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Government of India - Ministry of
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No. EL/11.5.5/5

Dated: 28/08/2009

Chief Electrical Engineer,

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SPECIAL MAINTENANCE INSTRUCTION No. RDSO/2009/EL/SMI/258 (Rev.'0'),
Dated 26-08-09.

1.0 TITLE

Improvement in reliability of LWL cards (AFB635 A01) and bus coupler cards (UFB 660 A01 & UFB 701A01) of three phase locomotives by testing QFBR-1478C & 2478C transmitter and receivers.

2.0 Background:

The premature failures of QFBR-1478C (transmitter) & 2478C (receivers) have affected the reliability of LWL and bus coupler cards of three phase locomotives. The matter was taken up with BTIL and BHEL and it has come to notice that manufacture of wafer of this optical transmitter was shifted from USA to Singapore and final packing of this transmitter was shifted from Singapore to Philippines in year 2004. Earlier, after manufacturing, screening test of this component, comprising of burn-in cycle of 500 hrs. from -25 to +70 degree C used to be done in USA. This practice was stopped when manufacturing was shifted to Philippines. Later on, this practice was reintroduced in the end of year 2007; at Philippines. Hence the suspected lot is in service against supplies made between Jan 2005 to Sep 2007 batch of production, which is failing in the field due to "Backline Defect" where the output dB level of the component goes down prematurely within a short span of time. It has also been observed that failure of optical transmitter of this batch is maximum causing premature failures of gate units, LWL card and Bus coupler cards. Special Maintenance Instructions for checking these transmitters in Gate units of power converter have already been issued by RDSO vide SMI NO. 257. In order to test these transmitter and receivers in LWL card and Bus coupler cards (UFB660A01 and UFB 701A01), this SMI is being issued.

3.0 Testing of QFBR (1478 C) transmitter and receiver (2478 C) in AFB635 B08 card:

To test QFBR (1478 C) transmitter and receiver (1478 C) by measuring dBm and voltage level in AFB635 B08 card.

3.1 Instructions:

The Fibre optical Transmitter/Receiver in (LWL) AFB 635 B08 converts the electrical firing pulses received from AS and NS controllers into corresponding light pulses for potential free and interference free transfer to the gate units. The feedback signal also transferred optically is converted into electrical impulses. There are 8 channels each for transmitter and receiver. For transmitter, signal level for optical logic "0" is < -40 dBm and for optical logic "1" it is > -20dBm. Similarly signal level for receiver optical logic "0" is < -40 dBm and for optical logic "1" it is between -24 dBm to -12dBm.

3.2 Method of testing:

3.3 Testing of Transmitter:

- (i) Take one empty SR Rack bus station. Connect the following Pins in back plane to loop back. (ref fig.1)
- (ii) Connect Pin No. 1 c6. & 1 a6. For channel A,
- (iii) Connect Pin No. 1 c8. & 1 a8. For channel B,
- (iv) Connect Pin No. 1 c10. & 1 a10. For channel C,
- (v) Connect Pin No. 1 c12. & 1 a12. For channel D,
- (vi) Connect Pin No. 2 c6. & 2 a6. For channel E,
- (vii) Connect Pin No. 2 c8. & 2 a8. For channel F,
- (viii) Connect Pin No. 2 c10. & 2 a10. For channel G,
- (ix) Connect Pin No. 2 c12. & 2 a12. For channel H,
- (x) Insert power supply card and AFB 635 B08 card inside the rack.
- (xi) Switch on 110 V power supply to the rack.
- (xii) Inject -13 dB optical power from LED source (RIFCOS meter) at the receiver of AFB 635 B08 and measure the optical power at transmitter with the help of dB meter. The values of optical power should be as given in para 3.5.

3.4 Testing of Receiver: Same set up has to be used however remove the looping back of pins in the back plane as given above. Connect LED Source meter to receiver under test. Connect multi meter on the receiver test point. Measure the output signal amplitude on Multi meter. It should be > 4.1 V.

3.5 Method of screening:

S.No.	Measured dBm level	Action to be taken
1.	< -18 dBm	The transmitter is likely to fail and should be replaced.
2.	between -16 dBm and -18 dBm	Measurement should be repeated after six months and if dBm loss is more than -1dBm from its previous recorded value, transmitter should be replaced.
3.	> -16 dBm	Measurement should be repeated in next AOH and if dBm loss is more than -1dBm from its previous recorded value, transmitter should be replaced.

3.6 Test Equipments Required: Properly calibrated RIFCOS optical power db meter. LED source, 110 VDC power supply.

3.7 Application to: WAP-5, WAP7, WAG9 and WAG9H locomotives.

3.8 Periodicity: In AOH/IOH/POH

3.9 Agency of implementation:

All sheds maintaining WAP5, WAP7, WAG9 and WAG9H locomotives.

4.0 Testing of QFBR (1478 C) transmitter and (2478 C) receiver in UFB660A01 card:

To test QFBR (1478 C) transmitter and receiver (2478 C) by measuring dBm and voltage level in UFB 660A01 card.

4.1 Instructions:

The bus coupling Device UFB 660 A01 converts the signal between the electrical local bus (redundant) and optical remote bus non redundant. It generates the optical signals corresponding to the electrical signal received by local bus and vice versa.

UF B660 A01 (Bus Coupler) has 5 channels, one redundant interface (two channels) and three non-redundant channels (three channels)

Each channel technically divided into two groups one is transmitter group and second one is receiver group.

Testing of those groups is carried out independently.

4.2 Method of Testing:

Testing of Transmitter Group:

- (i) Take one empty CEL bus station.
- (ii) Insert power supply card and UFB660A01 card inside the rack.
- (iii) On UFB660A01 card, identify test point TP1 as shown in fig.2 for channel 1.
- (iv) Switch on power supply to the rack.
- (v) Apply +5 volt at test point TP1. This +5 volt supply may be taken Pin 28 of REGA. (refer fig 3)
- (vi) Measure dB value at optical power receiver meter. The dB value should lie between -12 to -16 dBm.
- (vii) If the level is less than - 16 dBm a balancing resistor of at least 70 Ohm must be soldered in between solder posts T1 and T2 (see fig 2).
- (viii) If the level is greater than - 12 dBm, the resistor must be unsoldered and the indicated value has to be determined again with the resistance decade.
- (ix) If it is not possible to bring the dBm level within specified limits through balancing resistor, transmitter may be considered as defective and should be replaced.

4.3 Testing of receiver Group: The testing of receiver group is carried out in reverse order i.e. optical signal is injected to the receiver and corresponding electrical signal is measured at REGA pin 3 as shown in fig 2. The voltage at REGA pin 3 should be +5 volt and between 0 to 0.08V if optical signal is switched off in healthy condition of receiver

4.4 Test Equipments Required: Properly calibrated RIFOCS optical power db meter. LED source, 110 VDC and + 5 volt power supply and multimeter.

4.5 Application to:
WAP5, WAP7, WAG9 and WAG9H locomotives.

4.6 Periodicity: In AOH/IOH/POH

4.7 Agency of implementation:
All sheds maintaining WAP5, WAP7, WAG9 and WAG9H locomotives.

5.0 **Testing of QFBR (1478 C) transmitter and (2478 C) receiver in UFB701 A01 card:** The testing of transmitter and receiver of this card can be carried out based on the method explained in para 4.0.

DA: As above

404/28/08/09
(Sandeep Srivastava)
for Director General /Elect

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Encl: As above.

404/28/08/09
(Sandeep Srivastava)
For Director General (Elec.)

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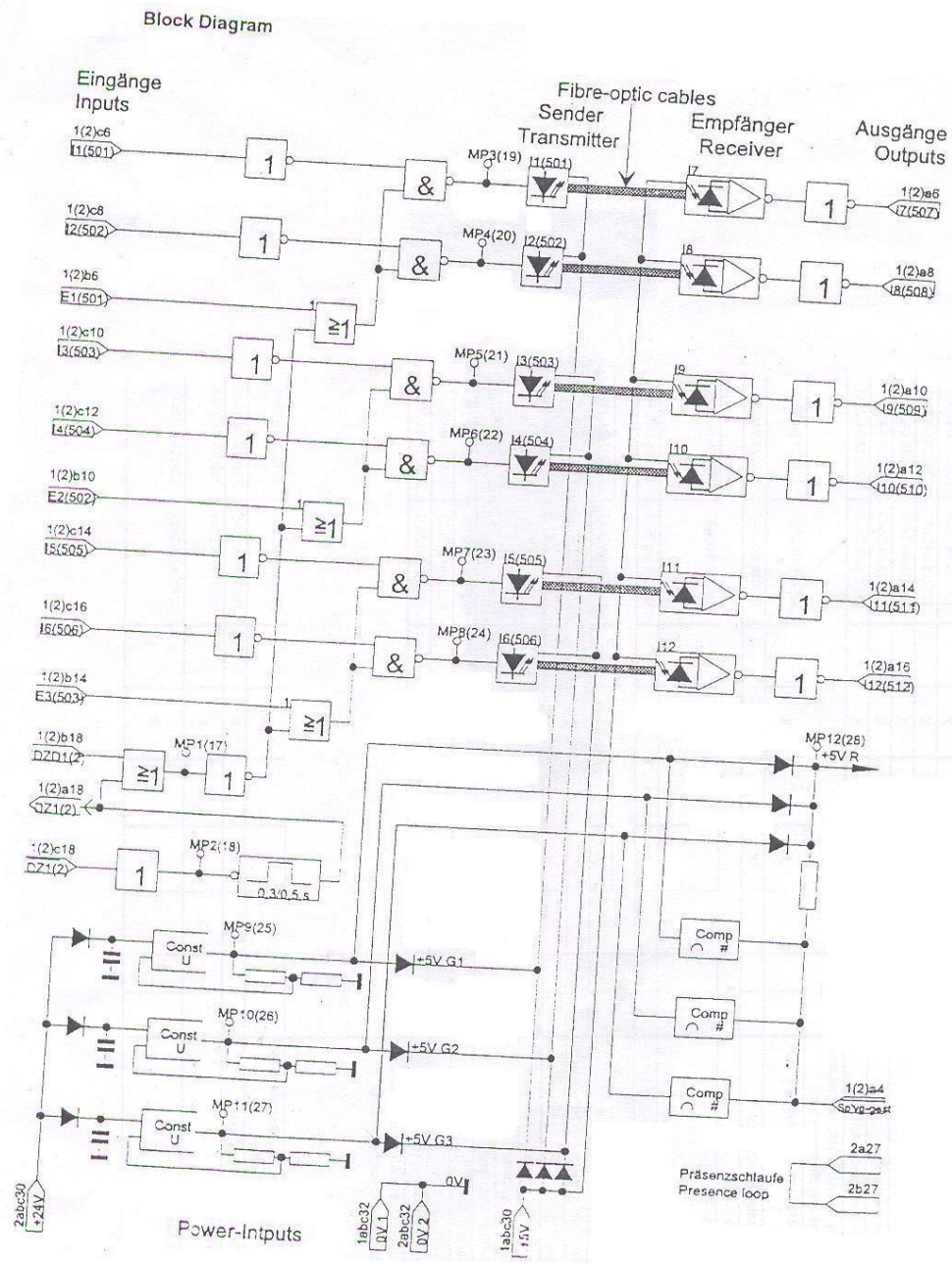


Fig 1 : DESIGNATION FOR CIRCUIT WITHOUT BRACKETS FOR CIRCUIT 2 IN BRACKETS

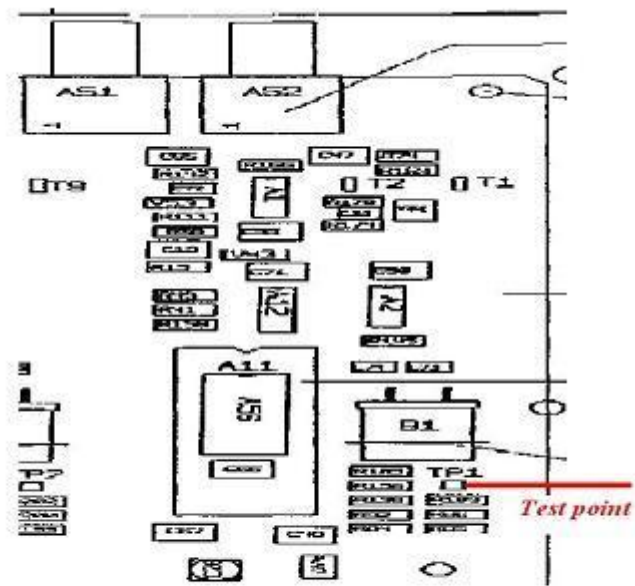


Fig 2 : TESTING OF TRANSMITTER GROUP

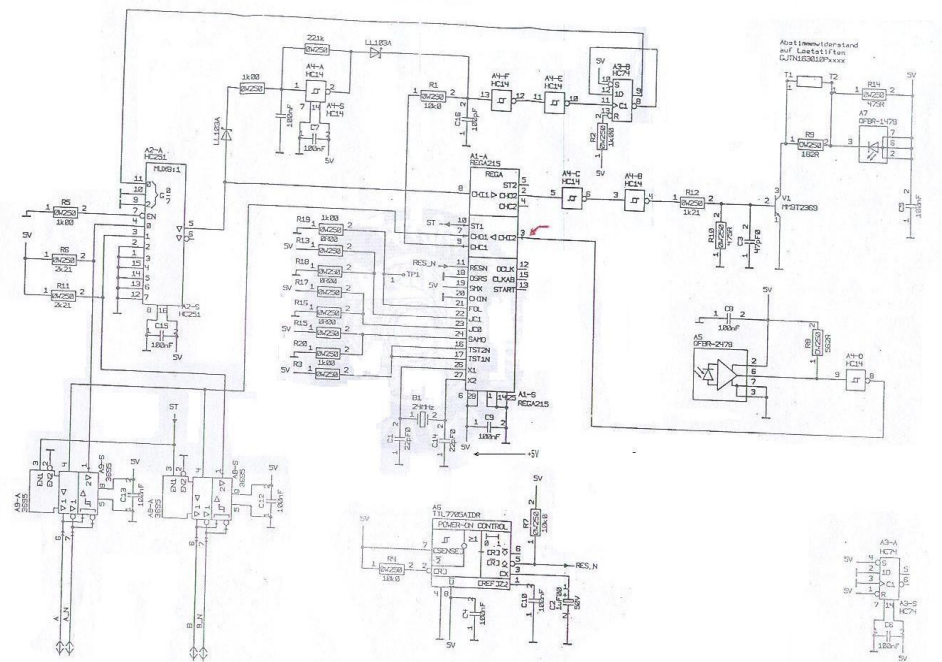


Fig. 3 TESTING OF RECIEVER GROUP