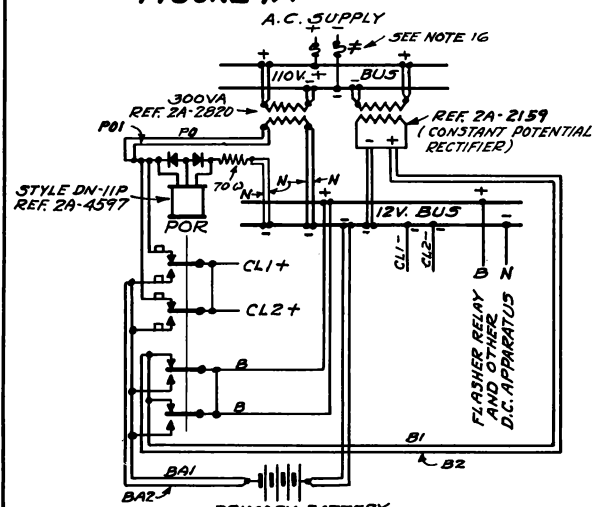


EACH BATTERY SHALL CONSIST OF TWENTY (20) TYPE HA-1000 CELLS. WHERE FIG. 2A IS USED AND MORE THAN 8 LAMPS ARE PROVIDED TYPE HA-1302 CELLS SHALL BE USED. (SEE NOTE 12.)

**PRIMARY BATTERY OPERATION**  
WHERE A.C. POWER IS NOT AVAILABLE.

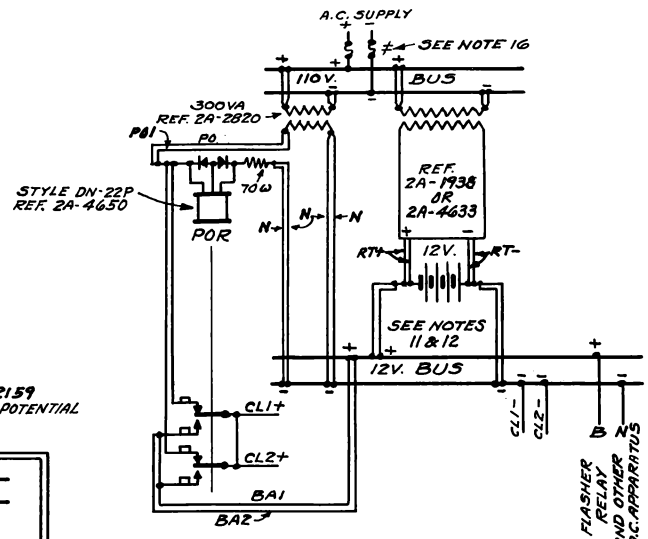
**FIGURE 1A**



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.)

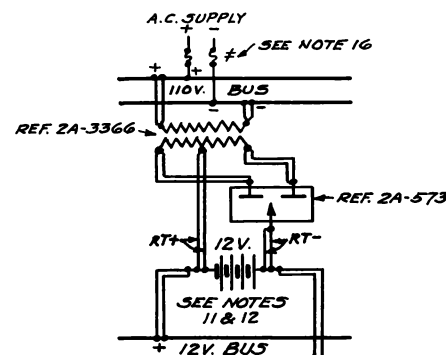
FOR USE WHERE A.C. SUPPLY IS AVAILABLE AND PRIMARY BATTERY STANDBY IS PROVIDED.

**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.

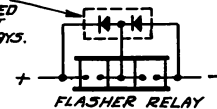
**FIGURE 1D**



BATTERY CHARGING ARRANGEMENT WHICH MAY BE USED IN LIEU OF ARRANGEMENT SHOWN FOR CHARGING BATTERIES IN FIGURES 1C & 1D.

**FIGURE 1E**

REF. 2A-3376 FOR NF FLASHERS. RECTIFIERS ARE FURNISHED AS STANDARD EQUIPMENT WITH FNIG & FNIGA 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.
  - 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.
  - 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.
- 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.
  - 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.
- 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.
- 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 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 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 CE 234, SECTION 44, PARA. (n).

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-4322. WHERE FIG. 1A IS PROVIDED USE LAMP 4832, REF. 25E-4211, WITH ADAPTOR, OMITTING 200 OHM RESISTOR. LAMPS SHALL BE PLACED IN PILOT-LIGHT, EQUIPPED WITH WHITE LENS.

- 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.
- SIGNALS SHALL NOT BE LIGHTED EXCEPT FOR APPROACHING TRAINS WHEN RED LIGHTS FLASHING ALTERNATELY (30 TO 45 TIMES PER MINUTE) SHALL BE DISPLAYED.

**REVISIONS**

MARCH 7, 1962.  
NOTE 5 (C) MODIFIED,  
NOTES 11, 12, 13 & 15  
CHANGED. SH. 1 REVISED.

APPROVED: *J. W. Chatter*  
L.E.P.

**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.

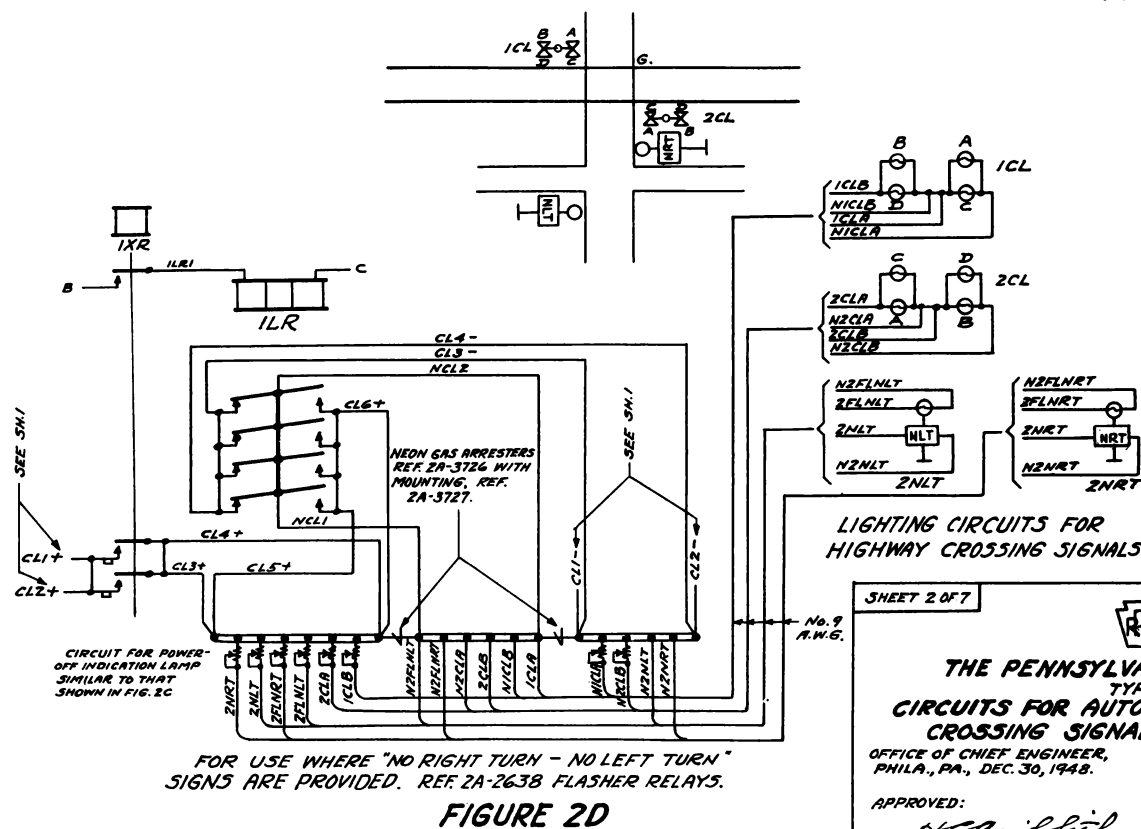
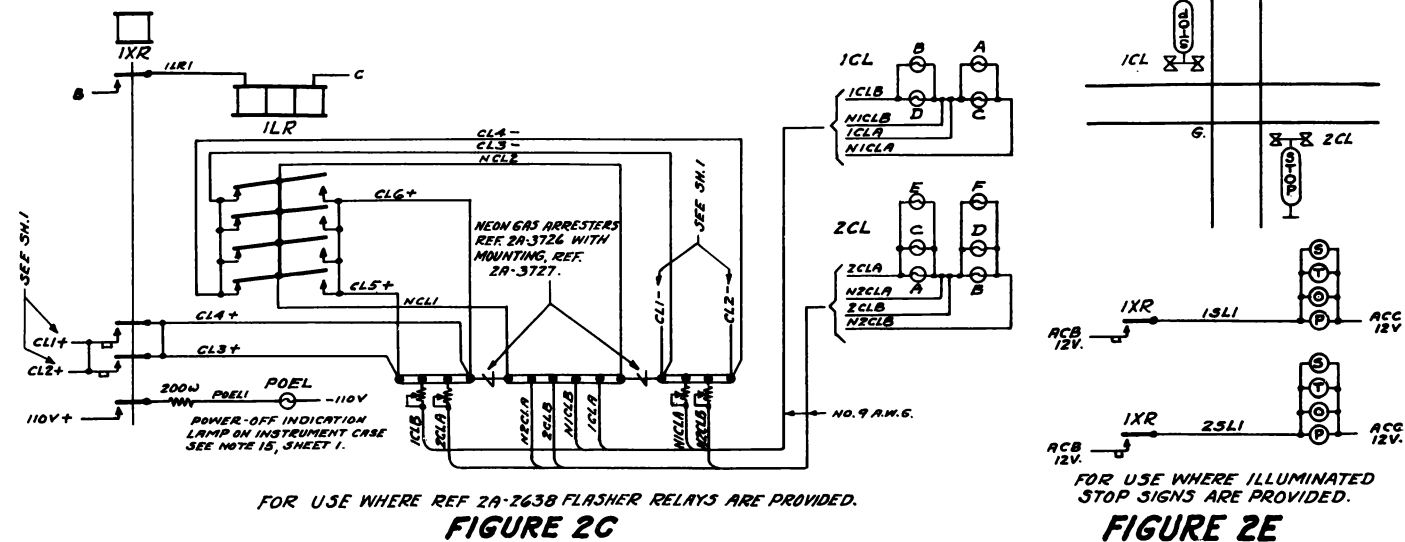
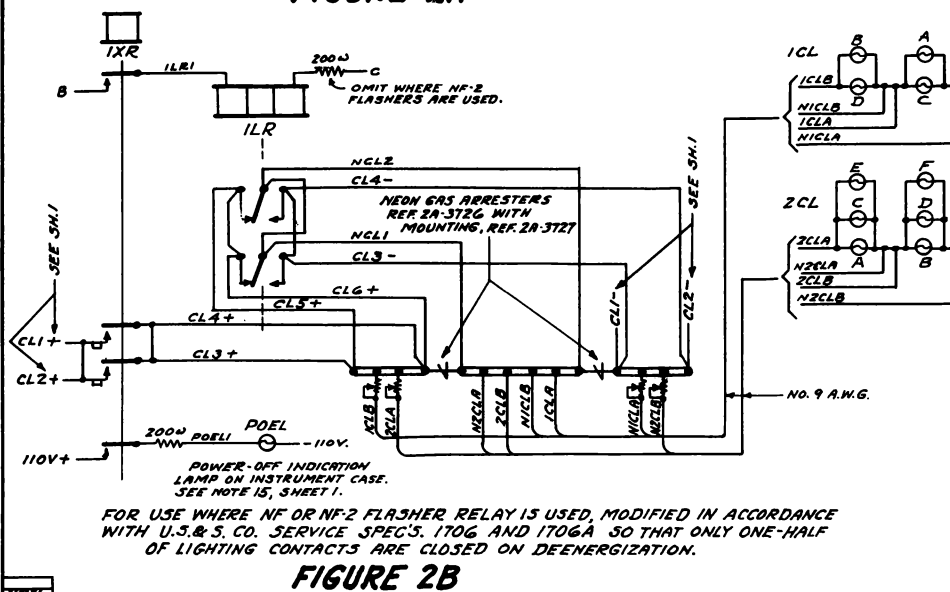
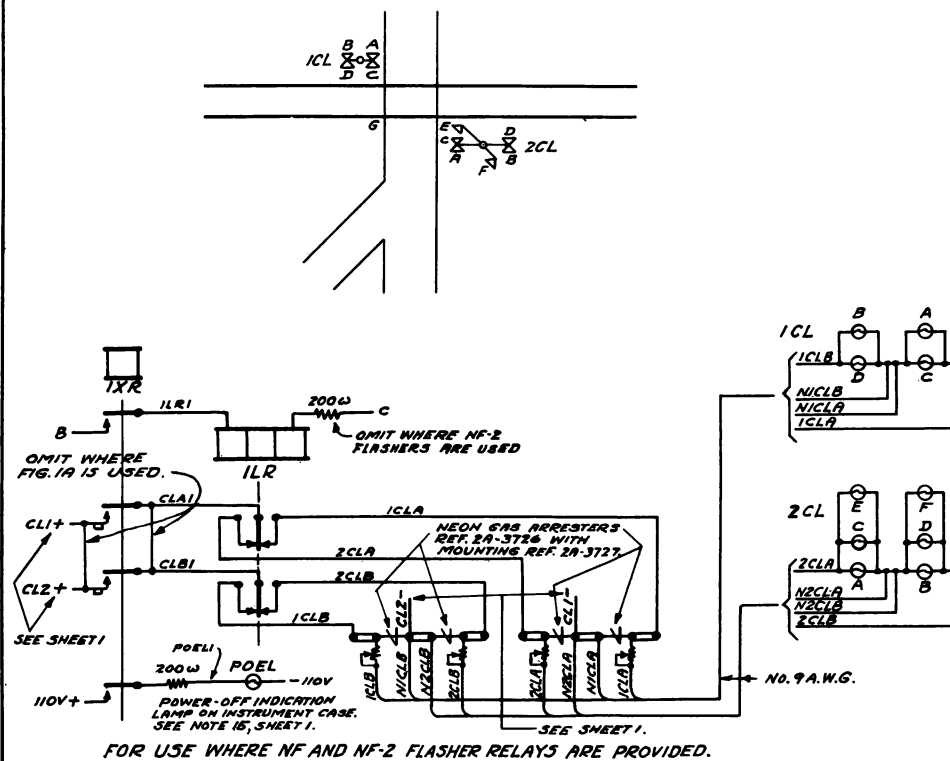
NOT TO SCALE

APPROVED:

*J. W. Chatter*  
ASST. CHIEF ENGINEER, T.-C.-S.

APPROVED:

*J. W. Chatter*  
CHIEF ENGINEER



### ***REVISIONS***

### LIGHTING CIRCUITS FOR HIGHWAY CROSSING SIGNALS.

**SHEET 2 OF 7**

**5-860**

**THE PENNSYLVANIA RAILROAD  
TYPICAL  
CIRCUITS FOR AUTOMATIC HIGHWAY  
CROSSING SIGNALS AND GATES**

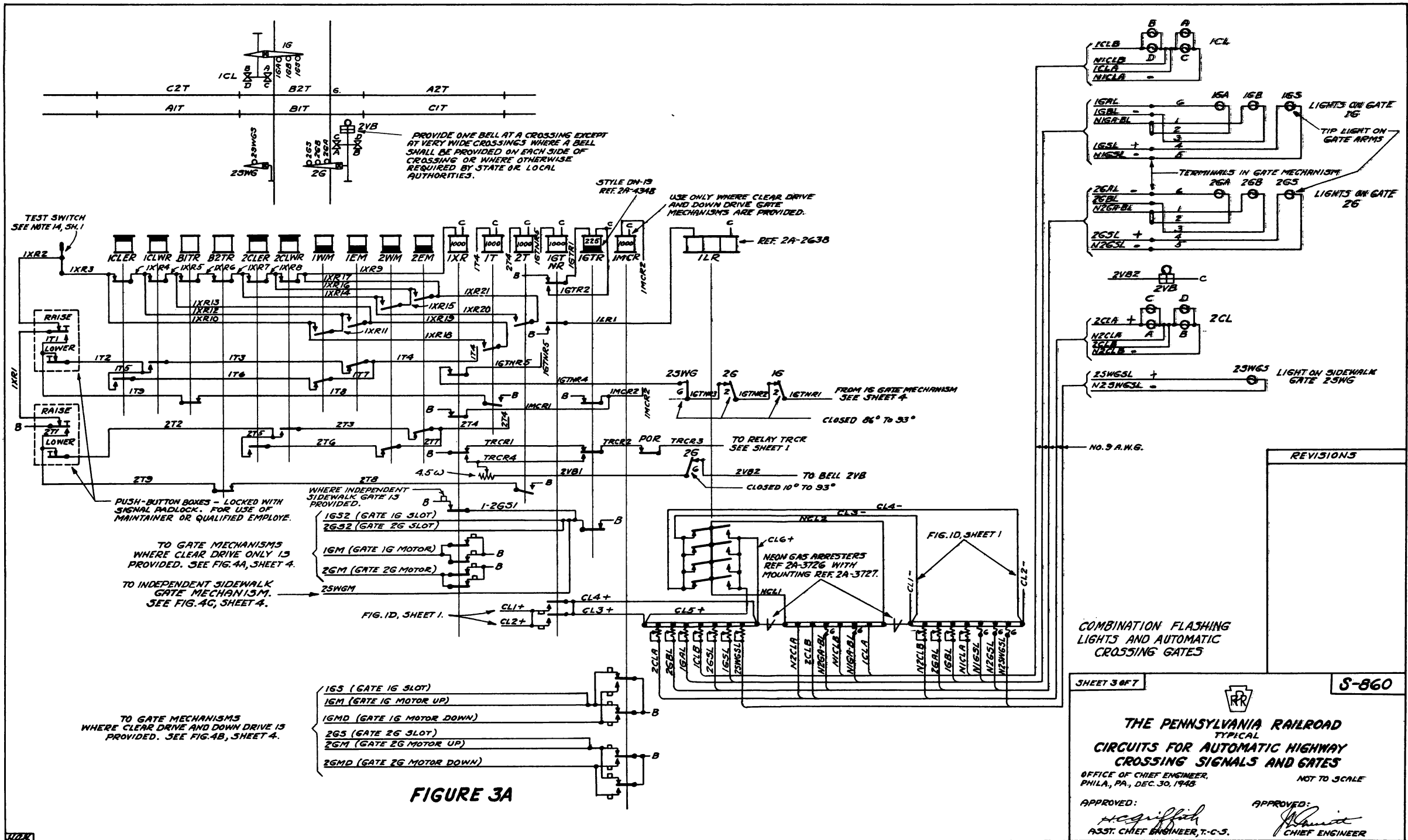
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PHILA., PA., DEC. 30, 1948. NOT TO SCALE

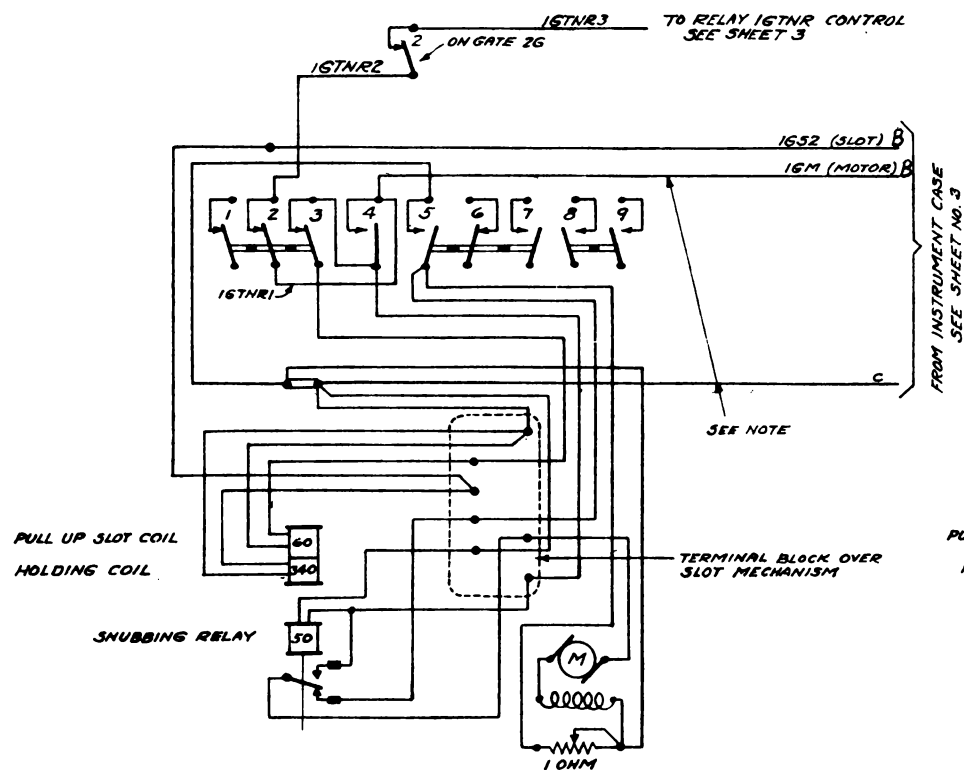
**APPROVED:**

*H. C. Griffith*  
ASST. CHIEF ENGINEER, T.C.-3

**APPROVED:**

*J. H. Bennett*  
CHIEF ENGINEER

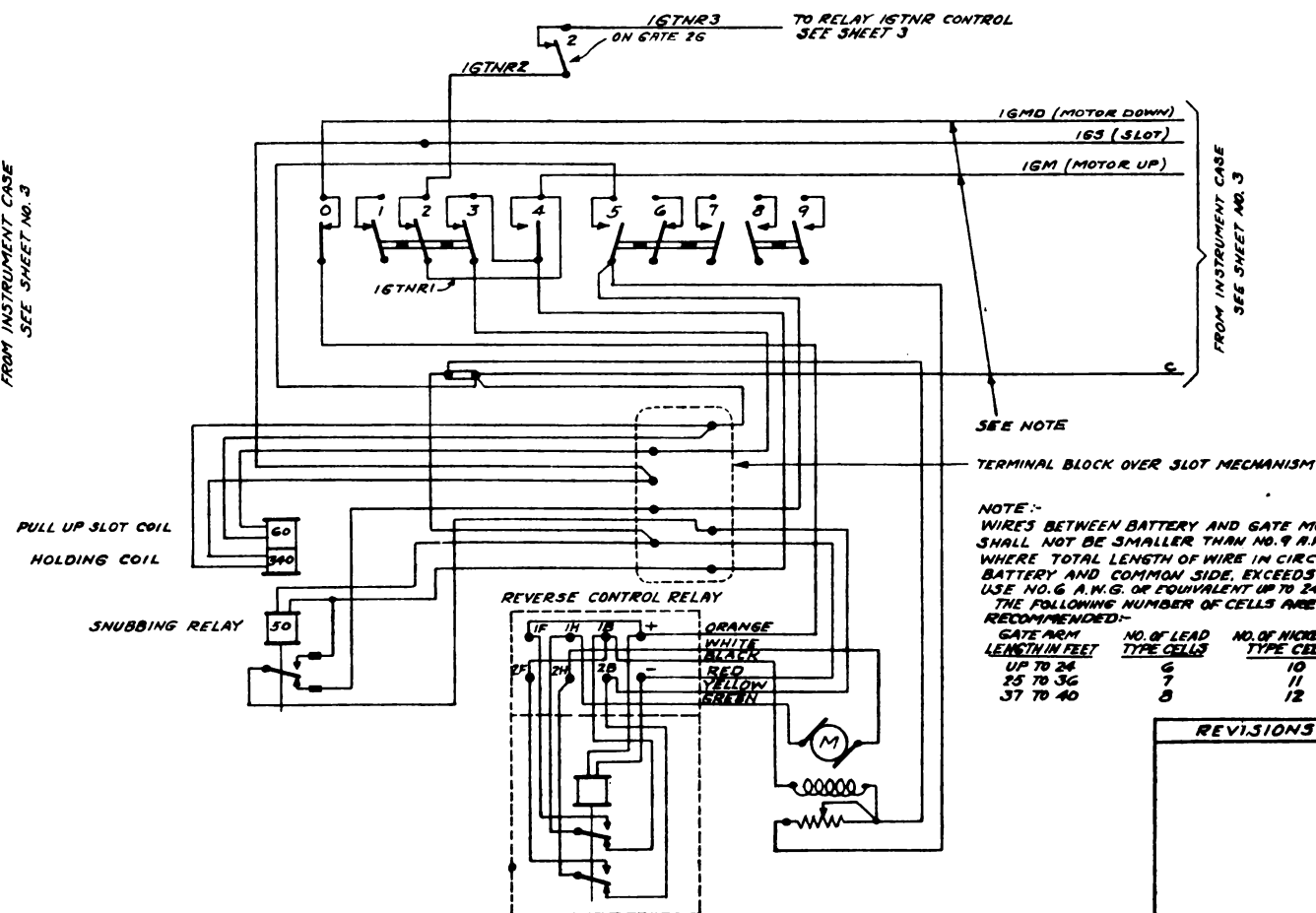




WIRING FOR GATE MECHANISM 3564  
CLEAR DRIVE ONLY

**FIGURE 4A**

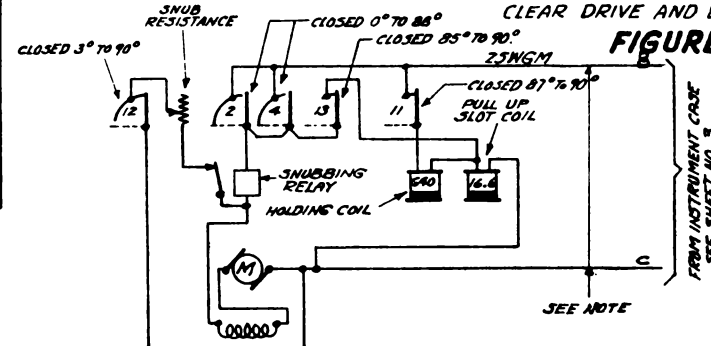
CIRCUIT CONTROLLER FUNCTIONS - FIGURES 4A & 4B		
SPACE NUMBER	USE OF CONTROLLER	CONTACT OPERATION
0	TO OPEN MOTOR CIRCUIT DOWN (FIG. 4B)	46° TO 93° OPEN
1	SPARE	86° TO 93° CLOSED
2	TO CONTROL OF RELAY GTNR	86° TO 93° CLOSED
3	TO PULL UP SLOT MAGNET	86° TO 93° CLOSED
4	TO CUT OFF MOTOR AFTER GATE HAS CLEARED	0° TO 83° 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**

NOTE:-  
WIRES BETWEEN BATTERY AND GATE MOTOR  
SHALL NOT BE SMALLER THAN NO. 9 A.W.G.  
WHERE TOTAL LENGTH OF WIRE IN CIRCUIT,  
BATTERY AND COMMON SIDE, EXCEEDS 120'.  
USE NO. 6 A.W.G. OF EQUIVALENT UP TO 240'.  
THE FOLLOWING NUMBER OF CELLS ARE  
RECOMMENDED:-

GATE ARM LENGTH IN FEET	NO. OF LEAD TYPE CELLS	NO. OF NICKEL-IRON TYPE CELLS
UP TO 24	6	10
25 TO 36	7	11
37 TO 40	8	12

REVISIONS

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THE PENNSYLVANIA RAILROAD  
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OFFICE OF CHIEF ENGINEER,  
PHILA., PA., DEC. 30, 1948

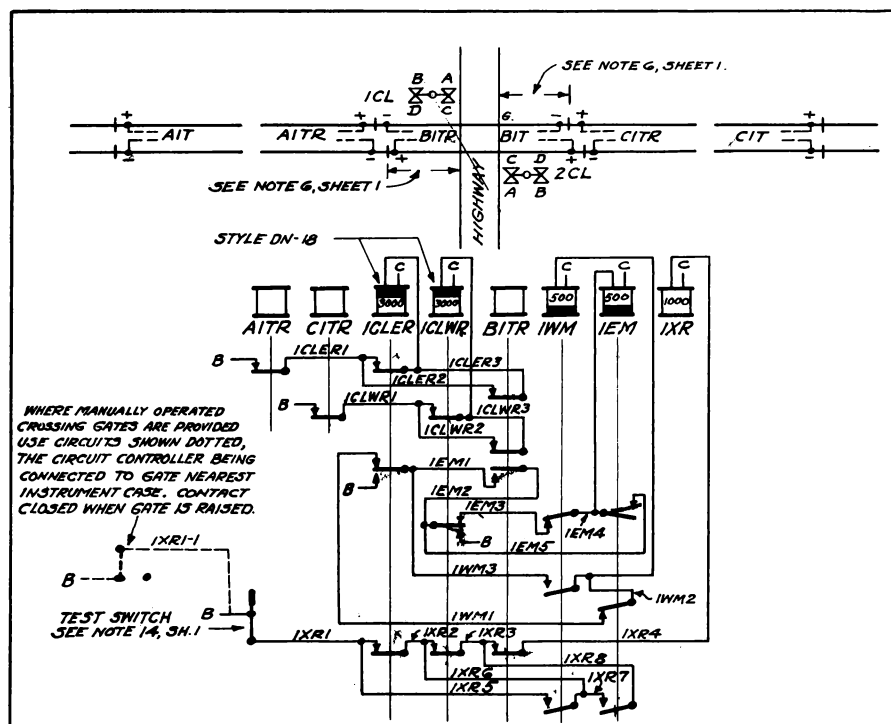
NOT TO SCALE

APPROVED:

*H. C. Griffith*  
ASST. CHIEF ENGINEER, T.C.S.

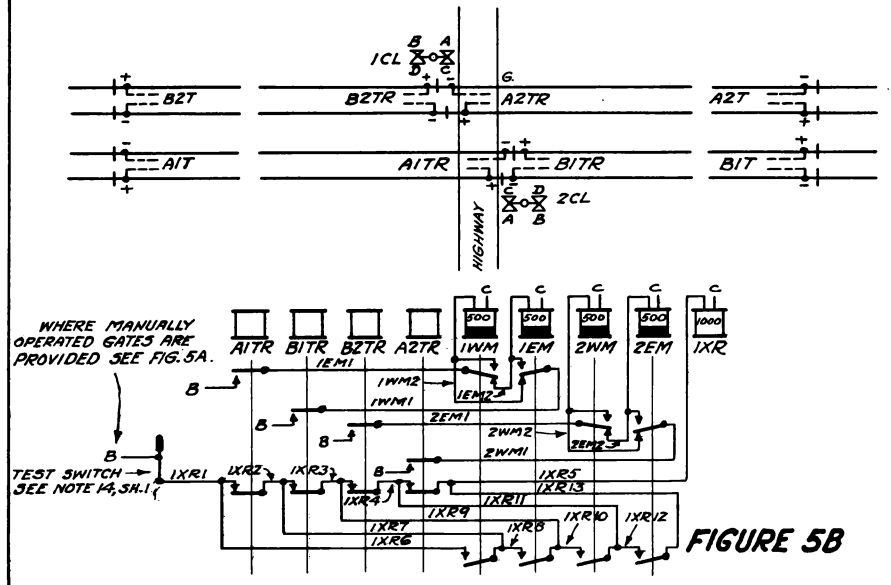
APPROVED:

*J. H. ...*  
CHIEF ENGINEER



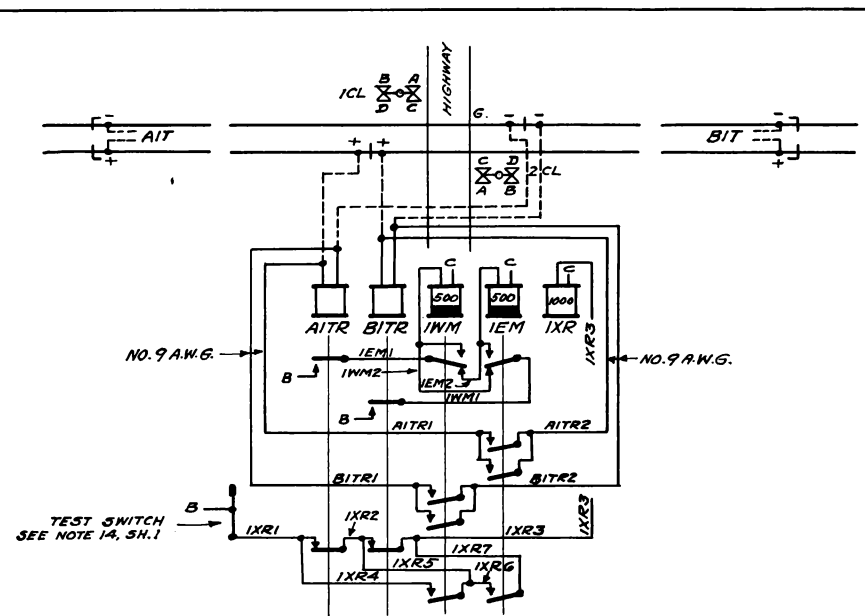
DIRECTIONAL CONTROL WHERE SHORT TRACK SECTION OVER CROSSING IS PROVIDED  
SEE NOTE 4, SHEET 1

**FIGURE 5A**



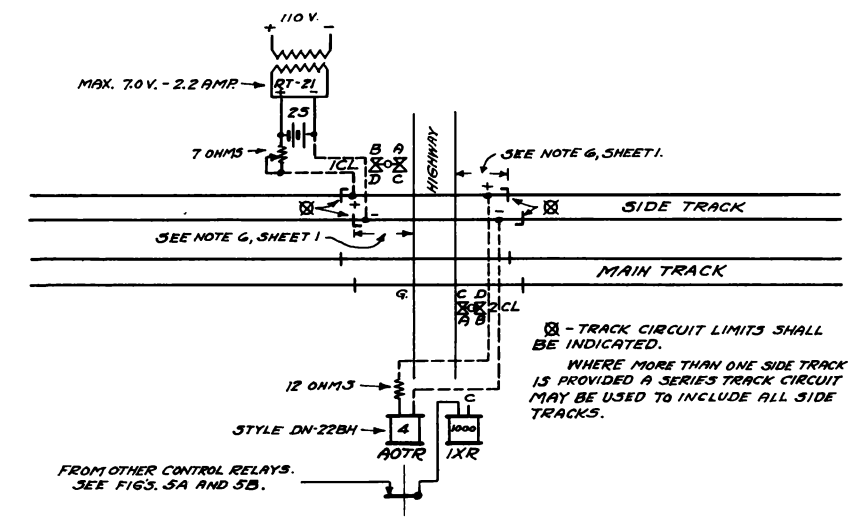
DIRECTIONAL CONTROL WHERE NO SHORT TRACK SECTION OVER CROSSING IS PROVIDED.  
SEE NOTE 4E, SHEET 1.

**FIGURE 5B**



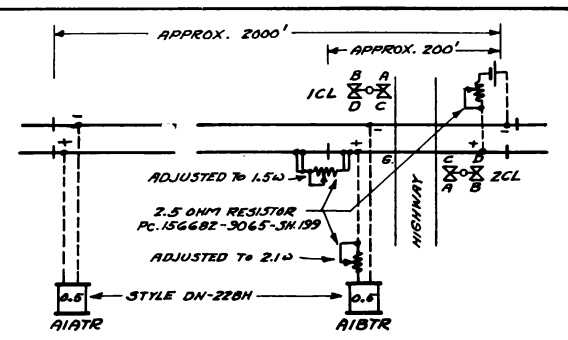
MAY BE USED IN STEAM TERRITORY WHERE FIXED SIGNALS ARE NOT CONTROLLED OVER TRACK SECTIONS AIT & BIT.

**FIGURE 5C**



WHERE MOVEMENTS ON SIDE TRACK ARE SUFFICIENTLY FREQUENT TO GIVE GOOD SHUNTING SENSITIVITY, A 4 OHM DN-11 TRACK RELAY WITH A 10 OHM RESISTOR IN SERIES, FED FROM 1 CELL LEAD STORAGE OR EQUIVALENT IN VOLTAGE, MAY BE USED.

**FIGURE 5D**



ARRANGEMENT SHOWN MAY BE PROVIDED IN D.C. STEAM TERRITORY TO OBTAIN SHORT TRACK SECTION OVER CROSSING. DIRECTIONAL CONTROL SHALL BE SIMILAR TO FIG. 5B.

**FIGURE 5E**

REVISIONS

DIRECTIONAL CONTROLS  
AND  
SPECIAL TRACK CIRCUITS

SHEET 5 OF 7

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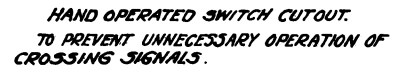
THE PENNSYLVANIA RAILROAD  
TYPICAL  
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OFFICE OF CHIEF ENGINEER.  
PHILA., PA., DEC. 30, 1948.

NOT TO SCALE

APPROVED:  
H. Griffith  
ASST. CHIEF ENGINEER, T.-C.-3.

APPROVED:  
J. Bennett  
CHIEF ENGINEER



**FIGURE 6A**



**NOTE:**  
IN STEAM TERRITORY CONTACTS CLOSED WHEN SWITCH IS IN REVERSE POSITION SHALL BE OPERATED BY REVERSE POINT DETECTOR IN T-20 MECHANISM.  
IN ELECTRIFIED TERRITORY A UNIVERSAL SWITCH CIRCUIT CONTROLLER SHALL BE PROVIDED.

**FIGURE 6B**



**STATION STOP OR WATER PLUG TIME CUT OUT.**

**FIGURE 6C**



**FIGURE 6D**



**CROSSING LOCATED JUST BEYOND INTERLOCKING SIGNAL.**

**FIGURE 6E**

ARRANGEMENTS SHOWN ARE ALSO FOR USE WHERE AUTOMATIC GATES ARE INSTALLED.

## REVISIONS

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**THE PENNSYLVANIA RAILROAD**  
**TYPICAL**  
**CIRCUITS FOR AUTOMATIC HIGHWAY**  
**CROSSING SIGNALS AND GATES**

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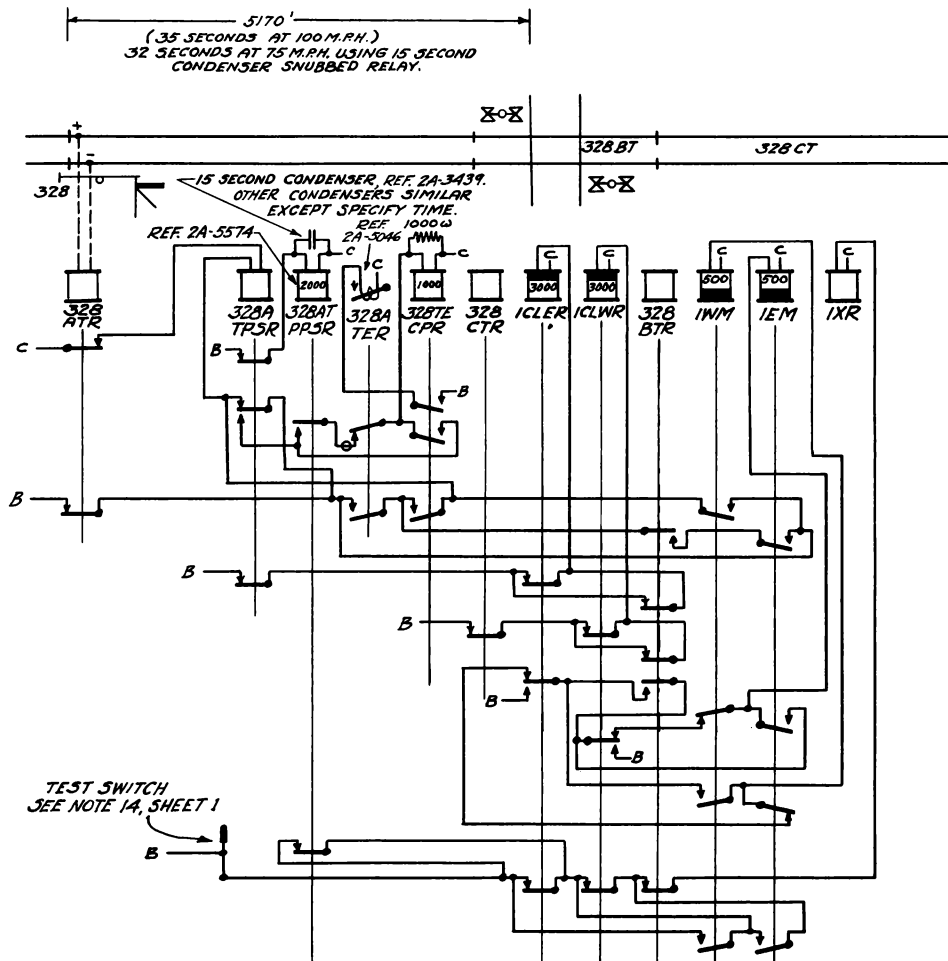
**NOT TO SCALE**

**APPROVED:**

APPROVED:  
*H. C. Griffith*  
ASST. CHIEF ENGINEER, T.-C.-S.

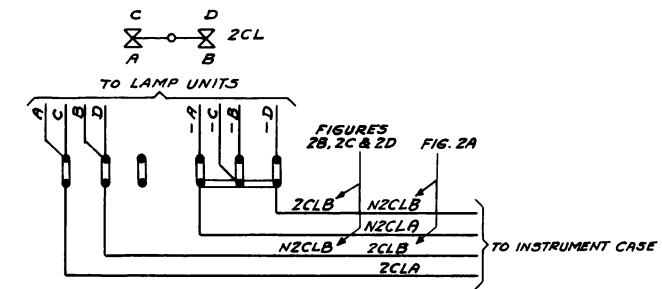
**APPROVED:**

APPROVED  
J. Bennett  
CHIEF ENGINEER

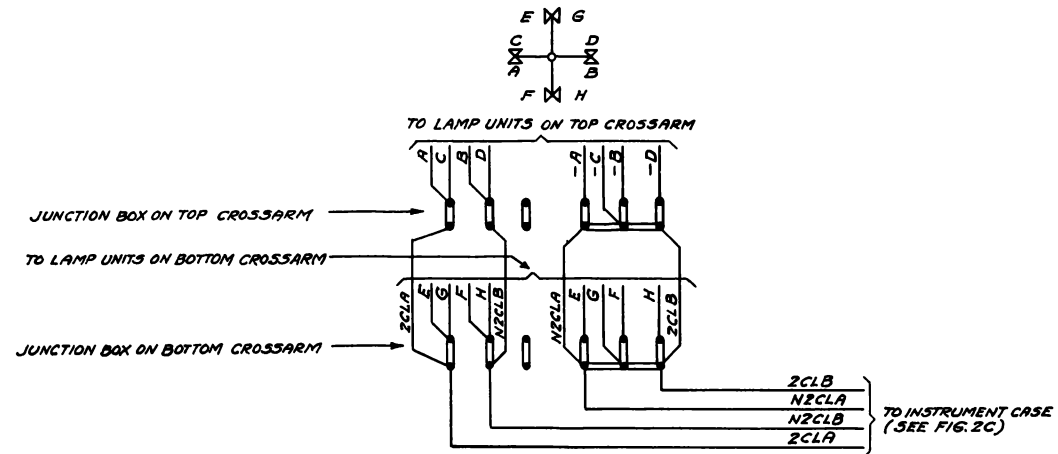


TIME DELAY CIRCUIT TO PERMIT USE OF EXISTING SIGNAL LOCATIONS  
OR CUT-SECTIONS FOR STARTING POINTS

**FIGURE 7A**



**FIGURE 7B**



**FIGURE 7C**  
WIRING OF TERMINALS IN JUNCTION BOX  
ON CROSSARMS

TIME DELAY CIRCUIT  
AND  
JUNCTION BOX WIRING

REVISIONS
JULY 14, 1952. FIG. 7A - 328ATER AND 328TECPR ADDED AND CIRCUIT FOR 328ATER MODIFIED, TO PREVENT CHARGING CONDENSER ON A MOMENTARY LOSS OF PHUNT. APPROVED: <i>W. J. Salomon</i>

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THE PENNSYLVANIA RAILROAD  
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PHILA., PA., DEC. 30, 1948  
NOT TO SCALE  
APPROVED: *W. C. Griffith* ASST. CHIEF ENGINEER, T.-C.-S.  
APPROVED: *W. J. Salomon* CHIEF ENGINEER