

Circuit Description
of
Automatic Interlocking
Dwg. TE3OD3

The circuits shown on TE3OD3 are for a simple automatic interlocking involving a crossing between two single track lines, upon one of which the traffic is dense and fast, but upon the other light and slow.

Two position, approach lighted distant signals with two position approach cleared and lighted home signals in conjunction with two track circuits are used on the main or heavy traffic road, but only two position approach cleared and lighted home signals in conjunction with three track circuits are used on the minor or light traffic road. All signals are of the searchlight type.

As will be noted from the drawing, all controlling apparatus is contained within one housing located at the crossing with signal control wires emanating therefrom. This system involves no more line wire or cable than would be used if the apparatus were distributed at various signals and, in addition, economizes on housing requirements, allowing for a more compact arrangement for ready inspection; therefore, reducing maintenance.

The principal features of this circuit arrangement are detailed on the right of the drawing and are explained in the following circuit description:

CONTROL OF SIGNAL #1

Assume that all track circuits are unoccupied, all signals are in the stop position and a train proceeds towards the crossing entering track circuit ALT. The shunting of relay 1^T completes the #1 signal control circuit, causing battery to pass over checking contact 3-4^{TER}: normal 1-2^{TE} contact, to insure that timing devices are in their normal position; front 3^{TR}, to insure an unoccupied conflicting detector circuit; front 1-2^{RGPSR} contact, for the purpose of checking the normally closed approach locking relay; back AL^{TR} contact for approach clearing; normal 3-4^{TE} contact, to check the conflicting time element in its normal or run down position; front 3-4^{RGPSR} to insure that conflicting signals are at stop; front A2^{TR}, to check proper slotting of signal over receding track circuit; through the coils of the signal, thence to common over the front contact 3-4^{RGPSR}. Signal D1 will then also clear and open the D1^{RHGPR} relay.

LOSS OF SHUNT ON THE APPROACH OR TRAIN BACKING OFF OF APPROACH

Let it now be assumed that while train approaches signal #1 it loses the shunt on ALT and track relay AL^{TR} picks up. This will not cause signal to display a stop indication because of the supplementary circuit over the back contact of 1-2^{RGPSR}. Should this loss of shunt persist for quite some time or should the train back off of the approach, thermal relay 1-2^{TER} starts to heat by battery passing over front contacts A2^{TR} and AL^{TR} and in due time will close its front contact and it, in turn, will pick up the 1-2^{RGPSR}, opening the heating circuit so that thermal will start to cool off. It will be noticed that the checking contact of the 1-2^{TER}

is open in the conflicting signal control circuit so that any attempt to clear signal #3 or #4 by proper approach must wait until 1-2TER has returned to its full normal position.

CONFLICTING SIGNAL LOCKOUT

Let it further be assumed that while train in question approaches signal #1 a second train occupies track circuit A3T. Signal #3 of course cannot clear because the 1-2RGPSR is open, nor can 3-4RGPSR relay open because signals #3 and #4 are at stop and a stick circuit exists around the open A3TR contact. Signal #3 will clear when first train clears track circuit A2T.

CHANGE OF ROUTE BY TIME RELEASE

At this point should the 1st train stop on its approach the 2nd train may proceed by operating the 3-4 time element release, which will open the stick circuit for signal #1 at the moment the release is wound up. When the release has run down to within 30 seconds of its time period, the 1-2RGPSR will pick up by battery from both #1 and #2 signals at stop, front contacts of the RHGPR relays, 3-4TE mid-stroke contact, coils of the 1-2RGPSR to common, and when release has run to within 5 seconds of its time period, signal #3 will clear over a circuit similar to that described for signal #1. This in turn opens the 3-4RGPSR, thereby opening its contact before the 3-4TE contact closes in the control circuit for signal #1.

CLEARING OF INTERLOCKING BY RECEDING TRAIN

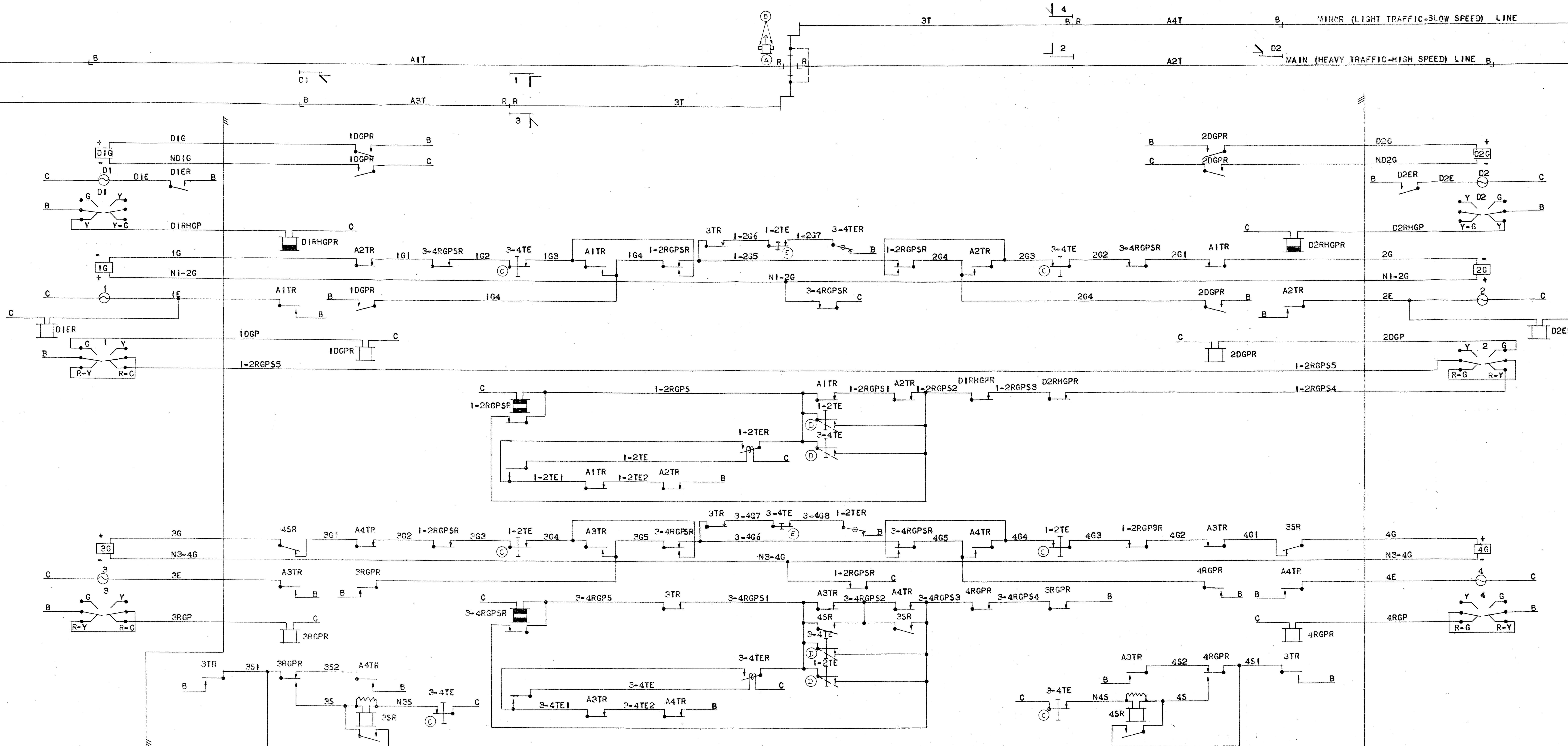
As train passes signal #1, in its regular procedure, it will not assume the stop indication until track circuit A2T is occupied, at which time the signal control stick circuit, already described,

will be opened, nor will relay 1-2RGPSR pick up, which prevents signal #2 from clearing until train in question passes beyond the A2T track circuit, at which time battery will pass over signals #1 and #2 at stop, front RHGPR contacts, both track relay contacts up, thence to common through the coils of the relay.

A train passing signal #3 on the slow speed line operates to release the crossing in a different manner than that described for signal #1. Here it is important to release the crossing for frequent high speed traffic as quickly as possible, which is accomplished by the use of the 3T detector circuit and the SR relay.

Unlike signal #1, a train passing signal #3 puts it to stop at once, and in doing so picks up the 3SR by battery passing over back contacts 3TR and 3RGPR, sticking up over back 3TR direct and later by battery passing over back A4TR and front 3RGPR. Relay 3-4RGPSR does not pick up due to the 3TR contact in its control but when train passes beyond this and occupies A4TR, relay will pick up due to the supplementary circuit over the closed 3SR contact around the open A4TR.

Let it be assumed that train on the main route desires to reverse its travel after passing signal 2, and to again proceed over the crossing. As already described, signal #2 is held at stop due to the open 1-2RGPSR contact, but may be cleared by operating the 1-2 time element release. When fully wound up and on its run down travel, the 1-2RGPSR will pick up in a manner already described and at the same time open the control circuit for signals 3 and 4 at the 1-2TE contact. When release has run down to within 5 seconds of its total time travel, signal #2 will clear.



NOTES

- (A) ALL APPARATUS CENTRALIZED IN ONE HOUSING.
- (B) MANUAL TIME RELEASE HOUSING.
- (C) CONTACT ON TC10 TIME RELEASE (PL. J-1705) CLOSED IN NORMAL (RUN DOWN) POSITION.
- (D) CONTACT ON TC10 TIME RELEASE (PL. J-1705) CLOSING 30 SECONDS BEFORE AND OPENS 10 SECONDS BEFORE REACHING NORMAL (RUN DOWN) POSITION.
- (E) CONTACT ON TC10 TIME RELEASE (PL. J-1705) CLOSING 5 SECONDS BEFORE REACHING NORMAL (RUN DOWN) POSITION.

PRINCIPAL FEATURES

- 1. - PREVENTS THE LOSS OF AN APPROACH CLEARED SIGNAL WITHIN A SET TIME AND PREVENTS THE CLEARING OF A CONFLICTING SIGNAL FOR A LONGER TIME IN EVENT OF LOSS OF SHUNT ON AN APPROACH CIRCUIT.
- 2. - PREVENTS THE LOSS OF A ROUTE BY THE MOMENTARY OPENING OR LOSS OF SHUNT ON THE DETECTOR TRACK CIRCUIT.
- 3. - PREVENTS CHANGE OF ROUTE CIRCUIT TO CONFLICTING ROUTE UNTIL FIRST TRAIN CLEARS THE RECEDING APPROACH ON THE MAIN (HEAVY TRAFFIC) LINE, THE DETECTOR CIRCUIT ON THE MINOR (LIGHT TRAFFIC) LINE OR ON EITHER LINE UNTIL FIRST TRAIN BACKS OFF OF PRIMARY APPROACH.
- 4. - PERMITS A SIGNAL TO CLEAR FOR EITHER A CONFLICTING ROUTE OR REVERSE MOVEMENT BY OPERATING MANUAL TIME RELEASE.

REVISIONS	
5	6-1-38
REDRAWN AND REVISED TO INCLUDE FEATURE #1.	
EMA	

REFERENCES	
U.S. & S. CO. WRITTEN DESCRIPTION D2.7.10	
SINGLE-TRACK TWO-ROAD CROSSING, D.C. SCHEME, COMBINED APPROACH-DETECTOR TRACK CIRCUITS, NORMALLY ENERGIZED APPROACH-LOCKING FEATURE.	
SEARCHLIGHT SIGNALS, COMBINED TRACK CIRCUITS ON MAIN LINE ONLY, CLOCKWORK TIME EMERGENCY-RELEASE FEATURE.	
DESIGNED EMA	
DRAWN MITCHELL	
TRACED MFR	
CHECKED RAMC	
OK'D	

AUTOMATIC INTERLOCKING SYSTEM	
GRADE CROSSING PROTECTION	
TYPICAL SYSTEM CIRCUITS	
U.S. & S. CO., SWISSVALE, PA.	

APPROVED HSY DATE 2-26-32	
DATE	2-10-32
SHEETS	TE 30D3
SCALE: NONE	