Test Project (Offline)

BRICS-FS-24_Maintenance of Railway Signal Equipment

2022 BRICS Skills Competition

Directory

1. Form of entry

Team competition (Double).

2. Contest content

The competition consists of four modules, which are completed in sequence. Participants shall be provided with task instructions, circuit diagrams, equipment layout diagrams and equipment operation instructions. The competition consists of the following task modules:

1)Examination and management platform of railway signal equipment

2)Maintenance of railway signal equipment

3)Installation and debugging of railway signal equipment

4) Fault Searching and Solution of Railway Signal Equipment

Changes to competition tasks and scoring criteria can only be made if the competition site cannot be completed and approved by the Lead expert.

Competitors may be disqualified if they fail to comply with occupational health safety environmental requirements or put themselves and other competitors at risk.

After completing the module, the results will be graded

3. Project module and time requirements

3.1 Project module and Time Requirements

There are four module in Maintenance of Railway Signal Equipment competition , which require contestants to complete within 5 hours. Please refer to Table 1 for the name and time requirements of module for specific projects.

Table 1 List of project module and time requirements

Serial number	Name of module	Completion time of competition content
1	Module A:Examination and management platform of railway signal equipment	120 min
2	Module B:Operation assessment of interlocking system	40 min
3	Module C: Maintenance of railway signal equipment	60 min
4	Module D: Fault Searching and Solution of Railway Signal Equipment	80 min

The competition schedule is shown in Table 2.

3.2 Platform for maintenance skills of railway signal equipment

3.2.1. Composition of the examination platform for maintenance skills of railway signal equipment

1)Examination and management platform of railway signal equipment
2)Computer interlocking operation platform for rail transit
3)Virtual Scene Examination Platform for Railway Signal Equipment

3.2.2. Operation flow of Examination and management platform of railway signal equipment

Administrators log in → create groups → create student accounts (including student names, account numbers, password, schools, countries, groups,) → edit test papers (including interlocking operation test questions, fault types, management items) → Check the online status of students → Check the completion of the test paper → end of test → scores in statistics and inquiry.

3.2.3 Operation flow of Computer interlocking operation platform for rail transit

Account login → Receive papers → complete test paper → submit test paper.

3.2.4 Operation flow of Virtual Scene Examination Platform for Railway Signal Equipment

Account login → Receive papers→ Complete troubleshooting and Maintenance work → Submit papers.

3.2.5 Operation process of railway signal equipment integrated training platform

Troubleshooting: equipment power supply → check equipment status → judge fault type → check circuit diagram → test electrical characteristics → fault handling → result verification

Signal equipment installation: signal equipment accessories installation → device wiring → device installation → circuit conduction → device power supply → result verification

3.3 Task content

Module A : Examination and management platform of railway signal equipment

A1 Signal equipment control assembly installation

The competitors shall complete the control combination installation of signal equipment on the railway signal equipment comprehensive training platform according to the circuit schematic diagram (Figure 1) and wiring diagram (Figure 2) of signal equipment. Please ensure that the wiring is standard, full, smooth, burr free and firm, and the wiring is consistent with the drawing during the implementation of the task.

1. Mission requirements

1) Installation and wiring of relay base;
2) Combined side installation and wiring;
3) Circuit breaker base installation and wiring;
4) Installation of signal equipment;
2. Railway signal equipment installation list

Table 3 Railway signal equipment installation list

Serial number	name	specifications and models	unit	quantity	remark
1	Multi-fiber blue line	0.5	meter	100	
2	tie	3 * 150	root	100	
3	Solder wire	The 1.5 mm	reel	1	
4	Soldering iron	Front page 60 w	bundle	1	
5	Number tube	Arrange according to the exam questions	group	1	
6	Empty combination		nape	1	
7	Relay and relay base		nape	1	
8	Combined side		nape	1	
9	open		nape	1	
10	The base		nape	1	
11	Turnout installation tool		knot	1	

3. Verify the result

Wiring standard, full, smooth, no burr, firm, drawing consistent, the equipment can work normally.

A2 Power-on commissioning of signal devices

According to the circuit schematic diagram (Figure 1) and distribution diagram (Figure 2) of the signal equipment, the competitors will complete the power-on debugging of the signal equipment on the comprehensive training platform of railway signal equipment. Please make sure that the mixed power test is conducted before power transmission and the fault part is handled to ensure the normal operation of the signal equipment.

1. Task requirements

1) Mixed power test before power supply;
2) Conduct conduction test on the signal control circuit;
3) Equipment power supply;
4) Signal equipment driven by interlocking software;
5) Record electrical parameters of signal equipment

2. Verify the result

The turnout operation is normal, the positioning and reverse position are normal, and the state is consistent with the interlock; The signal is normally lit, and the display is consistent with the interlock; Zpw-2000 equipment works normally, the track relay is sucked up normally, and the working state is consistent with the interlock.

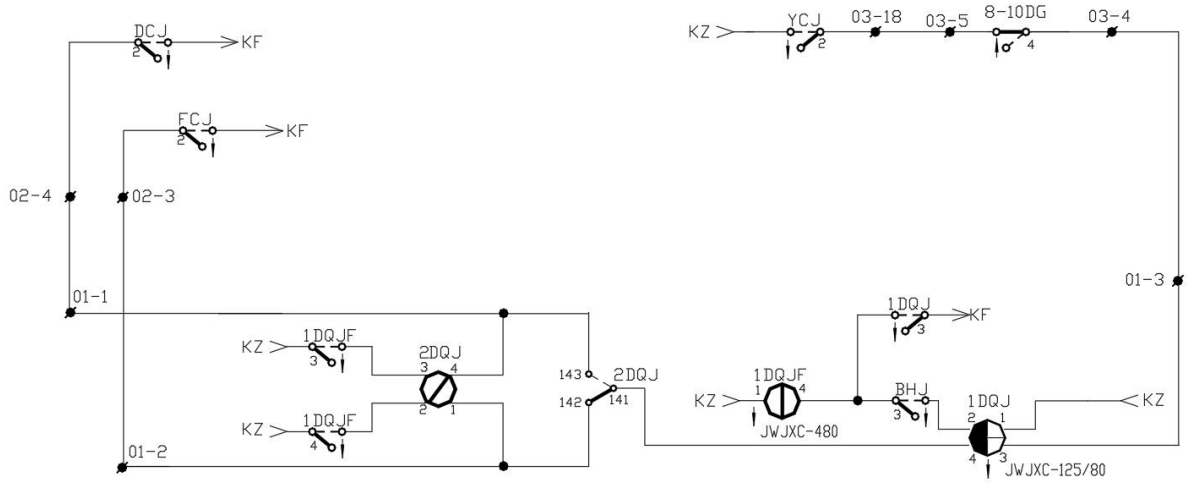


Figure. 1 Schematic diagram of signal equipment circuit

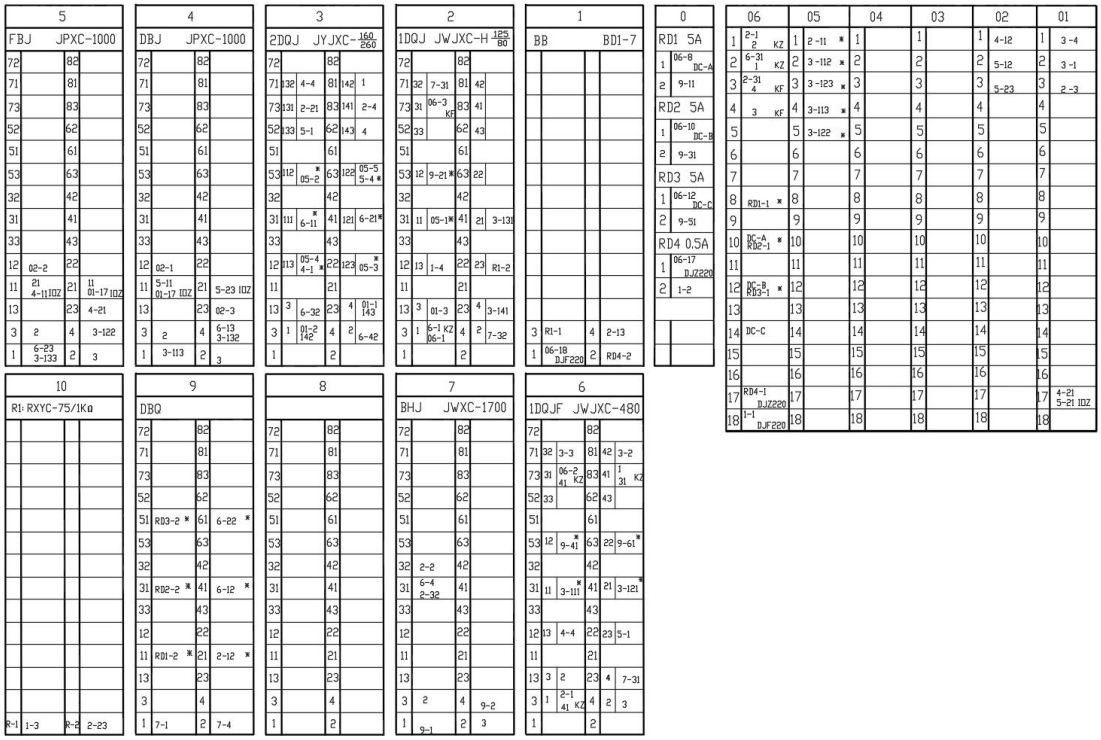


Figure 2 Installation layout and distribution diagram

Module B :Computer interlocking operation platform for rail transit

Competitors should complete the computer-based interlocking operation in Computer interlocking operation platform for rail transit (Figure 1) according to the requirements of the examination questions.The tasks include the following:

Route permutation, Route release,Modified operation,Boot master lock,Botton

close up,Turnout operation,Shunt bad setting...

Mission statement: This module is completed on the Computer interlocking operation platform for rail transit provided by the organizing Committee.

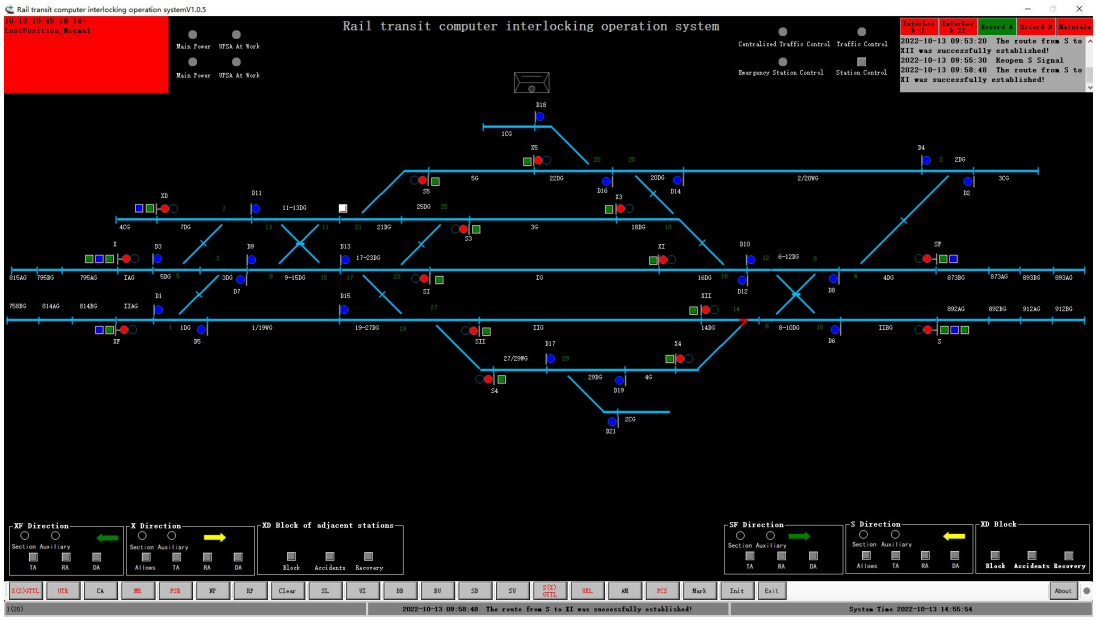


Figure 3 Computer interlocking operation platform for rail transit

Table 4 Examples of operation problems

Operation assessment of interlocking system		
Serial number	**Type of topic**	**Sample question**
1	Establishment of normal operation departure route	departure route of arranging XI-SF
2	Establish a departure route in reverse direction	departure route of arranging SI-S
3	Establish a receiving toute in reverse direction	receiving toute of arranging SF-XI
4	shunting route	shunting route of arranging SI-D9
5	Reopening of signal	Reopening XI-SF signal
6	Total human solution	Cancel XI-SF route when IG is occupied
7	cancel a route	Cancel the departure route of XI-SF
8	District solution	Use the zone to solve and release the guidance route of XF-SII
9	Boot master lock	locking X Throat All turnout
10	Release the boot master lock	calling-on signal of releasing S boot master lock
11	Guide the route	Open XF calling-on signal with boot master lock
12	turnout reverse position operation	Move 23 turnout to reverse position
13	botton release	SII signal botton close up, Rank SII-X route

14	Modified operation	Change the pick-up alignment of track of "S" from pick-up to departure
15	Poor shunt	Setting IIG shunt Bad

Module C Maintenance of railway signal equipment

Competitors should complete maintenance of railway signal equipment operation on the Virtual Scene Examination Platform for Railway Signal Equipment according to the task requirements:maintenance of ZPW-2000A track circuit,maintenance of ZDJ9 switch machine, maintenance of home signal,maintenance of TYJL-III interlocking,maintenance of Dinghan power supply panel

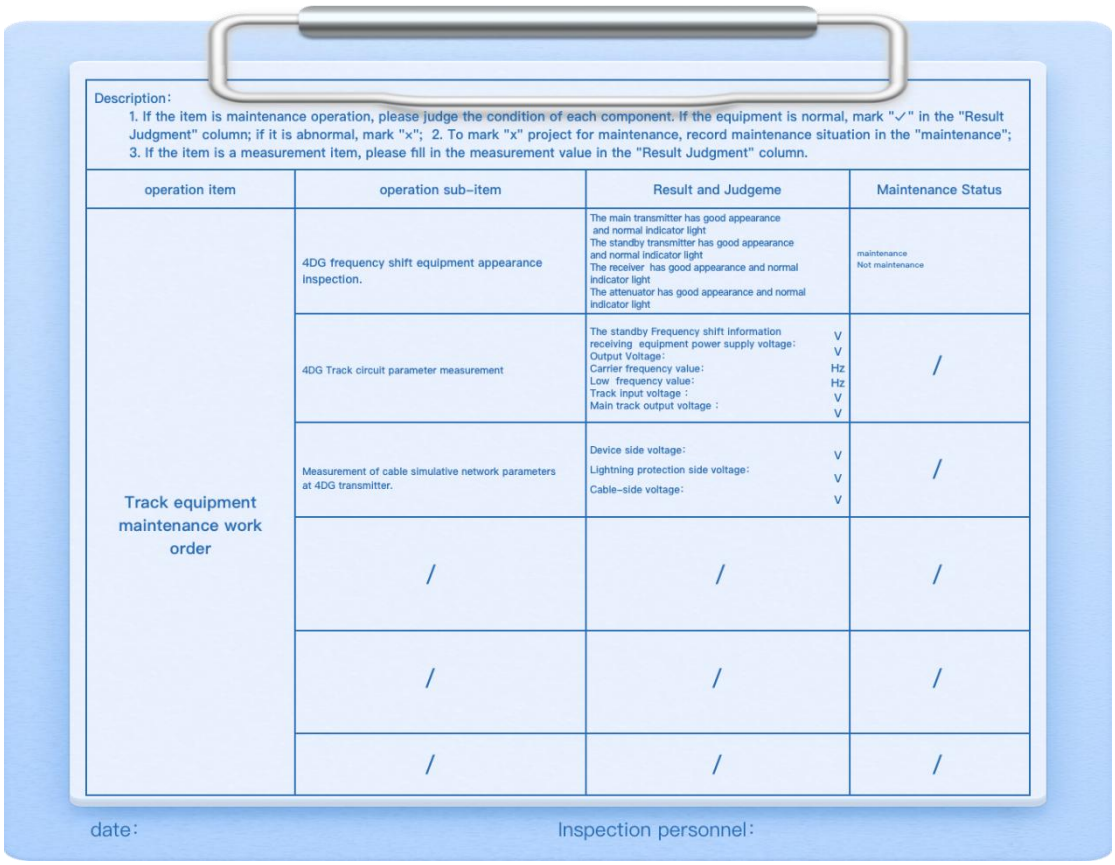
Specific requirements:

1) Check the job sheet;
2) Where selecting needsmaintenance;
3) record the state of equipment;
4) maintenance the faulty equipment
5) record the state of maintenance
6) Uploaded by operation record.

Mission statement: This module is completed on the Virtual Scene Examination Platform for Railway Signal Equipment provided by the organizing Committee.

Maintenance of ZPW-2000A track circuit

In theVirtual Scene Examination Platform for Railway Signal Equipment for equipment appearance inspection, electrical characteristics test，Replacement of faulty equipment. Complete maintenance operation and label according to the job sheet (Figure 4).



Description:
1. If the item is maintenance operation, please judge the condition of each component. If the equipment is normal, mark "✓" in the "Result Judgment" column; if it is abnormal, mark "×"; 2. To mark "x" project for maintenance, record maintenance situation in the "maintenance";
3. If the item is a measurement item, please fill in the measurement value in the "Result Judgment" column.

operation item	operation sub-item	Result and Judgeme	Maintenance Status
Track equipment maintenance work order	4DG frequency shift equipment appearance inspection.	The main transmitter has good appearance and normal indicator light The standby transmitter has good appearance and normal indicator light The receiver has good appearance and normal indicator light The attenuator has good appearance and normal indicator light	maintenance Not maintenance
	4DG Track circuit parameter measurement	The standby Frequency shift information receiving equipment power supply voltage: V Output Voltage: V Carrier frequency value: Hz Low frequency value: Hz Track input voltage : V Main track output voltage : V	/
	Measurement of cable simulative network parameters at 4DG transmitter.	Device side voltage: V Lightning protection side voltage: V Cable-side voltage: V	/
	/	/	/
	/	/	/
	/	/	/

date: Inspection personnel:

Figure 4 Job Sheet

Specific requirements:

1) Open the Job Sheet, maintenance the corresponding equipment;
2) record the state of equipment;
3) maintenance the failure equipment;
4) record the state of maintenance.

Module D Fault Searching and Solution of Railway Signal Equipment

Competitors should completeFault Searching of railway signal equipment operation on the Virtual Scene Examination Platform for Railway Signal Equipment according to the task requirements: Troubleshooting the fault of ZPW-2000A track circuit,Troubleshooting the fault of switch control circuit,Troubleshooting the fault of signal control circuit.

Investigate flow

1) Check the fault phenomenon in interlocking;
2) Check the relevant equipment status;
3) Check circuit diagram;
4) Electrical measurement by selecting instrument;
5)Analysis electrical characteristics;
6) Troubleshooting points of failure
7) Uploading Operation Records

signal red light trouble shooting

According to rail transportation, operation, computer-based interlocking, system, alarm, information, fault, railway signal, equipment, system, railway signal, equipment, system, fault, fault, fault, fault, fault, fault, fault, fault, fault, fault, fault, fault, fault, fault, fault, fault fault phenomenon can be viewed according to interlocking interface in Figure 5, and signal can be checked according to circuit diagram, electic fault.

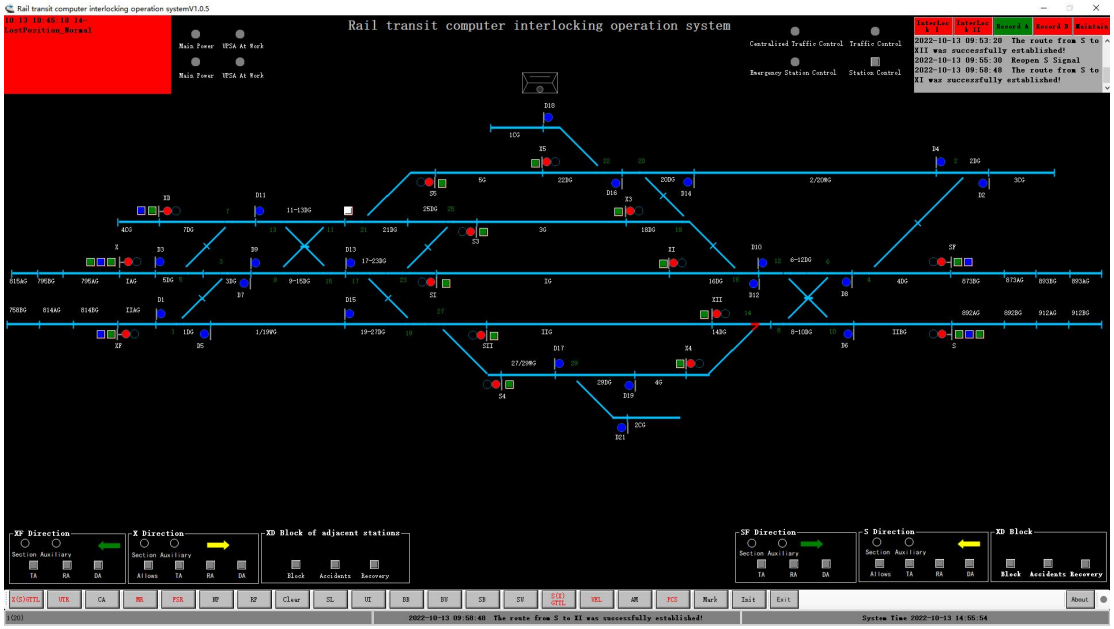


Figure 5 interlocking interface

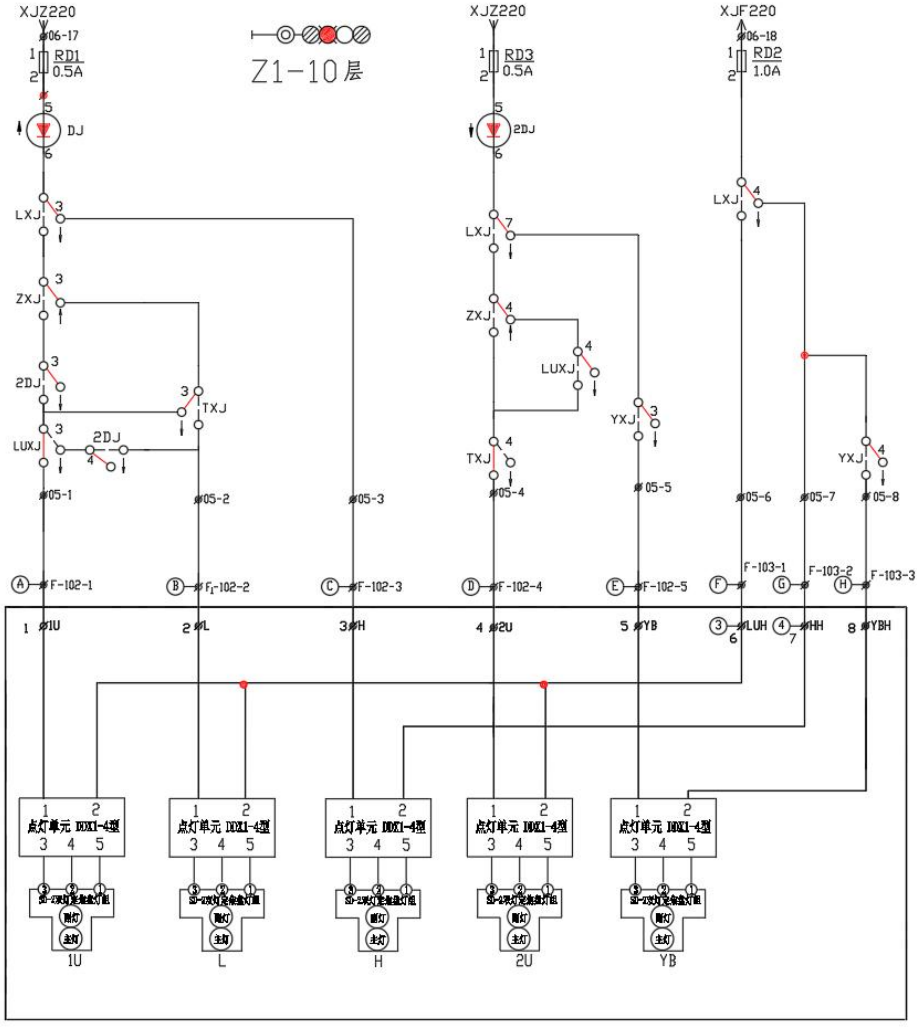


Figure 6 circuit, signal

Specific requirements:

1) Carry out electrical test according to circuit diagram;

2) analysis of data to judge the type of fault;

3) label the judgment results (each fault phenomenon can only be label once);

2. Verify the results

The fault point is judged correctly,Electrical parameters return to normal,Interlocking system alarm disappears.

4. Score standard

Table 5 Scoring standard

module	Detailed rules	Score
A	Examination and management platform of railway signal equipment	35.00

B	Interlocking system operation	10.00
C	Maintenance of railway signal equipment	20.00
D	Troubleshooting of railway signal equipment	30.00
E	Professional quality	5.00
Total		100.00