

Recommended Direct-Current Track Circuit Test Record
 Revised 20132025 (2 Pages)

Table 8110-1: Rail, Ballast Resistance and Other Data

RAIL ROAD															
DIRECT CURRENT TRACK CIRCUIT TEST RECORD															
RAIL, BALLAST RESISTANCE AND OTHER DATA															
TOWN			STATE			DIVISION			CIRCUIT NO.						
TYPE OF CIRCUIT		NEUTRAL	RELAYED	POLARIZED	END FED	CENTER FED	LENGTH			L = M.F.T.					
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NO. OF RAILS								
RAIL WEIGHT	ANGLE BARS	INSUL. JOINT	CROSS TIES	BALLAST	BATTERY	BONDS	TIE PLATES				RELAYS				
TYPE	TYPE	TYPE	KIND	KIND	TYPE	TYPE	TYPE				EAST OR NORTH RELAY	WEST OR SOUTH RELAY	EAST OR NORTH RELAY	WEST OR SOUTH RELAY	
LENGTH	CONDITION	NUMBER	TREATMENT	% FREE OF RAILS	LENGTH OF LEADS	SIZE GAUGE	METHOD OF FASTENING	MAKE				RATED RESIST.			
ANCHORS PER RAIL		CONDITION	CONDITION	% DRAINAGE	GAUGE OF LEADS	LENGTH (IN)	TO TIE TO RAIL	TYPE				# OF CONTACTS			
ROAD CROSSING #	R.R. CROSSING #	STATIONS #			HOUSING	# PER JOINT	LENGTH OF LEADS			RATED WORKING					
WATER SPOUTS #	COAL STATIONS #	SWITCHES #			CONDITION			GAUGE OF LEADS			RATED DROP AWAY				
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>END FED CIRCUIT</p> <p>FIG. 1 WITHOUT AMMETER</p> </div> <div style="text-align: center;"> <p>FIG. 2 WITH AMMETER IN CIRCUIT</p> </div> <div style="text-align: center;"> <p>CENTER FED CIRCUIT</p> <p>FIG. 3 WITHOUT AMMETER</p> </div> <div style="text-align: center;"> <p>FIG. 4 WITH AMMETER IN CIRCUIT</p> </div> </div>															
TEST DATA					COMPUTED DATA (COMPENSATED FOR AMMETER RESISTANCE)										
NO. AND ARRANGEMENT OF CELLS	M = Multiple S = Series														
DATE SET UP															
INSERTED RESISTANCE AT BATTERY RATED OHMS															
MOISTURE CONDITION OF BALLAST															
TEMPERATURE OF AIR (F)															
E	VOLTS AT BATTERY	1-3													
E ₁	VOLTS AT TRACK SIDE OF RESISTANCE UNIT	1-3													
E ₂	VOLTS AT RAILS, AT BATTERY	1-3													
E ₃	VOLTS AT RAILS, RELAY END	1-3													
E ₄	VOLTS AT RELAY TERMINALS	1-3													
E ₅	VOLTS AT RAILS, AT BATTERY	2-4													
E ₆	VOLTS AT RELAY TERMINALS	2-4													
I'	CURRENT AT BATTERY	2-4													
I''	CURRENT AT RELAY	2-4													
MAXIMUM SHUNT RESISTANCE ACROSS RAILS TO DROP RELAY	RELAY END														
	AT BATTERY														
	RELAY END														
RELAY WORKING, AMPERES ACTUAL															
RELAY DROP-AWAY, AMPERES ACTUAL															
* E ₇	VOLTS AT RAILS, RELAY END	3													
* E ₈	VOLTS AT RELAY TERMINALS	3													
* E ₉	VOLTS AT RELAY TERMINALS	4													
* I'''	CURRENT AT RELAY	4													
* RELAY WORKING, AMPERES ACTUAL															
* RELAY DROP-AWAY, AMPERES ACTUAL															
OBSERVED BY	DATE														
* = ADDITIONAL TESTS FOR CENTER FED CIRCUITS															

Table 8110-2: Effect of Rail Breakage or Removal and Other Data

----- RAIL ROAD -----

DIRECT CURRENT TRACK CIRCUIT TEST RECORD 8.1.10 -2
EFFECT OF RAIL BREAKAGE OR REMOVAL AND OTHER DATA

TEST TO DETERMINE THE CURRENT FLOW IN RELAY WITH RAIL BROKEN OR REMOVED AT CENTER OF TRACK CIRCUIT, AND TO DETERMINE RELATIVE LEAKAGE CURRENT THROUGH GROUND AND ACROSS TIES.

TRANSFER THE FOLLOWING INFORMATION FROM FORM 8.1.10 -1

TOWN _____ STATE _____ DIVISION _____ CIRCUIT NO. _____

TYPE OF CIRCUIT NEUTRAL RELAYED POLARIZED END FED CENTER FED LENGTH _____ L = _____ M.F.T.
 NO. OF RAILS _____

CROSS TIES, KIND _____ TREATMENT _____ CONDITION _____ % LESS THAN YEAR OLD _____
TIE PLATES, KIND _____ METHOD OF FASTENING TO TIES _____ TO RAIL _____
BATTERY, KIND _____ MANUF. _____ TYPE _____ NO. OF CELLS _____ CONNECTED _____
RELAY, RATED RESIST. _____ ACTUAL RESISTANCE _____ ACTUAL DROP-AWAY _____
BALLAST, KIND _____ MOISTURE CONDITIONS _____ BALLAST RESISTANCE TOTAL R_b _____
RAIL, WEIGHT _____ RAIL RESISTANCE, R_r _____

TAKE COMPLETE SET OF TRACK CIRCUIT READINGS IN ACCORDANCE WITH 8.1.10 -1
TEST FOR CONDITION OF INSULATED JOINTS, RAIL BREAKAGE, OR REMOVAL

TEST CONDITION OF INSULATED JOINTS BY NOTING WHETHER VOLTAGES E_2 AND E_3 CHANGE WHEN TRACK IS SHUNTED ON OPPOSITE SIDES OF JOINTS.

FIGURE 1

TESTS FOR CONDITION OF INSULATED JOINTS				VOLTS
E_2	NORMAL (RAILS NOT SHUNTED)	_____		_____
E_3	NORMAL (RAILS NOT SHUNTED)	_____		_____
E_2	WITH RAIL SHUNTED AT C	_____		_____
E_3	WITH RAIL SHUNTED AT D	_____		_____

TEST FOR RAIL BREAKAGE OR REMOVAL

BATTERY POLARITY	NORMAL				REVERSE				AVERAGE				REMARKS
	A	B	A + B	NONE	A	B	A + B	NONE	A	B	A + B	NONE	
E													
I													
E_2													
E_{10}													
E_{11}													
E_3													
E_4													
RELAY COMPUTED													

TESTS FOR LEAKAGE ACROSS GROUND AND ACROSS TIES

TRACK BATTERY AND RELAY SHOULD BE DISCONNECTED, SWITCHES A AND B OPENED, JUMPERS J ADDED, AND VOLTAGE APPLIED FROM AUXILIARY BATTERY C ACROSS INSULATED JOINTS AT CENTER OF TRACK CIRCUIT.

FIGURE 2

TESTS FOR FIGURE 2				REMARKS
READ VOLTAGE E_7 AND CURRENT I_3 FOR BOTH POLARITIES OF BATTERY C.				
WITH W END OF CIRCUIT				
	POSITIVE	NEGATIVE	AVERAGE	
E_7	_____	_____	_____	
I_3	_____	_____	_____	

LIST OF SYMBOLS: R_b = TOTAL BALLAST RESISTANCE. R_{b1} = PART OF BALLAST RESISTANCE DUE TO LEAKAGE THROUGH GROUND.
 R_r = TOTAL RAIL RESISTANCE. R_{b2} = PART OF BALLAST RESISTANCE DUE TO LEAKAGE ACROSS TIES.

CALCULATIONS: $R_{b1} = \frac{E_7}{I_3} - \frac{R_r}{8} =$ _____ OHMS. $R_{b2} = \frac{R_b \times R_{b1}}{R_b - R_{b1}} =$ _____ OHMS.

THE ABOVE TESTS SHOULD BE OBTAINED ON TYPICAL TRACK CIRCUITS HAVING GOOD BALLAST, AND HAVING POOR BALLAST, AND UNDER BOTH WET AND DRY BALLAST CONDITIONS, AND WITH PRIMARY AND LEAD PLATE STORAGE BATTERIES.

TESTS MADE BY _____ OBSERVED BY _____ DATE _____

CALCULATIONS MADE BY _____ DATE _____

REMARKS: _____