इरिसेट

गाड़ी डिटेक्शन प्रयोगशाला

प्रयोग **सं :** टी डी एल **- 01**

IRISET

TRAIN DETECTION LABORATORY

EXPERIMENT NO.: TDL – 01

नाम
Name : _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

अनुक्रमांक
Roll No : _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

प्राप्तांक
Marks Awarded :

पाठ्यक्रम
Course : _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

दिनांक
Date : _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

अनुदेशक के आद्यक्षर
Instructor Initial :

DC Track Circuit in NON RE Area

INTRODUCTION

Track circuit is vital circuit because it is used to detect the presence of vehicle on track. In this circuit Rails are the part of a circuit. Since it is vital circuit, if in case it fails, failure must be on safe side.

Aim of this experiment is to study “Fail safe method of Adjustment" of a DC track circuit and also to find the relationship between ‘Ballast Resistance’ ‘& ‘Train Shunt Resistance, ‘Ballast Resistance’ & ‘Relay Voltage’.

EQUIPMENTS:

Indoor Equipments:

a) TPR
b) Repeaters of TPR
c) Power supply for TPR (24 V DC / 60 V DC)

Outdoor Equipments:

a) Secondary Cell - 1/2 (40AH / 80AH / 120 AH)
b) Battery Charger 2 – 6 V DC O/P
c) Fuse
d) Regulating Resistance 0 - 15 Ω (adjustable)
e) DC Neutral Track Relay QT2 RELAY
f) Signal cable connection in between TR (front contact) and TPR.

- (Voltmeter, ammeter & 0.5 Ω TSR are required for this experiment)

WORKING PRINCIPLE:

a) Track circuit jurisdiction is limited by insulation joint.

b) Each track circuit works independently.

c) Its circuit is normally energized to keep track relay in pick up condition.

d) After shunting of two rails by axle of vehicle concerned track relay drops.

e) Track relays energisation and de-energisation also affected by ballast resistance and its TSR value.

DESCRIPTION

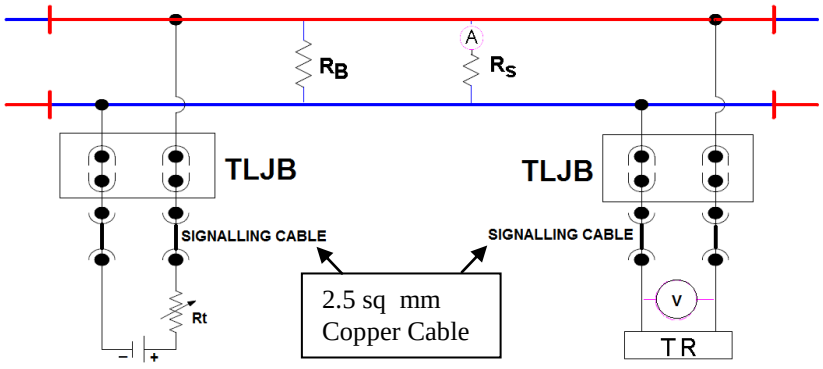
a) Resistances in track circuit

Resistance	Description
R_T	**Regulating Resistance** is the resistance which is adjustable when used with a fixed voltage battery and connected in series with the track.
R_B	**Ballast Resistance** is the net resistance offered by the ballast and sleepers across the track to leakage of rail currents. It varies according to the dry or wet condition of the ballast and soil
R_r	**Rail Resistance** is the resistance offered by the continuity rail bonds, which is rather more than the resistance of the rails themselves. It is in fact negligible under normal conditions, but varies according to bond conditions.
R_R	**Relay Resistance** is fixed for a relay and type of its coil connections.
R_S	**Resistance of the shunting vehicles** is the resistance offered by the shunting vehicle axles. It varies according to the condition of rail table (top), weight of the vehicles and their speed. The highest resistance which, when applied across the track, can open the track relay front contacts is known as its **'Train Shunt Resistance'** (TSR) value. It is the measure of its dependability.
R_{fc}	**Resistance of track lead cable at feed end**
R_{rc}	**Resistance of track lead cable at relay end** is generally very low and Rrc is the main constituent of cable resistance.

b) Safety checks

- When track relay is in pick up condition voltage on relay should not exceed 300% of pickup value in case of QT2. (For QBAT track relay-235%, for shelf type track relay-250%)
- When track relay is in drop condition voltage on relay should not exceed 85%of drop away value.
- TSR value should not be less than 0.5 Ω
- TSR must be checked regularly.
- Check POH date of track relay for shelf type track relays.

c) Observe the track circuit shown below and do the experiment.



- **The following steps are required to be achieved for fail safe adjustment of DC track circuit.**

Observe the following details of the track relay and note down			
Type of Track Relay	……	P.U. Value	……. V DC
Coil Resistance of TR	…… Ω	D.A. Value	…….. V DC
Calculate the value and record		300% of P.U. value	……. V DC
		125% of P.U. value	…….. V DC
		85% of D.A value	…….. V DC

	Description	**TR Voltage**
STEP 1	Connect the relay end to the feed end directly, (bypassing the track)	
STEP 2	Connect a Voltmeter across the track relay	
STEP 3	Adjust the voltage across the TR by the regulating resistance gradually and **note the value** **(Track relay voltage shall be less than 300%of pick up value)**	…….. V DC UPTO 300% of P.U Value
STEP 4	Connect '0.5 Ω' resistance across track relay. & observe TR must drop. **Note the value** **(Track relay voltage shall be less than 85%of drop away value)**	…….. V DC Less than 85% of D.A Value
	Note : Repeat the **STEP 3 & STEP 4 by adjusting 15** Ω Regulating resistance suitably **till 300% of PU & 85% DA condition satisfies.** **Note the final value of Regulating resistance.**	…….…… Ω
	V Max* (at infinite ballast resistance condition	…….. V DC
STEP 5	Now. Connect feed end and relay end to their respective places on track circuit (with rail resistance & actual ballast). **Note the track relay voltage** **(it should not be less than 125% of P.U. Value).**	.. …….. V DC More. Than 125% of P.U Value
	If it is less than 125% of P.U. Value, **do not readjust the regulating resistance** **a)** try to improve the ballast resistance, **b)** Check out the rail resistance whether it is beyond the limits. or **c)** Reduce track circuit length	

- **Ballast resistances of different values are provided in centre place of desk model.**
- **Keep voltage across 'TSR' constant for all reading.**

READINGS:

S.No.	Ballast Resistance (Keeping R.R. constant)	Relay voltage Without TSR	Current Through TSR (With ammeter)	Voltage Across TSR	TSR = voltage/ Current.
1.	10 Ω				
2.	30 Ω				
3.	50 Ω				
4.	Infinity				

EXERCISE:

1) Write the relation in between

   - Relay voltage and Ballast resistance ----------,
   - Relay voltage and TSR----------,
   - TSR and Ballast resistance ----------.

2) Is the 'relay voltage at Infinite ballast resistance' reading in **step-4*** 'V max' different from the reading in serial no 4 of table If so, why?

3) From the table note the following: When the ballast resistance increases, train shunt resistance ---------- and relay voltage ----------

4) What is the recommended cable size for track leads of feed and relay end?

5) Draw the circuit diagram from board.

Date: **Signature of the Trainee**