

Railway Networks and Introduce and Explain the Challenges Distributed To the Railroad

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Abstract: Railway signaling and control systems That have been developed throughout the history of the industry, despite the Influential role the safety and operation of trains Challenges and problems are now. To solve these problems, these systems must Use day and new technologies are restructuring. Developed countries as well as some of the rail industry Drawing on its experience and technology in Europe and Japan. Usually more effective than others in the industry are the source of change. But the setup and use of these technologies New challenges and problems associated with, Challenges outlined in this paper has tried to prevent their expression.

Keywords: railway signaling and control systems, technological and structural change, challenges and ways to prevent

1. Introduction

1825 marks the first man on horseback with a red flag before George Steffensen steam locomotives between Stockton and Darlington station was called on the motion. Before the invention of the telegraph poles in the United States of America 10/5 meters distance of 48 km. The other was placed on the ground that it was based on each agent. When the train was leaving the station of origin, Marks next to the post office once every few minutes using a telescopic camera that shot up the white flag on top of the first post to read. When the train approached the station to confirm he was going the same way to the next station. In 1872, William Robinson closed the circuit in normal mode (normal) invented The invention as the point went wide as a tool for more efficient and safe operation of the trains. As increasing numbers of trains (providing safety, transport) was changed to the more positive the more efficient operation.

2. Signs of the railway In:

Order to maintain the safety of the train, the rail or rails should be no fault or defect. Furthermore, in order to avoid the occurrence of accidents such as collisions, it is necessary

to maintain the proper distance between the previous and next train. And the axis of a train track in the opposite direction of another train between two stations not to. Train distance control technique are saying. When the train or wagon on the signal path of the needle will move the view, not the other way into or Rails to leave. Using safety pins to control the path of the train say. Development of necessary technical equipment control signals from the control of trains. Besides the equipment, protective devices marks the intersection of the surface to prevent a car accident with a train and the line circuit Signal control equipment is used as the signs are there.

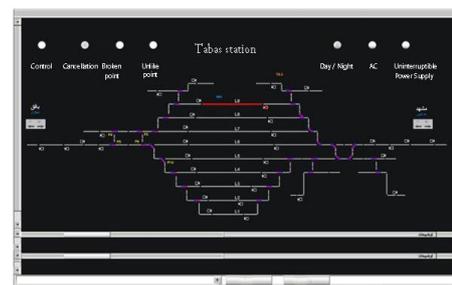


Figure1: manifold of signaling

3. Check tell unit

A magnetic system is installed after the last wagon trains to czech reel fixed base near tel aviv, there is a resonance mode. Tel czech induced voltage on the device relay is actuated to move the train a number of stations, station b to station a to side b track was occupied by the red arrows called to active...

upon arrival station b and the bobbin contacting the telephone system of the czech state resonance and the relay acts and flash off and call blocking entry to fully train to the next station has announced.

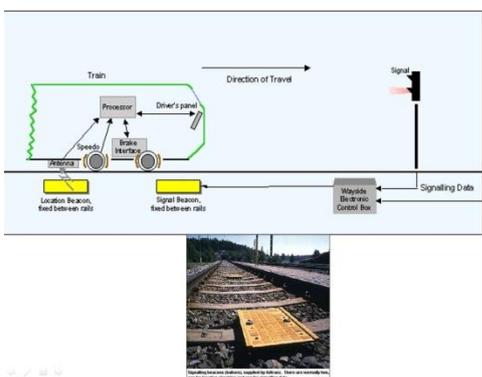


Figure 2: Check tell system

3.1 challenges in Check tell system

Winter frost in the resonant mode and relay your lost he did not act on Impact plume Czech with coil fixed base due to not respecting the distance from Tel Czech with ground impact breaks the conditions of low To address this problem, the system of axes created.

4. Block System

4.1 Safety and operation of the train

In order to take advantage of high-speed trains and the safety of the front should be free And to a certain distance between the front and back of the train set is preserved. Therefore the interval block system Spatial distance is used.Blocks in a given time interval between the trains are operated., Even if the previous train stops at the station will be able to schedule the next train will move a certain distance The immune system is so low that only applies to lines such as trams and trains lighter train speeds are low..The system blocks away from where the trains always a certain distance between the trains can move Top speed on a segment that is exclusively available to move. This particular piece is called a block. Each of these systems utilize a system call blocks. To meet the myriad Using this system, the block device is fitted to both ends of the block.There are two ways to block the operation of the system. By mutual agreement of the other two devices by train operators automatically by the circuit line. The first system is called the Black Hand, and the second is an automatic block system.

4.2 Block systems

Block systems, depending on the devices are classified as below.

1. The operation of double track railway automatic block system uses
2. the operation of the railway systems of linear block an automatic, semi-automatic lining (license free path and guide rod) is used. There are other systems that have been removed due to little use.

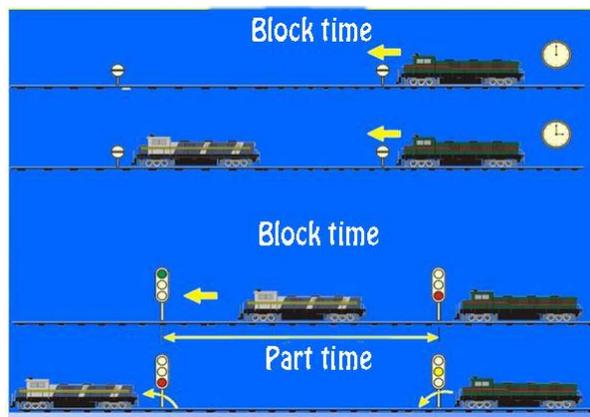


Figure 3: Block procedure time and place

4.2.1 System disk blocks

Drive block equipment at both ends of a piece of railroad track block to block device is mounted disc. These two systems are linked together by an electric cooperative agreement with Vqfl and sent by train to the locomotive engineer will carry. A block device is 24 discs if the disc out of the back of the machine should be back to normal .The system back to normal. If the device can not return to normal on both sides will be out another disc.

If they are different, then the number of odd and even drive trains in aThe accumulated number should be updated every so often.

4.2.2 Automatic block system for single-track railway

This system includes two key stations to ensure safe operation of traffic in front of the train. This situation is similar to a manual block system. When the button is enabled if the train's blocks traffic not to view an automatic signal (motion) and the other view (Stop) will display In other words block the front of the train is blocked.

Meanwhile, slice the block into several smaller blocks can be divided into consecutive trains for deployment Double track railway system is the same infrastructure for the movement of the train is very difficult and complex Special attention should be responsible. Ways smaller than the distance between the station is equipped with automatic block signal (in Mrz-hrblak) is divided. There is also a station on the line circuit and key decision to move train traffic to be handled.

Automatic traffic signal control relay switch traffic for blocks and falls to mid-elected Automatic signal to the control center, which will have an effect on the signal And so the show is shot. Switches and Relays single lane of traffic

on the railway has had a special significance:

4.2.2.1 Switch traffic

Switches traffic between the two end blocks A and B stations are installed. After mutual agreement are used when traffic is the key to operate the relay traffic that will be described later acted all the circuits, circuit blocks and intermediate control signal used to trigger the block. When the train is dispatched before the train traffic moving towards the key intermediate signal-sending and automatic block signals do not work.

4.2.2.2 Relay traffic

Relay traffic is controlled by traffic key and harmony central automatic block signal line circuits equipment allows the train to move. According to the performance of the relay circuit to transmit the signal line and only the changed blocks to train as a signal to front view (a) shows.

4.2.3 Semi-automatic block system

It blocks the track between the two stations are not classified automatically checks and protects. Part of a line between two stations and station forms part of the block. Circuit line connected to the input and output sides of the train station to detect Show Two-line detector circuit where the input signal are embedded station circuit including a tip line to show the movement of trains between There are two stations. Train with a pair of keys for moving traffic on the adjacent station is tuned. Semi-automatic block systems like automatic block system so that it protects not block size Track this suburban rail traffic is relatively light devices are commonly used.

4.2.3.1 Protection of semi-automatic block system Block Set:

1. Part of the station, and the distance between two stations Rablak say. Showing the entry and exit of trains each end block portions of the station two circuit open line OT and CT package is equipped as soon as the train passes the line circuit blocks are automatically locked.
2. to regulate the movement of trains: A single-track railroad train set is essential for the function keys by two parties in traffic stations will be built. Keys automatically block traffic is the key.
3. Signal Device :Send a signal to the input signal and said signal indicative of repetitive sub-signals. Original signal, the signal is not blocked.

4.2.4 Unit Operations

Exploitation operations as types of semi-automatic block. Sending the train station A: Train Traffic Control key. Train Traffic Control key. In order to demonstrate the deployment

of key features (signal sending) and is used to lock the block to move. Short circuits 21T and 5CT dispatch time, and to get to the train station B and locked to keep moving.

the train reaches the station. Caution in view of the input signal is represented by the key input signal 2R signals up front if the automatic control (ARC) is controlled train entry control point (2DA) detected signal is then sent to the input AND signal 3R B 2R station is controlled automatically. Reaching the detector circuit train station by station B 2CT 20T and information obtained by monitoring at break is specified 2DA. When the train passed through the circuit input signal lines and 20T train station A sends data entry and support for the operation of relays and releases the block. When the train crossed the line circuit 2CT is the key to open the locked traffic can be disabled.

4.2.5 Automatic block system

MABKA78 automatic block system monitoring and control are two separate blocks. Normally Two pieces blocks on both sides of a block system controls the station.

Pathways and routes in a single line, a single line block system MABKA78 two units are required for each station. MABKA78 block system can be interlocked with parallel connection to any relay or electronic automatic block to follow the rules, with respect to the desired voltage level connected to this system. Automatic block system using microprocessor and its features are designed to be fail-safe and is responsible for the following tasks:

1. detection using block-based Freedom or axis counters
2. applying an automatic logic operations block permit the free entry of incoming interlockings output acts to block the interlockings

5. Driven design of systems

5.1 Nearby stations exchanging data in units of blocks Vmhrshmarman

To announce the release of the axis, the most accepted method in the world in terms of safety and ease of operation. This feature has proven itself in the long track. In this way, the train goes from the point A to segment AB through the axis of a coil coupled to the transceiver is considered bullish. We have to announce the release of the AB segment of the axis from the point B to point A occurs or comes back again. Thus, once again crossing the axis coil pair transmitter and receiver in B and A to Z count and the entry point for the train to return to AB or A is subject to a zero count. Reel counting operation using two pairs of transmitters - receivers that are connected to the rails and an electronic microprocessor unit which is located on the side rails are done. The axis of the shaft 999 is intended to count. Acceptable minimum wheel diameter of 350 mm is counted according to international standards.

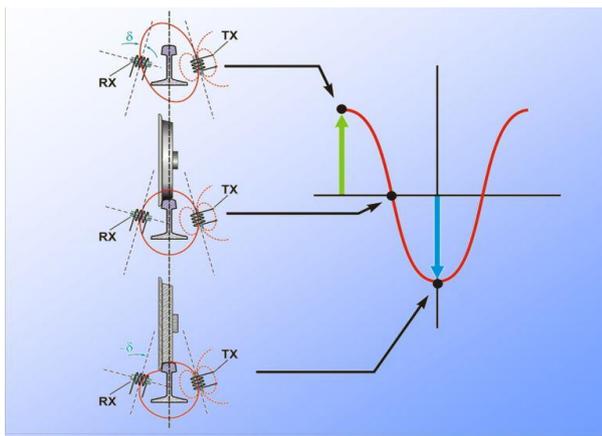


Figure 5: How to count the number of axle by axle



Figure 6: How to count the number of axle by axle

Operation permits the release or block the operation of the system will automatically block MABKA78 this means that if the operator wants the source station interlockings. A train station adjacent to the block between your stations to send the output to the block just to get. The opinion. System interlockings and or parallel connections and system Block MABKA78 source station transmits the request to the deployed unit. Required if any of these apply to be transferred based on the source station.

If there is a requirement in this solicitation to a single source is transferred to the station. Units in coordination with the destination station, the station interlockings agreement or disagreement with the request returns.

Based on information received from the destination station licenses are issued free output signal interlockings towards the desired block is green.

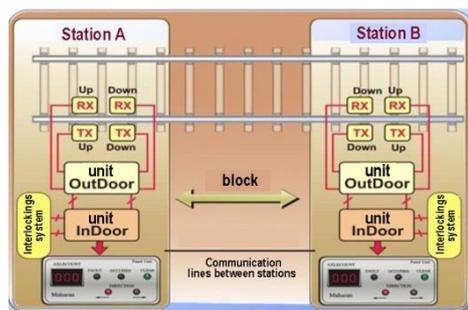
6. Centric operations counted

1. identify the train
2. counting down the train Yasvdy
3. The judge of occupied or free blocks

6.1 Block diagram of the system

MABK78 block system with three components of the central control unit and the display panel is formed. The central control unit the station signaling equipment room adjacent to the boundary line of the display panel of the unit block of rooms at the station and operator station is installed.

6.2 Single line pull



This unit includes a transmitter coil and receiver electronics unit. Electronic unit with axes crossing detector power line

Figure 7: operations counted

segments of processing depends on the relationship between people. The electronic unit Saab as Rocky 6/8 inch aluminum that will be installed in compliance with the isolation requirements in JB

JB electronics module protects against damaging environmental factors. This will prevent the chamber from dust and moisture.

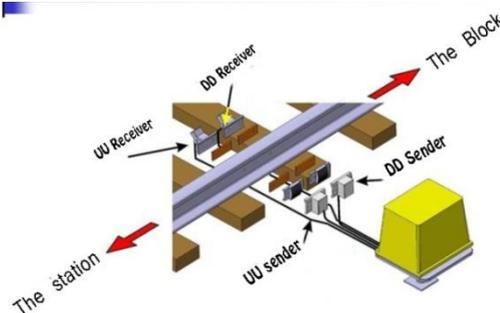


Figure 8: operations counted

6.3 Challenges in the system of axes

Train station A to station B passes through the coil, a transceiver coupled to the upward counting is Upon reaching the station B passes through the coil pair to the downside as transceiver B is Check and train to point B is subject to a zero count If the coil surrounding the station (B) are setting off down counting operation is not possible to block the release announcement does not

Bridge between stations A and B via a fiber optic communication system, which is the moment of disconnection, the system will not be able to count in ascending or descending orde.

a foreign object into the receiver and the transmitter coil and the adjacent stations (A and B) on the train Reel and Broken Reel in the receiver and transmitter can be driven to count.

7. Line circuit

7.1 Defined line circuit

There is a train line circuit to detect electrical circuits, control systems, direct and indirect signals such as safety systems, and the systems of forming an electrical circuit with rail replacement needles and short axes of the vehicle by the rail.

7.2 Circuit of line

Illustrates the principles of the circuit in which the end portions of a given length is divided and both ends of the electrical are insulated, the boards of each section, to reduce the electrical resistance is connected with special fittings.

At one end of the device at the other end of the power supply circuit is used to control the relay circuit. If no train is present in the circuit, the relay power supply with sufficient current is being drawn from the If the circuit is occupied by a train or wagon wheels and axles that trains low-resistance electrical circuit and the relay will be excreted Short circuit.

Attracted or repelled by the relay contacts are bright green and red signals by train order signal is controlled by the Details of the operation of the circuit structure are different from each other but all power supply current limiting resistor, and relay rail lines are.

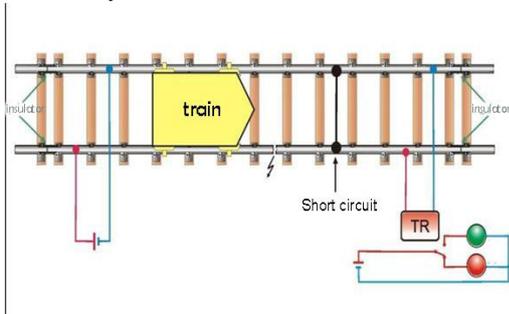


Figure 9: Working principle of the circuit

7.3 open systems and closed-circuit line

Open circuit system, the electric lines of the relay circuit that is normally excreted. On arrival by train to the main train line circuit relay and the relay is being drawn up

Thus Show (a) or Absorption signal relay line is displayed. This circuit is not necessary because the safety line in case of power failure or wire breakage or uncertain tracks, etc. Despite the train line circuit fault, the relay will not be absorbed. This circuit is not used except in special cases.

Depending on the circuit, the electrical circuit is closed when its effect is absorbed in normal mode. When the train arrived right portion of the school is the main circuit through a low resistance Short circuit by train, So that a small current through the relay and the relay will be excreted. View of (a) the signal relay tr disposal is displayed. So the relay operation when the normal immune from power outages and other failures holds.

Line circuit pack for high safety applications is common, however, due to its high energy consumption of the circuit is constant.

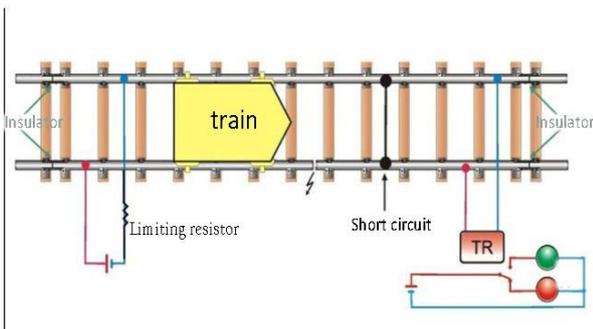


Figure 10: Working principle of the circuit

7.3.1 Line circuit constants

Line circuit, the electrical circuit in which the rails are used. Terms of rails in parallel electrical circuits installed on Travs on high ground. Each track has its own strength as regular rail connections are linked together like an infinite circuit shown in Figure organizations.

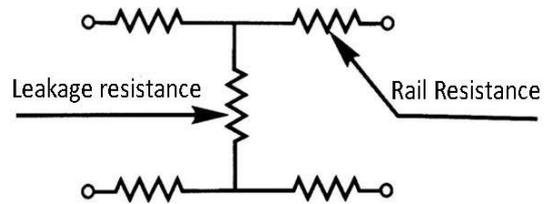


Figure 11: Leakage resistance

Bridge and shunt resistance series resistance element is called leakage is high due to the circuit lines by all axes are Short circuit train. Short circuit resistance by connecting the wheels and axles of rail will change and resistances are negligible.If true, then replace the rails rouge or dust after rain or if there is resistance on the short rails and rails of the wheel and axle changes.

Short circuit wheel axle track strength and is measured as follows. First line circuit line voltage is measured on the arrival of the train. He trains in the absence of close tolerance between the rails and the train with Justice voltage relays they show the previous value. Depending on the resistance value of the resistor between the two rails of a train Short circuit and the less resistance the better.

7.3.1.1 Polarity adjustment and line circuit

If the insulation is damaged rail line circuit relay stray currents caused by adjacent lines even when the circuit track occupied by the vehicle will be working. Thus, the circuit layout should be such that the same polarity as that could cause security needs.

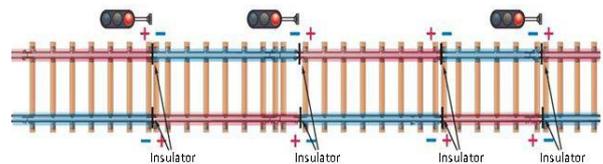


Figure 12: Test method polarity

This insulated rail joints Short circuit is to determine whether the men are sent to relay the stream is absorbed near the line or not? As seen in the figure should be disposed of in a relay.

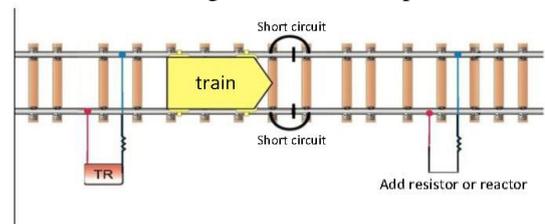


Figure 13: Testing methods and polarity by voltmeter

Insulated rail joints on one side and short on the other hand,

the potential difference can be measured insulation. We also measured the potential difference between the two rails. If $E_2 > E_1$ will be the opposite polarity.'s Station Area lines and sub-stations and lines are not identical circuits or circuits power line near the end being Note that when the settings are not necessary

. The key issue is how to set the polarity of the relay does not work in bad conditions.

7.4 frequency circuit line

Conventional lines and electrical line frequency circuit (AC-DC) does not require isolation between adjacent tracks and the separation between adjacent tracks if accepted by the electrical circuits In this case the conductor rails for electric trains is totally secure. It selectable frequencies used in the separate groups of four to six kHz 9 kHz to 17 kHz and is.

These frequencies are chosen in such a way that the overall multiples of 50 Hz to love are the elite round against any interference with harmonics in electric power lines will remain unchanged.

In this system, every piece of track for her, which is uniquely identified by a specific code, and frequency FSK modulated ways. The signal from the sending unit to the desired track will be announced. At the end of the receiver circuit, the voltage will analyze the received code. Short circuit two rails of the track, the train was entering the track and thus no signal received by the receiver, causing the truck 10 are occupied. Changing the operation frequency and code by simply changing the number of switches on the instrument panel is done. The adjacent tracks are always different frequency code.

Short circuit tow rails of the track the train was entering the track and thus no signal received by the receiver causing the track 10 are occupied.

Other features include remote power control capabilities of the system means The electronic parts and circuits in the equipment room signs are only gimmick - are Off And the lines are in the area. Yet the overall profile of the frequencies we Circuit.

- a plurality of devices designed to double
- the system is fail-safe so that any error in his performance, which makes the circuits work.
- For each transmitter and receiver, are commonly considered to be three.
- is completely modular system for repairing faulty card, it should only be replaced with a sound card.

Furthermore, the detection of a variety of tests to evaluate the performance of each card, and the card is faulty are: Double-circuit line electrically isolate adjacent

1. Creating high reliability through the use of modulation and coding
2. the creation of an overlay zone for the two-circuit line consultant
Protection against lightning
3. systems to parse through the source DC 24V & AC/50HZ 220V

4. The transmitter output protected against Short circuit
5. protects the system against excess voltages unwanted

7.4.1 Frequency of the circuit

Specific code for each circuit in the circuit, the frequency and frequency has been determined. Modulation techniques to transmit signals over schools will enter the track. At the receiver, the signal from leaving the track on the first floor will be filtered. Of the filter elements made of high-precision Match only if the specified frequency defined for filtering incoming frequency signal processing is applied to the next class.

The classification of the received signal power is evaluated to be less than the limit defined. In establishing the conditions for releasing the code you received in the line circuit is not the source of the circuit.

Therefore, a high reliability of the system, in order to announce the release of the circuit, the following three conditions must always be true:

Defined frequency matching Frequency incoming line circuit having power to accept the received signal, the received code matches the code line circuit characteristics. Should be noted that the shapes In each of the above three conditions or in case of any fault in the circuit being released immediately declared that the occupation is violated and the circuit.

In order to increase the reliability of hardware and application multiplicities of two microprocessors for dual-frequency operation is analyzed and the correct code is used. In this case, both. In which case either independently or release forms processing circuit of the line is free only if agreed by both the processor circuit line will be announced.

7.4.2 Line frequency circuit system components

The transmitter unit (TX): The task of generating code to create frequency carrier and FSK modulation and amplification of the signal is.

Receiving unit (RX): Demodulation performance and signal processing functions from the unit.

Implementation Unit (TU): To establish the correspondence between the circuit and the transmitter and receiver units are used.

Single Supply (PWS): a possible feeding system to AC/50HZ 220V (-20% + 10%) provides.

Control Unit: The unit's task is to evaluate the ongoing performance of the system in case of any error in the location of the fault system were oppressed by a desire If the fault LED and alarm of the circuit corresponding to the action.

Frequency and line frequency circuit bit pattern to each line circuit is assigned a specific frequency.'s Characteristic frequency signal transmitter circuit line. Frequencies are specified in the table. The maps of each station and each circuit line ballots profile name specified on the form used.

Table 1: Method polarity

Group 06									Group 07			
Feriquency in hertz	9500	10500	11500	12500	13500	14500	15500	16500	4750	5250	5750	6250
Feriquency	F_1	F_2	F_3	F_4	F_5	F_6	F_7	F_8	F_9	F_{10}	F_{11}	F_{12}

As shown in Fig frequencies used in the system are divided into two groups of 06 and 07. Differences in the two sub-types of rock bands are tuning in over the rails.

In addition to frequency track circuit line as a 20-bit pattern is assigned. Every bit pattern of an 8-bit code the bit pattern is an 8-bit code that is sent from the sender to the side rails.

Post code around the center frequency and the FSK method is done by changing + -64 HZ. However, when the circuit is open when the frequency of the received bit pattern is sent to the receiver according to the bit pattern.

7.4.3 Challenges in system line circuit

Damage to the insulation of the rails: rails insulated circuit is separated from the adjacent lane. It may not hurt either disable or stability of the circuit can disrupt their work.

As a result of the polarity of the circuit adjacent to the crash without safety lines arise. The dilemma of the circuit failure insulated conductor rails in particular, this document sets out the permissible error of his opposite poles of the circuit.

most likely to fail in the height of summer to winter insulation, and other times, the extreme temperature changes cause expansion and contraction of the rails and it will creep in there. Concern insulating rails through ensuring the maintenance staff while performing their job duties such as signing tamping near insulation, tighten the fitting rails, rails set between summer and winter is another creep rails believe, should to minimize.

the foreign object in insulating rails: the high and insulated rail joints are loose metal objects and other external Comments can find The following ties. This condition causes leakage into the adjacent lane circuit. If any two adjacent pole line circuit failure without maintaining the same safety arises.

The circuit includes two-way line, a central piece of insulated rail at its opposite end is very near the interface due to the conductor rails (shrup) or small metallic foreign objects, etc., there will be short at this point.

Increased resistance to abrasion or the use of an extension cord because the extension cord is faulty or incorrectly stunned rail connections to be applied electrical resistance increases and This situation has led to a change in voltage in the receiver and the performance of the circuit is faulty.

Increased resistance wire interface. Improper connection of thin, conductive wires used in the device relays are working irregularly.

Work irregular Relay for lowering high play strength. Where quality is low and the high seed rain or melting snow and ice can increase the leakage current is Infected flowers Resulting in irregularities in the operation of the relay circuit is created so that it looks wrong. Such a situation occurs when maintenance personnel should be required to take action to

remedy the situation.

There came a time share situation, the control circuit is configured correctly and the information is necessary to create favorable conditions for voltage and current circuit is set to a range of values nominal.

Short circuit line from the intersection of pipelines, bridges, transit and metal beams and cables, wires or other objects.

Besides the insulation of the bridge, or in locations that require special attention are the cross beam, etc. Failure to detect the location of the hidden parts of the work and requires much time.

8. Conclusions:

Systems due to the possibility of visiting the station range of symptoms; during installation it is necessary to control the following factors:

Proper installation, sturdy closure assembly screws, wire connectors, ensure the accuracy of the system (inside and outside the station) and the lack of voltage fluctuations and the precautions necessary to prevent damage to electronic systems

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