



GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

रूट रिले इण्टर लॉकिंग पर परस्पर संवादात्मक प्रश्न कोष Interactive Question Bank on Route Relay Interlocking



लक्ष्य समूह: एस.एस.ई./जे.ई. (सिग्नल) एवं सिग्नल अनुरक्षक
Target Group: SSE/JE(Signal) & Signal Maintainers

कैमटेक/एस/प्रोज/2017-18/एसपी8/1.0

मार्च 2018

CAMTECH/S/PROJ/2017-18/SP8/1.0

March 2018



महाराजपुर, ग्वालियर - 474005
Maharajpur, Gwalior (M.P.) - 474005

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प्राक्कथन

भारतीय रेलवे में रूट रिले इंटरलॉकिंग प्रणाली प्रमुख यार्डों हेतु महत्वपूर्ण सिग्नलिंग प्रणालियों में से एक है । इस प्रणाली का बुनियादी ज्ञान सिग्नल कार्मिक को उसके अंतर्गत आने वाले संस्थापन के अनुरक्षण एवं त्रुटि निवारण में सहायक हो सकता है ।

कैमटेक ने संकेत एवं दूरसंचार कार्मिकों को स्वयं के ज्ञान को जाँचने के लिए इस विषय पर परस्पर संवादात्मक प्रश्नकोष तैयार किया है । मुझे आशा है की यह उनके प्रतिदिन अनुरक्षण के कार्य में तथा उनकी क्षमता को बढ़ाने में सहायक होगा ।

कैमटेक, ग्वालियर

दि. 27.03.2018

डी. गोविंद कुमार

प्रिंसिपल कार्यकारी निदेशक

FOREWORD

Route Relay Interlocking system is one of the important signalling systems for major yards in Indian Railways. The basic knowledge of this system can help the signal personnel in maintenance and troubleshooting of the installation under their jurisdiction.

CAMTECH has prepared an interactive question bank on the subject for S&T personnel to enable them test their knowledge regarding RRI. I hope that this will help them in their day to day maintenance work as well as improve their efficiency.

CAMTECH Gwalior

Date: 27.03.2018

D. Govind Kumar

Principal Executive Director

भूमिका

गाड़ियों के कुशलतापूर्वक एवं संरक्षा से संचालन हेतु भारतीय रेल्वे के सभी प्रमुख यार्डों में रूट रिले इंटरलॉकिंग प्रणाली के संस्थापन उपलब्ध हैं । इस प्रणाली में जटिल परिपथ होते हैं जिसमें बड़ी संख्या में विभिन्न रिले एवं उनकी नाम पद्धतियाँ होती हैं । इस प्रणाली के अनुरक्षण हेतु कम से कम इसका बुनियादी ज्ञान इसमें प्रयुक्त रिले तथा उनकी कार्यप्रणाली का ज्ञान आवश्यक है ।

कैमटेक ने संकेत एवं दूरसंचार कार्मिकों के आर आर आई से संबन्धित ज्ञान में वृद्धि हेतु इस परस्पर सवादात्मक प्रश्नकोष को तैयार किया है । ब्रिटिश तथा सीमेन्स दौनों प्रकार की प्रणाली का समावेश बहु विकल्प प्रकार तथा सही / गलत प्रकार के प्रश्नों के साथ इस प्रश्नावली में किया गया है।

हम इरिसेट, सिकंदरबाद, सं. एवं दू.सं. प्रशिक्षण संस्थान, भायकला, म. रेलवे, सं. एवं दू.सं. प्रशिक्षण संस्थान, पोदनूर, द. रेलवे, मै. सीमेन्स लि. मुम्बई तथा भारतीय रेल्वे के संकेत एवं दूरसंचार के अधिकारियों तथा एस एस ई/जे ई के अत्याधिक आभारी हैं जिन्होंने इस प्रश्नावली को तैयार करने में सहायता की है ।

चूंकि तकनीकी उन्नयन एवं शिक्षण एक क्रमिक प्रक्रिया है, अतः इस प्रश्नकोष में आप कुछ जोड़ने या सुधारने की आवश्यकता महसूस कर सकते हैं । यदि ऐसा है तो कृपया अपने सुझाव हमें ईमेल dirtsntcamtech@gmail.com पर भेजें अथवा इस पते पर लिख भेजें : भारतीय रेल, उच्च अनुरक्षण प्रौद्योगिकी केंद्र, होटल आदित्याज के सामने, एयरपोर्ट मार्ग, महाराजपुर, ग्वालियर (म. प्र.) 474005

कैमटेक, ग्वालियर

दि.:27.03.2018

दिनेश कुमार यादव

निदेशक (संकेत एवं दूरसंचार)

PREFACE

Route Relay Interlocking installations are available on every major yard of Indian Railways for efficient and safe movement of trains. This system consists of complex circuits with a large number of various relays and their nomenclature. To maintain this system one should at least have a basic knowledge about the system, its relays and their functions.

CAMTECH has prepared this interactive question bank to help S&T personnel improve their knowledge about RRI. Both British and Siemens systems have been covered in this question bank with multiple choice type and true/false type questions.

We are sincerely thankful to IRISSET, Secunderabad, S&T Training Institute, Byculla, C.Rly., S&T Training Institute, Podanur, S.Rly., M/S Siemens Ltd. Mumbai and S&T officers and SSEs/JEs of Indian Railways who helped us in preparing this question bank.

Since technological upgradation and learning is a continuous process, you may feel the need for some addition/modification in this handbook. If so, please give your comments on email address dirtsntcamtech@gmail.com or write to us at Indian Railways Centre for Advanced Maintenance Technology, In front of Adityaz Hotel, Airport Road, Maharajpur, Gwalior (M.P.) 474005.

CAMTECH Gwalior

Date: 27.03.2018

D.K.M.Yadav

Director (S&T)

विषय सूची

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डिस्क्लेमर

यह स्पष्ट किया जाता है कि इस प्रश्नकोष में दी गयी जानकारी सिग्नल इंजीनियरिंग मैनुअल, रेलवे बोर्ड प्रकाशनों तथा आर डी एस ओ प्रकाशनों के किसी भी वर्तमान आलेखों को विस्थापित नहीं करती है | यह दस्तावेज वैधानिक नहीं है वरन इसमें दिए गए निर्देश केवल मार्ग दर्शन हेतु हैं | यदि किसी बिन्दु पर विरोधाभास दृष्टीगोचर होता है, तब सिग्नल इंजीनियरिंग मैनुअल, रेलवे बोर्ड प्रकाशनों, आर डी एस ओ मार्गदर्शन अथवा जोनल रेलवे के निर्देशों का पालन करें |

DISCLAIMER

It is clarified that the information given in this question bank does not supersede any existing provisions laid down in the Signal Engineering Manual, Railway Board and RDSO publications. This document is not statutory and instructions given are for the purpose of guidance only. If at any point contradiction is observed, then Signal Engineering Manual, Railway Board/RDSO guidelines may be referred or prevalent Zonal Railways instructions may be followed.

हमारा उद्देश्य

अनुरक्षण प्रौद्योगिकी और कार्यप्रणाली का उन्नयन करना तथा उत्पादकता और रेलवे की परिसम्पत्ति एवं जनशक्ति के निष्पादन में सुधार करना जिससे अंतर्विषयों में विश्वसनीयता, उपयोगिता और दक्षता प्राप्त की जा सके |

OUR OBJECTIVE

To upgrade Maintenance Technologies and Methodologies and achieve improvement in Productivity and Performance of all Railway assets and manpower which inter-alia would cover Reliability, Availability and Utilisation.

यदि आप इस सन्दर्भ में कोई विचार और सुझाव देना चाहते हैं तो कृपया हमें इस पते पर लिखें :

संपर्क सूत्र : निदेशक (संकेत एवं दूरसंचार)

पत्राचार का पता : भारतीय रेल उच्च अनुरक्षण प्रौद्योगिकी केंद्र,
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कैमटेक प्रकाशन CAMTECH Publications

CAMTECH is continuing its efforts in the documentation and up-gradation of information on maintenance practices of Signalling & Telecom assets. Over the years a large number of publications on Signalling & Telecom subjects have been prepared in the form of handbooks, pocket books, pamphlets and video films. These publications have been uploaded on the internet as well as railnet.

For downloading these publications

On Internet:

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Go to *Directorates* → *CAMTECH* → *Publications for download* → *S&T Engineering*

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A limited number of publications in hard copy are also available in CAMTECH library which can be got issued by deputing staff with official letter from controlling officer. The letter should be addressed to Director (S&T), CAMTECH, Gwalior.

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रूट रिले इण्टर लॉकिंग पर परस्पर संवादात्मक प्रश्न कोष
Question bank on Route Relay Interlocking

Section A: British RRI (Metal to carbon relays)

I. Multiple choice type questions (Q.No.1 to 50)

Choose correct answer from the given choices (a), (b), (c) & (d)

- Q1. Which of the following is TRUE for British RRI?
 (a) CLS is not compulsory
 (b) Manual operation of points is not possible
 (c) Route buttons are compulsory
 (d) Metal to metal contact relay are used
- Q2. Which type of wire is used for relay base contact wiring of metal to carbon relays?
 (a) PVC 16 strand 0.2 mm dia
 (b) PVC single strand 0.6 mm dia
 (c) PVC single strand 1 mm dia
 (d) None of the above
- Q.3 In British RRI when Overlap Stick Relay OVSR drops
 (a) Unlocks points in overlap
 (b) Locks points in route
 (c) Unlocks points in route
 (d) Locks points in overlap
- Q4. In British RRI Station Masters Control Relay SMR/SMCR picks up
 (a) When SM's panel key is 'IN' and turned to Normal
 (b) When SM's panel key is turned to Reverse and taken out from panel
 (c) Irrespective of whether SM's panel key is IN or OUT
 (d) None of the above
- Q5. In British RRI, which of the following is FALSE for Route Checking Relay UCR?
 (a) Each signal will have its own UCR
 (b) This relay is normally de-energized relay.
 (c) In UCR circuit all points in route, overlap and isolation (set& locked) are proved.
 (d) None of the above
- Q6. In British RRI system which of the following is NOT TRUE?
 (a) Concerned LR front contact is proved in UCR Circuit
 (b) Crank handle key IN (locked) is proved in UCR Circuit
 (c) UCR front contact is proved in HR circuit.
 (d) UCR front contact is proved in ASR circuit

- Q7. In British RRI system which of the following is NOT proved in ASR circuit?
- Track locking
 - Indication locking
 - Approach locking
 - Back locking
- Q8. In British RRI, the Approach Lock Stick Relay ASR can be energized
- Only after the train travels on the entire route sequentially and clears the route.
 - On cancellation with time delay when dead approach provided or approach track occupied.
 - On cancellation without any time delay when approach track provided and not occupied by train.
 - All of the above
- Q9. In British RRI, which of the following is TRUE about Approach Lock Stick Relay ASR?
- ASR is a normally de-energized relay
 - Whenever a route is set and route-checking relay UCR is energized it causes ASR to drop
 - Once ASR picks up, all the points are locked
 - Front contact of ASR is proved in HR circuit
- Q10. In British RRI, which of the following is NOT TRUE for Sequential Proving Relays UYRs?
- UYRs are normally in energised condition
 - Front contacts of UYRs are proved in ASR circuits and also in their own stick path.
 - Back contacts of UYRs are proved in HR circuit.
 - UYRs are having slow to release feature.
- Q11. In British RRI which of the following combinations is required for concerned Signal control Relay HR to pick up?
- RR↓ UCR↑ ASR↑ TSR↓
 - RR↑ UCR↑ ASR↓ TSR↑
 - RR↓ UCR↓ ASR↑ TSR↑
 - RR↑ UCR↓ ASR↑ TSR↓
- Q12. In British RRI, the Timer initiating Relay JSLR
- Picks up through route initiation
 - It ensures the train is within the route set.
 - Initiates timer which gives output after the desired time lapse.(60/120/240 seconds)
 - All of the above

- Q13. In British RRI, as per Crank handle Interlocking circuits
- (a) Crank handle lock Relay CHLR picks up when CH key is inserted in the EKT and turned.
 - (b) Crank handle Free Relay CHFR drops when all concerned signal knobs are normal
 - (c) Once CHFR drops crank handle key can be extracted
 - (d) When crank handle key is OUT, it shall be possible to clear signal concerned.
- Q14. Which of the following is applicable to Route Relay interlocking using metal to carbon contact relays?
- (a) Only knob type panels to be used.
 - (b) Only automatic operation of points to be provided.
 - (c) Back contact proving in Metal To Carbon type relays is not required to avoid the relay remain permanently in picked up condition.
 - (d) All of the above
- Q.15. In British RRI the relay UNCR
- (a) Picks up when any Route button is pressed
 - (b) Drops when any Route button is pressed
 - (c) Picks up when any signal & concerned Route button are pressed
 - (d) Drops when any signal & concerned Route button are pressed
- Q.16. In British RRI, the relay NNCR
- (a) Drops when any button is stuck up on the panel
 - (b) Picks up when any button is stuck up on the panel
 - (c) Stops the alarm of button stuck up on the panel
 - (d) None of the above
- Q.17. In British RRI, the which of the following is TRUE about relay GXJR?
- (a) GXJR is a normally energized relay
 - (b) GXJR drops when any of the signals become blank
 - (c) GXJR is made slow to release
 - (d) All of the above
- Q.18. In British RRI, which relay is allowed to pickup along with GNR to throw the signal to danger in case of emergencies irrespective of whether relay SMR/SMCR is pick up or drop?
- (a) EWNR
 - (b) GNCR
 - (c) EGGNR
 - (d) GEGR

- Q.19. In British RRI, which of the following is the main function of relay WJR?
- (a) It switches. heavy duty contact relay WCR (QBCA).
 - (b) It is situated at location box near point location
 - (c) It controls DC 110V to point motor for a fixed time.
 - (d) None of the above
- Q.20. Which of the following is TRUE for Track Stick Relay TSR?
- (a) There can be one TSR for each signal
 - (b) A common TSR can also be provided among two or more signals for the same direction of traffic, which will not be taken OFF at the same time.
 - (c) It picks up through controlling track circuit clear condition
 - (d) All of the above
- Q.21. In British RRI the point indication relay NWKR/RWKR is
- (a) Normally de-energized
 - (b) Always energized
 - (c) Normally energized
 - (d) Energized only when route is set
- Q.22. In British RRI the colour of calling-on signal button on operating panel is.
- (a) Blue
 - (b) Red
 - (c) Yellow with White dot
 - (d) Red with White dot
- Q.23. In British RRI the indication for ON aspect of shunt signal below main signal (dependent shunt) is
- (a) Horizontal White light
 - (b) No light
 - (c) Vertical White light
 - (d) Cross White light
- Q.24. In British RRI, the relay OVSR picks up in which of the following conditions?
- (a) After 120 seconds of occupying the berthing track before overlap for a stopping train
 - (b) After passage of train beyond the overlap with starter taken 'OFF'
 - (c) Both (a) and (b) above
 - (d) None of the above
- Q.25. In British RRI, picking up of which relay proves that the interlocked Level Crossing gates if any in the Route and overlap are locked and closed against Road traffic (LXPR up)
- (a) LXYPR.
 - (b) LX(IN)PR
 - (c) LXNR
 - (d) LXPR

- Q.26. In British RRI, the indication for ON aspect of Calling –On signal on operating panel is
- (a) No light
 - (b) Yellow light
 - (c) Red light
 - (d) White light
- Q.27. In British RRI, when point knob is in centre (where 3 position knobs are provided for point operation), the contacts
- (a) N & NC make.
 - (b) R & RC make
 - (c) NC & RC make
 - (d) N & R make
- Q.28. In British RRI, which of the following relays are used in system II only?
- (a) ASR,UCR
 - (b) ZR,LR,UR,OCR
 - (c) WLR,WNR,WRR
 - (d) NWKR,RWKR
- Q.29. In British RRI, which of these relays are associated with sectional route release?
- (a) WNR/WRR
 - (b) NWKR/RWKR
 - (c) NR/RR
 - (d) TRSR/TLRSR
- Q.30. In British RRI, which of these relays performs the function of one train one signal?
- (a) ASR
 - (b) UCR
 - (c) TSR
 - (d) SMR
- Q.31. In British RRI, the Station master's Control Relay SMR
- (a) Drops when the SM's panel key is IN and turned
 - (b) Energised when the SM's panel key is IN and turned
 - (c) Energised when the SM's panel key is taken out.
 - (d) Does not depend upon the position of SM's panel key
- Q.32. In British RRI, the relay WLR is
- (a) used for locking the point
 - (b) normally in pick up condition
 - (c) drops only when the route is initiated .
 - (d) drops only when the point knob is turned to N or R position (for individual operation).

- Q.33. In British RRI, where there is no track circuit on the approach of the signal, the route release is effective only after a time delay, then such locking is termed as
- (a) Approach locking
 - (b) Dead-approach locking
 - (c) Back locking
 - (d) Indication locking
- Q.34. In British RRI, the locking which prevents release of route unless the concerned signal display its normal aspect on arrival of the train or on cancellation of that signal is termed as
- (a) Approach locking
 - (b) Dead-approach locking
 - (c) Back locking
 - (d) Indication locking
- Q.35. In British RRI, which of the following relays is normally in de-energized condition.
- (a) TPR
 - (b) ASR
 - (c) HR
 - (d) All of the above
- Q36. In British RRI Picking up of ASR after the train movement ensures that
- (a) The signal has assumed its normal aspect
 - (b) The concerned signal knob is normal
 - (c) The train has physically moved and reached the berthing track
 - (d) All of the above
- Q37. In British RRI the signal control circuit for Home signal ensures that all concerned points are correctly set and locked
- (a) In route,
 - (b) In route & isolation
 - (c) In route, isolation and overlap
 - (d) None of the above
- Q38. In British RRI the signal control circuit for Starter signal ensures that all track circuits concerned are clear
- (a) In route up to the next signal in advance
 - (b) In route & isolation
 - (c) In route, isolation and overlap
 - (d) No track circuit in route /berthing / overlap need be proved
- Q39. In British RRI picking up of TSR after the train ensures that
- (a) The controlling track is clear.
 - (b) The Signal knob is restored to Normal.
 - (c) ASR is in up condition (route not locked)
 - (d) All of the above

- Q40. In British RRI the relays associated with cancellation of route with time delay are
- (a) ASR,UCR &TSR
 - (b) WLR,WNR/WRR
 - (c) RJPR, JSLR, JR& NJPR
 - (d) HR,DR,HECR,DECR
- Q41. In British RRI system II the Relay used for extending point operation supply to the field location is
- (a) WRR
 - (b) WNR
 - (c) ZNR
 - (d) PCR
- Q42. In British RRI the Point operation initiating relays only for system II are
- (a) ZR,LR,UR,OCR
 - (b) CR,NR,RR
 - (c) WLR,WNR.WRR
 - (d) NWKR/RWKR
- Q43. In British RRI the Route selection/initiation relays only for system II are
- (a) ZR,LR,UR,OCR
 - (b) CR,NR,RR
 - (c) UCR,ASR
 - (d) TSR, TRSR,TLSR
- Q44. In British RRI the main function of relay UCR is
- (a) Route releasing
 - (b) Route checking
 - (c) Route initiating
 - (d) Route holding
- Q45. In British RRI system II the main function of relay UR is
- (a) Route releasing
 - (b) Route checking
 - (c) Route initiating
 - (d) Route holding

- Q46. In British RRI which of the following relays performs the function of route holding
- (a) UCR
 - (b) ASR
 - (c) TSR
 - (d) WLR
- Q47. In British RRI system II which of the following relays performs the function of route locking
- (a) UCR
 - (b) UR
 - (c) ZR
 - (d) WLR
- Q48. In British RRI system II which of the following relays performs the function of route initiation
- (a) UCR
 - (b) UR
 - (c) ZR
 - (d) WLR
- Q49. In British RRI which of the following timer relays in a thermal timer pick up with HOT contact
- (a) JR
 - (b) JSLR
 - (c) JSR
 - (d) NJPR
- Q50. In British RRI which of the following is NOT a feature of domino type panel
- (a) Self-restoring type of buttons
 - (b) Easy to make deletion and addition on the operating panel during yard modification
 - (c) The Top plate (console) of the operating panel has only one complete plate and holes/slots are cut to provide switches, buttons, indications, counters, keys etc.
 - (d) Route gets released as the train clears the route, no extra operation is required

II. True/False type questions (Q.No.51 to 100)**State True or False**

Q. No.	Question
51.	Route Relay Interlocking system is also known as Non- route setting type Relay Interlocking
52.	When UCR picks up, ASR concerned will be dropped in British RRI.
53.	The points will be set automatically in RRI when signal button and route button are pressed simultaneously
54.	The point switches if used in route setting type inter locking (RRI) will have three positions i.e. N, C and R.
55.	For automatic operation of points in RRI , the point knob has to be set to required position (N or R)
56.	As per Railway Board's directions all panels must be of Domino Type, with only self restoring type buttons and have the facility for "Route setting Type", even for smaller and wayside stations.
57.	In British RRI the Point Indication Relays NWKR and RWKR are normally in dropped condition
58.	In British RRI the Track Left & Right Stick Relays TRSR and TLSR are normally in pick up condition
59.	Relay TRSR is used in British RRI for Sectional Route Release for Leftward movement
60.	In British RRI, UCR front contact is proved in HR circuit.
61.	In British RRI, the relay OVSR is normally energized and drops whenever the signal is taken 'OFF' leading towards that overlap.
62.	In UCR circuit of British RRI, all points in route, overlap and isolation (set& locked) are proved.
63.	In British RRI, Calling on signal will not have separate UCR, ASR, JSLR, and HR.
64.	In British RRI the relays used are proved type metal to metal contact relays.
65.	In British RRI the power supply normally used for relays is 24 DC
66.	For major yards British RRI system I is used
67.	In British RRI, Emergency point operation is compulsory
68.	SM's key is to be provided to lock the panel to prevent unauthorized operation
69.	In British RRI, the Emergency Signal Cancellation (EGGN) button is kept in sealed condition
70.	In British RRI, the relay UCR is a normally de-energized relay.
71.	In British RRI JSLR and NJPR front contacts are used in the cancellation path of ASR
72.	In British RRI, The ON aspect of an independent shunt signal is diagonal white light
73.	The metal to carbon contact relays used in British RRI have all independent contacts except time element relays
74.	In metal to carbon relays used in British RRI, have 4 nos. fixed front contacts namely A5-A6, A7-A8, B5-B6 & B7-B8
75.	Metal to carbon relays used in British RRI are factory sealed. The users are not allowed to open the relays

Q. No.	Question
76.	In British RRI, the number of LRs will be less than the number of signal routes possible in that yard.
77.	Picking up of LR in British RRI system ensures that an authorised person carries out the required manual operation at the panel and no conflicting route is initiated.
78.	In British RRI, normally each signal is provided with one ASR. Common ASR can be used for two or more adjacent signals for economy purpose.
79.	In British RRI, picking up of ASR relay holds all the points in the route including points in the overlap/ isolation and cannot be altered unless certain conditions are fulfilled.
80.	Locking by which the route set cannot be altered when the train has passed the signal and is still in the route entered, is termed as back locking
81.	For a two-aspect signal two signal controlling relays are used and for a three aspect three relays are used.
82.	Indication locking is achieved by including front contacts of HR, DECR & HE CR in ASR circuit.
83.	Use of HE CR & DECR back contacts instead of RE CR front contact in ASR circuit prevents route locking due to signal lamp fusing.
84.	HR relay is used to control the aspect of a signal and is normally in the energized condition.
85.	Normally for Calling- On signals no track circuit in route /berthing / overlap need be proved in signal control circuit.
86.	In case of Automatic Signalling territory, where there is a possibility of second train coming On Calling –on track, the first track ahead of the signal and a TSR shall be proved in the calling-on Signal control circuit.
87.	It is not necessary to prove points in isolation for signal control circuit of shunt signal
88.	It is not necessary for a Shunt signal to lock any signal above it (on the same post) if it is leading on the same route /routes.
89.	Shunt being a subsidiary Signal locks respective main signals on the same line in same or opposite direction.
90.	On panel, the red indication appears, when track is occupied through TPR back contacts only when the route is locked.
91.	When a track is not occupied and the signaled movement is not initiated no light appears in the panel.
92.	Flashing indication of point indicates the initiation of point operation or when its position is disturbed.
93.	In system II for a train movement, the points in the overlap are held by a relay OHR. Generally there will be one relay for each road and for each direction.
94.	In system II as soon as ASR drops, the concerned road OHR picks up.
95.	In British RRI, the relay ASR is normally in the de-energized position and picks up once the points in the initiated route are checked by the UCR relay.

Q. No.	Question
96.	In British RRI, dropping of ASR relay holds all the points in the route including points in the overlap/ isolation and cannot be altered unless certain conditions are fulfilled.
97.	In British RRI, during the course of operation if the point track fails, the point operation should be completed. For this purpose the front contact of WLR is shunted across the point TPR up contact.
98.	As per Railway Board's directions all panels must be of Domino Type, with only self restoring type buttons and have the facility for "Route setting Type", even for smaller and wayside stations.
99.	In British RRI whenever a route is electrically locked for clearing a signal, through ASR back contact and the relevant TPR front contacts, the indication which appears on panel is RED.
100.	UECR should pick up with three or more lamps fused in the junction type route indicator.

III. Short & descriptive answer type questions (Q. No. 101 to 150)**Answer the following questions**

- Q.101. What is the function of Station Master's Control Relay SMR/SMCR relay in British RRI ?
- Q.102. Give brief description about Track Stick Relay TSR circuit.
- Q.103. What is the function of Route Checking Relay UCR in British RRI?
- Q.104. What is the function of Approach Lock Stick Relay ASR in British RRI?
- Q.105. Give brief description of Sequential Route Release circuits in British RRI.
- Q.106. Why are UYRs made slow to release in sequential route release circuits?
- Q.107. What type of relays are used for emergency cancellation of route with time delay?
- Q.108. What is the function of Overlap Stick Relay OVSR in British RRI?
- Q.109. What are the conditions which are required to be proved to pick up signal control relay HR for clearing a signal?
- Q.110. Which track circuits are to be proved in signal control circuit?
- Q.111. Which points are required to be proved correctly set and locked in signal control circuit?
- Q.112. Which track circuits are to be proved in calling on signal control circuit?
- Q.113. What is track locking and how it is achieved in British RRI?
- Q.114. What is approach locking and dead approach locking and how these are achieved in British RRI?
- Q.115. What is back locking and how it is achieved in British RRI?
- Q.116. What is indication locking and how it is achieved in British RRI?
- Q.117. What type of locking is provided between main and shunt signals?
- Q.118. Briefly explain the function of Track Stick Slow Release Relay TSSLR.
- Q.119. Briefly explain Crank handle interlocking. How it is achieved through the relay CHLR in British RRI?
- Q.120. Briefly explain the function of Point Time oriented Relay WJR.
- Q.121. Briefly explain the function of Timer Initiating Relay JSLR.
- Q.122. Briefly explain the function of Time Lag Proving Relay NJPR.
- Q.123. What is British RRI System II? How it differs from System I?
- Q.124. Give brief description of crank handle interlocking.
- Q.125. State the function of relays LXRR and LXYS associated with the interlocking of level crossing gate.

IV.

Answer Key**Section A
Part I**

Q. No.	Answer
1.	(c)
2.	(a)
3.	(d)
4.	(a)
5.	(d)
6.	(d)
7.	(a)
8.	(d)
9.	(b)
10.	(a)
11.	(b)
12.	(c)
13.	(a)
14.	(c)
15.	(b)
16.	(a)
17.	(d)
18.	(c)
19.	(c)
20.	(d)
21.	(c)
22.	(d)
23.	(b)
24.	(c)
25.	(d)

Q. No.	Answer
26.	(a)
27.	(c)
28.	(b)
29.	(d)
30.	(c)
31.	(b)
32.	(a)
33.	(b)
34.	(d)
35.	(c)
36.	(d)
37.	(c)
38.	(a)
39.	(d)
40.	(c)
41.	(d)
42.	(b)
43.	(a)
44.	(b)
45.	(c)
46.	(b)
47.	(c)
48.	(b)
49.	(c)
50.	(c)

V.

Answer Key**Section A****Part II**

Q. No.	Answer
51.	FALSE
52.	TRUE
53.	TRUE
54.	TRUE
55.	FALSE
56.	TRUE
57.	FALSE
58.	TRUE
59.	FALSE
60.	TRUE
61.	TRUE
62.	TRUE
63.	FALSE
64.	FALSE
65.	TRUE
66.	FALSE
67.	TRUE
68.	TRUE
69.	FALSE
70.	TRUE
71.	TRUE
72.	FALSE
73.	TRUE
74.	FALSE
75.	TRUE

Q. No.	Answer
76.	FALSE
77.	TRUE
78.	TRUE
79.	FALSE
80.	TRUE
81.	FALSE
82.	FALSE
83.	TRUE
84.	FALSE
85.	TRUE
86.	TRUE
87.	TRUE
88.	FALSE
89.	TRUE
90.	FALSE
91.	TRUE
92.	TRUE
93.	TRUE
94.	FALSE
95.	FALSE
96.	TRUE
97.	TRUE
98.	TRUE
99.	FALSE
100.	FALSE

VI.

Answer Key

**Section A
Part III**

Ans.101. SMCR/SMR: Station Masters Control Relay

This relay is energized when the SM's panel key is 'IN' and turned to Normal. The energisation of SMCR/SMR relay provides authorized operation of all the functions on the panel. When SM's key is turned to reverse and taken out from panel by SM, prevents unauthorized operation and locks the panel in the last operated position. The energised contacts of SMCR are used in knob circuits, button circuits, point operation circuits, route initiation circuits, route cancellation circuits, emergency circuits, crack handle circuits, timer circuits etc. Repeaters of SMCR may be made as required.

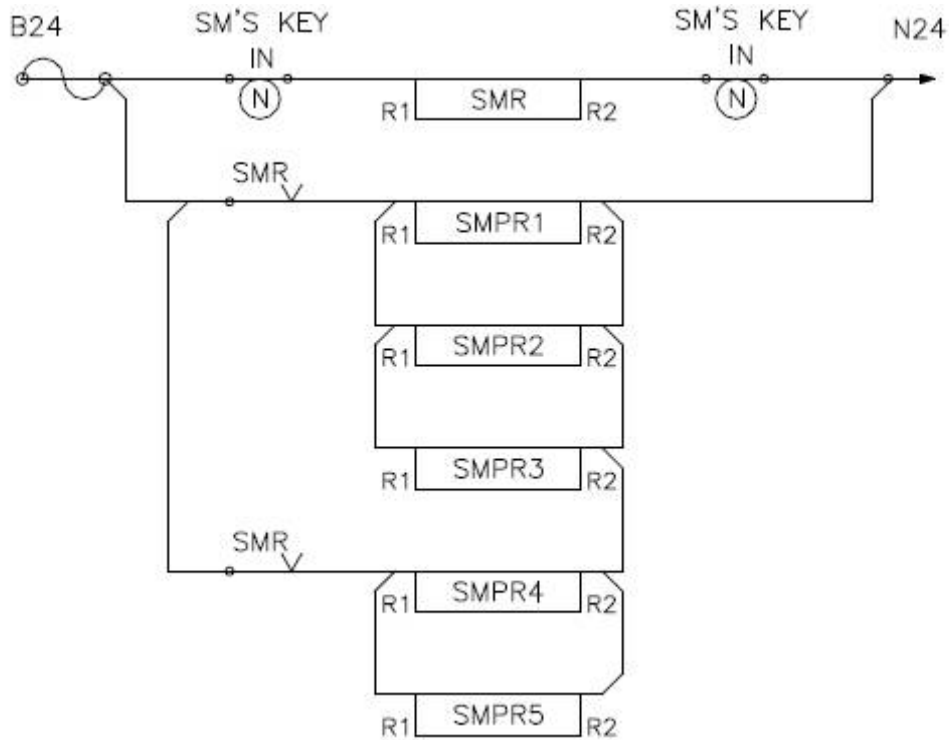


Fig.A.1

Ans.102. Track Stick Relay (TSR) Circuit

This is a one signal-one train (one movement) circuit. When a signal is taken off for a train and the train passes the signal, the TSR ensures that the signal is put back to 'ON' immediately. The TSR also ensures that the signal does not re-clear automatically, though knob is left in Reverse and all other conditions favourable. The stick relay is controlled by the first track circuit immediately in advance of the signal and the normal position of the concerned signal knob. Fig A.2 (A) is with signal switch, Fig. A.2 (B) is with signal Button.

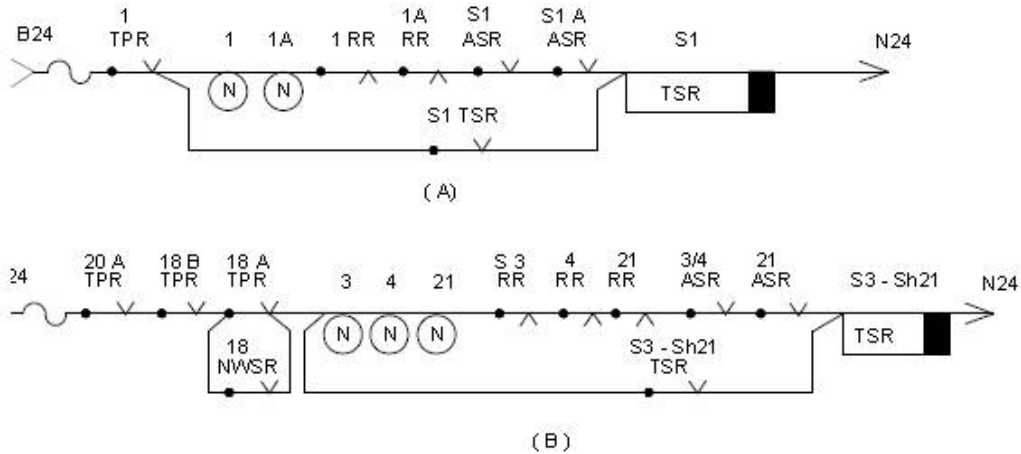


Fig.A.2

The pickup contact of the relay is used in the signal control circuit (HR). After the train passes the signal and the control track is occupied, TSR drops and the signal is put back to 'ON'. To pick up TSR again, the signal switch has to be made normal and/or the dropping of controlling relays RR, HR and picking up of ASR. Only after picking of TSR, the signal knob can be reversed to take off signal for the next train. Thereby TSR ensures one signal – one train feature.

A combined TSR circuit can be made for signals leading to the same route (ie.signals conflicting in nature) and having common controlling track circuit. For Home signal with 'CO' ON & Shunt on the same post or starter signals of different lines leading towards same route or a starter signal with shunt below it. It is only to economize number of TSR relays , wiring and to reduce the circuits size.

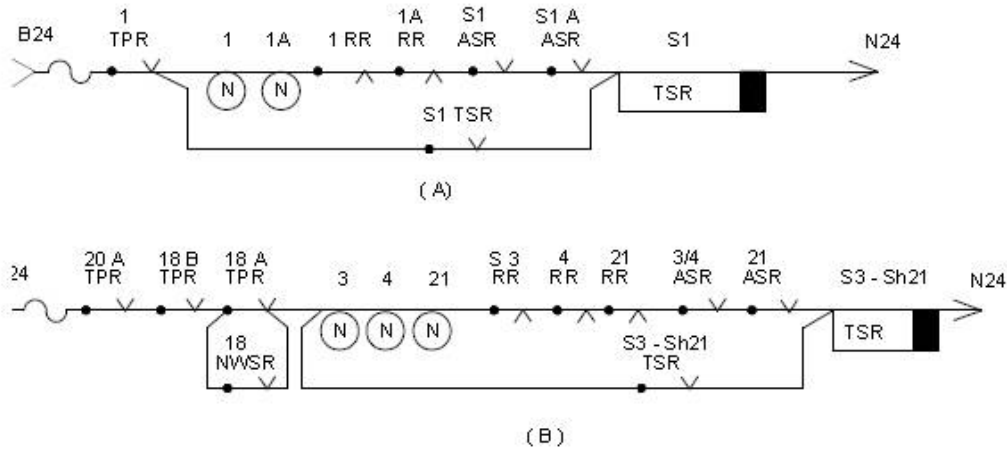


Fig. A.3

Fig. A.3 (A) & (B) are combined TSR circuits with separate switches for signals. It may be noted that the track circuit immediately after the signal or nearest common TC must be taken to replace the signal soon after the train passes. Hence in big yards where it is not possible, separate TSR may be made.

Ans.103. Route Checking Relay

The relay UCR is used to prove that all the points in the initiated routes including points in overlap are operated and locked to the required positions. Separate UCRs are provided for each route and are normally in de-energized position. Picking up of UCR proves that the points in the initiated route is correctly set and locked.

Energisation of UCR ensures that

- I. The required manual operation in the panel has been carried out. (Concerned route LR ↑)
- II. The points in the route including overlap are correctly set, locked and electrically detected. (Concerned points NWKR / RWKR's ↑)
- III. No conflicting movement in that route is initiated. (Conflicting UCR's ↓ & ASR's ↑)

UCR front contact is included in signal control relay HR- circuit to prove that the initiated route is correctly set for clearing the signal and its back contact is used in route locking relay ASR circuit to ensure that the route cannot be altered without putting back the signal to normal.

Ans.104. Approach Lock Stick Relay ASR

ASR is a normally energized relay. Whenever a route is set and route-checking relay UCR is energized it causes ASR to drop and there by locks the route i.e., locks all the points in the route including in overlap & isolation.

It is necessary to lock the route before a signal is taken off. Every signal will be having one ASR and the drop contact of ASR is proved in HR pick up circuit to ensure locking of that signal route before the signal is cleared.

It mainly consists of 3 circuits

- (a) Indication locking.
- (b) Back locking.
- (c) Approach locking

Once ASR picks up the locking effect on the signal route is released and all the points will become free. Hence before a route is released, it must be ensured that the signal is normal and the movement is completed and the route tracks are clear. To achieve this, indication locking, route locking & approach locking applicable to a signal, are proved in ASR circuit.

ASR can be energized in 4 ways.

- (i) Only after the train travels on the entire route sequentially and clears the route.
- (ii) On cancellation with time delay when dead approach provided or approach track occupied.
- (iii) On cancellation without any time delay when approach track provided and not occupied by train.
- (iv) Calling on Cancellation: When ever due to Back locking track circuit failures, the route is locked (ASR not picked) then calling on knob reversed and calling on ASR drops. Immediately calling on knob is normalized and calling on

cancellation is applied (CO-CAR up) calling on NJPR picks up after 240 seconds time delay which picks up the Main signal ASR. This way the route is released without S&T Person's intervention.

Ans.105. Sequential Route release Circuits

The Route locked for a signalled Train movement should get released only after the train has arrived on proper signal in proper direction and the track circuits have been sequentially actuated by the train. This is registered by picking up of sequential proving relays UYR's. (some railways call them as TPZR, TSSLR etc.). The pick up contact of UYR's are used to energise ASR in the normal route release path. To ensure that the route is getting released only after the sequential occupation of tracks by a train arriving in proper direction, the UYRs are picked up in a pre-determined fashion and not by accidental dropping /bobbing of back lock track circuits or power supply fluctuations.

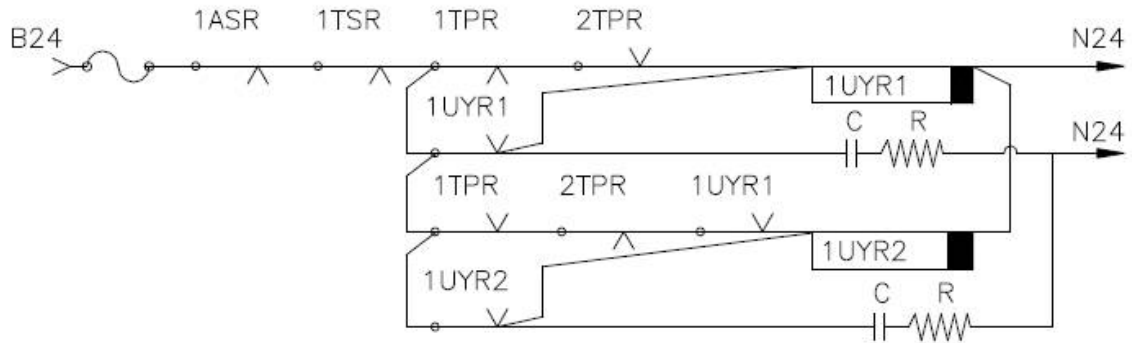


Fig.A.4

Following is the sequence of train movement and sequential operation of TPR's.
 When the train is on 1st track only, 1TPR down, 2 TPR up
 When the train clears 1T and occupies 2T, 1TPR up, 2TPR down.
 With the first sequence, UYR1 picks up. With the second sequence and UYR1 picks up, UYR2 picks up. These above two sequences are possible only with the passage of train and not due to battery failure or track bobbing or power failure.
 Now days in these circuits, the de-energized contacts of two consecutive track circuits TPR's are proved together to pick up UYRs. Three UYR's - UYR1, UYR2 and UYR3 are energised for more reliability using 3 track circuits sequentially.
 In addition to this, it is also a practice to include the back contacts of all track circuits in the route including berthing track in route release circuit relays sequentially to guard against permanent energisation of any track relay either due to mechanical or electrical problems.

Ans.106. ASR picks up through UYR's front contacts and UYR's will be up through drop contact of ASR. Therefore, it is necessary to ensure that after the train arrival, UYR's do not drop unless sufficient time is given for ASR to pick up and stick. Any failure in the time delay arrangement will not give sufficient time for ASR to pick up resulting to a failure and this aspect is to be taken care during maintenance for a trouble free working.

Ans.107. In British RRI, the following type of relays are used for emergency cancellation of route with time delay:

- (a) Mechanical Time Release Relay operated by a Mechanical timer with reduction gear.
- (b) Thermal element relay (QJ1).
- (c) Electronic Timer Relay (ET).

In Mechanical Time Release, the rotation of a gear system makes the Reverse contact after two minutes. The reverse contact is used in picking up ASR. This is not used now a days.

QJ1 is a Q series timer relay, which has a thermal coil and a bimetallic strip. This is used along with another Q series relay called NJPR (JR).

To get the required time delay, now-a-days electronic timers are used. The electronic timers are having solid state electronic circuits inside. This gives an output, two minutes after the input is given. Since the Electronic circuits using semi conductors, which are not treated as fully reliable, it is a practice to use two Timers in parallel and their contacts in series for releasing the route

Ans.108. Overlap Stick Relay

Whenever a signal is taken off, the points in the route, in overlap and in isolation are to be held in locked position till the train completely passes and clears them. As far as points in the route are concerned, they are locked till the train clears and the back lock tracks have picked up and the ASR picks up. But once ASR pick up, the locking affect on overlap points is released and the points in the overlap can be operated, which is undesirable.

For example, home signal S1, ASR is picked up after the train clears the back lock tracks, but the train is still rolling on berthing track, where as the overlap points beyond starter become free if starter is not given. This is considered undesirable. If starter is given then they are held further. In case starter is not given, still the overlap points should be held in locked position for a specified time (120 seconds) to ensure that the train stopped in rear of starter, only then the points should become free. During this time, if the train over shoots, then the points cannot be operated. To achieve this feature, OVSR circuit is adopted. OVSR is normally energized and drops whenever the signal is taken 'OFF' leading towards that overlap.

When a signal has more than one route, then the no. of OVSR relays will be equal to the no. of routes available for that signal. OVSR relay is designated with starter number, beyond which the overlap is considered.

- Ans.109. At HR stage the following conditions are to be satisfied for clearing a signal
- (a) Crank handles are 'in', i.e. proved by CHLRs up and CHFRs down.
 - (b) Route Release Relays have de-energized after the last train movement (UYR1, UYR2 etc., are down) (In Southern Railways UYR1 and UYR2 are called as TSSLR and TPZR respectively)
 - (c) No cancellation is initiated i.e. JSLR down.
 - (d) Interlocked LCs if any in the Route and overlap are locked and closed against Road traffic (LXPR up) and held locked till the passage of that train is over.
 - (e) Conflicting signals are at 'ON' is proved by proving the front contact of ASRs or back contacts UCRs of conflicting signals.
 - (f) All points in the route, overlap and isolation are set and locked i.e. Concerned NWKRs, RWKRs are in up condition.
 - (g) Concerned to its own signal i.e.
 - RR is up.
 - UCR is up.
 - ASR is down.
 - One signal - one train feature (TSR up)
 - (h) All Back lock and controlling tracks are clear i.e. TPRs concerned are up.
 - (i) Signal ahead is not blank (GECR up or RECR/HECR/DECR UP)
 - (j) Route Indicator lamps are not lit for straight line (UHRs / UGRs and UECCR down) (compulsory in case of Junction type Indicator)
 - (k) Route Indicator lamps are lit for loop lines (UGR or UHR and UECCR up)
 - (l) Sidings in the route & overlap are kept normal and held (siding KLPR/NPR up).
 - (m) Cross protection is provided for the signal control relay, by the Front contact of ASR or Back contact of UCR. These contacts are not favorable for signal clearance.
 - (n) Double cutting is provided by UCR up & ASR down.

Ans.110. The following track circuits are to be proved in Signal Control Circuit:

- (i) For Home signal
 - Track circuits in route, concerned berthing track+ overlap.
- (ii) For starter signal.
 - Track circuit in the route up to the next signalling advance.
- (iii) For Shunt Signals.
 - Normally up to next opposing signal in advance.
 - In big yards, where intermediate shunts are there, the line is clear up to next intermediate shunt signal in advance.
- (iv) For Calling- On signals.

No track circuit in route /berthing / overlap need be proved. However it shall be possible to clear Calling - On signal only when the train has come to a stop at the calling-on track.

In case of Automatic Signalling territory, where there is a possibility of second train coming on Calling –on track, the first track ahead of the signal and a TSR shall be proved in the calling-on Signal circuit.

Ans.111. The following points are required to be proved correctly set and locked in Signal Control Circuit:

- (i) For home Signal
 - Points in route, in isolation and overlap.
- (ii) For Starter Signal.
 - Points in route and in isolation.
- (iii) For Shunt Signal.
 - points in route (isolation not compulsory)
- (iv) For Calling –On Signal.
 - Points in route and in isolation.

Ans.112. **For Calling- On signals**

No track circuit in route /berthing / overlap need be proved. However it shall be possible to clear

Calling - On signal only when the train has come to a stop at the calling-on track.

In case of Automatic Signalling territory, where there is a possibility of second train coming on Calling –on track, the first track ahead of the signal and a TSR shall be proved in the calling-on Signal circuit.

Ans.113. **Track Locking**

This locking prevents alteration of a point if the point track is occupied. In British RRI, it is achieved by proving the point track TPR up contact in WLR circuit. During the course of operation if the point track fails, the point operation should be completed. For this purpose the front contact of WLR is shunted across the point TPR up contact. Once point is operated for reverse position, picking up of RWKR drops WRR but WLR drops only after the route is locked (ASR down).

Ans.114. **Approach locking/Dead approach locking**

By providing Approach Locking, the route set cannot be altered in the face of an approaching train unless the train has come to a stop at the signal and the conditions are safe. It is achieved by providing track circuits in rear of a stop signal for a sufficient length called approach track. Where ever approach track is provided, the relay - AR- will be on the main circuitry path of the ASR and the cleared route can be released immediately if approach track is free. Since it is not economical and following trains will not be there in absolute block system, this track circuit will not be available for home signals of the above section but are provided in automatic signaling area. In case of starter signal berthing track becomes the approach track. Where there is no track circuit on the approach of the signal, the route release is effective only after a time delay and is termed as **dead approach** locking. Normally the time delay is 120 seconds for main line signals and 60 seconds for loop line signals /shunt signals. Cancellation of the cleared route by normalizing the signal knob has the following options:

- When the Approach track is free ---- AR up (route gets released immediately)

- Complete arrival of the train (by sequential proving of track circuit) --- TSSLR up.
- Where there is no track circuit in rear of the signal or when the approach track is occupied- --- JSLR and NJPR up (cancellation path)
- Bypassing back lock tracks through emergency route release--- CO-ERR up. (Clear and cancel calling- on signal and initiate emergency route release)

Ans.115. Back Locking

Locking by which the route set cannot be altered when the train has passed the signal and is still in the route entered, that is, the train has not cleared the tracks between the signal and the last back lock track in that route. In British RRI, this is achieved by including those TPR front contacts in ASR circuit. As soon as the train passes the cleared signal this locking will be effective and the ASR will pick up only when these tracks are free. Signal with sectional route release, back lock track will not be extended up to the last point track and ASR picks up by sequential proving and the route ahead will be held by TLSR/TRSR.

Ans.116. Indication Locking

This locking prevents release of route unless the concerned signal displays its normal aspect on arrival of the train or on cancellation of that signal. In British RRI, this is achieved by including back contacts of HR, DECR & HECR in ASR circuit. Use of HECR & DECR back contacts instead of RECR front contact prevents route locking due to signal lamp fusing.

Ans.117. Locking between Main & Shunt Signals

Shunt signal locks any signal above it (on the same post) if it is leading on the same route /routes. Shunt being a subsidiary Signal locks respective main signals on the same line in same or opposite direction.

Shunt does not require overlap points to be proved. Hence any move with main signals (running signals) in the overlap without physical isolation must be locked. In smaller yards (way side stations) where only one movement is expected from the same berthing track, Starter locks another starter/shunt leading in opposite direction also provided. In busy yards it is dispensed with.

Ans.118. Track stick slow release relay (TSSLR)

This relay is used to prove the arrival of a train for which a signal is cleared and also helps in releasing the route after the train movement is completed. As such, care is taken not to release the locked route by momentary dropping of the tracks before actual train movement is completed.

This is achieved by using sequential track proving method with additional relays TPZR and

TSSLR. Up contact of TSSLR is proved in ASR pick up circuit and its down contact are proved in HR circuit.

Note: - As ASR back contact is used in TSSLR pick up circuit and TSSLR front contact in

ASR pick up circuit, during the transition period of ASR picking up, supply to TSSLR will be cut which should not cause the same to drop. For that, a time delay circuit is provided in TSSLR to make it slow to release.

Picking up of TSSLR ensures that

- The train has been received on signal.
- The track is occupied and cleared in a sequential order.

Ans.119. CHLR : Crank handle lock Relay

It picks up when crank handle is inside the EKT equipment and the key is turned Its F/C is used in relevant signals UCR & HR circuit

Crank handle can be extracted when all the relevant signals are in normal position.

It will drop when the crank handle is initiated for extraction from the equipment.

Ans.120. WJR: Point Time oriented relay

- Picks up when NWR/RWR picked up for normal/Reverse operation respectively.
- Picks up through B/C of WXR
- It further switches WXR
- It further switches. WCR (QBCA) heavy duty.
- Drops when the point is operated to required position/condenser discharged whichever is earlier.
- Normal supply is cut OFF when WXR picks up.
- WJR is continued to be pick up by charged condenser till such time condenser discharges.

Ans.121. JSLR: Timer initiating Relay

- It is used to cancel the set route, proves the route is locked before the train could move beyond the signal / after the train moved the signal and cleared the route (ASPR B/C)
- It is designated by prefixing with signal no.
- It picks up through station master's authorization (SMR F/C).
- It picks up through cancellation initiation by pressing push button.

- It picks through concerned signal normal position (drop condition of HR/DR,RR UCR proved).
- It ensures the train is not within the route set (clear of the route).
- It initiates timer to activate which gives output after the desired time lapse.(60/120/240 seconds)
- If there is a common timer grouped among other signals, only one JSLR to pick up at a time so other JSLR B/C to be proved alternately in JSLR pick up circuits.
- JSLR, NJPR together will feed ASR after lapsing of the defined time lag.
- COJSLR, NJPR together will feed to clear the calling on signal since calling-on signal shall be taken to OFF after ensuring the stoppage of the train for the predetermined time.
- CHJSLR, NJPR together will feed CHYR in case emergency crank handle extraction feature under locked condition feature where exists.
- LXJSLR, NJPR together will feed LXYR in case emergency LC gate key extraction feature under locked condition feature where exists.

Ans.122. NJPR: Time- lag Proving Relay

- This picks up after initiating timer as per the preset time lag according to selection in the group (generally 120 seconds for all signals, but some railways follow 60 sec. for shunt signals)
- Cancellation press button normally closed contact is used in the NJPR initial path
- circuit to prove its integrity.
- Its pick up is used in the respective time lag proving circuits
- Its back contact is used in the in the JSLR initial pickup circuit to ensure that NJPR should pick up all the times with a fresh (regulated) time lag.
- For calling on its designation is CONJPR and for route cancellation the time lag is 240 sec. which is followed by most of the Railways. Some railways may be following 120 sec.

Ans.123. In RRI (British), there are two systems, British system I for minor yards and system II for major yards.

System I

System I of British RRI is also called as Route-Setting Type or NX-system (Entrance-Exit System). In this system all the points required for a signal are automatically, operated to the required position, then UCR picks up and the signals are taken 'off' , by simply turning the signal switch to reverse or pressing

a signal button and by pressing the suitable Route button simultaneously. In this system, route buttons are compulsory. Provision for manual operation of points is also given. In this system sectional route release (SRR) also may be provided which facilitates more parallel movements in the yard.

System II

For big and major yards where traffic is considerably more, setting of route by individual operation of points is time consuming as well as sometimes confusing and causes unnecessary delay. In major yards, more number of parallel movements and shunt signal movements are involved. Hence another system of British RRI i.e. System II is adopted. In system II, the point control circuits are prepared in geographical manner. All other circuits are same as system - I. Instead of many LRs in point control circuits only 3 relays i.e., ANR, BNR and RR only will be used in System - II. ANR or BNR controls the operation of point to normal and RR will control the operation of points to reverse.

Ans.124. Crank handle interlocking

Where point motors operate points, crank handles are provided to facilitate operation of points mechanically (manually) in case of point failure. The manual operation of point, after a signal is cleared, may endanger the train operation. Therefore, it is necessary that crank-handle be interlocked with signals suitably.

It is not possible to provide CH interlocking for every point individually. At the same time it is not proper to have only one crank handle common for all the points also. Therefore, points are grouped to achieve optimum flexibility.

- (a) Whenever a signalled movement has to take place over the points it will not be possible to release the concerned CH which is kept locked inside an electrical key transmitter (HKT/RKT/EKT).
- (b) When the crank handle is OUT it shall not be possible to
 - Operate the points from panel.
 - Clear any signal concerned.
- (c) It shall not be possible to insert the crank handle taken out from one group in any other group point machine.

To achieve the above interlocking, the crank handle should be chained and welded to the EKT key. When the key is inserted in the EKT and turned to clockwise, crank handle in proving relay CHLR picks up and sticks through its own front contact.

Crank handle EKT will be kept locked in a glass-fronted box provided with pad lock. The keys will be under the personal custody of S.M. S.M has to make entries in CH register whenever crank handle is released for the manual operation of the point.

Instead of HR back contact ASR front contacts are used to ensure that Signals are at 'ON' for releasing Crank handle by certain Railways, wherever end panels are provided. In this case an emergency release system also is to be provided to release crank handle when ASR fails.

Ans.125. **LXRR : Level crossing gate control reverse relay**

- Picks up when gate control is reversed.
- It picks up LXYS for releasing gate control.
- Its B/C is proved in LXPR circuit.
- Its B/C is proved in concerned signal RR circuit.

LXYR : Level crossing control releasing relay

- It picks up through LXRR F/C.
- It picks up through LXFR F/C in route free condition.
- It picks up through LXJSLR F/C in route locked condition (Gate control release under route locked condition).
- It picks up LXYPR in RE areas at gate locations.
- Its B/C is proved in LXPR circuit



Section B: Siemens RRI (Metal to metal relays)

I. Multiple choice type questions (Q. No. 251 to 300)

Choose correct answer from the given choices (a), (b), (c) & (d)

- Q.251. Route Relay Interlocking system is also called as
- (a) Non-Route setting type Relay Interlocking
 - (b) Route setting type Relay Interlocking
 - (c) Electronic Interlocking
 - (d) Solid state Interlocking
- Q.252. As per Railway Board policy, Route Relay Interlocking should be provided for centralized operation of points and signals at stations which have
- (a) Upto 50 routes
 - (b) 50 to 100 routes
 - (c) 100 to 200 routes
 - (d) Above 200 routes
- Q.253 In Siemens RRI the Point Group Lock Relay is
- (a) WKR1
 - (b) (R/N)WLR
 - (c) W(R/N)LR
 - (d) WLR
- Q.254. The standard contact configuration of Siemens K50 ON/OFF ECR is
- (a) 6F/2B
 - (b) 5F/3B
 - (c) 4F/4B
 - (d) 3F/3B
- Q.255. In Siemens Route Relay Interlocking, the Point detection relays NWKR and RWKR are
- (a) Always energized
 - (b) Normally energized and are de-energized when route setting is done.
 - (c) Always de-energized
 - (d) Normally de-energized and are energized when route setting is done.
- Q.256. In Route Relay Interlocking system if a point is lying in reverse condition then for setting a route in which that point is required in normal condition
- (a) Point is required to be set in normal condition manually
 - (b) Point will be automatically thrown to normal during route setting
 - (c) Point will not be thrown automatically to normal during route setting if it is in the overlap.
 - (d) Point will not be thrown automatically to normal during route setting if it is in the isolation.

- Q.257. In Route Relay Interlocking system the function of Points Chain Group is to ensure that
- (a) Starting of point machines in a route is one after the other during route setting.
 - (b) Starting of all the point machines in a route is simultaneous during route setting.
 - (c) Picking up of Z1WR in each Point group is simultaneous during route setting.
 - (d) None of the above
- Q.258. In Siemens RRI, the coil resistance of the relay WKR1 in a Major Points Group is
- (a) 17 Ohm
 - (b) 52.3 Ohm
 - (c) 60 Ohm
 - (d) 1840 Ohm
- Q.259. The K-50 interlocked relay used in Siemens RRI is available with following contact arrangement
- (a) 5F/3B
 - (b) 6F/2B
 - (c) 4F/4B
 - (d) All of the above
- Q.260. In which of the following conditions the relay WKR₂ operates in Siemens RRI?
- (a) During point operation
 - (b) With more than one earth fault on conductors
 - (c) Whenever point remains out of correspondence
 - (d) All of the above
- Q.261. For point operation, the last relay to pick up for switching the feed to the motor is
- (a) WKR2
 - (b) WR
 - (c) WJR
 - (d) W(R)R
- Q.262. In Siemens RRI, the Direction determining relay is
- (a) ZU(R/N)R
 - (b) W(R/N)R
 - (c) W(R/N)LR
 - (d) (R/N) WLR
- Q.263. In Siemens RRI, which relay circuit ensures that whole route is available for requested signal movement and prevents partial route setting?
- (a) Z1UR
 - (b) DUCR
 - (c) UDKR
 - (d) ZDUCR

- Q.264. In Siemens RRI, which of the following is true for the Signal Lock Stick Relay (GLSR)?
- (a) In main signal group this relay remains normally in energised condition.
 - (b) This relay is used to provide one train one signal feature.
 - (c) This remains picked up after GR2 picks up
 - (d) All of the above
- Q.265. Which of these signal control relays is made slow to release in Siemens RRI
- (a) GR1
 - (b) GR2
 - (c) GR3
 - (d) GR4
- Q.266. In Siemens RRI, front contacts of which relay are proved in the WNR circuit to ensure that signal clearance operation does not take place along with point operation?
- (a) GNCR and UNCR
 - (b) GNCR & WNCR
 - (c) WNCR & UNCR
 - (d) None of the above
- Q.267. Which of these relays can pick up in a signal group through button operation on panel even if SM's key is OUT to facilitate restoration of cleared signal to 'ON' position in case of emergency?
- (a) GNR
 - (b) EGNR
 - (c) Both GNR & EGNR
 - (d) None of the above
- Q.268. If any button is pressed on the panel and not released within 15 seconds or in case the button got stuck up in depressed condition, an audio and visual alarm is given to draw the attention of the operator. This function is achieved through the relay:
- (a) GNCR
 - (b) UNCR
 - (c) WNCR
 - (d) NNCR
- Q.269. Which of these relays does not pick up in a 2-aspect main signal group?
- (a) GR1
 - (b) GPR1
 - (c) GR2
 - (d) GR3

- Q.270. Which of these relays does not pick up in a 3-aspect main signal group?
- (a) GR1
 - (b) GLSR
 - (c) G(R)LR
 - (d) GR3
- Q.271. In crank handle interlocking circuit which of these relays is provided at site?
- (a) CHKLR
 - (b) CHKLCR
 - (c) CHKLCPR
 - (d) CHY(R/N)R
- Q.272. Relay provided to achieve interlocking between main signal & shunt signal leading towards the same direction.
- (a) SH GZR
 - (b) SH G(R/N)R
 - (c) SH GLSR
 - (d) SH GR2
- Q.273. Which of the following relays is not a relay of point group?
- (a) WJR
 - (b) Z1WR1
 - (c) TP1P2R
 - (d) Z1UR
- Q.274. A Universal Route Group caters for how many route sections?
- (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
- Q.275. When the first leftmost yellow indication on a major point group is lit steady then it means that
- (a) The point is under operation.
 - (b) Point zone track circuits are clear
 - (c) The point group is involved in a route set, with points in route, overlap or isolation.
 - (d) The point is correctly set, locked, detected and is in correspondence with the point group.

- Q.276. In Siemens RRI, the Sub-route locking relay is
- (a) U(R)S
 - (b) G(R)LR
 - (c) U(R)LR
 - (d) W(R)LR
- Q.277. In Siemens RRI, the supply used for Internal relays is
- (a) 24 V DC
 - (b) 60 V DC
 - (c) 110 V DC
 - (d) 12 V DC
- Q.278. In Siemens RRI, the Common Button to introduce Auto working of a Main Signal is
- (a) AULR
 - (b) AYN
 - (c) AGRN
 - (d) AGGN
- Q.279. In Siemens RRI, the relays used for external circuits of RE area are
- (a) K50 Interlocked Relay
 - (b) Non-ACI K50 Neutral Control Relay
 - (c) ACI K50 Neutral Control Relay
 - (d) None of the above
- Q.280. In Siemens RRI, the K50 neutral relays are available in following contact configuration
- (a) 6F/2B
 - (b) 5F/3B
 - (c) 4F/4B
 - (d) All of the above
- Q.281. In Siemens RRI, the standard contact configuration for Route lamp Checking Relay UECR is
- (a) 6F/2B
 - (b) 6F/1B
 - (c) 4F/4B
 - (d) 3F/3B
- Q.282. In Siemens RRI, code pins are provided on the relay base plate of mini groups
- (a) To prevent the plugging of wrong relay in a base.
 - (b) To prevent plugging of relay in a wrong direction
 - (c) To prevent picking up of relay during wrong operation
 - (d) All of the above

- Q.283. In Siemens RRI, the coil connections for bottom relay of a K50 neutral mini group are terminated on
- (a) 11-12
 - (b) 13-14
 - (c) 91-92
 - (d) 93-94
- Q.284. In Siemens RRI, total no. of terminals in rear of major point group are
- (a) 150
 - (b) 180
 - (c) 120
 - (d) 240
- Q.285. In Siemens RRI, the final permission for signal clearance is given by two independent relays namely
- (a) U(R)S & DUCR
 - (b) WKR1 & WKR2
 - (c) AJTR1 & AJTR2
 - (d) GR1 & GR2
- Q.286. In Siemens RRI, the relay employed to achieve one operation one movement is
- (a) G(R)LR
 - (b) GLSR
 - (c) GPR1
 - (d) GR1 & GR2
- Q.287. In Siemens RRI, on pressing Signal button and Emergency Signal Release button simultaneously on panel, which relays will first operate?
- (a) GNR & GLSR
 - (b) GNR & G(R)LR
 - (c) GNR & ERNR
 - (d) GNR & EGNR
- Q.288. In Siemens RRI, the helper relays for Approach Lock Release Time setting Relay used to set a pre-determined time for Calling-on Signal clearance as well as for Approach Lock Release.
- (a) ZR1, ZR2 & ZR3
 - (b) WKR1, WKR2 & WKR3
 - (c) UYR, UYR2 & UYR3
 - (d) AJTR1, AJTR2 & AJTR3

- Q.289. In Siemens RRI, which of the following relays perform the function of conventional green aspect controlling relay DR?
- (a) GR1
 - (b) GR2
 - (c) GR3
 - (d) GR4
- Q.290. In Siemens RRI, how many number of terminals are there in rear of a universal route group?
- (a) 100
 - (b) 120
 - (c) 180
 - (d) 200
- Q.291. In Siemens RRI, 'B' route section setting relay 'B' U(R)S controls
- (a) Setting of point in the straight route.
 - (b) Setting of point in the diverging route.
 - (c) Sequential proving of sub-route track circuits for automatic route release by the passage of train
 - (d) Locking of sub-route when it is engaged in a signalled move.
- Q.292. In Siemens RRI, if point indication relay WKR1 is picked up in the point group it indicates that
- (a) The point and point group is out of correspondence
 - (b) Point is set and locked in normal position
 - (c) Point is set and locked in reverse position
 - (d) Point is set and locked in correspondence with point group
- Q.293. In Siemens RRI, the coil resistance of relay WKR2 in point group is
- (a) 52.3 Ohm
 - (b) 60 Ohm
 - (c) 100 Ohm
 - (d) 1840 Ohm
- Q.294. In Siemens RRI, the major point group consists of total
- (a) 17 relays
 - (b) 18 relays
 - (c) 19 relays
 - (d) 20 relays
- Q.295. In Siemens RRI, one point chain group can cater for
- (a) 5 nos. of major point groups
 - (b) 6 nos. of major point groups
 - (c) 7 nos. of major point groups
 - (d) 8 nos. of major point groups

Q.296. In Siemens RRI, a sub-route can have

- (a) 1 no. of route section
- (b) 1 or 2 nos. of route sections
- (c) 3 or 4 nos. of route sections
- (d) 1 or more nos. of route sections

Q.297. In Siemens RRI, in the layout shown below, which two route sections can be set simultaneously with points in normal for parallel movement?

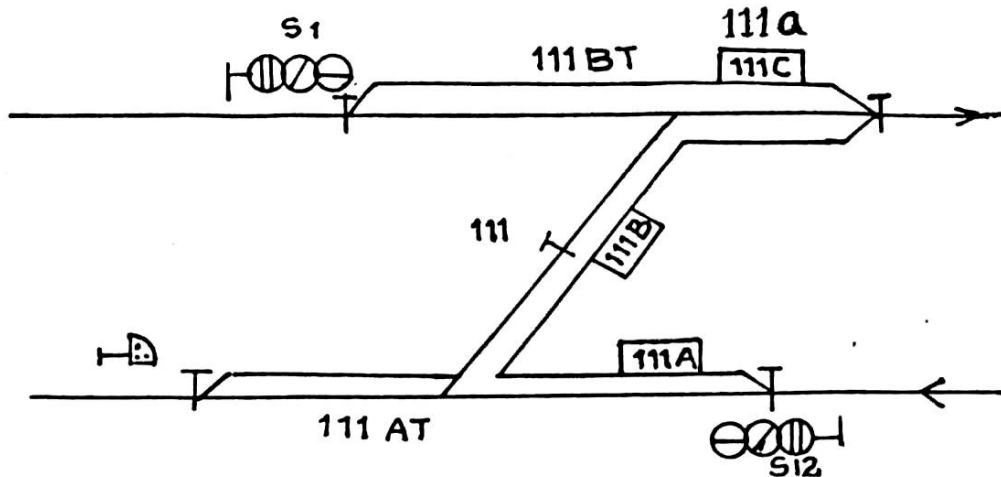
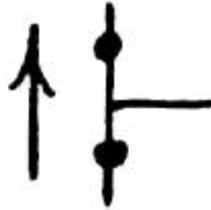


Fig : 4.2

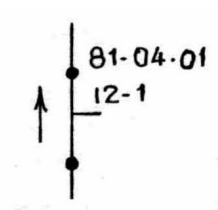
- (a) 111A & 111B
- (b) 111A & 111a
- (c) 111B & 111a
- (d) None of the above

Q.298. In Siemens RRI, the following symbol indicates



- (a) Front contact of a normally energized neutral relay
- (b) Back contact of a normally energized neutral relay
- (c) Front contact of a normally de-energized neutral relay
- (d) Front contact of a normally de-energized neutral relay

Q.299. In Siemens RRI, the number 04 shown in the following figure indicates



- (a) Contact termination on tag block
- (b) Rack number on which the relay is provided
- (c) Position of the relay in relay rack
- (d) Contact number of the relay

Q.300. In Siemens RRI, the following symbol is used for



- (a) Point locking relay
- (b) Point detection relay
- (c) Route checking relay
- (d) Route locking relay

II. True/False type questions (Q. No.301 to 350)**State True or False**

Q. No.	Question
301.	In Siemens RRI, the point group used is Major Group only
302.	In Siemens RRI, the point indication relays are always in pick up condition.
303.	In Siemens RRI, the point locking is done by the relays U(R)S and concerned OVZ2U(R)R
304.	In Siemens RRI, Sub route locking is done by U(N)LR for main signal move
305.	In Siemens RRI Sub route locking for shunt move is done by U(R)S
306.	Point chain group is necessary in Siemens RRI for automatic operation of points
307.	Setting of route is compulsory for the picking up of GLSR in Siemens RRI
308.	In Siemens RRI there is a major role of relay U(R)S in initiating the point group operation of points to required position.
309.	In Siemens RRI, diversion selector relay Z1UR1 of all the sub routes in the route requiring the point in Reserve position operates.
310.	In Siemens RRI, for main signal the Signal Lock Stick Relay GLSR normally remains energized and drops when the route is initiated.
311.	In Siemens RRI, for shunt signal the Signal Lock Stick Relay GLSR normally remains energized and drops when the signal button is released.
312.	In Siemens RRI, the Point detection relay WKR1 is normally in drop condition and picks up when route setting is done
313.	In Siemens RRI the relay W(R/N) R facilitates super imposed detection of point.
314.	In Siemens RRI the relay W(R)R is energized for point detection.
315.	In Siemens RRI the relay W(N)R is energized for point detection.
316.	In Siemens RRI, whenever there is out of correspondence between points and points relay group, the relay WKR2 picks up
317.	In Siemens RRI, the relay CHKLCR is a normally pick up relay which proves the condition of Crank Handle key at site. This is provided in the cabin.
318.	In Siemens RRI, once the slot for Crank handle (KLCR) is given, the point cannot be operated by route setting
319.	In Siemens RRI, crank handle contact is provided both in positive and negative side of point operation circuit of D.C. machine
320.	In Siemens RRI, relay SH-G(N)R initiates Shunt signal and route.
321.	In Siemens RRI, relay G(N/R)LR is an interlocked relay in a Signal group
322.	In Siemens RRI, the power supply voltage for operation of metal to metal relays is 60 V DC
323.	In Siemens RRI, the K-50 AC immunized mini-group relay consists of 5F/3B contacts configuration.

324.	In Siemens RRI, the coil connections for top relay in a mini-group are at terminals no.93-94 of base plate
325.	In Siemens RRI, the picking up of Z1WR in each Point group is ensured one after another during route setting, so that the operation of point relays group/starting (switching) of point machine is staggered.
326.	When metal to metal contact relays are used, it is mandatory to check for release of relay after each previous operation is proved, before any function is controlled through their operated contacts.
327.	In case of 'Metal to metal contact', welding / arcing chances are less compared to 'metal to carbon contact'.
328.	Use of Silver/Silver-palladium, Silver- Nickel for contacts in K50 relays ensures less contact resistance.
329.	K50 relays have independent type contacts.
330.	Siemens ON & OFF Lamp Proving relays are available in 4F/4B contact configuration
331.	Code pins prevent the plugging of wrong combination relays while guide pins do not allow plugging of relay in inverted position
332.	Two neutral K-50 relays are latched electrically to form an interlocked relay
333.	In Siemens point machine the inner contacts of switch pedestal are detection contacts and outer contacts are control contacts.
334.	The internal wiring of point machine installed at the left hand side of point is different from that fitted at right hand side.
335.	The position of short and long connection detection rods depends upon the position of point machine i.e. LHS or RHS with respect to track.
336.	Siemens 110 Volts D C. point machine has a split field series wound motor where as 380 V A.C. 3 phase machine is provided with an induction motor
337.	Crank handle contact is provided only in the negative side of point operation circuit of D.C. point machine where as they are proved in two phases in the case of 3 phase machine
338.	In Siemens RRI, by merely looking at the status of relay WKR1 (i.e. pick up or drop), one can know whether the point is in normal or reverse condition.
339.	For main signal, the relay GLSR normally remains energized and picks up only when the route is initiated.
340.	In Siemens RRI, diversion selector relay Z1UR1 pertains to all the sub routes in the route requiring the point in Reserve position.
341.	In Siemens RRI, a shunt signal group caters for one shunt signal only.
342.	In Siemens RRI, the relay WKR2 operates only when the point and point group is out of correspondence
343.	In Siemens RRI, Point Time Element Relay (WJR), once this relay is energized, will be held for 10 Seconds.

344.	In Siemens RRI, one relay rack can accommodate 8 nos. of major point groups.
345.	In Siemens RRI, one relay rack can accommodate 16 nos. of mini-group relays
346.	In Siemens RRI, no tag block pin should have more than two wires terminated on it.
347.	In Siemens RRI, when any button on the operating panel is pressed WNCR drops.
348.	In Siemens RRI, when any button on the operating panel is kept pressed for more than 15 seconds the relay NNCR drops.
349.	In Siemens RRI, unlike other relays the repeater relay U(R/N)PS operates earlier than the main relay U(R/N)S
350.	In Siemens RRI, the crank handle key lock relay CHKLR is provided in the relay room.

III. Short & descriptive answer type questions (351 to 375)

- Q.351. In Siemens RRI, what is the role of relays GR1 & GR2 in clearing a signal?
- Q.352. In Siemens RRI, how one train one signal is achieved by relay GLSR?
- Q.353. In Siemens RRI, what is the function of relays U(R)S and U(N)S?
- Q.354. In Siemens RRI, what function does relay U(R)LR perform?
- Q.355. In Siemens RRI, what is the function of relay WKR1 in point group?
- Q.356. In Siemens RRI, in what conditions the relay WKR2 in a point group operates?
- Q.357. In Siemens RRI, what is the function of relay WKR3 in a point group?
- Q.358. In Siemens RRI, briefly explain the function of relay WJR in a point group?
- Q.359. In Siemens RRI, what is point chain group and how it helps in automatic operation of points?
- Q.360. Give brief description of Major Point Group used in Siemens RRI?
- Q.361. What are the basic differences in features of 110 V DC and 380 V AC 3 phase Siemens Electric Point machines?
- Q.362. Briefly explain the function of relays GNR & GNCR in Siemens RRI.
- Q.363. Briefly explain the function of relays UNR & UNCR in Siemens RRI.
- Q.364. Briefly explain the function of relays WNR & WNCR in Siemens RRI.
- Q.365. Briefly explain the function of relay NNCR in Siemens RRI.
- Q.366. Briefly explain Emergency Route Section release.
- Q.367. In Siemens RRI, what is the function of relay SHG(R/N)R?
- Q.368. In Siemens RRI, what function is performed by relays MNGZR and SHGZR?
- Q.369. In Siemens RRI, what function is performed by relay ZDUCR?
- Q.370. In Siemens RRI, how the setting of overlap is ensured by relay OVZ2U(R)R?
- Q.371. Give brief description of the function of the relay G(R)LR in Siemens RRI.
- Q.372. How manual route release is done due to traffic emergency in Siemens RRI?
- Q.373. State general characteristics of K50 relays used in Siemens RRI?
- Q.374. What are the design features of 'metal to metal contact' relays used in Siemens RRI to prevent welding/arcing ?
- Q.375. What are the advantages of relay grouping in Siemens RRI? Is there any disadvantage of relay grouping?
- Q.374. Briefly state the function-wise grouping of K50 type relays used in Siemens RRI?
- Q.375. Briefly state the comparison of K50 type and Style Q relays.

IV.

Answer Key**Section B
Part I**

Q. No.	Answer
251.	(b)
252.	(d)
253.	(c)
254.	(d)
255.	(d)
256.	(b)
257.	(a)
258.	(d)
259.	(c)
260.	(d)
261.	(b)
262.	(a)
263.	(d)
264.	(b)
265.	(a)
266.	(a)
267.	(c)
268.	(d)
269.	(d)
270.	(c)
271.	(a)
272.	(b)
273.	(d)
274.	(b)
275.	(d)

Q. No.	Answer
276.	(c)
277.	(b)
278.	(d)
279.	(c)
280.	(d)
281.	(b)
282.	(a)
283.	(d)
284.	(b)
285.	(d)
286.	(b)
287.	(c)
288.	(d)
289.	(c)
290.	(a)
291.	(b)
292.	(d)
293.	(a)
294.	(c)
295.	(d)
296.	(d)
297.	(b)
298.	(a)
299.	(c)
300.	(c)

V.

Answer Key**Section B****Part II**

301.	TRUE	326.	TRUE
302.	FALSE	327.	FALSE
303.	FALSE	328.	TRUE
304.	FALSE	329.	TRUE
305.	TRUE	330.	FALSE
306.	TRUE	331.	TRUE
307.	FALSE	332.	FALSE
308.	TRUE	333.	TRUE
309.	TRUE	334.	FALSE
310.	FALSE	335.	TRUE
311.	TRUE	336.	TRUE
312.	FALSE	337.	TRUE
313.	TRUE	338.	FALSE
314.	FALSE	339.	FALSE
315.	TRUE	340.	TRUE
316.	TRUE	341.	FALSE
317.	TRUE	342.	FALSE
318.	TRUE	343.	TRUE
319.	FALSE	344.	TRUE
320.	FALSE	345.	FALSE
321.	FALSE	346.	TRUE
322.	TRUE	347.	FALSE
323.	TRUE	348.	TRUE
324.	FALSE	349.	TRUE
325.	TRUE	350.	FALSE

VI.

Answer Key**Section B****Part III**

Ans.351. The signal clearance is done in accordance with the requirements specified in IRSE manual. The final permission for signal clearance is given by two independent energisation i.e., two relays are used for clearing a signal (Red to Yellow). The first relay GR1 operates proving that all sub routes are set, checked and locked. Isolation points and overlap is clear. To achieve one operation one movement a signal lock stick relay (GLSR) is employed. This GLSR relay normally remains de-energized and picks up when the route is initiated and drops before the second signal control relay (GR2) is operates to clear a signal. In case of shunt signal this relay is normally energized and drops when the signal button is released. GR1 operating energizes the junction indicator lamps for diverging routes and initiates locking of all other signal leading towards that berthing track for which the signal control relay No.2 (GR2) operates.

Ans.352. **One train One Signal**

GLSR relay normally remains de-energized and picks up when the route is initiated and drops before the second signal control relay (GR2) is operating to clear a signal. Soon after Route setting and before buttons are released, GLSR picks up to enforce a Signal operation on panel for every train thus achieving one signal one train operation.

GLSR picking up proves that:

- Route and Signal initiating relays operated to ascertain that the route sections are not lying set from the previous operation.
- Signal and route buttons are kept pressed.
- The concerned Route sections are set
- GPR1 dropped after previous operation, to disconnect GLSR stick feed supply when it picks up and
- EGNR back contact is proved to drop GLSR relay during manual cancellation effected when the signal control relay GR1 fails to pick up, after a route is set & locked.

Ans..353. Route Setting Relays [U(R)S/U(N)S]

There are two sets of route setting relays in each universal route group and cater for two route sections. It is an interlocked relay, when the upper/top coil is latched, it indicates that the route section is set and when the lower armature (bottom relay) latched it indicates that the route section is not set.

In RRI when 'A' route section setting relay AU(R)S is latched, it controls the setting of points in the sub-route for straight route and 'B' route section setting relay B U(R)S controls the setting of point in the diverging route.

Ans.354. Sub-route Locking Relay [U(R)LR/U(N)LR]

This is an interlocked relay used for locking the sub-route when it is engaged in a signalled move. This is common relay for all the route sections in a sub-route. The latching of upper relay locks the sub-route and latching of bottom relay indicates that the sub-route is free.

Picking up of this relay [U(R)LR] ensures that –

- a) the concerned route section setting relay U(R)S is latched;
- b) route section is clear of a train
- c) relevant DUCR is up;(relevant route section is checked)
- d) concerned buttons are released.

Ans.355. Point Detection Relay No.1 (WKR1)

This relay detects the correct setting and locking of point in either position. This relay energies only when the point is set and locked in correspondence with point group. Independently it cannot indicate the position of the point.

$$W(N)R + (N)WLR + WKR1 = NWKR\uparrow$$

$$W(N)R + (R)WLR + WKR1 = RWKR\uparrow$$

Ans.365. Point Detection Relay No.2 (WKR2)

This is also called as “Cross Protection Relay”. It operates during sequence of relay operation in point group and switches on point time delay relay. Once this relay picks up and drops only when the point is set and locked It also energies when the point and point group is out of correspondence and when there is a cable fault. It protects the point by causing WKR1 to drop to provide flashing indication.

Ans.357. Point Detection Relay No.3 (WKR3)

It is double coil relay. It is also called as an “End Position Proving Relay”. This relay operates:

- i) When the point and point group is in correspondence on completion of operation through point operation supply (IC 110VD). When once energized at the end of Point Operation, stick through its 2nd coil till such time W(N)R is latched.
- ii) It operates during sequence of relay operation in point group when the point operation from normal to reverse is initiated to disconnect the point detection supply of WKR1.

Ans.358. Point Time Element Relay (WJR)

This is a neutral relay. To make it slow to release a 2500 Mfd condenser in a series with 39 Ohms resistance connected across the relay coil. Once this relay is energized, will be held for 10 Seconds. This relay controls the point contactor relay for a maximum period of 10 Seconds or this relay drops as soon as the WKR3 picked up. This feature prevents the overloading of point machine in case of obstacles or failure. It operates during sequence of relay operation in point group when the point operation from Reverse to Normal is initiated to disconnect the point detection supply of WKR1.

Ans.359. Point Chain Relay Group:

This relay group is used only in Route Relay Interlocking and placed on the top of the rack just above major point relay group. One chain group can cater for eight major point groups. There are eight WWR relays in it, which pick up one after another and also drop one after another. The pick up contact of one relay (WWR) is used for one major point group to energize Z1WR1 relay during automatic operation of point. Thus the picking up of Z1WR1 in each major point group is ensured one after another during route setting so that the operation of point relay group/starting of point machine is staggered and not simultaneous.

Following are the sequence of operation of relays in Point Chain Relay Group:

Z₁WR₁↑, **WLR**↑, Z₃WR₁↑, 1WWR↑, **WLR**↓, 2WWR↑, 3WWR↑, 1WWR↓, 4WWR↑, 2WWR↓, 5WWR↑, 3WWR↓, 6WWR↑, 4WWR↓, 7WWR↑, 5WWR↓, 8WWR↑, 6WWR↓, WWYR↓, 7WWR↓, Z₃WR↓, 8WWR↓, WWYR↑.

Note - Relay name in **bold** means they are outside the point chain group.

Ans.360. Major Point Relay Group

The major Point relay group is used only in Route Relay Interlocking. This unit accommodates 5 interlocked relays, 13 neutral relays and a contactor relay. There are three indication lamps in it. The first lamp is a yellow lamp, which lits steady normally when the points are correctly set, locked, detected and is in correspondence with the point group. During operation of points, or faulty condition of points, it flashes. The middle indication (red) lits steady when the

point group is involved in a route set, as points in route, overlap or isolation. It flashes when the group initiation fails under route setting condition if initiation stops with Z1WR- and WLR- or with both the relays alone operated. The third red indication lites when point zone track circuit is occupied or failed. The major point relay group operates the point during automatic route setting and individual point operation. Under route setting condition, the point group can get operated automatically if the point fails in theroute, overlap or isolation. In case of individual point operation, pressing of WWN and WN or EWNand WN operate the point group.

⊗ HKE		⊗ RKE		⊗ RKE	
Z1WR1	Z1NWR	Z1RWR	Z1WR	WLR	WKR1
W(R)R	(R)WLR1	(R)WLR2	(R)WLR3	W(R)LR	WKR2
W(N)R	(N)WLR1	(N)WLR2	(N)WLR3	W(N)LR	
W	R	WJR	Z2WR1	Z2WR2	
		TP1R	TP1P1R	WKR3	

Fig.B.1

Ans.361. The following are the basic differences I features of 110 V DC and 380 V AC 3 phase Electric Point machines:

- 110 Volts D C. machine has a split field series wound motor where as 380 V A.C. 3 phase machine is provided with an induction motor.
- The switch pedestals of D.C. machine and A.C. machine are similar but conditions at which their contacts are being made or broken arc different.
- In case of D.C. machine, when the motor starts operation its detection contacts break first and then the control contacts make. Similarly, at the end of operation the control contacts break after which the corresponding detection contacts make. Thus the detection contacts and the corresponding control contacts (ND and NC or RD and RC) cannot make simultaneously at any instant.
- For AC. machine, the switch pedestal contacts are provided in such a way that when the motor starts operation, its control contacts make first and then the corresponding detection contacts break. Similarly at the end the detection contacts make before the control contacts break. Thus ND and NC or RD and RC will be available simultaneously for a short period while starting and stopping the machine.

- Crank handle contact is provided only in the negative side of point operation circuit of D.C. machine where as they are proved in two phases in the case of 3 phase machine.
- Relay WKR2 once picked up through Z1RWR or Z2NWR front contact is held through its own stick path in the point relay group of D.C. machine. WKR2 in point group of 3-phase machine is made to hold in picked up condition with the help of induced voltage *in* the secondary winding of a current transformer provided externally. Initially when 3-phase supply is switched on both the primary windings of this transformer will get connected in such a way that the voltage induced in the secondary winding will be added up. Once the motor starts and the detection contacts break current can flow through only one primary winding. But the induced voltage in the secondary winding is enough to hold WKR2 in picked up position. At the end of the operation, when the point is set, locked and detected, both the primary windings of the transformer will be connected in series across the same phase so that the fluxes produced in the two primary windings will cancel each other and therefore the secondary voltage reduces to zero with the result WKR2 drops.

Ans.362. **GNR : Signal push button relay.**

GNCR : All signal push button normal checking relay.

GNR relay is provided in the respective Signal groups. When a signal button GN is pressed, GNR picks up in the respective signal group. EGNR back contact is proved in this circuit to ensure that one operation (clearance or cancellation) is possible at a time. Each GNR is repeated by a GNPR. The circuit entire station zone are grouped together in a cascading way that only one 'GNPR' will pick up at a time. SM's control is provided in GNPR circuit to prevent unauthorized clearing of Signals.

A common relay GNCR is picked up proving all Signal buttons normal (GNR'S down). This relay drops immediately when any one GN is pressed and its GNPR has energised.

GNR and EGNR relays in the Signal group pick up even when SM key of the panel is taken out.

This is to facilitate restoration of cleared signal to 'ON' position in case of emergency but GNPR relay picks up proving the SM's key is IN.

A front contact of WNCR and back contact of WWNR, EWNR is proved in the GNPR circuit to ensure that the point operation does not take place along with signal clearance.

Ans.363. **UNR : - Route push button relay.**

UNCR: - All route push button normal checking relay.

The UNR relays are provided seperately in a K-50 mini group, which picks up when the respective route button is pressed on panel. The UNRs are repeated by UNPRs as required.

The UNRs are grouped in the same way as GNPRs such that only one route button relay picks up at a time.

A common relay UNCR remains in the energised condition through the back contacts of all the UNR and UNPR relays in series. This relay drops immediately when any one of the route buttons is pressed on panel and UNR has energised.

A front contact of WNCR and back contact of WWNR, EWNR is proved in the UNPR circuit to ensure that the point operation does not take place with signal clearance.

The SM key contact is proved in the pick up circuit of UNR, UNPR relays.

Ans.364. **UNR : - Route push button relay.**

UNCR: - All route push button normal checking relay.

The UNR relays are provided separately in a K-50 mini group, which picks up when the respective route button is pressed on panel. The UNRs are repeated by UNPRs as required.

The UNRs are grouped in the same way as GNPRs such that only one route button relay picks up at a time.

A common relay UNCR remains in the energized condition through the back contacts of all the UNR and UNPR relays in series. This relay drops immediately when any one of the route buttons is pressed on panel and UNR has energized.

A front contact of WNCR and back contact of WWNR, EWNR is proved in the UNPR circuit to ensure that the point operation does not take place with signal clearance.

The SM key contact is proved in the pickup circuit of UNR, UNPR relays.

Ans.365. **NNCR :- All (NNCR) button Normal checking relay :**

When all the button checking relays (GNCR, UNCR, WNCR), EUUYNR, EUYNR, EGGNR, ZDUCR, EWNR, WWNR, their repeater relays are in dropped condition, the button-checking relay NNCR relay energizes. This relay is made slow to release by the provision of 3000 μ f condenser in series with 100 ohm resistance across the relay coil. Releasing time of NNCR is about 15 Sec

When any button is pressed, the button relay energized the button checking relay drops. This in turn breaks the circuit for NNCR relay. NNCR now holds for 15 seconds-and then drops if the button is not released or in case the button got stuck up in depressed condition.

The de-energised condition of this relay gives a visual indication on panel and also audible indication to draw the attention of the operator. Both these failures indications continue till the fault is set right

Illuminated indications for GNCR, UNCR and WNCR are provided on the panel.

Note:

GNCR, - 'S' indication
 UNCR - 'R' indication
 WNCR - 'P' indication

Ans.366. Emergency Route Section Release:

In case of track circuit failure in any section of the route set, the route section concerned cannot get released either in the process of automatic route release or manual route release. This situation calls for a joint action of the panel operator along with some responsible official of signalling department to normalize this route section and avoid heavy traffic detentions.

After getting a specific written request from the operator, S & T key is inserted and turned on the panel. Then the operator breaks the seal, turns the disc to free EUYN and presses it along with the specific route section point button, WN. With this, the route section gets unlocked and normalized. Consequently its points get free from route locking and the signal locking relay concerned also gets normalized.

Ans.367. SH G(R/N)R (Main Signal/Shunt Signal selecting Relay)

This is an interlocked relay provided to achieve an interlocking between main signal & shunt signal leading towards the same direction. When SH G(N)R picked up, it permits main signal/Calling ON Signal route initiation and when SH G(R)R picked up, it permits shunt signal route initiation.

Following Conditions are proved in Sh. G(R/N)R

(I) SH. G(N)R

- (a) Ensures that no Signal buttons and route buttons are in pressed condition.
- (b) All the route sections & overlaps falling in the SH-signal route are Normal.
- (c) SH G(R)R front contact is used as a economizer contact.

(II) Sh G(R)R

- (a) Shunt signal button and concerned route button is pressed.
- (b) All the route sections & overlaps falling in the SH-signal route are Normal.
- (c) SH G(N)R front contact is used as a economizer contact.

(III) Common Conditions for Sh G(R/N)R

- (a) concerned route sections are proved normalised after previous operation.
 - (b) Over laps falling in the Shunt signal route are proved normal.
- This prevents initiation of main signal / calling ON Signal in Single line section of the road in same direction and opposite direction.

Ans.368. **Main GZR :- Main Signal Initiation relay.**

Sh GZR :- Shunt Signal Initiation relay.

These are neutral and common relays for entire station or zone. If the station is divided in to two or more zones then each zone will have one such relay.

Main GZR or SHGZR relay operates when any main /shunt Signal is initiated and only when the entire route including the overlap is free for setting. Even when any one of the point in the route to be initiated is engaged by a conflicting movement this relay does not operates and makes the push button operation ineffective. When it is operated it permits the initiation of route setting and signal clearance circuits

Ans.369. **ZDUCR :- Zonal Route permissibility checking relay.**

Whenever main signals are to be cleared, ZDUCR relay operates only after the energisation of MNGZR and for shunt signal after the energisation of Sh. GZR. But in case of calling ON signal clearance ZDUCR relay energises directly as there is no GZR for calling On Signal. A common relay is used for the entire yard so that only one signal and Route can be initiated at a time.

Ans.370. **Overlap Setting Relay: OVZ2U(R)R**

After Route Initiation, overlap setting takes place. It is an Interlocked relay. When the main signal or calling on signal in S/Line Section is initiated overlap setting relay reverse coil operates and latches to lock the overlap points. One such relay is provided for each overlap. The energisation of this relay proves that.

1. The route initiated is for main signal or for calling ON Signal in Single line section.
2. Concerned signal and route buttons are pressed simultaneously.
3. Points in the over lap are set and detected to the required position correctly
4. Conflicting overlaps and Route Section are normal and not set some times two conflicting overlaps of a signal may require points in the same position.
5. OV Z2U(N)R front contact is used as a economizer contact

Ans.371. **G(R)LR :- Signal locking Relay**

This relay is an interlocked relay. The energisation of top relay G(R)LR locks the signal and bottom relay G(N)LR unlocks the signal.

The signal lock relay is provided one for every exit track and is common for both directions. It prevents the clearance of any other signal for that line from any direction after a signal has been cleared. This relay is named after the Exit or Berthing track.

The relay G(R) LR energizes once GPR1 is energised but before the de-energisation of GLSR.

It proves –

- (i) One train on one Signal clearance condition (proved a second time in this stage)

- (ii) GPR1 operated
 - (iii) Either Route indicator is lit or Route Points are in Normal (this condition is required only for Signals with Route indicator)
 - (iv) Conflicting Main and Shunt Signals are interlocked (proved a second time in this stage) and
 - (v) Route tracks are clear; Route sections are checked and locked (proved a second time in this stage)
- Feed to GLSR is cut off when GPR1 de-energised contact is broken soon after GR1 picks up.
But both GPR1 energized and GLSR energised are proved to latch G(R)LR.
Hence GLSR is made slow to drop.

Ans.372. In emergencies, the various locking releases of route are effected by specified operation on the panel:

Manual Route Release

EGGN is pressed with the concerned GN to release indication locking on all sections of the route set. Then, a process known as '*manual route release*' is initiated by the operator by means of three buttons, viz, EUUYN, GN & UN. This operation releases locking and normalizes all the route sections as well as the overlap if set at the same time. The locking becomes free soon after the panel operation for route release, in case track circuits in approach of signal are not occupied, nor failed. If they are not clear, the release takes place when the three button operation is repeated after a safe time lapse of 120 seconds, as read from a stabilized panel indication which started flashing after the first three button operation. The route and overlap release leads to the release of signal locking and point lockings.

Emergency Route Section Release

In case of track circuit failure in any section of the route set, the route section concerned cannot get released either in the process of automatic route release or manual route release. This situation calls for a joint action of the panel operator along with some responsible official of signalling department to normalise this route section and avoid heavy traffic detentions.

After getting a specific written request from the operator, S & T key is inserted and turned on the panel. Then the operator breaks the seal, turns the disc to free EUYN and presses it alongwith the specific route section point button, WN. With this, the route section gets unlocked and normalised. Consequently its points get free from route locking and the signal locking relay concerned also gets normalised.

Emergency Overlap Release

In case, a signal overlap has to be released in emergency, the pressing of 'OYN' along with the 'UN' concerned behind the signal, releases the overlap instantly provided the last section of the route concerned is already normal. If OYN is not provided on the panel, EUYN is used instead of OYN for this purpose

Ans.373. General Characteristics of K-50 Relays

- German Standard Spec. DIN 57831/VDE 0831 Code 736
- IRS Spec. S46/74
- Plug-in, Proved type DC Miniature Relays
- Independent Type of contacts
- PU Time : 25- 60 m sec; Drop away time : 7 – 15 m sec.
(For AC immunized relays : 200 m sec / 50 m sec)
- 60V Operation (Range : 50-110V)
- Contact resistance – 0.05 Ohm
- Wiping action of contacts (Self cleaning)
- Guide pins to prevent inverse plugging
- Code pins to prevent plugging of wrong type
- Contact current rating : 3 A Continuous, 5 A for 30 sec (SW)

Ans.374. The design features of ‘metal to metal contact’ to prevent welding / arcing are:

- **Series Double Make & Break Arrangement**
Contact making/ breaking at 2 places simultaneously - Arc is dissipated fast.
- **Elliptical shape of contacts**
Lesser area of contact.
- **Tips of contacts specially designed**
Triangular Cross-section rivets (tips) get connected by cylindrical pin across their axes
- **Faster operation of relays**
PU Time : 25- 60 m sec; Drop away time : 7 – 15 m sec.
- **Lesser area of contact**
Use of Siler / Silver-palladium, Silver- Nickel for contacts–contact resistance less
- **Less tractive effort** - Faster operation achieved.

Ans.375. Advantages of relay grouping

- Functional Group :Arrangement of relays relating to a function in one enclosure
- Uniform gear control methods independent of yard lay-out
- Only inter-group wiring is dependent on yard lay-out
- Intra-group wiring - Pre-wired (40% of wiring)
- Interference prevented due to sealing of group
- Indications on groups

Disadvantage of relay grouping

- . Inventory cost is high



C. References

- S12- IRISET notes on Relay Interlocking Metal to Carbon Relays (British)
- S14- IRISET notes on Interlocking with Metal to Metal Relays
- S15- IRISET notes on Panel Interlocking with Metal to Metal Relays
- S16- IRISET notes on Route Relay Interlocking (Siemens)
- STTI Podanur S.Rly. literature on Route Relay Interlocking (System I & System II)
- STTI Byculla C.Rly. literature on Siemens RRI
- M/s Siemens Sequential line diagrams for circuit explanations
- Manual for Siemens Circuit Route Relay Interlocking RT-103-76-01 version 1

गुणवत्ता नीति

रेलों में यात्री और माल यातायात की बढ़ती मांग को पूरा करने के लिए गुणवत्ता प्रबंध प्रणाली में अनुसंधान, डिजाइनों और मानकों में उत्कृष्टता तथा सतत सुधारों के माध्यम से सांविधिक और नियामक अपेक्षाओं को पूरा करते हुए सुरक्षित आधुनिक और किफायती रेल प्रौद्योगिकी का विकास करना ।

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