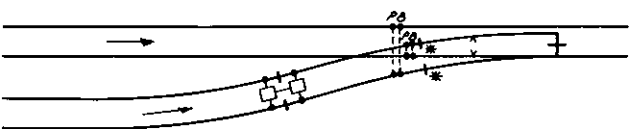
FIGURE 3B



TURNOUT - MEDIUM SPEED TRAILING
INTERVENING TRACK CIRCUIT BETWEEN SIGNAL
AND TURNOUT SHALL BE PROVIDED ON EITHER TRACK
FOR OVERRUN PROTECTION. (SEE PLAN S-881.)

STEAM ROAD ONLY

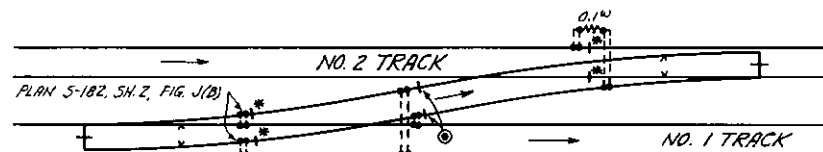
FIGURE 3C



TURNOUT - MEDIUM SPEED TRAILING
INTERVENING TRACK CIRCUIT BETWEEN SIGNAL
AND TURNOUT SHALL BE PROVIDED ON EITHER TRACK
FOR OVERRUN PROTECTION. (SEE PLAN S-881.)

ELECTRIFIED TERRITORY ONLY

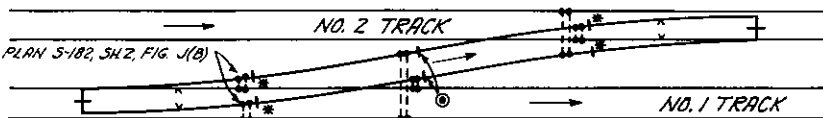
FIGURE 3D



CROSSOVER - MEDIUM SPEED IN ONE DIRECTION
WITH NO INTERVENING TRACK CIRCUIT BETWEEN HOME SIGNAL
AND CROSSOVER ON NO. 2 TRACK.

STEAM ROAD ONLY

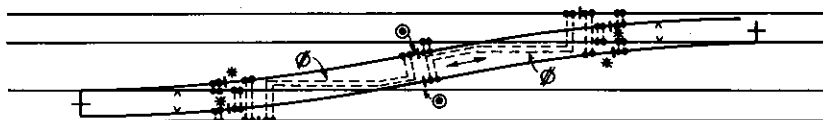
FIGURE 3E



CROSSOVER - MEDIUM SPEED IN ONE DIRECTION

STEAM ROAD - EXCEPT AS SPECIFIED IN FIG. 3E
ELECTRIFIED TERRITORY

FIGURE 3F



CROSSOVER - MEDIUM SPEED IN BOTH DIRECTIONS

FIGURE 3G

NOTES:-

1. FOR GENERAL NOTES AND DETAIL REFERENCES SEE SHEET NO. 1.
⊙ = SEE SHEET NO. 1, NOTES 6 & 7.
* = SEE SHEET NO. 1, NOTES 6 & 8.
2. BONDING AND INSULATION OF TURNOUTS AND CROSSOVERS OVER WHICH RESTRICTING CAB SIGNAL INDICATIONS ONLY ARE DISPLAYED SHALL BE IN ACCORDANCE WITH SHEET NO. 2, EXCEPT AS SPECIFIED IN FIG. 3B.
3. FROGS SHALL BE BONDED IN ACCORDANCE WITH PLAN S-182, SH. 2, FIG. 1.
4. SWITCH POINTS SHALL BE BONDED IN ACCORDANCE WITH PLAN S-182, SH. 2, FIG. 1, USING J(A) RAIL BOND LOCATION EXCEPT WHERE J(B) IS SPECIFIED BY NOTE.
5. BONDS MARKED ⊕ SHALL BE LOCATED INSIDE AND ADJACENT TO RAIL AS SHOWN.
6. → = DIRECTION OF TRAFFIC FOR WHICH CODE IS GIVEN.
7. ⊕ = HEEL OF SWITCH.

REVISIONS

INTERLOCKED SWITCHES

STEAM ROAD
ELECTRIFIED TERRITORY
CAB SIGNAL TERRITORY

SUPERSEDES S-803, SH. 6, DATED 5-15-28,
AND SH. 7, DATED 1-11-29.

SHEET 3 OF 5

S-803



THE PENNSYLVANIA RAILROAD
STANDARD
BONDING AND INSULATION OF SWITCHES

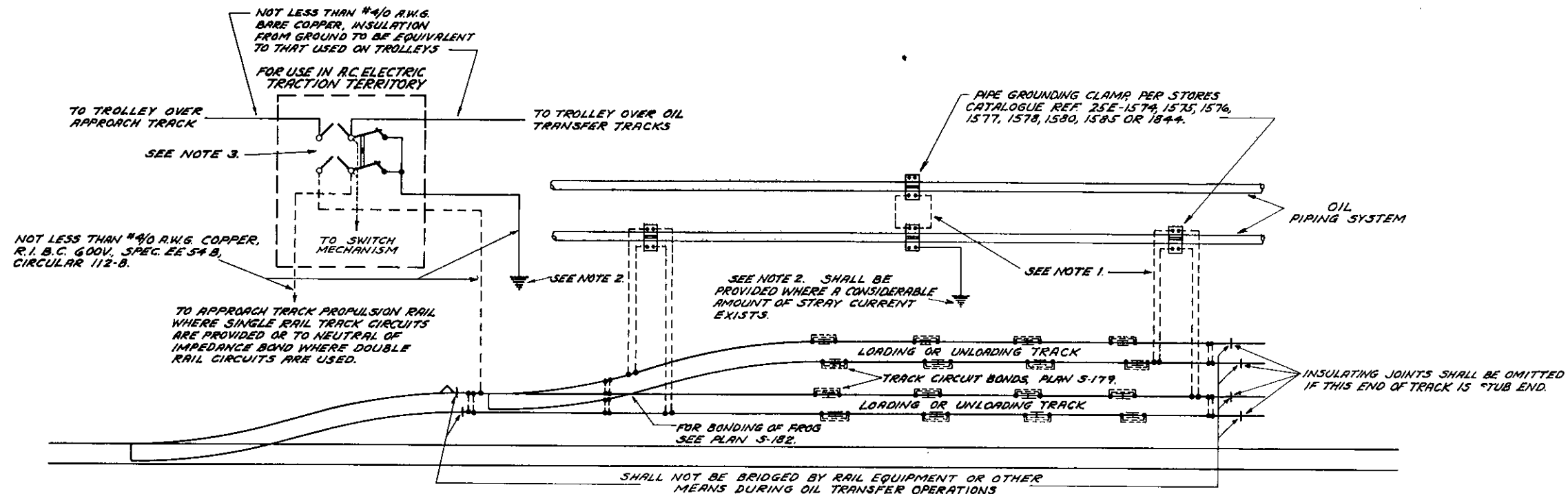
OFFICE OF CHIEF ENGINEER,
PHILA., PA., DEC. 29, 1948.

APPROVED:

ASST. CHIEF ENGINEER, T.C.S.

APPROVED:

CHIEF ENGINEER



NOTE:-

1. BONDS BETWEEN PIPES, RAILS, PIPING SYSTEM AND RAILS, AND PIPING SYSTEM AND GROUND SHALL HAVE A COMBINED CONDUCTIVITY OF NOT LESS THAN A NO. 0 COPPER CABLE. THREE COPPER COVERED CABLES OR TWO COPPER CABLES (7 STRAND-NO. 10 A.W.G., PLAN S-182) ARE EQUIVALENT TO ONE NO. 0 COPPER CABLE IN CONDUCTIVITY.
2. GROUNDING IN GENERAL SHALL BE IN ACCORDANCE WITH G.S.T. SPEC. 2001, USING GROUND ROD PER STORES CATALOGUE REF. 2B-5228 AND CLAMP 2B-4346.
3. THE DISCONNECTING SWITCH ARRANGEMENT REQUIRED MAY BE OBTAINED BY USING TWO DISCONNECTING, SPST, 15KV, 600 OR 1200 AMP, MANUALLY REMOTE CONTROLLED SWITCHES, ITEM G9 IN SPEC. P-230-7, EXCEPT BLADE IS TO BE GROUNDED WHEN IN OPEN POSITION; THE INSULATORS TO BE EQUAL TO LOCKE #23105. SWITCHES ARE TO BE MECHANICALLY CONNECTED TO OPERATE AS A DOUBLE-POLE UNIT, AND THE GROUNDING BLADE SOCKETS ARE TO BE ELECTRICALLY CONNECTED. WHERE SHORT CIRCUIT CURRENT FROM TROLLEYS WILL NOT EXCEED 25,000 AMPERES, A SWITCH OF 600 AMPERE RATING SHALL BE USED. WHERE SHORT CIRCUIT CURRENT FROM TROLLEYS IS ABOVE 25,000 AMPERES AND NOT EXCEEDING 50,000 AMPERES, A SWITCH OF 1200 AMPERE RATING SHALL BE USED.
4. THIS PLAN IS FOR USE IN CONNECTION WITH CURRENT ISSUE OF LETTER OF GENERAL PRACTICE NO. 140 FOR THE PREVENTION OF ELECTRIC SPARKS THAT MAY CAUSE FIRE DURING THE TRANSFER OF INFLAMMABLE LIQUIDS TO OR FROM RAIL EQUIPMENT.
5. IN A.C. ELECTRIFIED TERRITORY APPROVAL OF THE INDIVIDUAL CASE BY THE CHIEF ENGINEER AND CHIEF OF MOTIVE POWER SHALL BE OBTAINED PRIOR TO PLACING THE FACILITIES IN SERVICE.

REVISIONS

STEAM ROAD TERRITORY-
(OMIT DISCONNECT SWITCH, IT'S
CONNECTIONS, AND THE REQUIREMENTS
OF NOTE 3)

A.C. ELECTRIC TRACTION TERRITORY

SUPERSEDES PLAN S-807, SHEET 1,
DATED 4-11-33 AND LAST REV. 7-18-35.

SHEET 1 OF 2

S-807



THE PENNSYLVANIA RAILROAD
TYPICAL
PROTECTION OF OIL SIDINGS FROM
ELECTRIC SPARKS

OFFICE OF CHIEF ENGINEER,
PHILADELPHIA, PA., JUNE 22, 1945.

NOT TO SCALE

APPROVED:

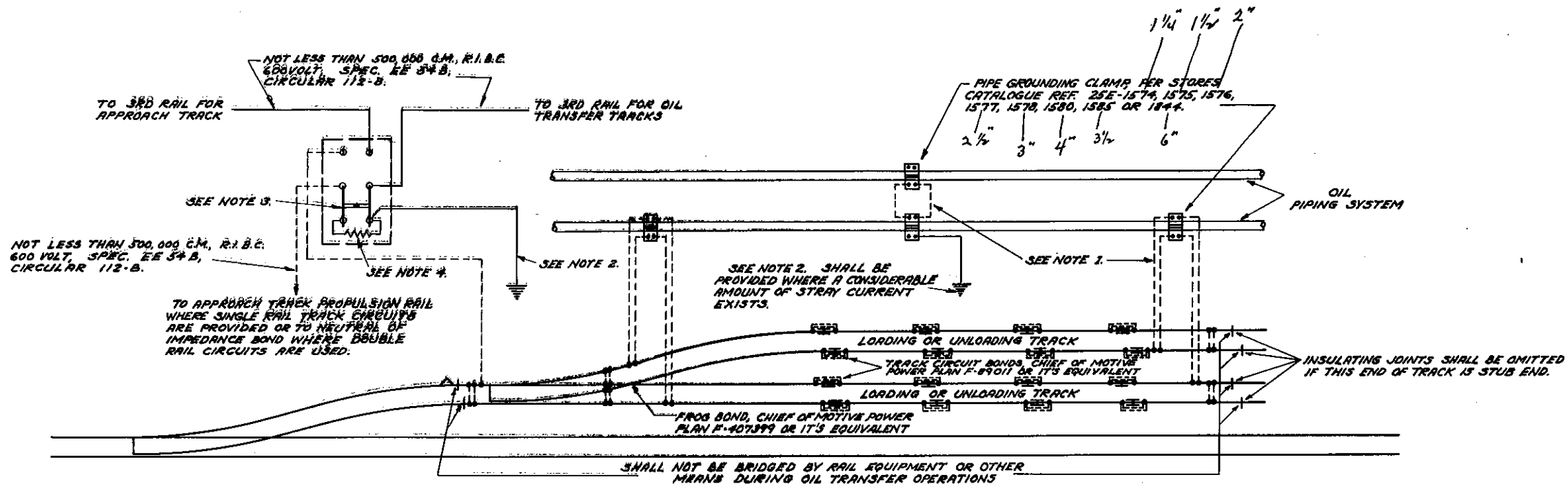
APPROVED:

APPROVED:

W. Griffith
ASST. CHIEF ENGINEER T.C.&S.

J. Stair
ELECTRICAL ENGINEER

CHIEF ENGINEER



NOTE:-

1. BONDS BETWEEN PIPES, RAILS, PIPING SYSTEM AND RAILS, AND PIPING SYSTEM AND GROUND SHALL HAVE A COMBINED CONDUCTIVITY OF NOT LESS THAN 250,000 G.M. COPPER CABLE.
2. GROUNDING IN GENERAL SHALL BE IN ACCORDANCE WITH G.S.T. SPEC. 2001, USING GROUND ROD PER STORES CATALOGUE REF 28-5228 AND CLAMP 28-4346.
3. SPECIAL D.P.D.T. SWITCH - STORES CATALOGUE REF 25E-783049-L.
4. FOR DETAILS OF GROUNDING RESISTANCE AND MOUNTING, SEE CHIEF OF MOTIVE POWER DRAWING E-404773.
5. ELECTRICAL TESTS SHOULD BE MADE AT TIME OF BONDING TO INSURE THAT NO EXCESSIVE CURRENTS NOR OTHER UNDESIRABLE CONDITIONS DEVELOP.
6. THIS PLAN IS FOR USE IN CONNECTION WITH CURRENT ISSUE OF LETTER OF GENERAL PRACTICE NO 140 FOR THE PREVENTION OF ELECTRIC SPARKS THAT MAY CAUSE FIRE DURING THE TRANSFER OF INFLAMMABLE LIQUIDS TO OR FROM RAIL EQUIPMENT.
7. IN D.C. ELECTRIFIED TERRITORY APPROVAL OF THE INDIVIDUAL CASE BY THE CHIEF ENGINEER AND CHIEF OF MOTIVE POWER SHALL BE OBTAINED PRIOR TO PLACING THE FACILITIES IN SERVICE.

REVISIONS

D.C. ELECTRIC TRACTION TERRITORY

SHEET 2 OF 2

SUPERSEDES PLAN S-807,
SHEET 2, DATED 7-13-35.

S-807



THE PENNSYLVANIA RAILROAD
TYPICAL
PROTECTION OF OIL SIDINGS FROM
ELECTRIC SPARKS

OFFICE OF CHIEF ENGINEER,
PHILADELPHIA, PA., JUNE 22, 1945.

NOT TO SCALE

APPROVED:

APPROVED:

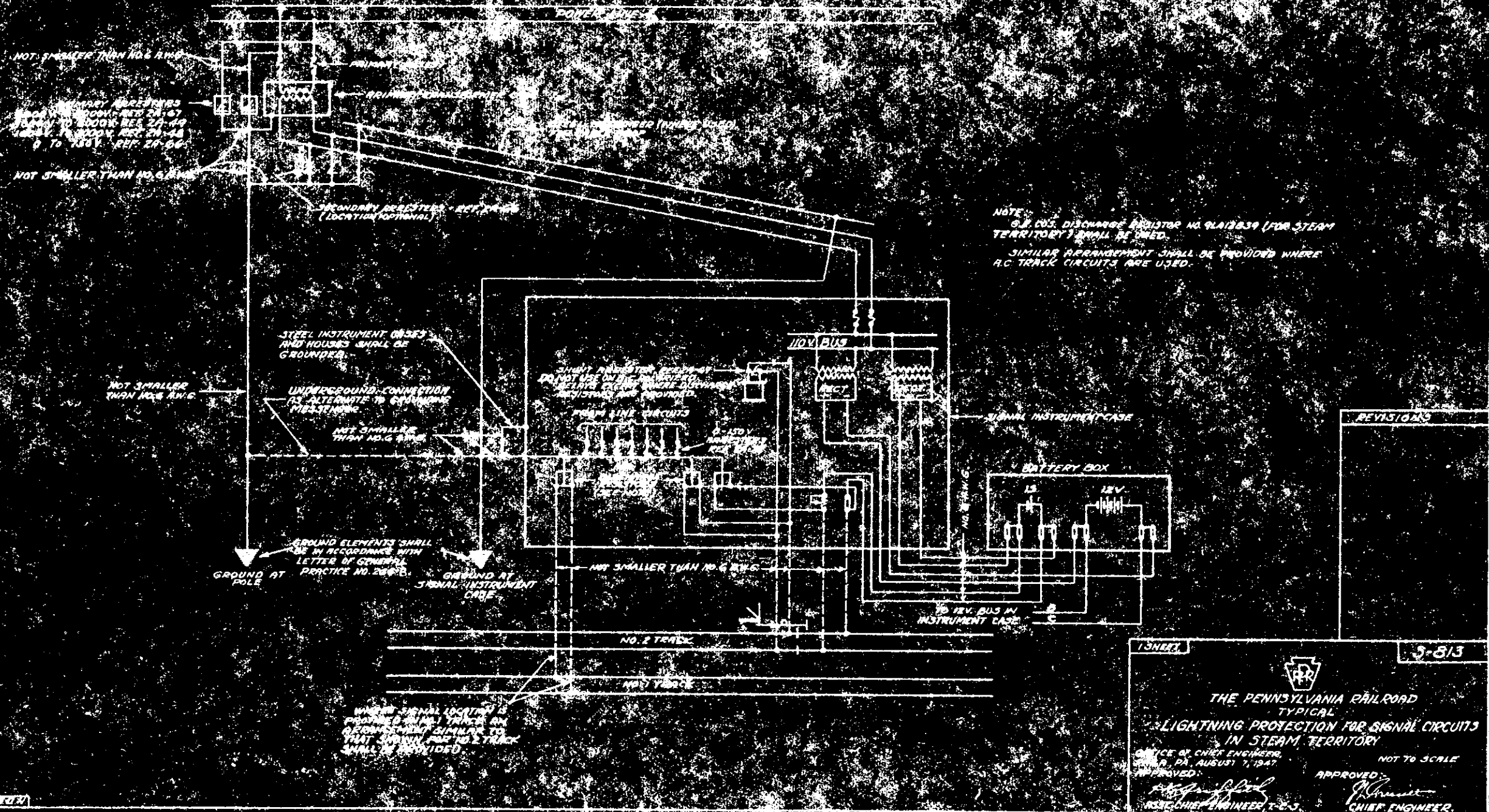
APPROVED:

H. G. Griffith *J. Stair, Jr.*

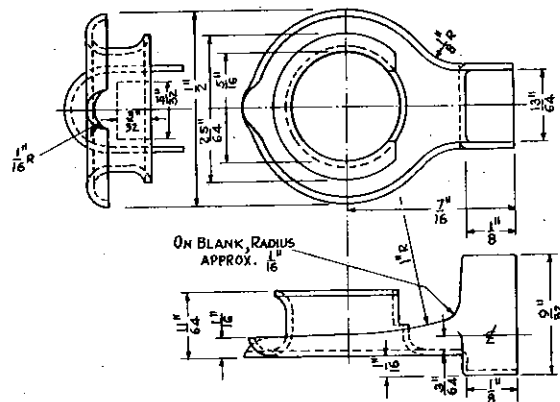
ASST. CHIEF ENGINEER T.C. & S.

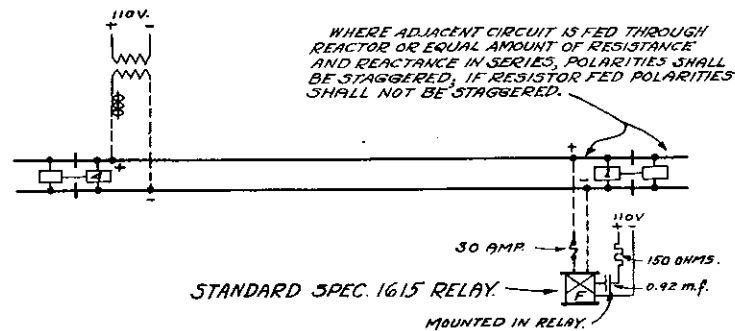
ELECTRICAL ENGINEER

CHIEF ENGINEER



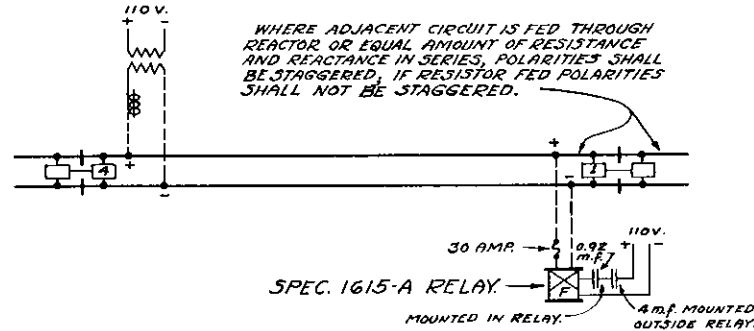
823





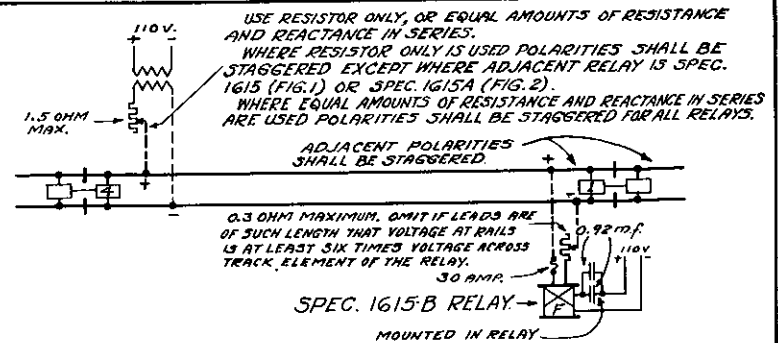
FOR USE ON TRACK CIRCUITS BETWEEN 3000' & 6000'.

FIG. 1.



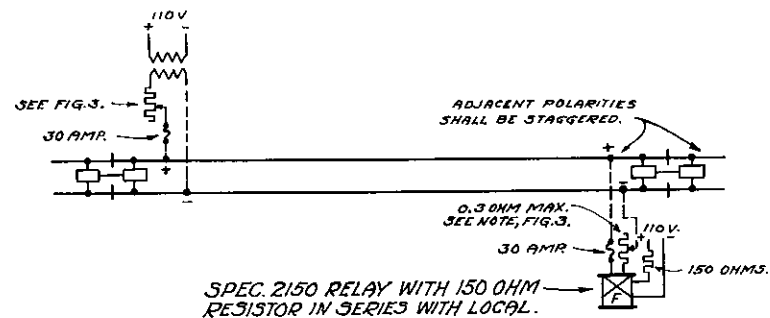
FOR USE ON TRACK CIRCUITS IN AUTOMATIC TERRITORY UP TO 3000'.

FIG. 2.



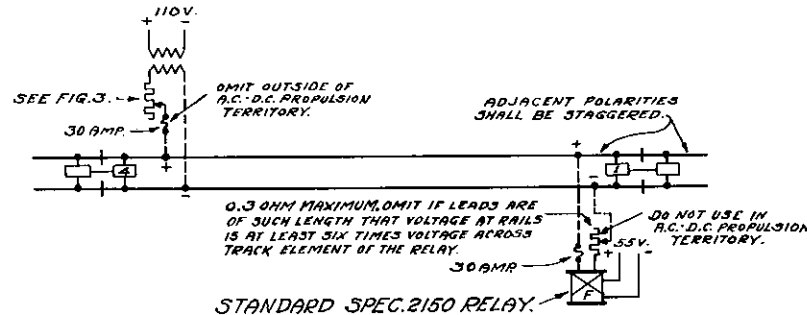
FOR USE ON INTERLOCKING TRACK CIRCUITS UP TO 2000' FOR USE ONLY WHEN SPEC. 1615 RELAYS ARE IN STOCK. WHEN NEW RELAYS MUST BE OBTAINED USE SPEC. 2197, FIG. 6.

FIG. 3.



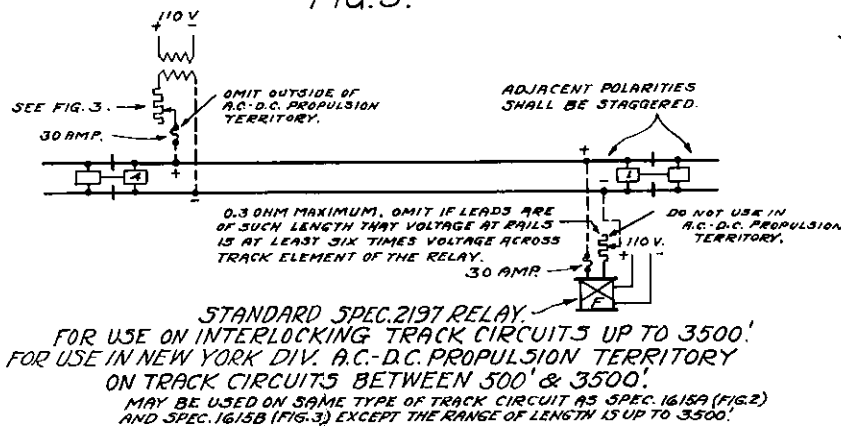
FOR USE IN NEW YORK DIV. A.C.-D.C. PROPULSION TERRITORY WHERE LOW IMPEDANCE BONDS ARE USED ON SHORT INTERLOCKING TRACK CIRCUITS UP TO 500'.

FIG. 4.



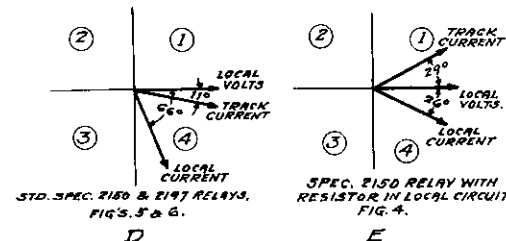
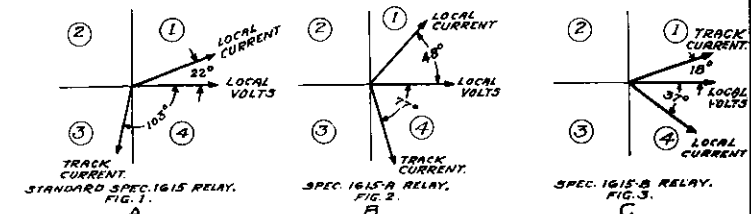
FOR USE ON INTERLOCKING TRACK CIRCUITS UP TO 3500' FOR USE IN NEW YORK DIV. A.C.-D.C. PROPULSION TERRITORY ON TRACK CIRCUITS BETWEEN 500' & 3500'.

FIG. 5.



FOR USE ON INTERLOCKING TRACK CIRCUITS UP TO 3500' FOR USE IN NEW YORK DIV. A.C.-D.C. PROPULSION TERRITORY ON TRACK CIRCUITS BETWEEN 500' & 3500' MAY BE USED ON SAME TYPE OF TRACK CIRCUIT AS SPEC. 1615A (FIG. 2) AND SPEC. 1615B (FIG. 3) EXCEPT THE RANGE OF LENGTH IS UP TO 3500'.

FIG. 6.



IDEAL PHASE RELATIONS FIG. 7.

NOTE:-

1. TRACK CIRCUIT POLARITIES ARE ARRANGED TO PROVIDE BROKEN DOWN INSULATING RAIL JOINT PROTECTION. TESTS SHALL BE MADE IN ACCORDANCE WITH PARAGRAPH 35, C.E. 232, TO INSURE THAT SUCH PROTECTION IS OBTAINED. WHERE RELAY INSTALLED IN ACCORDANCE WITH FIGURES 2 OR 3 FAILS TO COMPLY WITH THE TESTS, RELAY SPEC. 2197, FIG. 6, SHALL BE SUBSTITUTED TO OBTAIN COMPLIANCE.

2. UNLESS OTHERWISE SPECIFIED ARRANGEMENTS SHOWN ARE FOR A.C. PROPULSION TERRITORY ONLY.

REVISIONS.	
MAY 19, 1950.	NOTE AT RELAY END, FIG. 1A & 2, NOTE AT FEED END, FIG. 3, AND NOTE 1 CHANGED.
APPROVED:	H. J. Salmonson
12-16-36. FUSES FORMERLY SHOWN 20 AMPS. NOTE IN FIG. 2 CHANGED. FIGS. 6 & 7 FORMERLY T&B, FIG. 6 BEING REMOVED.	
APPROVED:	A. H. Hall

1 SHEET

THE PENNSYLVANIA RAILROAD
STANDARD
APPLICATION OF CENTRIFUGAL TRACK RELAYS
ON DOUBLE RAIL TRACK CIRCUITS

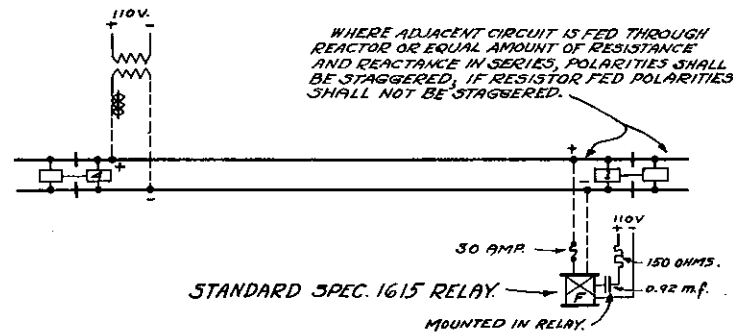
OFFICE OF CHIEF SIGNAL ENGINEER.
PHILA., PA., OCT. 31, 1936.

APPROVED: *A. H. Hall*
CHIEF SIGNAL ENGINEER.

NOT TO SCALE

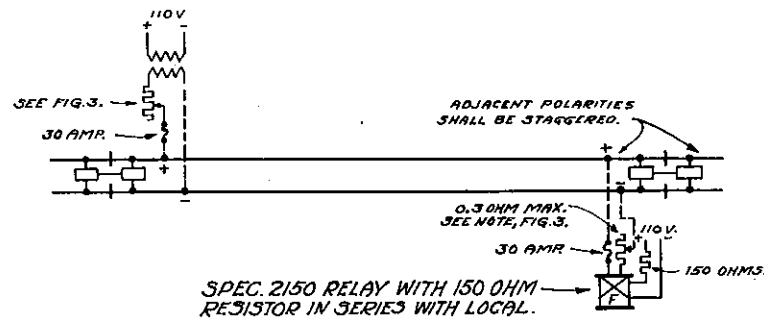
APPROVED: *H. J. Salmonson*
CHIEF ENGINEER.

5-816



FOR USE ON TRACK CIRCUITS BETWEEN 3000' & 6000'.

FIG. 1.



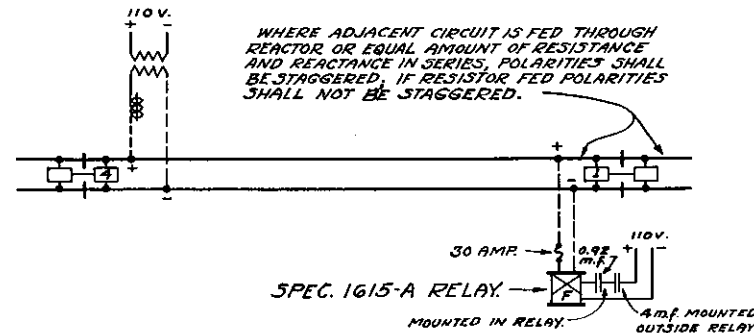
FOR USE IN NEW YORK DIV. A.C.-D.C. PROPULSION TERRITORY WHERE LOW IMPEDANCE BONDS ARE USED ON SHORT INTERLOCKING TRACK CIRCUITS UP TO 500'.

FIG. 4.

NOTE:-

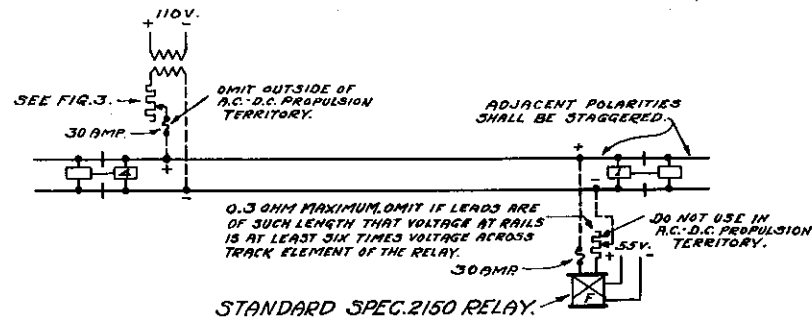
1. TRACK CIRCUIT POLARITIES ARE ARRANGED TO PROVIDE BROKEN DOWN INSULATING RAIL JOINT PROTECTION. TESTS SHALL BE MADE IN ACCORDANCE WITH PARAGRAPH 35, C.E. 232, TO INSURE THAT SUCH PROTECTION IS OBTAINED. WHERE RELAY INSTALLED IN ACCORDANCE WITH FIGURES 2 OR 3 FAILS TO COMPLY WITH THE TESTS, RELAY SPEC. 2197, FIG. 6, SHALL BE SUBSTITUTED TO OBTAIN COMPLIANCE.

2. UNLESS OTHERWISE SPECIFIED ARRANGEMENTS SHOWN ARE FOR A.C. PROPULSION TERRITORY ONLY.



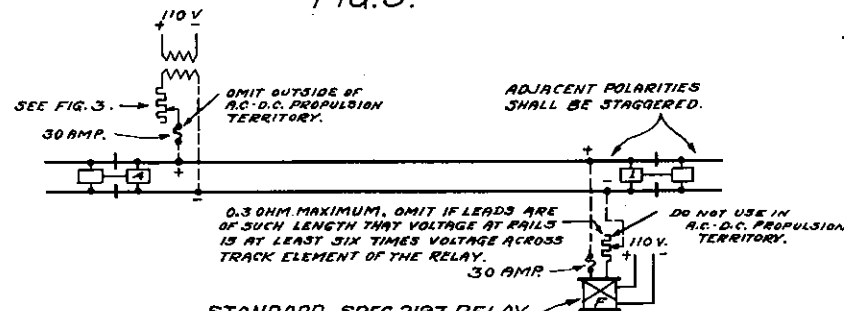
FOR USE ON TRACK CIRCUITS IN AUTOMATIC TERRITORY UP TO 3000'.

FIG. 2.



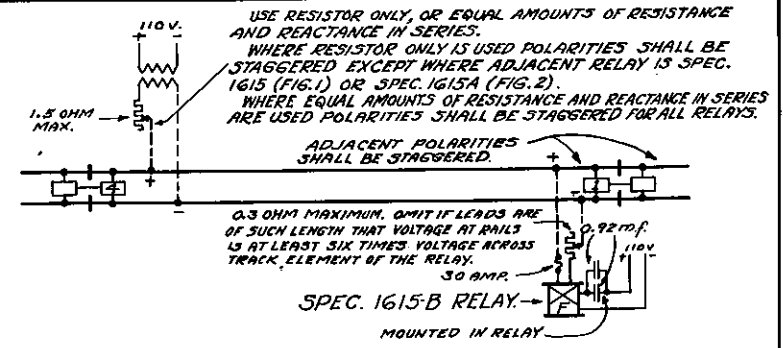
FOR USE ON INTERLOCKING TRACK CIRCUITS UP TO 3500' FOR USE IN NEW YORK DIV. A.C.-D.C. PROPULSION TERRITORY ON TRACK CIRCUITS BETWEEN 500' & 3500'.

FIG. 5.



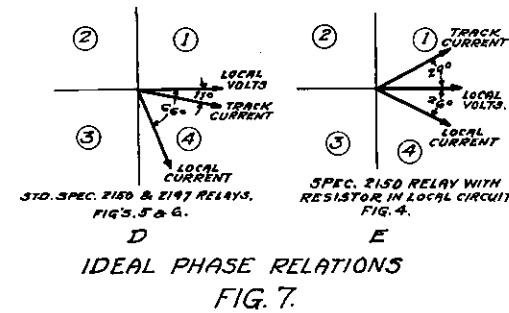
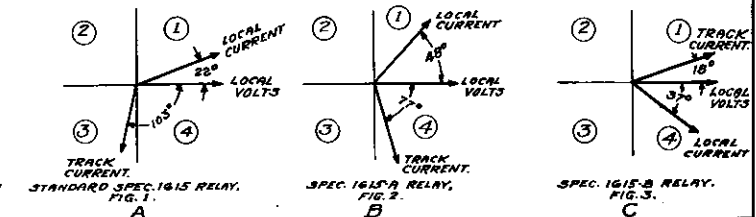
FOR USE ON INTERLOCKING TRACK CIRCUITS UP TO 3500' FOR USE IN NEW YORK DIV. A.C.-D.C. PROPULSION TERRITORY ON TRACK CIRCUITS BETWEEN 500' & 3500'.

FIG. 6.



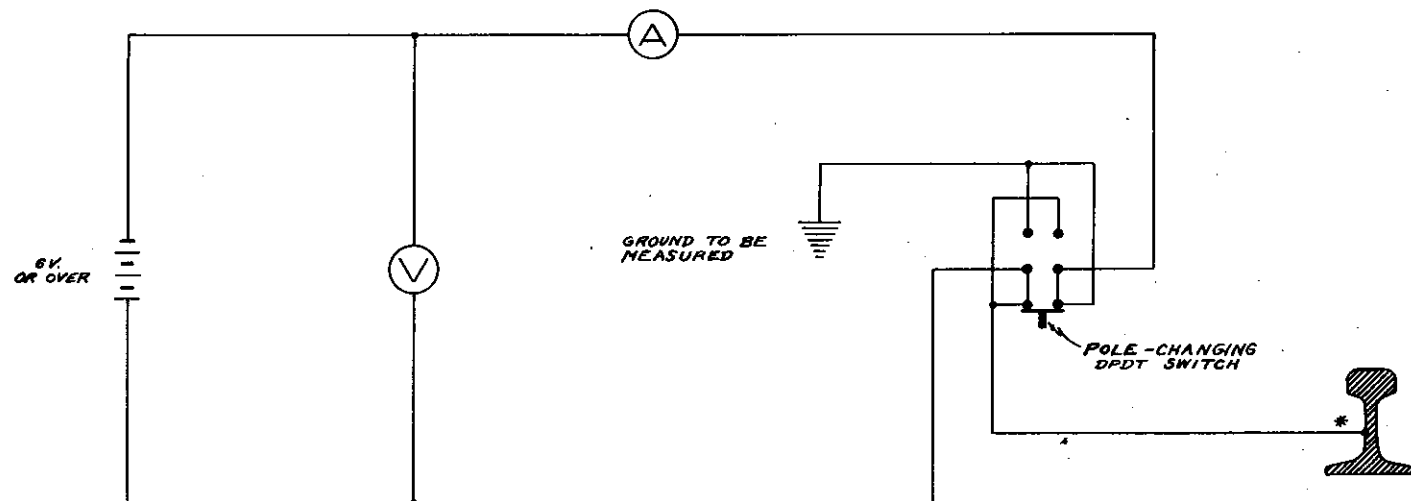
FOR USE ON INTERLOCKING TRACK CIRCUITS UP TO 2000' FOR USE ONLY WHEN SPEC. 1615 RELAYS ARE IN STOCK. WHEN NEW RELAYS MUST BE OBTAINED USE SPEC. 2197, FIG. 6.

FIG. 3.



IDEAL PHASE RELATIONS FIG. 7.

REVISIONS.
MAY 19, 1950. NOTE AT RELAY END, FIG. 1 & 2, NOTE AT FEED END, FIG. 3, AND NOTE 1 CHANGED. APPROVED: H. J. Salmonson
12-16-36. FUSES FORMERLY SHOWN 20 AMP'S. NOTE IN FIG. 2 CHANGED. FIGS. 6 & 7 FORMERLY T & S, FIG. 8 BEING REMOVED. APPROVED: A. H. Tull



RESISTANCE OF GROUND EQUALS AVERAGE READING OF VOLTMETER
DIVIDED BY AVERAGE READING OF AMMETER.

NOTE:—* CONNECTION TO RAIL MAY BE MADE BY MEANS OF A
CLAMP OR TO EXISTING FEED OR RELAY WIRES.

DO NOT USE EXCEPT WHEN RAIL IS PICKED UP AND
WHEN NO TRAIN IS APPROACHING SIGNAL. ALSO TRACK
CIRCUIT SHOULD BE AT LEAST 2000 FT. LONG TO INSURE
THAT RAIL BE OF LOW ENOUGH RESISTANCE TO BE SATISFACTORY.

REVISIONS

1 SHEET

S-817



THE PENNSYLVANIA RAILROAD

METHOD OF MEASURING RESISTANCE OF MADE GROUND

OFFICE OF ASST. CHIEF ENGINEER-SIGNALS NOT TO SCALE
PHILA., PA., JULY 17, 1937

APPROVED

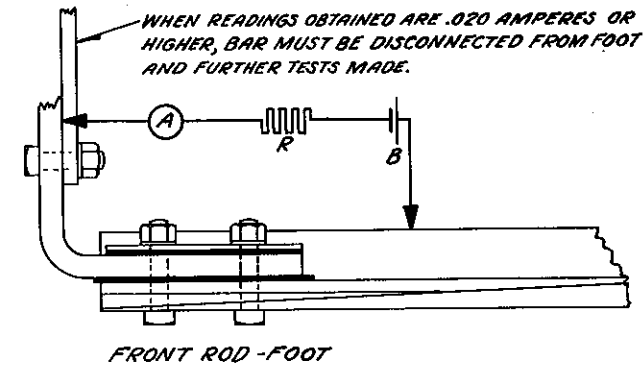
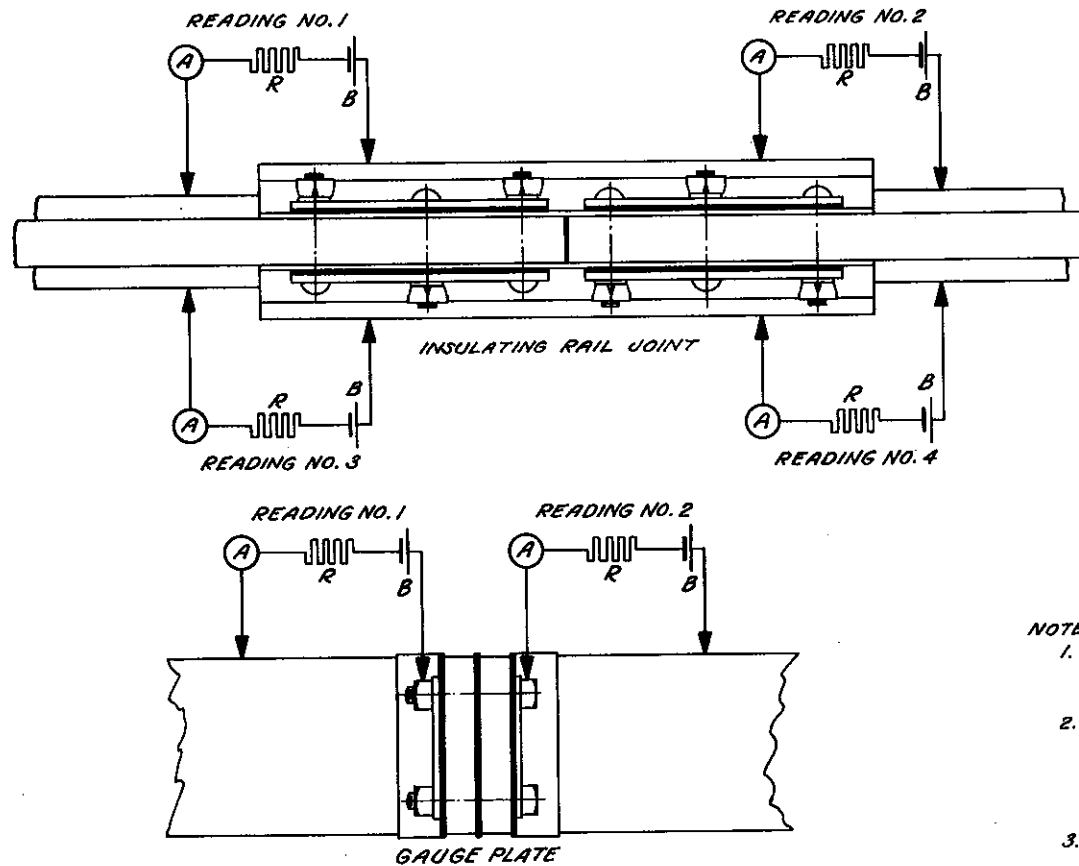
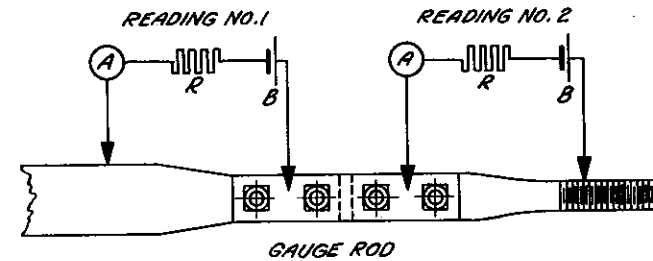
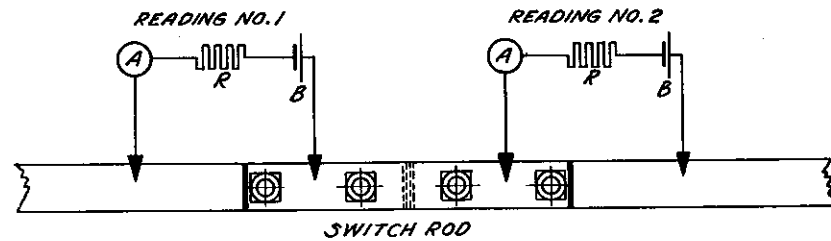
N.C. Stanton

ASST. CHIEF ENGINEER-SIGNALS

APPROVED

W. B. Higgins

CHIEF ENGINEER



LEGEND
 A = D.C. MILLI-AMMETER
 B = 1 DRY CELL (APPROX. 1½ VOLTS)
 R = 4 TO 10 OHMS RESISTANCE (FOR LIMITING CURRENT FLOW IN CASE OF BROKEN DOWN INSULATION.)

NOTES

1. WHEN READINGS OBTAINED ARE .020 AMPERES OR HIGHER, INSULATION SHALL BE RENEWED, EXCEPT FOR INSULATING RAIL JOINTS.
2. ON INSULATING RAIL JOINTS, WHEN TOTAL READINGS, AS DETERMINED FROM NOTE 3, ARE .020 AMPERES OR HIGHER, THE INSULATING RAIL JOINT SHALL BE TAKEN APART AND RUST THOROUGHLY CLEANED WITH A WIRE BRUSH AND DEFECTIVE INSULATION AND INSULATING BUSHINGS RENEWED.
3. TO DETERMINE TOTAL READING ON INSULATING RAIL JOINT ADD THE HIGHER CURRENT READING OBTAINED FROM READING NO. 1 AND NO. 2 TO THE HIGHER CURRENT READING OBTAINED FROM READING NO. 3 AND NO. 4.
4. ON MECHANICALLY OPERATED SWITCHES - WHEN READINGS OBTAINED ARE .020 AMPERES OR HIGHER, PIPE LINE MUST BE DISCONNECTED FROM SWITCH AND FURTHER READINGS TAKEN.
5. FLEXIBLE METALLIC CONDUIT CONNECTED TO ANY GROUNDED APPARATUS, SUCH AS E.P. VALVES, SWITCH MECHANISMS ETC., SHALL BE FREE FROM METALLIC CONTACT WITH MECHANISM WHILE TEST IS BEING MADE.

REVISIONS

1 SHEET



S-818

THE PENNSYLVANIA RAILROAD

TRACK INSULATION TESTS

OFFICE OF ASSISTANT CHIEF ENGINEER-SIGNALS NOT TO SCALE
 PHILA., PA., JAN. 12, 1936.

Approved

N. L. Stanton
 Assistant Chief Engineer-Signals

Approved

W. D. Higgins
 Chief Engineer

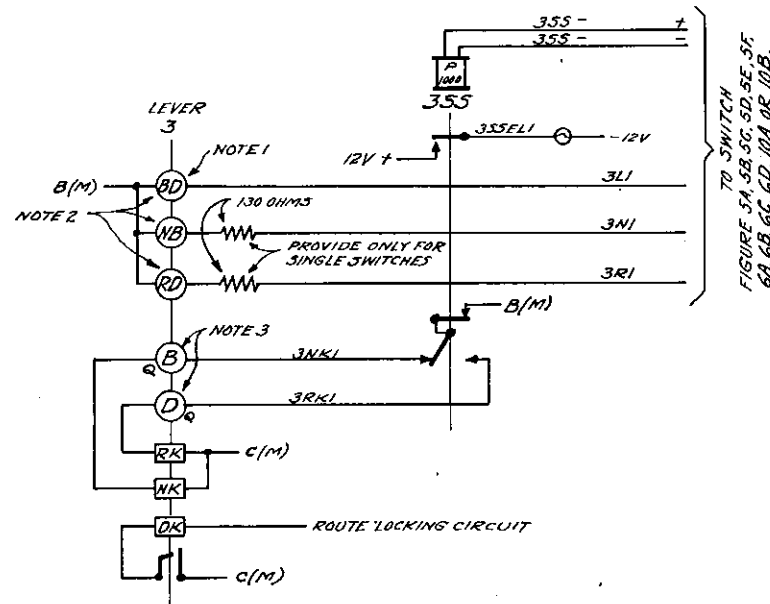


FIG. 1A

SEGMENTS AND QUADRANTS SHALL BE IN ACCORDANCE WITH THOSE LISTED ON SHEET NO. 3.

NOTE:

1. "BD" CONTACT SHALL BE OPEN WHEN MOVEMENT OF LEVER IS PREVENTED BY SWITCH LEVER DETECTOR LOCK.
2. SWITCH CONTROL BANDS SHALL BE PLACED ON LARGE SECTION OF ROLLER WHERE ANGULAR MOVEMENT OF ROLLER IS LESS THAN NINETY (90) DEGREES.
3. Q = QUICK SWITCH.
4. EACH SINGLE SWITCH, CROSSOVER OR DOUBLE SLIP SWITCH OPERATED BY ONE LEVER, SHALL HAVE AN INDIVIDUAL COMMON CONNECTION TO COMMON BUS IN NEAREST INSTRUMENT CASE.
5. A TURNOUT AND DERAIL SHALL BE OPERATED THE SAME AS A CROSSOVER.

LEVER- CONTROL AND INDICATION CIRCUITS
STYLE A1 OR A5 SWITCH & LOCK MOVEMENTS WITH STYLE G VALVES

REVISIONS

SUPERSEDES LEVER CONTROL AND INDICATION CIRCUITS FORMERLY SHOWN ON S-822, SH. 1 DATED 7-18-28, SH. 2 DATED 1-10-31 AND SH. 3, 15, 16, 17, 18, 19 & 20 DATED 8-15-34.

SHEET 1 OF 15

S-822



THE PENNSYLVANIA RAILROAD
STANDARD
CIRCUITS FOR ELECTRO-PNEUMATIC
SWITCHES

OFFICE OF CHIEF ENGINEER,
PHILA., PA., MAY 24, 1950.

APPROVED:

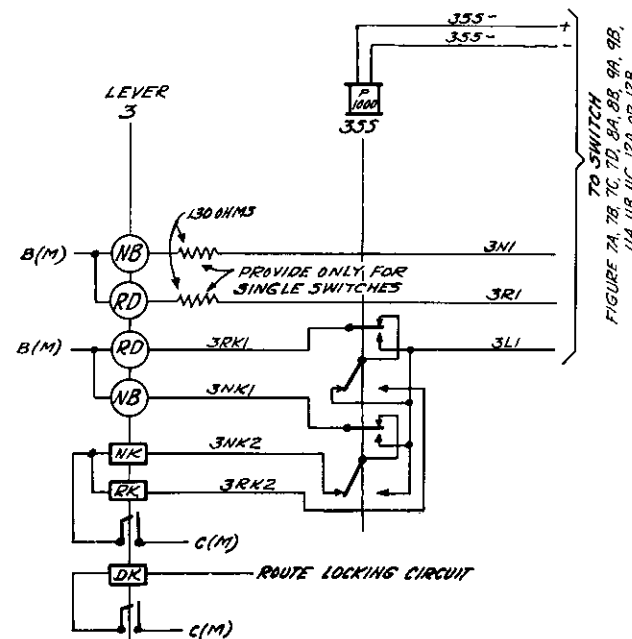
H. G. Salmonson

ASST. CHIEF ENGINEER-SIGNALS

APPROVED:

J. H. White

CHIEF ENGINEER



MODEL 12 OR STYLE DP14 POLAR INDICATION RELAYS
DO NOT USE FOR NEW WORK OR RENEWALS.

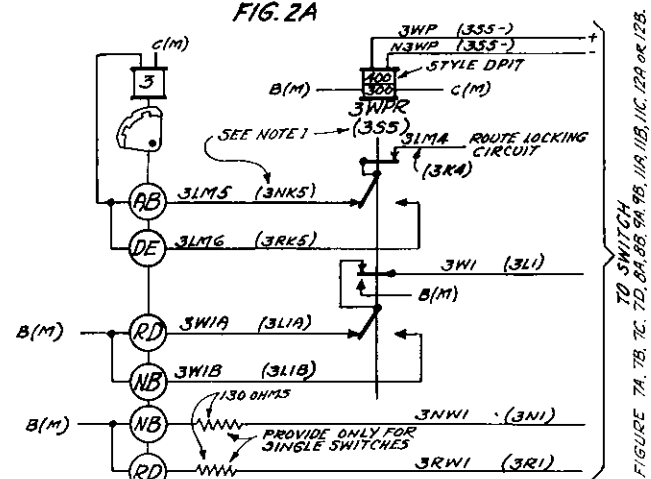


TABLE INTERLOCKER - STYLE DP17 POLAR INDICATION RELAY

SEGMENTS AND QUADRANTS FOR NORMAL INDICATION (NM OR NK), REVERSE INDICATION (RM OR RK) AND DETECTOR LOCK (L OR DK) SHALL BE AS FOLLOWS:

SEGMENT		QUADRANT	TYPE OF MACHINE
INDICATION	NY DRINK - RY DRINK	DETECTOR L OR DK	
141 - 8316	138 - 8316	89 - 8349	MODEL 1A, TYPE F14 &
165 - 8316	137 - 8316	107 - 8349	STYLE 58
143 - 8316	137 - 8316	54 - 8349	STYLE P3
159 - 8316	72 - 8316	6 - 8349	TYPE F & OLD STYLE 1
159 - 8316	72 - 8316	54 - 8349	STYLE P & 57
143 - 8316	137 - 8316	6 - 8349	TYPE F13 & MODEL 1

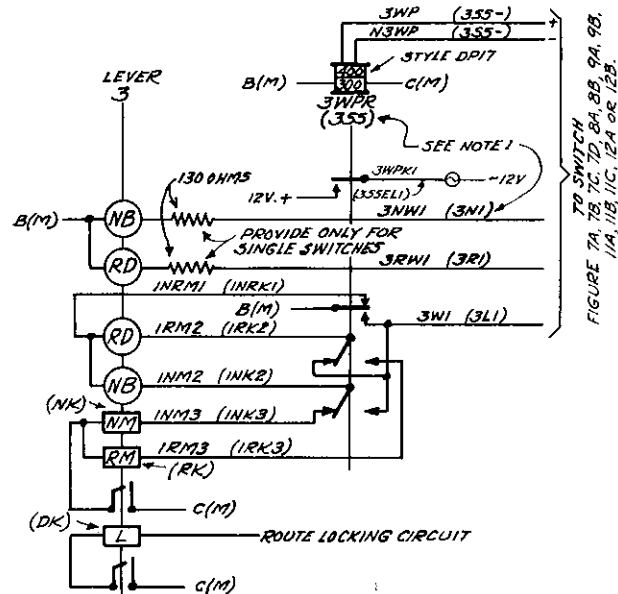


FIG. 2B

1000 OHM MODEL 12 OR DP-14 POLAR INDICATION RELAYS - DO NOT USE FOR NEW WORK OR RENEWALS.
STYLE DP-17 POLAR INDICATION RELAYS - FOR ALL NEW WORK AND RENEWALS, EXCEPT WHERE PLUG-IN RELAYS ARE PROVIDED.

STYLE DP-17 POLAR INDICATION RELAYS - FOR ALL NEW WORK AND RENEWALS, EXCEPT WHERE PLUG-IN RELAYS ARE PROVIDED.

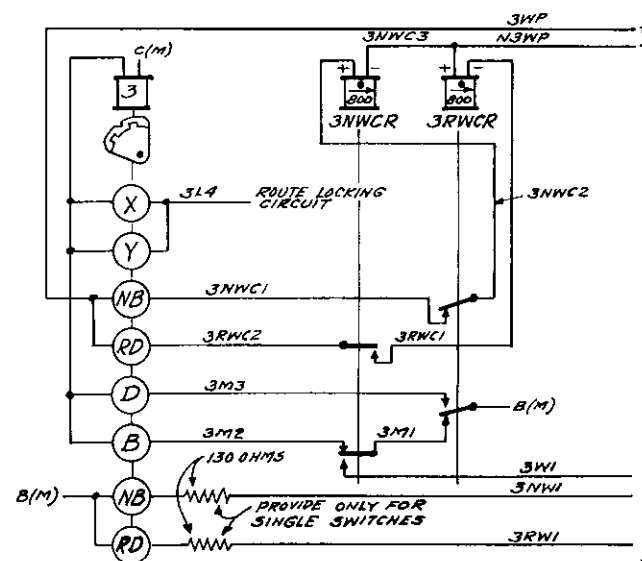
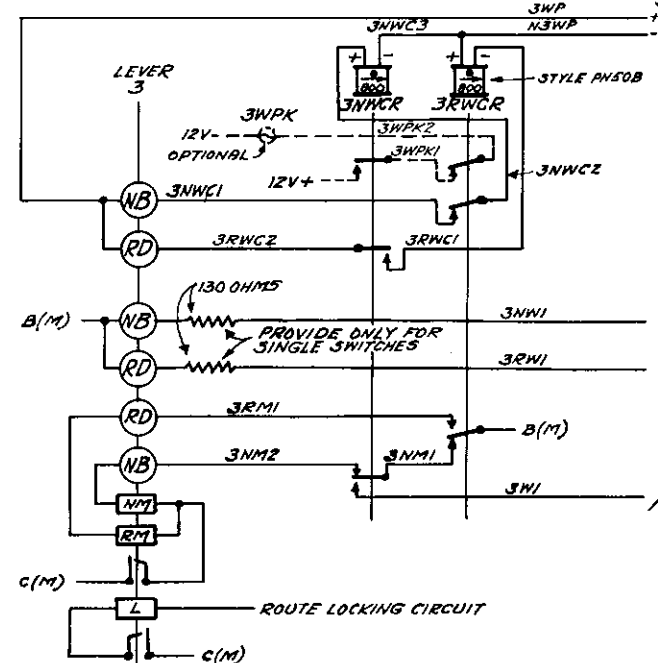


TABLE INTERLOCKER - PN-50B BIASED NEUTRAL RELAYS
FIG. 2E

USE LATCH PCE. NO. 54413, SH. 23-8711 WITH SEGMENT 142-8316
 " " " " 49820, SH. 19-8711 " SEGMENTS 143-8316 AND 165-8316
 " " " " 5608, SH. 7-8711 " SEGMENT 159-8316



STYLE PN-50B BIASED NEUTRAL PLUG-IN TYPE INDICATION RELAYS
FIG. 2C

NOTE:
1. A.P.R. CIRCUIT NOMENCLATURE USED FOR DESIGNATING INSTRUMENTS IN FIGS. 2B AND 2D. FORMER P.P.R. CIRCUIT NOMENCLATURE AND WIRE NUMBERS SHOWN IN PARENTHESES.

LEVER-CONTROL AND INDICATION CIRCUITS
 STYLE A1 OR A5 SWITCH AND LOCK MOVEMENTS
 WITH STYLE CP VALVES (QUICK SWITCH OMITTED)
 MAINTAINER'S RESET FOR POINT DETECTOR
 OR WHERE NO POINT DETECTOR IS PROVIDED.

MAINTAINER'S RESET FOR POINT DETECTOR
OR WHERE NO POINT DETECTOR IS PROVIDED.

REVISIONS

FIGS. 2A, 2B & 2D SUPERSEDES
LEVER CONTROL & INDICATION
CIRCUITS FORMERLY SHOWN
ON 5-822, SH.4 DATED 6-25-29
AND REVISED 9-27-48, SH.5
DATED 10-30-29 AND REVISED
4-14-32, SH.9 DATED 5-31-32 &
SHTS. 10, 11, 12 & 13 DATED 8-15-34.
FIGS. 2C & 2E ADDED.

SHEET 2 OF 15

S-822

THE PENNSYLVANIA RAILROAD
STANDARD
CIRCUITS FOR ELECTRO-PNEUMATIC
SWITCHES

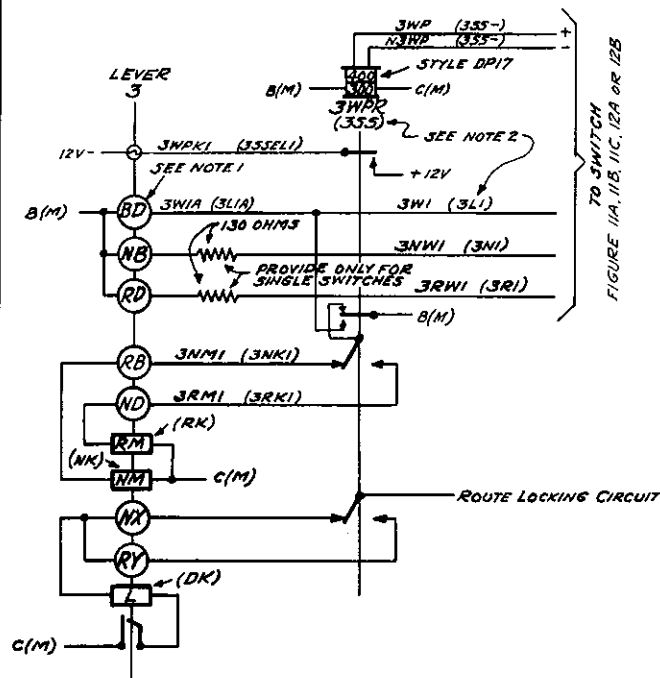
OFFICE OF CHIEF ENGINEER,
PHILA., PA., MAY 24, 1950.

APPROVED:

W. E. Salmonson
ASST. CHIEF ENGINEER-SIGNALS

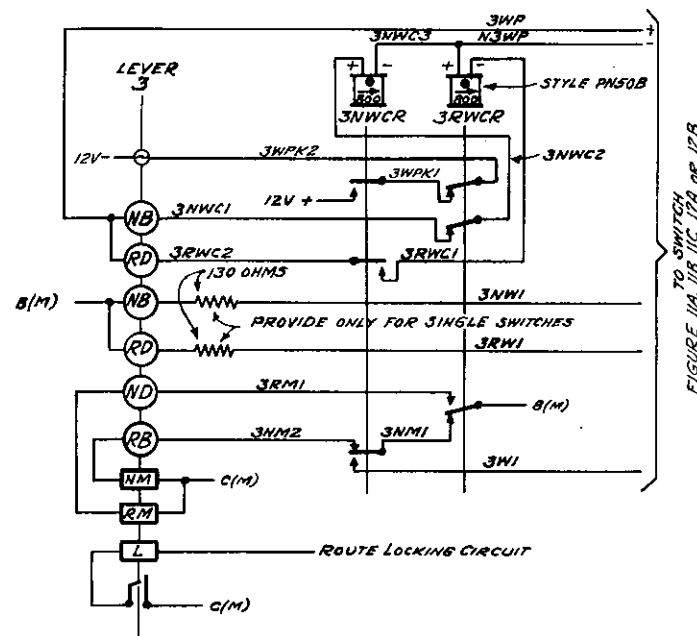
APPROVED

J. H. Bennett
CHIEF ENGINEER



USING DP-17 POLAR RELAYS

FIG. 3A



USING STYLE PN-50B PLUG-IN TYPE RELAYS.

FIG. 3B

NOTE:

1. "BD" SHALL BE OPEN WHEN MOVEMENT OF LEVER IS PREVENTED BY SWITCH LEVER DETECTOR LOCK.
2. A.A.R. CIRCUIT NOMENCLATURE USED FOR DESIGNATING INSTRUMENTS. FORMER R.R. CIRCUIT NOMENCLATURE AND WIRE NUMBERS SHOWN IN PARENTHESIS.

SEGMENTS AND QUADRANTS FOR NORMAL INDICATION (NM), REVERSE INDICATION (RM) AND DETECTOR LOCK (L) SHALL BE AS FOLLOWS:-

INDICATION (NM OR RM)	DETECTOR (L)	QUADRANT	TYPE OF MACHINE
151-8316	138-8316	89-8349	MODEL 14, TYPE F14 & STYLE P5
166-8316	137-8316	107-8349	STYLE S8
152-8316	137-8316	54-8349	STYLE P3
208-8316	72-8316	6-8349	TYPE F OR OLD STYLE E.P.
208-8316	72-8316	54-8349	STYLE P OR S7
152-8316	137-8316	6-8349	TYPE F13 & MODEL 13EP

REFERENCES 151-8316, 138-8316, 89-8349, ETC., ARE U.S. & S. CO. DRAWING NUMBERS.

USE LATCH PCE NO. 54413, SH. 23-8711 WITH SEGMENT 151-8316
 " " " " 49820, SH. 17-8711 " SEGMENTS 152-8316 AND 166-8316
 " " " " 3996, SH. 1-8711 " SEGMENT 208-8316

LEVER - CONTROL AND INDICATION CIRCUITS
 FOR USE WHERE STYLE AS MOVEMENTS WITH CP VALVES ARE
 PROVIDED WITH LEVER RESTORE FOR POINT DETECTOR

SHEET 3 OF 15

S-822

THE PENNSYLVANIA RAILROAD
 STANDARD
 CIRCUITS FOR ELECTRO-PNEUMATIC
 SWITCHES

OFFICE OF CHIEF ENGINEER,
 PHILA., PA., MAY 24, 1950.

APPROVED:
 H. L. Salmonson
 ASST. CHIEF ENGINEER-SIGNALS

APPROVED:
 J. H. H. H.
 CHIEF ENGINEER

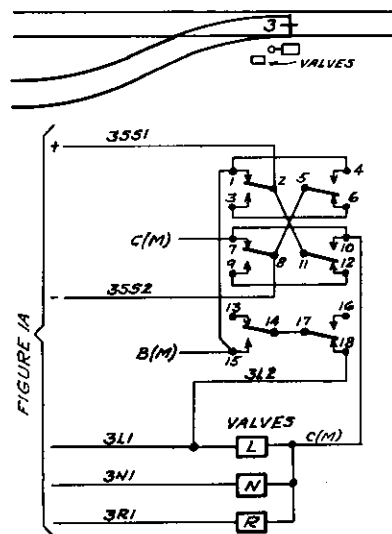


FIG. 5A

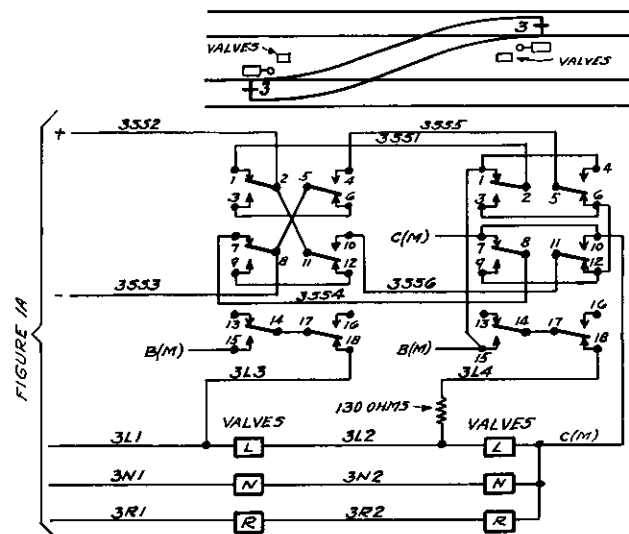


FIG. 5B

FINGER TYPE INDICATION CONTROLLER

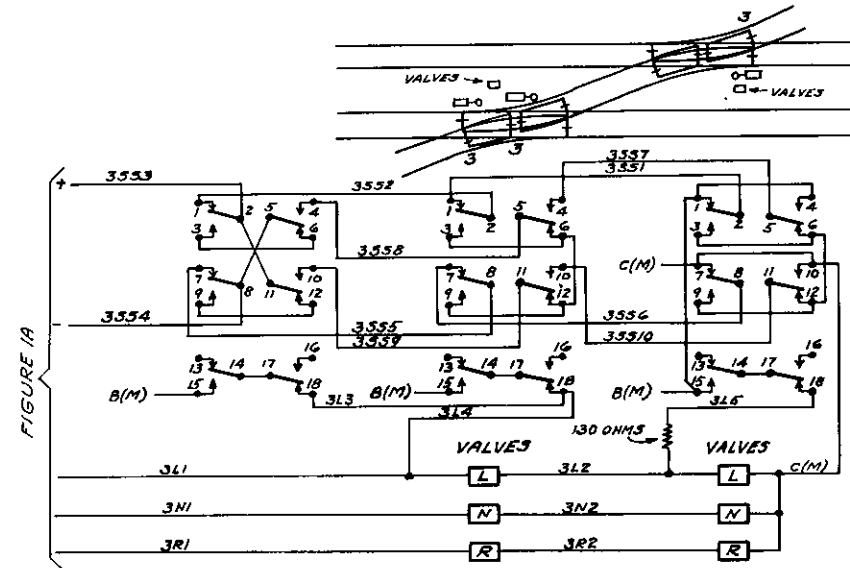


FIG. 5C

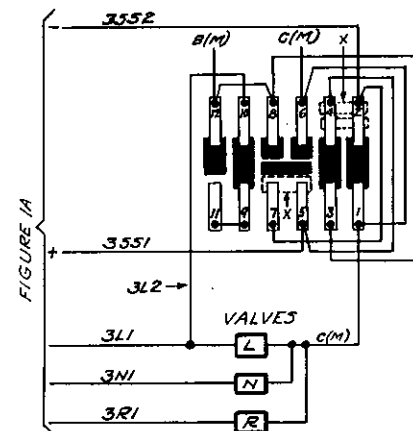


FIG. 5D

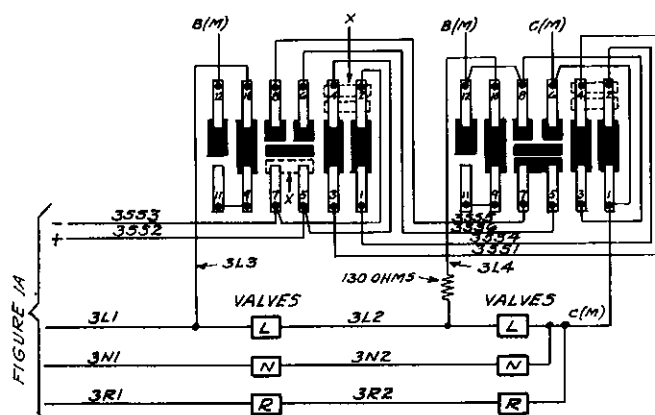


FIG. 5E

ROTARY TYPE INDICATION CONTROLLER

SEGMENT "X" MUST BE REMOVED FROM CONTROLLER AT RELAY END.

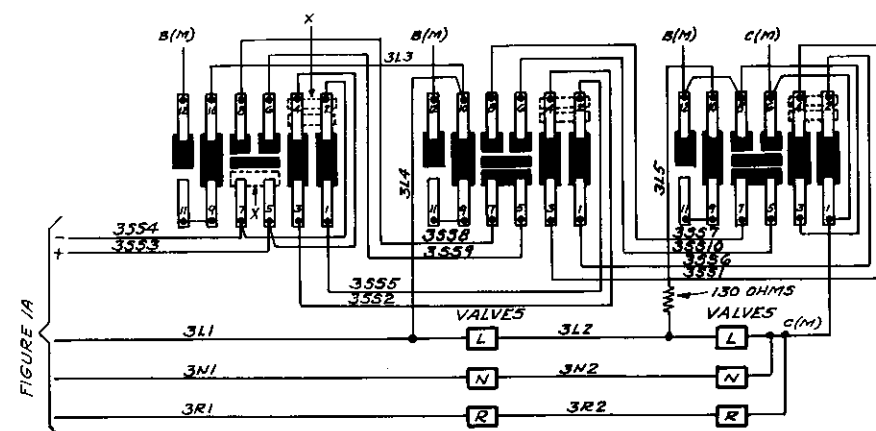


FIG. 5F

CONTACT OPERATION FINGER TYPE INDICATION CONTROLLER:
CONTACTS 1 AND 7 OPEN AND 3 AND 9 CLOSE BEFORE SWITCH
IS UNLOCKED AT START OF SWITCH THROW.
CONTACTS 4 AND 10 CLOSE AND 6 AND 12 OPEN AFTER SWITCH
IS LOCKED AT END OF SWITCH THROW.
CONTACTS 15 AND 18 SHALL BE ADJUSTED TO MAKE JUST
BEFORE INDICATION CONTACTS BREAK.

SWITCH - CONTROL AND INDICATION CIRCUITS
STYLE A1 SWITCH & LOCK MOVEMENTS WITH STYLE G VALVES
WHERE 18', 20' OR 30' SWITCH POINTS ARE PROVIDED.

REVISIONS

SWITCH CONTROL AND INDICATION
CIRCUITS SUPERSEDE S-822,
3H.1 DATED 7-18-28, 3H.8
DATED 1-10-31.

SHEET 5 OF 15

S-822

THE PENNSYLVANIA RAILROAD
STANDARD
CIRCUITS FOR ELECTRO-PNEUMATIC
SWITCHES

OFFICE OF CHIEF ENGINEER,
PHILA., PA., MAY 24, 1930.

APPROVED:
W. G. Salmonson
ASST. CHIEF ENGINEER - SIGNALS

APPROVED:
J. H. Schmitt
CHIEF ENGINEER

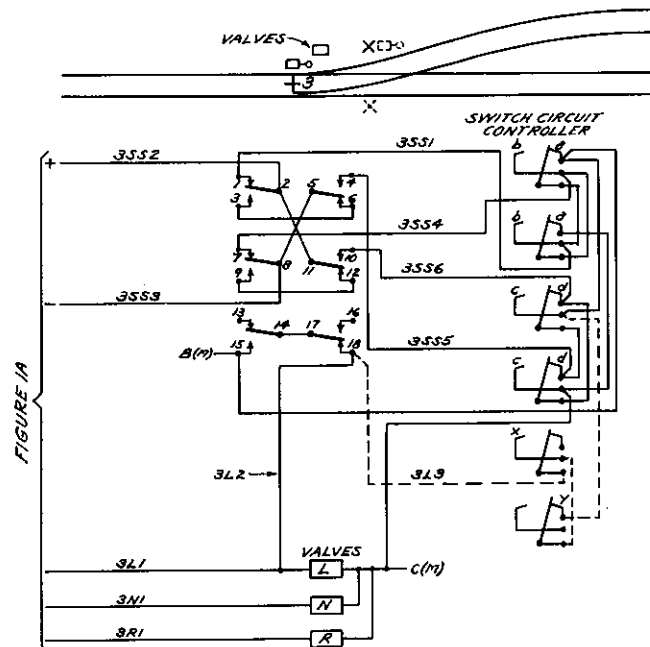


FIG. 6A

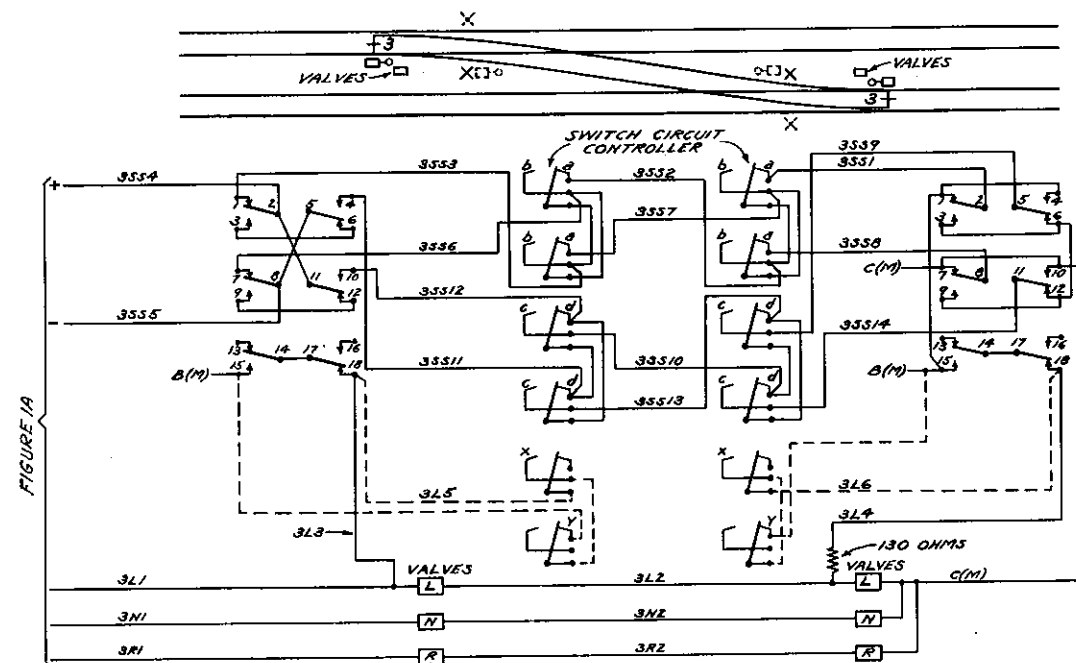


FIG. 6B

CONTACT OPERATION FINGER TYPE INDICATION CONTROLLER:
CONTACTS 1 AND 7 OPEN AND 3 AND 9 CLOSE BEFORE SWITCH
IS UNLOCKED AT START OF SWITCH THROW.
CONTACTS 4 AND 10 CLOSE AND 6 AND 12 OPEN AFTER SWITCH
IS LOCKED AT END OF SWITCH THROW.
CONTACTS 15 AND 18 SHALL BE ADJUSTED TO MAKE JUST
BEFORE INDICATION CONTACTS BREAK.

CONTACT OPERATION US SWITCH CIRCUIT CONTROLLER:
CONTACTS a ARE CLOSED WHEN SWITCH IS NORMAL.
CONTACTS b ARE OPEN WHEN SWITCH IS NORMAL.
CONTACTS c ARE CLOSED WHEN SWITCH IS REVERSE.
CONTACTS d ARE OPEN WHEN SWITCH IS REVERSE.
CONTACT x CLOSSES BEFORE CONTACTS a OPEN.
CONTACT y CLOSSES BEFORE CONTACTS c OPEN.

WHERE SWITCH AND LOCK MOVEMENT IS USED AT THE MID-POINT
(PLAN 5-222-A) CIRCUITS SHOWN DOTTED SHALL BE PROVIDED.

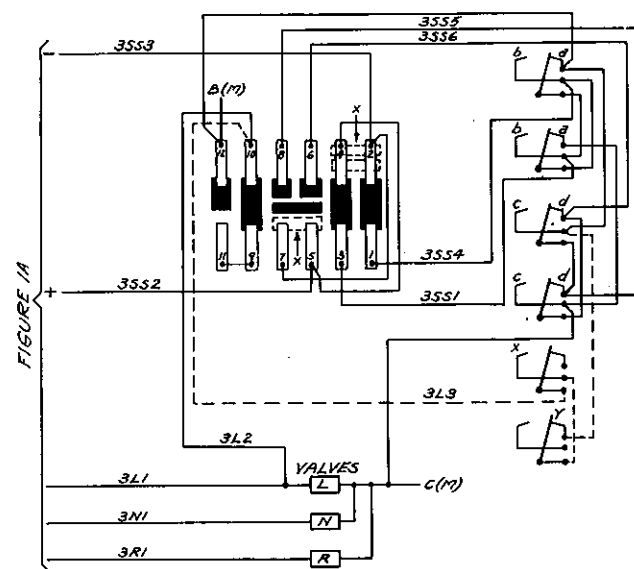


FIG. 6C

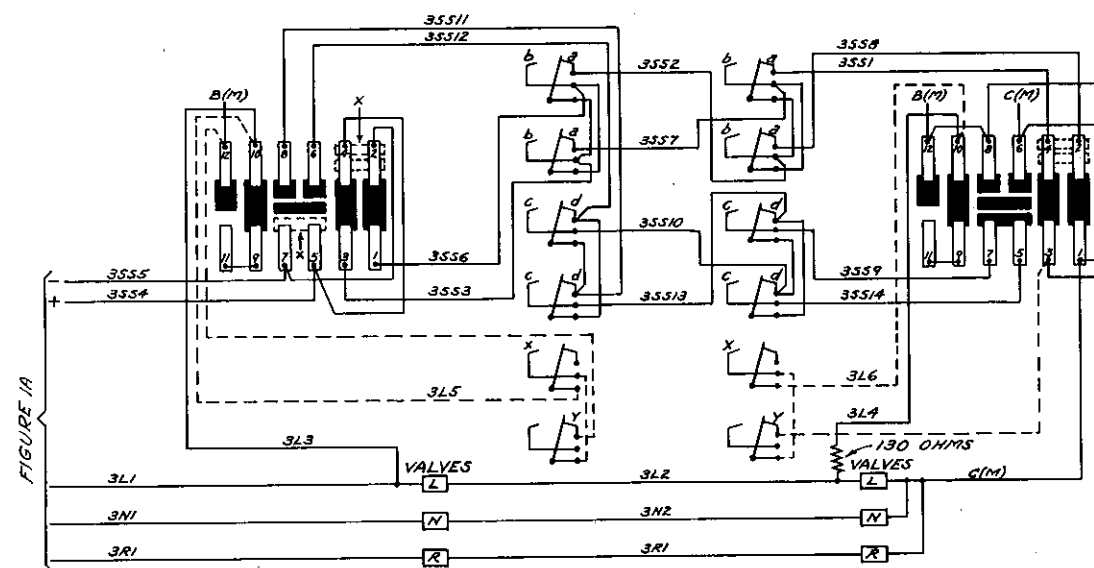


FIG. 6D

ROTARY TYPE INDICATION CONTROLLER
SEGMENT "X" MUST BE REMOVED FROM CONTROLLER
AT RELAY END.

SWITCH-CONTROL AND INDICATION CIRCUITS

STYLE A1 SWITCH AND LOCK
MOVEMENTS WITH STYLE C
VALVES WHERE 45° SWITCH
POINTS ARE PROVIDED.

REVISIONS

SWITCH CONTROL AND INDICATION
CIRCUITS SUPERSEDE S-822,
SHTS. 17, 18, 19 & 20 DATED
8-15-34.

SHEET 6 OF 15

S-822

THE PENNSYLVANIA RAILROAD
STANDARD
CIRCUITS FOR ELECTRO-PNEUMATIC
SWITCHES

OFFICE OF CHIEF ENGINEER,
PHILA., PA., MAY 24, 1950.

APPROVED:

W. G. Salmonson
ASST. CHIEF ENGINEER-SIGNALS

APPROVED:

J. H. Smith
CHIEF ENGINEER

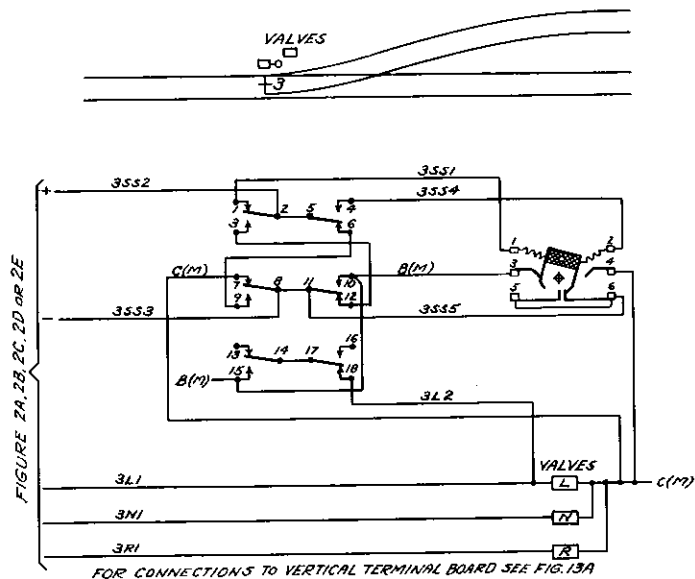
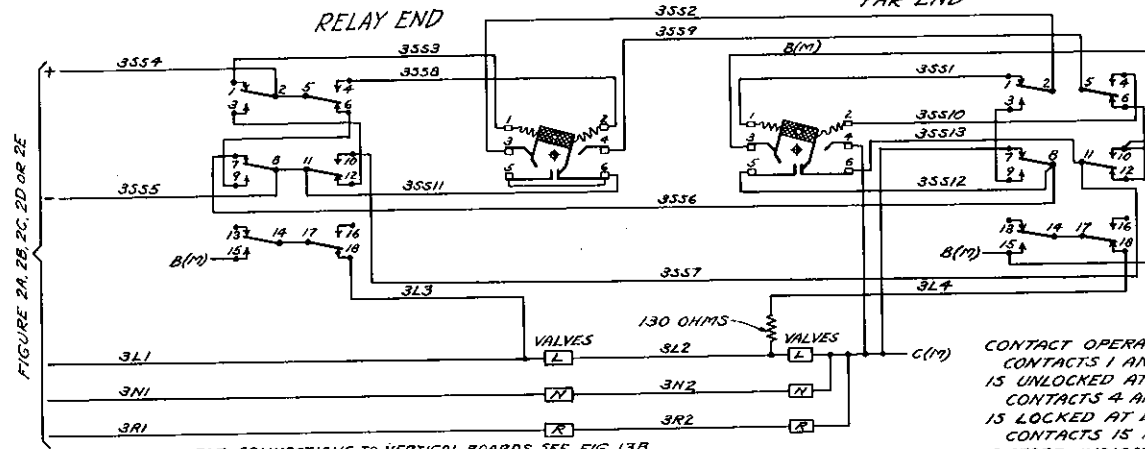


FIG. 7A

FINGER TYPE INDICATION CONTROLLER

FIG. 7B



CONTACT OPERATION FINGER TYPE INDICATION CONTROLLER
CONTACTS 1 AND 7 OPEN AND 3 AND 9 CLOSE BEFORE SWITCH
IS UNLOCKED AT START OF SWITCH THROW.
CONTACTS 4 AND 10 CLOSE AND 6 AND 12 OPEN AFTER SWITCH
IS LOCKED AT END OF SWITCH THROW.
CONTACTS 15 AND 18 SHALL BE ADJUSTED TO MAKE JUST
BEFORE INDICATION CONTACTS BREAK.

CONTACTS * ARE OPERATED BY SWITCH VALVE.

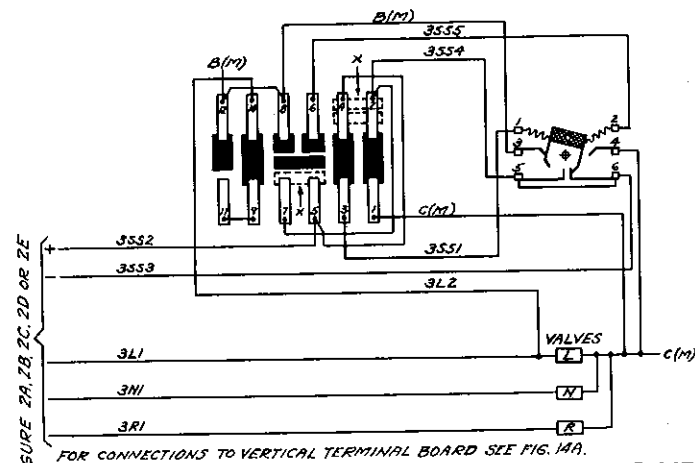
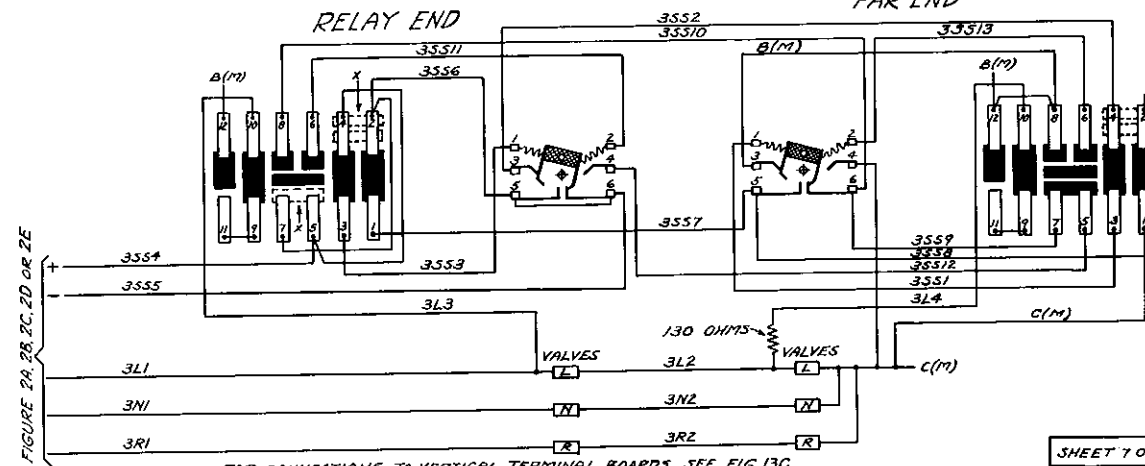


FIG. 7C

ROTARY TYPE INDICATION CONTROLLER
SEGMENT "X" MUST BE REMOVED FROM CONTROLLER AT RELAY END.

FIG. 7D



SWITCH-CONTROL AND INDICATION CIRCUITS
STYLE A1 SWITCH AND LOCK MOVEMENTS WITH CP VALVES
WHERE 18', 20', OR 30' SWITCH POINTS ARE PROVIDED.

REVISIONS

SWITCH CONTROL AND INDICATION
CIRCUIT SUPERSEDES S-822,
S-823, S-824 DATED 6-25-29 AND REVISED
9-27-48 AND S-825 DATED
10-30-29 AND REVISED 4-14-32.

SHEET 1 OF 15

S-822



THE PENNSYLVANIA RAILROAD
STANDARD
CIRCUITS FOR ELECTRO-PNEUMATIC
SWITCHES

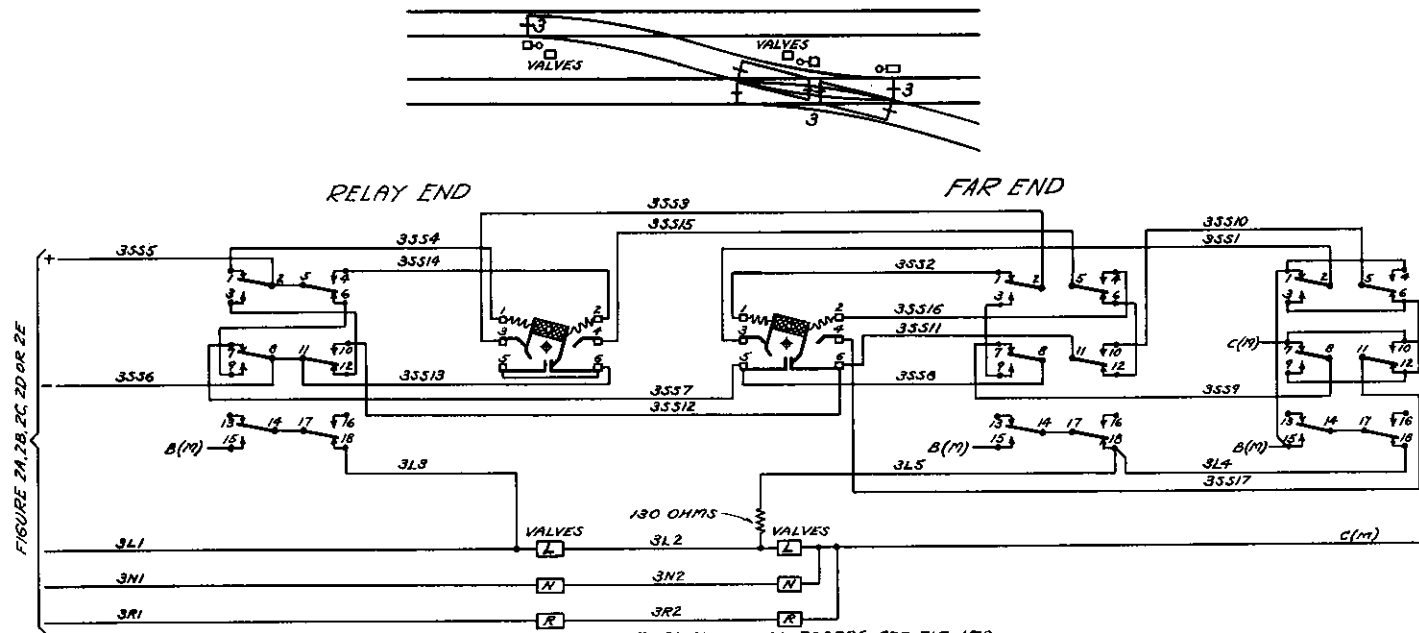
OFFICE OF CHIEF ENGINEER,
PHILA., PA., MAY 24, 1950.

APPROVED:

M. G. Salmonson
ASST. CHIEF ENGINEER-SIGNALS

APPROVED:

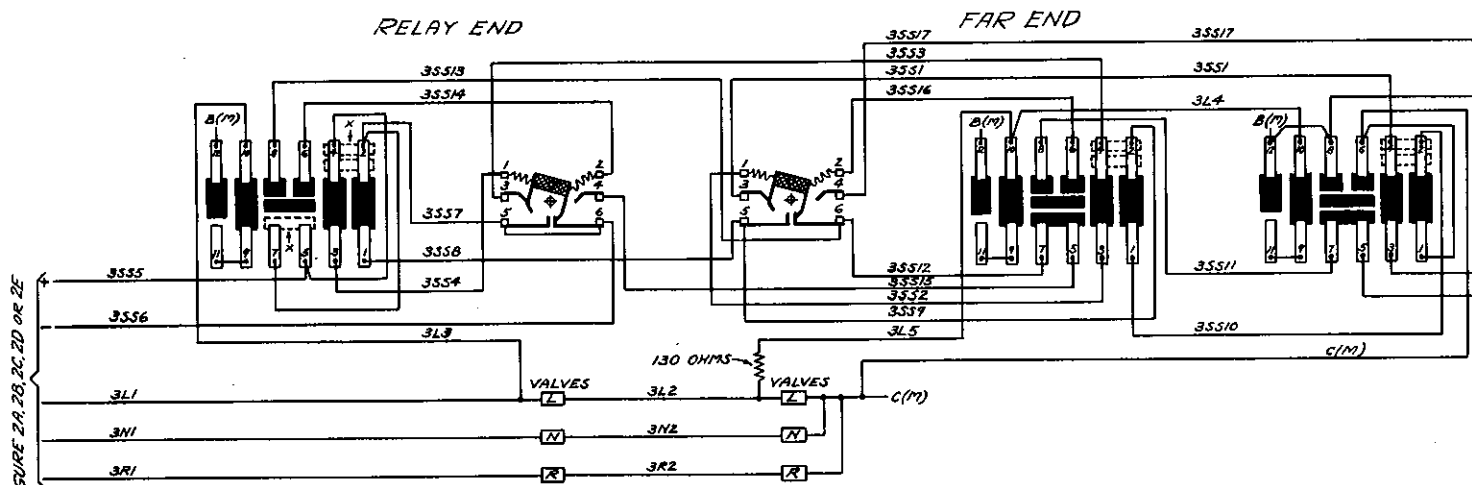
J. H. Smith
CHIEF ENGINEER



CONTACT OPERATION FINGER TYPE INDICATION CONTROLLER:
CONTACTS 1 AND 7 OPEN AND 3 AND 9 CLOSE BEFORE SWITCH
IS UNLOCKED AT START OF SWITCH THROW.
CONTACTS 4 AND 10 CLOSE AND 6 AND 12 OPEN AFTER SWITCH
IS LOCKED AT END OF SWITCH THROW.
CONTACTS 15 AND 18 SHALL BE ADJUSTED TO MAKE JUST
BEFORE INDICATION CONTACTS BREAK.

CONTACTS ♦ ARE OPERATED BY SWITCH VALVE.

FOR CONNECTIONS TO VERTICAL TERMINAL BOARDS SEE FIG. 15A
FINGER TYPE INDICATION CONTROLLER
FIG. 8A



SWITCH-CONTROL AND INDICATION CIRCUITS

STYLE AI SWITCH AND LOCK
MOVEMENTS WITH STYLE CP
VALVES WHERE 18', 20', OR 30'
SWITCH POINTS ARE PROVIDED.

SWITCH CONTROL AND INDICATION
CIRCUIT SUPERSEDES S-822,
SH.4 DATED 6-25-29 AND REVISED
9-27-48 AND SH.5 DATED
10-30-29 AND REVISED 4-14-32.

FOR CONNECTIONS TO VERTICAL TERMINAL BOARDS SEE FIG. 15B
 ROTARY TYPE INDICATION CONTROLLER
 SEGMENT "X" MUST BE REMOVED FROM CONTROLLER AT RELAY END

FIG. 8B

SHEET 8 OF 15

5-822

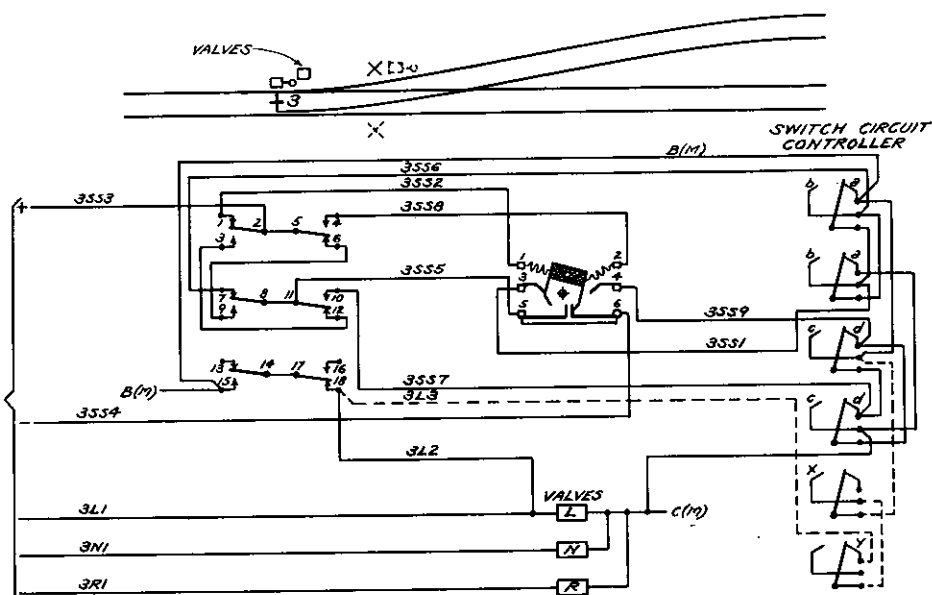
THE PENNSYLVANIA RAILROAD
STANDARD
CIRCUITS FOR ELECTRO-PNEUMATIC
SWITCHES

OFFICE OF CHIEF ENGINEER,
PHILA., PA., MAY 24, 1950
APPROVED: *[Signature]*

APPROVED:
W. G. Salmonson
ASST. CHIEF ENGINEER-SIGNALS

APPROVED:
J. Whessitt
CHIEF ENGINEER

FIGURE 2A, 2B, 2C, 2D OR 2E



FOR CONNECTIONS TO VERTICAL TERMINAL BOARD SEE FIG. 14B

FIG. 9A

CONTACT OPERATION FINGER TYPE INDICATION CONTROLLER:
CONTACTS 1 AND 7 OPEN AND 3 AND 9 CLOSE BEFORE SWITCH IS UNLOCKED AT START OF SWITCH THROW.
CONTACTS 4 AND 10 CLOSE AND 6 AND 12 OPEN AFTER SWITCH IS LOCKED AT END OF SWITCH THROW.
CONTACTS 15 AND 18 SHALL BE ADJUSTED TO MAKE JUST BEFORE INDICATION CONTACTS BREAK.

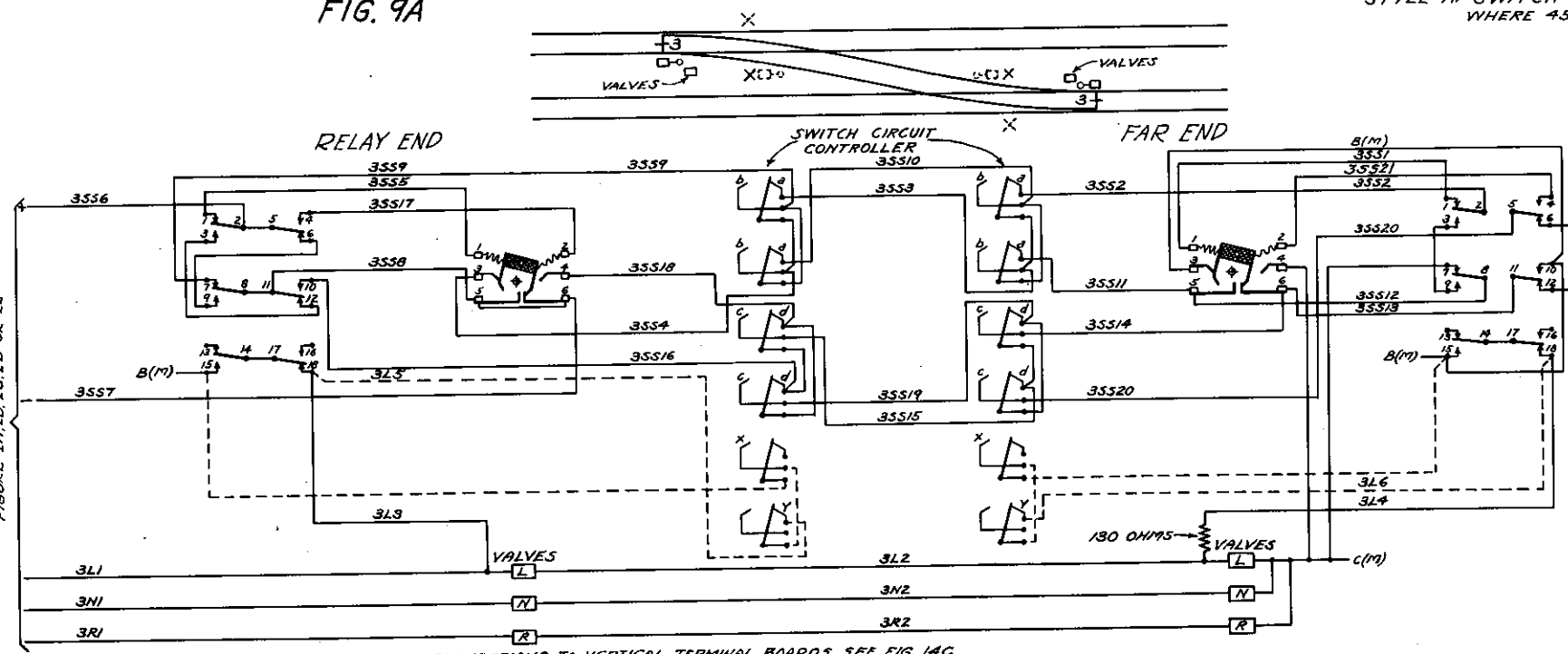
CONTACT OPERATION US SWITCH CIRCUIT CONTROLLER:
CONTACTS a ARE CLOSED WHEN SWITCH IS NORMAL.
CONTACTS b ARE OPEN WHEN SWITCH IS NORMAL.
CONTACTS c ARE CLOSED WHEN SWITCH IS REVERSE.
CONTACTS d ARE OPEN WHEN SWITCH IS REVERSE.
CONTACT x CLOSING BEFORE CONTACTS a OPEN.
CONTACT y CLOSING BEFORE CONTACTS c OPEN.

WHERE SWITCH AND LOCK MOVEMENT IS USED AT THE MID-POINT (PLAN S-222-A) CIRCUITS SHOWN DOTTED SHALL BE PROVIDED.

CONTACTS d ARE OPERATED BY SWITCH VALVE

SWITCH-CONTROL AND INDICATION CIRCUITS STYLE A1 SWITCH AND LOCK MOVEMENTS WITH CP VALVES WHERE 45° SWITCH POINTS ARE PROVIDED.

FIGURE 2A, 2B, 2C, 2D OR 2E



FOR CONNECTIONS TO VERTICAL TERMINAL BOARDS SEE FIG. 14C

FIG. 9B

REVISIONS

SWITCH CONTROL AND INDICATION CIRCUITS SUPERSEDE S-822, SHTS. 12 AND 13 DATED 8-15-34.

SHEET 9 OF 15

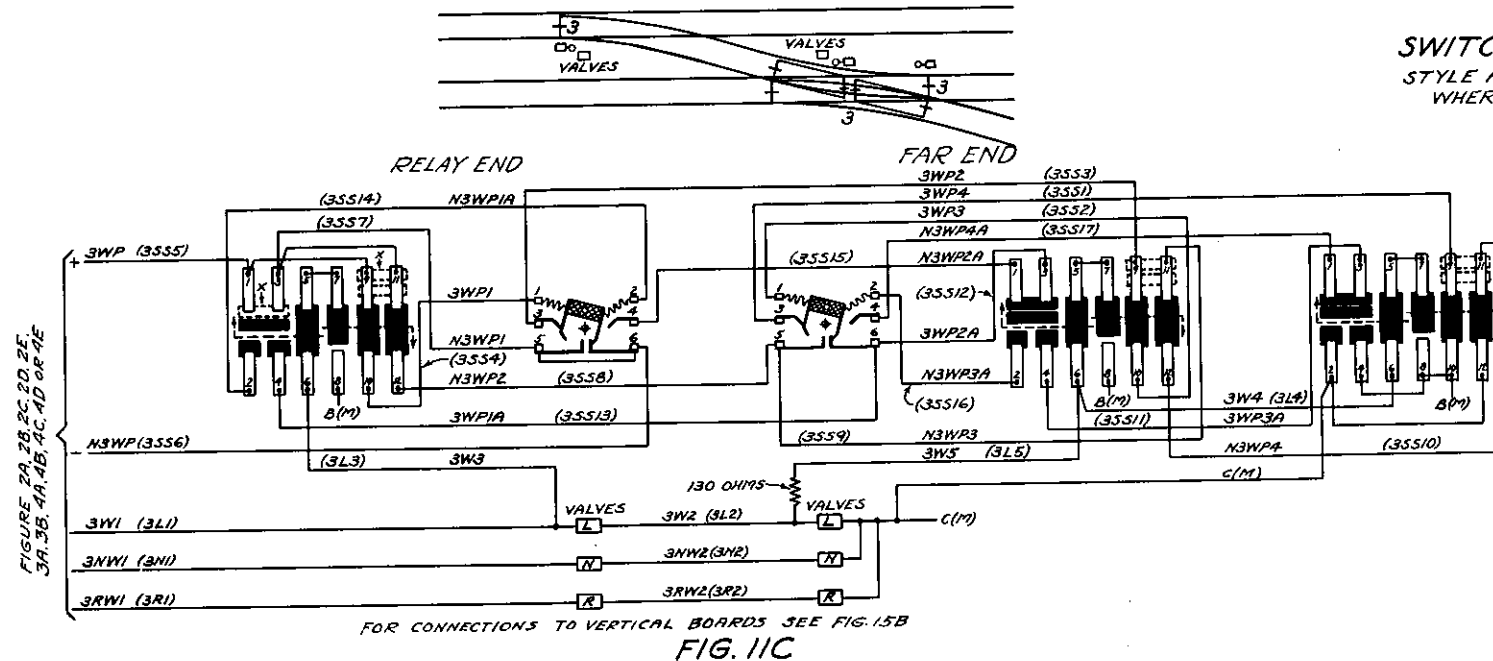
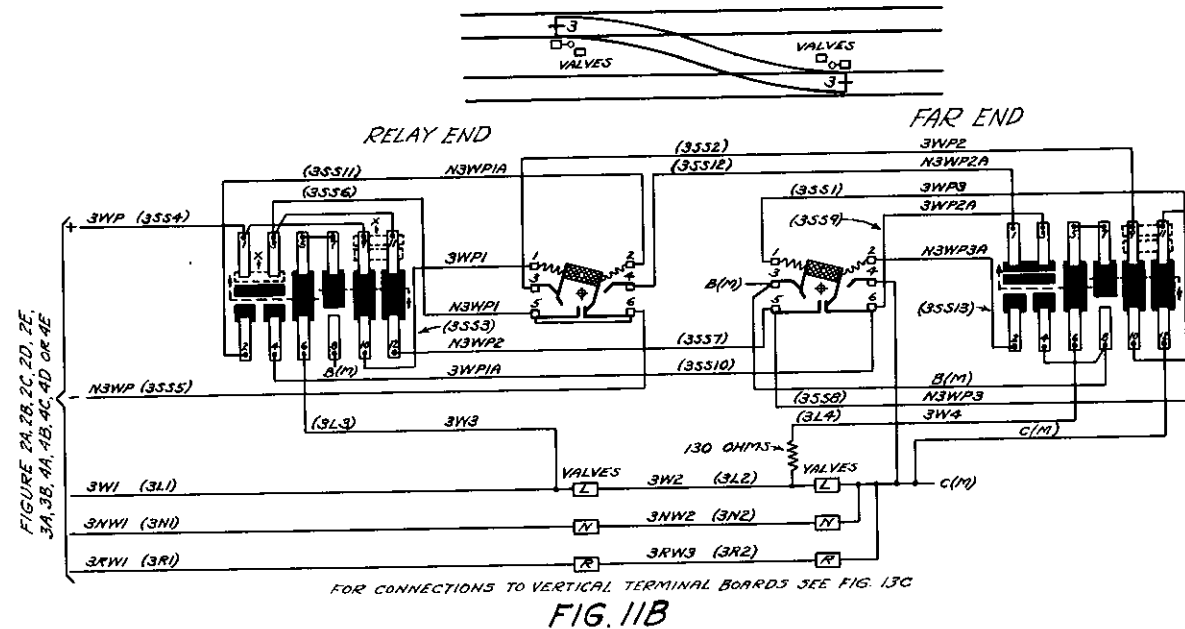
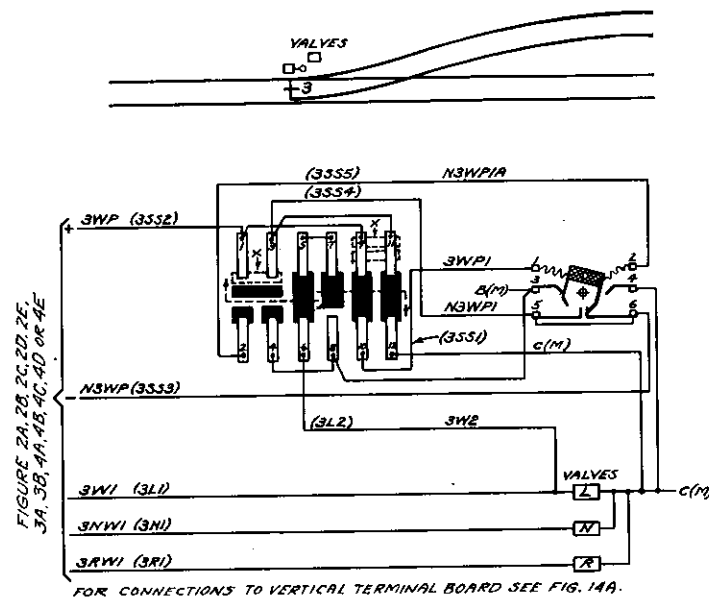
S-822

THE PENNSYLVANIA RAILROAD
STANDARD
CIRCUITS FOR ELECTRO-PNEUMATIC SWITCHES

OFFICE OF CHIEF ENGINEER,
PHILA., PA., MAY 24, 1950.

APPROVED:
H. G. Salmonson
ASST. CHIEF ENGINEER-SIGNALS

APPROVED:
J. H. Reinecke
CHIEF ENGINEER



SWITCH-CONTROL AND INDICATION CIRCUITS
STYLE A5 SWITCH AND LOCK MOVEMENTS WITH CP VALVES
 WHERE 18", 20", OR 30" SWITCH POINTS ARE PROVIDED

CONTACTS Φ ARE OPERATED BY SWITCH VALVE.
SEGMENT "X" MUST BE REMOVED FROM CONTROLLER
AT RELAY END.

A.A.R. CIRCUIT NOMENCLATURE USED FOR WIRE NUMBERS.
FORMER P.R.R. WIRE NUMBERS SHOWN IN PARENTHESES.

REVISIONS	
F.	SWITCH CONTROL AND INDICATION CIRCUIT SUPERSEDES S-822. SN.9 DATED 5-31-32.

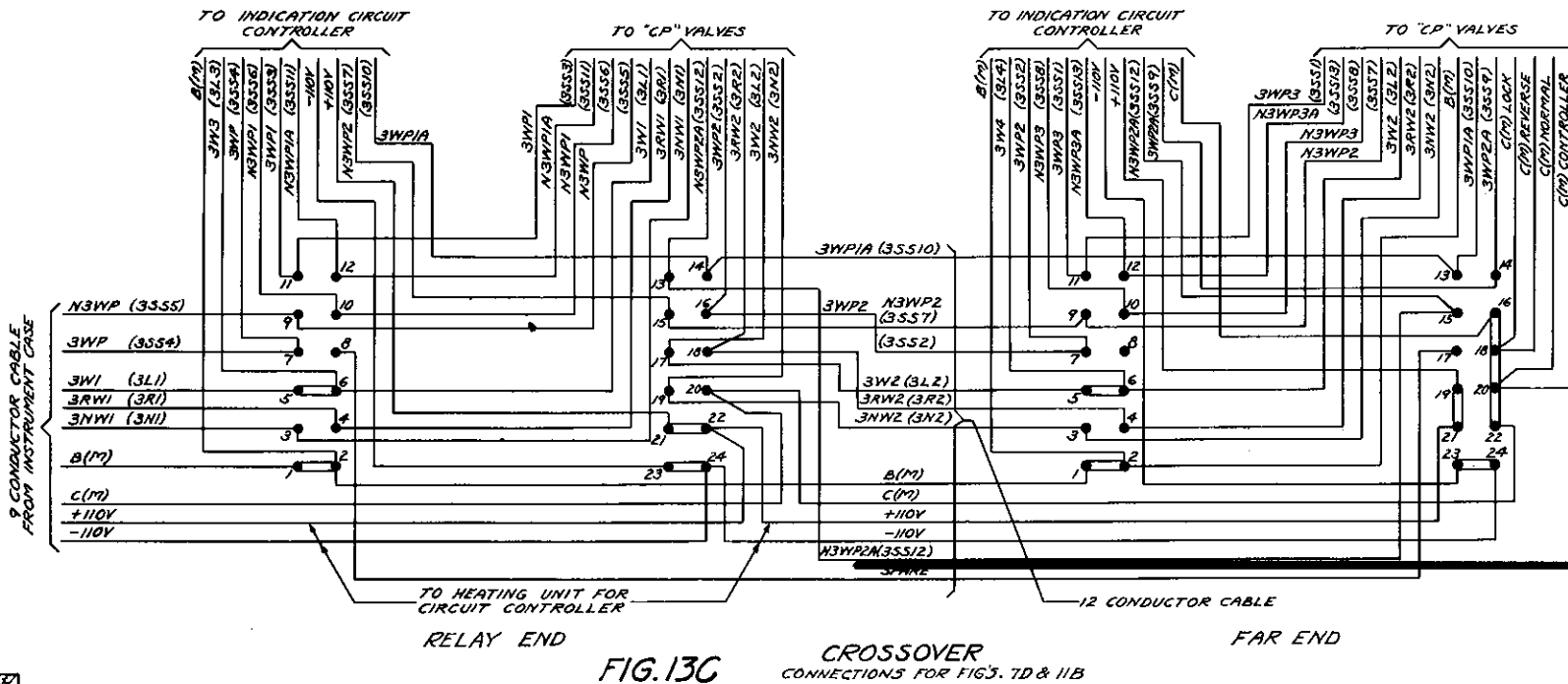
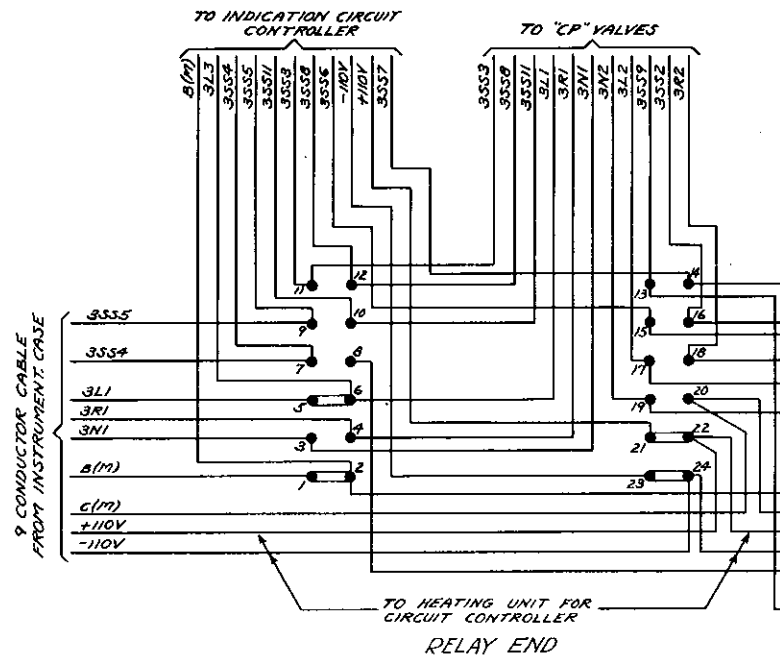
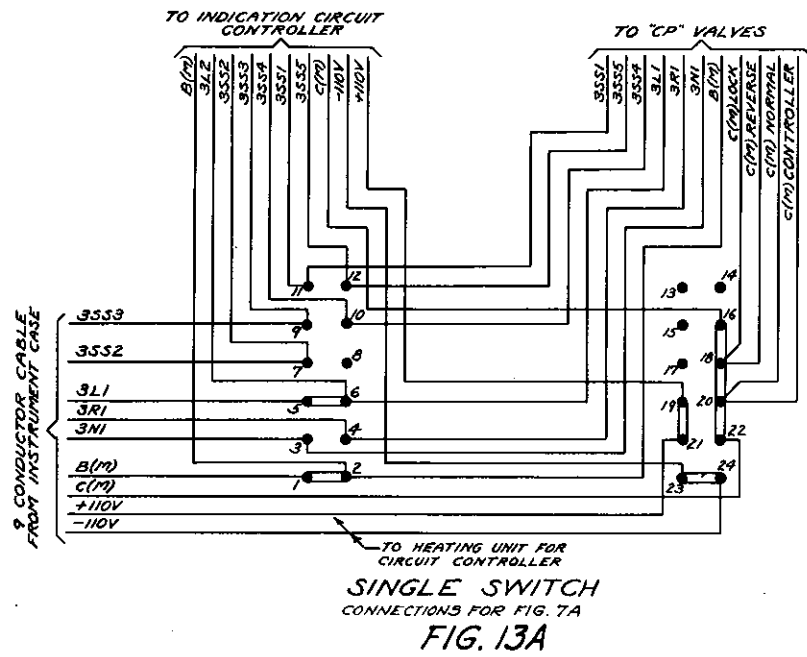
SHEET 11 OF 15

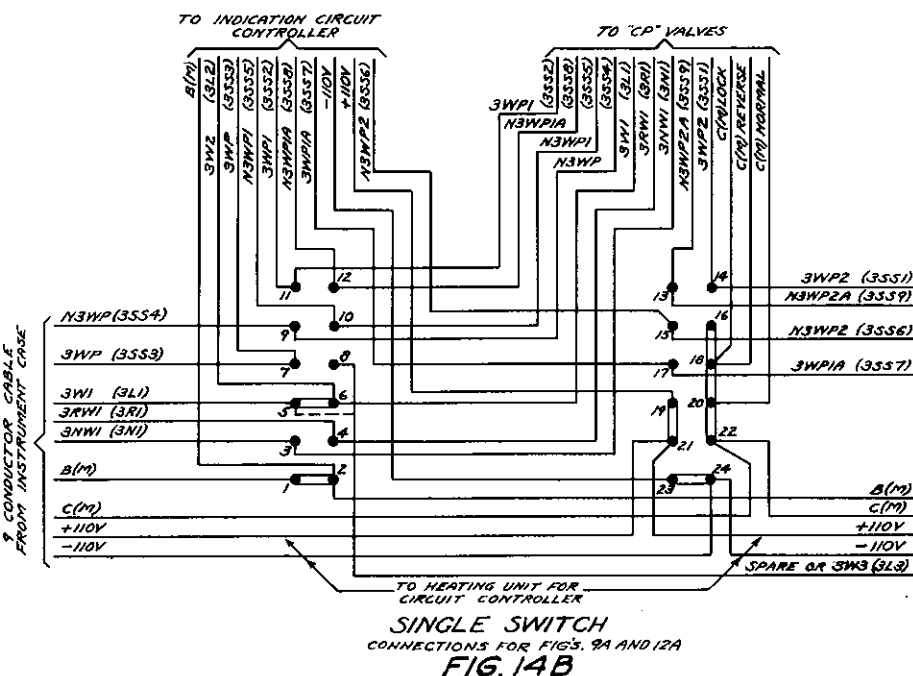
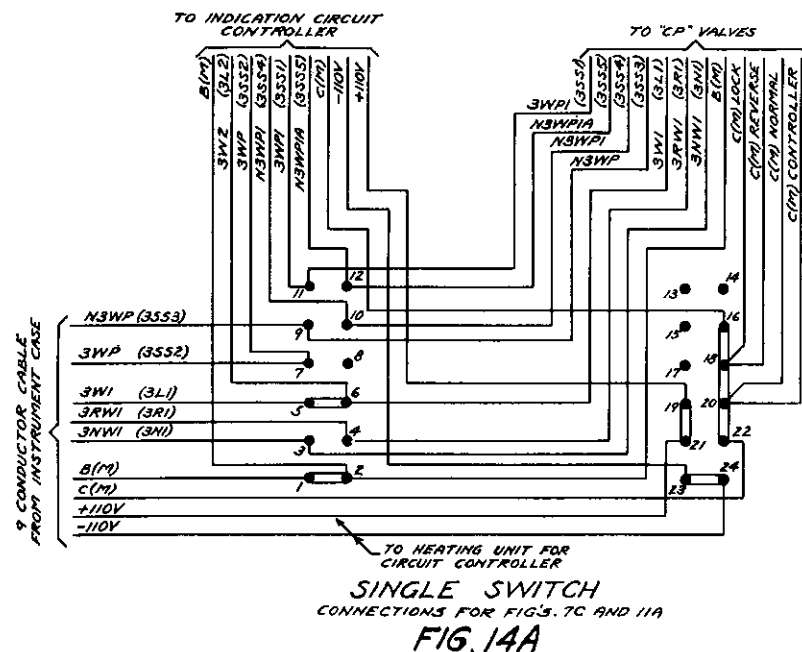
S-822

THE PENNSYLVANIA RAILROAD
STANDARD
CIRCUITS FOR ELECTRO-PNEUMATIC
SWITCHES

OFFICE OF CHIEF ENGINEER,
PHILA., PA., MAY 24, 1950.
APPROVED:
H. G. Salmonson
ASST. CHIEF ENGINEER-SK

APPROVED:
J. W. Bennett
CHIEF ENGINEER

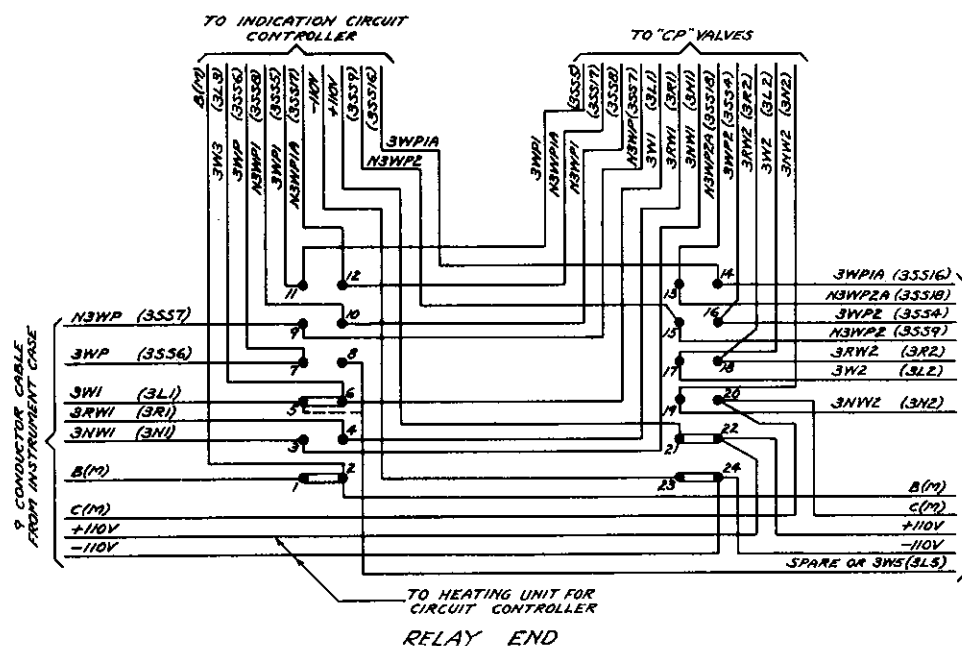




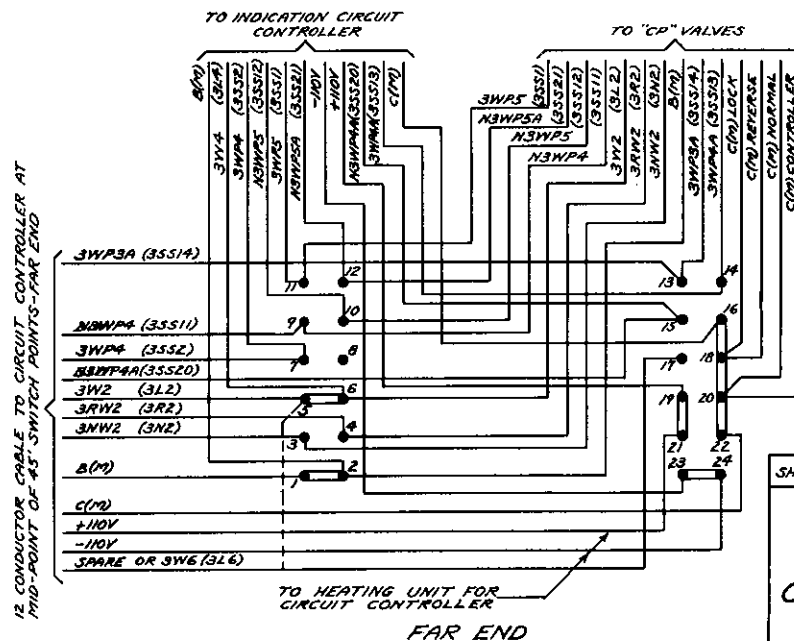
WHEN WIRES 3L3, FIG. 14B OR 3L5 & 3L6 FIG. 14C ARE REQUIRED ARRANGE CONNECTIONS AS SHOWN DOTTED.

A.A.R. CIRCUIT NOMENCLATURE USED FOR WIRE NUMBERS. FORMER P.R.R. WIRE NUMBERS SHOWN IN PARENTHESIS.

CONNECTIONS TO VERTICAL TERMINAL BOARDS FOR STYLE "CP" VALVES



CROSSOVER
CONNECTIONS FOR FIGS. 9B AND 12B
FIG. 14C



REVISIONS

SUPERSEDES S-822, 34.7
DATED 9-28-48.

SHEET 14 OF 15

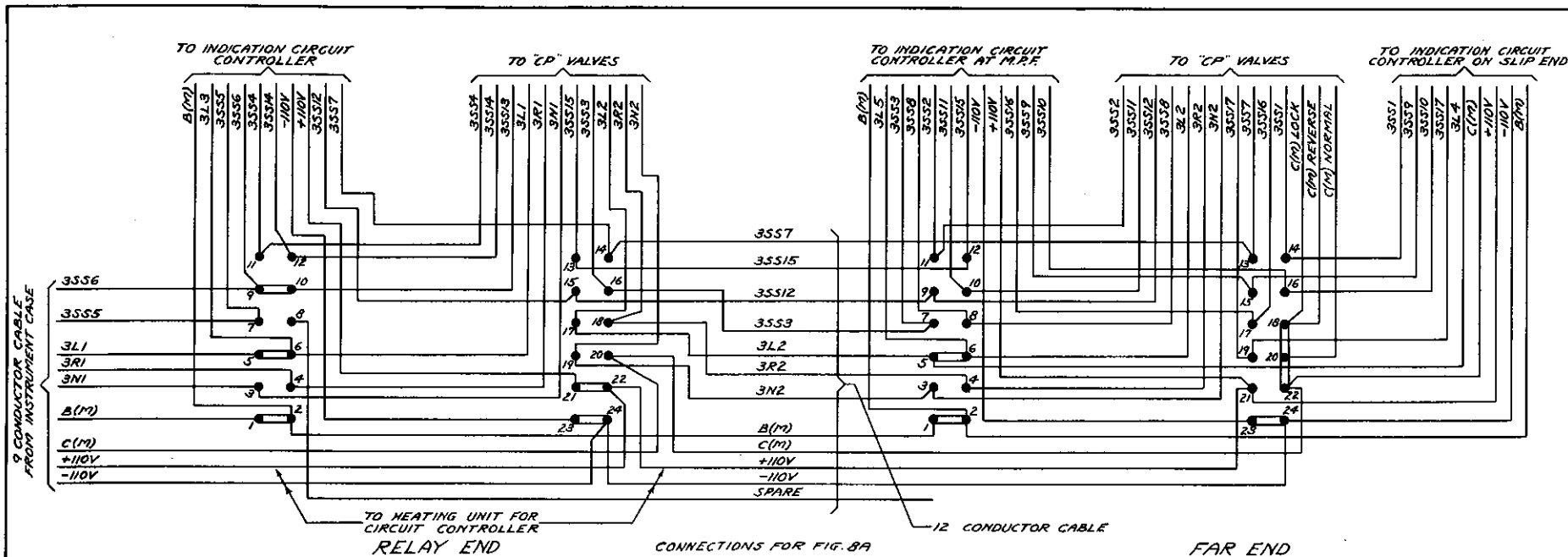
S-822

THE PENNSYLVANIA RAILROAD
STANDARD
CIRCUITS FOR ELECTRO-PNEUMATIC
SWITCHES

OFFICE OF CHIEF ENGINEER,
PHILA., PA., MAY 24, 1950.

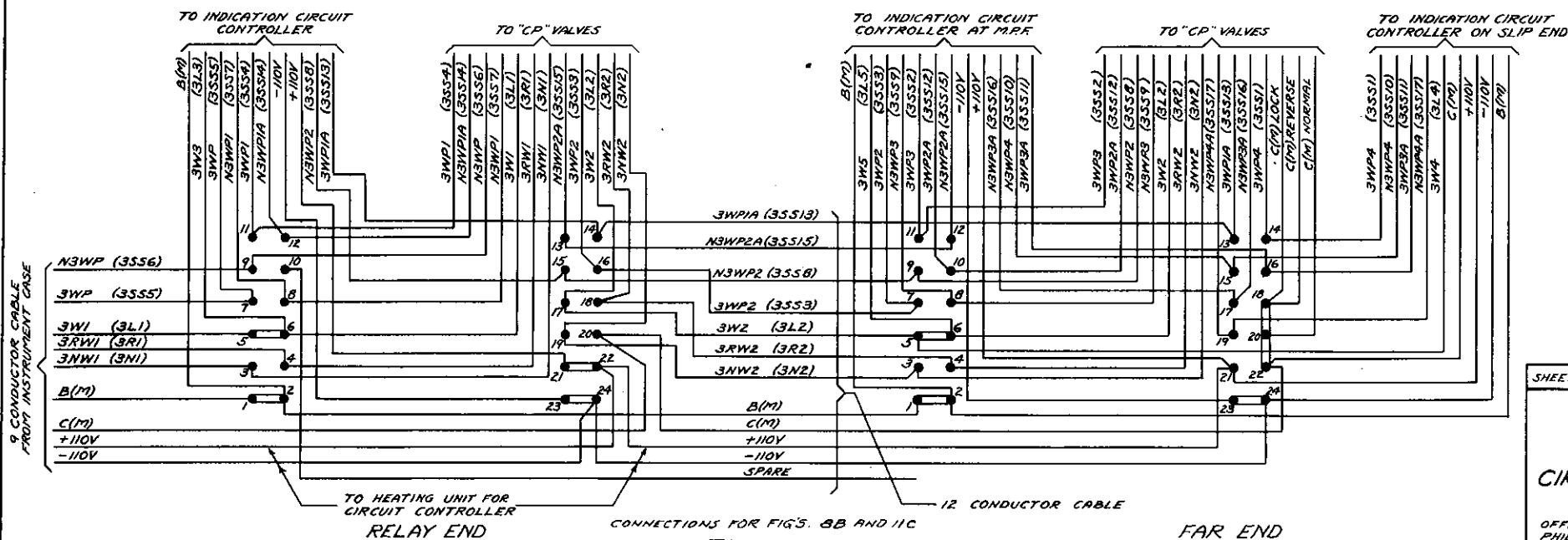
APPROVED:
H. L. Salmonson
ASST. CHIEF ENGINEER-SIGNALS

APPROVED:
J. H. H. H.
CHIEF ENGINEER



CONNECTIONS TO
VERTICAL TERMINAL BOARDS
FOR
STYLE "CP" VALVES
SLIP SWITCHES

A.A.R. CIRCUIT NOMENCLATURE USED FOR
WIRE NUMBERS IN FIG. 15B. FORMER P.R.R.
WIRE NUMBERS SHOWN IN PARENTHESES.



REVISIONS

SHEET 15 OF 15

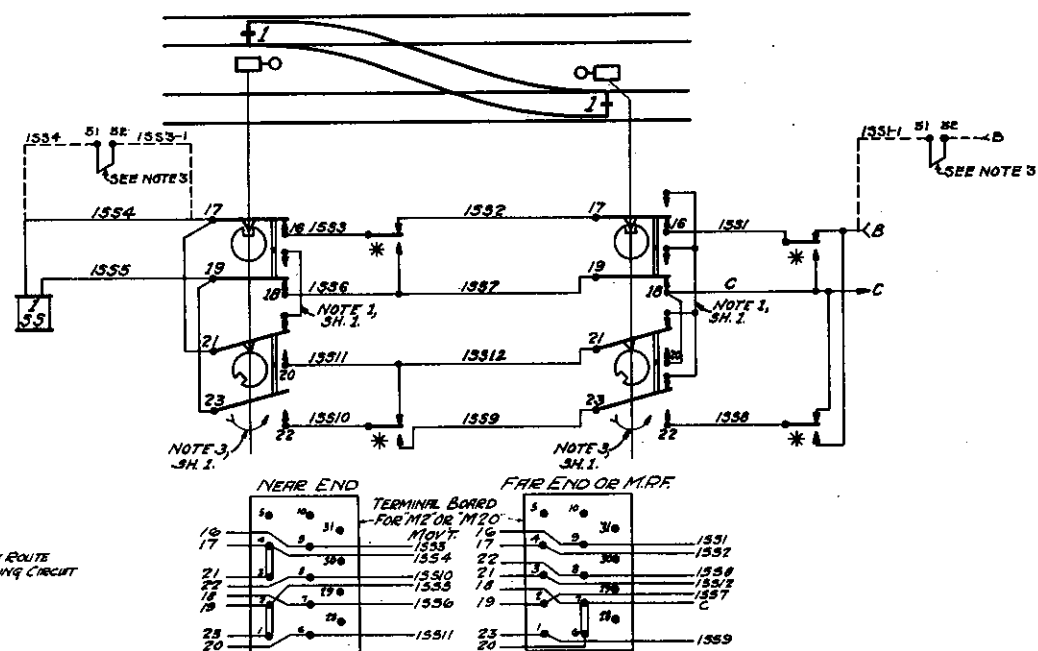
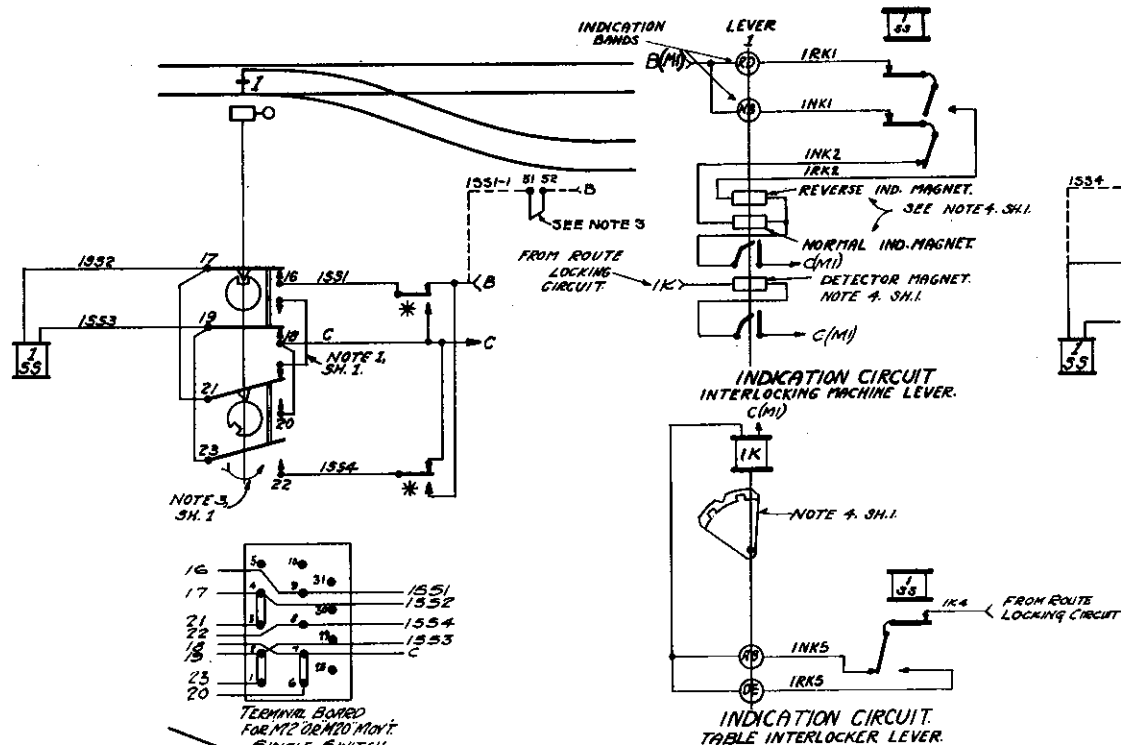
S-822

THE PENNSYLVANIA RAILROAD
STANDARD
CIRCUITS FOR ELECTRO-PNEUMATIC
SWITCHES

OFFICE OF CHIEF ENGINEER,
PHILA., PA., MAY 24, 1950.

APPROVED:
N. G. Salomonson
ASST. CHIEF ENGINEER-SIGNALS

APPROVED:
J. H. Smith
CHIEF ENGINEER



NOTE:-

- * CONTACTS ON TYPE "F" CONTROLLER.
- FOR GENERAL NOTES SEE SHEET NO. 1.
- CIRCUITS SHOWN IN DOTTED LINES SHALL BE PROVIDED WHERE M2 OR M20 MOVEMENTS ARE USED, CIRCUIT CONTROLLER BEING OPERATED BY SELECTOR LEVER IN M20 AND BY CRANK IN M2 MOVEMENTS.

STYLE "M", "M2", & "M20" MOVEMENTS
SWITCH INDICATION AND "55"
CONTROL CIRCUITS
(WITHOUT QUICK SWITCH)

REVISIONS.

5-25-32- NOTE 3 ADDED.
APPROVED: *[Signature]*

SHEET 2 OF 6

S-823

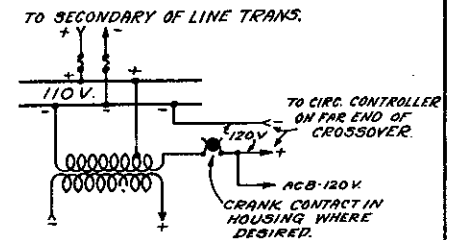
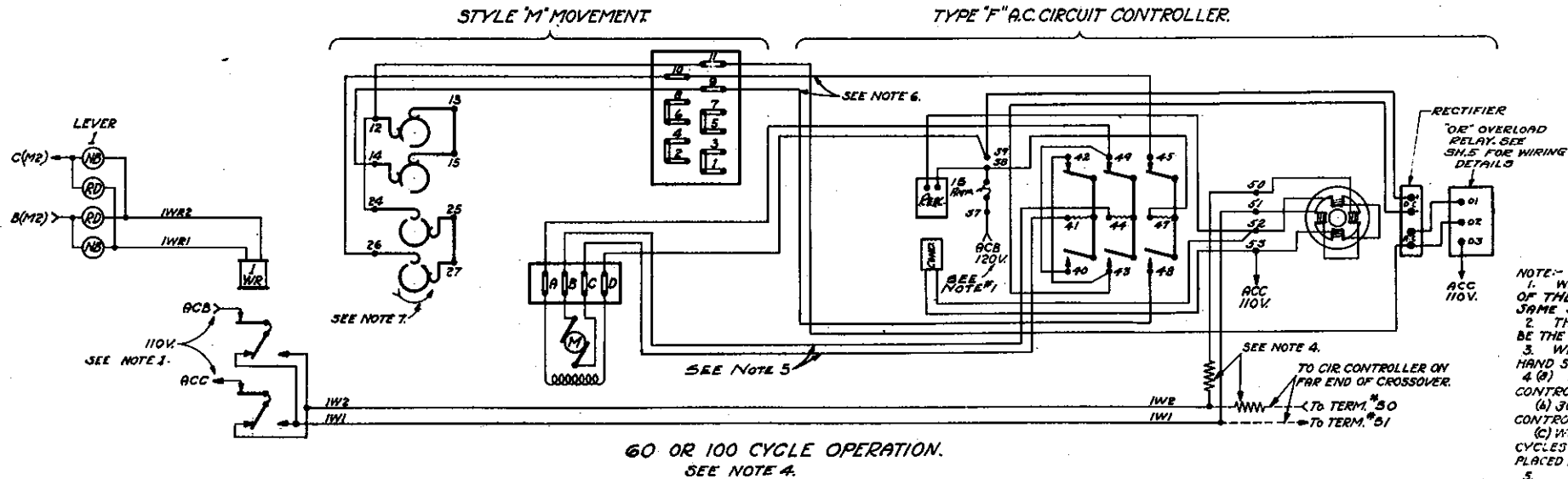
THE PENNSYLVANIA RAILROAD
STANDARD
CIRCUITS FOR ELECTRIC SWITCHES

OFFICE OF CHIEF SIGNAL ENGINEER,
PHILA., PA., JUNE 1, 1932.

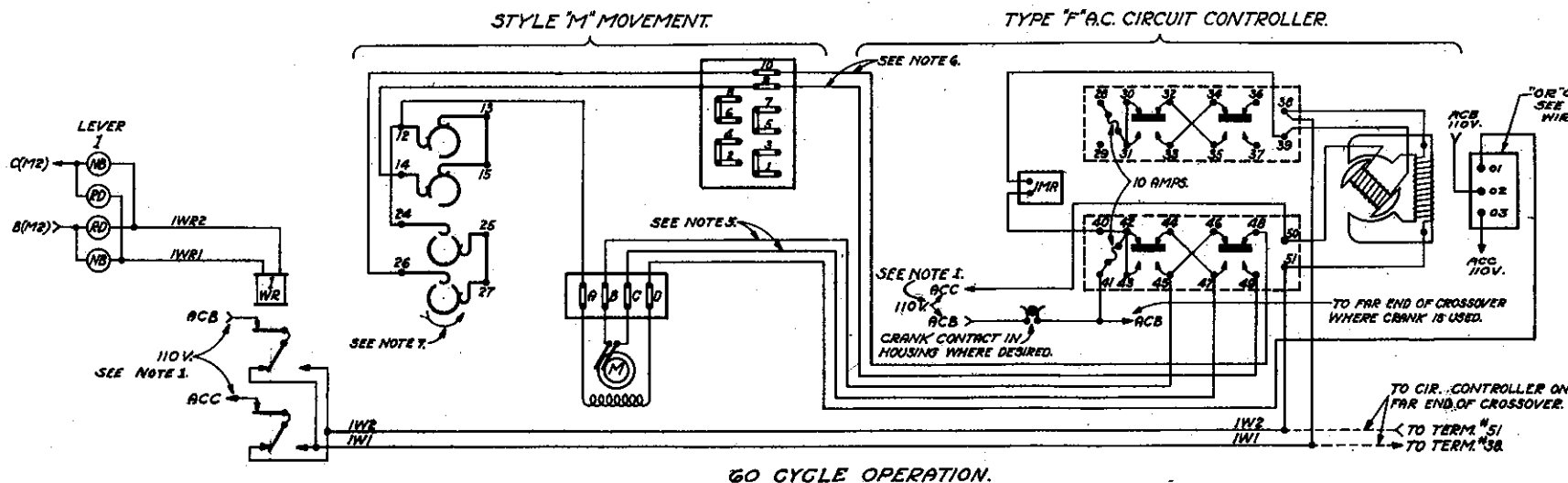
NOT TO SCALE

Approved: *[Signature]*
Chief Signal Engineer

Approved: *[Signature]*
Chief Engineer



- NOTE:-
1. WHERE A.C. CONTROLLERS ARE USED BOTH ELEMENTS OF THE CONTROLLER MUST BE ENERGIZED FROM THE SAME SOURCE OF POWER.
 2. THE CONTROL OF A SINGLE SWITCH AND DERAIL SHALL BE THE SAME AS A CROSSOVER.
 3. WIRING AS SHOWN IS FOR MOVEMENT WHERE RIGHT HAND SWITCH POINT IS NORMALLY CLOSED.
 4. (a) 250 OHM RESISTORS SHALL BE USED FOR 100 CYCLE CONTROLLERS.
(b) 300 OHM RESISTORS SHALL BE USED FOR 60 CYCLE CONTROLLERS.
(c) WHERE A 100 CYCLE CONTROLLER IS OPERATED ON 60 CYCLES A 100 OHM-SWATT CAPACITY RESISTOR SHALL BE PLACED IN SERIES WITH THE 250 OHM RESISTOR.
 5. WHERE LEFT HAND POINT IS NORMALLY CLOSED OR FOR MOVABLE POINT PROGRESSIVE MOVEMENT INTERCHANGE LEADS TO B AND C.
 6. WHERE LEFT HAND POINT IS NORMALLY CLOSED INTERCHANGE LEADS TO 9 AND 10.
 7. -ARROW INDICATES DIRECTION OF NEXT ROTATION.



"OR" OVERLOAD RELAYS.

FOR EXISTING INSTALLATIONS, OVERLOAD RELAY MAY BE INSTALLED IN INSTRUMENT CASE IF LOCATED IN CLOSE PROXIMITY TO THE SWITCH MOVEMENT. IF NOT, A NEW CIRCUIT CONTROLLER BOX SHALL BE USED.

STYLE 'M' MOVEMENT.

A.C. OPERATION

FOR EXISTING INSTALLATIONS.

REVISIONS.	
MAR. 1, 1937	NOTE 1, FORMERLY SPECIFIED 500 OHM RESISTOR
APPROVED: <i>[Signature]</i>	
SEPT. 1, 1934	"OR" OVERLOAD RELAYS ADDED IN LIEU OF THERMAL CUTOUTS.
APPROVED: <i>[Signature]</i>	
REDRAWN FROM SHS 1 & 7 OF PLAYS 9-215 DATES 12-8-23 & 10-26-26 RESPECTIVELY.	

SHEET 3 OF 12

S-823

THE PENNSYLVANIA RAILROAD

STANDARD

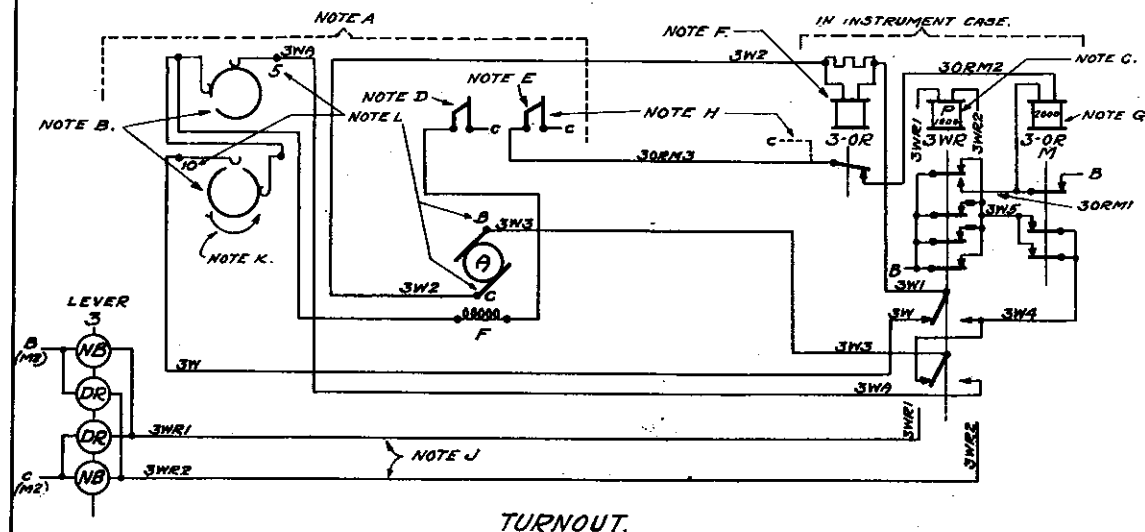
CIRCUITS FOR ELECTRIC SWITCHES

OFFICE OF CHIEF SIGNAL ENGINEER,
PHILA., PA., JUNE 28, 1929.

Approved: *[Signature]*
Chief Signal Engineer

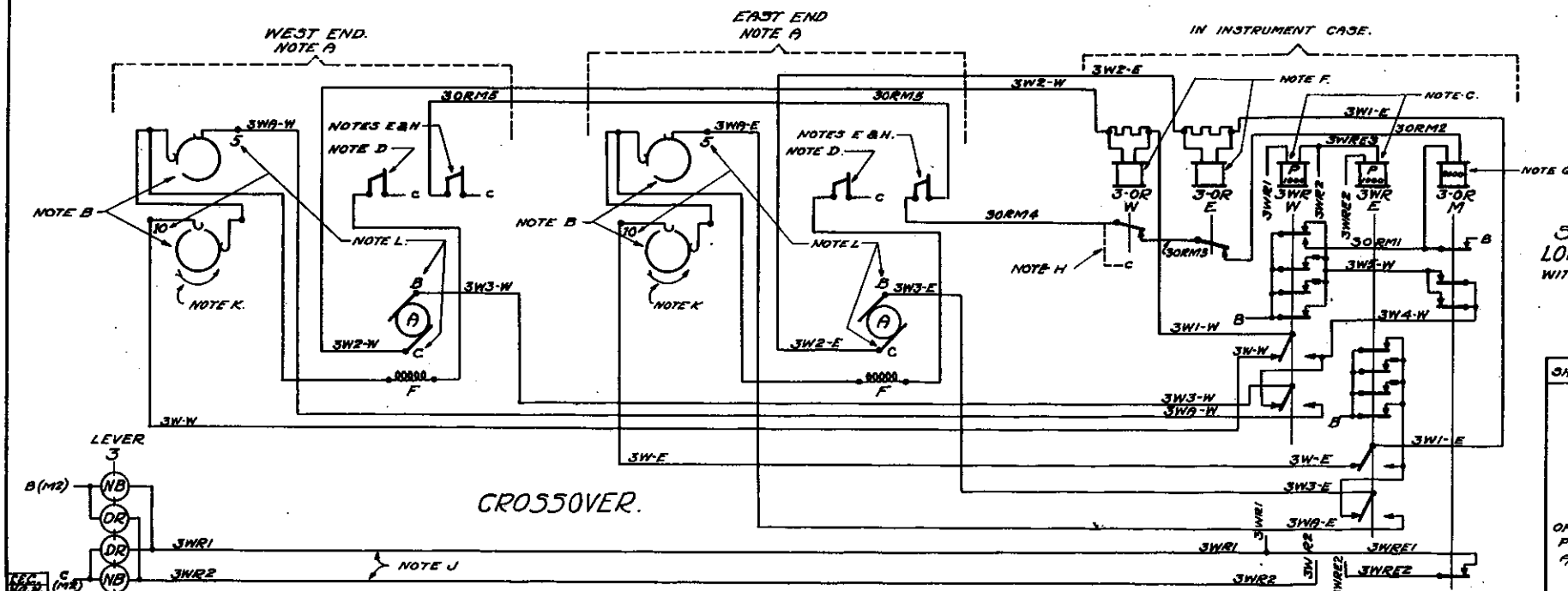
NOT TO SCALE

Approved: *[Signature]*
Chief Engineer



- NOTE:-
- SWITCH MOVEMENT- M2, M20 OR M22 - CLASS B - 20 VOLT MEDIUM SPEED.
 - CONTACTS ON SWITCH INDICATION CIRCUIT CONTROLLER. - SEE NOTE L.
 - POLARIZED SWITCH CONTROL RELAY WITH 2F & 2B LOW VOLTAGE CONTACTS, 2F HIGH VOLTAGE CONTACTS AND AN & 4R POLAR CONTACTS, THE HIGH VOLTAGE FRONT CONTACTS BEING ADJUSTED TO OPEN AFTER THE LOW VOLTAGE CONTACTS.
 - DUAL SELECTOR LEVER CONTACT ON M20 OR M22 MOVEMENT OR STICK CONTACT ACTUATED BY HAND CRANK OPERATION ON M2 MOVEMENT WHICH MUST BE MANUALLY RESET.
 - DUAL SELECTOR LEVER CONTACT ON M20 OR M22 MOVEMENT.
 - ORIO OVERLOAD RELAY (NON-STICK TYPE).
 - DUAL SELECTOR AND OVERLOAD STICK REPEATER DN11 RELAY, ONCE OPENED CAN ONLY BE PICKED UP BY OPENING THE "WR" RELAY.
 - WHEN CONTROLLING AN M2 MOVEMENT OMIT CONTACT REFERRED TO IN NOTE E AND CONNECT AS SHOWN BY DOTTED LINE.
 - CONTROL CIRCUITS FOR "WR" RELAYS ARE TYPICAL. COMPLETE CIRCUITS FOR "WR" RELAYS SHALL BE SHOWN ON CIRCUIT PLAN FOR EACH INSTALLATION.
 - ARROW INDICATES DIRECTION OF NEXT ROTATION.
 - SWITCH MACHINE WIRING IS SHOWN FOR A MOVEMENT HAVING A R.H. POINT NORMALLY CLOSED. IF USED FOR A SWITCH HAVING A L.H. POINT NORMALLY CLOSED, INTERCHANGE LEADS TO TERMINALS 'B' & 'C' AND TO TERMINALS '5' & '10' ON MAIN TERMINAL BOARD IN SWITCH MACHINE, ALSO REVERSE THE INDICATION CIRCUIT CONTROLLER CAMS-NOTE B.

TURNOUT.



CROSSOVER.

STYLE M2-M20-M22
LOW VOLTAGE MOVEMENTS
WITH ORIO OVERLOAD RELAY.

REVISIONS.

SUPERSEDED SH. 6 OF PLAN
3-823 DATED 6-25-29.

3-823

SHEET 6 OF 12.

THE PENNSYLVANIA RAILROAD
STANDARD
CIRCUITS FOR ELECTRIC SWITCHES

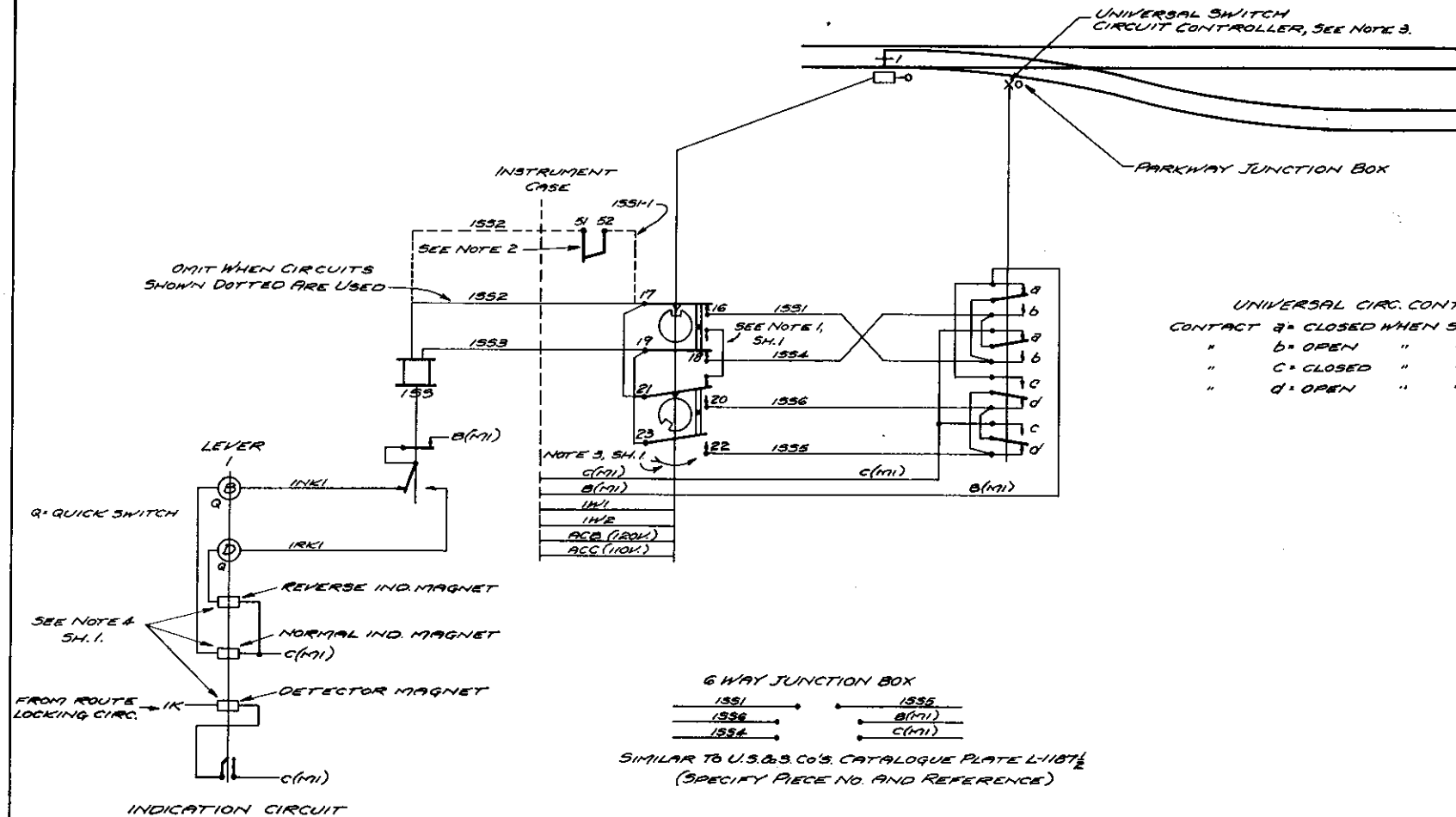
OFFICE OF CHIEF SIGNAL ENGINEER,
PHILA., PA., FEB. 9, 1937.

NOT TO SCALE

APPROVED:
CHIEF SIGNAL ENGINEER

APPROVED:

CHIEF ENGINEER.



UNIVERSAL CIRC. CONTROLLER
CONTACT a = CLOSED WHEN SW. IS NORMAL
" b = OPEN " " " "
" c = CLOSED " " " REVERSE
" d = OPEN " " " "

6 WAY JUNCTION BOX
1531 1535
1532 B(MI)
1533 C(MI)
1534
SIMILAR TO U.S.&S. CO'S. CATALOGUE PLATE L-1187 1/2
(SPECIFY PIECE NO. AND REFERENCE)

- NOTE:-
1. FOR GENERAL NOTES SEE SHEET No. 1.
 2. CIRCUITS SHOWN IN DOTTED LINES SHALL BE PROVIDED WHERE 'M2', 'M20' OR 'M22' MOVEMENTS ARE USED, CIRCUIT CONTROLLER BEING OPERATED BY SELECTOR LEVER IN 'M20' OR 'M22' AND BY CRANK IN 'M2' MOVEMENTS.
 3. SWITCH CIRCUIT CONTROLLER SHALL BE IN ACCORDANCE WITH U.S.&S. CO'S CATALOGUE PLATE J-1001, PIECE 116478 REFERENCE 'B' USING CRANK REFERENCE 31, PLATE J-1010.

STYLE 'M', 'M2', 'M20', 'M22' MOVEMENTS
SWITCH INDICATION AND
'55' CONTROL CIRCUITS
(WITH QUICK SWITCH)
WHERE
45' SWITCH POINTS
ARE USED
AND
UNIVERSAL CIRCUIT
CONTROLLER PROVIDED

REVISIONS

SHEET 1 OF 12

S-823

THE PENNSYLVANIA RAILROAD STANDARD CIRCUITS FOR ELECTRIC SWITCHES

OFFICE OF CHIEF SIGNAL ENGINEER
PHILA., PA., SEPT. 5, 1925.
Approved: *T. J. Hallinan*
Chief Signal Engineer

NOT TO SCALE
Approved: *T. J. Hallinan*
Chief Engineer

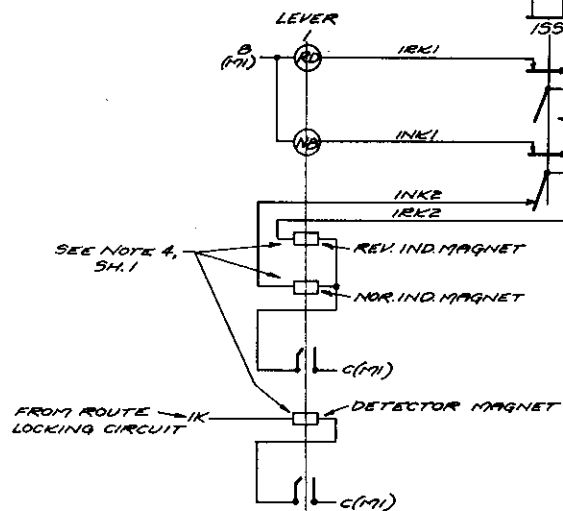
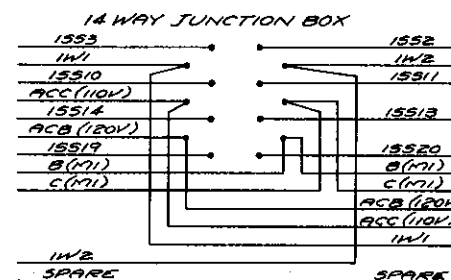
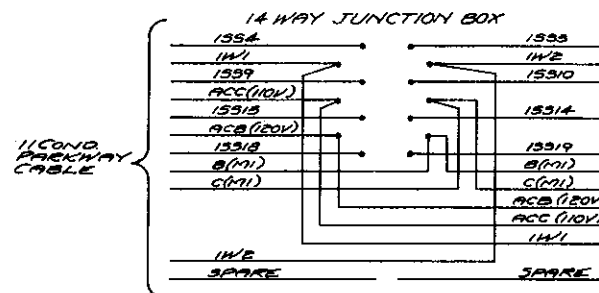


Diagram illustrating the wiring for the **INDICATION CIRCUIT** for the **TABLE INTERLOCKER LEVER**.

The circuit includes the following components and connections:

- C(M1)**: Motor or control unit.
- 1K**: Resistor.
- NOTE & SH.1**: Reference to a switch or component.
- 15S**: Relay or switch component.
- 1K**: Resistor.
- FROM ROUTE LOCKING CIRCUIT**: Connection from the route locking circuit.
- 11K5**: Line or terminal.
- 12K5**: Line or terminal.



SIMILAR TO U.S.&S. CO'S CATALOGUE PLATE L-1250
(SPECIFY PIECE NO. AND REFERENCE)

1. * : CONTACTS ON TYPE "F" CONTROLLER.
2. FOR GENERAL NOTES SEE SHEET NO.1.
3. CIRCUITS SHOWN IN DOTTED LINES SHALL BE PROVIDED WHERE "M2", "M20", OR "M22" MOVEMENTS ARE USED, CIRCUIT CONTROLLER BEING OPERATED BY SELECTOR LEVER IN "M20" OR "M22" AND BY CRANK IN "M2" MOVEMENTS.
4. SWITCH CIRCUIT CONTROLLER SHALL BE IN ACCORDANCE WITH U.S.S. CO.'S CATALOGUE PLATE J-1001, PIECE 16478, REFERENCE B. USING CRANK REFERENCE 31, PLATE J-1010.

35" 11", 12", 120", 122" MOVEMENTS
SWITCH INDICATION AND
' 35" CONTROL CIRCUITS
(WITHOUT QUICK SWITCH)
WHERE
45" SWITCH POINTS
ARE USED
AND
UNIVERSAL CIRCUIT
CONTROLLERS PROVIDED

REVISIONS

S-823

THE PENNSYLVANIA RAILROAD
STANDARD
CIRCUITS FOR ELECTRIC SWITCHES

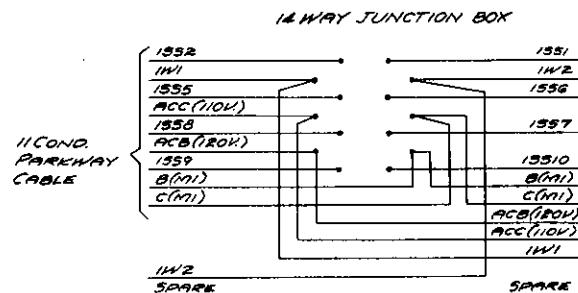
OFFICE OF CHIEF SIGNAL ENGINEER
PHILA., PA., SEPT. 8, 1955.
Approved: *A. H. Hudd*
Chief Signal Engineer

NOT TO SCALE

Approved: *T. J. Skellern*
Chief Engineer

NOT TO SCALE

CONTACT 2: CLOSED WHEN SW. IS NORMAL
 " b: OPEN " " " "
 " c: CLOSED " " * REVERSE
 " d: OPEN " " " "



SIMILAR TO U.S. & S. CO'S. CATALOGUE PLATE L-1250.
(SPECIFY PIECE NO. AND REFERENCE)

- NOTE:-
1. FOR GENERAL NOTES SEE SHEET NO.1.
2. CIRCUITS SHOWN IN DOTTED LINES SHALL BE PROVIDED WHERE 'M2', 'M20' OR 'M22' MOVEMENTS ARE USED, CIRCUIT CONTROLLER BEING OPERATED BY SELECTOR LEVER IN 'M20' OR 'M22' AND BY CRANK IN 'M2' MOVEMENTS.
3. SWITCH CIRCUIT CONTROLLER SHALL BE IN ACCORDANCE WITH U.S.C.S. CO.3. CATALOGUE PLATE J-1001, PIECE 116478, REFERENCE B USING CRANK REFERENCE 31, PLATE J-1010.
4. WHERE A5 SWITCH POINTS ARE LOCATED ON NEAR END OF CROSSOVER ONLY CIRCUIT CONTROLLER AND JUNCTION BOX MARKED 'A' SHALL BE PROVIDED AND WHERE A5 SWITCH POINTS ARE LOCATED ON FAR END OF CROSSOVER ONLY CIRCUIT CONTROLLER AND JUNCTION BOX MARKED 'B' SHALL BE PROVIDED.

STYLE, "M2", "M20", "M22" MOVEMENTS
SWITCH INDICATION AND
"55" CONTROL CIRCUITS
(WITH QUICK SWITCH)
WHERE
45' SWITCH POINT
IS USED
ON ONE END ONLY
AND
UNIVERSAL CIRCUIT
CONTROLLER PROVIDED.

REVISIONS

SHEET 11 OF 12

S-823



THE PENNSYLVANIA RAILROAD
STANDARD
CIRCUITS FOR ELECTRIC SWITCHES

OFFICE OF CHIEF SIGNAL ENGINEER
PHILA., PA., SEPT. 5, 1935.

Approved:

Chief Signal Engineer

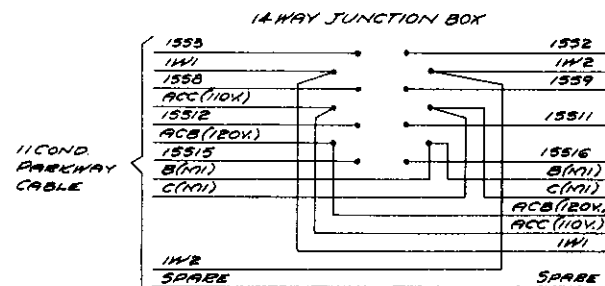
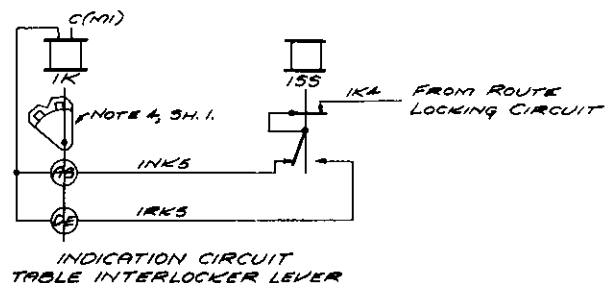
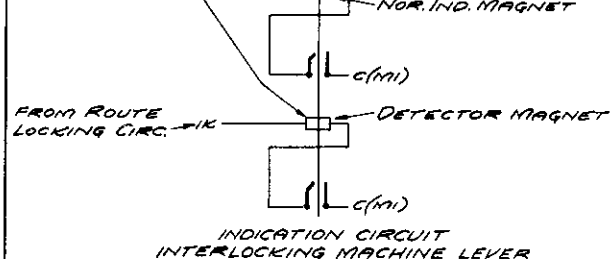
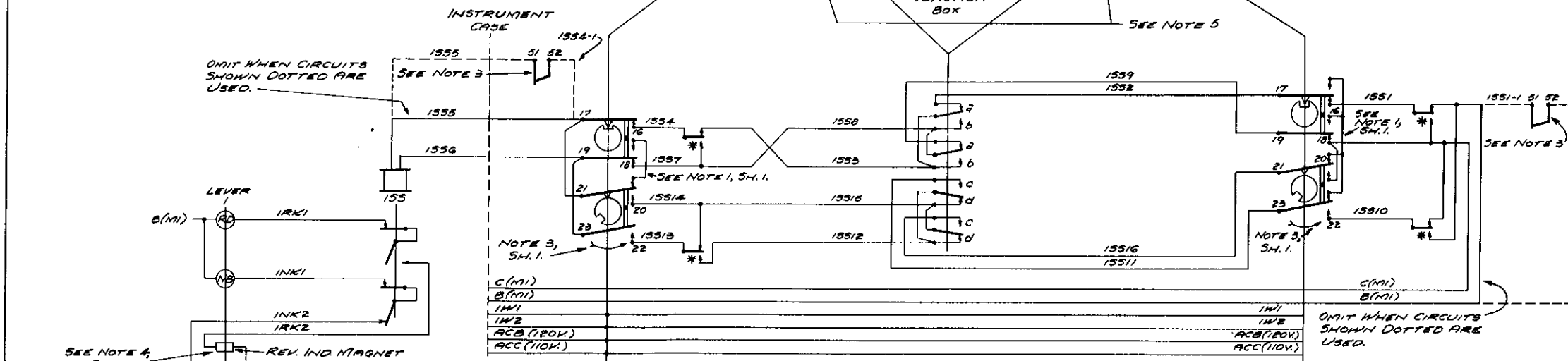
Approved:

NOT TO SCALE

T. J. Skillman
Chief Engineer

WY
EXX
G.O.
ELS

UNIVERSAL CIRCUIT CONTROLLER
CONTACT 2: CLOSED WHEN SW. IS NORMAL.
" 6: OPEN " " " "
" C: CLOSED " " " REVERSE
" D: OPEN " " " "



SIMILAR TO U.S. & S. CO'S. CATALOGUE PLATE L-1250
(SPECIFY PIECE NO. AND REFERENCE)

- NOTE:-
1. * CONTACTS ON TYPE "F" CONTROLLER.
 2. FOR GENERAL NOTE SEE SHEET NO.1.
 3. CIRCUITS SHOWN, DOTTED LINES SHALL BE PROVIDED WHERE "M2", "M20" OR "M22" MOVEMENTS ARE USED, CIRCUIT CONTROLLER BEING OPERATED BY SELECTOR LEVER IN "M20" OR "M22" AND BY CRANK IN "M2" MOVEMENTS.
 4. SWITCH CIRCUIT CONTROLLER SHALL BE IN ACCORDANCE WITH U.S & CO'S CATALOGUE PLATE J-1001, PAGE 116478, REFERENCE "B" USING CRANK REFERENCE 31, PLATE J-1010.
 5. WHERE 45 SWITCH POINTS ARE LOCATED ON NEAR END OF CROSSOVER ONLY CIRCUIT CONTROLLER AND JUNCTION BOX MARKED "A" SHALL BE PROVIDED AND WHERE 45 SWITCH POINTS ARE LOCATED ON FAR END OF CROSSOVER ONLY CIRCUIT CONTROLLER AND JUNCTION BOX MARKED "B" SHALL BE PROVIDED.

STYLE "M", "M2", "M20" "M22" MOVEMENTS
SWITCH INDICATION AND
"55" CONTROL CIRCUITS
(WITHOUT QUICK SWITCH)
WHERE
45' SWITCH POINT
IS USED
ON ONE END ONLY
AND
UNIVERSAL CIRCUIT
CONTROLLERS PROVIDED

REVISIONS

SHEET 12 OF 12

S-823



THE PENNSYLVANIA RAILROAD
STANDARD
CIRCUITS FOR ELECTRIC SWITCHES

OFFICE OF CHIEF SIGNAL ENGINEER
PHILA., PA., SEPT. 5, 1935.
Approved: 

NOT TO SCALE

Approved:

Chief Signal Engineer

T. J. Sullivan
Chief Engineer

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	COLLECTOR STANDARD (ELECTRIC) STYLE "P" ELECTRO-MECHANICAL	STYLE "P" ELECTRO-MECHANICAL OLD STYLE TYPE "P"	STYLE "P" ELECTRO-PNEU. OLD STYLE TYPE "P"	STYLE "P" ELECTRO-PNEU. OLD STYLE TYPE "P"
SIGNAL LEVER (NORMAL IN CENTER) TRAFFIC LEVER SWITCH DETECTOR SEGMENT FOR POWER SWITCH	 SH. 134-8316 1B	 SH. 137-8316 1B	 SH. 72-8316 1B	 SH. 185-8316 1D
SIGNAL LEVER (NORMAL IN EXTREME END POSITION) OR INDICATION FOR ELECTRIC SW. LOCK WHERE LEVER IS NOR- MAL IN EXTREME POSITION.	 SH. 136-8316 2A	 SH. 169-8316 2B	 SH. 158-8316 2C	 SH. 193-8316 2D
SWITCH INDICATION SEGMENT FOR POWER SWITCH (WHERE QUICK SWITCH IS PROVIDED)	 SH. 151-8316 3A	 SH. 165-8316 3B SH. 162-8316 3B OLD STYLE "P"	 SH. 1-8316 3C	 SH. 172-8316 3D
SWITCH INDICATION LEVER (ELECTRO-MECHANICAL SWITCH)	 SH. 108-8316 4A	 SH. 50-8316 4B	 SH. 43-8316 4C	 SH. 64-8316 4D
SWITCH INDICATION SEGMENT FOR POWER SWITCH (WITHOUT QUICK SWITCH)	 SH. 142-8316 5A	 SH. 135-8316 5B SH. 138-8316 5B OLD STYLE "P"	 SH. 159-8316 5C	 SH. 187-8316 5D
SWITCH DETECTOR SEGMENT (ELECTRO-MECHANICAL SWITCH)	 SH. 141-8316 6A	 SH. 128-8316 6B	 SH. 170-8316 6C	 SH. 187-8316 6D
SEGMENT TO PREVENT LEVER FROM BEING MOVED TO LEFT OR RIGHT.	 SH. 152-8316 7A	 SH. 129-8316 7B	 SH. 171-8316 7C	 SH. 188-8316 7D

NOTE:

1. WHERE SEGMENT WITH FORCED DOWN FEATURE IS PROVIDED A LATCH WITH LOWER FACE BEVELED SHALL BE PROVIDED.
2. QUADRANTS MUST BE SELECTED WITH NOTCHES ARRANGED IN ACCORDANCE WITH THE CUT OF THE SEGMENT WITH PROPER CONSIDERATION FOR THE LATCH CIRCUIT CONTROLLER, IF PROVIDED.
3. SEGMENTS SHOWN ARE FOR INTERLOCKING MACHINES MANUFACTURED BY THE UNION SWITCH & SIGNAL CO.
4. SH. 139-8316, 136-8316, ETC. REFERS TO THE UNION SWITCH & SIGNAL CO.'S DRAWING NUMBERS.

INTERLOCKING MACHINE

REVISIONS.

REVISIONS: SH. 134-8316 1B, 136-8316 2A, 137-8316 2B, 138-8316 2C, 139-8316 2D, 141-8316 6A, 142-8316 5A, 151-8316 3A, 152-8316 7A, 159-8316 5C, 162-8316 3B, 165-8316 3B, 169-8316 2B, 170-8316 6C, 171-8316 7C, 172-8316 3D, 185-8316 1D, 187-8316 5D, 188-8316 7D, 193-8316 2D.

APPROVED: [Signature]

SHEET 1 OF 2

S-824

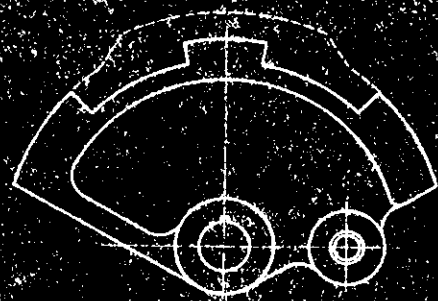
THE PENNSYLVANIA RAILROAD
STANDARD
SEGMENTS

OFFICE OF CHIEF SIGNAL ENGINEER
PHILA. PA. 19103

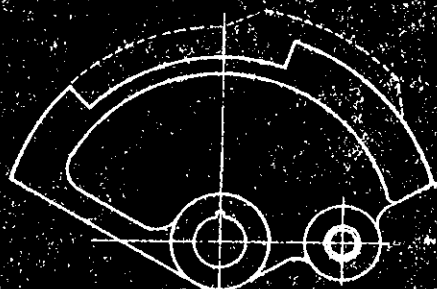
DATE: [Signature]

NOT TO SCALE

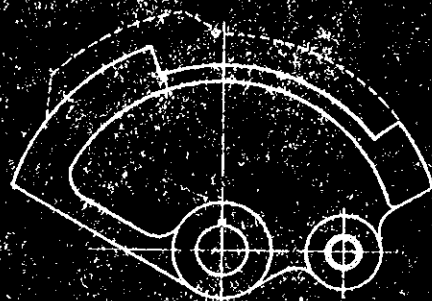
DATE: [Signature]



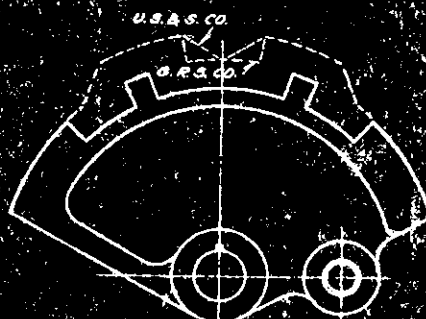
SIGNAL LEVER
(NORMAL IN CENTER)
OR
TRAFFIC LEVER
U.S. & S. CO. SN. 2-12592
G. R. S. CO. 13174-7.
FIG. 8



SIGNAL LEVER
(NORMAL IN LEFT POSITION)
U.S. & S. CO. SN. 4-12592
" T-12592 - USED WITH
3 POSITION DEVICE.
G. R. S. CO. 13174-19.
FIG. 9



SIGNAL LEVER
(NORMAL IN RIGHT POSITION)
U.S. & S. CO. SN. 5-12592
" T-12592 - USED WITH
3 POSITION DEVICE.
G. R. S. CO. 13174-18.
FIG. 10



SWITCH LEVER
U.S. & S. CO. SN. 3-12592
G. R. S. CO. 13174-16.
FIG. 11

REVISIONS

TABLE INTERLOCKER

SHEET 2 OF 2

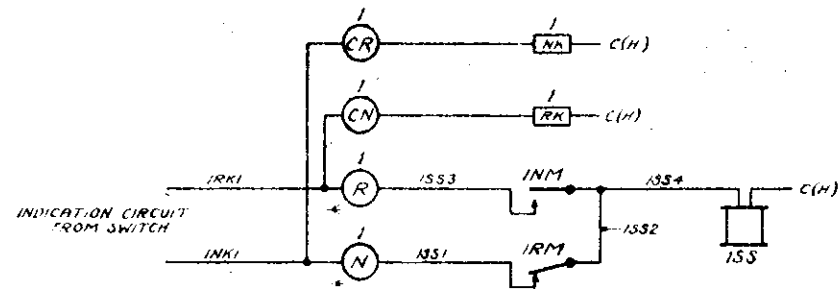
S-624

THE PENNSYLVANIA RAILROAD
STANDARD
SEGMENTS

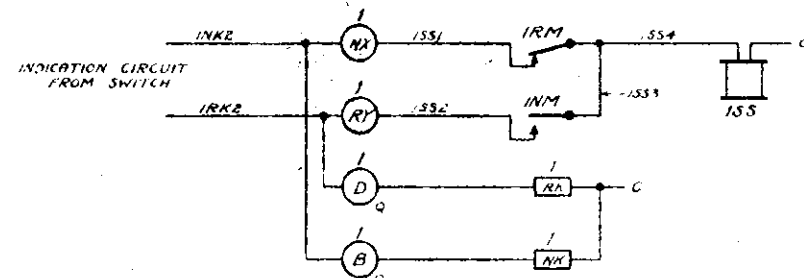
OFFICE OF CHIEF ENGINEER
PHILADELPHIA, PA. 19102

Approved: *[Signature]*

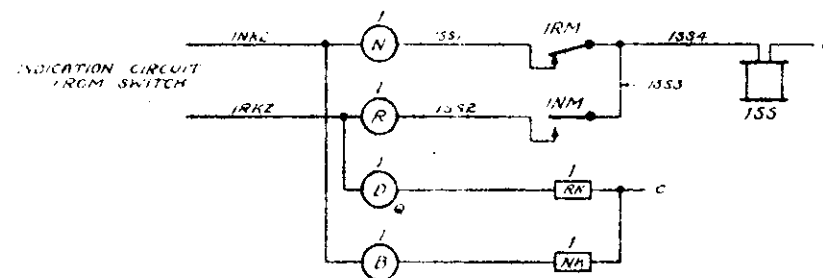
Not to Scale: *[Signature]*



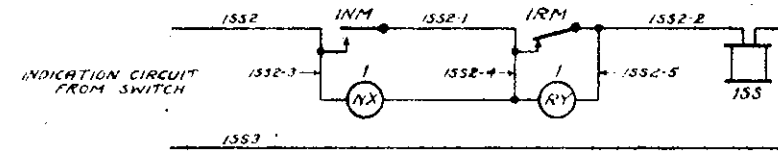
ELECTRO-MECHANICAL (U.S. & S CO)
SEE PLAN S-821
FIG 1



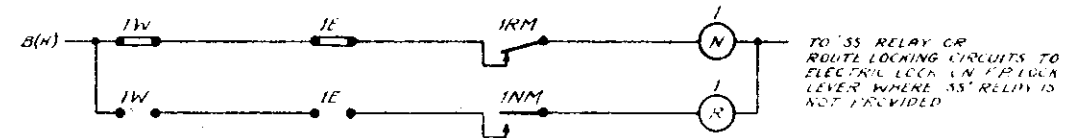
ELECTRO-PNEUMATIC MODEL 14 S.A.L. MOVEMENT
WITH STYLE 'C' VALVE
SEE PLAN S-822, SH. 2
FIG. 2



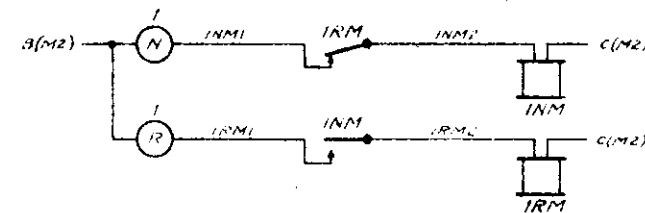
ELECTRO-PNEUMATIC MODEL 14 S.A.L. MOVEMENT
WITH OLD STYLE VALVE
SEE PLAN S-822, SH. 3
FIG. 3



POLARIZED SS CONTROLS
SEE PLAN S-822, SHEETS 1, 4, 5 & 8
S 823, 1 & 2
FIG 4



MECHANICAL
FIG 5



CONTROL CIRCUITS FOR
SWITCH LEVER REPEATING RELAYS
FIG 6

REVISIONS

S-820



THE PENNSYLVANIA RAILROAD
TYPICAL

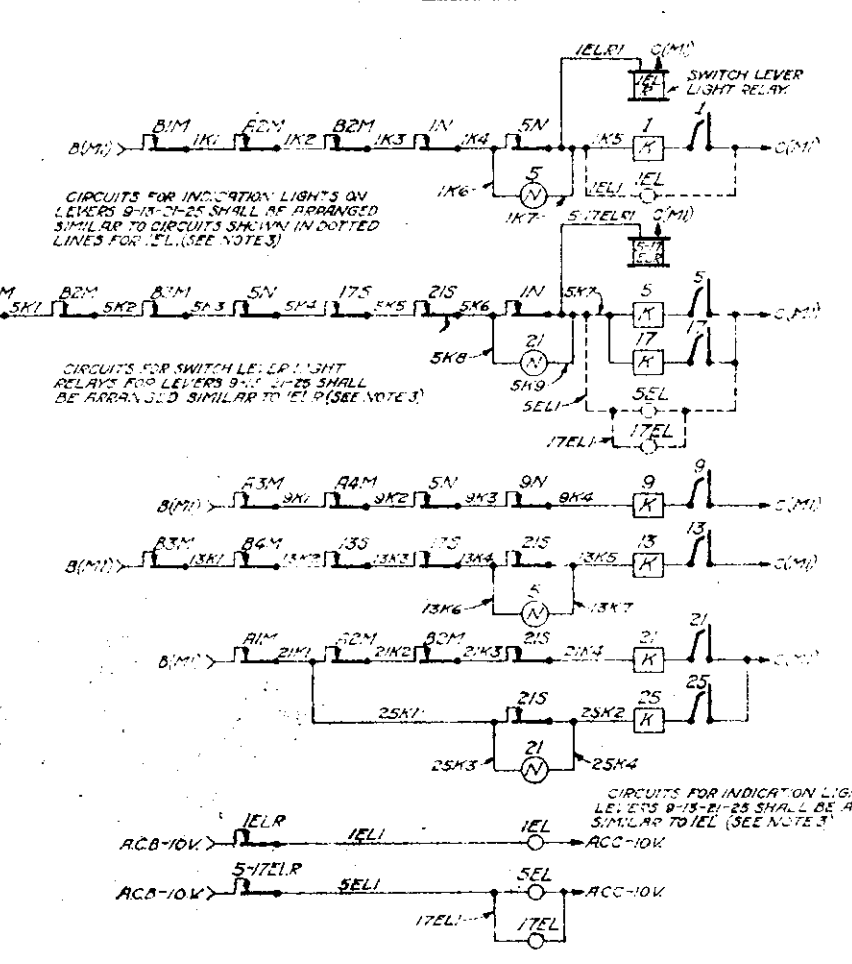
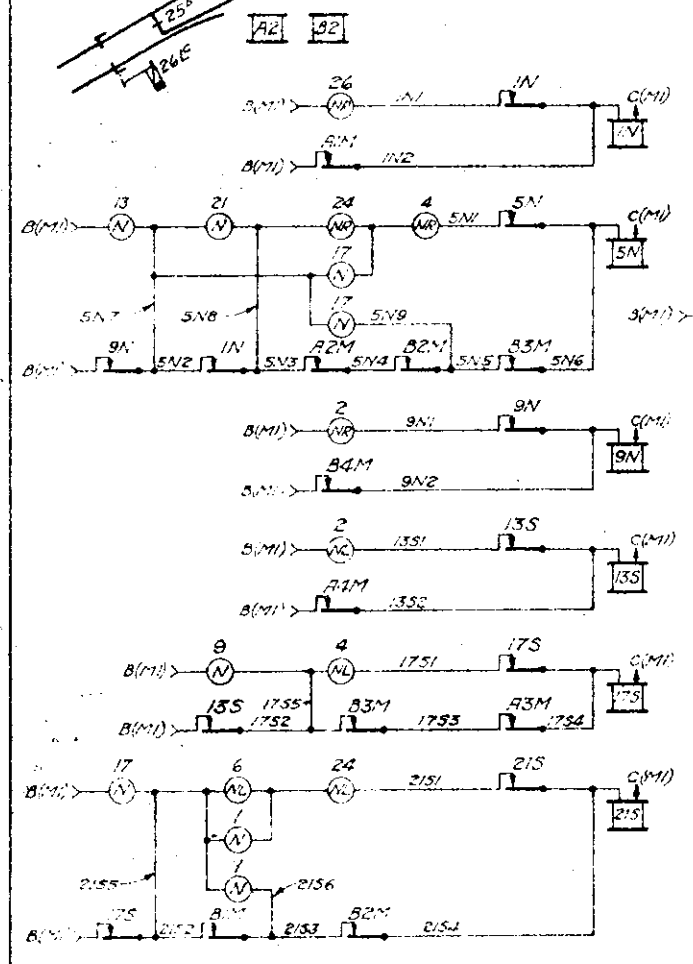
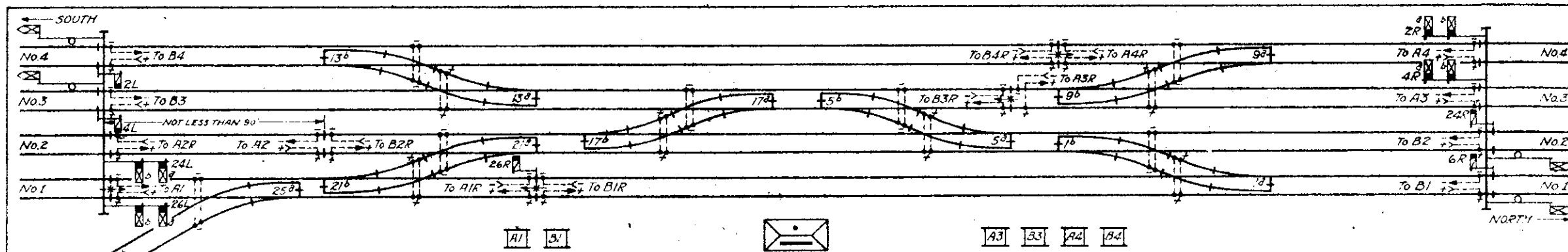
CIRCUITS FOR LEVER REPEATING RELAYS

DESIGNED BY: J. H. HARRIS
CHECKED BY: J. H. HARRIS

DATE: 10-1-22

Approved: *[Signature]*
Chief Engineer

Approved: *[Signature]*
Chief Engineer



MECHANICAL LOCKING

LEVER	LOCKS
1	17
5	9-21
17	17
24R	17
24L	5

NOTES:
 1. TRACKS ARE ARBITRARILY NUMBERED.
 2. ADDITIONAL TRACK SECTIONS MAY BE INSTALLED WHERE LOCAL TRAFFIC CONDITIONS REQUIRE QUICKER RELEASE OF SWITCHES.
 3. SWITCH LEVER LIGHT RELAYS SHOULD BE USED WHERE RELIABLE AC POWER IS AVAILABLE FOR LEVER INDICATION LIGHTS. WHERE NOT AVAILABLE, LIGHT RELAYS SHOULD BE OMITTED & INDICATION LIGHTS ARRANGED AS SHOWN IN DOTTED LINES. AT SMALL INTERLOCKINGS AND AT INTERLOCKINGS WHERE PRIMARY OR PORTABLE STORAGE BATTERIES ARE USED, LEVER LIGHTS SHOULD NOT AS A RULE BE INSTALLED.
 4. CONTROL CIRCUITS FOR TRACK REPEATING RELAYS SHALL BE IN ACCORDANCE WITH PLAN S-86, SH 2.

FOR SEMAPHORE SIGNALS

SHEET 1 OF 2

S-825

THE PENNSYLVANIA RAILROAD
TYPICAL
ROUTE LOCKING CIRCUITS

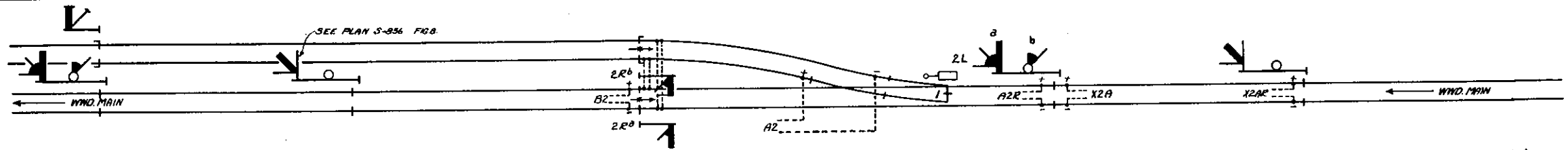
OFFICE OF CHIEF SIGNAL ENGINEER,
PHILA. PA. DEPT. 25-1002

Approved

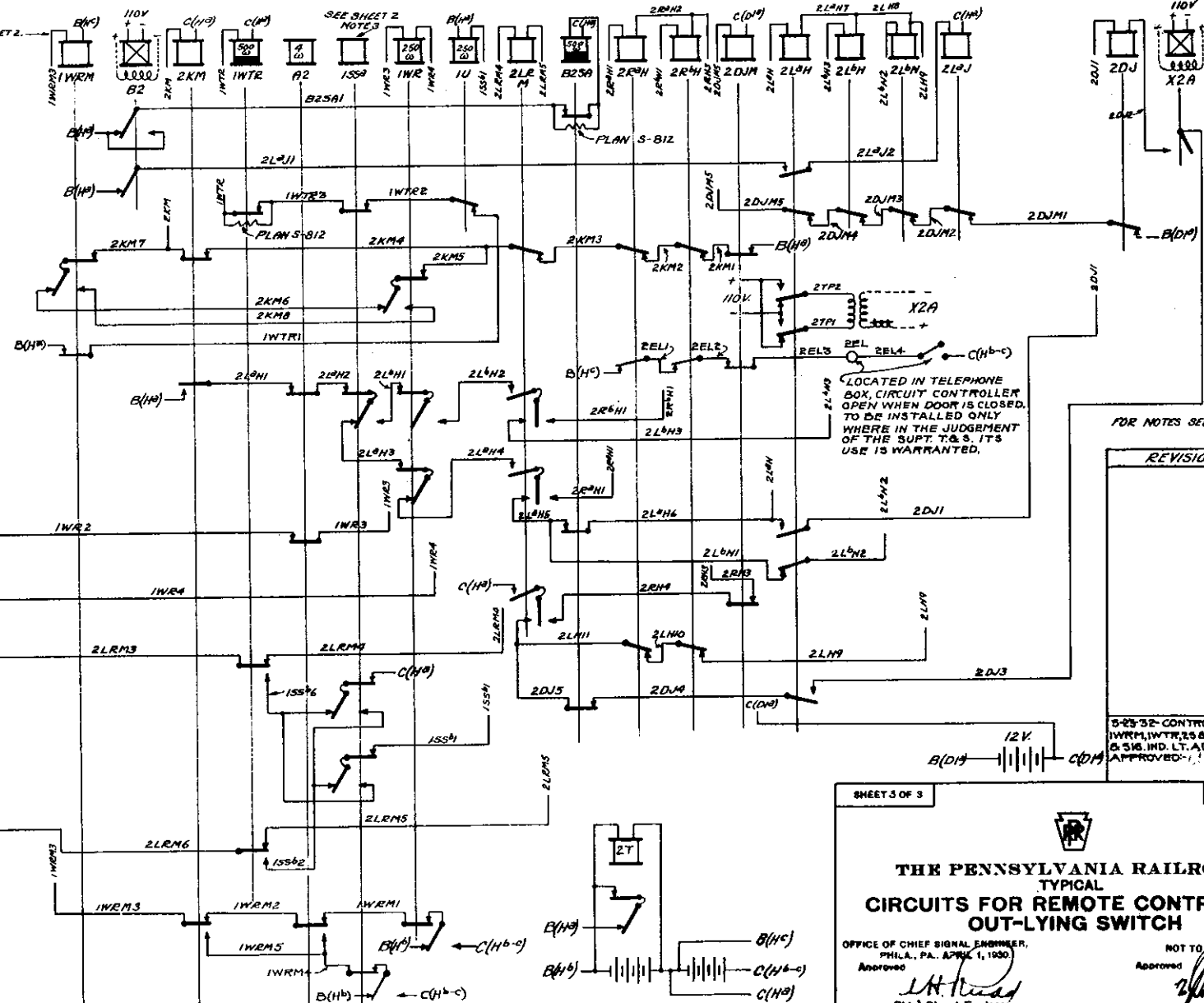
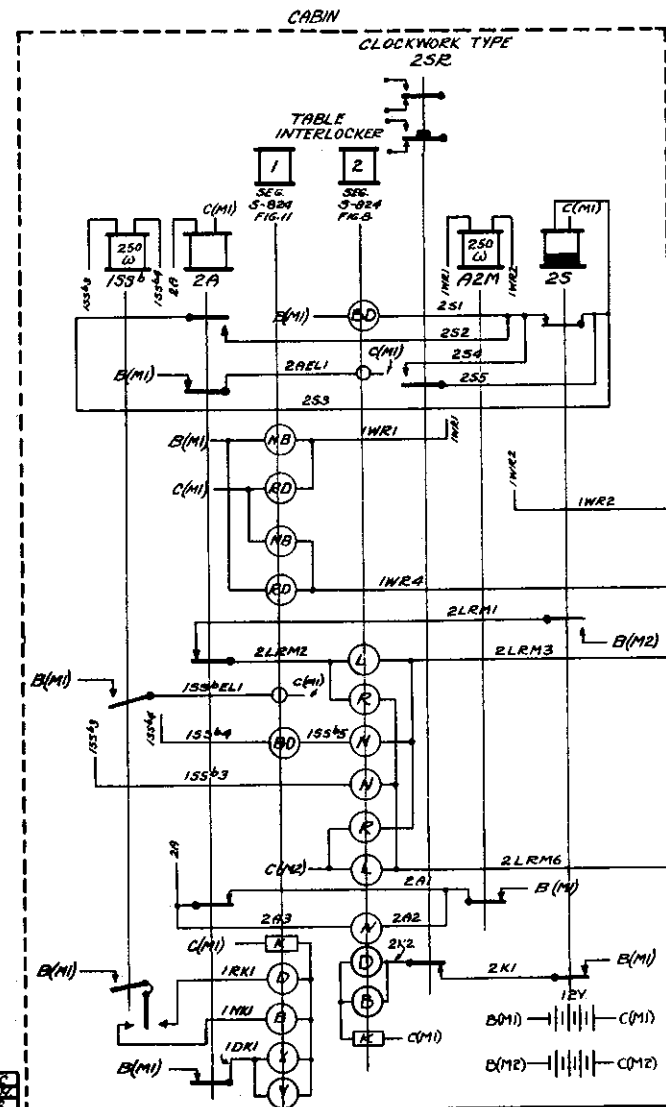
Chief Signal Engineer

Approved

Signal Engineer



WRRM SHALL HAVE A RETARDED DROP-ARM OF NOT LESS THAN 0.35 SECONDS. SEE NOTE 2, SHEET 2.



SHEET 3 OF 3

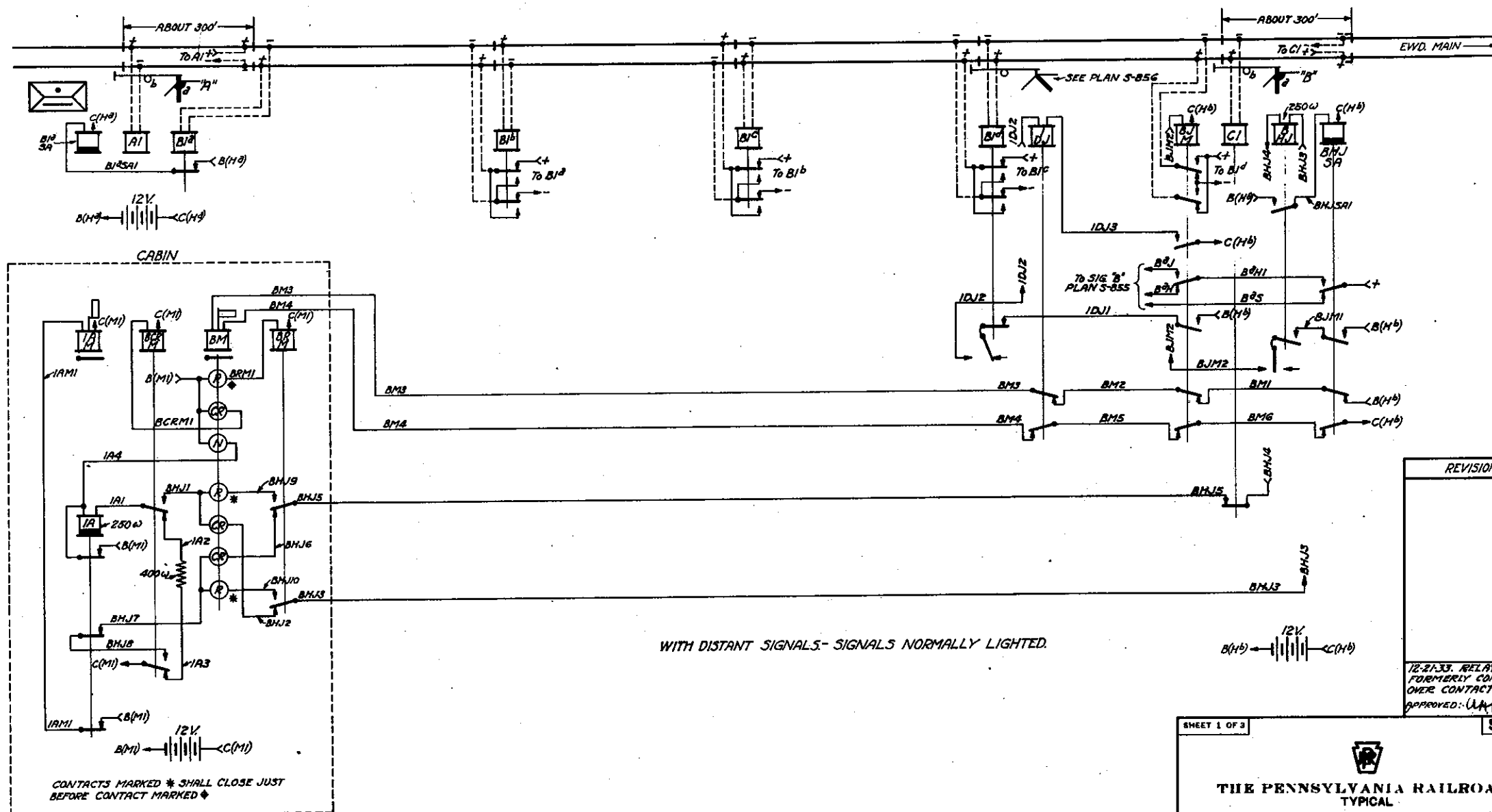
THE PENNSYLVANIA RAILROAD
TYPICAL
CIRCUITS FOR REMOTE CONTROL OF OUT-LYING SWITCH

OFFICE OF CHIEF SIGNAL ENGINEER,
PHILA., PA. APRIL 1, 1930.
Approved: *[Signature]*
Chief Signal Engineer

NOT TO SCALE
Approved: *[Signature]*
Chief Engineer

5-25-32-CONTROL CIRCUIT FOR WRRM, WTRRS & BK CHANGED 5-56 IND. LT. ADDED.
APPROVED: *[Signature]*
T.S.

S-826



WITH DISTANT SIGNALS- SIGNALS NORMALLY LIGHTED.

NOTE:-
CIRCUIT FOR CLEAR CONTROL RELAY FOR SIG. 'A'
SHALL BREAK OVER FRONT CONTACT OF RELAY 'B1234'.
CIRCUIT CONTROLLER 'BM' SHALL BE EQUIPPED WITH A
DEVICE TO STOP THE LEVER AT MID-STROKE, IN GOING
FROM NORMAL TO REVERSE, IN ACCORDANCE WITH PLAN
S-854.

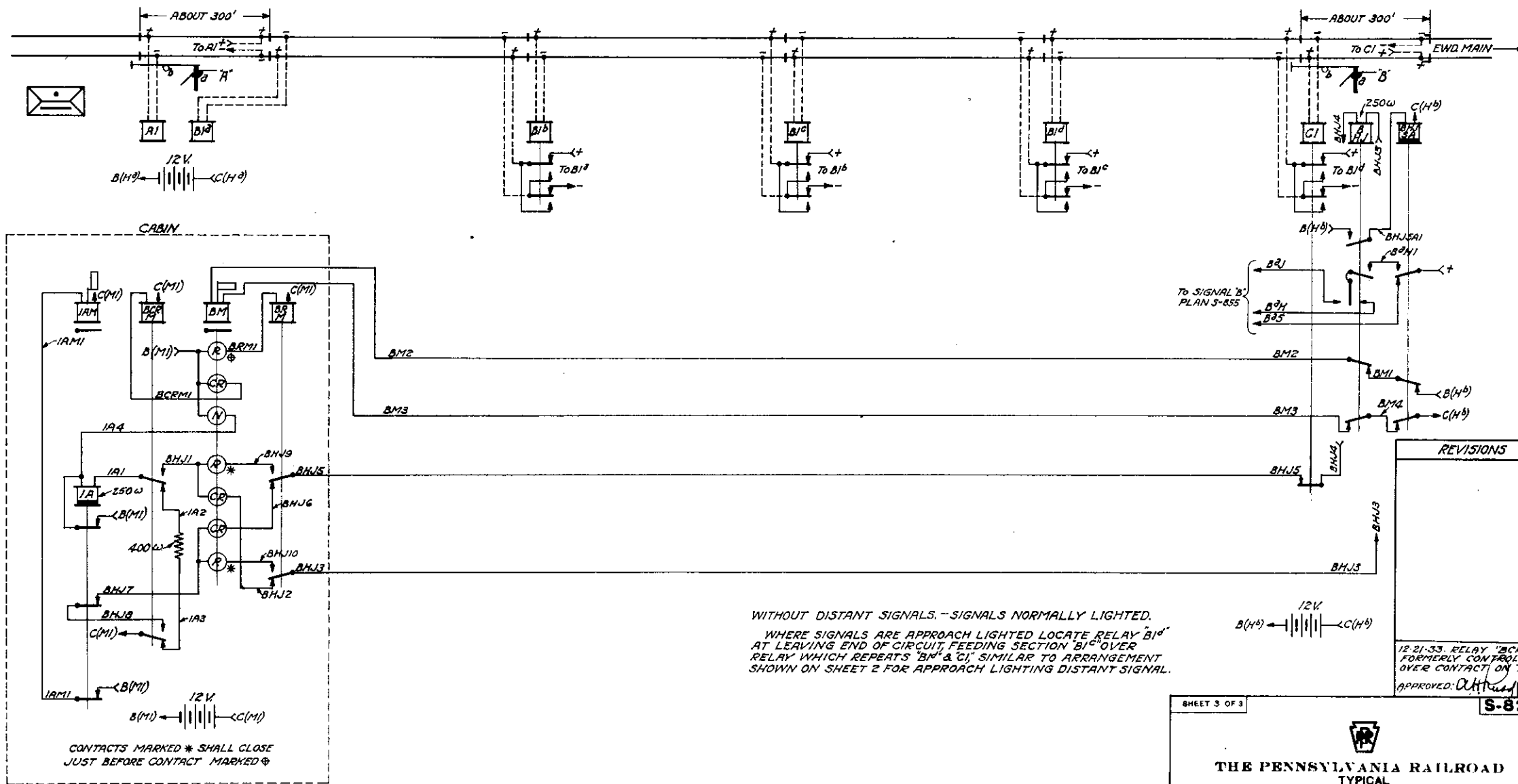
REVISIONS.

12-21-33. RELAY "BCRM"
FORMERLY CONTROLLED
OVER CONTACT OF "A".
APPROVED: [Signature]

SHEET 1 OF 3

S-827

THE PENNSYLVANIA RAILROAD
TYPICAL
CONTROL CIRCUITS FOR REMOTE
CONTROL OF MANUAL BLOCK SIGNAL
OFFICE OF CHIEF SIGNAL ENGINEER
PHILADELPHIA, MARCH 5, 1934.
Approved: [Signature]
Chief Signal Engineer
NOT TO SCALE
Approved: [Signature]
Chief Engineer



NOTE:-
CIRCUIT FOR CLEAR CONTROL RELAY FOR SIG. 'A'
SHALL BREAK OVER FRONT CONTACT OF RELAY 'B1a'
CIRCUIT CONTROLLER 'BM' SHALL BE EQUIPPED WITH A
DEVICE TO STOP THE LEVER AT MID-STROKE, IN GOING
FROM NORMAL TO REVERSE, IN ACCORDANCE WITH
PLAN S-854.

WITHOUT DISTANT SIGNALS. - SIGNALS NORMALLY LIGHTED.
WHERE SIGNALS ARE APPROACH LIGHTED LOCATE RELAY 'B1d'
AT LEAVING END OF CIRCUIT, FEEDING SECTION 'B1c' OVER
RELAY WHICH REPEATS 'BM' & 'C1', SIMILAR TO ARRANGEMENT
SHOWN ON SHEET 2 FOR APPROACH LIGHTING DISTANT SIGNAL.

REVISIONS
12-21-33. RELAY 'BCRM' FORMERLY CONTROLLED OVER CONTACT ON 'A1'.
APPROVED: <i>[Signature]</i> 1933

SHEET 3 OF 3

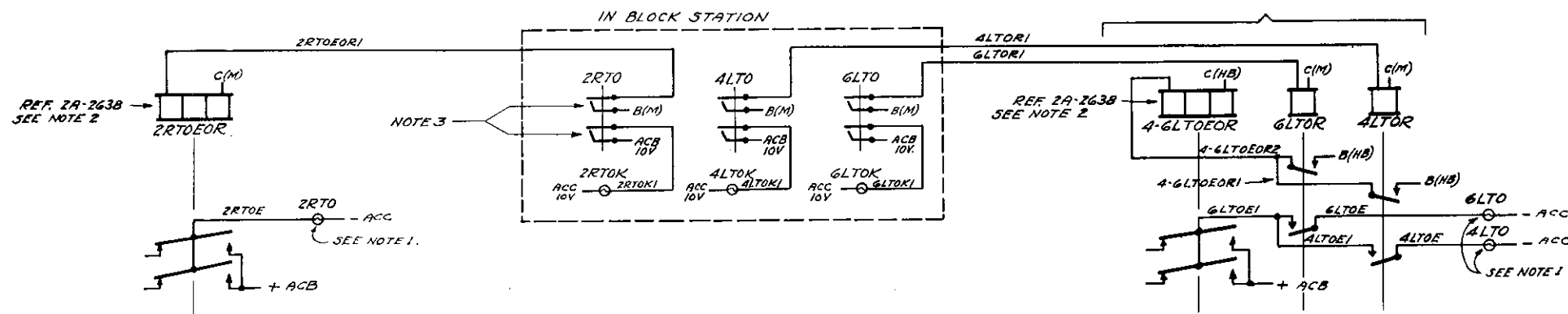
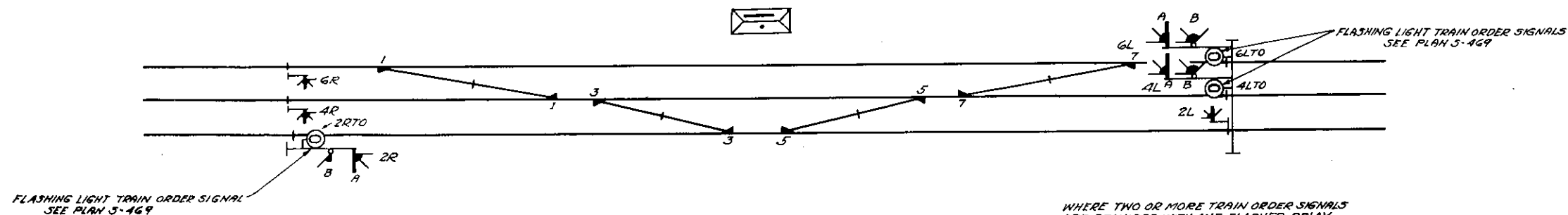
THE PENNSYLVANIA RAILROAD
TYPICAL
**CONTROL CIRCUITS FOR REMOTE
CONTROL OF MANUAL BLOCK SIGNAL**

OFFICE OF CHIEF SIGNAL ENGINEER
PHILA. PA., MARCH 8, 1923.

Approved: *[Signature]* Chief Signal Engineer

NOT TO SCALE
Approved: *[Signature]* Chief Engineer

S-827



- NOTE:
1. 10VOLT, 40 WATT LAMPS SHALL BE USED IN FLASHING LIGHT TRAIN ORDER SIGNALS. VOLTAGE AT LAMPS SHALL BE BETWEEN 9.0 AND 9.5 VOLTS.
 2. FLASHER RELAYS SHALL BE ADJUSTED TO APPROXIMATELY 30 FLASHES PER MINUTE.
 3. CONTROL SWITCHES SHALL BE TWO POSITION, DOUBLE POLE, SIMILAR TO W.R.S. CO. PLATE M30, REF. 2, PCE. NO. 0300-102.

REVISIONS

SUPERSEDES PLAN S-830
DATED 4-14-43

1 SHEET

S-830

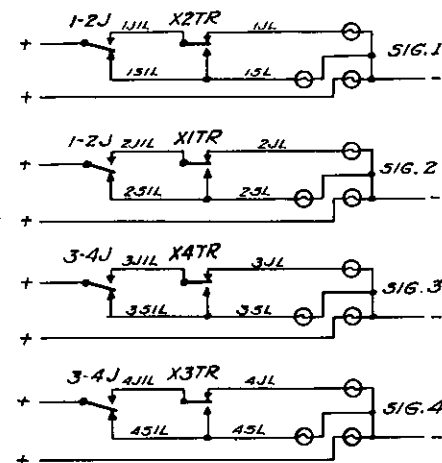
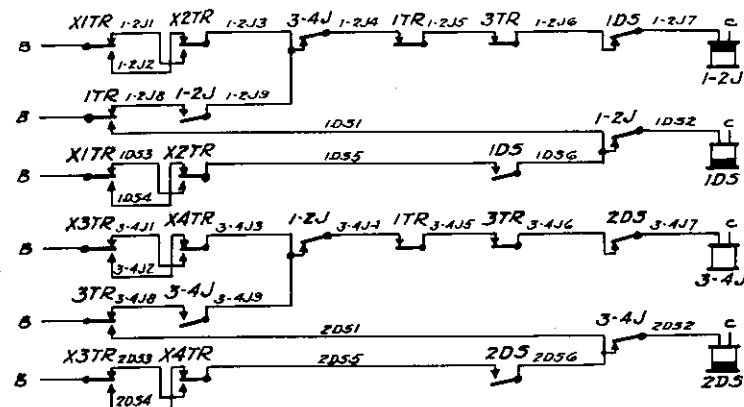
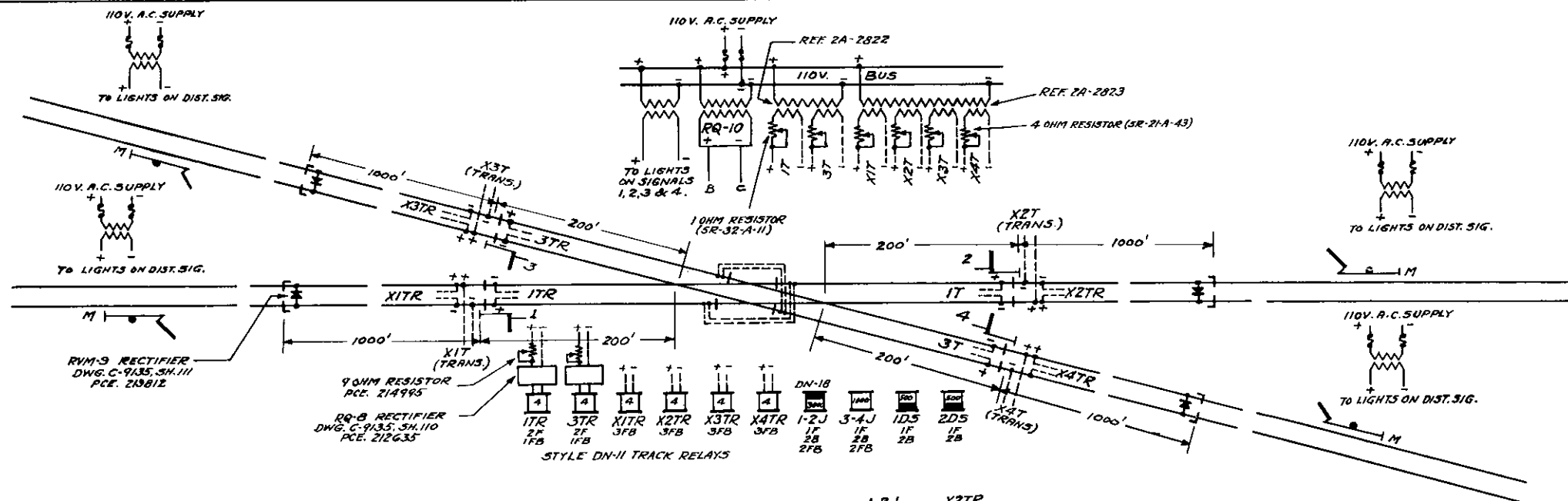
THE PENNSYLVANIA RAILROAD
TYPICAL
CONTROL CIRCUITS FOR FLASHING
LIGHT TRAIN ORDER SIGNAL

OFFICE OF CHIEF ENGINEER,
PHILA., PA., APRIL 25, 1930.

APPROVED:
H. G. Salmonson
ASST. CHIEF ENGINEER-SIGNALS

APPROVED:
J. H. Smith
CHIEF ENGINEER

NOT TO SCALE



NOTE:
AUTHORIZED SPEED OVER CROSSING - 15 M.P.H.

CROSSING SIGNALS - POSITION LIGHT TYPE
DWARF SIGNALS MOUNTED NOT LESS THAN 3 FEET
ABOVE TOP OF RAIL.

WHERE RELIABLE A.C. POWER IS NOT AVAILABLE
AND CONDITIONS WARRANT D.C. POWER MAY BE
PROVIDED.

FOR LINES OF
LIGHT TRAFFIC

REVISIONS

SHEET 2 OF 2

S-844



THE PENNSYLVANIA RAILROAD
TYPICAL

CIRCUITS FOR AUTOMATIC INTERLOCKING
AT RAILROAD GRADE CROSSING

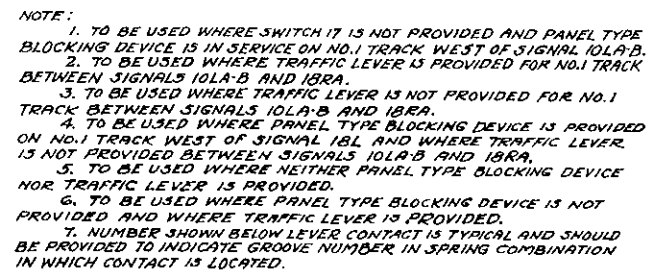
OFFICE OF CHIEF ENGINEER,
PHILA., PA., NOVEMBER 4, 1948.

APPROVED:

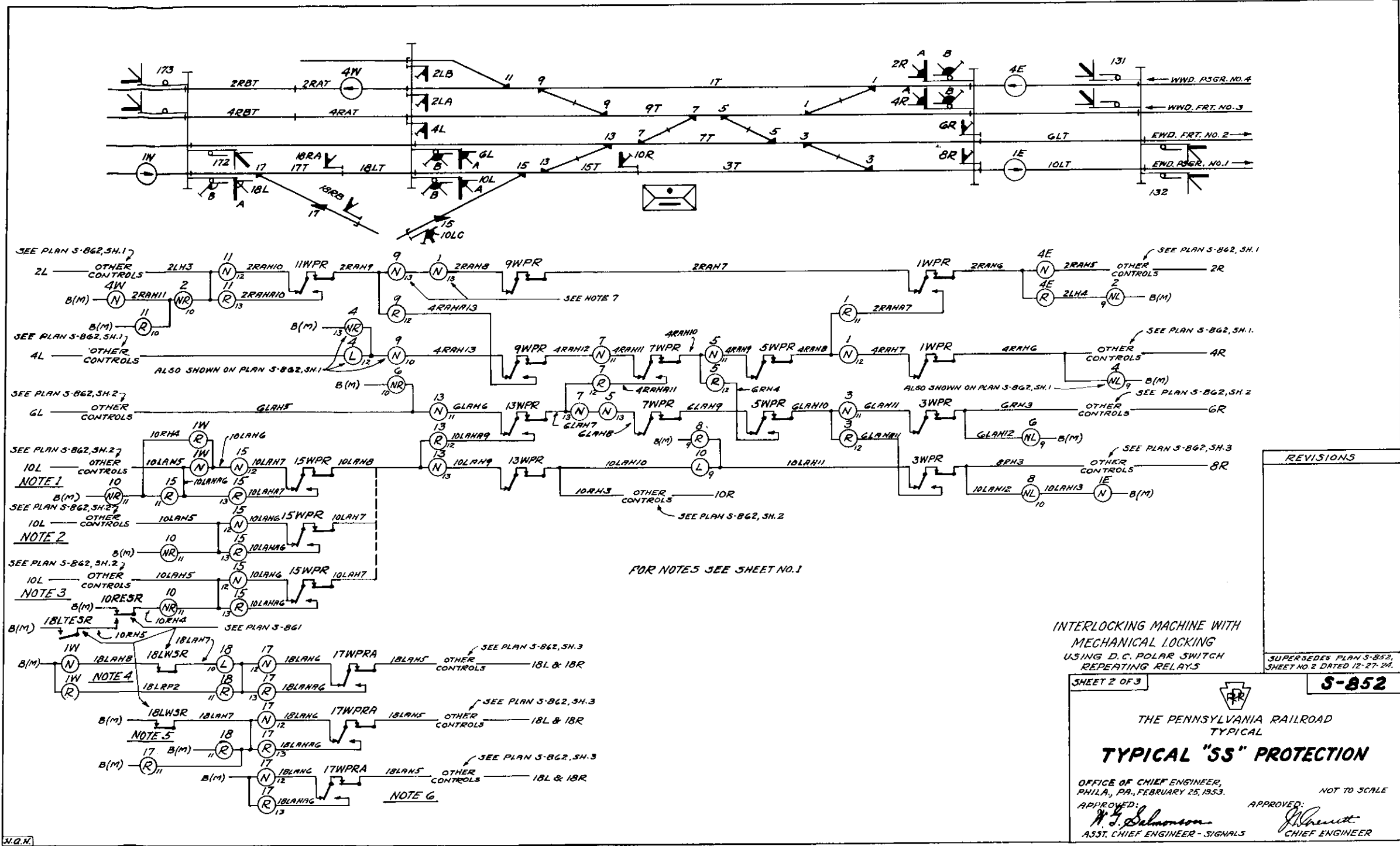
[Signature]
ASS'T. CHIEF ENGINEER - T.C.S.

APPROVED:

[Signature]
CHIEF ENGINEER



APPROVED: 
CHIEF ENGINEER



REVISIONS
1. SUPERSEDES PLAN S-852, SHEET NO. 2 DATED 12-27-24.

INTERLOCKING MACHINE WITH MECHANICAL LOCKING USING D.C. POLAR SWITCH REPEATING RELAYS

SHEET 2 OF 3

S-852

THE PENNSYLVANIA RAILROAD
TYPICAL

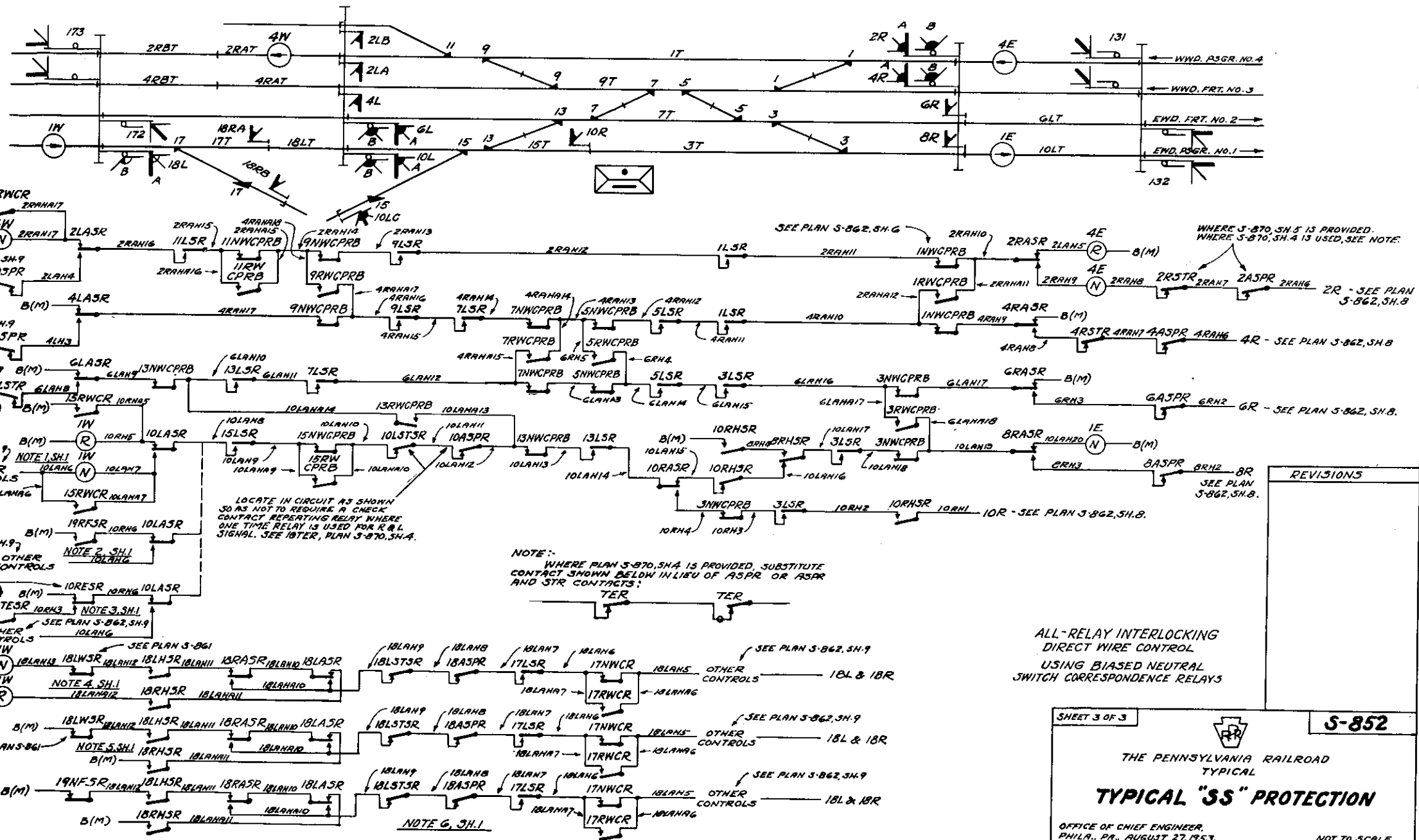
TYPICAL "SS" PROTECTION

OFFICE OF CHIEF ENGINEER, PHILA., PA., FEBRUARY 25, 1953.

APPROVED: *H. J. Salmonson*
ASST. CHIEF ENGINEER - SIGNALS

APPROVED: *J. H. H. H.*
CHIEF ENGINEER

NOT TO SCALE



ALL-RELAY INTERLOCKING
DIRECT WIRE CONTROL
USING BIASED NEUTRAL
SWITCH CORRESPONDENCE RELAYS

SHEET 3 OF 3

S-852

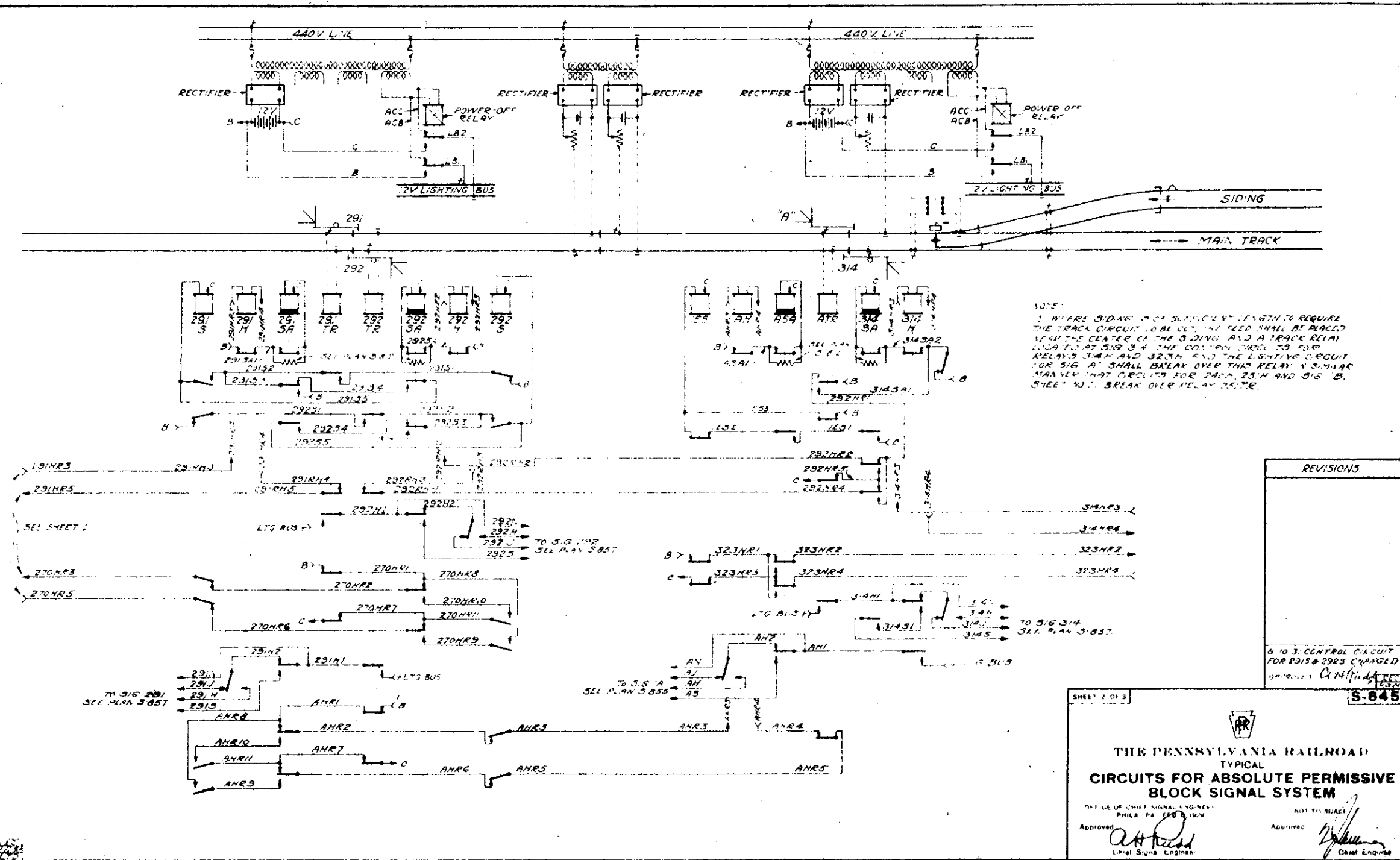
THE PENNSYLVANIA RAILROAD
TYPICAL
TYPICAL "SS" PROTECTION

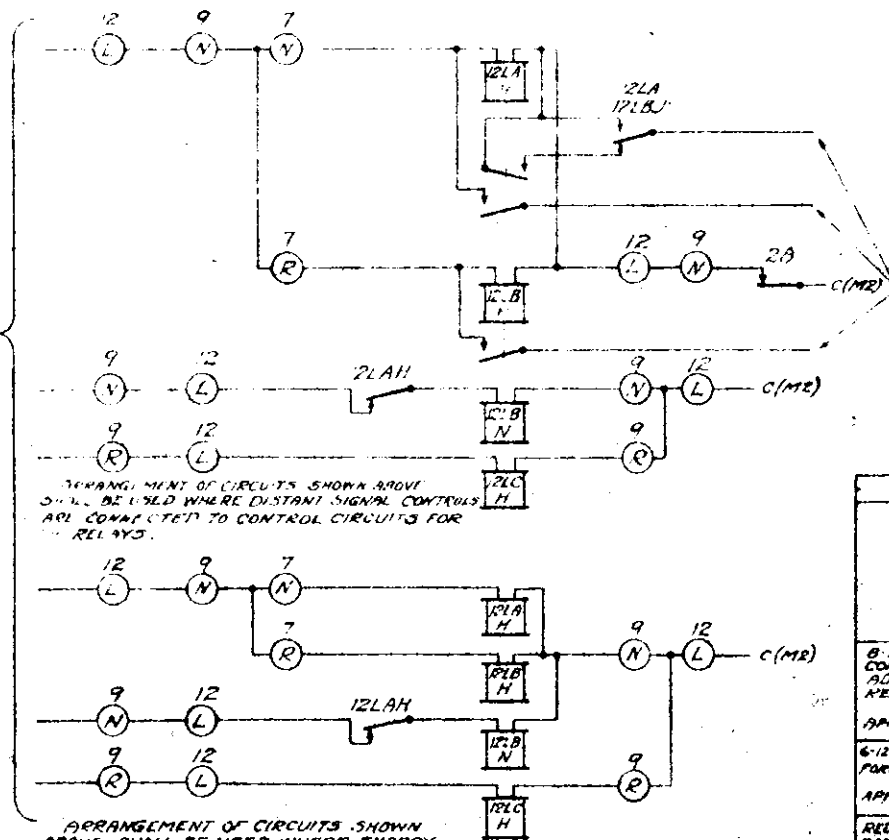
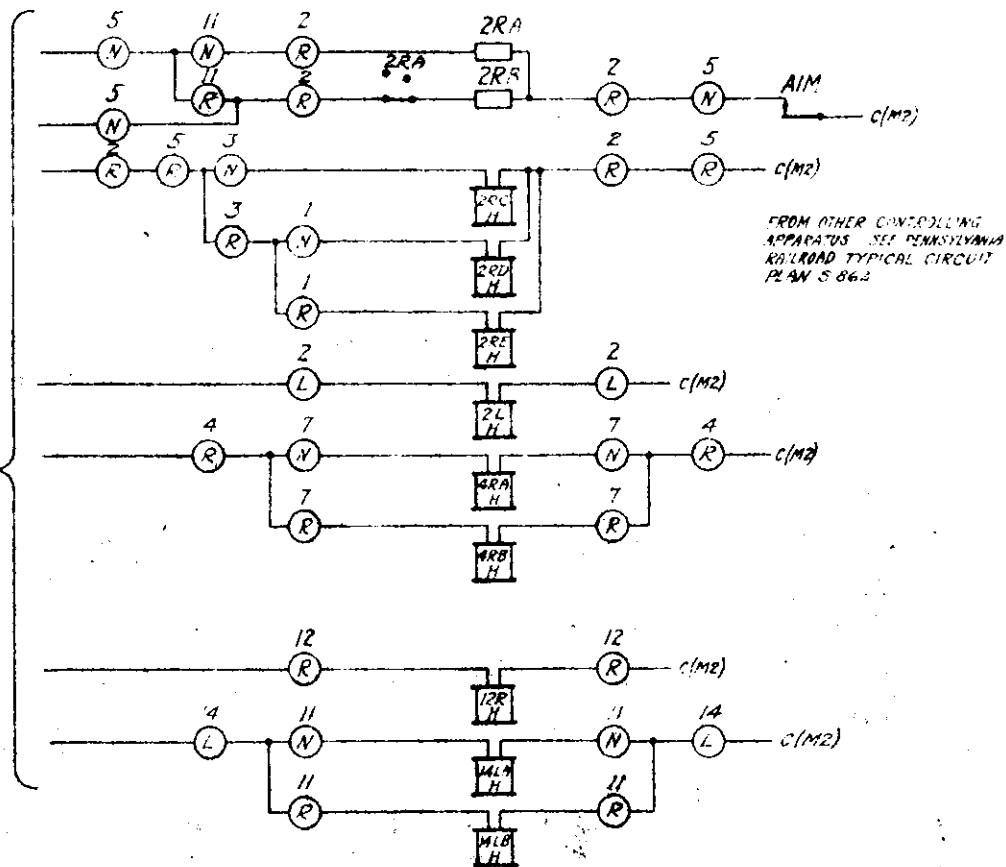
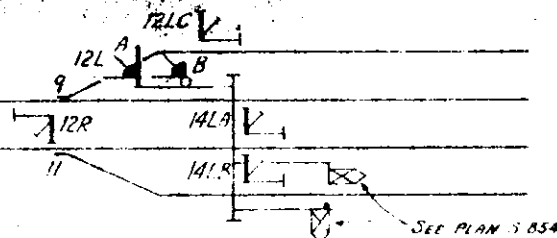
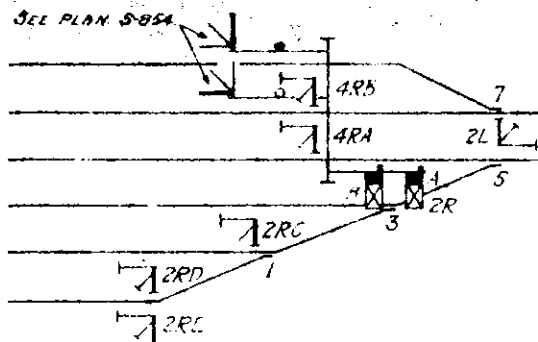
OFFICE OF CHIEF ENGINEER,
PHILA., PA., AUGUST 27, 1953.

APPROVED: *H. J. Salomonson*
ASST. CHIEF ENGINEER - SIGNALS

NOT TO SCALE

APPROVED: *J. J. Hurst*
CHIEF ENGINEER





REVISIONS

8-10-35 SIGNAL LAMP CONTACTS FORMERLY ADJACENT TO CONTROL RELAYS.
 APPROVED: *[Signature]*
 6-12-34 ALL SIGNALS FORMERLY REMAINING THE
 APPROVED: *[Signature]*
 REDRAWN FROM PLAN S-851 DATED 2-15-34

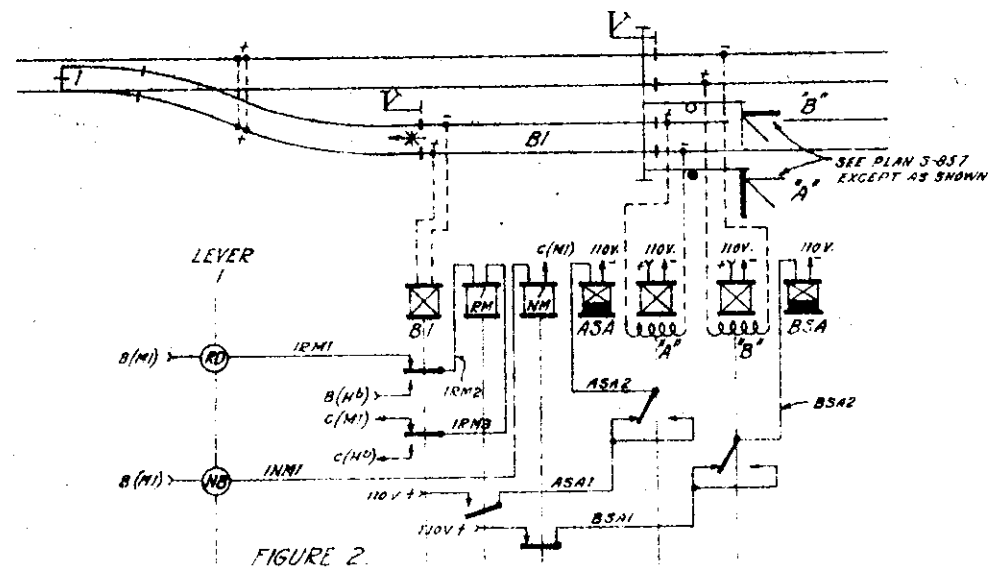
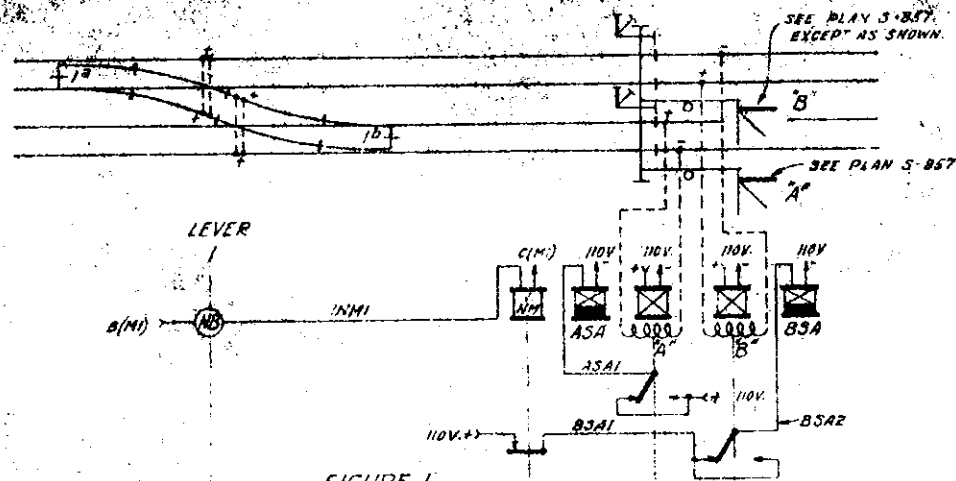
S-851

PENNSYLVANIA RAILROAD SYSTEM TYPICAL HOME SIGNAL CONTROL CIRCUITS BETWEEN MACHINE AND SIGNALS

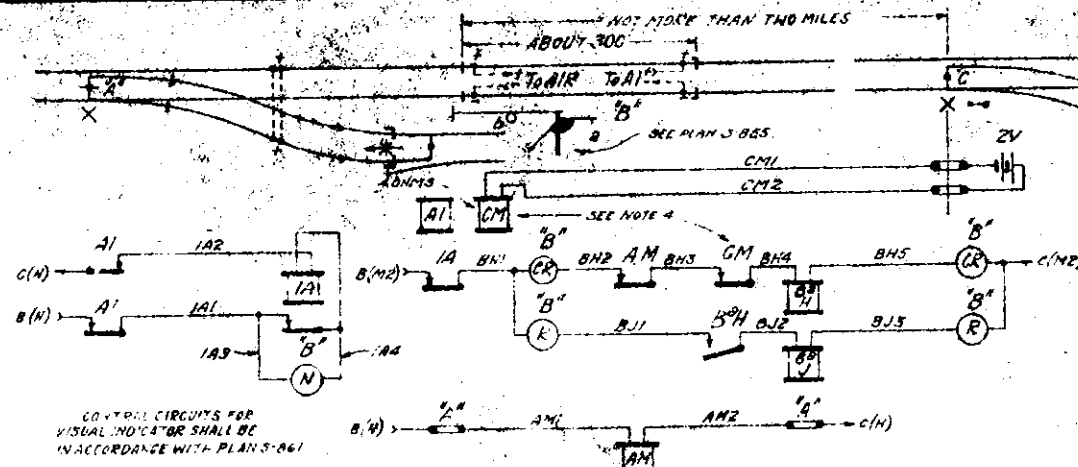
OFFICE OF CHIEF SIGNAL ENGINEER
 PHILA. PA. JUNE 12, 1934

Approved: *[Signature]*
 Chief Signal Engineer

Approved: *[Signature]*
 Chief Signal Engineer



NOTE: BLOCK SIGNALS SHALL BE CONTROLLED OVER DIVERGING SWITCHES (OR DERAILS) LOCATED IN THE TRACK APPROACHING AND WITHIN 500' OF THE SIGNAL AND THOSE UP TO 1000' MAY BE CONSIDERED.



NOTE: 1. -- BLOCK SIGNAL IN PERMISSIVE BLOCK TERRITORY SHALL BE CONTROLLED BY:

- A. A TRAFFIC CIRCUIT CONTROLLER EQUIPPED WITH A DEVICE TO STOP THE LEVER AT MID-STROKE, IN GOING FROM NORMAL TO REVERSE, REQUIRING A DISTINCT MOVEMENT BY THE OPERATOR TO MOVE LEVER PAST THE MID-STROKE POSITION.
- B. WHERE TOP ARM OF HOME INTERLOCKING SIGNAL IS ALSO A BLOCK SIGNAL IT SHALL BE CONTROLLED AS FOLLOWS:
 - (a) WHERE U.S. & C.O.'S. POWER OR ELECTRO-MECHANICAL MACHINE IS IN SERVICE, ONE LEVER, EQUIPPED WITH THREE POSITION DEVICE, SHALL BE USED TO CONTROL THE TOP ARM OF THE HOME SIGNAL AND A SECOND LEVER SHALL BE USED TO CONTROL OTHER SIGNALS USUALLY CONTROLLED BY THE ONE LEVER.
 - (b) WHERE O.R.S. CO.'S. POWER OR ELECTRO-MECHANICAL MACHINE IS IN SERVICE A SEPARATE LEVER SHALL BE USED TO CONTROL THE CLEAR POSITION OF THE BLOCK SIGNAL.
- C. A BLOCK SIGNAL AT AN INTERLOCKING MAY BE CONTROLLED FROM THE INTERLOCKING MACHINE AS FOLLOWS:
 - (a) WHERE U.S. & C.O.'S. POWER OR ELECTRO-MECHANICAL MACHINE IS IN SERVICE, BY A LEVER EQUIPPED WITH A THREE POSITION DEVICE.
 - (b) WHERE O.R.S. CO.'S. POWER OR ELECTRO-MECHANICAL MACHINE IS IN SERVICE, BY TWO LEVERS, ONE FOR THE PERMISSIVE AND THE OTHER FOR THE CLEAR BLOCK INDICATION.

2. -- WHERE THE SWITCH (OR RAIL) IS CONTROLLED BY A LEVER IN THE MACHINE, THE CONTROL CIRCUITS FOR THE SIGNAL RELAYS SHALL BE BROKEN OVER A CONTACT ON THE SWITCH LEVER (SEE PLANS 3-862, 3-811) EXCEPT WHERE THERE IS AN ADDITIONAL TRACK SECTION BETWEEN THE SWITCH AND ADVANCE SIGNAL, WHERE ARRANGEMENT SIMILAR TO THAT SHOWN IN FIG. 2 SHALL BE USED.

3. -- WHERE BOTH THE BLOCK SIGNAL AND THE SWITCH (OR RAIL) ARE CONTROLLED BY LEVERS IN THE MACHINE, THE SIGNAL LEVER SHALL MECHANICALLY LOCK THE SWITCH LEVER AND THE SWITCH REPEATERS RELAY (AM) SHALL BE OMITTED.

4. -- IF PROTECTION IS REQUIRED FOR A FACING POINT SWITCH LOCATED NOT MORE THAN 2 MILES BEYOND THE MANUAL BLOCK SIGNAL ARRANGE CIRCUITS AS FOLLOWS:--

- A. PERMISSIVE BLOCK TERRITORY. WHERE TRAFFIC CONDITIONS ARE SUCH THAT NO MATERIAL DELAY WILL RESULT FROM HOLDING THE SIGNAL AT "STOP" WITH THE TRACK OCCUPIED BETWEEN THE SIGNAL AND THE SWITCH, EXCEPT TRACK SECTION "A1" INCLUDE THE SWITCH OMITTING THE LINE (CM) RELAY. IF THIS ARRANGEMENT WILL RESULT IN EXCESSIVE DELAY THE LINE (SWITCH REPEATING) RELAY (CM) SHOULD BE PROVIDED.
- B. CLEARING BLOCK TERRITORY. EXTEND TRACK SECTION "A1" TO INCLUDE THE SWITCH, OMITTING THE LINE (CM) RELAY.

5. -- ALL NON-INTERLOCKED SWITCHES PROTECTED BY THE BLOCK SIGNAL SHALL BE IN ACCORDANCE WITH STANDARD PLANS BASIC NO'S. 5-228 TO 5-233 INCLUSIVE AND THOSE IN TRACK CIRCUIT TERRITORY SHALL BE INSULATED AND BONDED IN ACCORDANCE WITH PLAN 5-803.

REVISIONS

1-22-44. BLOOD SIGNAL, FIG. 3, FORMERLY PROTECTED AGAINST UNINTENSE, LOCATED NOT MORE THAN 6000 FT. BEYOND SIGNAL.

APPROVED: *H. C. Standen*

6-7-46. NOTE 4, FIG. 3, DELETED

APPROVED: *Anthony*

2-17-46. CIRCUITS FOR FIG. 3, AND NOTE 4, FIGURE 3, CHANGED, TITLE FORMERLY "TYPICAL CONTROL CIRCUITS FOR AIRCRAFT SIGNALS"

APPROVED: *W. J. Wood*

4-13-47. RELAYS NUMBERED FORMERLY CONTROLLED VON H & R CONTACTS RESPECTIVELY, FIG 1B2, AUXILIARY CIRCUIT CONTROLLER FORMERLY PROVIDED FOR CLEAR CONTROL OF SIGNAL 8, FIG. 3, FIG. 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791

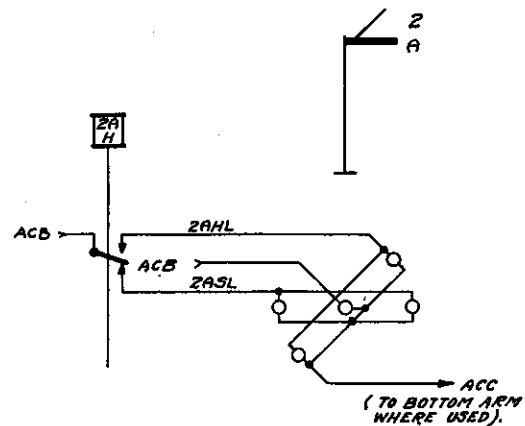


FIGURE 6.

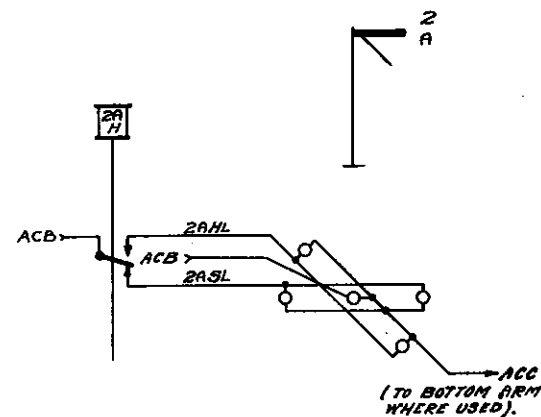


FIGURE 7.

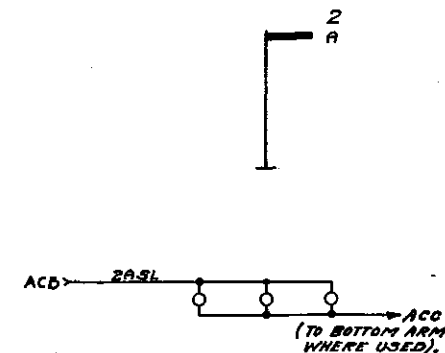


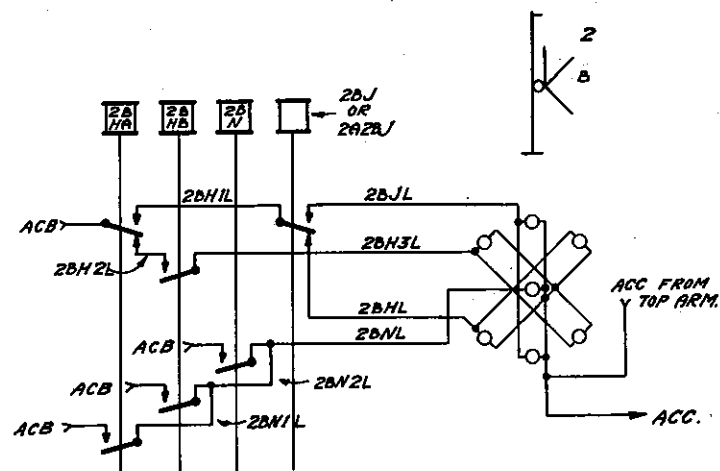
FIGURE 8.

FOR GENERAL NOTES SEE SHEET NO.1.

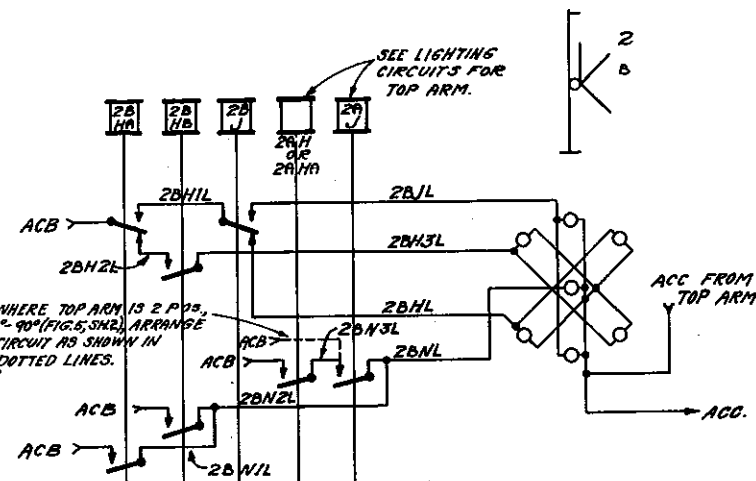
TOP ARM.

REVISIONS.
3-9-23 LIGHT-OUT RELAYS REMOVED. APPROVED: <i>[Signature]</i>
REDRAWN FROM TOP ARM CONTROL OF SHEETS 13 TO 23 INC. OF PLAN 3-955 DATED 11-14-21, SHS. 13, 20, 21, 24, 25, 26 & 29 LAST REVISED 11-9-22

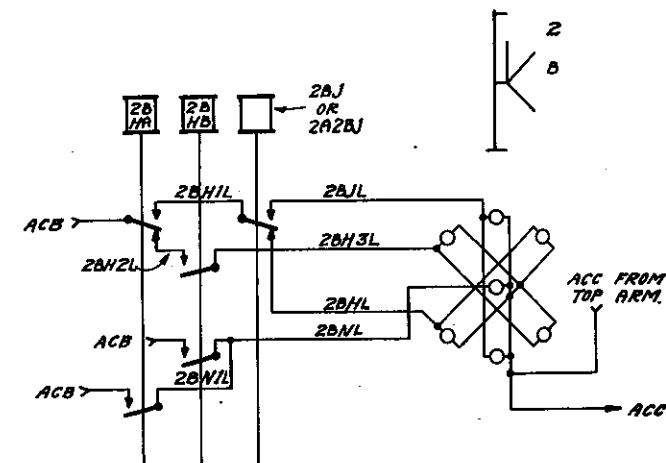
SHEET 3 OF 11	S-855
 PENNSYLVANIA RAILROAD SYSTEM STANDARD LIGHTING CIRCUITS FOR POSITION LIGHT HOME INTERLOCKING & BLOCK SIGNALS	
OFFICE OF CHIEF SIGNAL ENGINEER PHILA., PA., JAN. 20, 1923	
Approved <i>[Signature]</i> Chief Signal Engineer	Approved <i>[Signature]</i> Chief Engineer
NOT TO SCALE	



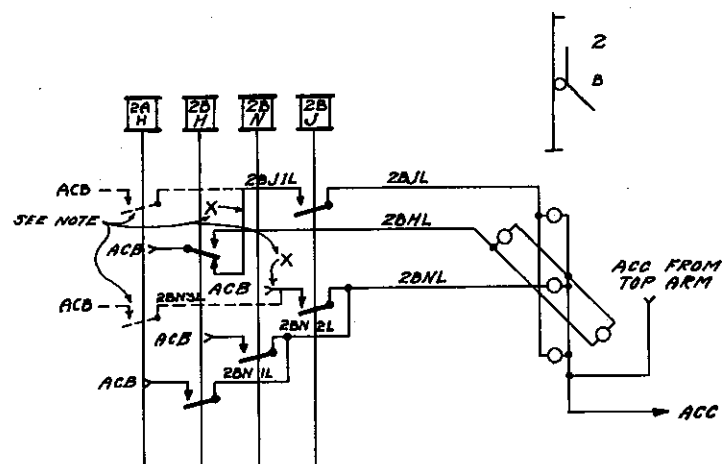
AUTOMATIC BLOCK TERRITORY.
FIGURE 11.



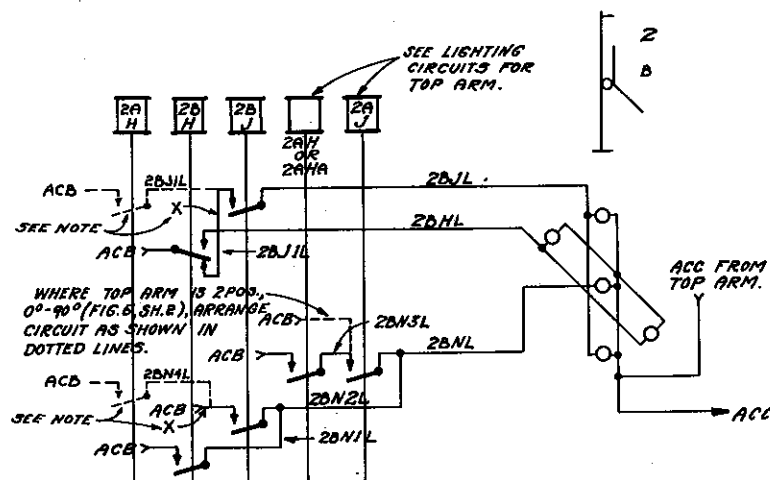
MANUAL OR CONTROLLED MANUAL BLOCK TERRITORY.
FIGURE 12.



MANUAL OR CONTROLLED MANUAL BLOCK TERRITORY.
FIGURE 13.



AUTOMATIC BLOCK TERRITORY.
FIGURE 14.



MANUAL OR CONTROLLED MANUAL BLOCK TERRITORY.
FIGURE 15.

NOTE:-
WIRES X SHALL BE OMITTED AND CIRCUITS SHOWN
DOTTED OVER "BH" RELAY PROVIDED WHERE "BJ"
RELAY IS USED IN CONTROL FOR TWO OR MORE
SIGNALS.

FOR GENERAL NOTES SEE SHEET NO. 1.

BOTTOM ARM.

REVISIONS.

3-5-33, LIGHT-OUT RELAYS
REMOVED AND FIGURES 1 & 15
MODIFIED.
APPROVED: *[Signature]*

S-855

SHEET 4 OF 11

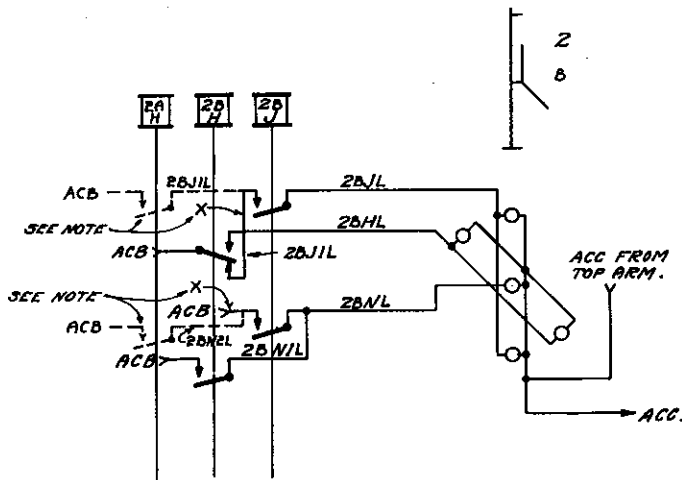
PENNSYLVANIA RAILROAD SYSTEM
STANDARD
LIGHTING CIRCUITS FOR POSITION LIGHT
HOME INTERLOCKING & BLOCK SIGNALS

OFFICE OF CHIEF SIGNAL ENGINEER,
PHILA., PA., JAN. 20, 1935

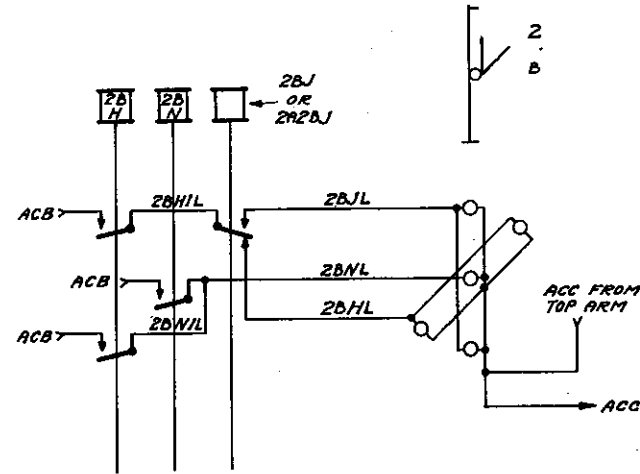
Approved: *[Signature]*
Chief Signal Engineer

Approved: *[Signature]*
Chief Engineer

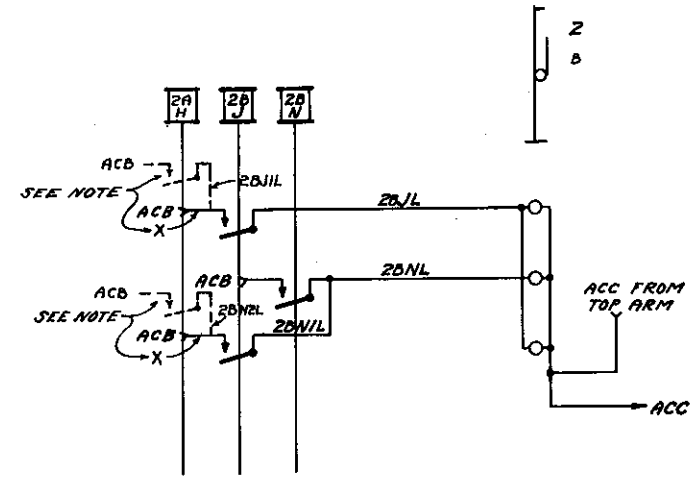
NOT TO SCALE



MANUAL OR CONTROLLED MANUAL BLOCK TERRITORY.
FIGURE 16.



AUTOMATIC BLOCK TERRITORY.
FIGURE 17.



AUTOMATIC BLOCK TERRITORY.
FIGURE 18.

NOTE:-
WIRES X SHALL BE OMITTED AND CIRCUITS
SHOWN DOTTED OVER 'AH' RELAY PROVIDED
WHERE 'BJ' RELAY IS USED IN CONTROL FOR
TWO OR MORE SIGNALS.

FOR GENERAL NOTES SEE SHEET NO.1.

BOTTOM ARM.

REVISIONS.

3-9-33. LIGHT-OUT RELAYS
REMOVED AND FIGURES 16, 18
& 19 MODIFIED.
APPROVED: *[Signature]*
1-26-35. FIGURES 16, 18 AND
20 ADDED.
APPROVED: *[Signature]*
REDRAWN FROM BOTTOM ARM
CONTROL OF SHEETS 36, 7, 8, 12, 15,
13, 24 & 27 OF PLAN S-855 DATED
10-18-24, LAST REVISED 11-9-23.

S-855

SHEET 5 OF 11



PENNSYLVANIA RAILROAD SYSTEM
STANDARD
LIGHTING CIRCUITS FOR POSITION LIGHT
HOME INTERLOCKING & BLOCK SIGNALS

OFFICE OF CHIEF SIGNAL ENGINEER,
PHILA., PA., JAN. 20, 1925

Approved: *[Signature]*
Chief Signal Engineer

Approved: *[Signature]*
Chief Engineer

NOT TO SCALE

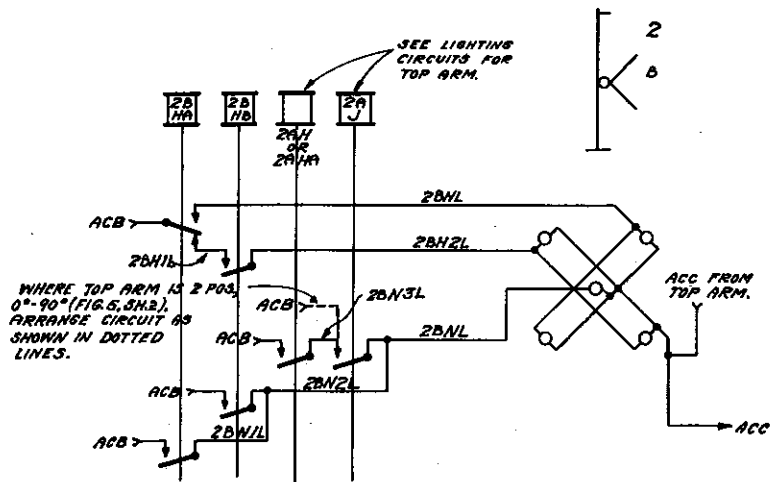


FIGURE 21.

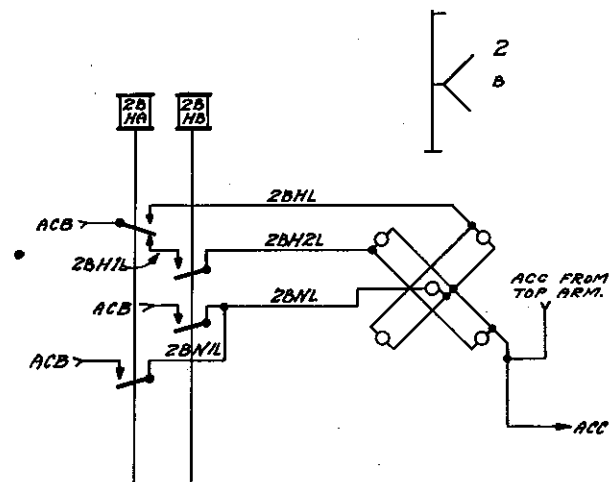


FIGURE 22.

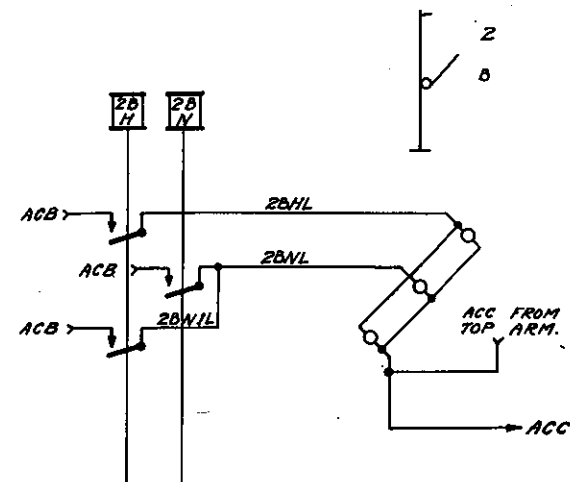


FIGURE 23.

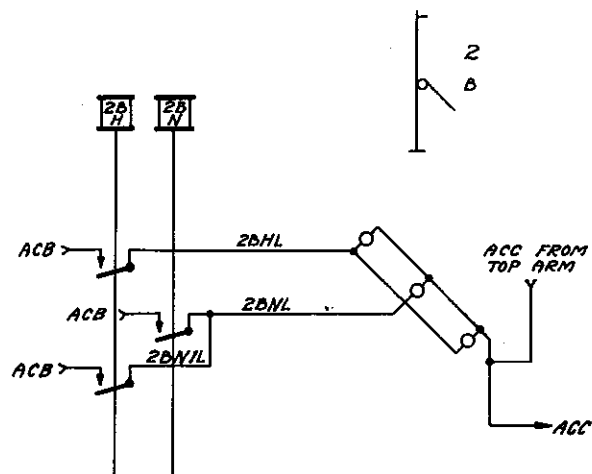


FIGURE 24.

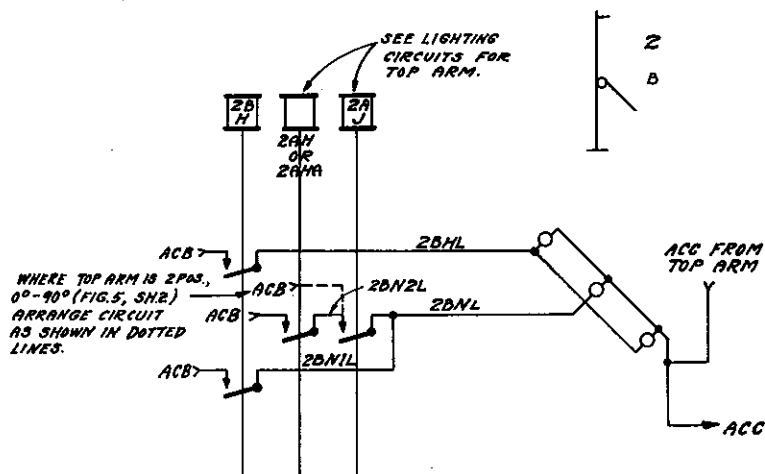


FIGURE 25.

FOR GENERAL NOTES SEE SHEET NO. 1.

BOTTOM ARM.

REVISIONS.	
3-3-33. LIGHT-OUT RELAYS REMOVED.	APPROVED: <i>[Signature]</i>
1-26-25. FIGURES 21, 22, 24 AND 25 ADDED.	APPROVED: <i>[Signature]</i>
REDRAWN FROM BOTTOM ARM CONTROL OF SHEETS 9, 21 AND 24 OF PLAN S-855 DATED 10-18-21, LAST REVISED 11-9-23.	

SHEET 6 OF 11

PENNSYLVANIA RAILROAD SYSTEM
STANDARD
LIGHTING CIRCUITS FOR POSITION LIGHT HOME INTERLOCKING & BLOCK SIGNALS

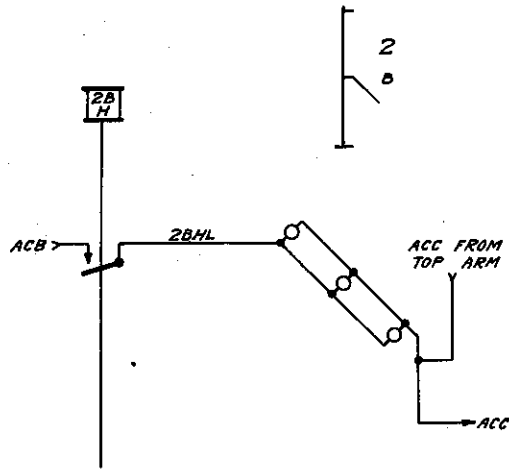
OFFICE OF CHIEF SIGNAL ENGINEER,
PHILA., PA., JAN. 25, 1925.

Approved: *[Signature]* Chief Signal Engineer

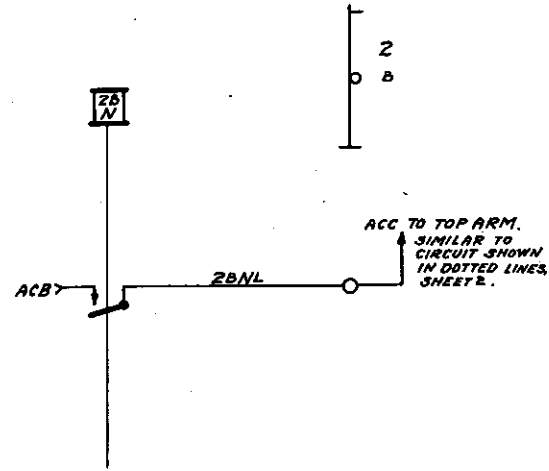
NOT TO SCALE

Approved: *[Signature]* Chief Engineer

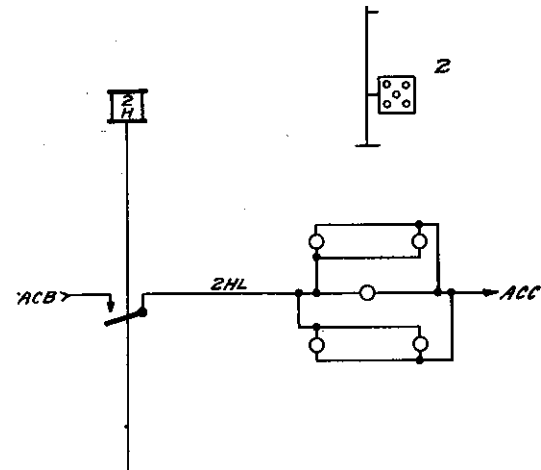
S-855



AUTOMATIC, MANUAL OR CONTROLLED MANUAL BLOCK TERRITORY.
FIGURE 26.



AUTOMATIC BLOCK TERRITORY.
FIGURE 27.
NOTE:—SEE SHEET 2 FOR SIMILAR ARRANGEMENT IN
MANUAL OR CONTROLLED MANUAL BLOCK TERRITORY.



TAKE SIDING INDICATOR.
FIGURE 30.

FOR GENERAL NOTES SEE SHEET NO.1.

BOTTOM ARM &
TAKE SIDING INDICATOR.

REVISIONS.

3-9-35 WIRE NUMBERS
MODIFIED.
APPROVED: *ant*
1-26-25, FIGURE 26 MODIFIED
APPROVED: *ant*
REDRAWN FROM BOTTOM ARM
CONTROL OF SHEETS 10, 22 & 34
OF PLAN S-855 DATED 10-10-21.

S-855

SHEET 7 OF 11



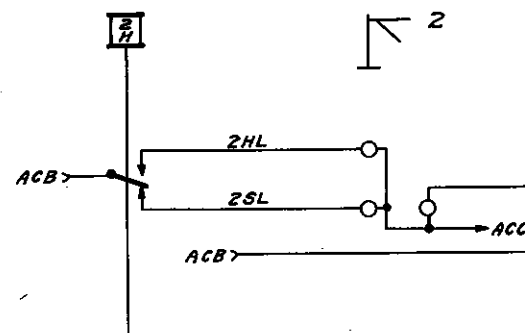
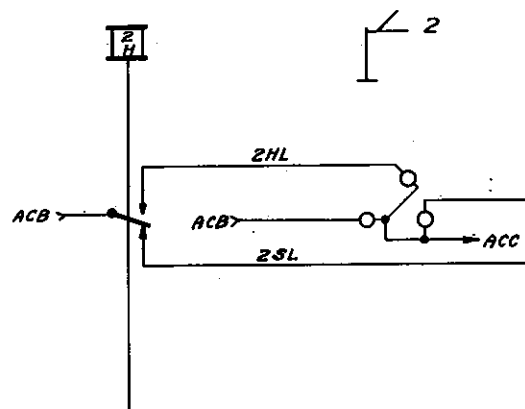
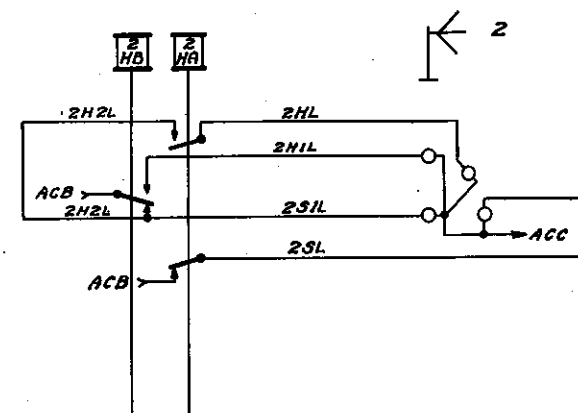
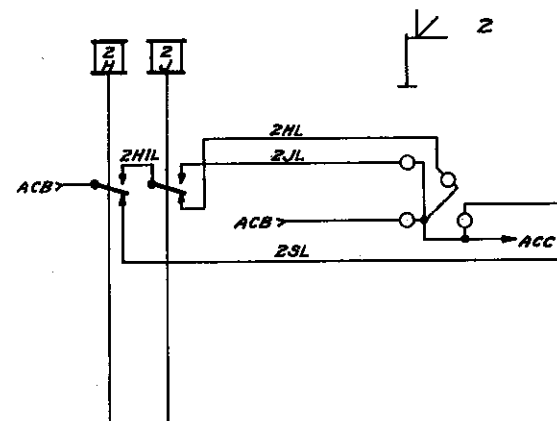
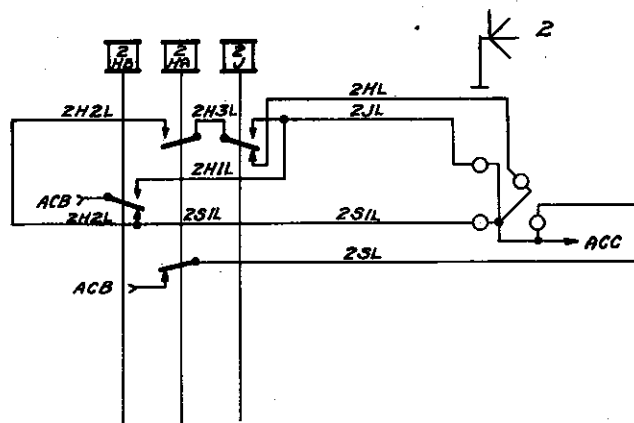
PENNSYLVANIA RAILROAD SYSTEM
STANDARD
LIGHTING CIRCUITS FOR POSITION LIGHT
HOME INTERLOCKING & BLOCK SIGNALS

OFFICE OF CHIEF SIGNAL ENGINEER,
PHILA., PA., JAN. 29, 1925

Approved *ant*
Chief Signal Engineer

NOT TO SCALE

Approved *ant*
Chief Engineer



FOR GENERAL NOTES SEE SHEET NO.1.

DWARF SIGNAL.
OLD TYPE

SHEET 6 OF 11

S-855

**PENNSYLVANIA RAILROAD SYSTEM
STANDARD
LIGHTING CIRCUITS FOR POSITION LIGHT
HOME INTERLOCKING & BLOCK SIGNALS**

OFFICE OF CHIEF SIGNAL ENGINEER,
PHILA. PA., JAN. 26, 1925.

Approved

Chief Signal Engineer

NOT TO SCALE

Approved:

Chief Engineer

REVISIONS.

3-9-33. WIRE NUMBERS
MODIFIED.
APPROVED: *C. H. [Signature]* REC
REDRAWN FROM SHEETS 30,
31, 32 & 33 OF PLAN S-855
DATED 10-18-21 AND SHEET 35
DATED 5-18-22.

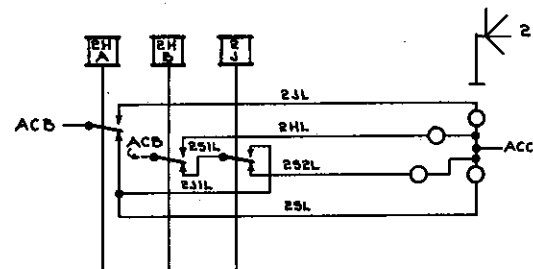
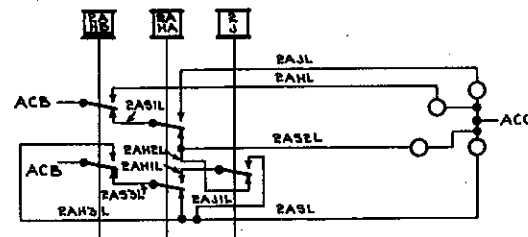


FIGURE 36A



FOR USE WHERE ONE CLEAR CONTROL (J)
RELAY IS PROVIDED FOR TWO OR MORE SIG'S.
FIGURE 36D
(SEE NOTE)

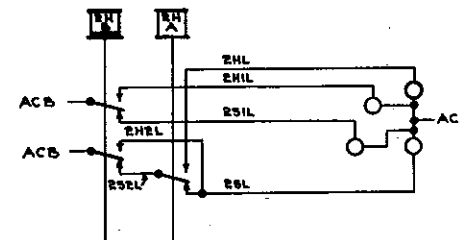
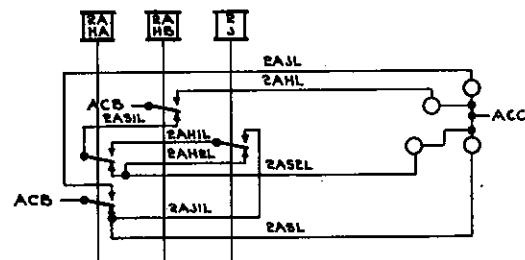


FIGURE 38B
(SEE NOTE)



FOR USE WHERE ONE CLEAR CONTROL (J)
RELAY IS PROVIDED FOR TWO OR MORE SIG'S.
FIGURE 36B

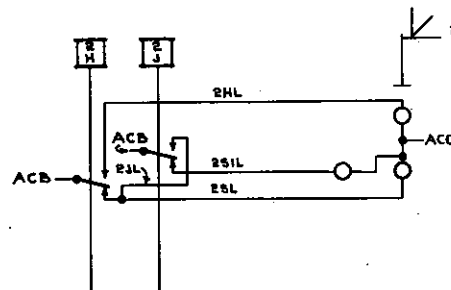


FIGURE 37

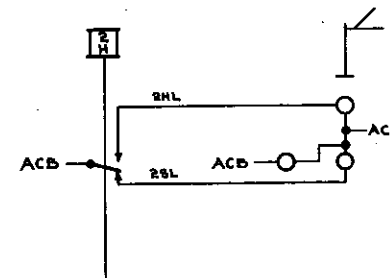


FIGURE 39

NOTE:-
FIGURES 36C, 36D AND 38B SHALL BE USED WHERE
SLOW ACTING 'HB' RELAYS ARE USED.

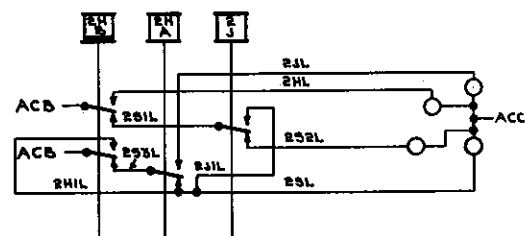


FIGURE 36C
(SEE NOTE)

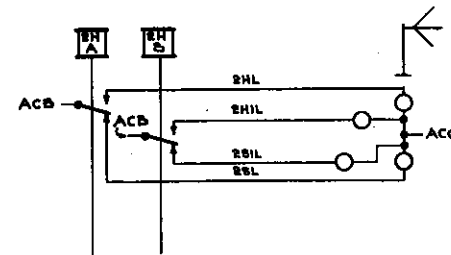


FIGURE 38A

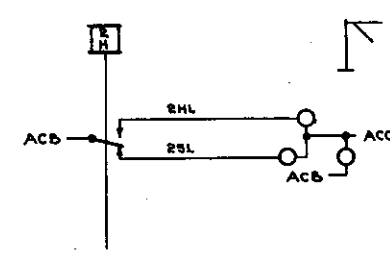


FIGURE 40

FOR GENERAL NOTES SEE 5H.NO.1.

DWARF SIGNAL
STANDARD SIGNAL MATERIAL
PLAN NO. 5-410.

SHEET 9 OF 11

S-855



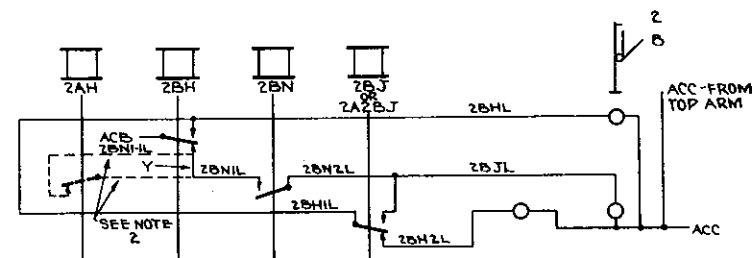
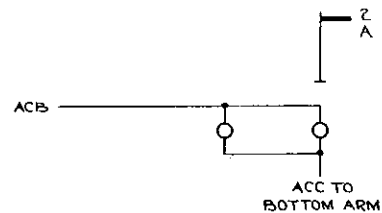
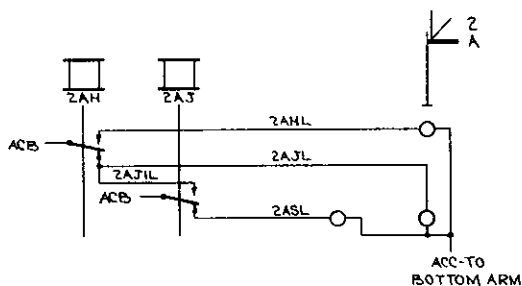
THE PENNSYLVANIA RAILROAD
STANDARD
LIGHTING CIRCUITS FOR POSITION LIGHT
HOME INTERLOCKING & BLOCK SIGNALS

OFFICE OF CHIEF SIGNAL ENGINEER,
PHILA. PA., MAR. 9, 1935.

Approved: *[Signature]*
Chief Signal Engineer

Approved: *[Signature]*
Chief Engineer

NOT TO SCALE



NOTE:-

1. WIRES "X" SHALL BE OMITTED AND CIRCUITS SHOWN DOTTED OVER FRONT CONTACT IN 'AH' RELAY PROVIDED WHERE 'BJ' RELAY IS USED IN CONTROL FOR TWO OR MORE SIGNALS.
2. WIRES "Y" SHALL BE OMITTED AND CIRCUITS SHOWN DOTTED OVER BACK CONTACT IN 'AH' RELAY PROVIDED WHERE 'BN' RELAY IS SLOW ACTING.
3. FOR GENERAL NOTES SEE SHEET 1.

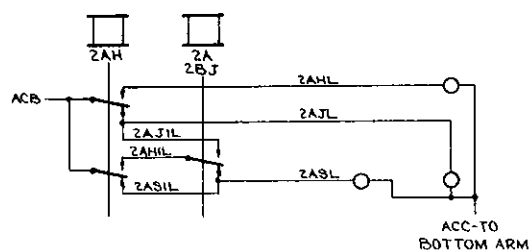
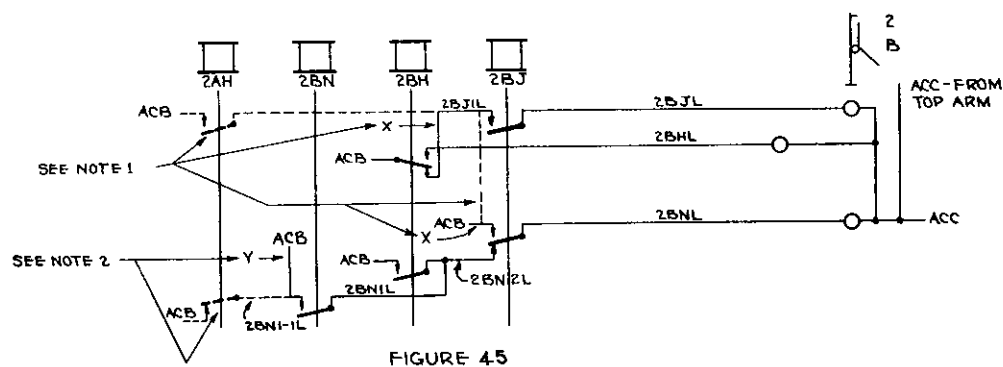
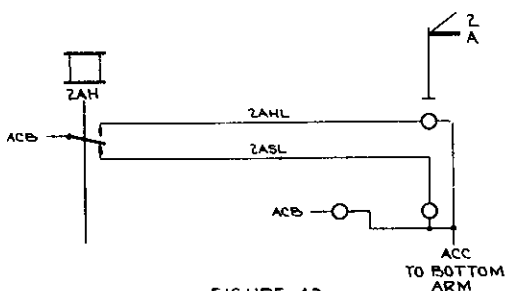
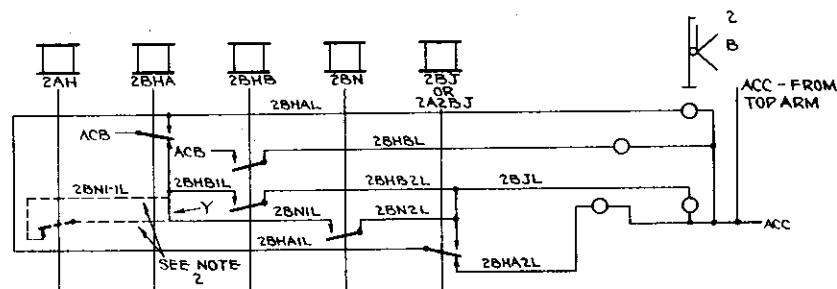


FIGURE 41B
FOR USE WHERE ONE CLEAR CONTROL (J)
RELAY IS PROVIDED FOR TWO OR MORE SIGS.



PEDESTAL SIGNAL
STANDARD SIGNAL MATERIAL
PLAN NO. S-410.

SHEET 10 OF 11

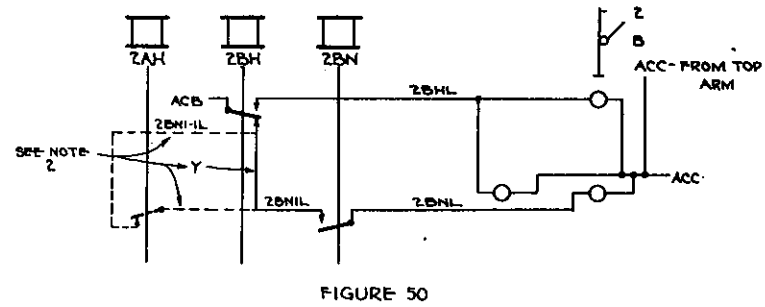
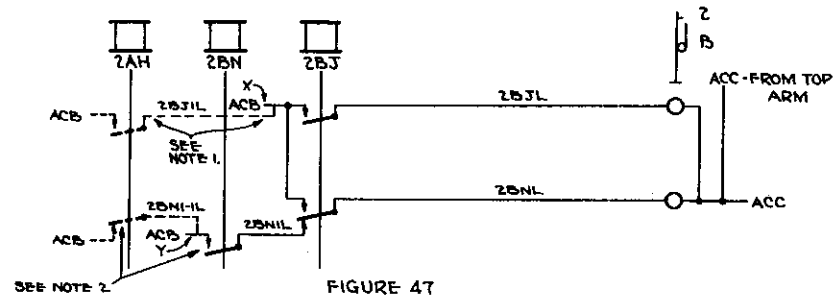
S-855

THE PENNSYLVANIA RAILROAD
STANDARD
LIGHTING CIRCUITS FOR POSITION LIGHT
HOME INTERLOCKING & BLOCK SIGNALS

Approved: *Anthony*
Chief Signal Engineer

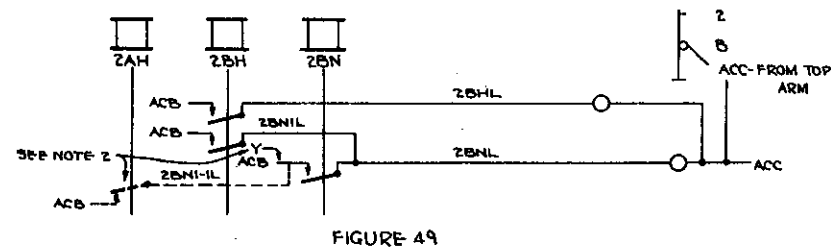
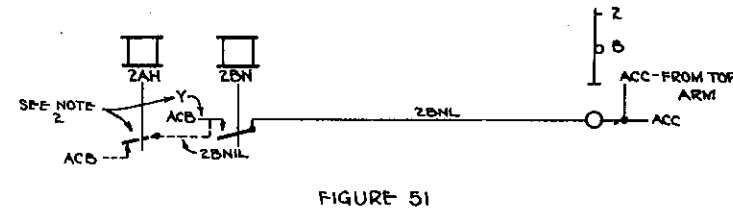
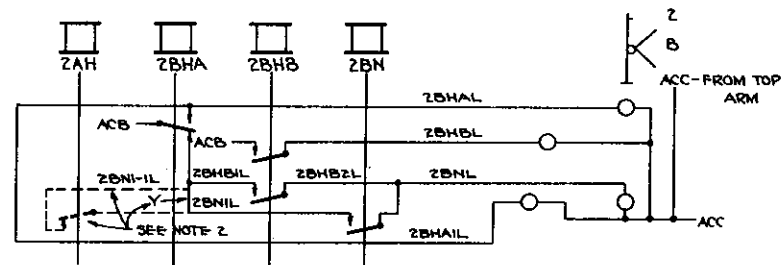
Approved:

Acting Chief Engineer



NOTE:-

1. WIRES "X" SHALL BE OMITTED AND CIRCUITS SHOWN DOTTED OVER FRONT CONTACT IN "AH" RELAY PROVIDED WHERE "BJ" RELAY IS USED IN CONTROL FOR TWO OR MORE SIGNALS.
2. WIRES "Y" SHALL BE OMITTED AND CIRCUITS SHOWN DOTTED OVER BACK CONTACT IN "AH" RELAY PROVIDED WHERE "BN" RELAY IS SLOW ACTING.
3. FOR GENERAL NOTES SEE SHEET 1



REVISIONS

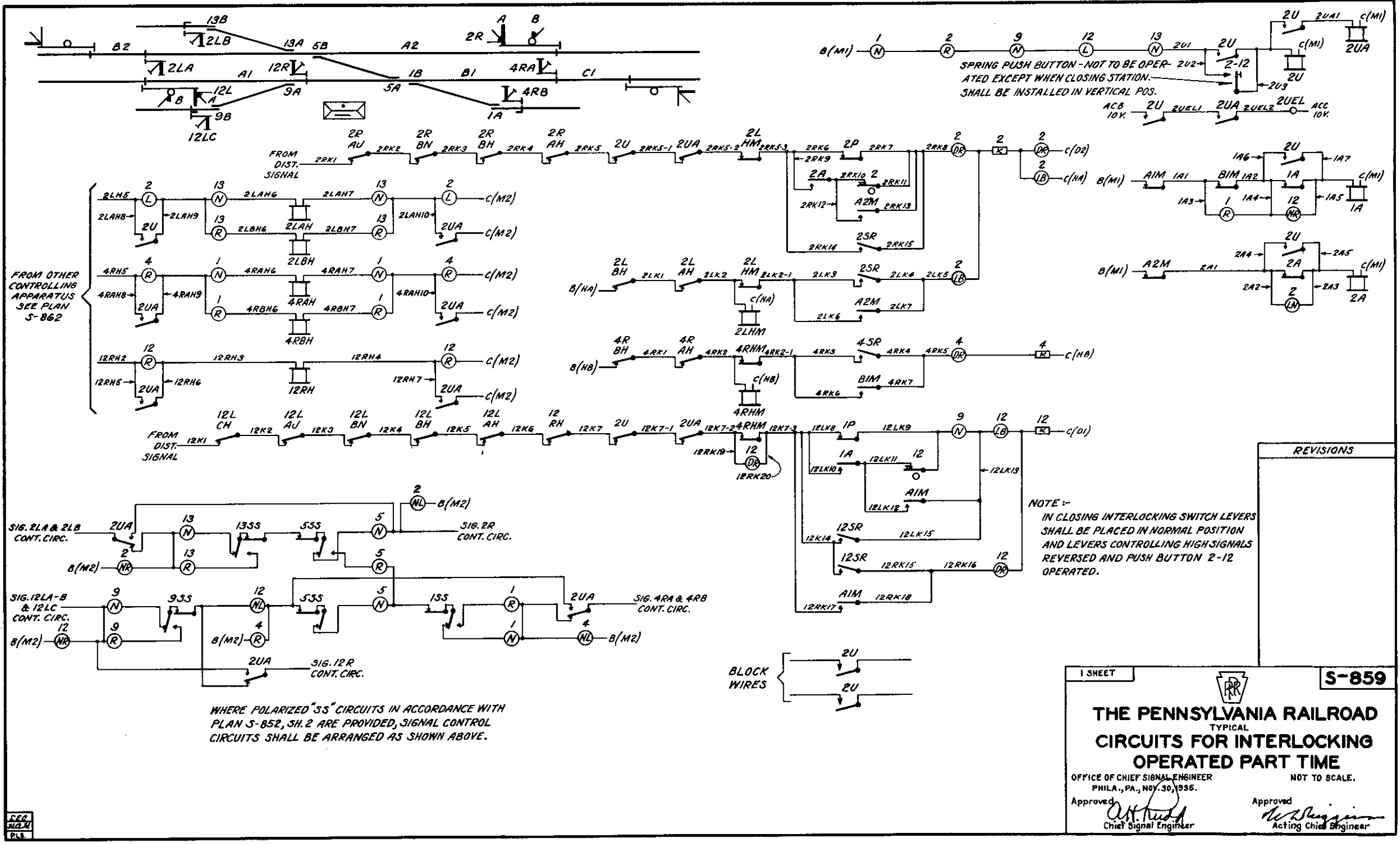
PEDESTAL SIGNAL
STANDARD SIGNAL MATERIAL
PLAN NO. S-410

SHEET 11 OF 11

S-855



THE PENNSYLVANIA RAILROAD
STANDARD
LIGHTING CIRCUITS FOR POSITION LIGHT
HOME INTERLOCKING & BLOCK SIGNALS
OFFICE OF CHIEF SIGNAL ENGINEER
PHILA., PA., OCT. 1, 1928
NOT TO SCALE
Approved: *[Signature]* Chief Signal Engineer
Approved: *[Signature]* Acting Chief Engineer



NOTE: IN CLOSING INTERLOCKING SWITCH LEVERS SHALL BE PLACED IN NORMAL POSITION AND LEVERS CONTROLLING HIGH SIGNALS REVERSED AND PUSH BUTTON 2-12 OPERATED.

WHERE POLARIZED "SS" CIRCUITS IN ACCORDANCE WITH PLAN S-852, SH. 2 ARE PROVIDED, SIGNAL CONTROL CIRCUITS SHALL BE ARRANGED AS SHOWN ABOVE.

REVISIONS

1 SHEET

S-859

THE PENNSYLVANIA RAILROAD
TYPICAL
CIRCUITS FOR INTERLOCKING
OPERATED PART TIME

OFFICE OF CHIEF SIGNAL ENGINEER
PHILA., PA., NOV. 30, 1935.

NOT TO SCALE.

Approved
Chief Signal Engineer

Approved
Acting Chief Engineer

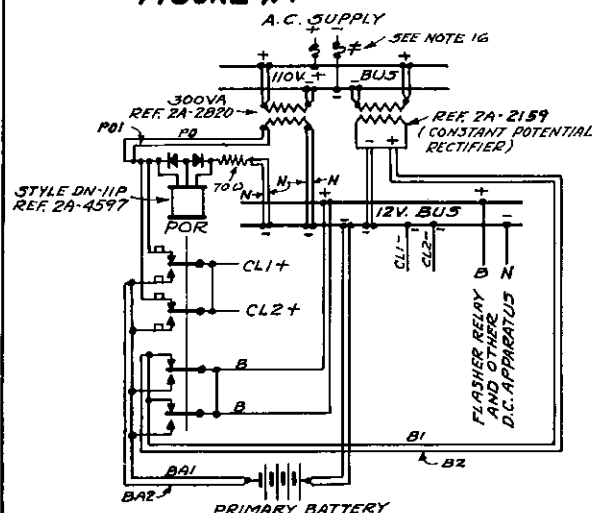
R.L.T



EACH BATTERY SHALL CONSIST OF TWENTY (20) TYPE HA-1000 CELLS. WHERE FIG. 2A IS USED AND MORE THAN 8 LAMPS ARE PROVIDED TYPE HA-1302 CELLS SHALL BE USED. (SEE NOTE 12)

PRIMARY BATTERY OPERATION WHERE A.C. POWER IS NOT AVAILABLE.

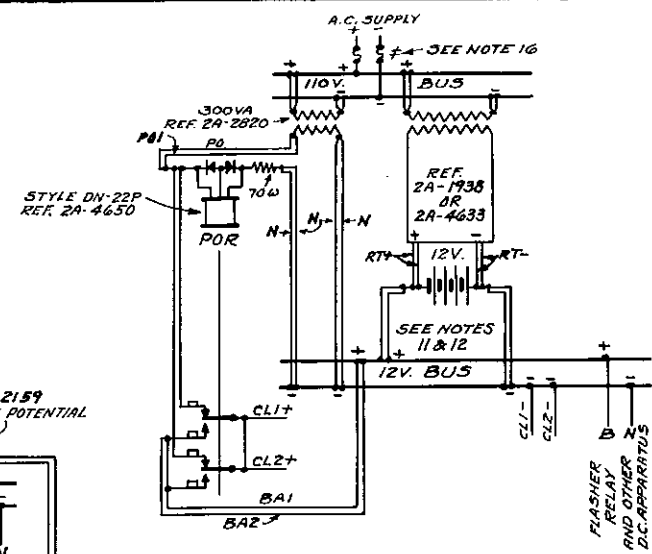
FIGURE 1A



PRIMARY BATTERY SHALL CONSIST OF TWENTY (20) TYPE HA CELLS. WHERE NOT MORE THAN 8 LAMPS ARE PROVIDED USE TYPE HA-1000 CELLS. WHERE MORE THAN 8 LAMPS ARE PROVIDED USE HA-1302 CELLS. (SEE NOTE 12)

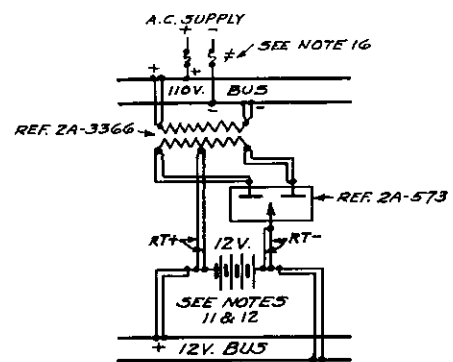
FOR USE WHERE A.C. SUPPLY IS AVAILABLE AND PRIMARY BATTERY STANDBY IS PROVIDED.

FIGURE 1B



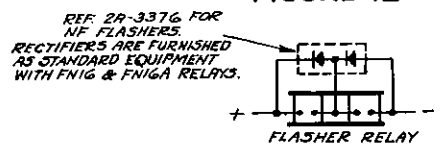
FOR USE WHERE A.C. SUPPLY IS AVAILABLE AND STORAGE BATTERY STANDBY IS PROVIDED. WHERE MORE THAN TWO GATE MECHANISMS ARE INSTALLED AN ADDITIONAL BATTERY MAY BE REQUIRED.

FIGURE 1D



BATTERY CHARGING ARRANGEMENT WHICH MAY BE USED IN LIEU OF ARRANGEMENT SHOWN FOR CHARGING BATTERIES IN FIGURES 1C & 1D.

FIGURE 1E



APPLICATION OF RECTIFIER FOR ELIMINATION OF RADIO INTERFERENCE.

FIGURE 1F

NOTES:

- FLASHING LIGHT CROSSING SIGNALS SHALL BE INSTALLED IN ACCORDANCE WITH PLAN S-463.
- AUTOMATIC CROSSING GATES SHALL BE INSTALLED IN ACCORDANCE WITH PLAN S-462.
- TRACK CIRCUITS SHOWN ARE TYPICAL. DETAIL ARRANGEMENT OF TRACK CIRCUITS MUST BE MADE FOR EACH INSTALLATION TO SUIT LOCAL CONDITIONS AND REQUIREMENTS.
- A SHORT TRACK CIRCUIT SHALL BE PROVIDED OVER HIGHWAY CROSSINGS TO OPERATE SIGNALS (AND GATES) WHEN TRAIN BLOCKS CROSSING:
 - IN SINGLE TRACK TERRITORY.
 - IN TERRITORY WHERE RULE 261 IS IN EFFECT.
 - TO COMPLY WITH STATE OR LOCAL REQUIREMENTS.
 - WHERE WARRANTED BY NUMBER OF REVERSE MOVEMENTS WITH TRAIN ORDERS.
- AT OTHER LOCATIONS (EXCEPT WHERE AUTOMATIC GATES ARE INSTALLED) SHORT TRACK CIRCUITS MAY BE OMITTED AND INSULATING RAIL JOINTS SHALL BE LOCATED EAST (OR NORTH) OF CROSSING FOR EASTWARD (OR NORTHWARD) TRACKS AND WEST (OR SOUTH) OF CROSSING FOR WESTWARD (OR SOUTHWARD) TRACKS.

5. (a) THE LOCATION OF INSULATING JOINTS, ESTABLISHING TRACK CIRCUITS FOR INITIATING THE OPERATION OF HIGHWAY CROSSING PROTECTION, SHOULD BE ESTABLISHED, INsofar AS PRACTICABLE, TO PROVIDE A STARTING TIME OF 30 SECONDS BUT NOT TO EXCEED 50 SECONDS.

(b) THE STARTING TIME OF 30 SECONDS SHOULD BE BASED ON A MAXIMUM SPEED AS OUTLINED IN THE FOLLOWING:-

- WHERE SPEEDS OF 100 MILES PER HOUR MAY BE ATTAINED AND IT IS ANTICIPATED SUCH SPEEDS WILL BE ATTAINED - MAXIMUM SPEED: 100 MILES PER HOUR.
- WHERE SPEED UNDER (1) IS NOT CONTEMPLATED - MAXIMUM AUTHORIZED SPEED.

(c) IN ESTABLISHING STARTING SECTIONS EXISTING CUT-SECTIONS AND SIGNAL LOCATIONS SHALL BE UTILIZED WHEREVER PRACTICABLE AND THE STARTING TIME OF 30 SECS. MAY BE REDUCED TO MIN. OF 27 SECS. FOR AUTO. GATES AND 25 SECS. WHERE AUTO. GATES ARE NOT INVOLVED.

1. WHERE THE DISTANCE FROM THE MOST REMOTE CROSSING SIGNAL TO CLEARANCE OF THE FARTHEST TRACK, AS MEASURED PARALLEL TO THE CENTER LINE OF THE HIGHWAY, IS MORE THAN 35 FEET THE MINIMUM TIME SHALL BE INCREASED BY ONE SECOND FOR EACH ADDITIONAL 5 FEET.

(d) WHERE TRACK CIRCUIT LOCATIONS ARE ESTABLISHED OR WHERE EXISTING TRACK CIRCUIT LOCATIONS ARE UTILIZED FOR OBTAINING A STARTING TIME FOR CONTEMPLATED INCREASE OF MAXIMUM AUTHORIZED SPEEDS, STARTING TIME FOR THE MAXIMUM AUTHORIZED SPEED IN EFFECT IS TO BE OBTAINED BY THE USE OF APPROVED RETARDING DEVICE OR DEVICES.

(e) ANY EXCEPTION, TO THE ABOVE, AS MAY BE REQUIRED TO MEET STATE OR LOCAL AUTHORITIES, SHOULD BE AGREED TO ONLY AFTER FULL DELIBERATION AND COMPLETE RECORD OF NEGOTIATIONS SHOULD BE KEPT IN FILE INDICATING REASONS FOR NOT

ACCEPTING STANDARDS PRESCRIBED.

6. WHERE SHORT TRACK CIRCUIT IS PROVIDED OVER HIGHWAY CROSSING INSULATING RAIL JOINTS SHALL BE LOCATED PREFERABLY TO FEET EACH SIDE OF CROSSING BUT NOT IN EXCESS OF 100 FEET. WHERE DUE TO LOCAL CONDITIONS, INSULATING JOINTS SHOULD BE LOCATED A GREATER DISTANCE, APPROVAL OF THE CHIEF ENGINEER SHOULD BE OBTAINED.

7. INSULATING RAIL JOINTS SHALL BE PLACED IN ACCORDANCE WITH CURRENT ISSUE OF G.E. 78.

8. CIRCUITS FOR OPERATION OF AUTOMATIC CROSSING GATES SHALL BE SO ARRANGED THAT GATES WILL START TO ASSUME HORIZONTAL POSITION BETWEEN 3 AND 5 SECONDS AFTER FLASHING LIGHT SIGNALS START TO OPERATE.

9. EACH SIGNAL SHALL BE PROVIDED WITH TWO RETURN WIRES. WIRES BETWEEN INSTRUMENT CASE AND SIGNALS SHALL BE NO. 9 A.W.G.

10. WHERE LINE WIRES ARE REQUIRED FOR CONTROL OF CROSSING SIGNALS, TWO WIRE DOUBLE BREAK CIRCUITS SHALL BE PROVIDED.

11. TYPE AND CAPACITY OF STORAGE BATTERIES SHALL BE IN ACCORDANCE WITH CE 234, SECTION 44, PARA. (ii)

12. BATTERIES SHALL BE HOUSED, IN BATTERY BOXES, INSTRUMENT CASES OR IN HEATED BUILDINGS.

13. FOR RECOMMENDED VOLTAGE AT LAMPS SEE CE 227, PARA. 27D.

14. TEST SWITCHES SHALL BE PROVIDED WHERE DESIGNATED EMPLOYEES ARE AUTHORIZED TO TEST CROSSING SIGNALS AND SHALL BE ACCESSIBLE TO ONLY SUCH EMPLOYEES. SWITCHES SHALL NOT BE LOCATED IN INSTRUMENT CASES AND MUST BE INSTALLED SO THAT SWITCH IS CLOSED WHEN DOOR OF HOUSING IS CLOSED.

15. A POWER-OFF INDICATION LAMP SHALL BE LOCATED ON INSTRUMENT CASE AT HIGHWAY CROSSING LOCATIONS WHERE A.C. POWER IS AVAILABLE USE LAMP 4837, REF. 25E-A-122. WHERE FIG. 1A IS PROVIDED USE LAMP 4832, REF. 24E-A-111, WITH ADAPTOR, OMITTING 200 OHM RESISTOR. LAMPS SHALL BE PLACED IN PILOT-LIGHT, EQUIPPED WITH WHITE LENS.

16. OVERLOAD CIRCUIT BREAKERS OF APPROVED TYPE MAY BE USED IN PLACE OF FUSES MARKED +. IF COMMERCIAL CO'S. FUSES ARE PROVIDED WHERE CONNECTION IS MADE, FUSES MARKED + SHALL BE OMITTED.

17. SIGNALS SHALL NOT BE LIGHTED EXCEPT FOR APPROACHING TRAINS WHEN RED LIGHTS FLASHING ALTERNATELY (30 TO 45 TIMES PER MINUTE) SHALL BE DISPLAYED.

POWER SUPPLY & NOTES.

SHEET 1 OF 7



THE PENNSYLVANIA RAILROAD
TYPICAL
CIRCUITS FOR AUTOMATIC HIGHWAY
CROSSING SIGNALS AND GATES

OFFICE OF CHIEF ENGINEER,
PHILA., PA., DEC. 30, 1948.

NOT TO SCALE

APPROVED:

Reginald
ASST. CHIEF ENGINEER, T.C.-3.

APPROVED:

Whitcomb
CHIEF ENGINEER

MARCH 7 1962
NOTE 5 (C) MODIFIED.
NOTES 11, 12, 13 & 15
CHANGED. SH. 1 REVISED.

APPROVED: *W. L. C. R.*
W. L. C. R.

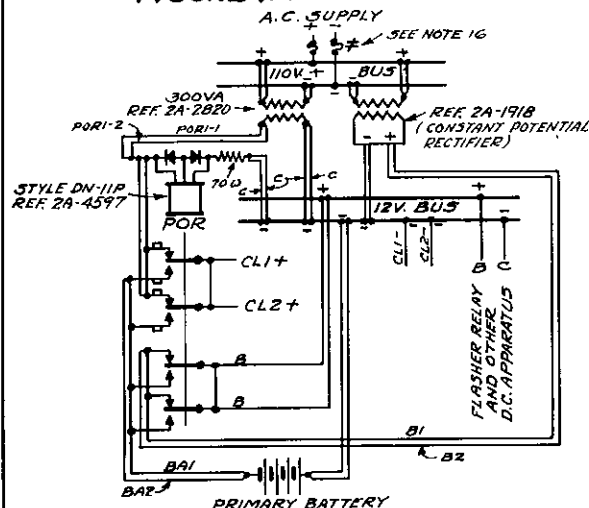
S-860



EACH BATTERY SHALL CONSIST OF TWENTY (20) TYPE HA-1000 CELLS. WHERE FIG. 2A IS USED AND MORE THAN 8 LAMPS ARE PROVIDED TYPE HA-1302 CELLS SHALL BE USED. (SEE NOTE 12)

PRIMARY BATTERY OPERATION WHERE A.C. POWER IS NOT AVAILABLE.

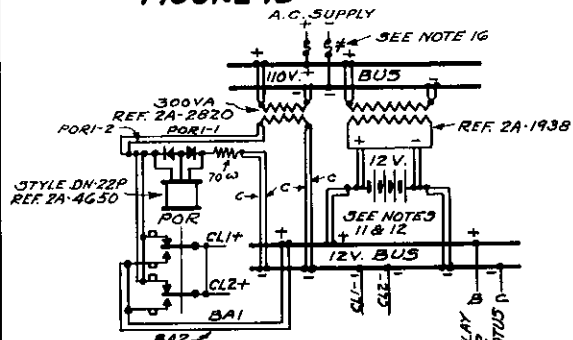
FIGURE 1A



PRIMARY BATTERY SHALL CONSIST OF TWENTY (20) TYPE HA CELLS, WHERE NOT MORE THAN 8 LAMPS ARE PROVIDED USE TYPE HA-1000 CELLS, WHERE MORE THAN 8 LAMPS ARE PROVIDED USE HA-1302 CELLS. (SEE NOTE 12)

FOR USE WHERE A.C. SUPPLY IS AVAILABLE AND PRIMARY BATTERY STANDBY IS PROVIDED.

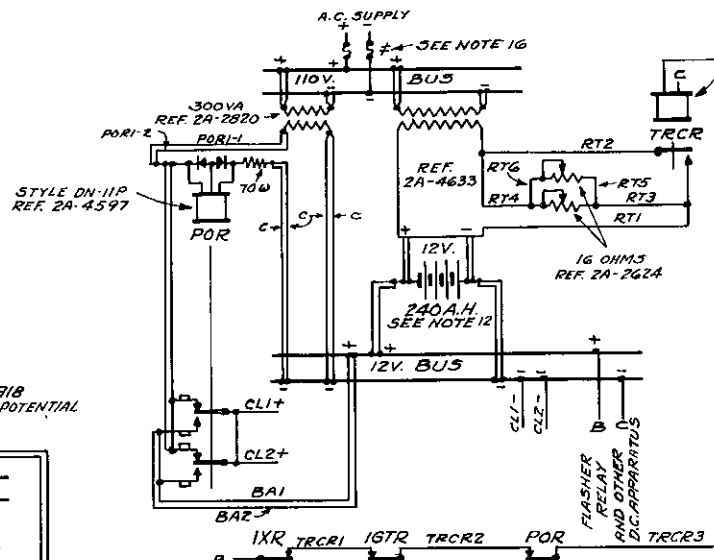
FIGURE 1B



WHERE CONDITIONS WARRANT TWO RATE CHARGE RELAY, AS SHOWN IN FIG. 1D, MAY BE PROVIDED.

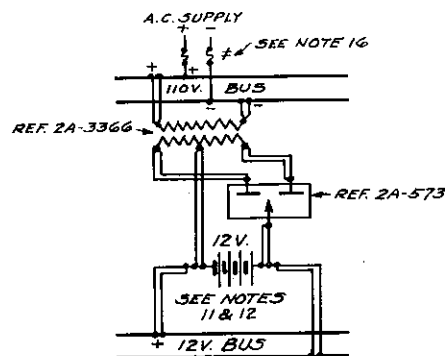
FOR USE WHERE A.C. SUPPLY IS AVAILABLE AND STORAGE BATTERY STANDBY IS PROVIDED.

FIGURE 1C



FOR USE WHERE AUTOMATIC CROSSING GATES ARE PROVIDED. WHERE MORE THAN TWO GATE MECHANISMS ARE REQUIRED ARRANGEMENT SHOWN ABOVE MAY BE PROVIDED FOR CONTROL OF GATE MECHANISMS AND A SEPARATE BATTERY PROVIDED FOR OTHER D.C. APPARATUS AND FLASHING LIGHT SIGNALS.

FIGURE 1D



BATTERY CHARGING ARRANGEMENT WHICH MAY BE USED IN LIEU OF ARRANGEMENT SHOWN FOR CHARGING BATTERIES IN FIGURES 1C & 1D.

FIGURE 1E

REF. 2A-3376 FOR NE FLASHERS. RECTIFIERS ARE FURNISHED AS STANDARD EQUIPMENT WITH FN1G & FN1GA RELAYS.

APPLICATION OF RECTIFIER FOR ELIMINATION OF RADIO INTERFERENCE.

FIGURE 1F

NOTES:-

- FLASHING LIGHT CROSSING SIGNALS SHALL BE INSTALLED IN ACCORDANCE WITH PLAN S-463.
- AUTOMATIC CROSSING GATES SHALL BE INSTALLED IN ACCORDANCE WITH PLAN S-462.
- TRACK CIRCUITS SHOWN ARE TYPICAL. DETAIL ARRANGEMENT OF TRACK CIRCUITS MUST BE MADE FOR EACH INSTALLATION TO SUIT LOCAL CONDITIONS AND REQUIREMENTS.
- A SHORT TRACK CIRCUIT SHALL BE PROVIDED OVER HIGHWAY CROSSINGS TO OPERATE SIGNALS (AND GATES) WHEN TRAIN BLOCKS CROSSING:
 - IN SINGLE TRACK TERRITORY.
 - IN TERRITORY WHERE RULE 261 IS IN EFFECT.
- TO COMPLY WITH STATE OR LOCAL REQUIREMENTS.
- WHERE WARRANTED BY NUMBER OF REVERSE MOVEMENTS WITH TRAIN ORDERS.
- AT OTHER LOCATIONS (EXCEPT WHERE AUTOMATIC GATES ARE INSTALLED) SHORT TRACK CIRCUITS MAY BE OMITTED AND INSULATING RAIL JOINTS SHALL BE LOCATED EAST (OR NORTH) OF CROSSING FOR EASTWARD (OR NORTHWARD) TRACKS AND WEST (OR SOUTH) OF CROSSING FOR WESTWARD (OR SOUTHWARD) TRACKS.

5. (a) THE LOCATION OF INSULATING JOINTS, ESTABLISHING TRACK CIRCUITS FOR INITIATING THE OPERATION OF HIGHWAY CROSSING PROTECTION, SHOULD BE ESTABLISHED, INsofar AS PRACTICABLE, TO PROVIDE A STARTING TIME OF 30 SECONDS BUT NOT TO EXCEED 50 SECONDS.

(b) THE STARTING TIME OF 30 SECONDS SHOULD BE BASED ON A MAXIMUM SPEED AS OUTLINED IN THE FOLLOWING:-

1. WHERE SPEEDS OF 100 MILES PER HOUR MAY BE ATTAINED AND IT IS ANTICIPATED SUCH SPEEDS WILL BE ATTAINED - MAXIMUM SPEED: 100 MILES PER HOUR.

2. WHERE SPEED UNDER (1) IS NOT CONTEMPLATED - MAXIMUM AUTHORIZED SPEED.

(c) IN ESTABLISHING STARTING SECTIONS EXISTING CUT-SECTIONS AND SIGNAL LOCATIONS SHALL BE UTILIZED WHEREVER PRACTICABLE AND, IN ORDER TO TAKE ADVANTAGE OF THESE LOCATIONS, THE MINIMUM STARTING TIME OF 30 SECONDS MAY BE REDUCED TO NOT EXCEEDING 10%.

1. WHERE THE DISTANCE FROM THE MOST REMOTE CROSSING SIGNAL TO CLEARANCE OF THE FARTHEST TRACK, AS MEASURED PARALLEL TO THE CENTER LINE OF THE HIGHWAY, IS MORE THAN 35 FEET THE MINIMUM TIME SHALL BE INCREASED BY ONE SECOND FOR EACH ADDITIONAL 5 FEET.

(d) WHERE TRACK CIRCUIT LOCATIONS ARE ESTABLISHED OR WHERE EXISTING TRACK CIRCUIT LOCATIONS ARE UTILIZED FOR OBTAINING A STARTING TIME FOR CONTEMPLATED INCREASE OF MAXIMUM AUTHORIZED SPEEDS, STARTING TIME FOR THE MAXIMUM AUTHORIZED SPEED IN EFFECT IS TO BE OBTAINED BY THE USE OF APPROVED RETARDING DEVICE OR DEVICES.

(e) ANY EXCEPTION, TO THE ABOVE, AS MAY BE REQUIRED TO MEET STATE OR LOCAL AUTHORITIES, SHOULD BE AGREED TO ONLY AFTER FULL DELIBERATION AND COMPLETE RECORD OF NEGOTIATIONS SHOULD BE KEPT IN FILE INDICATING REASONS FOR NOT

ACCEPTING STANDARDS PRESCRIBED.

6. WHERE SHORT TRACK CIRCUIT IS PROVIDED OVER EXISTING INSULATING RAIL JOINTS SHALL BE LOCATED PREVIOUS TO FEET EACH SIDE OF CROSSING BUT NOT IN EXCESS OF 100 FEET. WHERE DUE TO LOCAL CONDITIONS, INSULATING JOINTS SHOULD BE LOCATED A GREATER DISTANCE, APPROVAL OF THE CHIEF ENGINEER SHOULD BE OBTAINED.

7. INSULATING RAIL JOINTS SHALL BE PLACED IN ACCORDANCE WITH CURRENT ISSUE OF C.E. 78.

8. CIRCUITS FOR OPERATION OF AUTOMATIC CROSSING GATES SHALL BE SO ARRANGED THAT GATES WILL START TO ASSUME HORIZONTAL POSITION BETWEEN 3 AND 5 SECONDS AFTER FLASHING LIGHT SIGNALS START TO OPERATE.

9. EACH SIGNAL SHALL BE PROVIDED WITH TWO RETURN WIRES, WIRES BETWEEN INSTRUMENT CASE AND SIGNALS SHALL BE NO. 9 A.W.G.

10. WHERE LINE WIRES ARE REQUIRED FOR CONTROL OF CROSSING SIGNALS, TWO WIRE DOUBLE BREAK CIRCUITS SHALL BE PROVIDED.

11. TYPE AND CAPACITY OF STORAGE BATTERIES SHALL BE IN ACCORDANCE WITH LETTER OF GENERAL PRACTICE NO. 220-C.

12. BATTERIES SHALL BE HOUSED, IN INSULATED BATTERY BOXES, IN CONCRETE BOXES BELOW GROUND OR IN HEATED BUILDINGS.

13. RECOMMENDED VOLTAGE AT LAMPS APPROXIMATELY 12.0V, MINIMUM 11.5V, MAXIMUM 13.0V AND CIRCUITS ADJUSTED TO GIVE THE SAME VOLTAGE FOR LAMPS ON EACH SIGNAL.

14. TEST SWITCHES SHALL BE PROVIDED WHERE DESIGNATED EMPLOYEES ARE AUTHORIZED TO TEST CROSSING SIGNALS AND SHALL BE ACCESSIBLE TO ONLY SUCH EMPLOYEES. SWITCHES SHALL NOT BE LOCATED IN INSTRUMENT CASES AND MUST BE INSTALLED SO THAT SWITCH IS CLOSED WHEN DOOR OF HOUSING IS CLOSED.

15. A POWER-OFF INDICATION LAMP SHALL BE LOCATED ON INSTRUMENT CASE AT HIGHWAY CROSSING LOCATIONS, WHERE A.C. POWER IS AVAILABLE USE LAMP 4837, REF. 25F-4322, WHERE FIG. 1A IS PROVIDED USE LAMP 4832, REF. 25F-4211, WITH ADAPTOR, OMITTING 200 OHM RESISTOR. LAMPS SHALL BE PLACED IN U.S. & S. CO. HP-10 PILOT-LIGHT, PLATE K-137, REF. A, OMITTING LENS SHIELD FIG. 3 AND TO BE EQUIPPED WITH WHITE LENS.

16. OVERLOAD CIRCUIT BREAKERS OF APPROVED TYPE MAY BE USED IN PLACE OF FUSES MARKED #. IF COMMERCIAL CO'S. FUSES ARE PROVIDED WHERE CONNECTION IS MADE, FUSES MARKED # SHALL BE OMITTED.

17. SIGNALS SHALL NOT BE LIGHTED EXCEPT FOR APPROACHING TRAINS WHEN RED LIGHTS FLASHING ALTERNATELY (30 TO 45 TIMES PER MINUTE) SHALL BE DISPLAYED.

POWER SUPPLY & NOTES.

SHEET 1 OF 7



S-860

THE PENNSYLVANIA RAILROAD TYPICAL CIRCUITS FOR AUTOMATIC HIGHWAY CROSSING SIGNALS AND GATES

OFFICE OF CHIEF ENGINEER,
PHILA., PA., DEC. 30, 1948.

NOT TO SCALE

APPROVED:

W. H. Griffith
ASST. CHIEF ENGINEER, T.-C.-S.

APPROVED:

W. H. Griffith
CHIEF ENGINEER

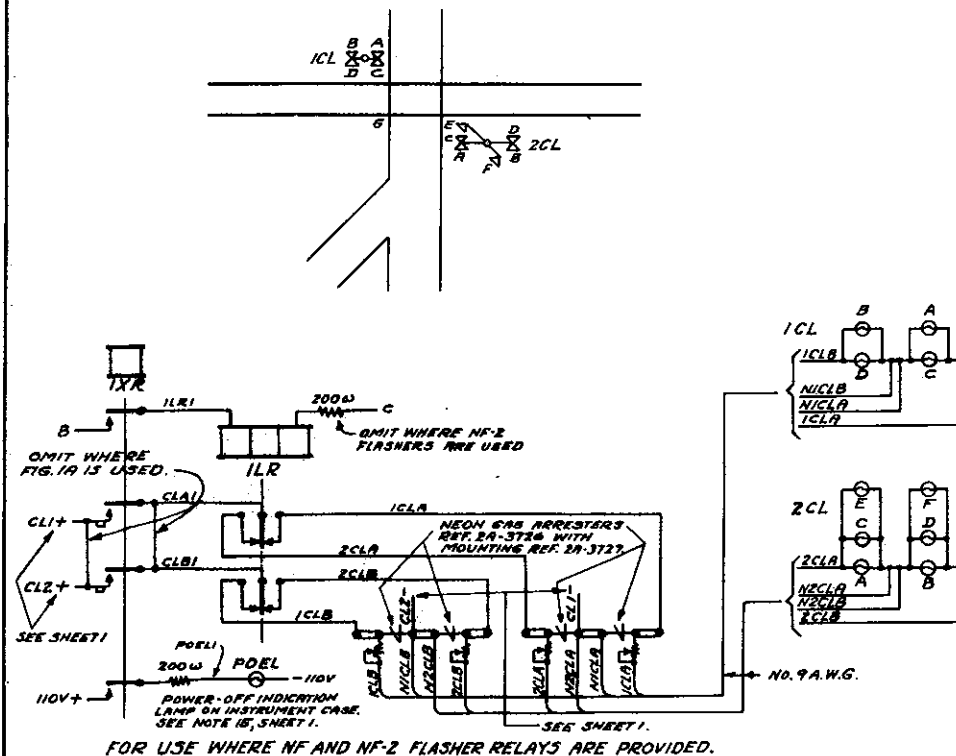


FIGURE 2A

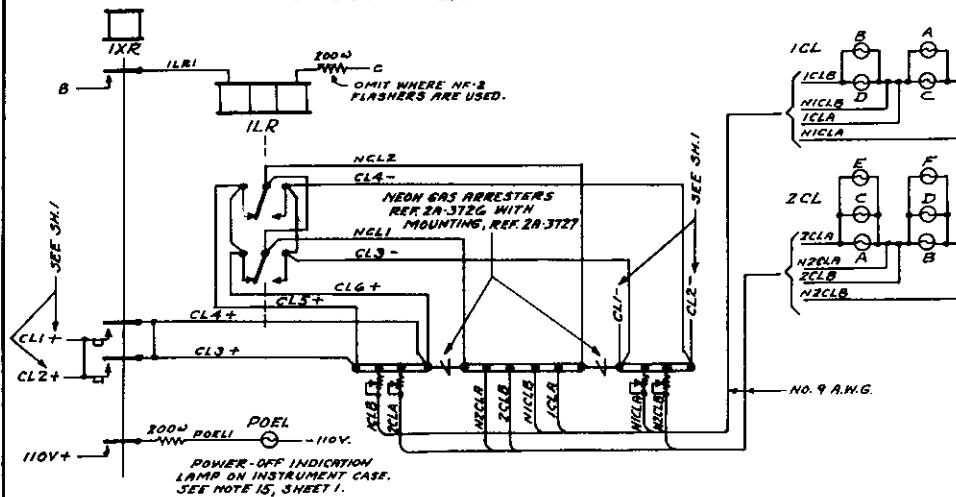


FIGURE 2B

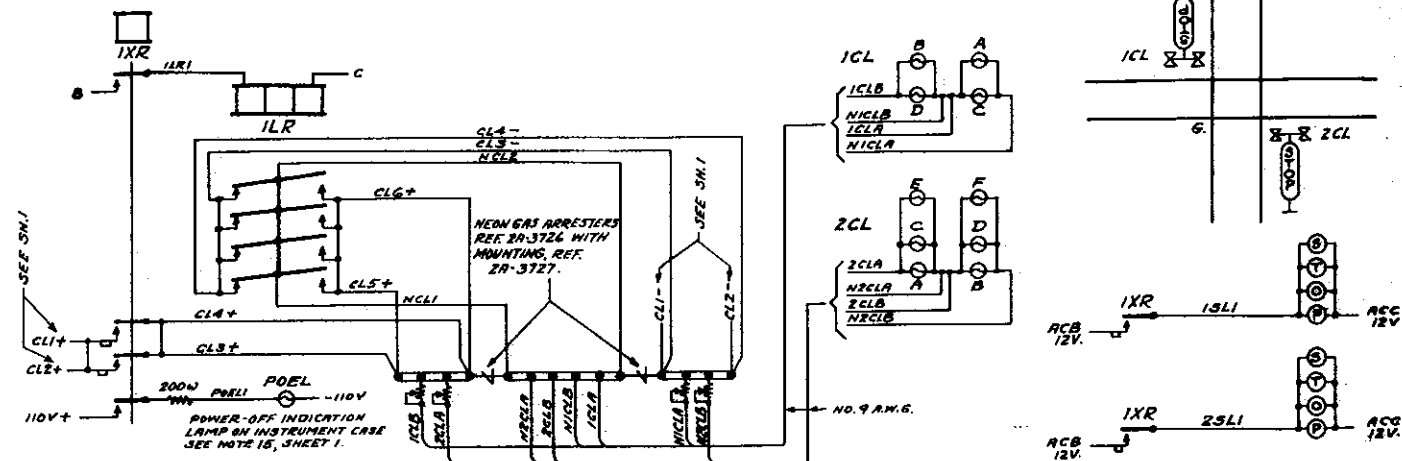


FIGURE 2C

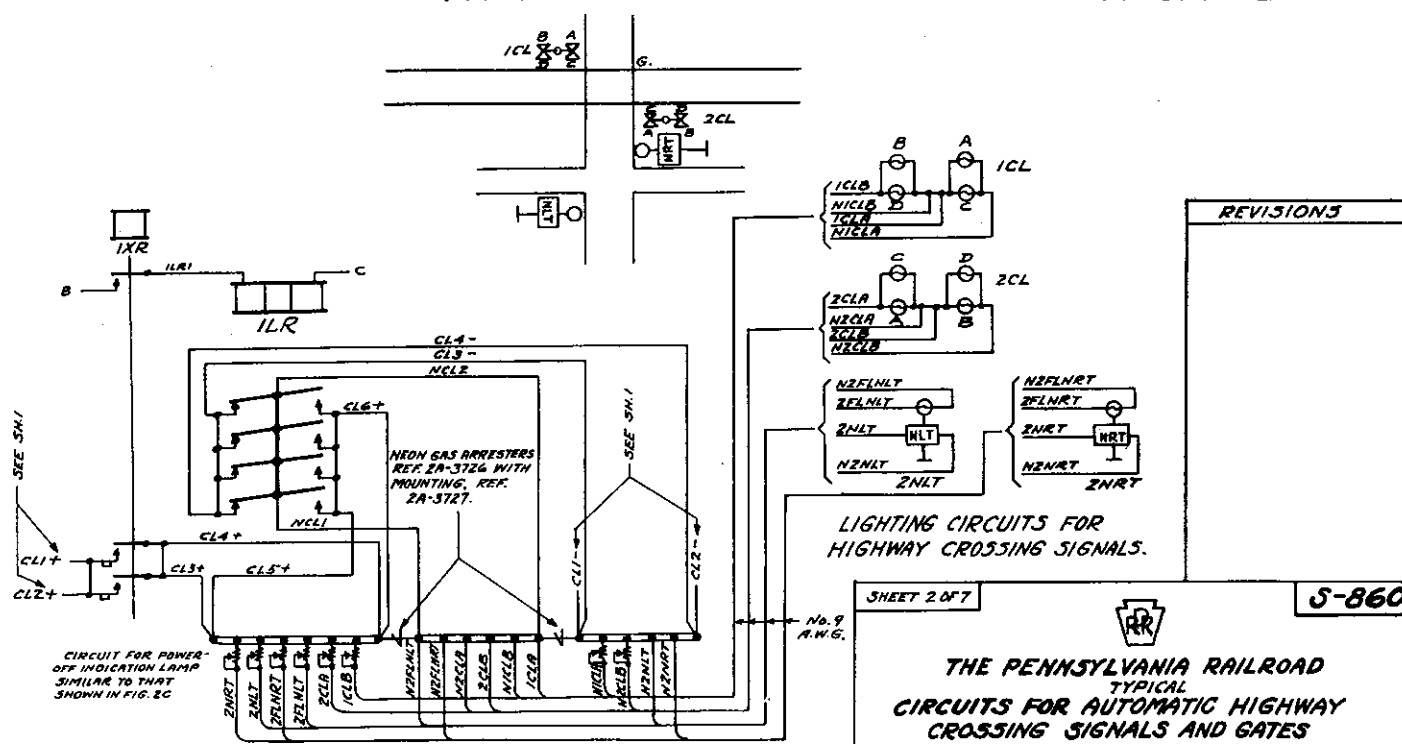


FIGURE 2D

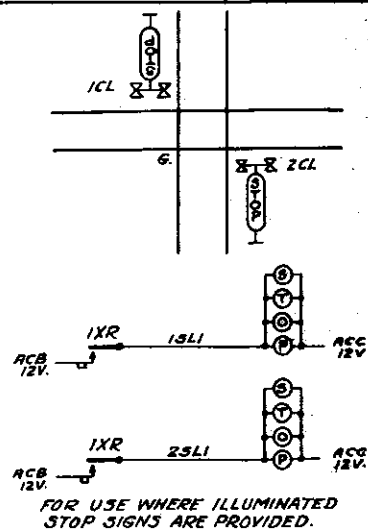


FIGURE 2E

LIGHTING CIRCUITS FOR HIGHWAY CROSSING SIGNALS.

SHEET 2 OF 7

S-860

THE PENNSYLVANIA RAILROAD
TYPICAL
CIRCUITS FOR AUTOMATIC HIGHWAY
CROSSING SIGNALS AND GATES

OFFICE OF CHIEF ENGINEER,
PHILA., PA., DEC. 30, 1948.

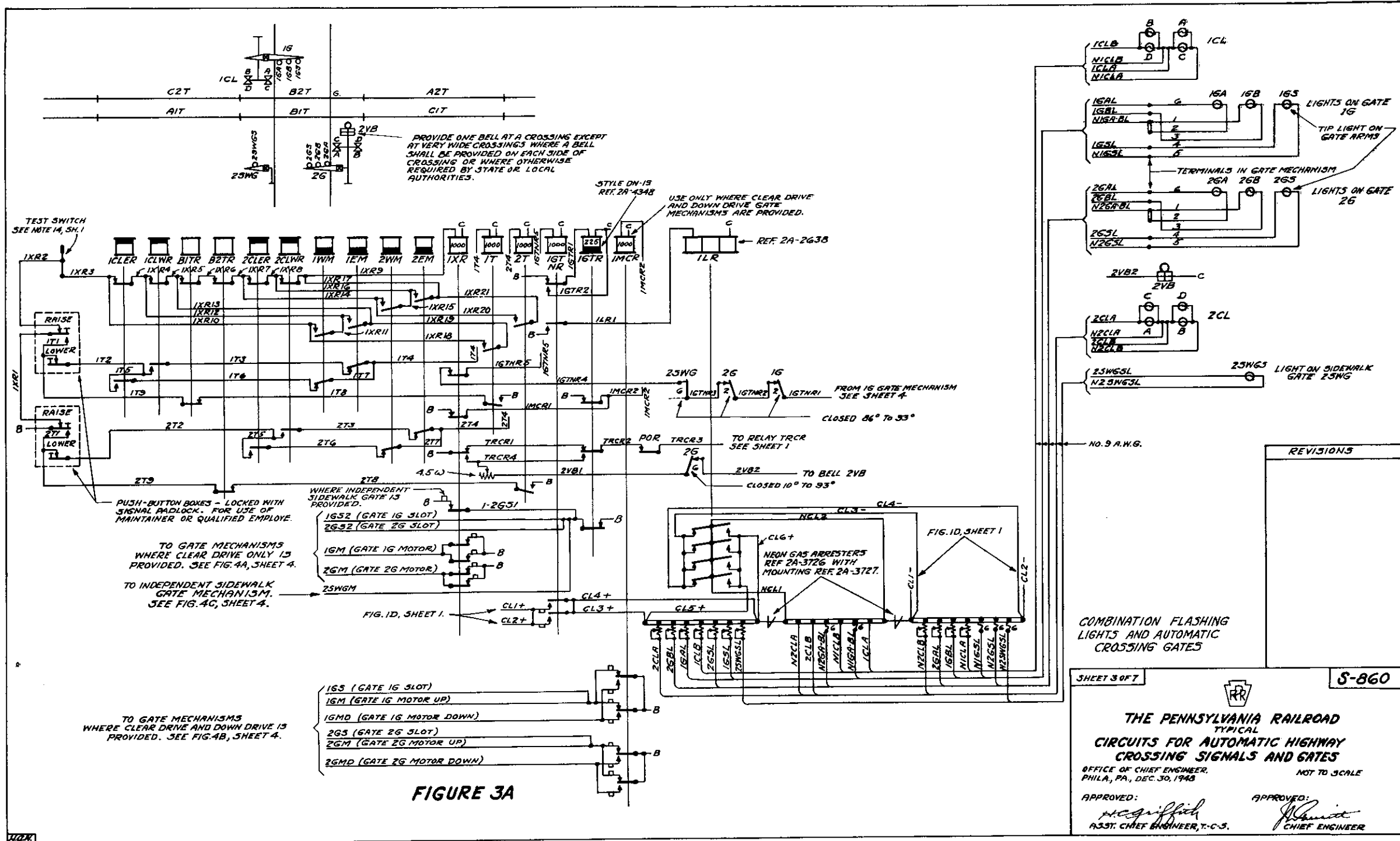
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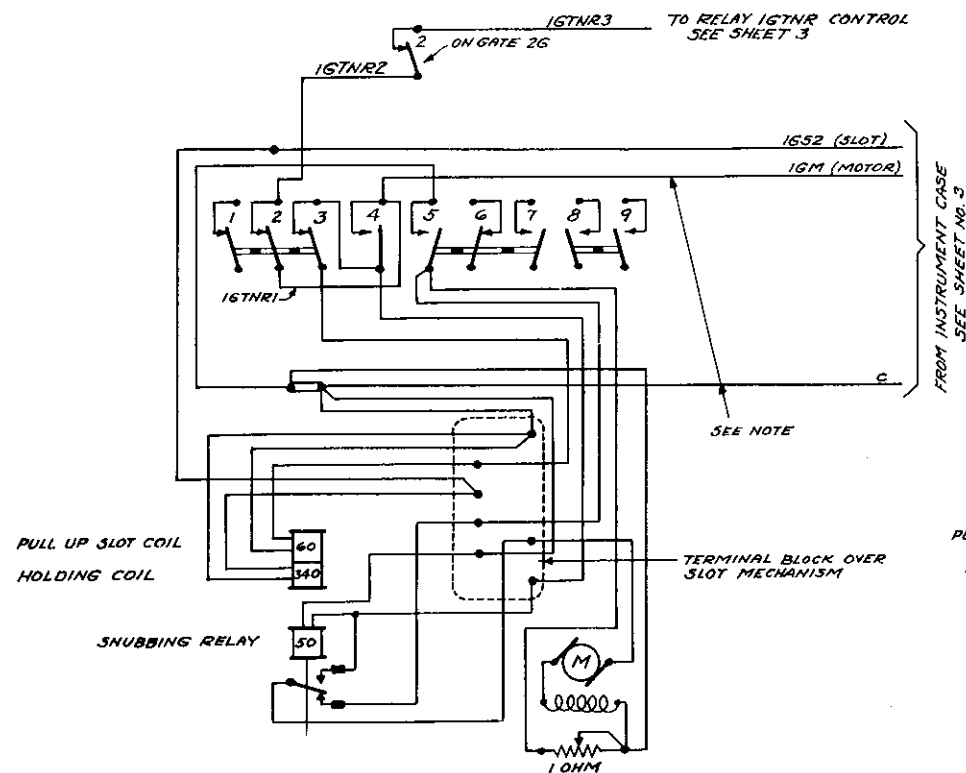
APPROVED:

A. C. Griffith
ASST. CHIEF ENGINEER, T.C.-S.

APPROVED:

J. H. Bennett
CHIEF ENGINEER

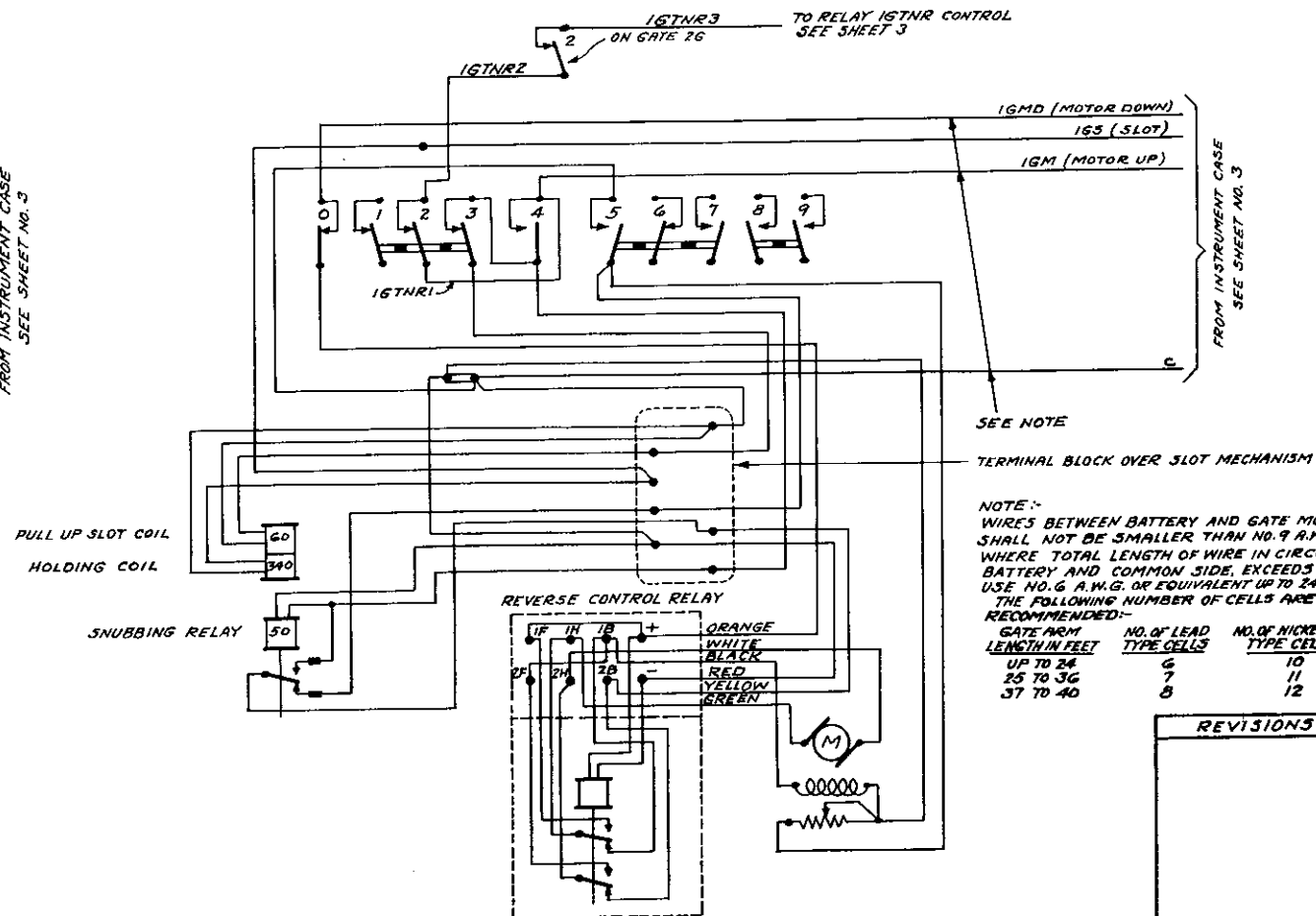




WIRING FOR GATE MECHANISM 3564
CLEAR DRIVE ONLY

FIGURE 4A

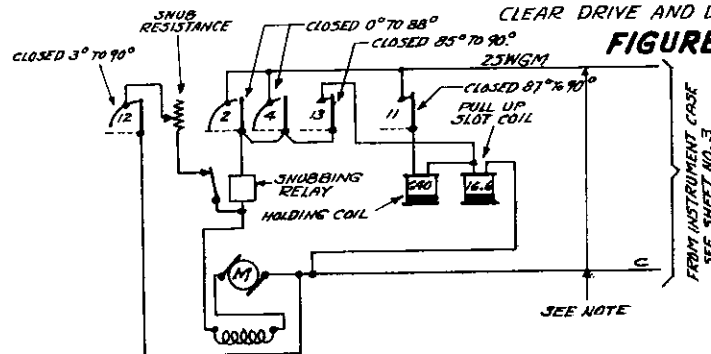
CIRCUIT CONTROLLER FUNCTIONS - FIGURES 4A & 4B		
SPACE NUMBER	USE OF CONTROLLER	CONTACT OPERATION
0	TO OPEN MOTOR CIRCUIT DOWN (FIG. 4B)	46° TO 93° OPEN
1	SPARE	86° TO 93° CLOSED
2	TO CONTROL OF RELAY GTNR	84° TO 93° CLOSED
3	TO PULL UP SLOT MAGNET	86° TO 93° CLOSED
4	TO CUT OFF MOTOR AFTER GATE HAS CLEARED	0° TO 89° UP 83° TO 0° DOWN CLOSED
5	TO CLOSE HEAVY SNUB CIRCUIT AS GATE ARM APPROACHES HORIZONTAL	0° TO 10° CLOSED
6	TO OPEN BELL CIRCUIT WHEN GATE IS HORIZONTAL	10° TO 93° OPEN
7	SPARE	0° TO 10° CLOSED
8	SPARE	0° TO 89° OPEN
9	SPARE	0° TO 89° OPEN



WIRING FOR GATE MECHANISM 3564
CLEAR DRIVE AND DOWN DRIVE

FIGURE 4B

WIRING FOR TYPE 3564
GATE MECHANISMS
AND
TYPE 3561-216L INDEPENDENT
SIDEWALK GATE MECHANISMS



WIRING FOR INDEPENDENT SIDEWALK GATE MECHANISM 3561-216L
CLEAR DRIVE ONLY.

FIGURE 4C

REVISIONS

SHEET 4 OF 7

S-860

THE PENNSYLVANIA RAILROAD
TYPICAL
CIRCUITS FOR AUTOMATIC HIGHWAY
CROSSING SIGNALS AND GATES

OFFICE OF CHIEF ENGINEER,
PHILA., PA., DEC. 30, 1948

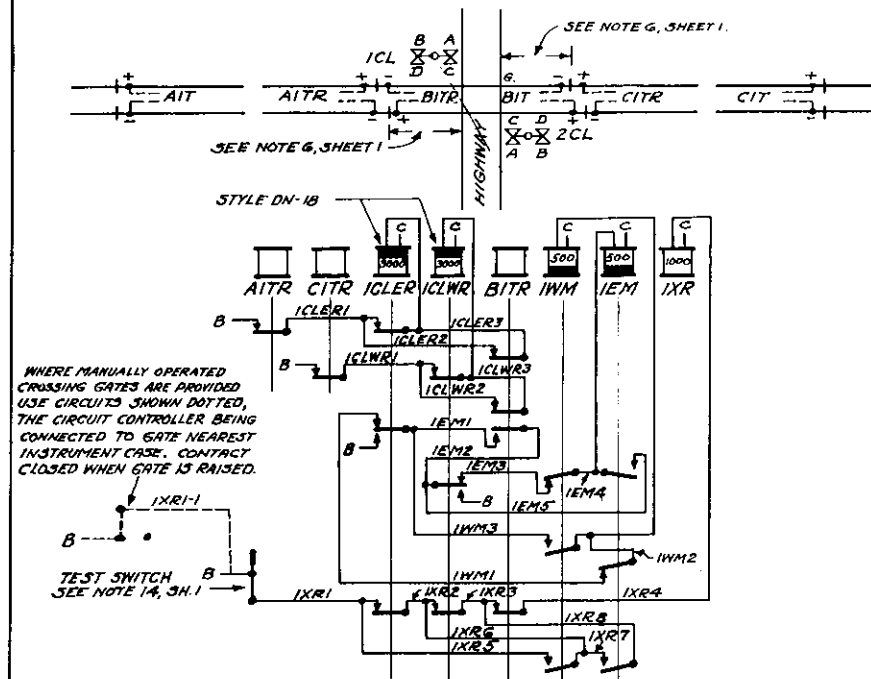
NOT TO SCALE

APPROVED:

H. C. Griffith
ASST. CHIEF ENGINEER, T-C.S.

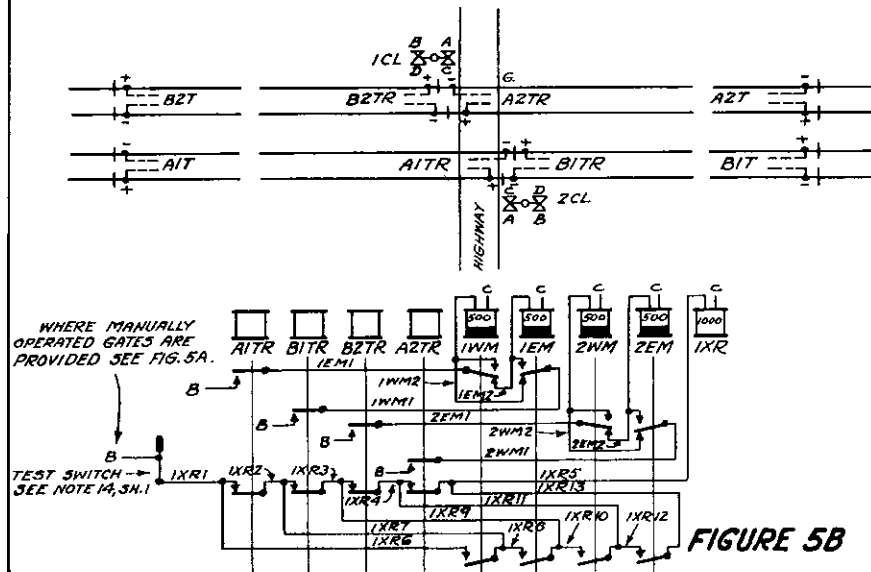
APPROVED:

J. H. ...
CHIEF ENGINEER



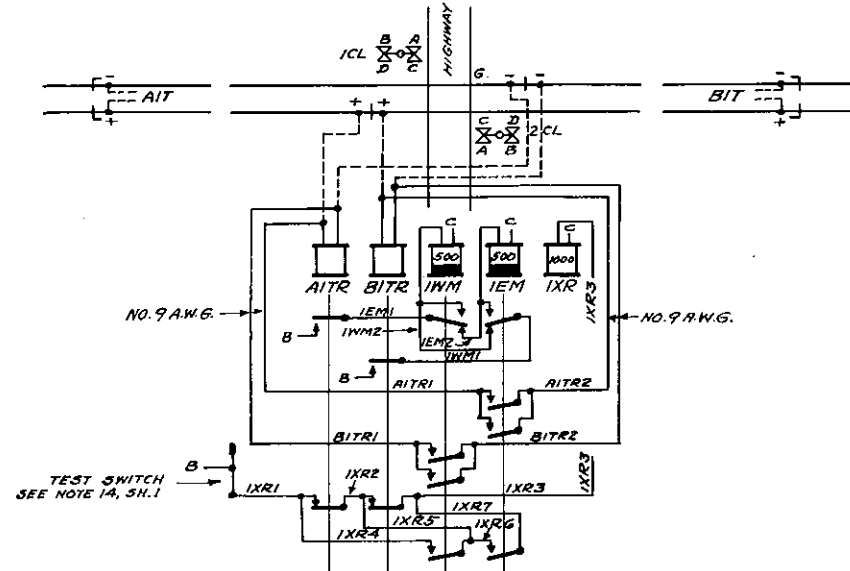
DIRECTIONAL CONTROL WHERE SHORT TRACK SECTION OVER CROSSING IS PROVIDED
SEE NOTE 4, SHEET 1

FIGURE 5A



DIRECTIONAL CONTROL WHERE NO SHORT TRACK SECTION OVER CROSSING IS PROVIDED.
SEE NOTE 4E, SHEET 1.

FIGURE 5B



MAY BE USED IN STEAM TERRITORY WHERE FIXED SIGNALS ARE NOT CONTROLLED OVER TRACK SECTIONS AIT & BIT.

FIGURE 5C

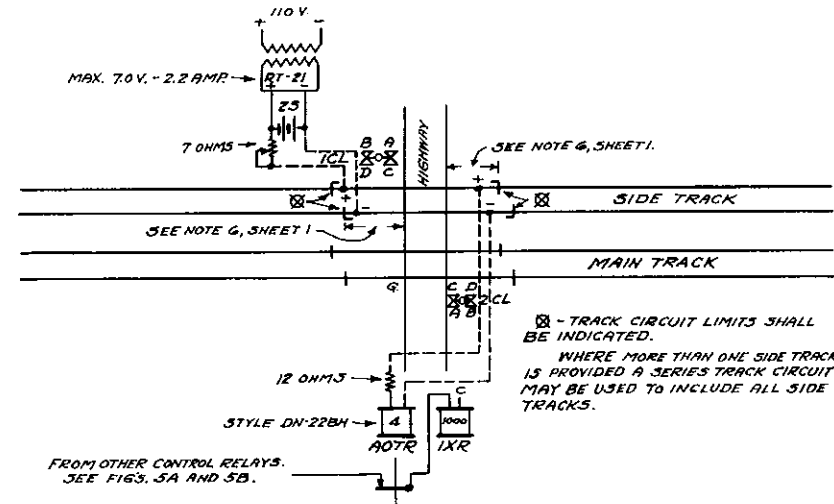


FIGURE 5D

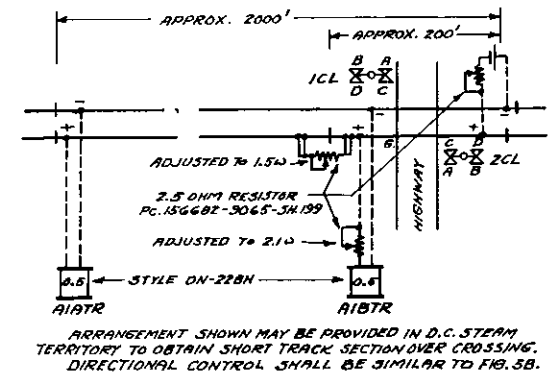


FIGURE 5E

REVISIONS

DIRECTIONAL CONTROLS AND SPECIAL TRACK CIRCUITS

SHEET 5 OF 7

S-860

THE PENNSYLVANIA RAILROAD
TYPICAL
CIRCUITS FOR AUTOMATIC HIGHWAY
CROSSING SIGNALS AND GATES

OFFICE OF CHIEF ENGINEER.
PHILA., PA., DEC. 30, 1948.

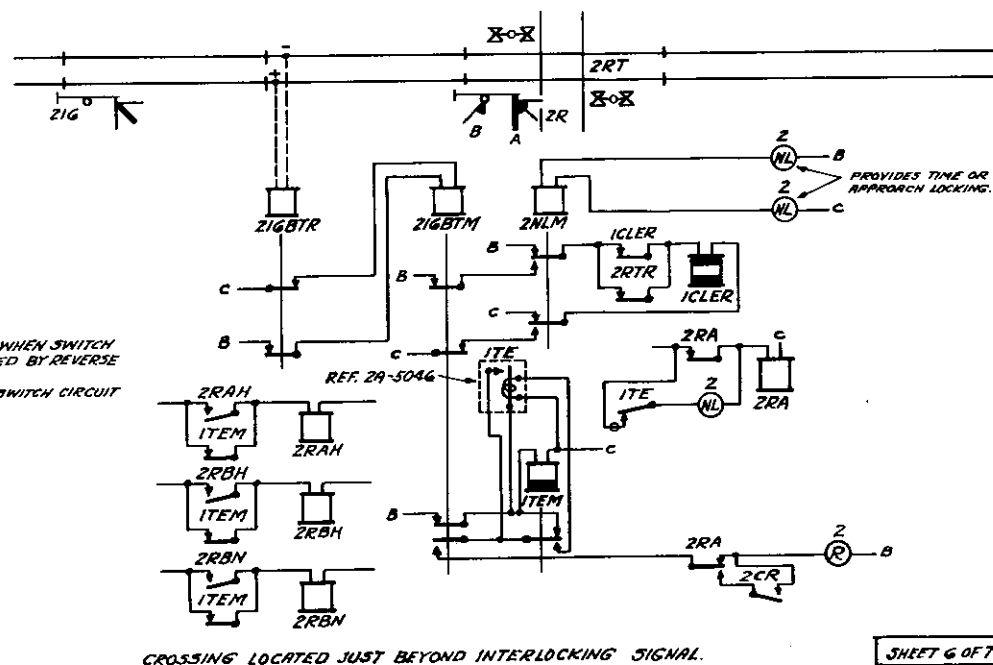
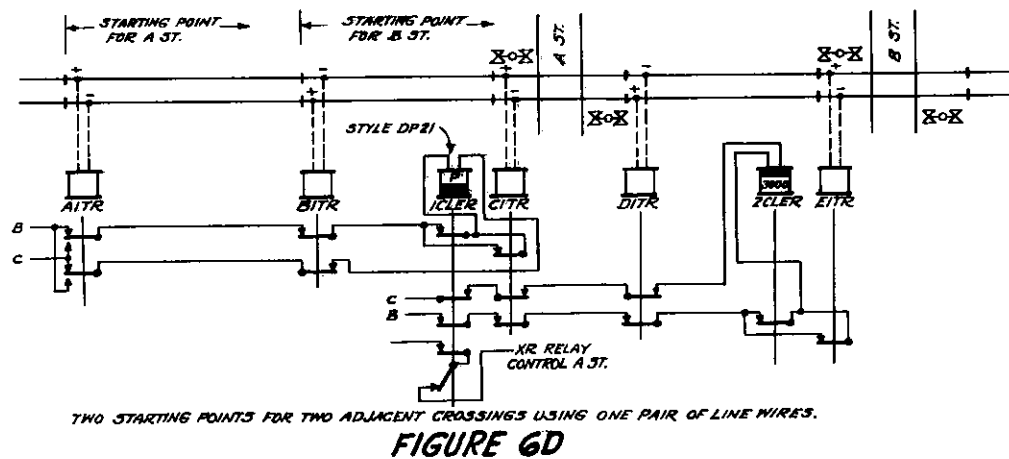
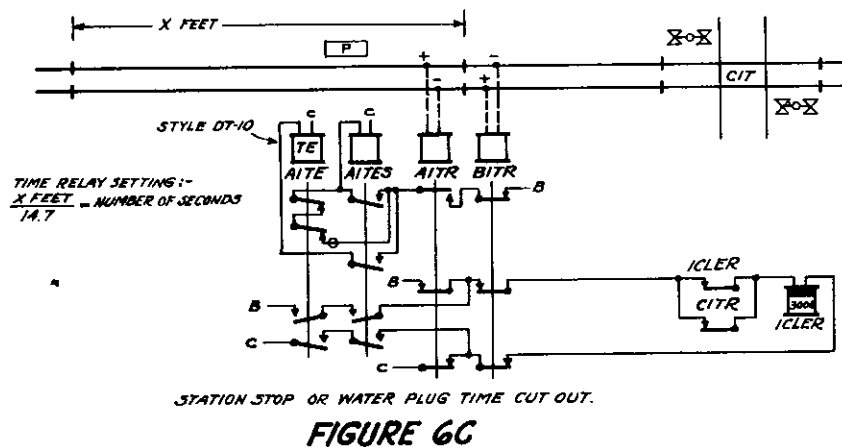
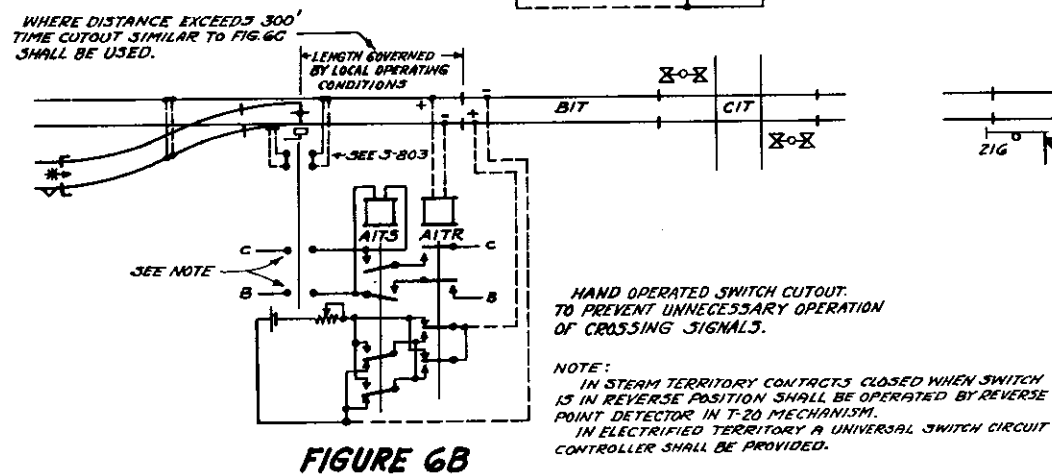
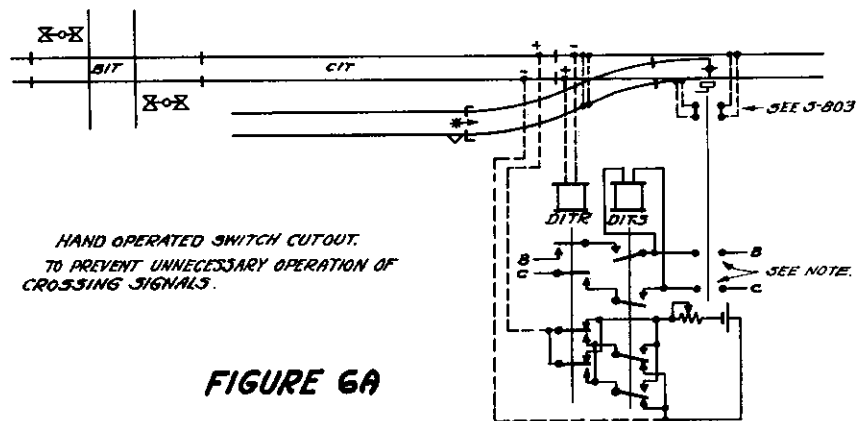
NOT TO SCALE

APPROVED:

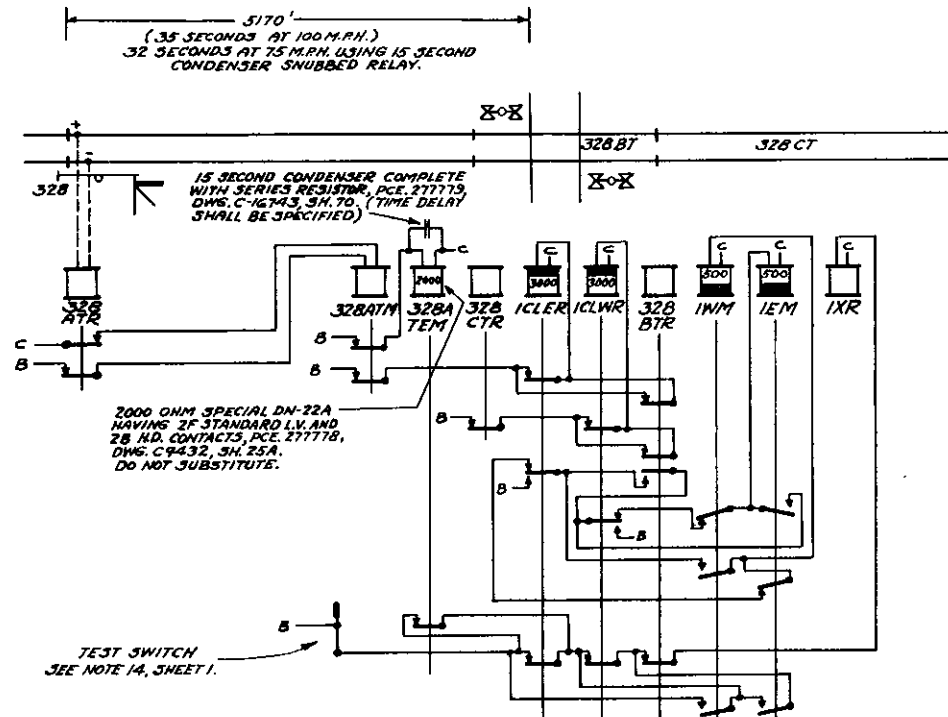
McGuffey
ASST. CHIEF ENGINEER, T. C. S.

APPROVED:

Whitcomb
CHIEF ENGINEER



REVISIONS



TIME DELAY CIRCUIT TO PERMIT USE OF EXISTING SIGNAL LOCATIONS OR CUT-SECTIONS FOR STARTING POINTS.

FIGURE 7A

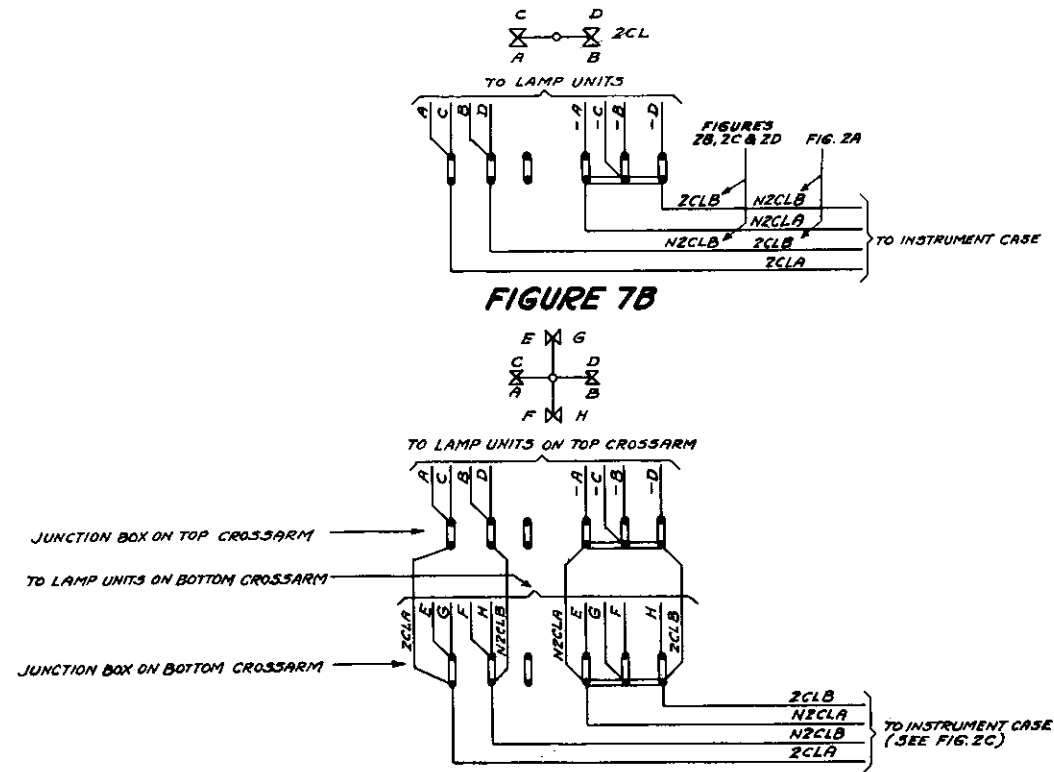


FIGURE 7B

FIGURE 7C

WIRING OF TERMINALS IN JUNCTION BOX ON CROSSARMS

TIME DELAY CIRCUIT
AND
JUNCTION BOX WIRING

SHEET 7 OF 7

S-860



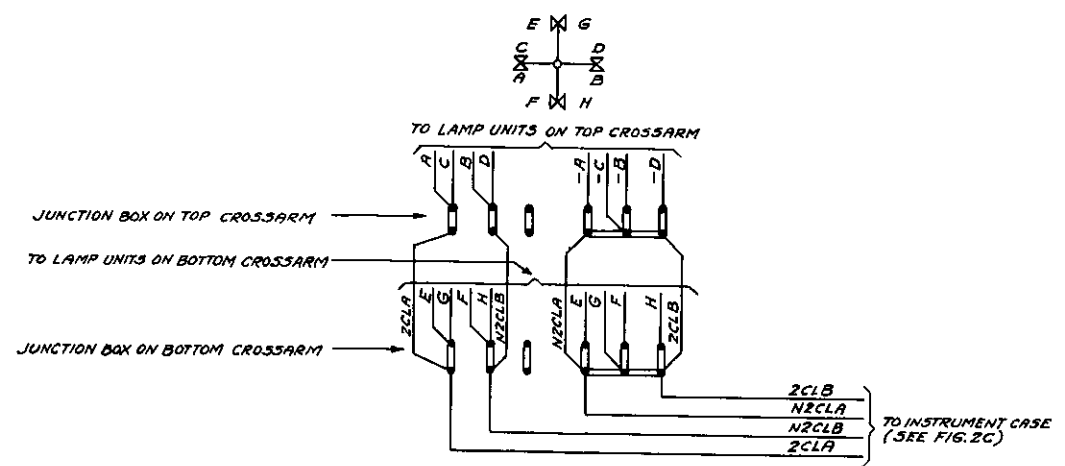
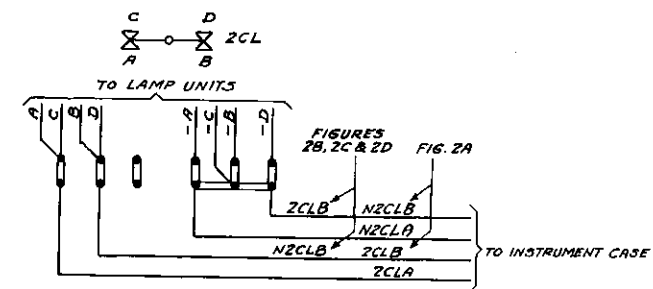
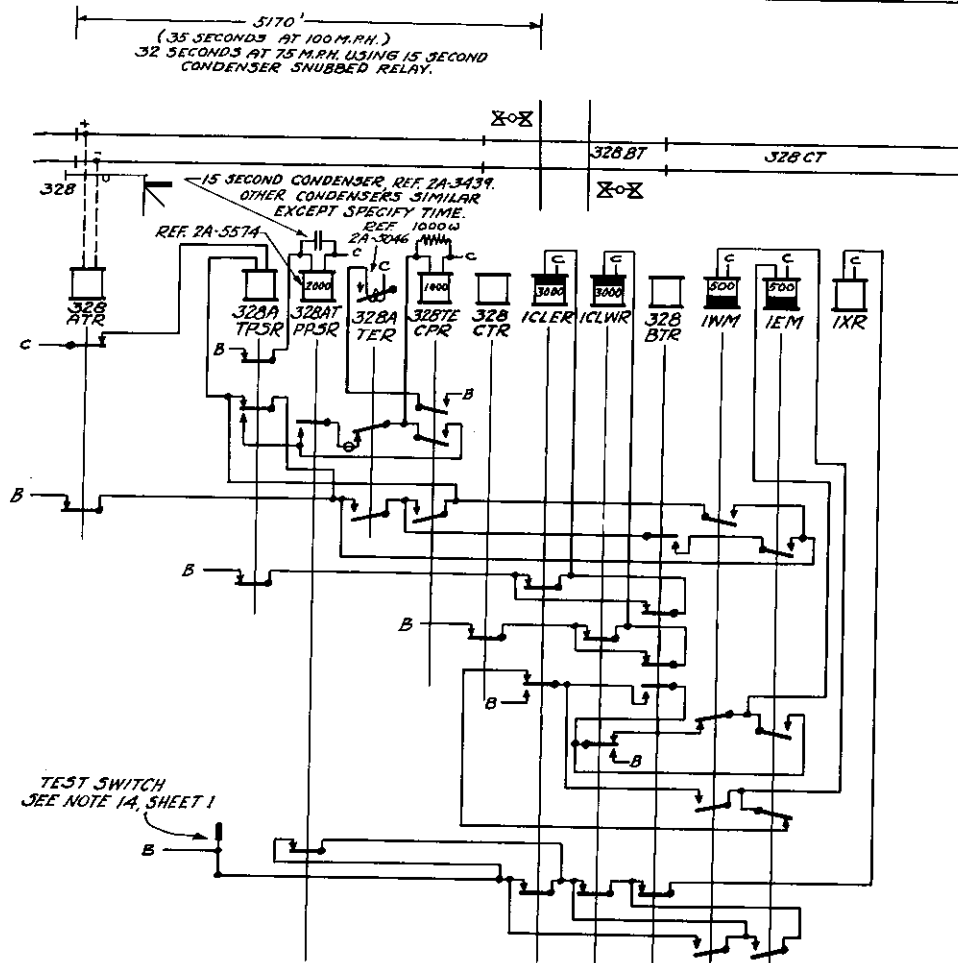
THE PENNSYLVANIA RAILROAD
TYPICAL
CIRCUITS FOR AUTOMATIC HIGHWAY
CROSSING SIGNALS AND GATES
OFFICE OF CHIEF ENGINEER,
PHILA., PA. DEC. 30, 1948
NOT TO SCALE

APPROVED:

W. Griffith
ASST. CHIEF ENGINEER, T.-C.-S.

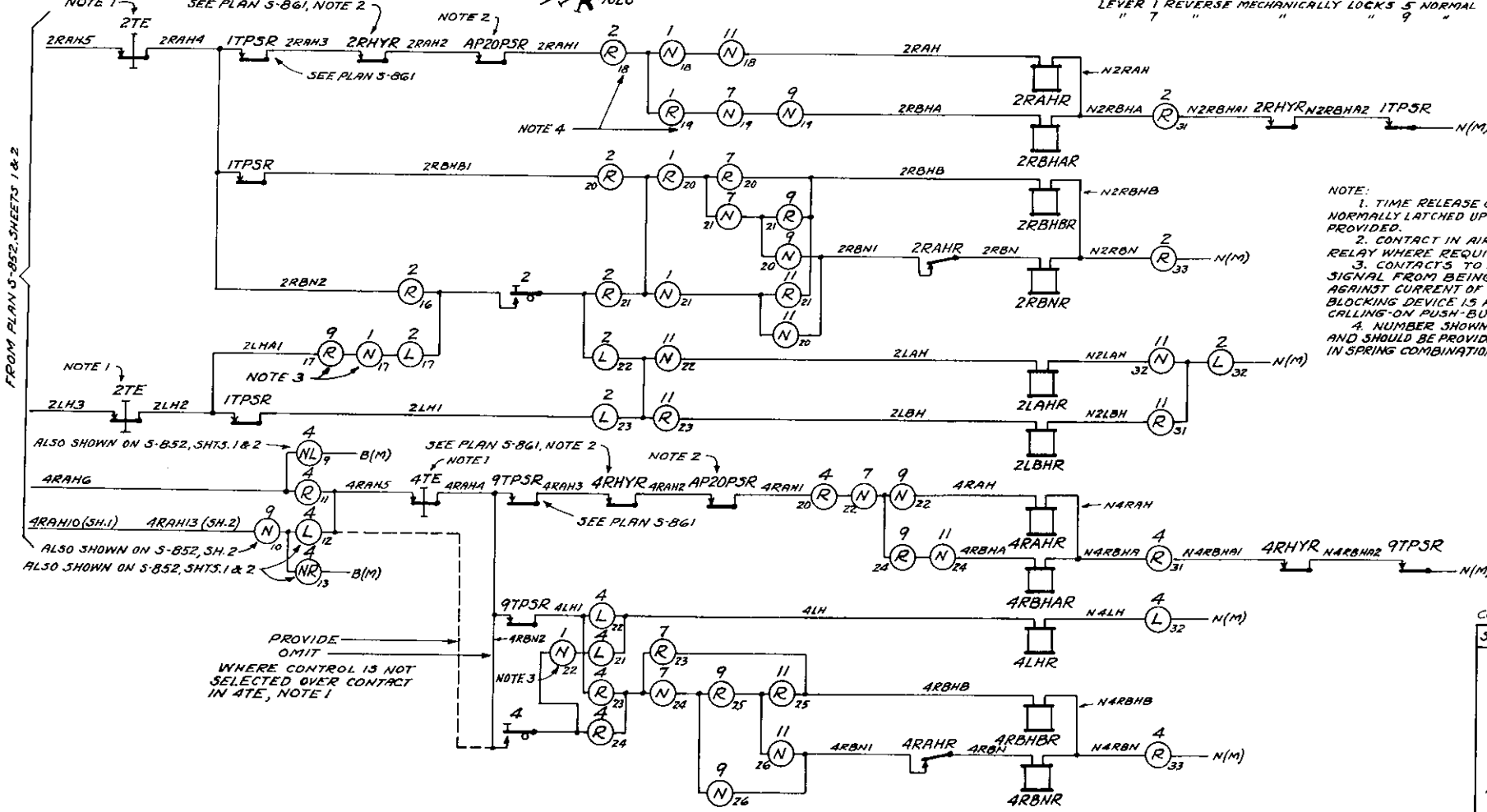
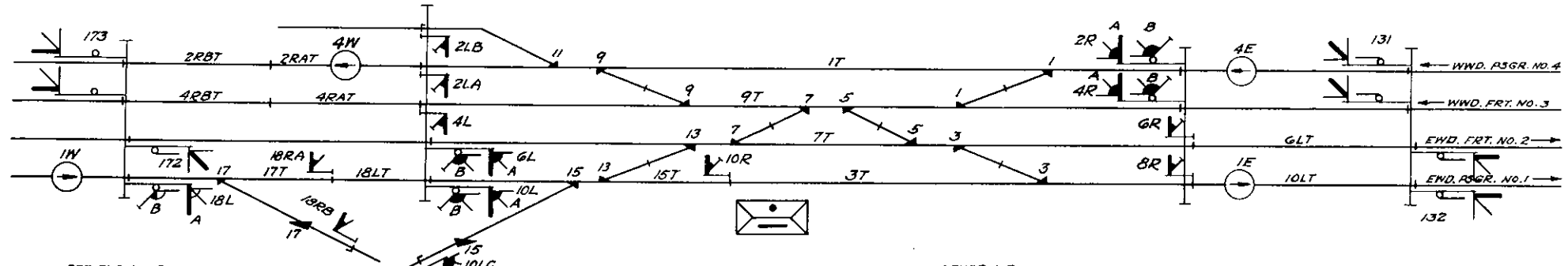
APPROVED:

W. Griffith
CHIEF ENGINEER



REVISIONS
JULY 14, 1952. FIG. 7A - 32BTRAR AND 32BTRCR ADDED AND CIRCUIT FOR 32BTRAR MODIFIED TO PREVENT CHARGING CONDENSER ON A MOMENTARY LOSS OF SHUNT. APPROVED: <i>H. G. Salmonson</i> 32BTR

TIME DELAY CIRCUIT AND JUNCTION BOX WIRING



- NOTE:
1. TIME RELEASE CONTACT SHALL BE USED WHERE NORMALLY LATCHED UP CLOCKWORK TIME RELEASES ARE PROVIDED.
 2. CONTACT IN AIR PRESSURE REPEATING STICK RELAY WHERE REQUIRED. SEE SHEET NO. 3.
 3. CONTACTS TO BE PROVIDED TO PREVENT SIGNAL FROM BEING DISPLAYED FOR MOVEMENT AGAINST CURRENT OF TRAFFIC WHERE PANEL TYPE BLOCKING DEVICE IS PROVIDED BY OPERATION OF CALLING-ON PUSH-BUTTON.
 4. NUMBER SHOWN BELOW LEVER CONTACT IS TYPICAL AND SHOULD BE PROVIDED TO INDICATE GROOVE NUMBER IN SPRING COMBINATION IN WHICH CONTACT IS LOCATED.

REVISIONS

INTERLOCKING MACHINE WITH MECHANICAL LOCKING

"H" CONTROLS
CONTINUED ON SHEETS 2 AND 3

SHEET 1 OF 9

S-862

THE PENNSYLVANIA RAILROAD
TYPICAL

**CONTROL CIRCUITS FOR
INTERLOCKING SIGNALS**

OFFICE OF CHIEF ENGINEER,
PHILA., PA. FEBRUARY 25, 1953.

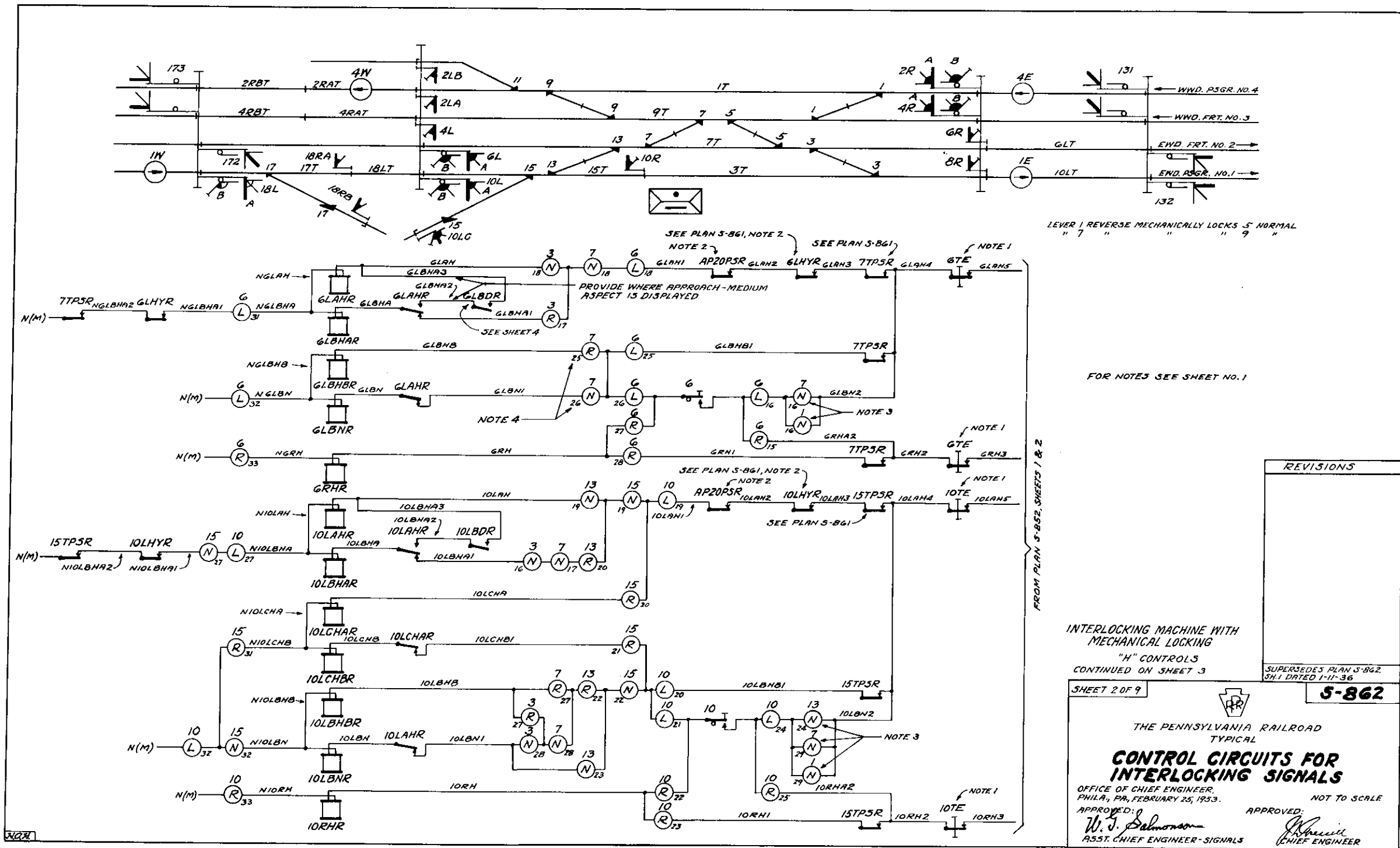
APPROVED: *W. G. Salmonson*
ASST. CHIEF ENGINEER-SIGNALS

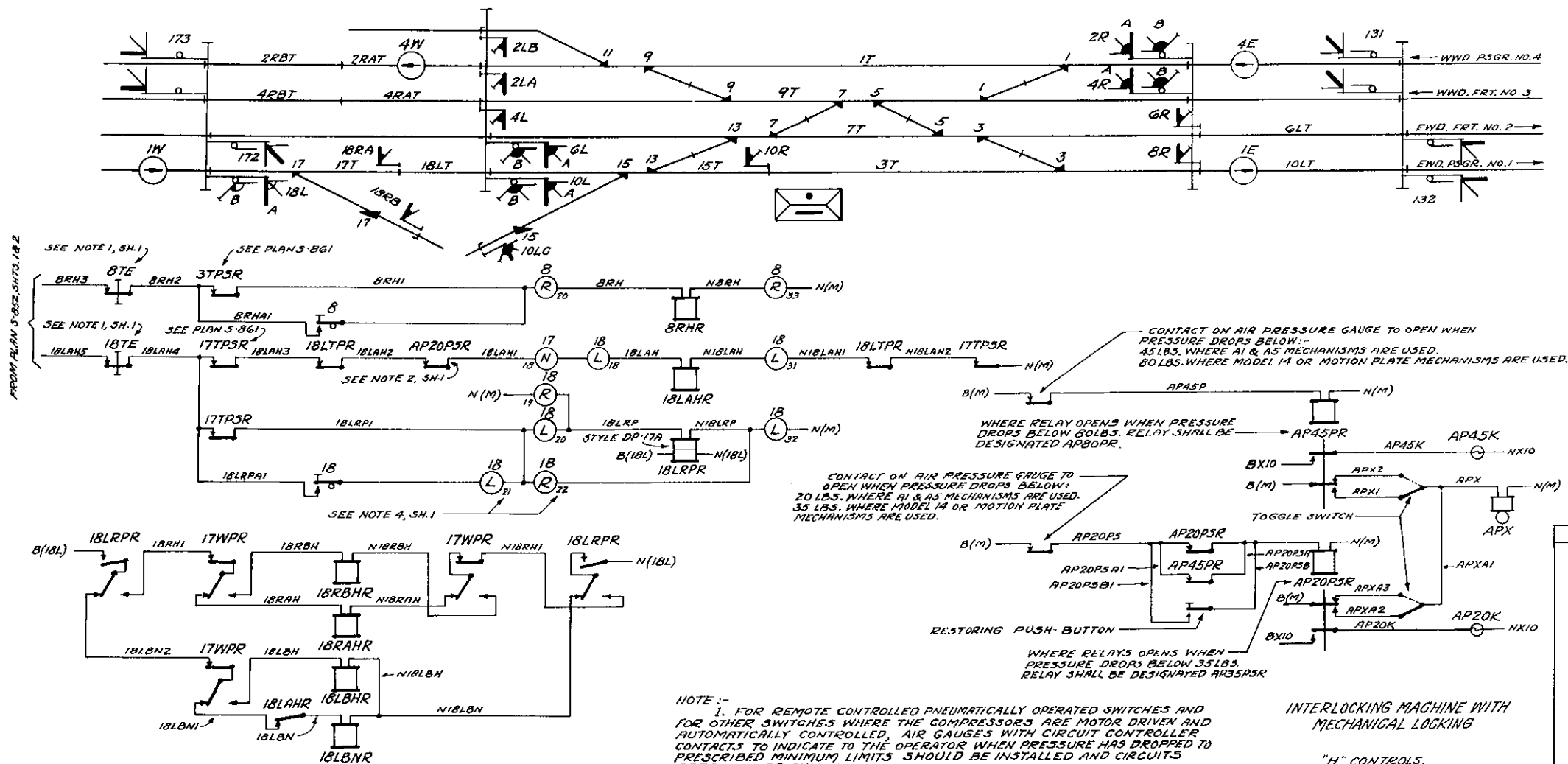
NOT TO SCALE

APPROVED: *[Signature]*
CHIEF ENGINEER

FROM PLAN S-852, SHEETS 1 & 2

W.G.S.





NOTE:-

1. FOR REMOTE CONTROLLED PNEUMATICALLY OPERATED SWITCHES AND FOR OTHER SWITCHES WHERE THE COMPRESSORS ARE MOTOR DRIVEN AND AUTOMATICALLY CONTROLLED, AIR GAUGES WITH CIRCUIT CONTROLLER CONTACTS TO INDICATE TO THE OPERATOR WHEN PRESSURE HAS DROPPED TO PRESCRIBED MINIMUM LIMITS SHOULD BE INSTALLED AND CIRCUITS ARRANGED AS SHOWN.
2. CONTROL CIRCUITS FOR SIGNALS SHALL BE ARRANGED SO THAT ASPECTS MORE FAVORABLE THAN RESTRICTING CAN NOT BE DISPLAYED WHEN LOW AIR PRESSURE (AP20PSR) RELAY OPENS.
3. FOR REMOTE CONTROL LOCATIONS, RELAY AP45PR, INDICATION BELL AND LIGHT SHALL BE INSTALLED IN CONTROL LOCATION.
4. AT INTERLOCKINGS WHERE A GROUP OF SWITCHES ARE SUPPLIED FROM ONE SET OF COMPRESSORS AND ANOTHER GROUP FROM A SECOND SET OF COMPRESSORS, SIGNALS SHALL BE CONTROLLED OVER LOW AIR PRESSURE (AP20PSR) RELAY FOR GROUP OR GROUPS OF SWITCHES OVER WHICH SIGNALS GOVERN.

INTERLOCKING MACHINE WITH MECHANICAL LOCKING

"H" CONTROLS.
 LOW AIR PRESSURE RELAYS AND INDICATION CIRCUITS

SHEET 3 OF 9



THE PENNSYLVANIA RAILROAD
 TYPICAL

CONTROL CIRCUITS FOR INTERLOCKING SIGNALS

OFFICE OF CHIEF ENGINEER,
 PHILA., PA., FEBRUARY 25, 1933.

APPROVED:

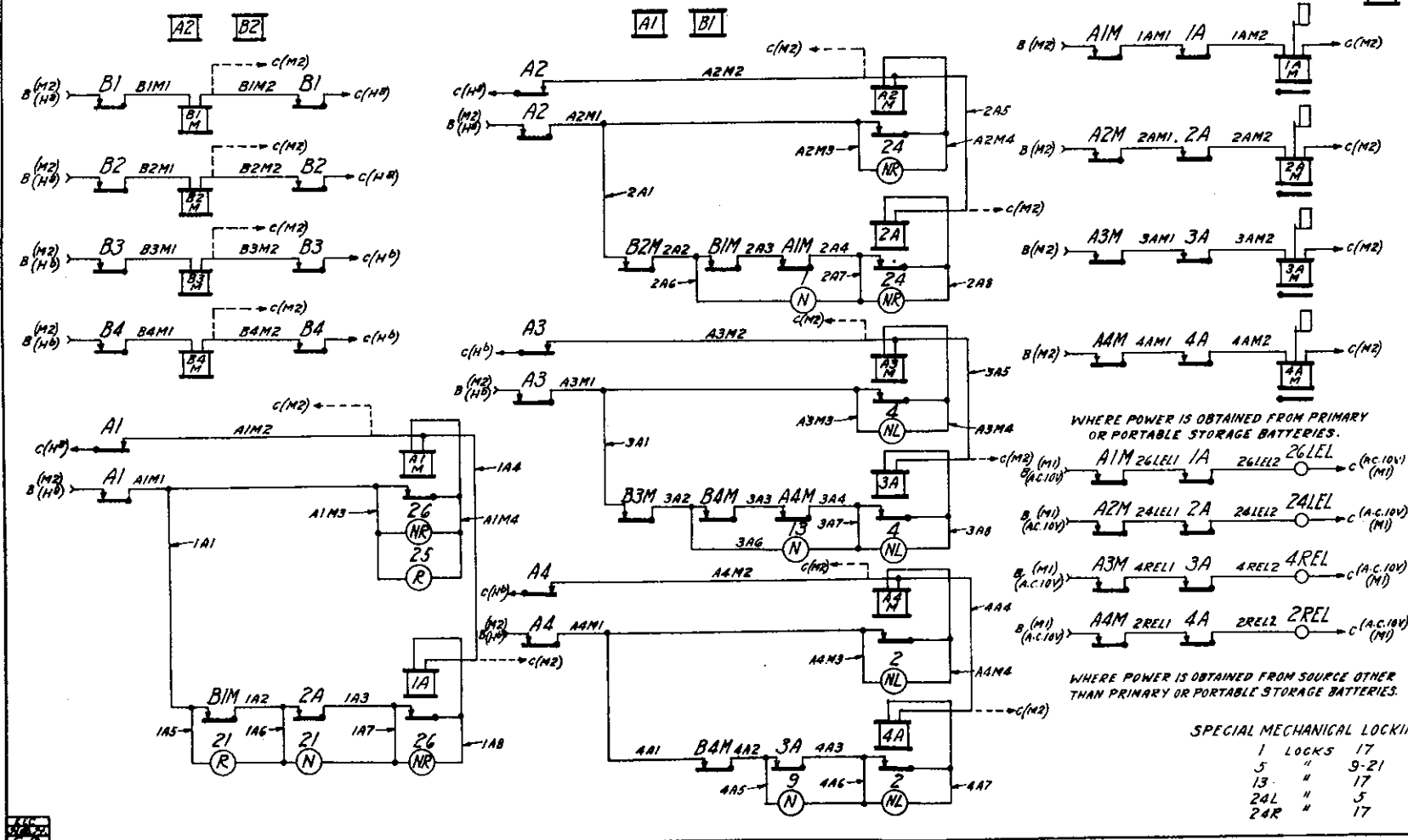
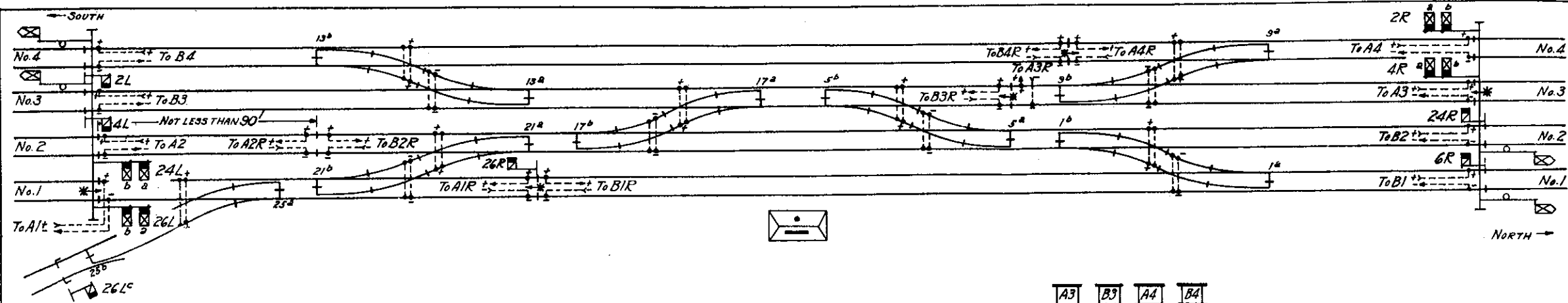
W. L. Salmonson
 ASST. CHIEF ENGINEER - SIGNALS

APPROVED:

NOT TO SCALE
 J. H. H. H. H.
 CHIEF ENGINEER

SUPERSEDES PLAN 3-862,
 SH. 3 DATED 4-8-46.

3-862



NOTE:-
REPEATING INDICATOR OR INDICATION LIGHT MAY BE PROVIDED TO REPEAT RELAYS AIM, AZM, A3M & A4M IF SO DESIRED.
ADDITIONAL TRACK SECTIONS MAY BE INSTALLED WHERE LOCAL TRAFFIC CONDITIONS REQUIRE QUICKER RELEASE OF SWITCHES.
TRACKS ARE ARBITRARILY NUMBERED.
IT SHOULD BE NOTED THAT THE INDICATING RELAY CONTROL IS CARRIED THROUGH ALL TRACK SECTIONS TO THE HOLDING SIGNAL FOR A CONFLICTING MOVEMENT WHERE HIGH OR RESTRICTED SPEED SIGNALS ARE INVOLVED. FOR ILLUSTRATION COMPARE THE CONTROL CIRCUIT FOR RELAY 1A WITH THAT FOR 4A.
WHERE A CROSSOVER MOVEMENT CAN BE MADE ONLY ON A SLOW SPEED SIGNAL (SEMI-AUTOMATIC) THE CONTROL NEED NOT BE TAKEN BEYOND THE SECTION THAT INCLUDES THE FOULING POINT.
ENERGY FOR REPEATING RELAYS SHALL BE TAKEN FROM BATTERY M2 WHEN INSTRUMENT REPEATED IS LOCATED INSIDE THE CABIN AND FROM NEAREST H BATTERY WHEN INSTRUMENT REPEATED IS LOCATED OUTSIDE THE CABIN. WHEN INSTRUMENT REPEATED IS LOCATED INSIDE THE CABIN, THE REPEATING RELAY SHALL GO DIRECT TO COMMON AS SHOWN DOTTED.

FOR MOTOR SIGNALS.

SPECIAL MECHANICAL LOCKING

1	LOCKS	17
5	"	9-21
13	"	17
24L	"	5
24R	"	17

SHEET 2 OF 2

PENNSYLVANIA RAILROAD SYSTEM
TYPICAL CONTROL CIRCUITS
FOR TRACK INDICATING RELAYS

OFFICE OF CHIEF SIGNAL ENGINEER,
PHILA., PA., JAN. 20, 1926

Approved *A.H. Ried* Chief Signal Engineer

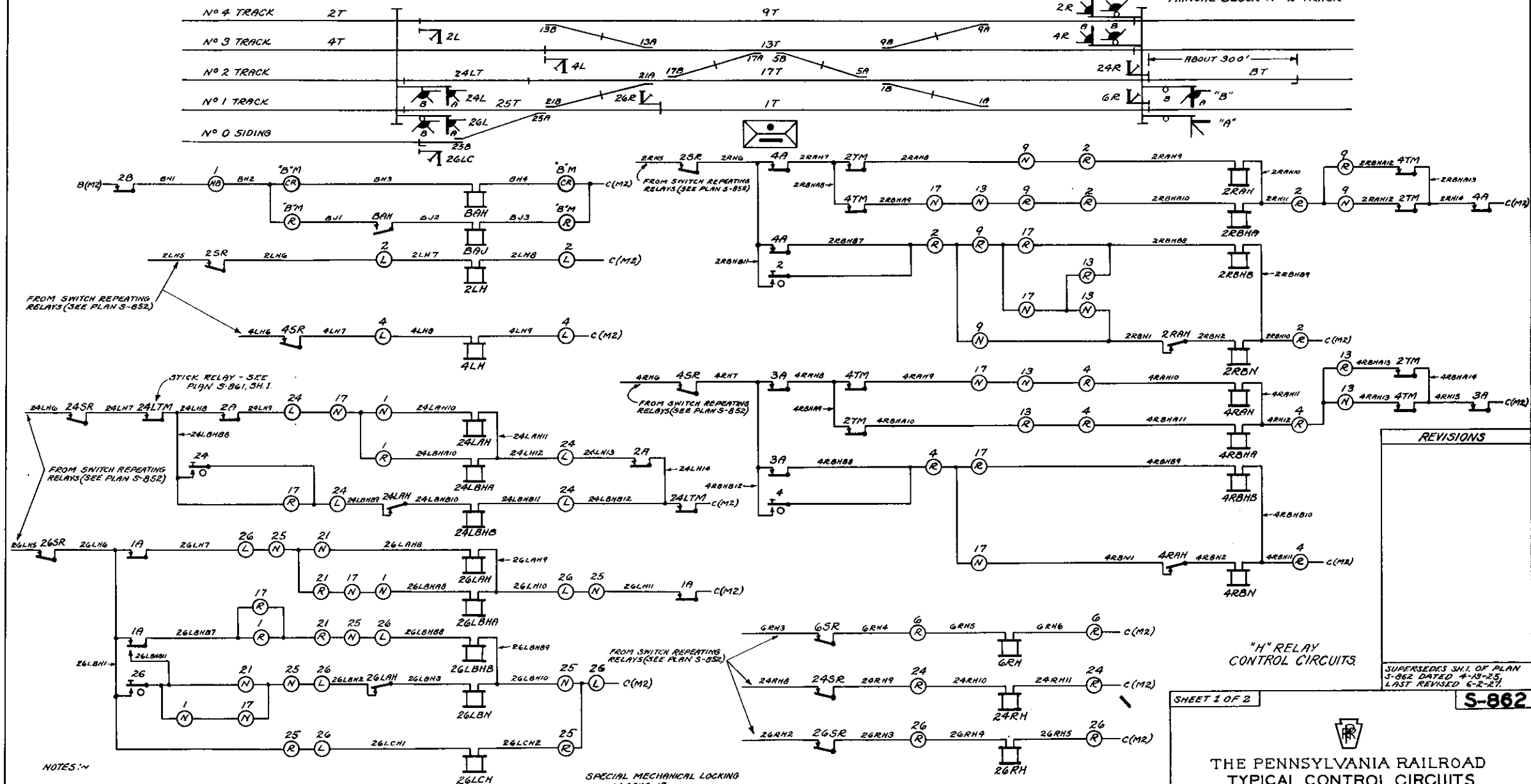
NOT TO SCALE

Approved *[Signature]* Chief Engineer

REDRAWN FROM PLAN S-861, SH. 2
DATED 12-19-24, LAST REVISED S-22-29.

S-861

AUTOMATIC BLOCK NO. 1, 3 & 4 TRACK
MANUAL BLOCK NO. 2 TRACK.



REVISIONS

SUPERSEDES SH.1. OF PLAN
S-862 DATED 4-19-25
LAST REVISED 6-2-27.

S-862

SHEET 1 OF 2

THE PENNSYLVANIA RAILROAD TYPICAL CONTROL CIRCUITS FOR HOME SIGNALS

OFFICE OF CHIEF SIGNAL ENGINEER
PHILA., PA., JANUARY 11, 1926.

Approved: *[Signature]*
Chief Signal Engineer

NOT TO SCALE
Approved: *[Signature]*
Acting Chief Engineer

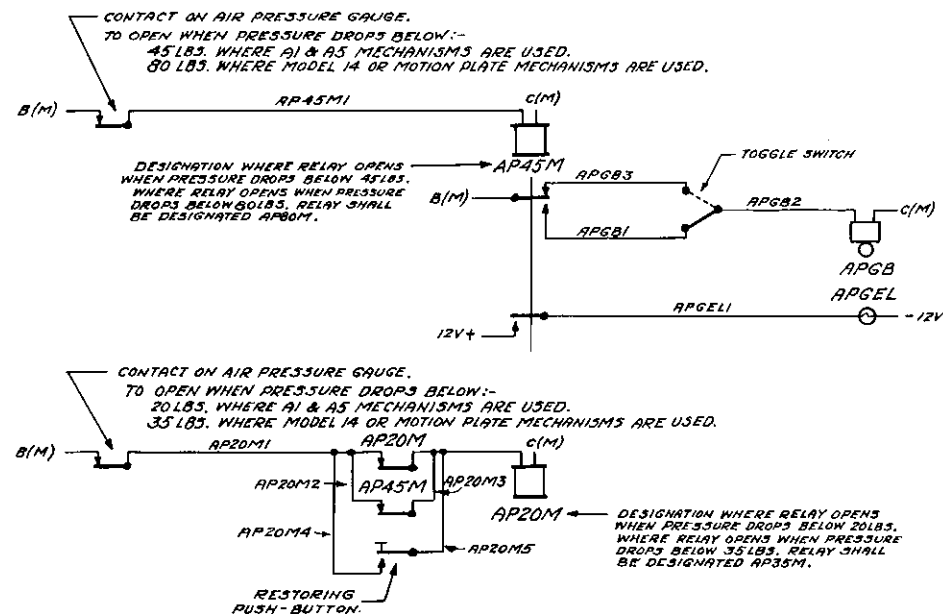
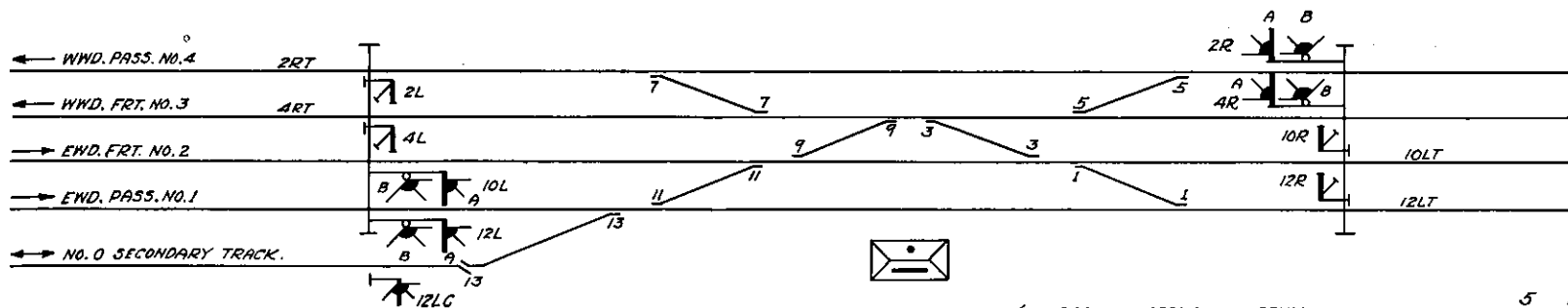
NOTES:-

1. WHERE A FACING POINT SWITCH IS LOCATED WITHIN APPROXIMATELY 5000' OF THE ADVANCE SIGNAL "B" CIRCUITS SHALL BE ARRANGED AS SPECIFIED IN NOTE 4 PLAN S-854.
2. BLOCK SIGNALS IN MANUAL BLOCK TERRITORY SHALL BE CONTROLLED IN ACCORDANCE WITH PENNSYLVANIA RAILROAD SYSTEM TYPICAL CIRCUIT PLAN S-854.

SPECIAL MECHANICAL LOCKING

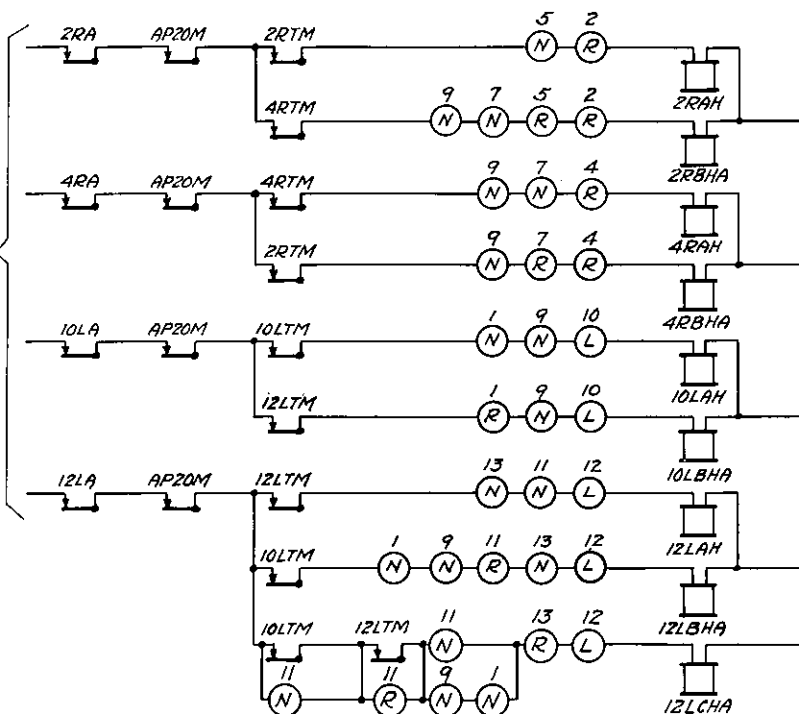
1 LOCKS 17
5 " 9 & 21
13 " 17
24 " 5
24R " 17

SHOULD SIG "B" BE CONTROLLED FROM INTERLOCKING MACHINE IT SHOULD LOCK SWITCH 1 NORMAL AND THE "NO" CONTACT OMITTED IN "BAH" CONTROL.



- NOTE:-
1. FOR REMOTE CONTROLLED PNEUMATICALLY OPERATED SWITCHES AND FOR OTHER SWITCHES WHERE THE COMPRESSORS ARE MOTOR DRIVEN AND AUTOMATICALLY CONTROLLED, AIR GAUGES WITH CIRCUIT CONTROLLER CONTACTS TO INDICATE TO THE OPERATOR WHEN PRESSURE HAS DROPPED TO PRESCRIBED MINIMUM LIMITS SHOULD BE INSTALLED AND CIRCUITS ARRANGED AS SHOWN ABOVE.
 2. CONTROL CIRCUITS FOR SIGNALS SHALL BE ARRANGED SO THAT ASPECTS MORE FAVORABLE THAN RESTRICTING CAN NOT BE DISPLAYED WHEN LOW AIR PRESSURE (AP20M) RELAY OPENS.
 3. FOR REMOTE CONTROL LOCATIONS - RELAY AP45M, INDICATION BELL AND LIGHT SHALL BE INSTALLED IN CONTROL LOCATION.
 4. AT INTERLOCKINGS WHERE A GROUP OF SWITCHES ARE SUPPLIED FROM ONE SET OF COMPRESSORS AND ANOTHER GROUP FROM A SECOND SET OF COMPRESSORS, SIGNALS SHALL BE CONTROLLED OVER LOW AIR PRESSURE (AP20M) RELAY FOR GROUP OR GROUPS OF SWITCHES OVER WHICH SIGNALS GOVERN.

FROM OTHER CONTROL APPARATUS SEE PLAN S-862, SH. 1



TO OTHER CONTROL APPARATUS SEE PLAN S-862, SH. 1

LOW AIR PRESSURE CONTROL WHERE ELECTRO-PNEUMATIC SWITCHES ARE PROVIDED - SEE NOTE 1.

SHEET 3 OF 3

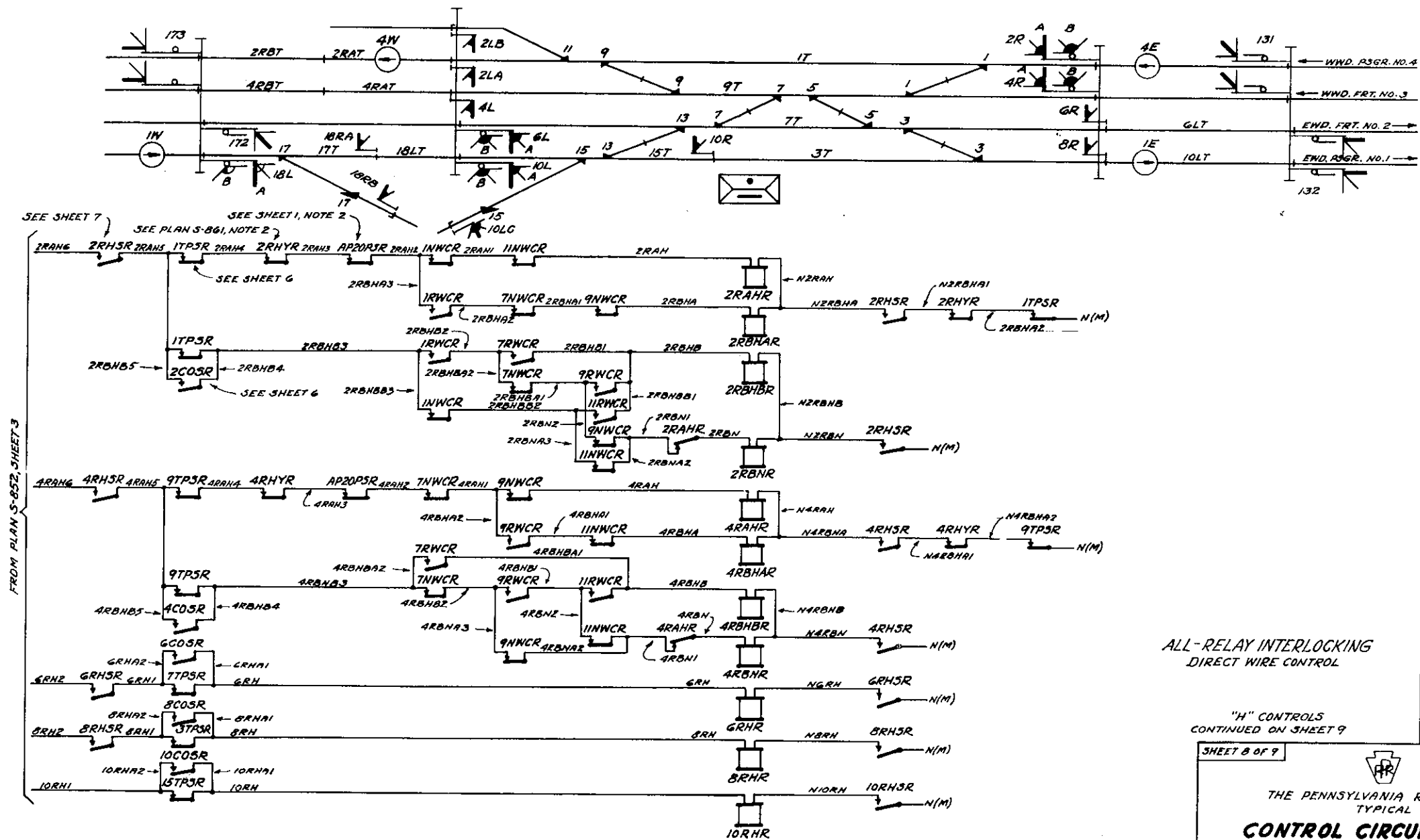
S-862

THE PENNSYLVANIA RAILROAD TYPICAL CONTROL CIRCUITS FOR HOME SIGNALS

OFFICE OF CHIEF ENGINEER,
PHILA., PA., JUNE 8, 1946.

APPROVED:
H. G. Haff
ASSY. CHIEF ENGINEER - P.C.S.

NOT TO SCALE
APPROVED:
J. H. Haff
CHIEF ENGINEER.



FROM PLAN S-852, SHEET 3

ALL-RELAY INTERLOCKING
DIRECT WIRE CONTROL

"H" CONTROLS
CONTINUED ON SHEET 9

SHEET 8 OF 9

S-862

THE PENNSYLVANIA RAILROAD
TYPICAL

CONTROL CIRCUITS FOR INTERLOCKING SIGNALS

OFFICE OF CHIEF ENGINEER,
PHILA., PA. AUGUST 27, 1933.

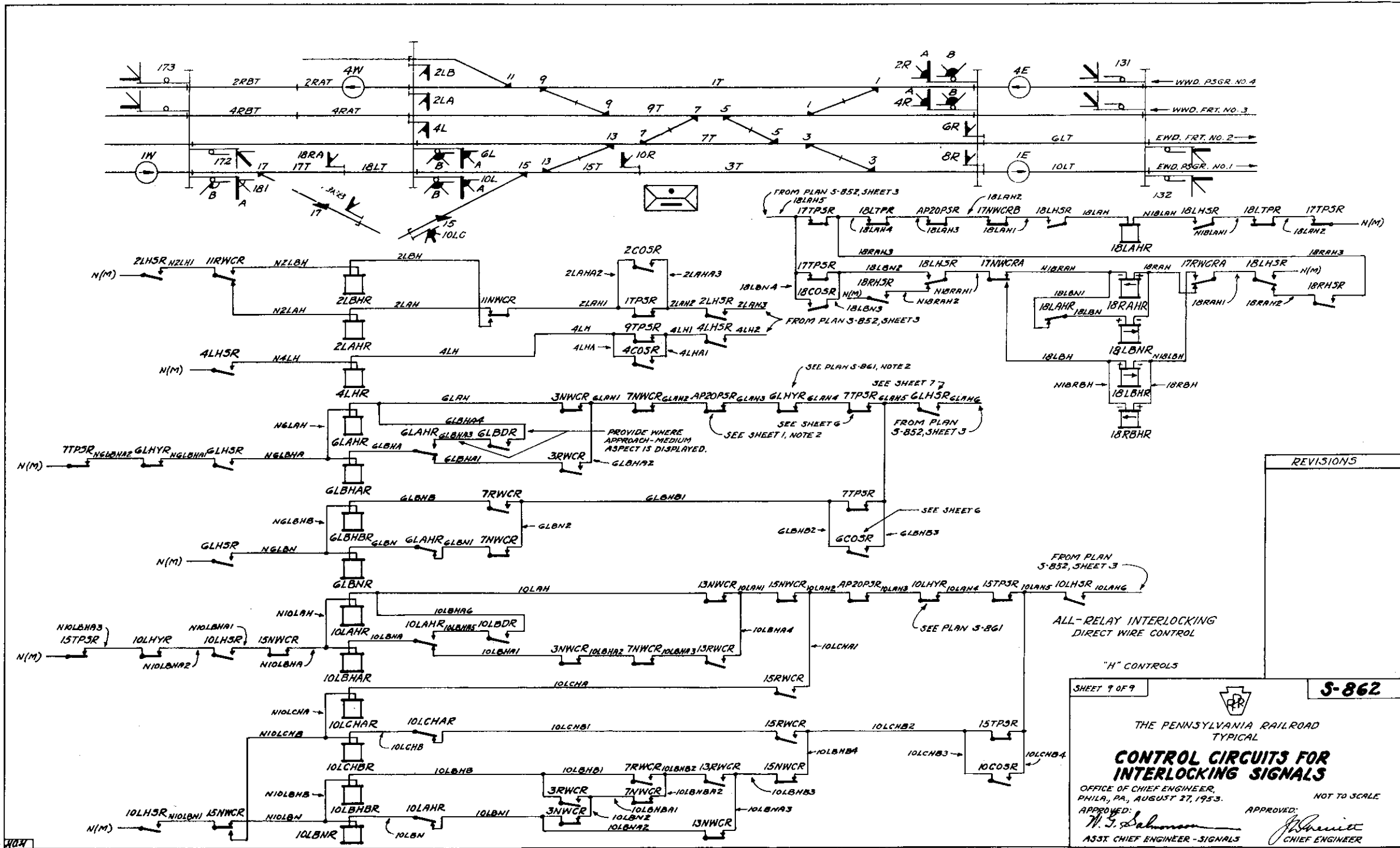
NOT TO SCALE

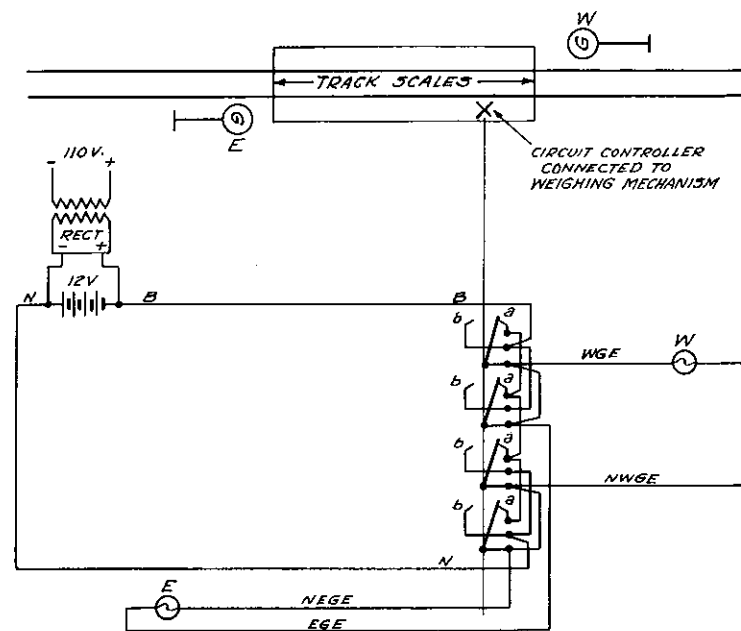
APPROVED:

W. E. Salmonson
ASST. CHIEF ENGINEER - SIGNALS

APPROVED:

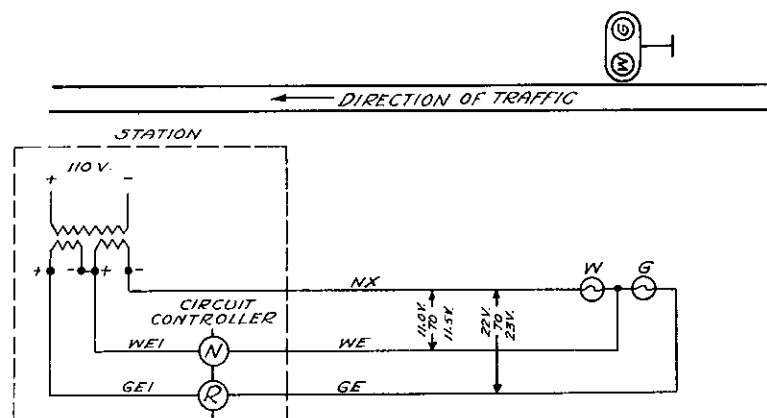
J. H. Smith
CHIEF ENGINEER



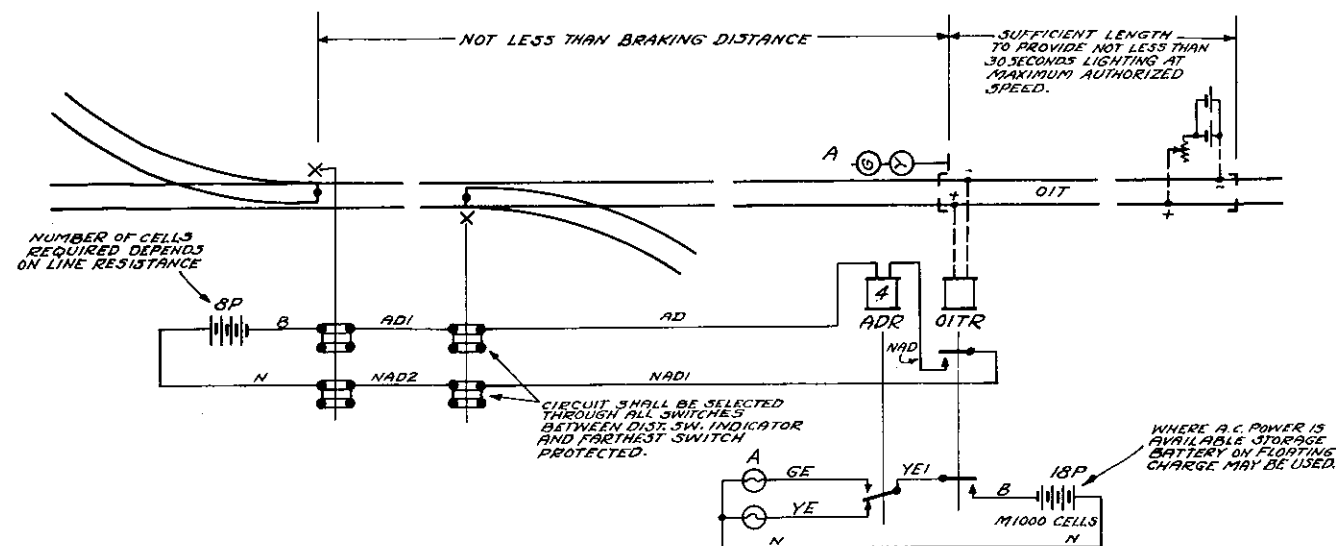


IN CIRCUIT CONTROLLER - CONTACTS *a* CLOSED AND *b* OPEN WHEN SCALES ARE SET FOR WEIGHING.
SIGNALS *E* & *W* NOT ILLUMINATED WHEN SCALES ARE SET FOR WEIGHING.

COLOR LIGHT SCALE SIGNALS
FIG. A



COLOR LIGHT FLAG STATION SIGNAL
FIG. B



COLOR LIGHT DISTANT SWITCH INDICATOR
FIG. C

REVISIONS

SUPERSEDES CIRCUITS
SHOWN ON DRAWINGS
S-457-C, S-470-A AND
S-473-A.

1 SHEET

S-831

THE PENNSYLVANIA RAILROAD
TYPICAL

CIRCUITS FOR COLOR LIGHT SCALE SIGNALS, FLAG
STATION SIGNAL & DIST. SWITCH INDICATOR

OFFICE OF CHIEF ENGINEER,
PHILA., PA., JULY 14, 1952.

NOT TO SCALE

APPROVED:

APPROVED:

W. G. Salmonson
ASST. CHIEF ENGINEER-SIGNALS

J. H. H. H.
CHIEF ENGINEER

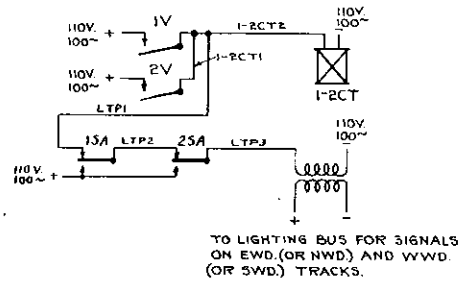


FIG. 1

NORMALLY DEENERGIZED "V" RELAYS.
100 CYCLE CODE
100 CYCLE TRACK.
SEE PLAN S-883, FIGS. 2 & 4.
" " " " S-884, SH. 2.
FOR USE WHERE SPARE DEPENDENT FRONT & BACK CONTACT IS NOT AVAILABLE ON SLOW ACTING RELAYS, SHALL ALSO BE USED IN ALL CASES WHERE SEPARATE LIGHTING TRANSFORMER IS PROVIDED.

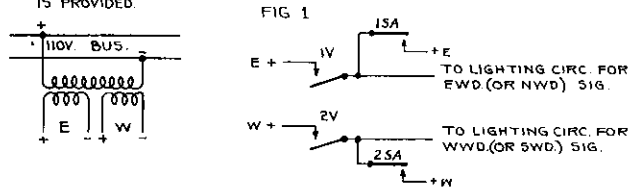


FIG. 2

NORMALLY DEENERGIZED "V" RELAYS.
100 CYCLE CODE
100 CYCLE TRACK.

SEE PLAN S-883, FIGS. 1, 2, 3 & 4.
" " " " S-884, SHS. 1 & 2.
FOR USE WHERE SPARE DEPENDENT FRONT & BACK CONTACT IS AVAILABLE ON SLOW ACTING RELAYS WHERE CIRCUITS ARE IN ACCORDANCE WITH S-883, FIGS. 2 & 4. AND S-884, SH. 2.-SEE SKETCH "A".

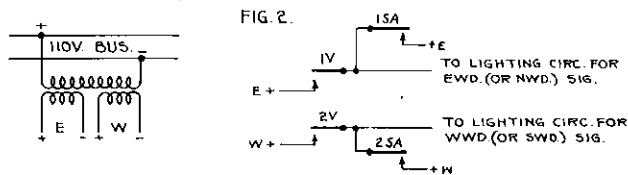


FIG. 3

NORMALLY ENERGIZED "V" RELAYS.
100 CYCLE CODE
100 CYCLE TRACKS
60 CYCLE TRACK

SEE PLAN S-883, FIGS. 11, 12, 13 & 14.
" " " " S-884, SHS. 10, 11, 12, 13, 14 & 15. SEE SKETCH "B".

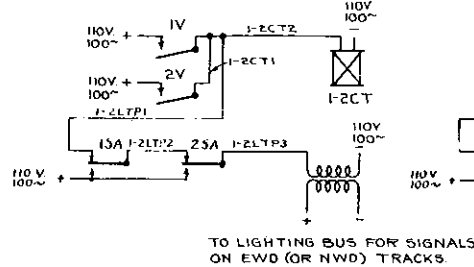


FIG. 4

NORMALLY DEENERGIZED "V" RELAYS.
100 CYCLE CODE
100 CYCLE TRACK.
SEE PLAN S-883, FIGS. 1, 2, 3 & 4.
" " " " S-884, SHS. 1 & 2.

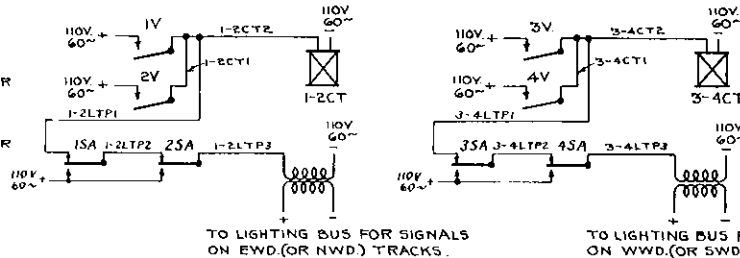


FIG. 5

NORMALLY DEENERGIZED "V" RELAYS.
100 CYCLE CODE
60 CYCLE CODERS.
60 CYCLE TRACK.

SEE PLAN S-883, FIGS. 5, 6, 7 & 8.
" " " " S-884, SHS. 4 & 6.

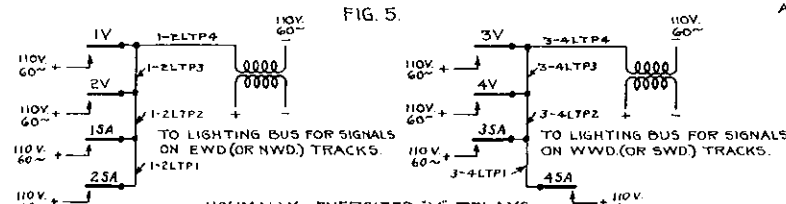
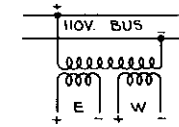


FIG. 6

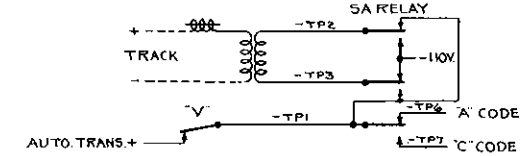
NORMALLY ENERGIZED "V" RELAYS.
100 CYCLE CODE
100 CYCLE CODERS
60 CYCLE TRACK

SEE PLAN S-883, FIGS. 11, 12, 13 & 14.
" " " " S-884, SHS. 10, 11 & 12. SEE SKETCH "B".



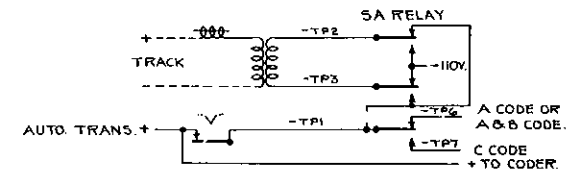
NORMALLY ENERGIZED "V" RELAYS.
100 CYCLE CODE
100 CYCLE TRACK (ELECTRIFIED TERRITORY)
SEE PLAN S-884, SHS. 15, 16 & 18.

FIG. 7



NORMALLY DEENERGIZED "V" RELAYS.
POLE-CHANGING CIRCUIT WHERE FIG. 2 IS USED.

SKETCH "A"



NORMALLY ENERGIZED "V" RELAYS.
POLE-CHANGING CIRCUIT WHERE FIG. 3 OR 6 IS USED.

SKETCH "B"

FOR USE IN CODED TRACK
CIRCUIT TERRITORY.

NOTE:-

1. WHERE MORE THAN ONE TRACK IS SIGNALLED IN A GIVEN DIRECTION ALL HIGH SIGNALS GOVERNING IN THAT DIRECTION SHALL BE APPROACH LIGHTED SIMULTANEOUSLY.
2. INTERLOCKING SIGNALS SHALL NOT BE APPROACH LIGHTED.

TWO TRACK ROAD

FOUR TRACK ROAD.

REVISIONS.

5-11-37, SIGNALS LIGHTED WHEN BLOCK BEYOND SIGNAL IS OCCUPIED.

APPROVED: *A. H. Hays*
SUPERSEDES PLAN S-865, SHEETS 1107, DATED 2-27-24.

S-865

1 SHEET

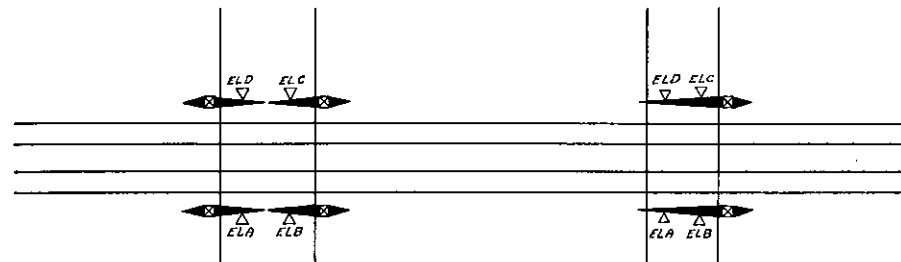
THE PENNSYLVANIA RAILROAD
STANDARD
APPROACH LIGHTING CIRCUITS.

OFFICE OF ASST. CHIEF ENGINEER-SIGNALS
PHILA., PA., AUG. 14, 1932.

Approved: *A. H. Hays*
Chief Signal Engineer

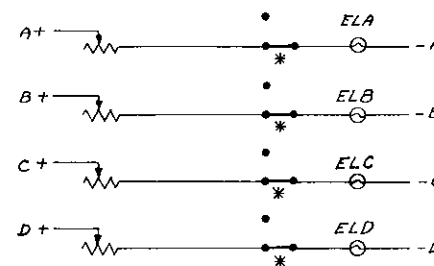
Approved: *[Signature]*
Chief Engineer

NOT TO SCALE.



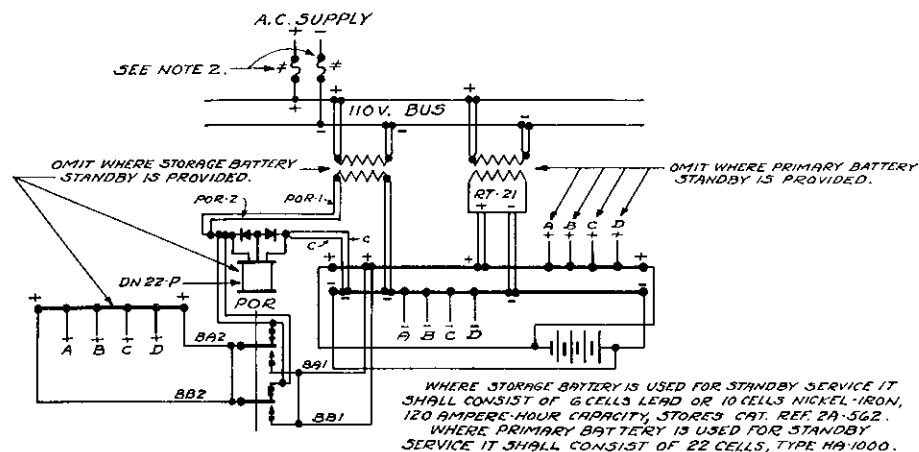
ARRANGEMENT FOR DOUBLE GATES, WITH ONE LAMP ON EACH GATE ARM (SEE NOTE 4).

ARRANGEMENT FOR SINGLE GATES, WITH TWO LAMPS ON EACH GATE ARM (SEE NOTE 4).

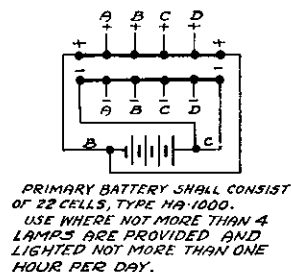


* MERCURY TYPE SWITCHES IN LAMP UNITS. CONTACTS OPEN WHEN GATE ARM IS 15° OR MORE ABOVE THE HORIZONTAL POSITION.

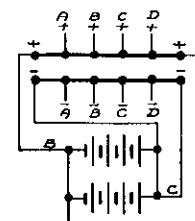
LIGHTING CIRCUITS FOR GATE ARM LAMPS.



FOR USE WHERE A.C. POWER IS AVAILABLE.



PRIMARY BATTERY SHALL CONSIST OF 22 CELLS, TYPE HA-1000. USE WHERE NOT MORE THAN 4 LAMPS ARE PROVIDED AND LIGHTED NOT MORE THAN ONE HOUR PER DAY.



PRIMARY BATTERY SHALL CONSIST OF 44 CELLS CONNECTED 22 IN SERIES MULTIPLE, TYPE HA-1000. USE WHERE MORE THAN 4 LAMPS ARE PROVIDED OR WHERE 4 LAMPS ARE LIGHTED MORE THAN ONE HOUR PER DAY.

FOR USE WHERE A.C. POWER IS NOT AVAILABLE.

NOTE :-

1. MINIMUM VOLTAGE AT LAMPS SHALL BE 11.5 V. CIRCUITS SHOULD BE ADJUSTED TO GIVE SAME VOLTAGE AT LAMPS ON SAME SIDE OF CROSSING.
2. OVERLOAD CIRCUIT BREAKERS OF A TYPE APPROVED BY THE ASSISTANT CHIEF ENGINEER-SIGNALS MAY BE USED IN LIEU OF FUSES MARKED #. WHERE COMMERCIAL LINE FURNISHES POWER AND COMMERCIAL CO'S. FUSES ARE PROVIDED WHERE CONNECTION IS MADE, FUSES # SHALL BE OMITTED.
3. BATTERY SHELTERS SHALL BE IN ACCORDANCE WITH CURRENT ISSUE OF SPEC. CE-233.
4. LAMPS ON CROSSING GATES SHALL BE IN ACCORDANCE WITH LETTER OF GENERAL PRACTICE 213 (BASIC NO.) AND SUPPLEMENT AND AS OTHERWISE REQUIRED BY STATE OR LOCAL AUTHORITY.

REVISIONS

1 SHEET

S-866



THE PENNSYLVANIA RAILROAD TYPICAL LIGHTING CIRCUITS FOR LAMPS ON HIGHWAY CROSSING GATES

OFFICE OF CHIEF ENGINEER,
PHILA., PA., APRIL 10, 1944.

NOT TO SCALE

APPROVED:

N. L. Stanton

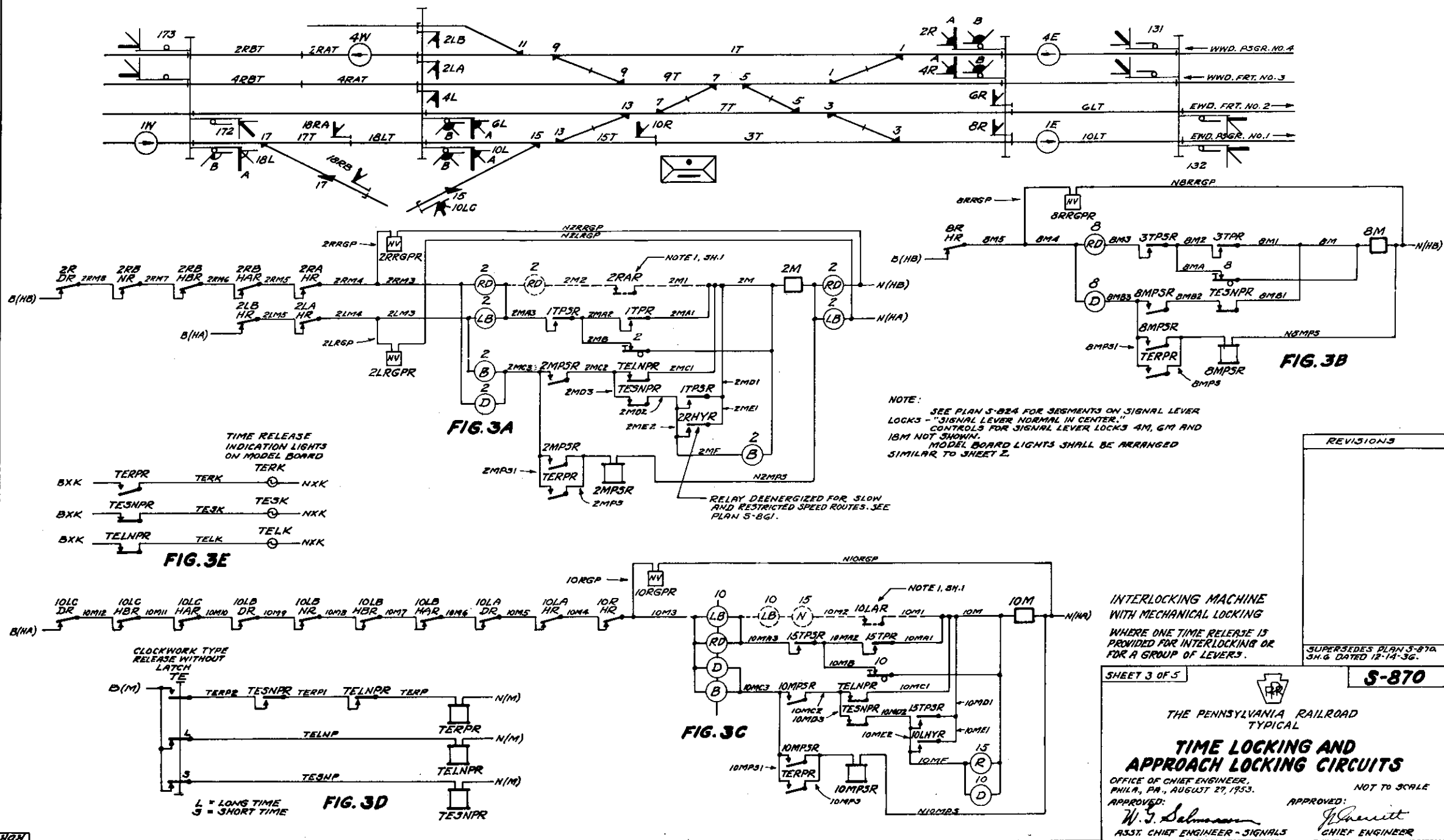
ASST. CHIEF ENGINEER-SIGNALS.

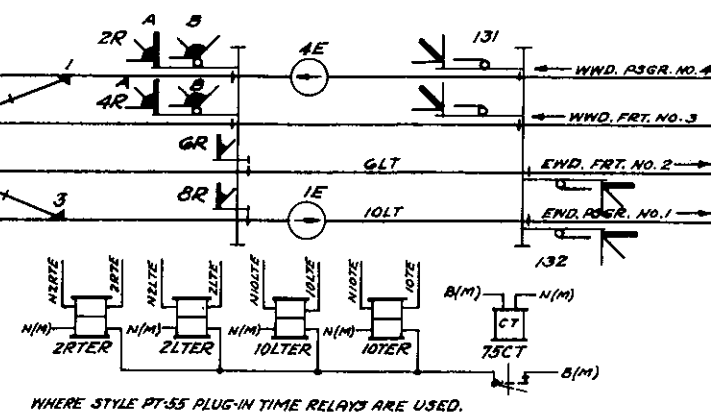
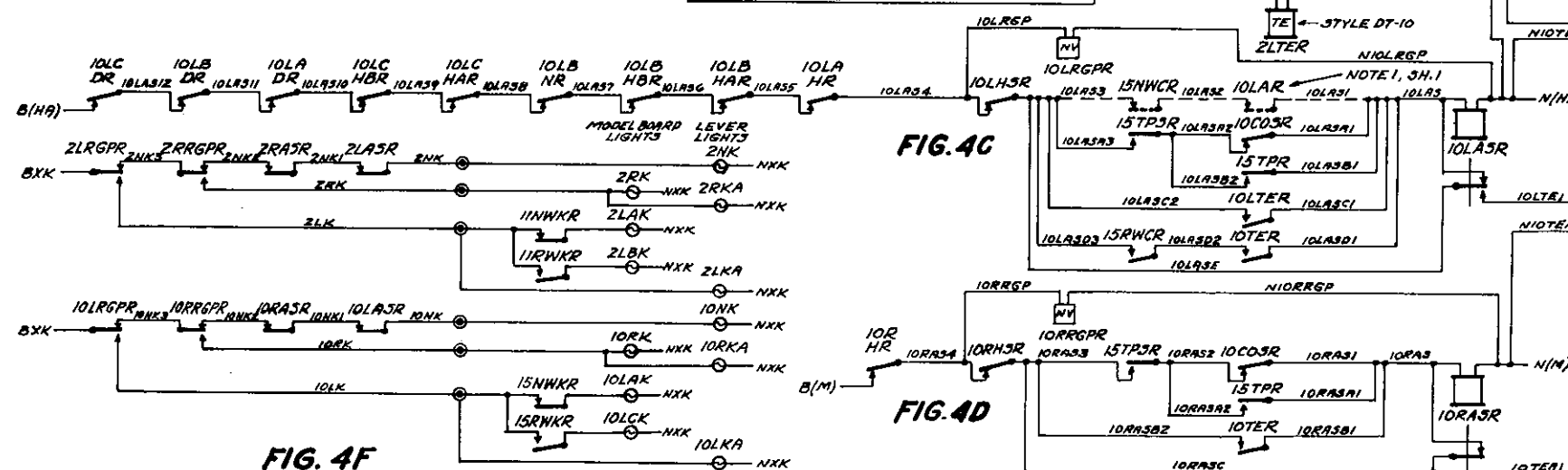
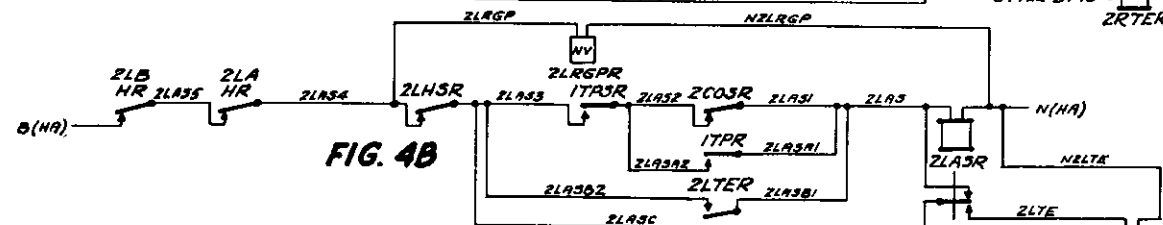
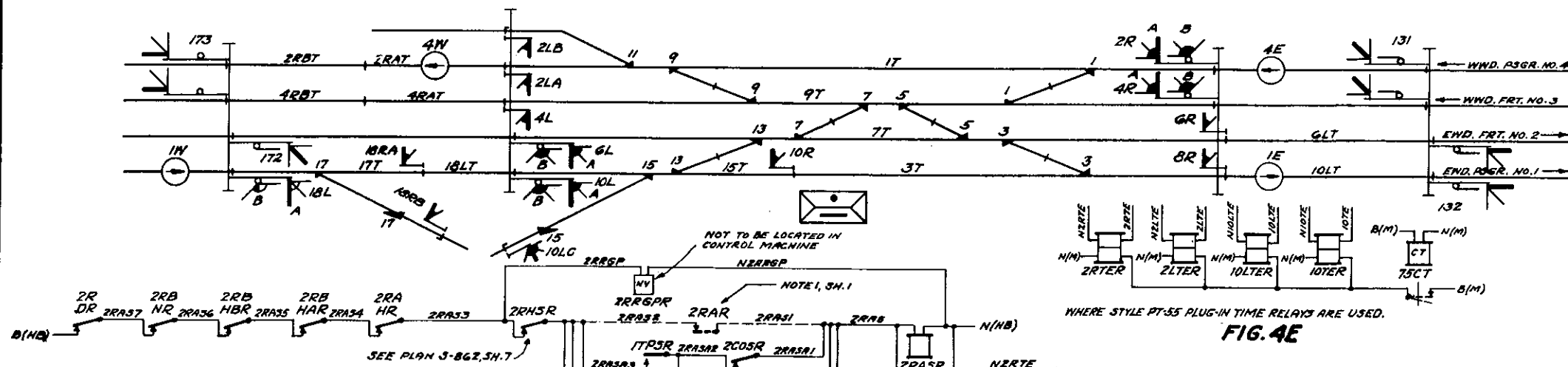
APPROVED:

J. H. Hamilton

CHIEF ENGINEER.

APPROVED: *J. H. Smith*
CHIEF ENGINEER





*ALL-RELAY INTERLOCKING
DIRECT WIRE CONTROL*

SEPARATE TIME RELAYS PROVIDED
FOR R SIGNALS AND L SIGNALS
CONTROLLED BY EACH SIGNAL
LEVER

SHEET 4 OF 5

S-870

THE PENNSYLVANIA RAILROAD
TYPICAL

TIME LOCKING AND APPROACH LOCKING CIRCUITS

OFFICE OF CHIEF ENGINEER,
PHILA., PA, AUGUST 27, 1953

APPROVED:
W. E. Selmonson
ASST. CHIEF ENGINEER - SIGNALS

APPROVED: 
CHIEF ENGINEER

NOT TO SCALE

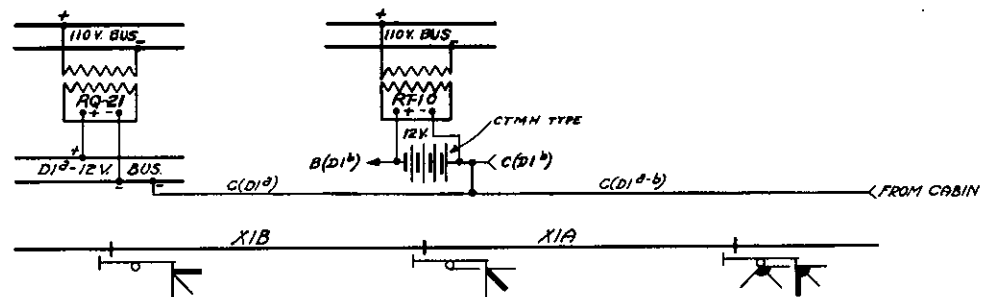


FIG. 1
ARRANGEMENT FOR USE WHERE RELIABLE AC. POWER IS AVAILABLE

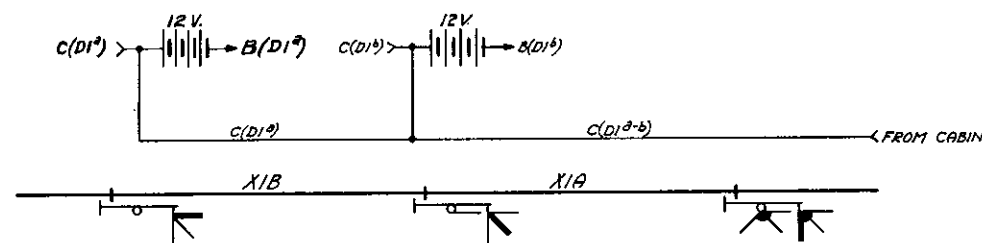


FIG. 2
ARRANGEMENT FOR USE WHERE RELIABLE AC. POWER IS NOT AVAILABLE

D.C. POWER SUPPLY FOR APPROACH RELAYS AND SIGNAL INDICATION CIRCUITS

NOTES:-

1. Ⓢ = MECHANICAL STICK PUSH BUTTON.
2. WHERE TIME LOCKING ONLY IS INSTALLED OMIT PORTION OF CIRCUIT SHOWN IN DOTTED LINES, SH'S. 3, 4 & 5.
3. ON SHEETS 3, 4 & 5 THE CLOCKWORK RELEASES SHALL BE EQUIPPED WITH LATCH AND THE NORMAL POSITION OF THE POINTER SET AT ZERO.
4. ON SHEET 6 THE CLOCKWORK RELEASES SHALL BE WITHOUT LATCH. THEY SHALL BE PROVIDED WITH SHORT AND LONG TIME CONTACTS, THE SHORT TIME CONTACTS TO CLOSE IN A PREDETERMINED TIME AFTER THE RELEASE LEAVES ITS REVERSE OR WOUND UP POSITION AND REMAIN CLOSED WITH THE RELEASE IN ITS NORMAL OR RUN DOWN POSITION.
5. THE SETTING OF THE TIME RELEASES SHALL BE IN ACCORDANCE WITH C.S.E. 9.
6. INDICATION LIGHTS CONNECTED IN MULTIPLE WITH THE INDICATION LOCK, AS SHOWN ON SH'S. 3 & 4, SHALL BE INSTALLED WHERE, IN THE JUDGMENT OF THE SUPERINTENDENT OF TELEGRAPH & SIGNALS, THEY ARE NECESSARY.

REVISIONS.

12-14-36. FIG'S. 1 AND 2
CHANGED AND NOTE 4
ADDED.

APPROVED:

NOT
TO
SCALE

SHEET 1 OF 6

S-870



THE PENNSYLVANIA RAILROAD
TYPICAL

SIGNAL INDICATION AND
APPROACH LOCKING CIRCUITS

OFFICE OF CHIEF SIGNAL ENGINEER,
PHILA., PA., MARCH 30, 1928.

Approved

A. H. Hoad
Chief Signal Engineer

Approved

[Signature]
Chief Engineer

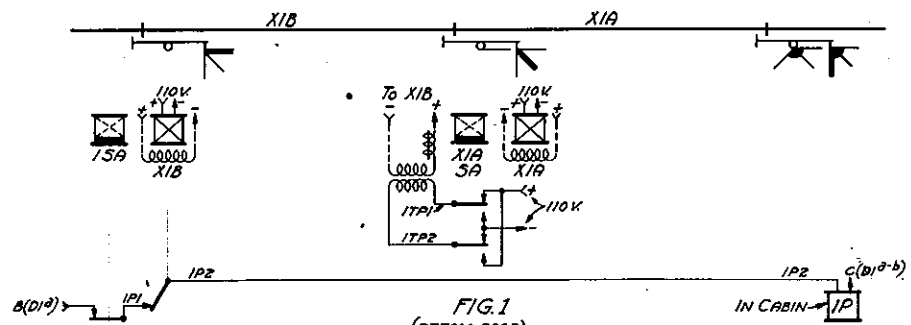


FIG. 1
(STEAM ROAD)
FOR USE WHERE TRACK RELAY CONTACT (XIA) IS NOT INCLUDED
IN POLE-CHANGING CIRCUIT FOR XIB.

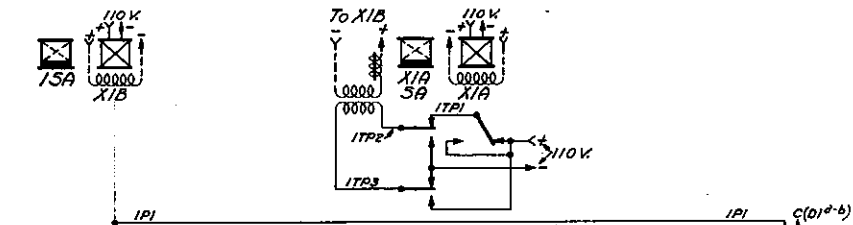


FIG. 2
(STEAM ROAD)
FOR USE WHERE TRACK RELAY CONTACT (XIA) IS INCLUDED
IN POLE-CHANGING CIRCUIT FOR XIB.

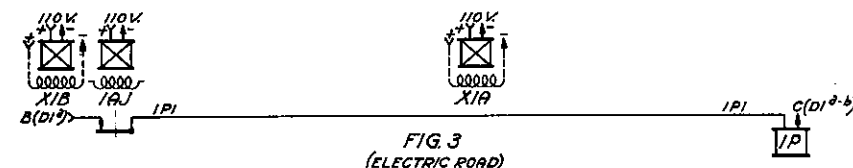


FIG. 3
(ELECTRIC ROAD)

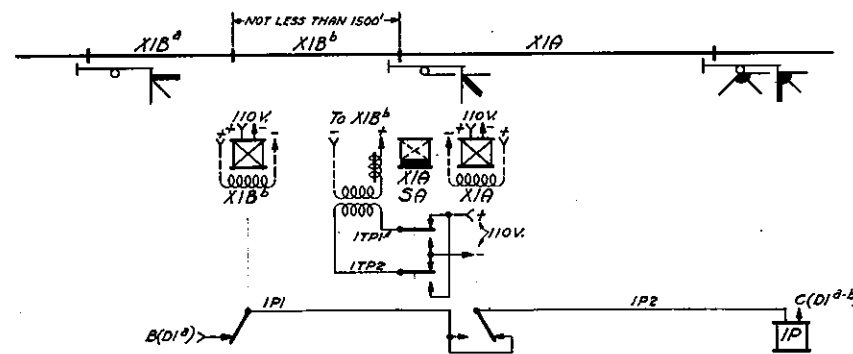


FIG. 4
(STEAM ROAD)
TWO BLOCK INDICATION.

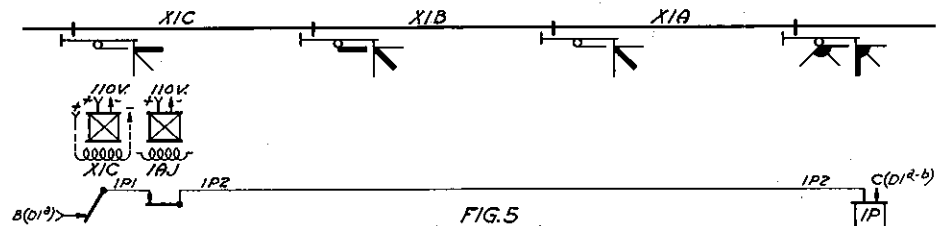


FIG. 5
(STEAM ROAD)
FOR USE WHERE POLARIZED TRACK AND NEUTRAL LINE
CIRCUITS ARE PROVIDED-PLAN S-857-FIG. 5.

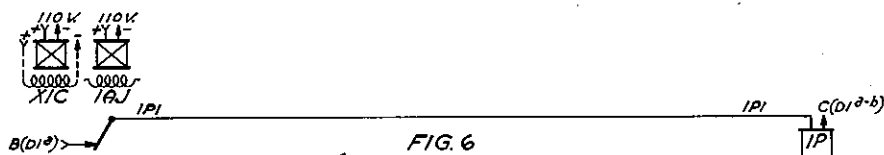


FIG. 6
(STEAM OR ELECTRIC ROAD)
FOR USE WHERE NEUTRAL TRACK AND POLARIZED LINE
CIRCUITS ARE PROVIDED-PLAN S-857-FIGS. 1 & 2.

THREE BLOCK INDICATION

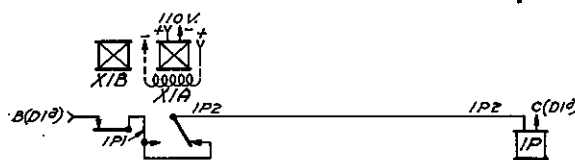
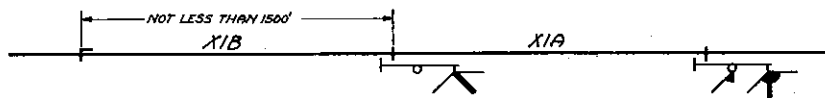


FIG. 7
DISTANT SIGNALS NORMALLY LIGHTED.

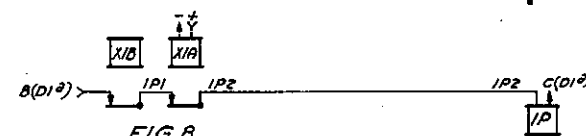
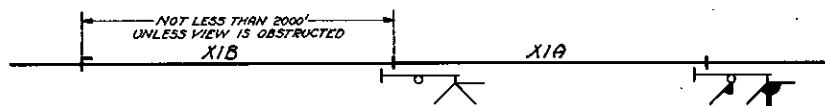


FIG. 8
DISTANT SIGNALS APPROACH LIGHTED.
MANUAL BLOCK TERRITORY

FOR GENERAL NOTES SEE SHEET NO. 1.

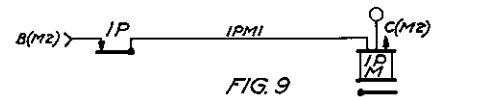


FIG. 9
WHERE POWER IS OBTAINED FROM PRIMARY
OR PORTABLE STORAGE BATTERIES APPROACH
INDICATORS (WITHOUT CONTACTS) SHALL BE USED.



FIG. 10
WHERE POWER IS OBTAINED FROM SOURCE
OTHER THAN PRIMARY OR PORTABLE STORAGE
BATTERIES APPROACH INDICATION LIGHTS
SHALL BE USED.

REVISIONS.

SUPERSEDES APPROACH RELAY
CONTROLS SHOWN ON S-870, 1 & 2
OF PLAN S-870, DATED 3-3-25,
LAST REVISED 3-3-25.

S-870

APPROACH RELAYS

SHEET 2 OF 3

THE PENNSYLVANIA RAILROAD
TYPICAL

SIGNAL INDICATION AND
APPROACH LOCKING CIRCUITS

OFFICE OF CHIEF SIGNAL ENGINEER,
PHILA., PA., MARCH 30, 1928.

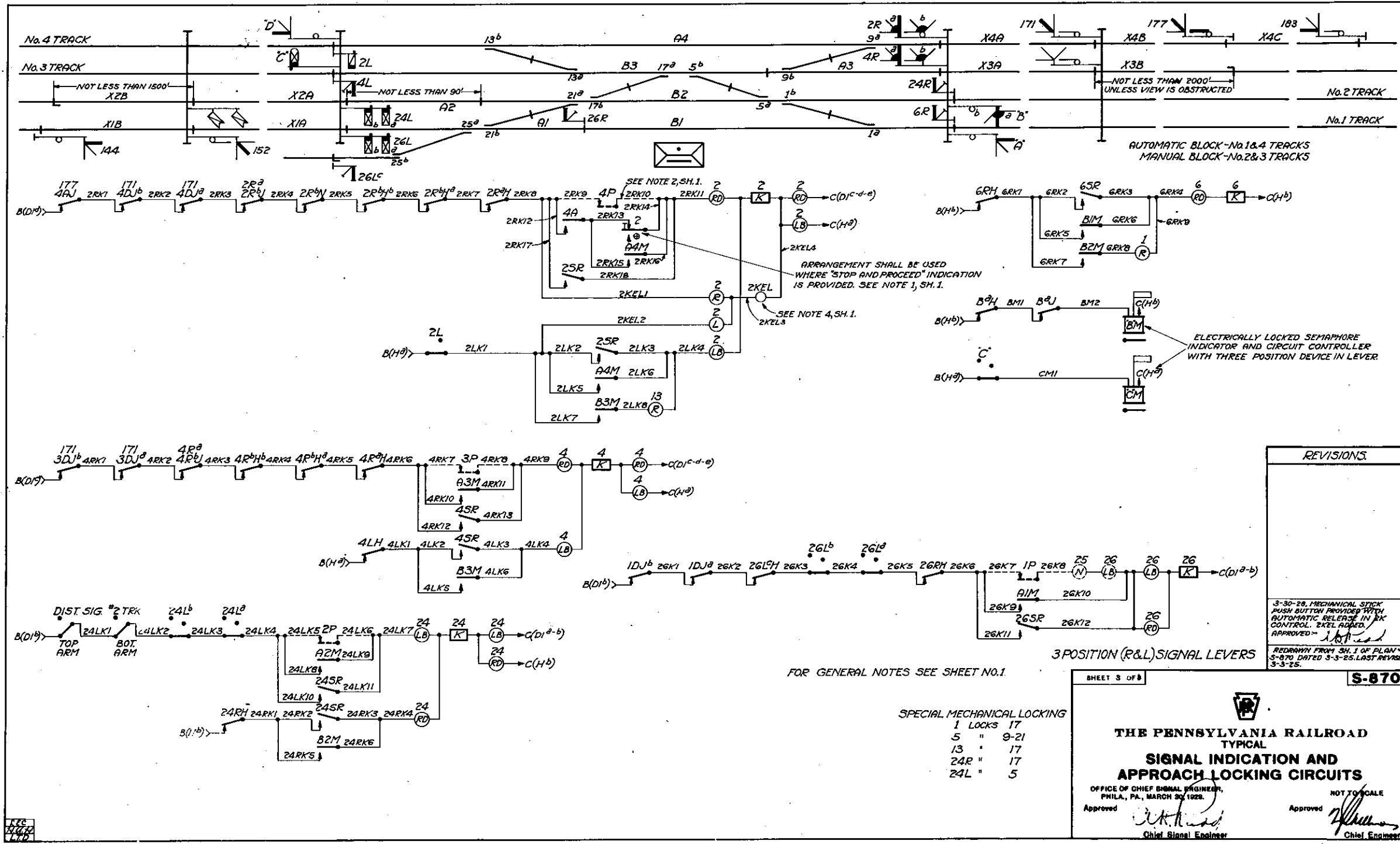
Approved

W. H. H. H.
Chief Signal Engineer

Approved

W. H. H. H.
Chief Engineer

NOT TO SCALE



FOR GENERAL NOTES SEE SHEET NO.1.

SPECIAL MECHANICAL LOCKING

1	LOCKS	17
5	"	9-21
13	"	17
24R	"	17
24L	"	5

REVISIONS
3-30-28. MECHANICAL STICK PUSH BUTTON PROVIDED WITH AUTOMATIC RELEASE IN 2K CONTROL. ZKL ADDED. APPROVED: [Signature]
REDRAWN FROM SH. 1 OF PLAN S-870 DATED 3-3-25. LAST REVISED 3-3-25.

S-870

THE PENNSYLVANIA RAILROAD

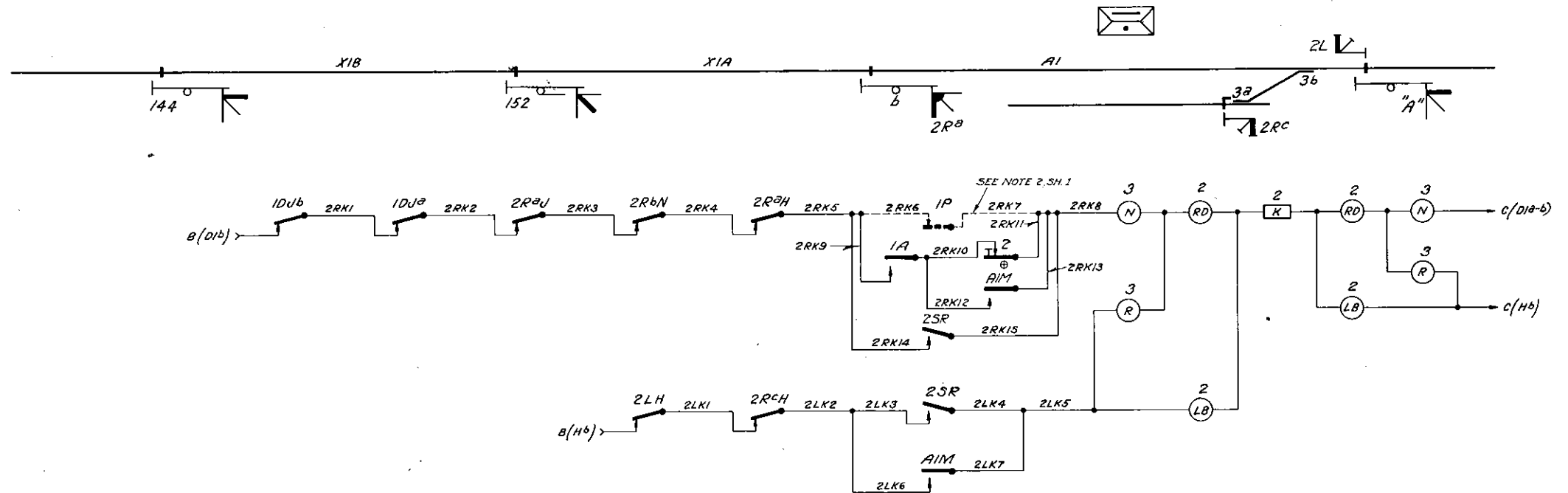
TYPICAL

SIGNAL INDICATION AND APPROACH LOCKING CIRCUITS

OFFICE OF CHIEF SIGNAL ENGINEER,
PHILA., PA., MARCH 30, 1928.

Approved: [Signature] Chief Signal Engineer

NOT TO SCALE
Approved: [Signature] Chief Engineer



CIRCUIT TO BE USED WHERE SIGNALS CONTROLLED
BY SAME LEVER MOVEMENT ARE LOCATED ON
OPPOSITE SIDES OF CABIN.

FOR GENERAL NOTES SEE SHEET NO. 1.

REVISIONS

3-30-28. MECHANICAL STICK
PUSH BUTTON PROVIDED WITH
AUTOMATIC RELEASE.
FORMERLY SH. 3
APPROVED: [Signature]

SHEET 5 OF 6

S-870

THE PENNSYLVANIA RAILROAD
TYPICAL
SIGNAL INDICATION AND
APPROACH LOCKING CIRCUITS

OFFICE OF CHIEF SIGNAL ENGINEER,
PHILA., PA., AUG. 23, 1928

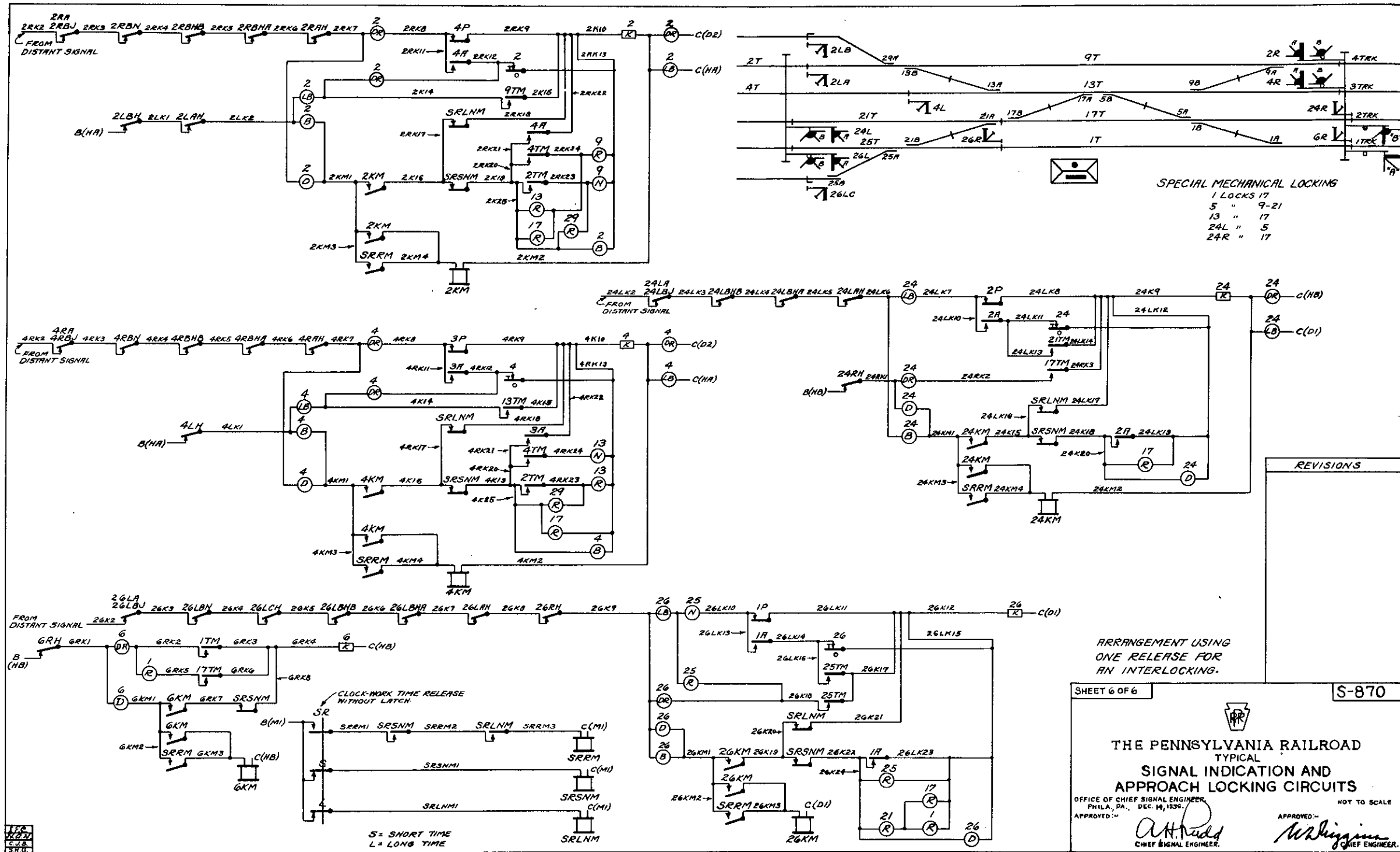
Approved

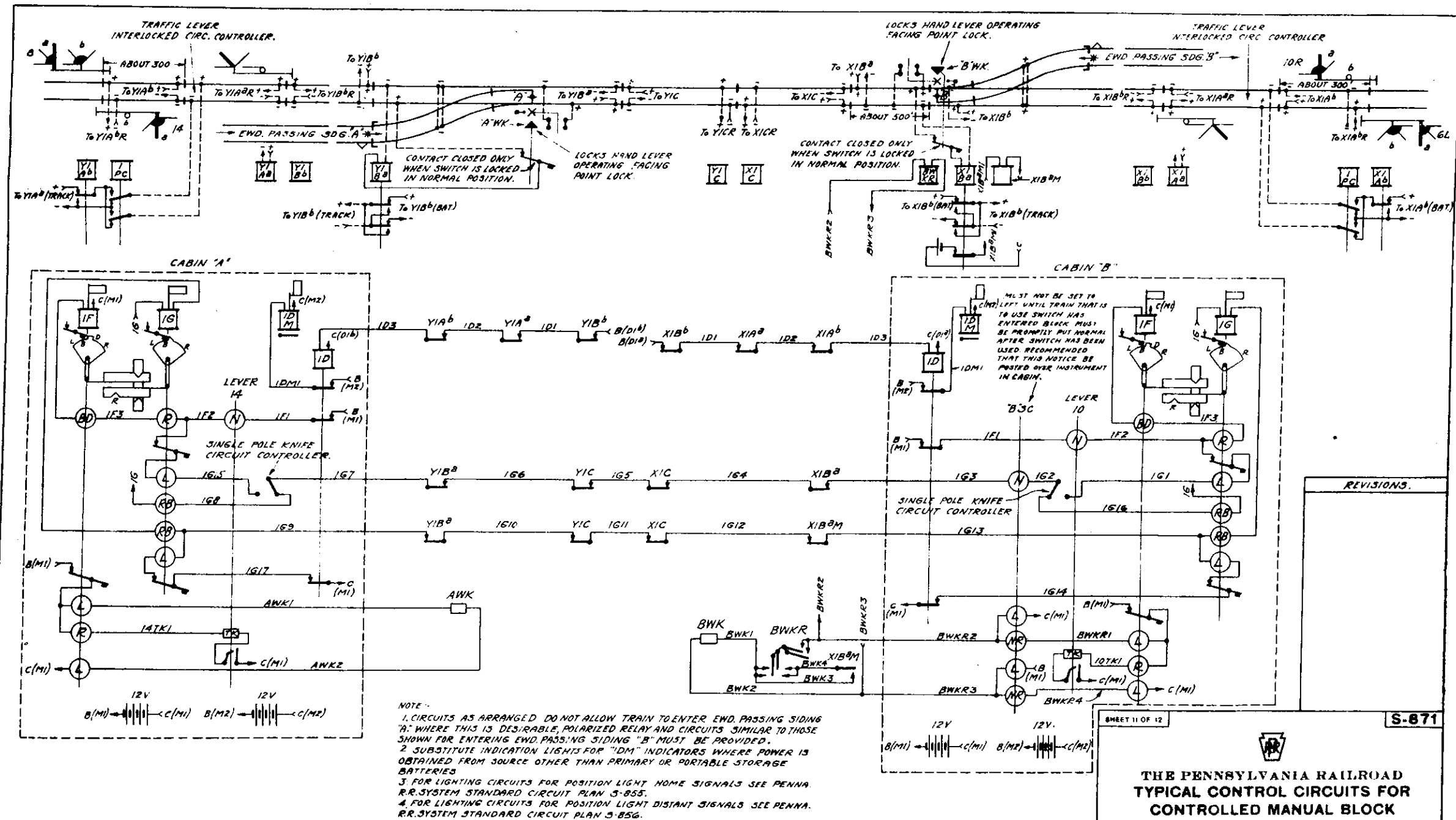
[Signature]
Chief Signal Engineer

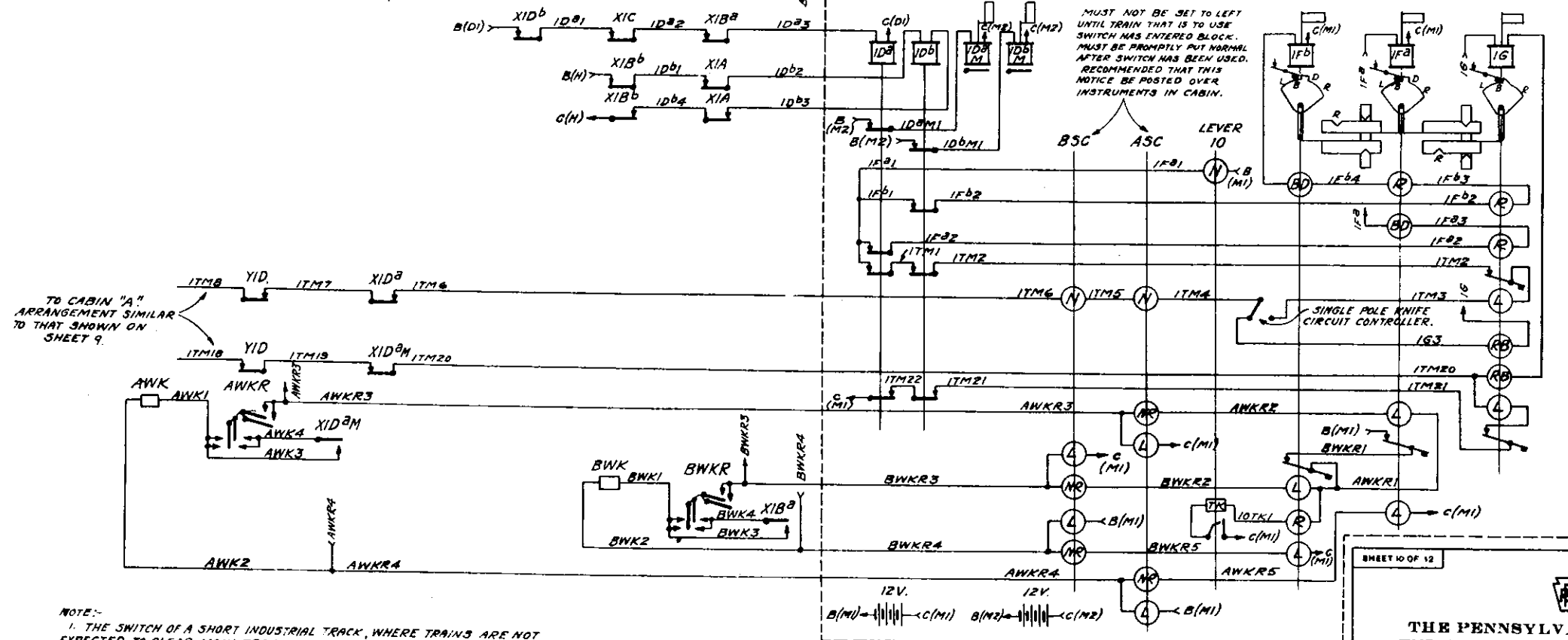
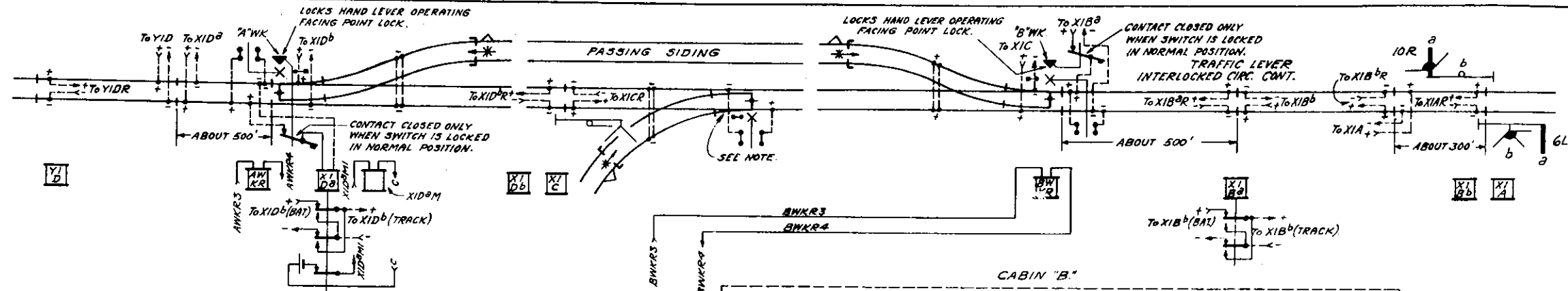
NOT TO SCALE

Approved

[Signature]
Chief Engineer







NOTE:-

1. THE SWITCH OF A SHORT INDUSTRIAL TRACK, WHERE TRAINS ARE NOT EXPECTED TO CLEAR MAIN TRACK IN NORMAL OPERATION, SHOULD NOT, AS A GENERAL RULE, BE ELECTRICALLY LOCKED. WHERE SUCH SWITCHES ARE ELECTRICALLY LOCKED SEE S-871, SHEET 12.
2. FOR LIGHTING CIRCUITS FOR POSITION LIGHT HOME SIGNALS SEE PENNA. R.R. SYSTEM STANDARD CIRCUIT PLAN S-855.
3. FOR LIGHTING CIRCUITS FOR POSITION LIGHT DISTANT SIGNALS SEE PENNA. R.R. SYSTEM STANDARD CIRCUIT PLAN S-856.

4. SUBSTITUTE INDICATION LIGHTS FOR REPEATING INDICATORS WHERE POWER IS OBTAINED FROM SOURCE OTHER THAN PRIMARY OR PORTABLE STORAGE BATTERIES.

D.C. TRACK CIRCUITS.
NOTE: FOR SIMILAR ARRANGEMENT USING A.C. TRACK CIRCUITS SEE S-855.

REVISIONS.

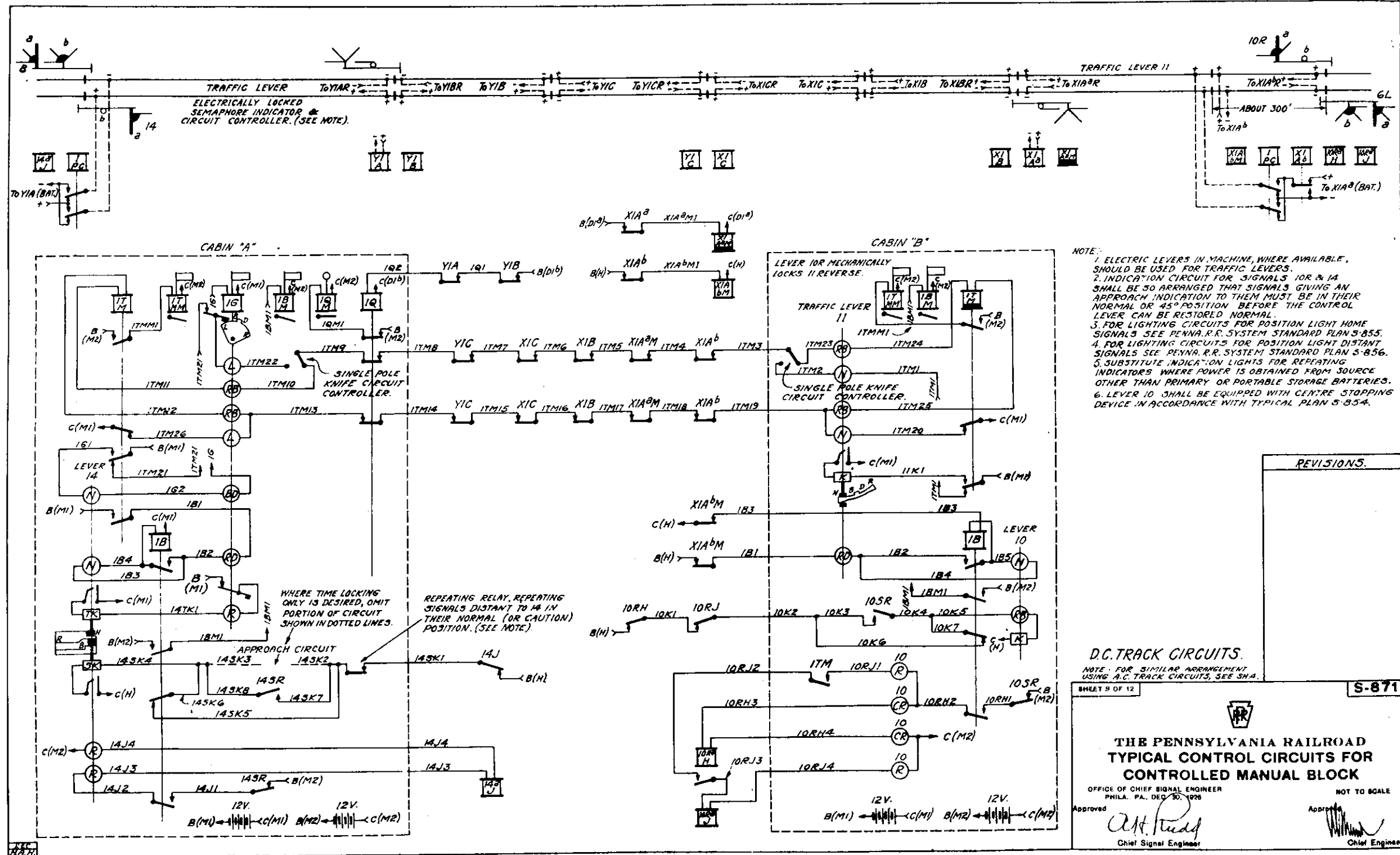
S-871

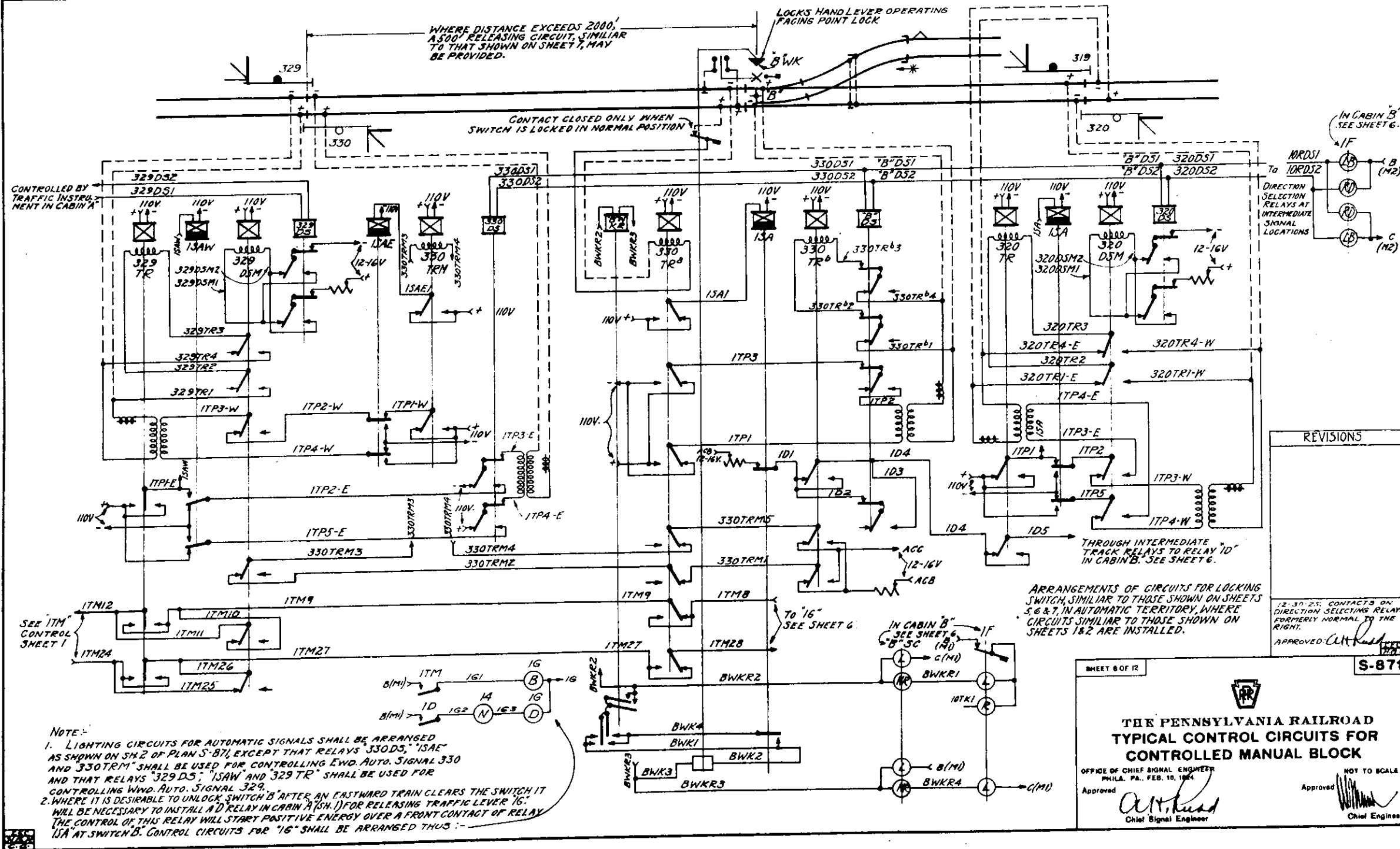
THE PENNSYLVANIA RAILROAD
TYPICAL CONTROL CIRCUITS FOR
CONTROLLED MANUAL BLOCK

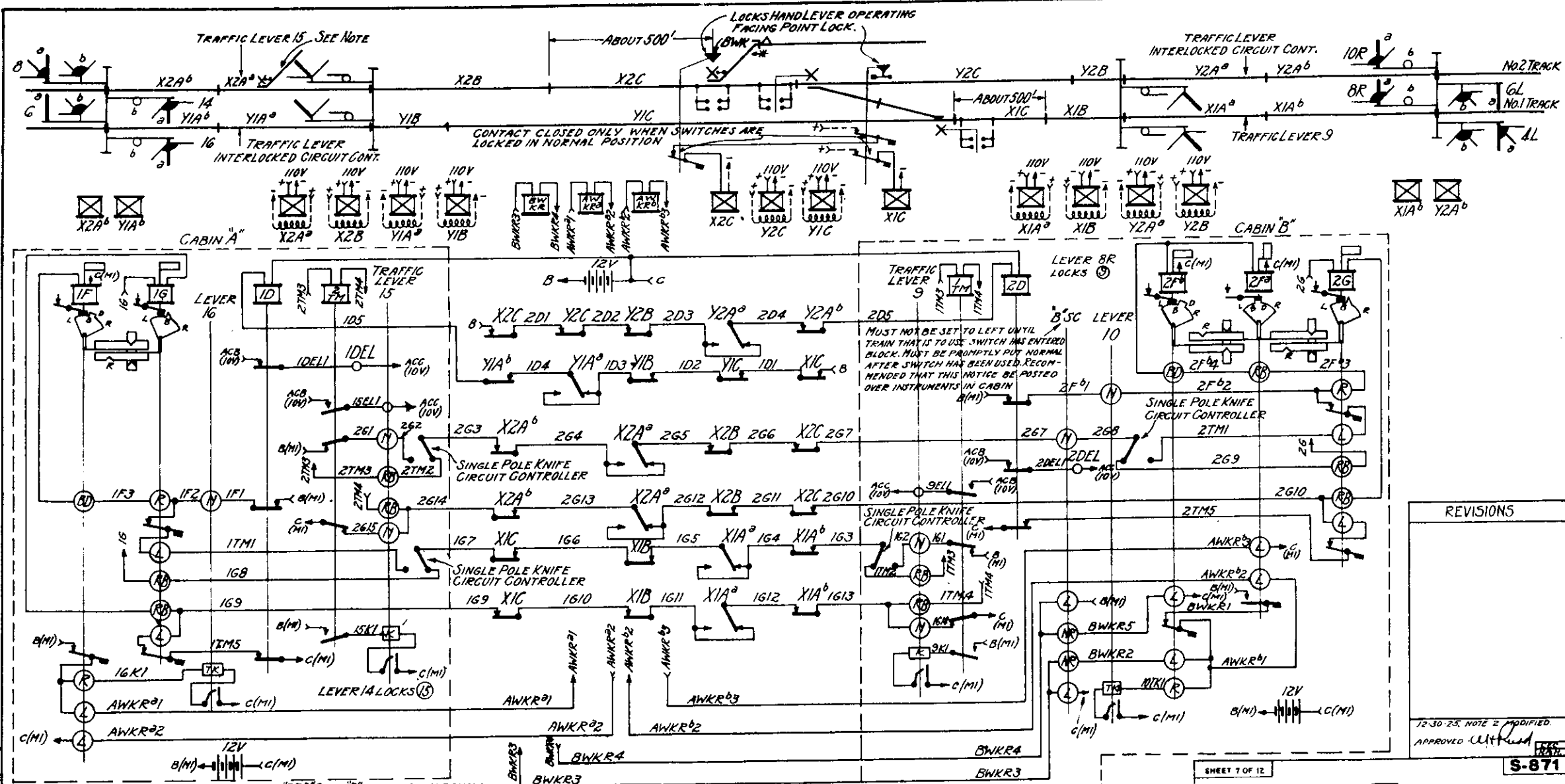
OFFICE OF CHIEF SIGNAL ENGINEER
PHILA. PA., DEC. 30, 1926

Approved: *A.H. Reed*
Chief Signal Engineer

NOT TO SCALE
Approved: *[Signature]*
Chief Engineer







1. SEGMENT AND LOCKING DOG ON INSTRUMENT "ZF", CABIN "B", SHOULD BE ARRANGED AS SHOWN WHERE TRACK ARRANGEMENT IS SIMILAR TO THAT SHOWN ABOVE. THIS ALLOWS "ZF" TO BE PUT TO THE "R" POSITION, THUS RELEASING "ZF" AND ALLOWING IT TO BE THROWN TO THE LEFT, AFTER EASTWARD TRAIN ON NO. 2 TRACK CLEARS SECTION X2C, RELAY 2D BEING DEENERGIZED. ELECTRIC SWITCH LOCK BWK MAY THEN BE ENERGIZED AND TRAIN MAY LEAVE SIDING AND PROCEED TO CABIN "A".
2. THE SWITCH OF A SHORT INDUSTRIAL TRACK, WHERE TRAINS ARE NOT EXPECTED TO CLEAR THE MAIN TRACK IN NORMAL OPERATION, SHOULD NOT, AS A GENERAL RULE, BE ELECTRICALLY LOCKED. WHERE SUCH SWITCHES ARE ELECTRICALLY LOCKED SEE S-871, S-12.
3. FOR LIGHTING CIRCUITS FOR POSITION LIGHT HOME SIGNALS SEE PENNA. R.R. SYSTEM STANDARD CIRCUITS PLAN S-855.
4. FOR LIGHTING CIRCUITS FOR POSITION LIGHT DISTANT SIGNALS SEE PENNA. R.R. SYSTEM STANDARD CIRCUITS PLAN S-856.

REVISIONS
12-30-25, NOTE 2 MODIFIED.
APPROVED <i>W. H. H. H.</i>
DATE

SHEET 7 OF 12

THE PENNSYLVANIA RAILROAD
TYPICAL CONTROL CIRCUITS FOR
CONTROLLED MANUAL BLOCK

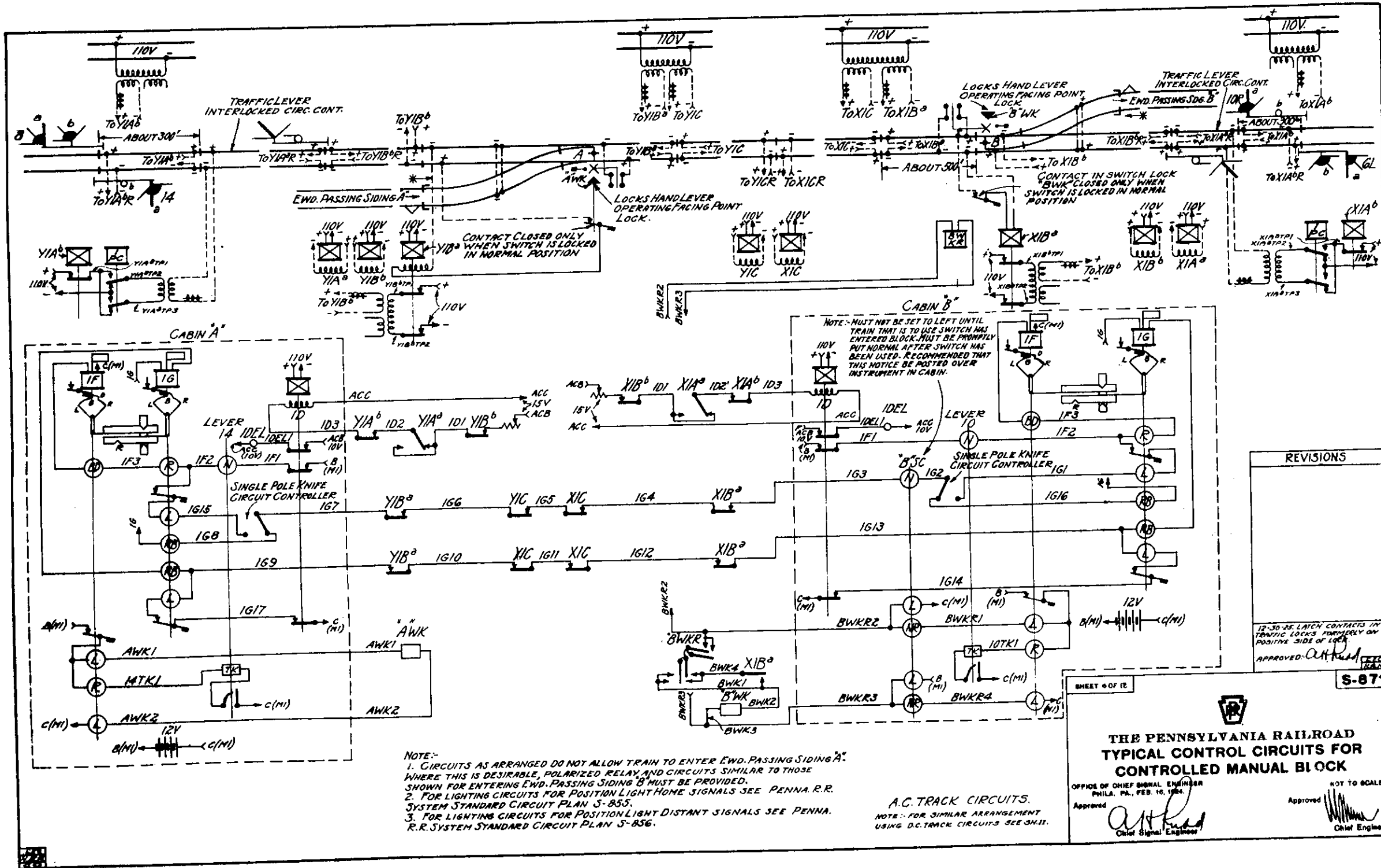
OFFICE OF CHIEF SIGNAL ENGINEER
 PHILA. PA., FEB. 10, 1925

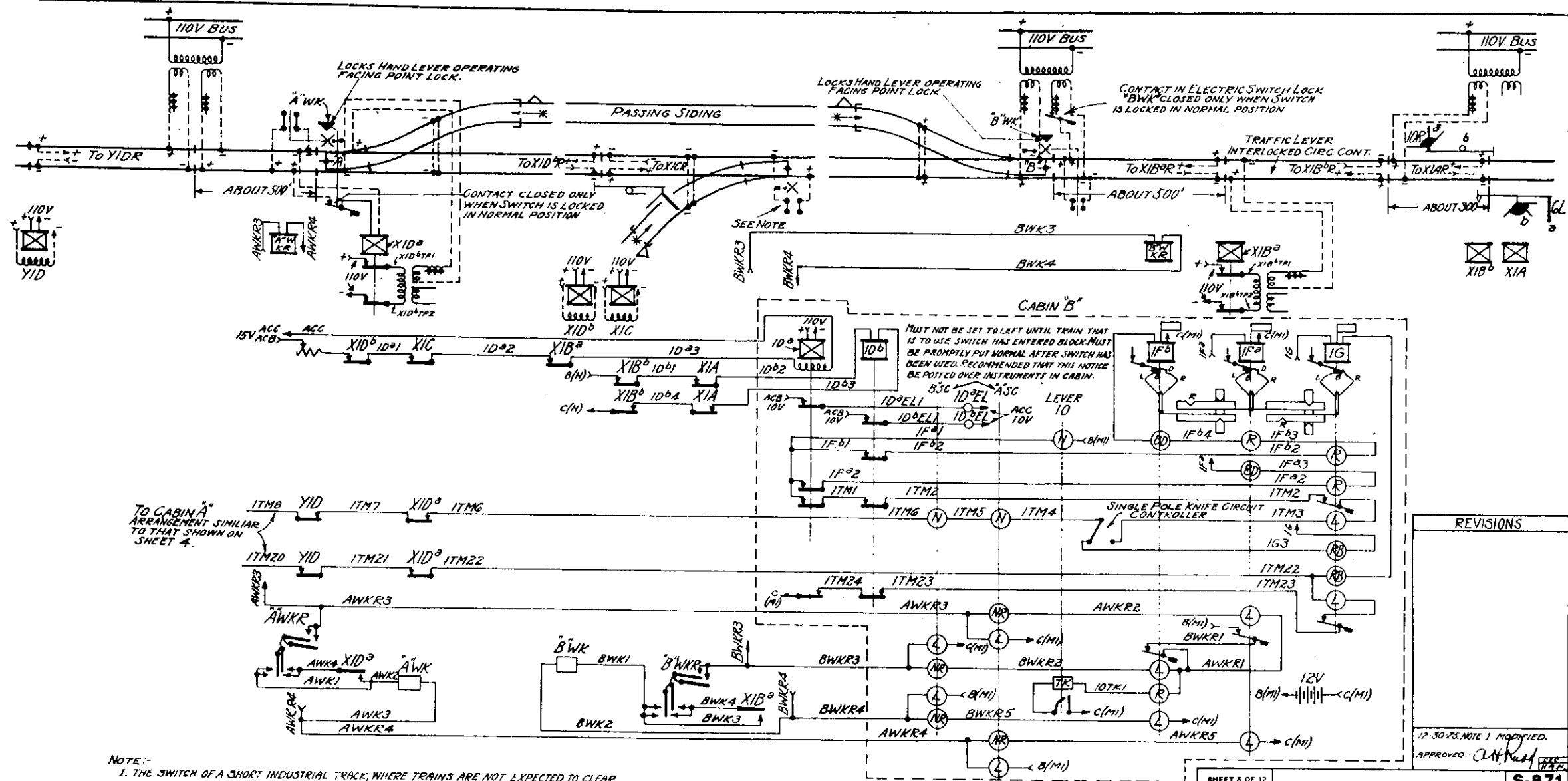
Approved *W. H. H. H.* Chief Signal Engineer

NOT TO SCALE

Approved *W. H. H. H.* Chief Engineer

S-871





NOTE:-
 1. THE SWITCH OF A SHORT INDUSTRIAL TRACK, WHERE TRAINS ARE NOT EXPECTED TO CLEAR MAIN TRACK IN NORMAL OPERATION, SHOULD NOT, AS A GENERAL RULE, BE ELECTRICALLY LOCKED, WHERE SUCH SWITCHES ARE ELECTRICALLY LOCKED, SEE S-871, 3H, 12.
 2. FOR LIGHTING CIRCUITS FOR POSITION LIGHT HOME SIGNALS SEE PENNA. R.R. SYSTEM STANDARD CIRCUIT PLAN S-855.
 3. FOR LIGHTING CIRCUITS FOR POSITION LIGHT DISTANT SIGNALS SEE PENNA. R.R. SYSTEM STANDARD CIRCUIT PLAN S-856.

A.C. TRACK CIRCUITS.
 NOTE: FOR SIMILAR ARRANGEMENT
 USING D.C. TRACK CIRCUITS SEE 3H, 10.

SHEET 8 OF 12

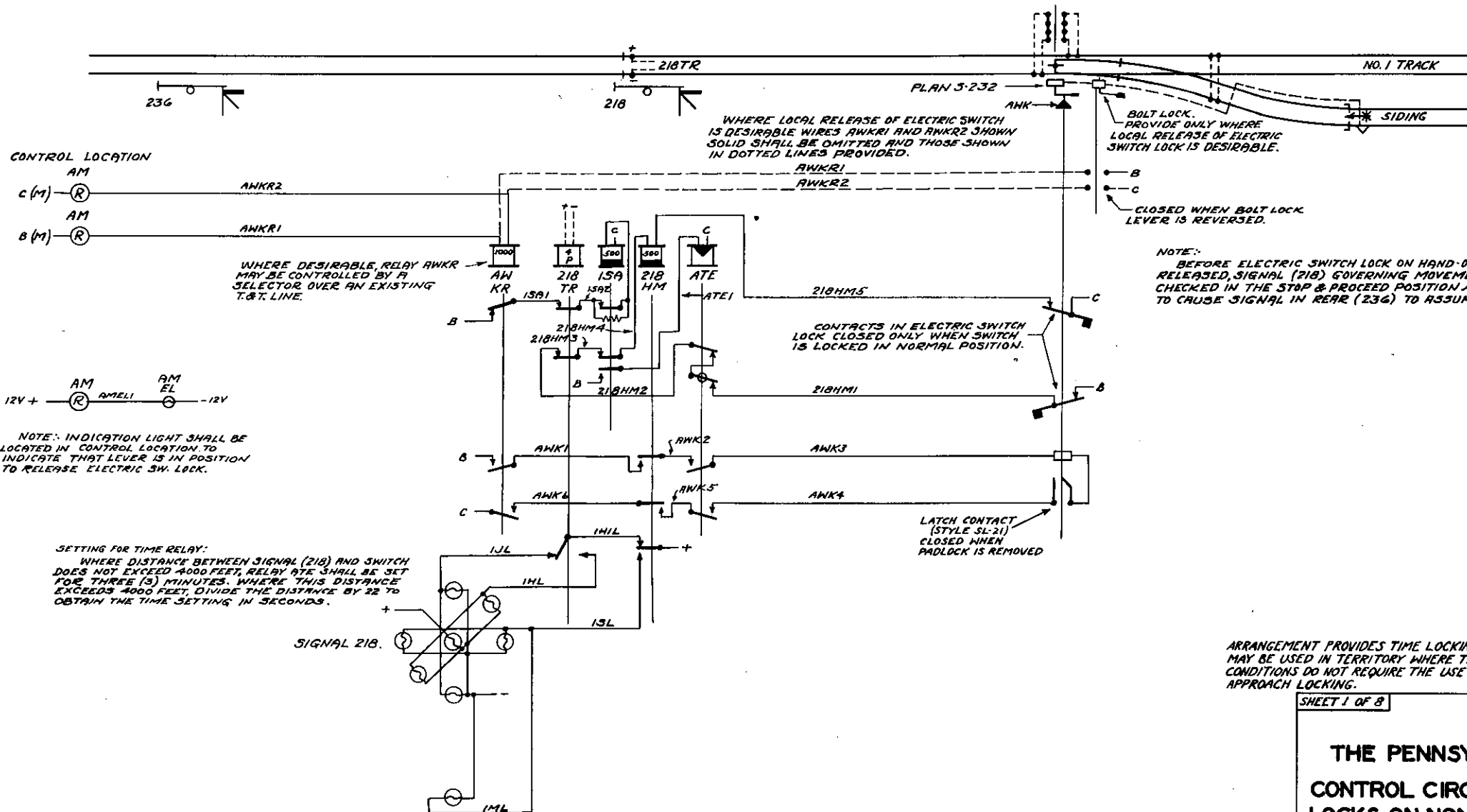
THE PENNSYLVANIA RAILROAD
 TYPICAL CONTROL CIRCUITS FOR
 CONTROLLED MANUAL BLOCK

OFFICE OF CHIEF SIGNAL ENGINEER
 PHILA. PA., FEB. 10, 1924
 Approved *[Signature]*
 Chief Signal Engineer

NOT TO SCALE
 Approved *[Signature]*
 Chief Engineer

REVISIONS

12-30-23, NOTE 1 MODIFIED.
 APPROVED: *[Signature]* *[Signature]*
 S-871



REVISIONS

ARRANGEMENT PROVIDES TIME LOCKING ONLY. MAY BE USED IN TERRITORY WHERE TRAFFIC CONDITIONS DO NOT REQUIRE THE USE OF APPROACH LOCKING.

NOV. 3, 1942. INDICATION LIGHT PROVIDED. APPROVED: *N. L. Stanton*

SHEET 1 OF 8

S-872

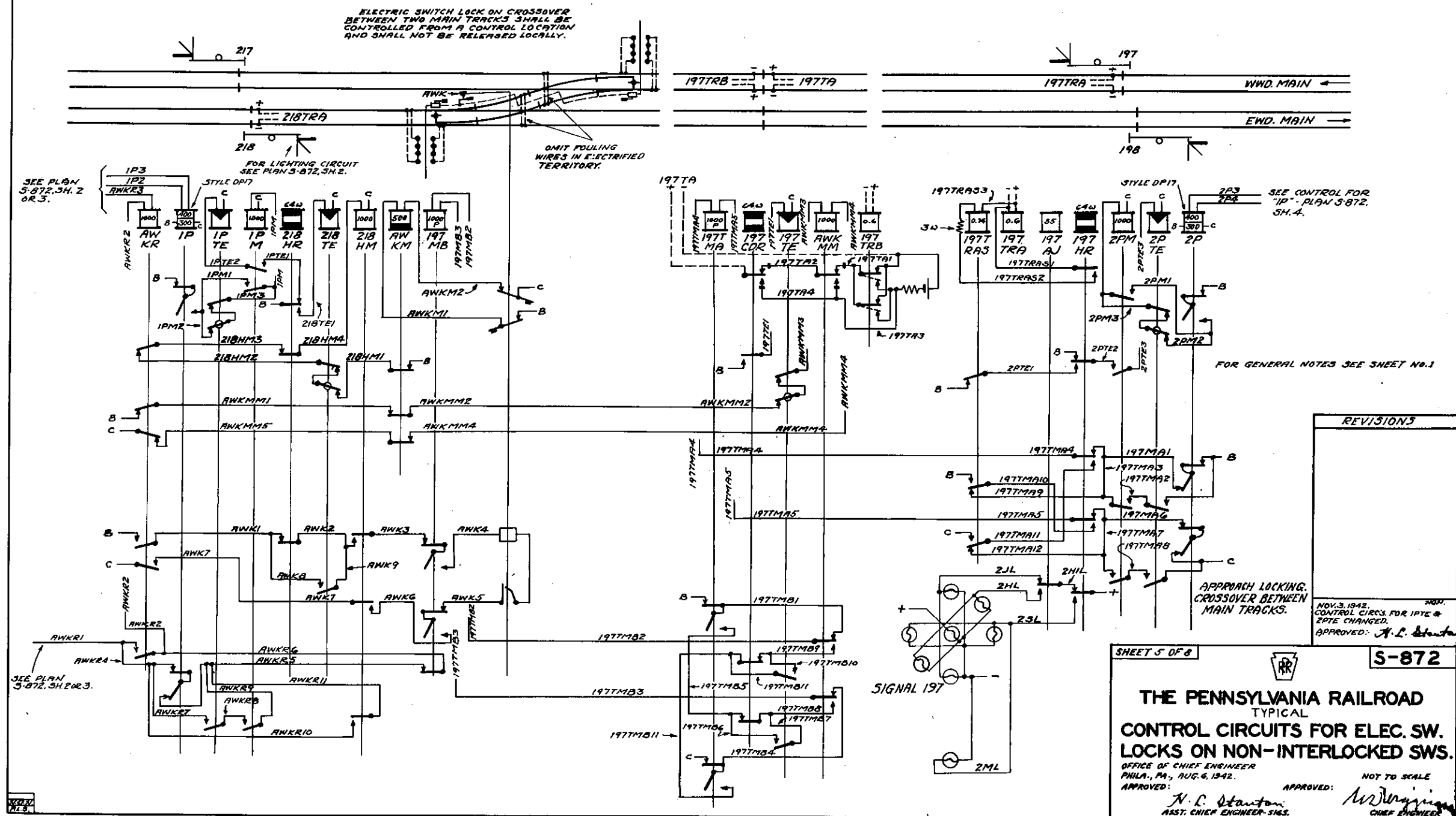
THE PENNSYLVANIA RAILROAD TYPICAL CONTROL CIRCUITS FOR ELEC. SW. LOCKS ON NON-INTERLOCKED SWS.

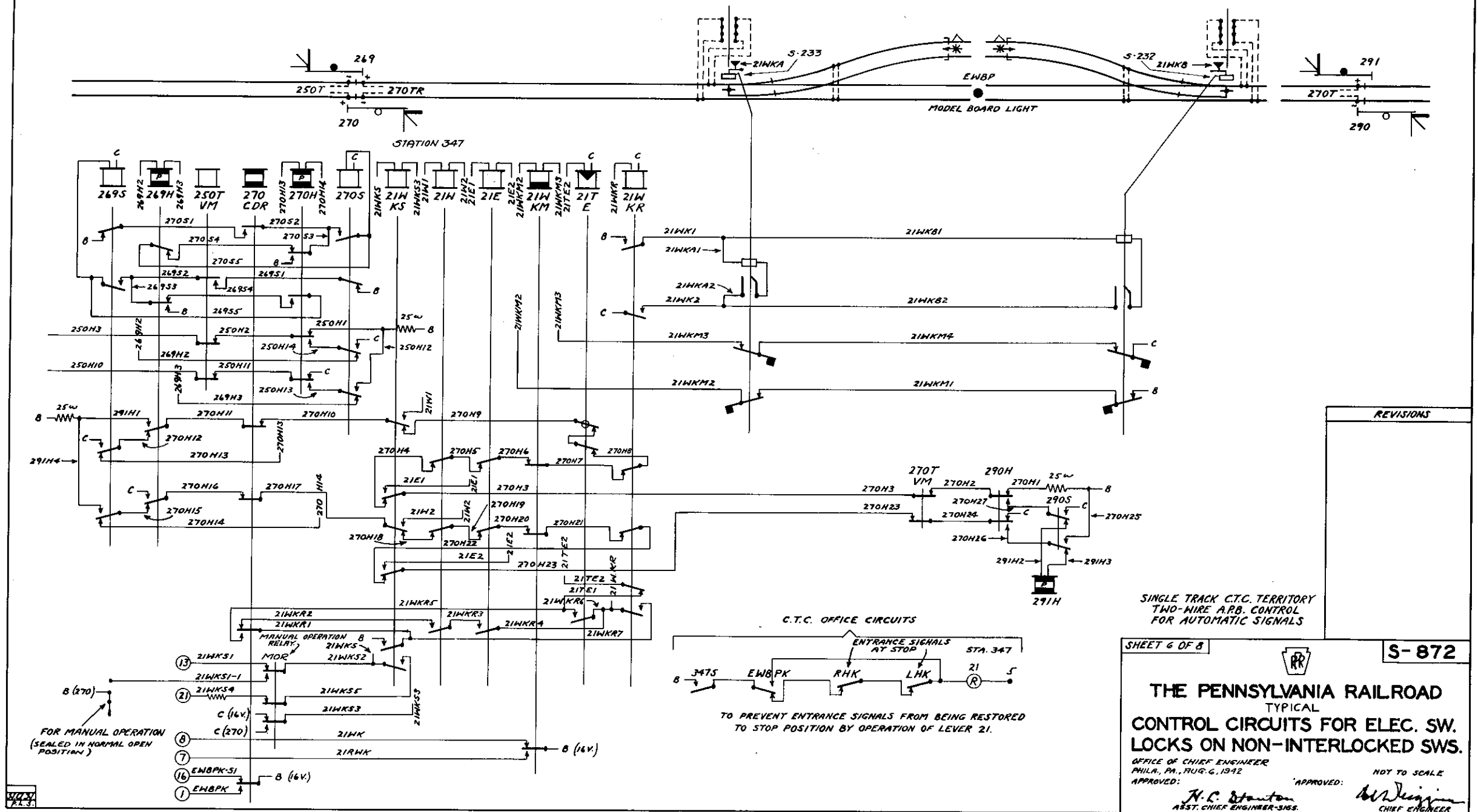
OFFICE OF CHIEF ENGINEER,
PHILA., PA., AUG. 6, 1942.

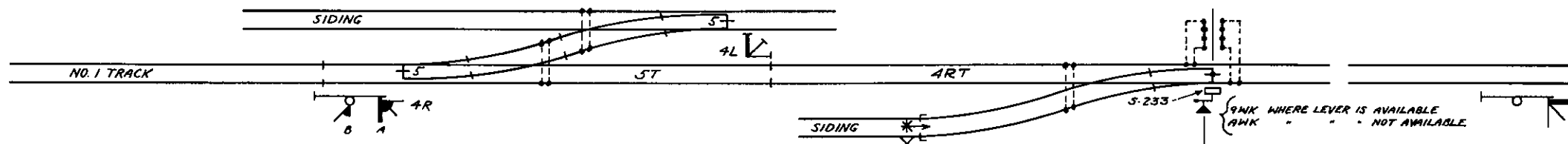
APPROVED: *N. L. Stanton*
ASST. CHIEF ENGINEER-SIGS.

APPROVED: *M. J. Sullivan*
CHIEF ENGINEER

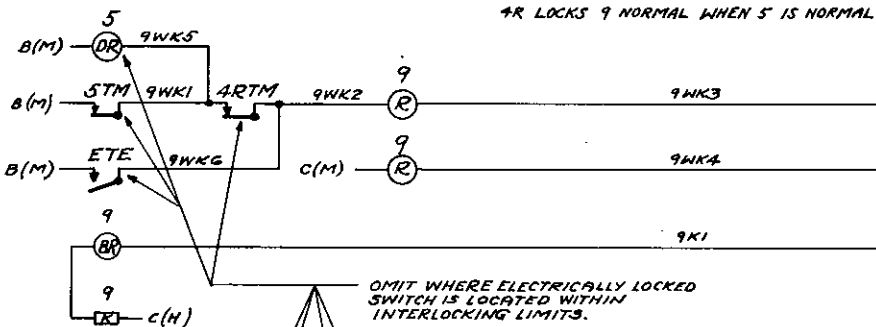
NOT TO SCALE



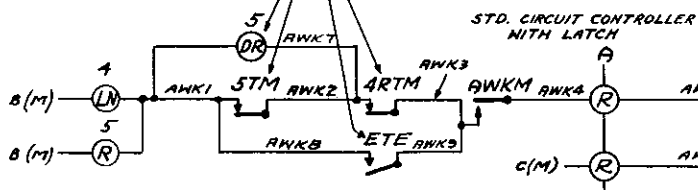




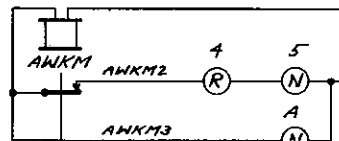
4R LOCKS 9 NORMAL WHEN 5 IS NORMAL



WHERE LEVER IN MACHINE IS AVAILABLE

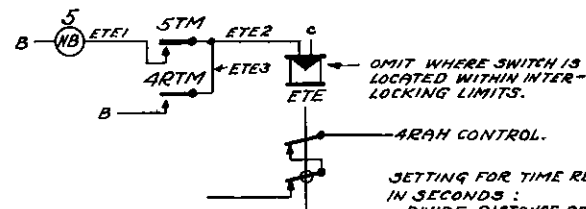


STD. CIRCUIT CONTROLLER WITH LATCH



4 RAH & 4 RBN CONTROL

WHERE LEVER IN MACHINE IS NOT AVAILABLE



SETTING FOR TIME RELAY IN SECONDS :
DIVIDE DISTANCE BETWEEN
SIG. 4R AND ELECTRICALLY
LOCKED SWITCH BY 22.

NOTE:
WHERE HAND-OPERATED SWITCH IS LOCATED WITHIN
INTERLOCKING LIMITS IT SHALL BE ELECTRICALLY LOCKED
IN NORMAL AND REVERSE POSITION.

REVISIONS

FOR USE WHERE SWITCH IS PROTECTED
BY INTERLOCKED HOME SIGNAL.

SHEET 8 OF 8



S-872

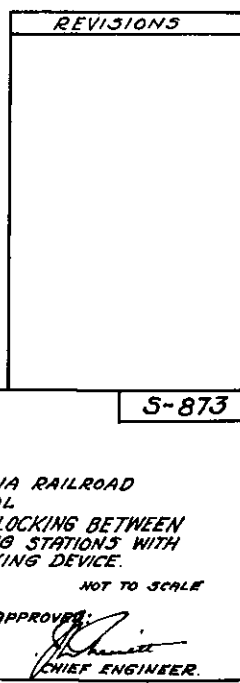
THE PENNSYLVANIA RAILROAD
TYPICAL
CONTROL CIRCUITS FOR ELEC. SW.
LOCKS ON NON-INTERLOCKED SWS.

OFFICE OF CHIEF ENGINEER
PHILA., PA., AUG. 6, 1942.

APPROVED:
N. L. Stanton
ASSY. CHIEF ENGINEER-SWS.

APPROVED:
W. J. Harrison
CHIEF ENGINEER

NOT TO SCALE



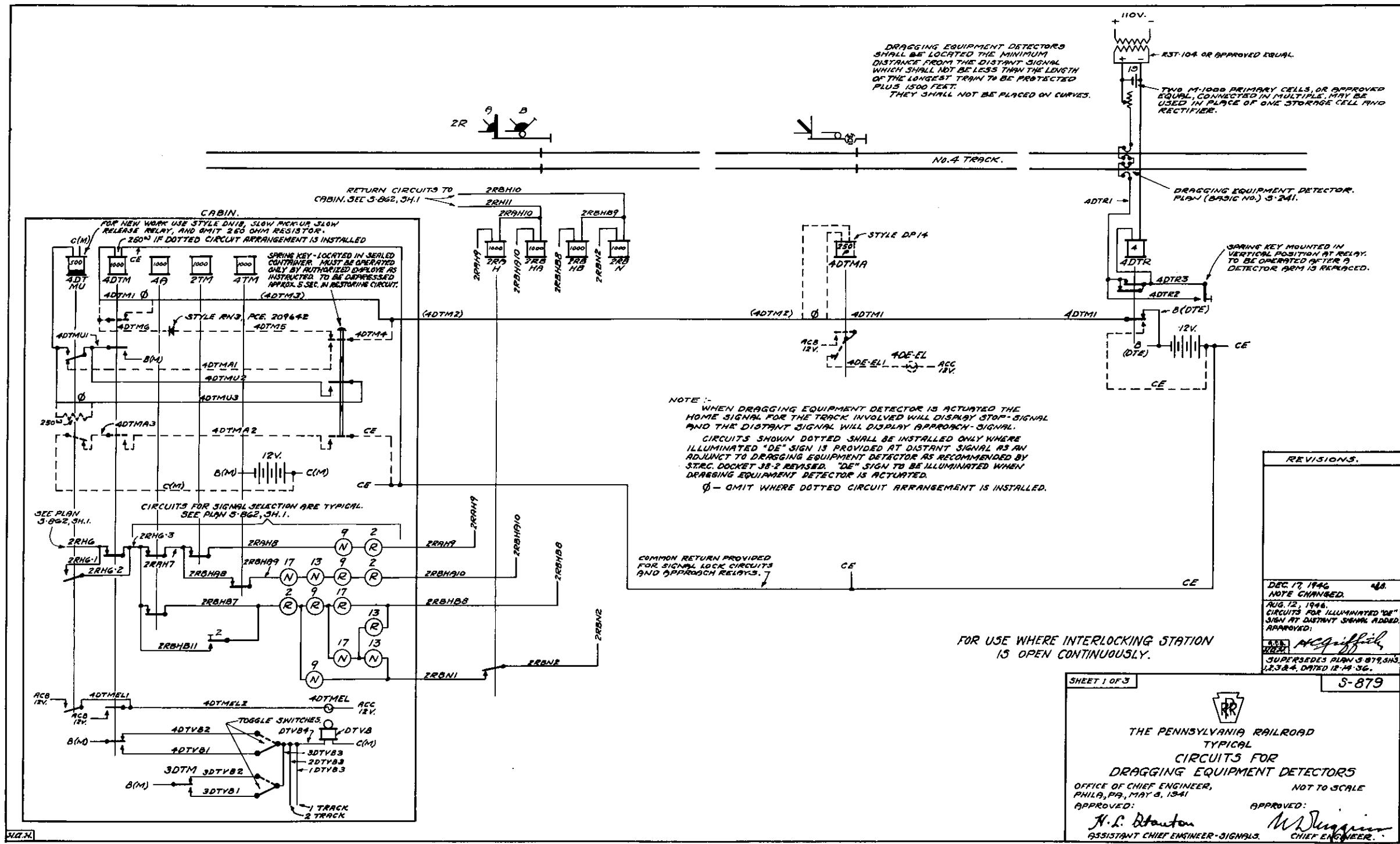


Diagram illustrating the track relay circuit for No. 4 Track, showing various relays and electrical connections.

Key Components and Connections:

- Relays:** 4DTR (Style DN11), 4DT (1000), 4DE (1000), 4DE-EL, 4DE-EL1, 4DE-EL2, 4DE-EL3, 4DE-EL4, 4DE-EL5, 4DE-EL6, 4DE-EL7, 4DE-EL8, 4DE-EL9, 4DE-EL10, 4DE-EL11, 4DE-EL12, 4DE-EL13, 4DE-EL14, 4DE-EL15, 4DE-EL16, 4DE-EL17, 4DE-EL18, 4DE-EL19, 4DE-EL20, 4DE-EL21, 4DE-EL22, 4DE-EL23, 4DE-EL24, 4DE-EL25, 4DE-EL26, 4DE-EL27, 4DE-EL28, 4DE-EL29, 4DE-EL30, 4DE-EL31, 4DE-EL32, 4DE-EL33, 4DE-EL34, 4DE-EL35, 4DE-EL36, 4DE-EL37, 4DE-EL38, 4DE-EL39, 4DE-EL40, 4DE-EL41, 4DE-EL42, 4DE-EL43, 4DE-EL44, 4DE-EL45, 4DE-EL46, 4DE-EL47, 4DE-EL48, 4DE-EL49, 4DE-EL50, 4DE-EL51, 4DE-EL52, 4DE-EL53, 4DE-EL54, 4DE-EL55, 4DE-EL56, 4DE-EL57, 4DE-EL58, 4DE-EL59, 4DE-EL60, 4DE-EL61, 4DE-EL62, 4DE-EL63, 4DE-EL64, 4DE-EL65, 4DE-EL66, 4DE-EL67, 4DE-EL68, 4DE-EL69, 4DE-EL70, 4DE-EL71, 4DE-EL72, 4DE-EL73, 4DE-EL74, 4DE-EL75, 4DE-EL76, 4DE-EL77, 4DE-EL78, 4DE-EL79, 4DE-EL80, 4DE-EL81, 4DE-EL82, 4DE-EL83, 4DE-EL84, 4DE-EL85, 4DE-EL86, 4DE-EL87, 4DE-EL88, 4DE-EL89, 4DE-EL90, 4DE-EL91, 4DE-EL92, 4DE-EL93, 4DE-EL94, 4DE-EL95, 4DE-EL96, 4DE-EL97, 4DE-EL98, 4DE-EL99, 4DE-EL100.
- Switches:** 4DTR1, 4DTR2, 4DTR3, 4DTR4, 4DTR5, 4DTR6, 4DTR7, 4DTR8, 4DTR9, 4DTR10, 4DTR11, 4DTR12, 4DTR13, 4DTR14, 4DTR15, 4DTR16, 4DTR17, 4DTR18, 4DTR19, 4DTR20, 4DTR21, 4DTR22, 4DTR23, 4DTR24, 4DTR25, 4DTR26, 4DTR27, 4DTR28, 4DTR29, 4DTR30, 4DTR31, 4DTR32, 4DTR33, 4DTR34, 4DTR35, 4DTR36, 4DTR37, 4DTR38, 4DTR39, 4DTR40, 4DTR41, 4DTR42, 4DTR43, 4DTR44, 4DTR45, 4DTR46, 4DTR47, 4DTR48, 4DTR49, 4DTR50, 4DTR51, 4DTR52, 4DTR53, 4DTR54, 4DTR55, 4DTR56, 4DTR57, 4DTR58, 4DTR59, 4DTR60, 4DTR61, 4DTR62, 4DTR63, 4DTR64, 4DTR65, 4DTR66, 4DTR67, 4DTR68, 4DTR69, 4DTR70, 4DTR71, 4DTR72, 4DTR73, 4DTR74, 4DTR75, 4DTR76, 4DTR77, 4DTR78, 4DTR79, 4DTR80, 4DTR81, 4DTR82, 4DTR83, 4DTR84, 4DTR85, 4DTR86, 4DTR87, 4DTR88, 4DTR89, 4DTR90, 4DTR91, 4DTR92, 4DTR93, 4DTR94, 4DTR95, 4DTR96, 4DTR97, 4DTR98, 4DTR99, 4DTR100.
- Power Sources:** 12V, 12V+, 12V-EL, 12V-EL1, 12V-EL2, 12V-EL3, 12V-EL4, 12V-EL5, 12V-EL6, 12V-EL7, 12V-EL8, 12V-EL9, 12V-EL10, 12V-EL11, 12V-EL12, 12V-EL13, 12V-EL14, 12V-EL15, 12V-EL16, 12V-EL17, 12V-EL18, 12V-EL19, 12V-EL20, 12V-EL21, 12V-EL22, 12V-EL23, 12V-EL24, 12V-EL25, 12V-EL26, 12V-EL27, 12V-EL28, 12V-EL29, 12V-EL30, 12V-EL31, 12V-EL32, 12V-EL33, 12V-EL34, 12V-EL35, 12V-EL36, 12V-EL37, 12V-EL38, 12V-EL39, 12V-EL40, 12V-EL41, 12V-EL42, 12V-EL43, 12V-EL44, 12V-EL45, 12V-EL46, 12V-EL47, 12V-EL48, 12V-EL49, 12V-EL50, 12V-EL51, 12V-EL52, 12V-EL53, 12V-EL54, 12V-EL55, 12V-EL56, 12V-EL57, 12V-EL58, 12V-EL59, 12V-EL60, 12V-EL61, 12V-EL62, 12V-EL63, 12V-EL64, 12V-EL65, 12V-EL66, 12V-EL67, 12V-EL68, 12V-EL69, 12V-EL70, 12V-EL71, 12V-EL72, 12V-EL73, 12V-EL74, 12V-EL75, 12V-EL76, 12V-EL77, 12V-EL78, 12V-EL79, 12V-EL80, 12V-EL81, 12V-EL82, 12V-EL83, 12V-EL84, 12V-EL85, 12V-EL86, 12V-EL87, 12V-EL88, 12V-EL89, 12V-EL90, 12V-EL91, 12V-EL92, 12V-EL93, 12V-EL94, 12V-EL95, 12V-EL96, 12V-EL97, 12V-EL98, 12V-EL99, 12V-EL100.
- Common Return:** COMMON RETURN PROVIDED FOR SIGNAL LOCK CIRCUITS AND APPROACH RELAYS.

Annotations:

- IN CAB SIGNAL TERRITORY RELAY 4DTR MAY BE LOCATED AT SIGNAL ZR AND CONTACT IN NORMALLY ENERGIZED "V" RELAY SUBSTITUTED FOR CONTACT SHOWN IN TRACK RELAY.
- RELAYS TO BE PROVIDED WHERE ILLUMINATED "DE" SIGN IS USED.
- SELF RESTORING DRAGGING EQUIPMENT DETECTOR
- SHALL INCLUDE SECTION IN WHICH DRAGGING EQUIPMENT DETECTOR IS LOCATED.
- TO APPROACH RELAY ZRP IN TOWER
- KEY TO BE IN SEALED ZR. MUST BE USED ONLY BY EMPLOYEE INSTRUCTED.
- MU2

REVISIONS

WHEN DRAGGING EQUIPMENT DETECTOR IS ACTIVATED THE HOME SIGNAL FOR THE TRACK INVOLVED WILL DISPLAY STOP-SIGNAL AND THE DISTANT SIGNAL WILL DISPLAY APPROACH-SIGNAL.

RELAYS AND CIRCUITS SHOWN FOR ILLUMINATED "DE" SIGN SHALL BE INSTALLED ONLY WHERE ILLUMINATED "DE" SIGN IS PROVIDED AT DISTANT SIGNAL AS AN ADJUNCT TO DRAGGING EQUIPMENT DETECTOR AS RECOMMENDED BY S.T.R.G. DOCKET 38-2 REVISED. "DE" SIGN TO BE ILLUMINATED WHEN DRAGGING EQUIPMENT DETECTOR IS ACTIVATED.

REVISIONS

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