By Fax to DE/HP/LKO
0522-450123

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)

No.94/M(L)/466/32 Dated: 23.02.2001

General Managers,
All Indian Railways.

Sub: Automatic "Switching-On" of Flasher Lights on Diesel and Electric Locomotives.

During train parting and alarm chain pulling on air braked trains, the drop observed in brake pipe pressure on locomotive is very small as the brake pipe is continuously charged by a bigger opening of ¾" by the compressor irrespective of train condition. The depletion rate of air being less than the air charging rate, the drop in brake pipe pressure on loco is not adequate to give indication to the driver or ensure automatic application of train brakes.

2. To overcome this problem, RDSO has proposed a modification on the brake system of locomotives to provide two stage charging of the air brake pipe using a magnet valve and a choke. When brake pipe is charged through the choke, charging rate is less and it is known as 'Run' position of the magnet valve. The magnet valve is kept in this position during normal running of the train. When the brake pipe is charged through magnet valve and choke, charging rate is more. This position of magnet valve is known as 'Release' position and is used at the time of initial charging and brake release.

3. An important by-product of this modification is the ability to ensure automatic "switching-on" of flasher light by sensing the drop in brake pipe pressure of locomotives which is otherwise not possible.

4. After extensive laboratory tests and field trials, RDSO has firmed up the scheme of modification and the details are enclosed as Annexure-I to this letter. Annexure-II gives details of method of checking by the shed maintenance staff and driver during routine maintenance and train operation respectively.

5. The modification broadly consists of the following:

- Fitment of two pressure switches and a magnet valve to ensure "release and run" feature on the locomotive.
- Modification of electrical control circuit of locomotive to bring the engine to idle (diesel) or GR0 position (electric).
- Introduction of time delay of 60 seconds to permit build up of requisite 4.8 Kg./Cm^2 without actuating flasher light in normal brake application.
- A 5.5 mm choke on locomotives.
- Increase in orifice size of alarm chain apparatus of coaches from the existing 4 mm to 8mm.

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6. The system is applicable only to air braked trains. On vacuum brake trains especially if train parting is in the rear coaches with locomotive power in full, the system is not effective and the flasher light may not be "switched-on" automatically. In addition to train parting, alarm chain pulling, flasher light will be switched on in 'Run' position of magnet valve after full service brake application till a brake pipe pressure of 4.8 Kg/Cm^2 is achieved.

7. During emergency brake application, **flasher light will not be switched on automatically,** although the engine will come to idle/GR0 position.

8. The above modification will ensure that on freight and passenger trains at the time of train parting/alarm chain pulling, there is automatic application of brake, engine comes to idle/GR0 position **and the flasher light is automatically switched on.**

9. The cost of modification is estimated at Rs. 20,000/-. The description/specifications and likely sources for the supply of materials required for the modification as advised by RDSO are enclosed at Annexure-III.

10. The scheme of modification to be followed by the Railways will be as under:

- As a first step, in order to gain experience on the modification, debug teething problems and train Loco Inspectors, Railways may carry out the above modification on 10 diesel & electric locomotives each on their system in the next two months.
- Railway Board, in the meanwhile, will finalise the rate contract of pressure switch and magnetic valve/time delay relays required for the modification.
- Railways will carry out the modification on all remaining BG main line diesel & electric locomotives in a time frame of one year from now.
- Modification to the orifice of passenger alarm system of coaches from the existing 4 mm to 8 mm will be done in a time frame of 4 months **after** the modification on all locomotives has been completed.
- The size of brake pipe charging line on some of the Electric locomotives would have to be changed from the existing ½" to ¾" diameter to reduce the brake release time on train.

11. The modification is only intended to assist the driver in identifying abnormal situations and **does not** seek to absolve him of his role in "switching-on" the flasher light. **The ultimate responsibility for immediate "switching-on" of flasher lights in abnormal situations causing infringement of adjoining track will continue to be of the driver and the existing instructions in this regard will continue to be applicable.**

12. This letter is issued with the approval of Board (MM & ML).

Encl: As above.

(Shakeel Ahmed)
Exec.Dir.Mech.Engg.(Traction)
Railway Board.

Copy to:-

DG/RDSO, Lucknow

Annexure I

Annexure of letter No. SD.DFM.A.4.7 dated 13.02.2001

(I) AUTOMATIC SWITCHING 'ON' OF FLASHER LIGHT IN CASE OF TRAIN PARTING - MODIFICATIONS ON DIESEL AND ELECTRIC LOCOMOTIVES

1. BACKGROUND

At present in emergency situations like train parting, driver of the train is required to switch ON flasher light on the locomotive to attract attention of the driver of the train coming from the opposite direction, therefore, it takes some time. It is felt that as an aid to the driver switching ON of flasher light should be made automatic during train parting.

1.2 To operate flasher light during train parting, RDSO has suggested modifications in the existing brake and electrical control circuit of diesel and electric locomotives to link switching ON of flasher light with drop in brake pipe pressure/vacuum on loco.

1.3 However, at present on air braked trains, since brake pipe is continuously charged through a big opening irrespective of train condition during train parting, adequate pressure drop is not available on brake pipe of loco to initiate operation of flasher light automatically. Therefore, it is felt that if charging of brake pipe is restricted during normal running of train then during train parting depletion of air will be at a rate higher than the charging rate and brake pipe pressure will drop significantly on the train. This drop in brake pipe pressure can be linked to operate flasher light. Details of modifications are given below :-

2. MODIFICATIONS

2.1 Modification-1 - Provision of magnet valve and choke to introduce Release and Run position on locomotives (refer Fig.1) .

The existing and modified brake circuits are shown in *Fig.1*. The MR charging line of brake pipe has been modified by providing a choke and a magnet valve. During normal running air passes through a choke of 5.5 mm dia to charge the brake pipe. Charging rate is sufficient to maintain normal leakage on loco and train. This is **'Run'** position. The magnet valve is connected to a push button (SP1/SP2 on diesel loco and BPSW1/BPSW2 on electric loco). When push button is pressed, magnet valve gets energised and provides full opening of ¾" to charge the brake pipe. This is **'Release'** position. Therefore, the modified circuit will provide air through restricted opening during Run position and through bigger opening during Release position of magnet valve. Due to this modification during train parting adequate pressure drop takes place on brake pipe of loco. This drop is sensed and used to switch ON flasher light automatically by further modifying pneumatic and electrical control circuits on diesel and electric locomotives.

2.2 **Modification-2 - Modification of pneumatic and electrical control circuits to operate flasher light automatically during train parting**

2.2.1 Modification in pneumatic circuit (brake circuit) of Locomotive (applicable both for diesel and electric locomotives)

2.2.1.1 *Details of modification to pneumatic circuit of pure air brake loco are shown in Fig.2.*

In the modified circuit two pressure switches designated as P1 & P2, have been provided. P1 has been provided between Port No. 5 of A-9 driver valve and Port No. 3 of MU-2B valve i.e. in the control pressure line of additional C-2 relay valve. P2 has been provided on loco brake pipe. Both the pressure switches are normally closed type. Pressure settings of pressure switch P1 and P2 are as under:-

Electrical contact of P1 to close at pressure below 4.6 kg/cm2
Electrical contact of P1 to open at pressure above 4.9 kg/cm2.
Electrical contact of P2 to close at pressure below 4.5 kg/cm2
Electrical contact of P2 to open at pressure above 4.8 kg/cm2.

2.2.1.2 During train parting on air brake trains, due to restricted charging, brake pipe pressure drops. When brake pipe pressure is less than 4.5 kg/cm^2, P2 will close resulting in electrical contact getting closed. Closure of electrical contact of pressure switch energises electrical circuit connected with P2 to bring diesel loco to idle rpm (*GR 'O'* on electric locomotive), to give audio & visual indications and to switch ON flasher light automatically.

2.2.1.3 However, brake pipe pressure also drops during normal brake application by automatic brake valve (A-9). Therefore, with only pressure switch P2 in circuit flasher light and audio-visual indications will switch ON automatically and loco will come to idle rpm during normal brake application also. To avoid this situation, an additional pressure switch P1 as mentioned above, has been provided in the control pressure line of additional C-2 relay valve. This pressure switch closes when pressure in the control line is below 4.6 kg/cm^2 . When P1 closes it deactivates electrical circuit of P2 pressure switch. During brake application by A-9, drop in control pressure of C-2 is faster than the drop in brake pipe pressure of loco, therefore, P1 closes earlier than P2 and deactivates electrical circuit of P2 before loco brake pipe pressure drops below 4.5 kg/cm^2. Therefore, neither loco will come to idle rpm (GR '0' on electric locomotive) nor flasher light and audio-visual indications will switch ON automatically during brake application by A-9.

2.2.1.4 During release of brakes by A-9, control pressure of C-2 builds up faster than brake pipe pressure on loco. Therefore, P1 opens before P2 and there is a possibility of loco coming to idle rpm (GR '0' on electric locomotive) during release of brakes. To avoid this, an 'OFF' time delay relay has been provided in series with electrical

contact of pressure switch P1. This time delay relay introduces time delay in activation of electrical circuit of P2 after opening of P1 pressure switch . Therefore, P2 electrical circuit does not activate immediately on opening of P1. **Time delay relay should be set to introduce a time delay of 60 seconds**. During this time delay which works as a masking period, brake pipe pressure on loco also builds up to 4.8 kg/cm^2 and P2 opens. In this way automatic switching ON of flasher light and audio-visual indications to driver .and diesel loco coming to idle rpm (GR '0' on electric locomotive) during release of brakes after most of the brake application, is avoided.

2.2.1.5 ***For dual brake locomotive the modifications are shown in Fig. 2(a)*** and detailed working remains same as above while working air brake train.

However, while working vacuum trains, P2 pressure switch will not be functional during train parting (there being no train brake pipe). The flasher light functions discussed above are therefore, achieved by connecting the flasher light circuit to the existing PCS/RGEB.

In this simple connection, however, there is a difficulty. It has been observed that during normal operation and control of vacuum trains, driver do operate the A-9 valve in such a manner that the brake pipe pressure goes below the H5 valve setting ,there by operating PCS/RGEB. This will also happen when emergency brake is applied by the driver through A-9 valve, in both vacuum and air brake trains. Therefore, the flasher light may get switched ON repeatedly during normal train control operation also. To avoid this, the modification ensures that the flasher light will not get switched ON when emergency brake is applied on trains through A-9 valve but will get activated when emergency brake application is made through D-1 emergency valve or when an abnormal situation of train parting takes place.

For this purpose, in the modified scheme, instead of only one common pressure switch being used operated through both H-5 & HB-5 valves, two pressure switches designated as PCS-1(RGEB-1) and PCS-2 (RGEB-2) have been used. ***PCS-2 (RGEB-2) is directly mounted on the brake pipe of locomotive. It is a replacement of H-5 valve. Therefore, in the modified circuit H-5 valve and double check valve are removed. PCS-1 (RGEB-1) is connected to HB-5 valve similar to the existing system.***

With the modified system, PCS-1 (RGEB-1) will operate during train parting on vacuum train and PCS-2 (RGEB-2) will operate during emergency brake application and train parting on air braked trains. The pressure setting of PCS-1 (RGEB-1) and PCS-2 (RGEB-2) are as under:

For Diesel Loco -

Electrical contact of PCS-1 to close at pressure below 6.5$\pm$0.1 kg/cm2
Electrical contact of PCS-1 to open at pressure above 7.5+ 0.1 kg/cm2.
Electrical contact of PCS-2 to close at pressure above 4.0 kg/cm2.
Electrical contact of PCS-2 to open at pressure below 2.8 kg/cm2

For Electric Loco -

Electrical contact of RGEB-1 to open at pressure below 6.5± 0.1 kg/cm2
Electrical contact of RGEB-1 to close at pressure above 7.5+ 0.1 kg/cm2.
Electrical contact of RGEB-2 to open at pressure below 2.8 kg/cm2
Electrical contact of RGEB-2 to close at pressure above 4.0 kg/cm2.

Note: *On pure air braked loco only PCS-2 (RGEB-2) will be there.*
On dual brake loco, both PCS-1 (RGEB-1) and PCS-2 (RGEB-2) will be there.
H-5 and double check valve will be removed on both pure air brake and dual air brake locomotives.

2.2.2 Modification in electrical control circuit of diesel and electric locomotives

2.2.2.1 The modified electrical control circuits to operate flasher light automatically during train parting are shown in fig. 3A, 3B & 3C for diesel and in Fig. 4 Rev.2 for electric locomotives respectively.

2.2.2.2 Modification on electrical control circuit of diesel locomotive (Ref. Fig 3A, 3B & 3C)

The modified circuit is valid only when reverser handle is in forward or in reverse position.

Train parting on air braked train:
Whenever there is a train parting on air braked train or brake pipe pressure drops below 4.5 kg/cm^2, electrical contact of P2 (pressure switch) shall get closed in turn energizing PR3 (GP relay) through normally closed interlock (PR11) of PR1 (Time Delay Relay). This in turn shall give supply to the flasher light control unit of the direction in which the reverser is placed through diodes D1 or D2 due to closing of N/O interlock of PR3 between wire no. 171 & 135. Thus flasher lamp of the side in which reverser is thrown, will glow automatically. Also the DMR will get de-energised due to opening of the NC interlock of PR3 in the DMR circuit string and FL relay shall also drop. This will cause the glowing of the LEDs through NC interlock of FL. The buzzer will also start working through NC interlock of PR2 & closing of NC interlock of FL and switches SW1&2. Engine shall also come to idle rpm.

Train parting on vacuum braked train:
Whenever there is a sudden drop of vacuum level, HB-5 valve operates PCS-1 and opens electrical contact of PCS-1. Opening of electrical contact of PCS-1 in turn causes drop of DMR and FL relay. De-energisation of FL relay will close N/C interlock FL11 between wire no. 171 and 135. It will give direct supply to flasher lights through normally closed contact FL11 of FL relay, N/C interlock of PR2, reverser contacts and diode D1 or D2. Thus flasher lamp of the side in which reverser is thrown will glow automatically. LED lights and the buzzer will also come. Engine shall also come to idle rpm.

Emergency brake application by A-9 valve:
When emergency brake application is done by A-9 valve, the pressure will drop on brake pipe of locomotive and electrical contact of PCS-2 will open. Opening of electrical contact of PCS2 in turn drops DMR and will bring engine to idle rpm. However, in this operation, electrical contact of PCS-1 and NC interlock of PR3 relay in DMR string will not open and FL relay will not drop. Therefore, in this operation, flasher light and audio visual indications will not switch ON automatically.

Emergency brake application by D-1 emergency valve:
When emergency brake application is done by D-1 emergency valve, electrical contacts PCS-1 & PCS-2 and NC interlock of PR3 relay in DMR string will open. This in turn causes dropping of DMR and FL relay. Dropping of FL relay will switch ON flasher light and audio visual indications automatically. Dropping of DMR will bring engine to idle rpm.

Re-set operation
Pressing of switch SW1 or SW2 causes the energisation of PR2 relay resulting in stopping of buzzer and automatic glowing of flasher light. LED indication will still be coming which can reset only when FL relay is again energised and its NC interlock in LED indication string is opened.

Note-

- If the **flasher lamp control unit** is provided with two way toggle switch with filament 1 and 2 with center off position, it should be replaced by a two way SPDT toggle switch (without a center off position) of rating 10 amp/250 V.
- Besides, automatic switching ON of flasher light, driver can switch ON the flasher unit whenever it is required by switch.
- SW1&SW2 are 5 amp Push button (Loco Start button type) switches.
- In certain circumstances, i.e. when full service brake is applied continuously (and not in a cyclic manner), such that the train comes to a stop, the release timings could be higher than 60 seconds on single pipe freight train if magnet valve is not energised through push button SP1/SP2 by driver. In such a case, flasher light will switch ON. The driver can reset the same through the reset switch SW1/SW2.

2.2.2.3 Modification on electrical control circuit of electric locomotive (Fig 4 REV.2 with its Annexure).

The circuit will be functional when reverser handle is either in forward or in reverse position.

In case of train parting on air brake stock being worked either by air brake or dual brake loco. pressure switch P2 will close resulting in energisation of flasher light, audio visual indication circuit as well as PR2 relay . On energisation of PR2 relay , normally its open interlock in the Q51 relay circuit(Annexure-III of Fig.4 REV.2) will

get closed and will bring GR to '0' through self interlock of PR2 relay. The circuit of flasher light as well as audio visual indication will also get latched . As a result, application of automatic brakes by the driver through A9 at this stage will not affect the functioning of the circuit. In this condition , if resetting switch SW1 /SW2 provided in the cab is pressed by the driver, QLF relay will get energised and supply to buzzer and flasher light will be cut off. However, visual indication through LEDs will continue to come until BP pressure is restored back to atleast 4.8 Kg /cm sq.

In case of dual brake loco, working vacuum brake stock, in case of train parting , pressure switch RGEB1 will get activated through VA1B and HB5 relay valve and its normally open interlock will energise flasher , audio visual alarm as well PR2 relay circuit . Rest of the circuit functioning will be similar to above.

When driver applies automatic brakes through A9 during normal working, pressure in control pressure pipe connected from port No.5 of A9 will drop resulting into proportional drop of BP pressure. As a result, contacts of pressure switches ' P1' and 'P2' both will close. However, operation of 'P1' will be faster due to control pressure being the controlling signal for 'Brake pipe pressure' As a result off time delay relay 'PR1' will get energised and its N/C interlock in the circuit of 'PR2' relay as well as audio-visual indication and flasher lights will instantly open, making operation of 'P2' ineffective. Thus, operation of audio-visual alarm and flasher light along with regression of GR through P2 will not take place.

During the condition of brake release after brake application, pressure in the control pressure pipe will rise quickly and reach to the level of 4.9kg/cm. sq. resulting into opening of N/O interlock of 'P1' pressure switch and de-energisation of 'PR1' relay . But de-energisation of PR1 relay will not cause energisation of PR2 relay as well as audio-visual indication and flasher light circuit as PR1 is an 'off' time delay relay,. Its N/C interlock in the circuit of'PR2' relay as well as audio-visual alarm and flasher light will close only after 60 secs. of de-energisation of PR1 relay. During this 60 sec. delay , the pressure in the BP pipe will also rise to the level of 4.8 kg/cm2 , forcing pressure switch 'P2' to open. Thus, operation of audio-visual alarm and flasher light along with regression of GR through P2 will not take place. However, in certain circumstances, i.e. when full service brake is applied continuously (and not in a cyclic manner), such that the train comes to a stop, the release timings could be higher than 60 seconds on single pipe freight train even with magnet valve in energised condition by pressing of push button BPSW1/BPSW2 by driver. In such a case, flasher light will switch ON. The driver can reset the same through the reset switch SW1/SW2.

When driver applies emergency brakes through A9 or D1 emergency brake valve, operation of P1 and P2 pressure switches will take place similar to above and flasher light as well as audio-visual circuit will be masked. However, due to excessive drop in BP pressure , pressure switch RGEB2 will get activated resulting in de-energisation of QRS2 relay available in electric loco control circuit and will bring GR to 'O' through opening of its normally close interlock in the Q51 relay circuit.

The test switch 'TS' has been provided to facilitate testing of the circuit by the driver.

5. **Alarm chain pull indication**

With the above modification, flasher light will switch ON automatically during train parting both on passenger and freight trains. It is proposed to use above modification to give indication to driver and to stop the train during alarm chain pull on air brake trains. It is proposed to achieve above objective by increasing orifice size of alarm chain apparatus on coaches to 8 mm from the existing 4 mm size in second phase of modification after the completion of modification of locomotives as mentioned above. During this transition period, the existing PATB system (audio visual alarm system connected with air flow measuring valve) should be retained on locomotives because with 4 mm orifice size on coaches during alarm chain pulling, adequate brake pipe pressure drop will not be there on locomotive to activate audio visual indication provided by the modified system with Release and Run position. Therefore the driver will get indication of alarm chain pulling from the existing PATB system.

Annexure II

(II) METHOD OF CHECKING OF MODIFIED BRAKE AND ELECTRICAL CONTROL CIRCUITS ON DIESEL AND ELECTRIC LOCOMOTIVES

Note:

Pressure setting of pressure switch P1 & P2, and brake pipe pressure gauge on both control stands / cabs should be done on same test bench in single setting. If it is done on locomotive then pressure gauges should not be changed after the setting of pressure switches. If pressure gauges are changed then resetting of pressure switches should be done according to new pressure gauge. Once the pressure gauges and switches are set then setting should not be disturbed and pressure switches should be sealed.

1. Checking of function of Release-Run magnet valve – On Diesel and Electric locomotives

1.1 Charge the loco brake system fully and note the following:

i)	Brake pipe pressure	5 kg/cm^2
ii)	Feed pipe pressure	6 kg/cm^2
iii)	Brake cylinder pressure	0
iv)	Main reservoir pressure between	8±0.1 to 10 kg/cm^2
v)	Brake pipe leakage	0.7 kg/cm^2 in 5 min.

1.2 i) Keep magnet valve in 'Release' position (energised state) and conduct test with 7.5 mm dia leak hole (RDSO drawing no. SKDP 2691) .
- Brake pipe pressure should not fall below 4.4 kg/cm^2.

ii) Keep magnet valve in 'Run' position (de-energise state) and conduct test with 7.5 mm dia leak hole.
- Brake pipe pressure should fall below 3.5 kg/cm^2 but should be more than 2.5 kg./cm^2.

Both the above tests should be conducted with diesel loco on idle and electric loco with 3x1000 compressor capacity. If electric locos are provide with 2x2000 capacity compressor then the tests should be conducted with 1x2000 compressor capacity but during the tests MR should not drop. If MR is dropping then tests should be done with higher compressor capacity.

1.3 i) Apply emergency brake through A-9 automatic brake valve
-Brake pipe pressure should drop to '0' Within 1-2 seconds.

ii) Keep push button of Release-Run magnet valve in pushed (ON) position, it will energise magnet valve (Release position)
Release after emergency brake application
-Brake pipe should rise to 5 kg/ cm^2 Within 3-6 seconds

1.4 i) Apply emergency brake through A-9 automatic brake valve
-Brake pipe pressure should drop to '0' Within 1-2 seconds.

ii) Keep push button in depressed (OFF) position to de-energise Release-Run magnet valve (Run position).
Release after emergency brake application
-Brake pipe should rise to 5 kg/sq.cm. More than 6 seconds

2. Checking of modification of electrical circuit of diesel locomotive (Keep magnet valve de-energised)

Note: For all the tests mentioned below keep the reverser handle either in forward or in reverse direction.

2.1 Cut off GF and keep throttle handle to 8th notch, apply full service brake application through A-9 brake valve and release the same

- Brake pipe pressure will drop to 3.2 - 3.4 kg/sq^2 within 3-5 seconds and subsequently come back to 5.0 kg/ cm^2 after A9 has been put to release position.

- Flasher light, LED light indication or buzzer sound should not switch ON automatically nor loco should come to idle rpm .

2.2 Apply emergency brakes by A-9 valve

- Engine should come to idle rpm . However, LED light indication, buzzer and flasher light should not switch ON automatically.

2.3 Cut off GF and move throttle handle to 8th notch , keep A-9 valve in release position, open D-1 emergency brake valve or angle cock of brake pipe

-Engine should come to idle rpm. LED light indication and buzzer sound should come. Flasher light should also switch ON automatically.

In this condition reset switch SW1/SW2

- Buzzer and flasher light should switch OFF but LED light indication should continue

Close D-1 emergency brake valve or angle cock of brake pipe and wait for some time so that brake pipe pressure is built on loco

- Light indication should also switch OFF as soon as BP is built up to 4.8 kg/sq^2.

2.4 Cut off GF and move throttle handle to 8th notch , Apply full service brake by A-9 and release the brake. Immediately open angle cock of brake pipe and drop BP pressure to 3.2 kg/sq^2 (brake pipe pressure should be above PCS2 setting)

-Neither flasher light, should switch ON automatically nor engine should come to idle rpm for 60 sec and there should not be LED light indication and buzzer sound for 60 sec. After 60 sec flasher light, LED light indication and buzzer should switch ON automatically and loco should come to idle rpm.

2.5 Cut off GF and more throttle handle to 8th notch, remove vacuum hose pipe from dummy (applicable to dual brake and pure vacuum brake loco).

- Engine should come to idle rpm. Flasher light and audio visual indication should switch ON automatically

In this condition reset switch SW1/SW2

- Buzzer and flasher light should switch OFF but LED indication should continue.

Again put hose pipe on dummy and wait for some time.

- LED indication should also stop.

2.6 Check the modification with reverser handle in neutral position

- Modifications should not work i.e flasher light and audio-visual indications should not switch on automatically in any of the tests mentioned in para 2.1 to 2.5.

3. Testing Procedure for modified electrical circuit of electric locomotive

3.1 Put HVSI1 , HVSI2, HVMT1 & HVMT2 switches to position 'Zero', throw reverser to either 'F' or 'R' and take 2-3 notches through master controller. Now apply automatic brakes through A-9 up to full service application and release the same .

- Brake pipe pressure will drop to 3.2 - 3.4 kg/sq^2 within 3-5 seconds and subsequently come back to 5.0 kg/ cm^2 after A9 has been put to release position.
- There should not be any audio visual alarm, GR should not come to zero and flasher light should not glow.

3.2 With conditions same as above in (1), open Asst. Driver's emergency brake valve (D1/D2), alternatively open BP angle cock of either side.

- GR should come to Zero and audio visual alarm as well as flasher light of driving cab should start working.

3.3 With flasher light of driving cab working , press resetting switch SW1/SW2 provided in cab.

- Flasher light of driving cab should stop working as soon as SW1/SW2 push button switch is pressed.
- Visual indication through LEDs should continue to come and must not reset.

3.4 Close Asst. Driver's emergency brake valve D1/D2 (in case of BP angle lock, close the same)

- Visual indication through LEDs should extinguish as soon as BP pressure rises to 4.8 kg/cm ^{2}.

3.5 Again with HVSI1 , HVSI2, HVMT1 & HVMT2 switches on position '0', bring MP to '0' , again take it to 'N' and take few notches. Apply emergency brake through A9

- GR should come to Zero (through RGEB-2 and QRS-2).
- Flasher light as well as Audio/Visual alarm of the driving cab should not start automatically.

3.6 Again with HVSI 1, HVSI 2, HVMT1 & HVMT2 on position '0', put MP to position 'N' and take 2-3 notches. Now attach special coupling as per RDSO's drg. no. SK.DP-2691, Rev. '0' meant for compressor capacity test, with BP pipe on either side and open BP angle cock.

- GR should come to '0' position.

- Audio-visual alarm should come and simultaneously flasher light of driving cab should also start working.

3.7 With flasher light and audio-visual alarm of driving cab working, press audio-visual alarm/flasher light resetting switch SW1/SW2 provided in the cab.

- Flasher light as well as audio alarm of driving cab should stop working as soon as SW1/SW2 resetting push button switch is pressed.

- Visual indication through LEDs should continue to come and must not reset.

3.8 Close BP angle cock and put MP to '0'.

- Visual indication through LED should extinguish as soon as BP pressure rises to 4.8 kg/ cm^2 .

3.9 Put HVSI1 , HVSI2, HVMT1 & HVMT2 switches to position 'Zero', throw reverser to either 'F' or 'R' and take 2-3 notches through master controller. Now remove vacuum hose pipe from dummy (for dual brake and pure vacuum brake loco).

- GR should come to zero through RGEB-1and audio visual as well as flasher light of driving cab should start working.

Press reset switch SW1/SW2

- Flasher light and audio indication should stop but visual indication (LED) should continue.

Again put hose pipe on dummy and wait for some time.

- LED indication should also go.

3.12 Check the modification with reverser in neutral position

- Modifications should not work i.e flasher light and audio-visual indications should not switch ON automatically in any of the tests mentioned above.

(III) IMPORTANT INSTRUCTIONS FOR DRIVERS

Note *The modification to switch flasher light ON, LED light indication and audio indication automatically during train parting is just an aid to the driver. In no way it does take away the responsibility of the driver in abnormal situations like train parting etc. as given in GR and SR.*

1. Brake and electrical control systems of diesel and electric locomotives have been modified to switch ON flasher light and audio-visual indications (through LED light and buzzer) automatically during train parting. In addition to this, in above situation, diesel locomotive will come to idle rpm and on electric locomotive GR will come to '0' condition. Above indications may also come during angle cock closing on train, hose pipe disconnection and in some cases of alarm chain pulling which depends upon the location of alarm chain pulling and loco notch conditions.

2. For initial charging of brake pipe and for release of brakes, a manual push button has been provided on each control stand/ cab which will energise the magnet valve ('Release' position) and will increase the charging rate. **Driver should keep the manual push button pressed during brake release / initial charging.**

3. Reset switches SW1/SW2 have been provided on both control stands/cabs to reset flasher light and audio indication when they have switched ON automatically. Pressing the reset switch will switch OFF flasher light and audio indication but light indication through LED will continue till the brake pipe pressure is built up to 4.8 kg/cm^2.

4 If resetting of only audio indication (buzzer) is required then driver must manually switch 'ON' flasher light before pressing the resetting switch SW1/SW2.

5. If reverser handle is in neutral position, flasher light, audio & visual indications will not switch ON automatically in the situations mentioned in para 1 because electrical circuit of modification will remain deactivated.

6. During normal train running if all the indications i.e. switching ON of flasher light, light indication and buzzer come automatically and loco also comes to idle rpm (GR '0' on electric loco) , then it indicates an abnormal situation on the train like train parting. In this situation drag on train will also be experienced. Driver should immediately find out the cause of abnormality and act as given in GR and SR.

7 A time delay of 60 seconds has been introduced in the circuit to avoid switching ON of flasher light with audio - visual indications during normal release of brake. This time delay period starts only after the A-9 valve handle is placed in release position. After the lapse of this period of 60 seconds if the brake pipe pressure on loco is not built upto 4.8 kg/cm^2 then flasher light and other indications will switch ON automatically. Normally this should happen only if

- there is a high leakage rate on the rake.

- there is an abnormality like train parting etc. In such a case, the BP pressure will not show a trend of building up or may in fact decrease. The driver will also feel a drag on the train.

The driver should satisfy himself regarding the above and reset the flasher light only if he is sure that no abnormality exists.

8. If the magnet valve is not energised by push button as in para 2 above, brake release timings of the train will be more. In such conditions, the driver should wait till the brakes on rake are released fully (i.e. BP pressure rises to 4.9 kg/cm^2 at least).

9. During running condition of train, the 'release/run' push button should not be pressed i.e. magnet valve should not be energised.

10. Driver should ensure that the modified system provided on locomotive is in working order.

11. Driver should not disturb the pressure setting of pressure switch and A-9 brake valve after it has been set by the loco sheds.

...electrical control circuits to

Annexure III

(IV) MATERIAL REQUIRED FOR MODIFICATIONS AND SOURCES OF SUPPLY

S. No	Description of Material	Qty	Sources of Supply	Required For Diesel/Electric
1	Normally closed type magnet valve: 1 SR-3278-25/5.5-6G 72 Volts for diesel loco. 2 SR-3278-25/5.5-6G 110 Volts for electric loco.	1	M/S. Rotex Manufacturers and Engineers (Gujarat) Private Limited 987/11 , GIDC , Makarpura, Vadodara- 390 010 Ph No. 0265- 643136/642745 FAX- 0265 –644 430.	Both for Diesel as well as Electric locos.
2	Pressure Switch Type MCS-11 (Knorr make) or RT 116X (Indfoss make)	3	M/S KNORR-BREMSE INDIA (P) LIMITED 14/6 Mathura Road Faridabad – 120 003. Phone No. (0129) 276409 Fax : 276412,275935 M/s Indfoss Industries Ltd. 706-707 Surya Kiran, 19 Kasturba Gandhi Marg New Delhi	Both for Diesel as well as Electric locos.
3	PR-1 OFF Time Delay Relay Type : CT32.1/72 VDC (Concord) (for diesel loco) CT 32.1/110V DC (concord) (for electric loco)	1	M/S Concord Automation & Controls G-43,D.L.F Industrial Estate Faridabad –121003 Phone 0129-278256 Fax 0129-290854	Both for Diesel as well as Electric locos.
4	Push Button Switch (SP1&2 *BPSW1&BPSW2*) 5 amp to operate release- run magnet valve	2	Available in the shed	Both for Diesel as well as Electric locos.
5	General purpose relay Type M24 EF2 (PL, PR2, PR3)	3	Available in the shed (BHEL)	*For Diesel loco.*

	Reset switch (SW1 / SW2) Loco start switch type 5 amp	2	Available in the shed	Both for Diesel as well as Electric locos.
	Buzzer	2	Available in the shed	Both for Diesel as well as Electric locos.
8	LED indication	2	Available in the shed	Both for Diesel as well as Electric locos.
9	SPDT Switch 10 amp/250 V	2	Available in the shed	*For Diesel loco only.*
10	Blocking Diode (D1,D2) 12 amp/ 1000 V	2	Available in the shed	*For Diesel loco only.*
11.	*Blocking Diode (VSFL1,VSFL2,VSPR2)*	*3*	*Available in the shed*	*For Electric loco only.*
12	PC-8 type relay	2	Available in the shed	*For Electric loco only.*
13.	*Two position Siemens make switch (HOCVAR type)*	*1*	Available in the shed	*For Electric loco only.*

CONDITION	FLOW THROUGH	
	MAGNET VALVE	CHOKE
RELEASE	✓	✓
RUN	×	✓

MODIFICATION I

MODIFIED CIRCUIT

EXISTING CIRCUIT

TWO WAY MAGNET VALVE Rotex Type SR 3278-25/5.5-6G (72 Volts for diesel and 110 Volts for electric locomotives
(NORMALLY CLOSED) TO BE ENERGISED WITH PUSH BUTTON SWITCH
FOR RELEASE OF BRAKES

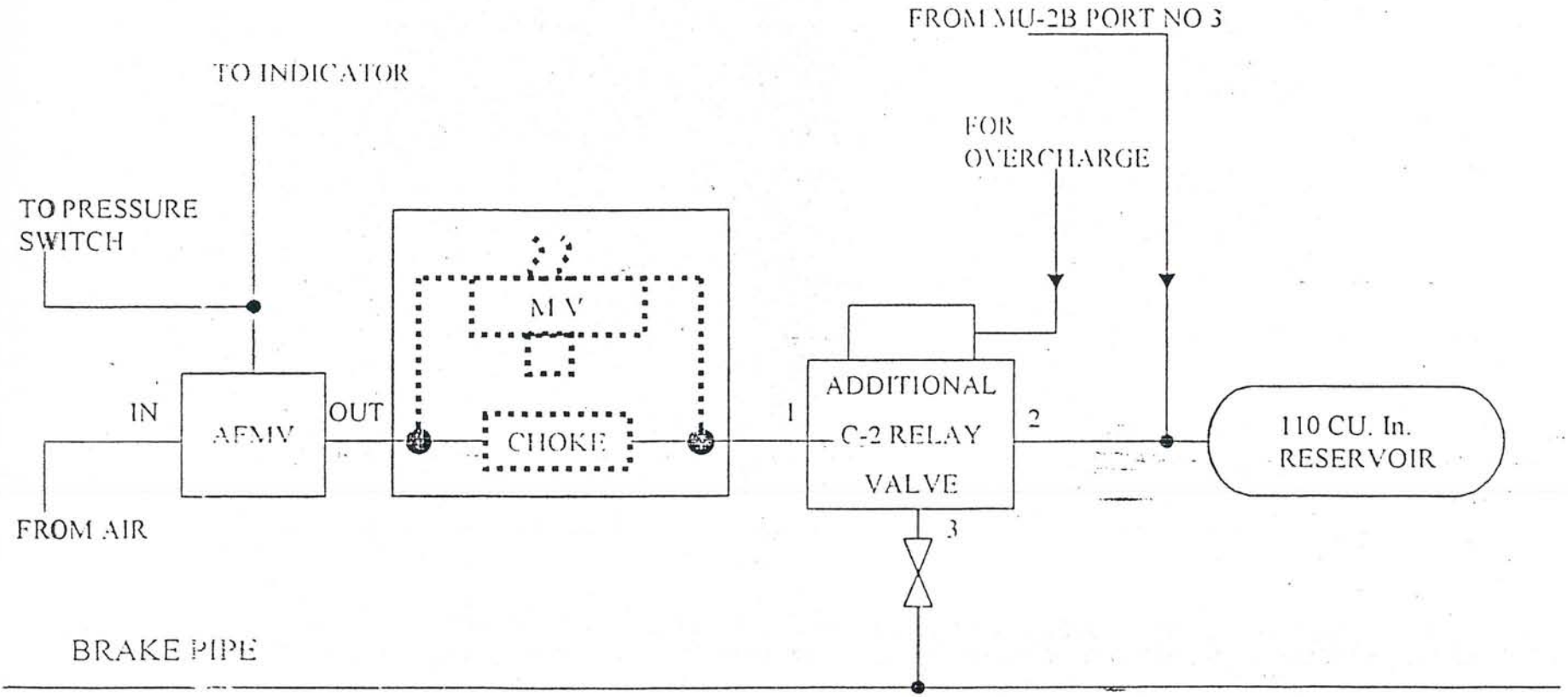
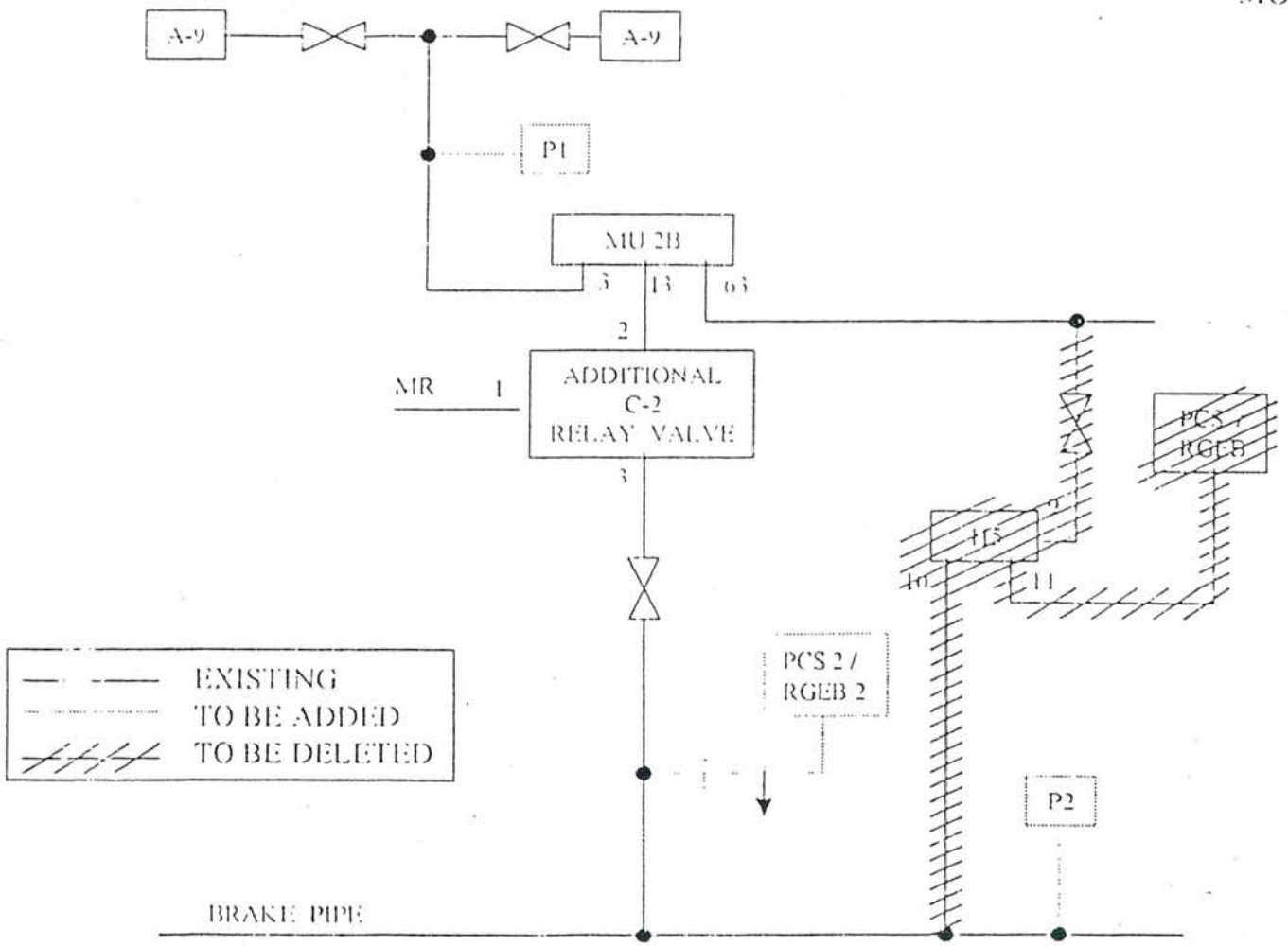
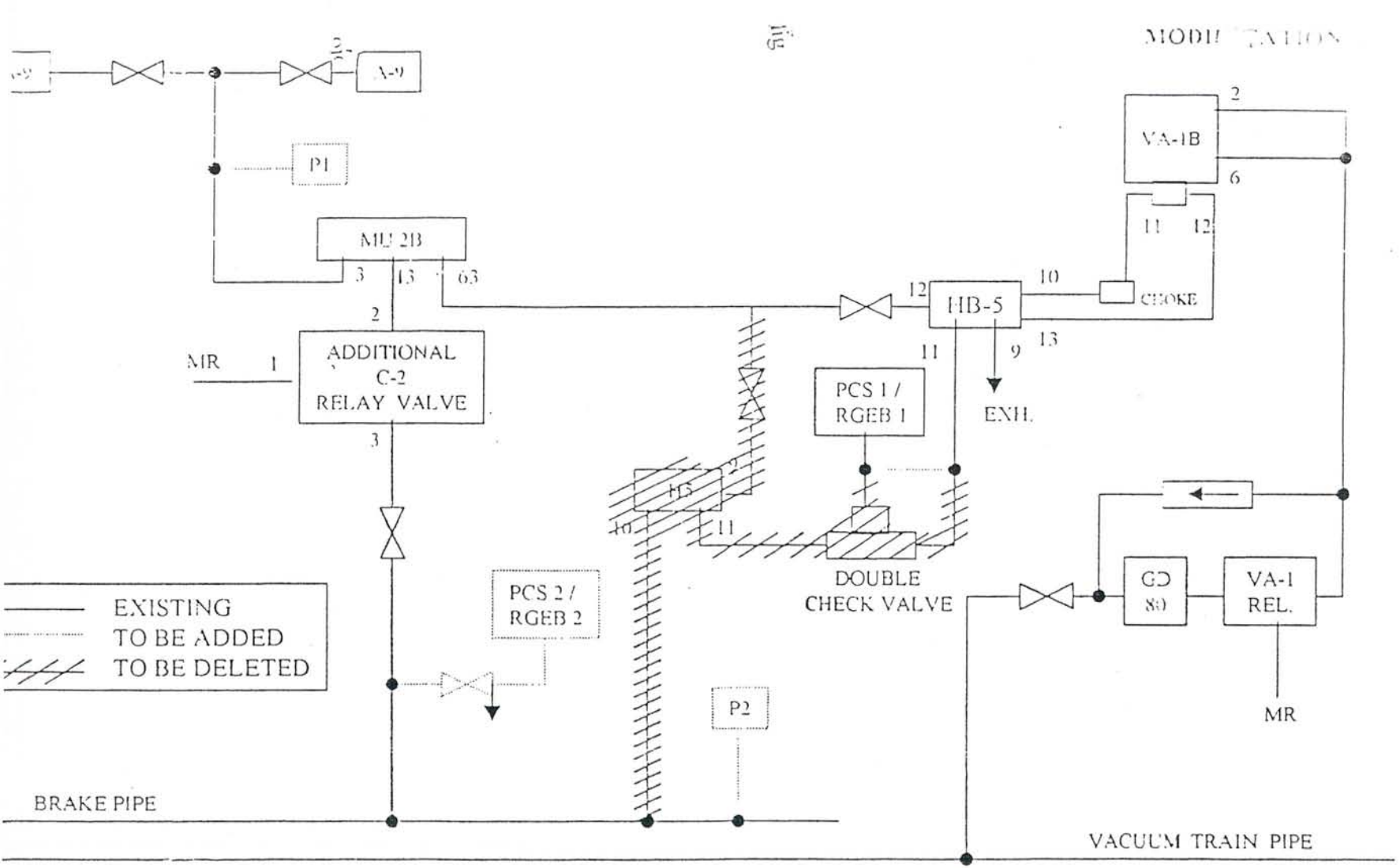


FIG-1 PROVISION OF RELEASE AND RUN POSITIONS IN THE BRAKE SCHEMATIC DIGRAM FOR PURE AIR BRAKE AND DUAL BRAKE SYSTEMS



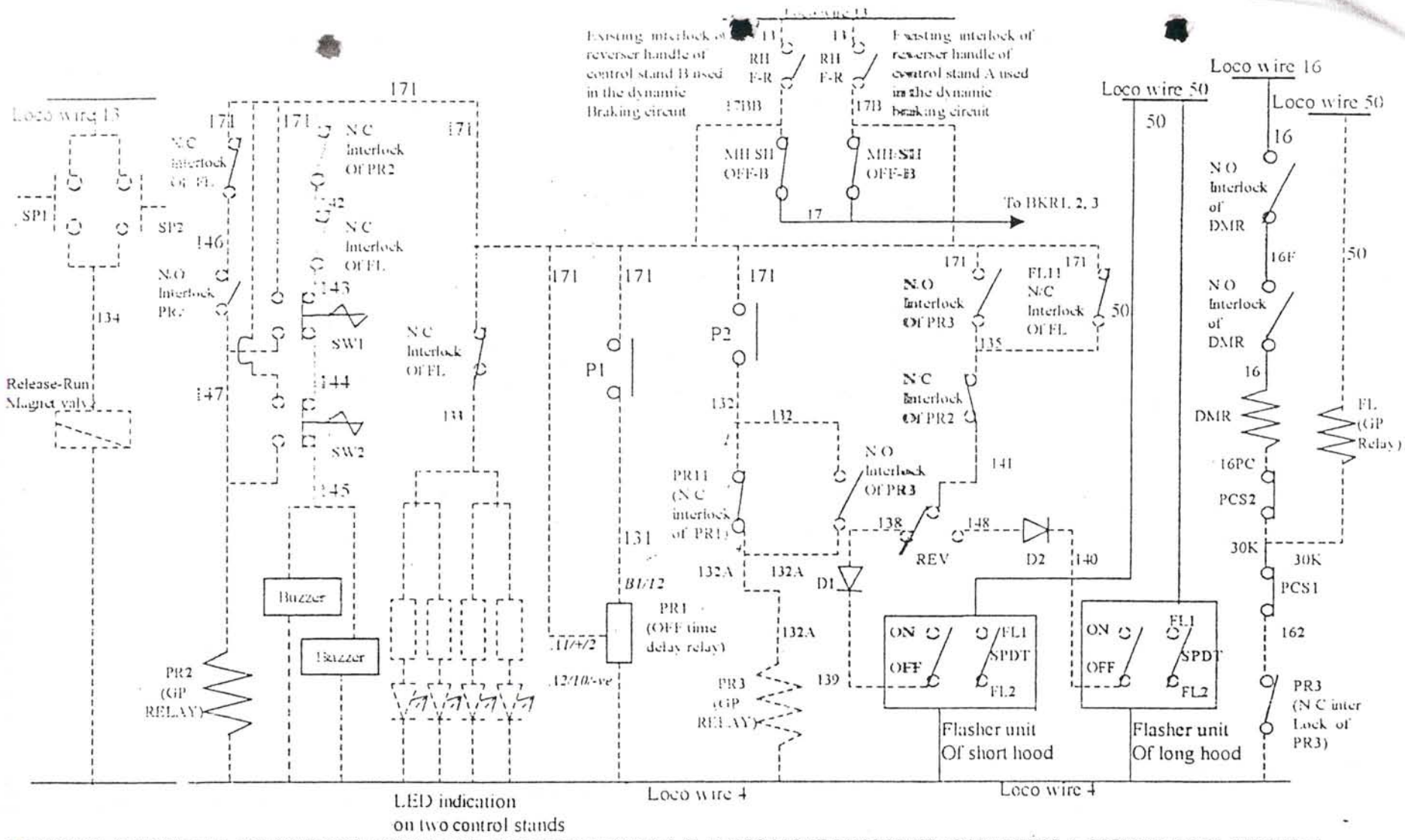
NOTE - i) H5 will be removed.
ii) PCS/RGEB is relocated and re-designated as PCS2/RGEB2

FIG-2 MODIFICATION IN PNEUMATIC CIRCUIT OF PURE AIR BRAKE LOCOMOTIVES TO SWITCH ON FLASHER LIGHT AUTOMATICALLY DURING TRAIN PARTING



NOTE - i) H5 and double check valve will be removed on dual brake locomotives.
ii) Existing PCS/RGEB has been re-designated as PCS1/RGEB1 and a new pressure switch added directly on brake pipe and designated as PCS2/RGEB2

FIG-2(a) MODIFICATION IN PNEUMATIC CIRCUIT OF DUAL BRAKE LOCOMOTIVES TO SWITCH ON FLASHER LIGHT AUTOMATICALLY DURING TRAIN PARTING



MODIFIED ELECTRICAL CIRCUIT FOR AUTOMATIC SWITCHING 'ON' OF FLASHER LIGHT DURING TRAIN PARTING & OPENING OF ELECTRICAL CONTACT OF PCS1 FOR WDM2, WDG2, WDM2C LOCO

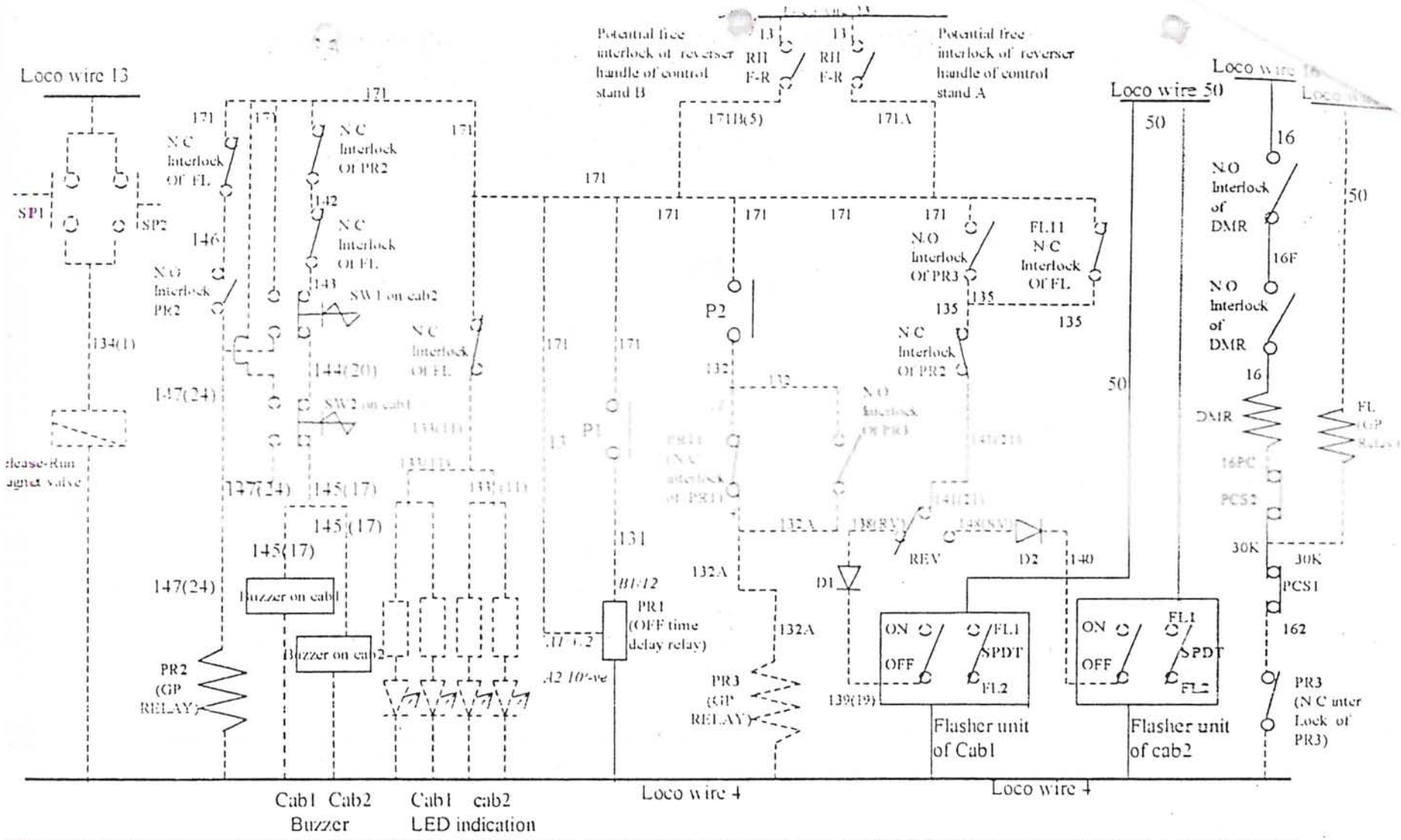
Note-1. All the modifications are shown by dashed lines.

2. New wire numbers have been given for the purpose of identification.

3. The terminals of TDR are numbered as per the nomenclature of M/s. Concord, New Delhi.

4. Interlock RH F-R shown between wire 13-17B(17BB) to replace interlock between wire 17-17B(17BB) in the existing circuit and interlock MH/SH OFF-B shown between wire 17-17B(17BB) to replace interlock between wire 13-17B(17BB) in the existing circuit.

FIG 3 (A)



SHOWING MODIFIED ELECTRICAL CIRCUIT FOR AUTOMATIC SWITCHING 'ON' OF FLASHER LIGHT DURING TRAIN PARTING & OPENING OF ELECTRICAL CONTACT OF PCS1 FOR WDP2 LOCO

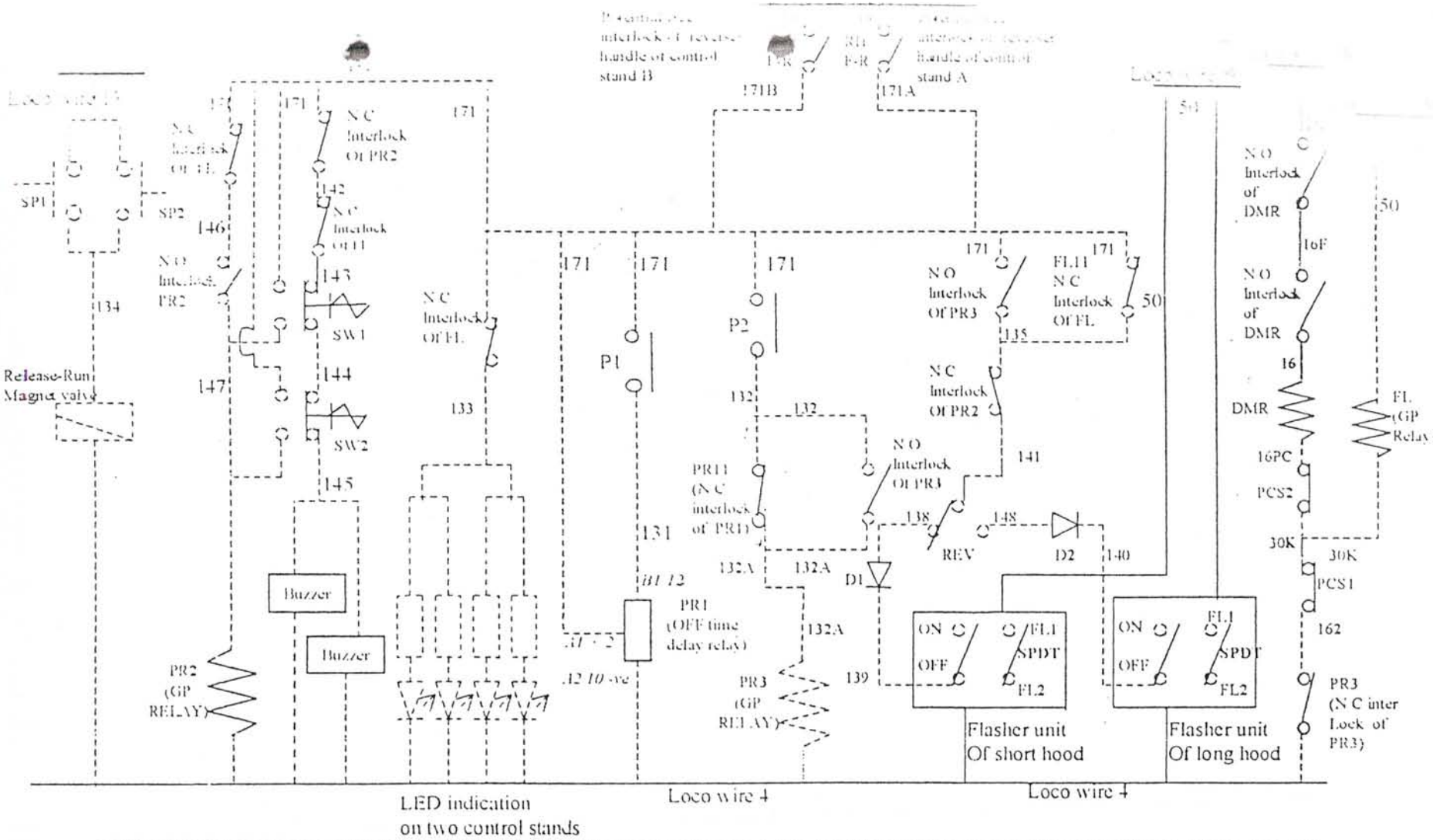
Note-1. All the modifications are shown by dashed lines.

2. New wire numbers have been given for the purpose of identification.

3. The terminals of TDR are numbered as per the nomenclature of M/s. Concord, New Delhi.

4. Existing MU wire numbers have been shown within parenthesis wherever applicable.

FIG. 3(B)



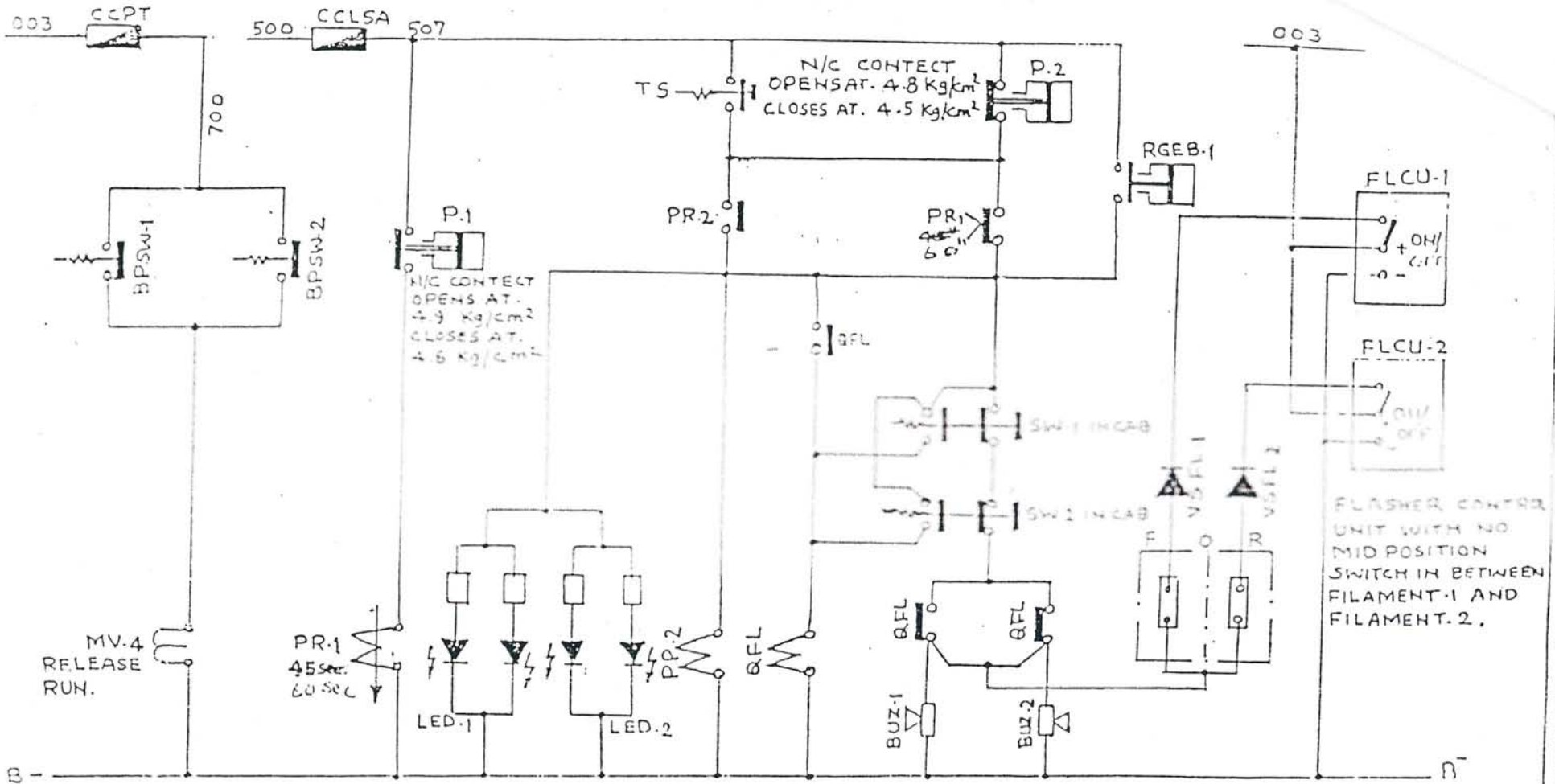
MODIFIED ELECTRICAL CIRCUIT FOR AUTOMATIC SWITCHING 'ON' OF FLASHER LIGHT DURING TRAIN PARTING & OPENING OF ELECTRICAL CONTACT OF PCS1 FOR WDP1 LOCO

Note- 1. All the modifications are shown by dashed lines.

2. New wire numbers have been given for the purpose of identification.

3. The terminals of TDR are numbered as per the nomenclature of M/s. Concord, New Delhi.

FIG 3 (C)



MODIFIED ELECTRICAL CONTROL CIRCUIT FOR RELEASE RUN FEATUREALONG WITH AUTOMATIC SWITCHING 'ON' OF FLASHER LIGHT & REGRESSION OF TAP CHANGER DURING TRAIN PARTING FOR ELECTRIC LOCOMOTIVES

CONDITIONS TO SATISFY -

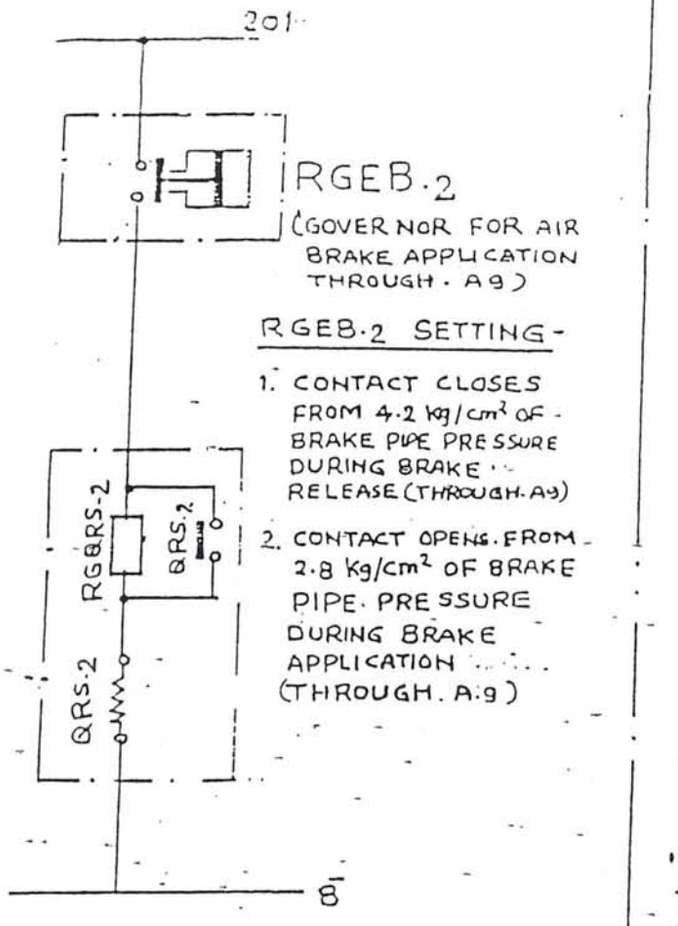
1. WHEN $RGEB_2$ (QRS_2) IS OPEN (EMERGENCY BRAKE APPLICATION BY DRIVER) → GR COMES TO '0', BUT NO OPERATION OF AUDIO-VISUAL INDICATION AS WELL AS FLASHER LIGHT.

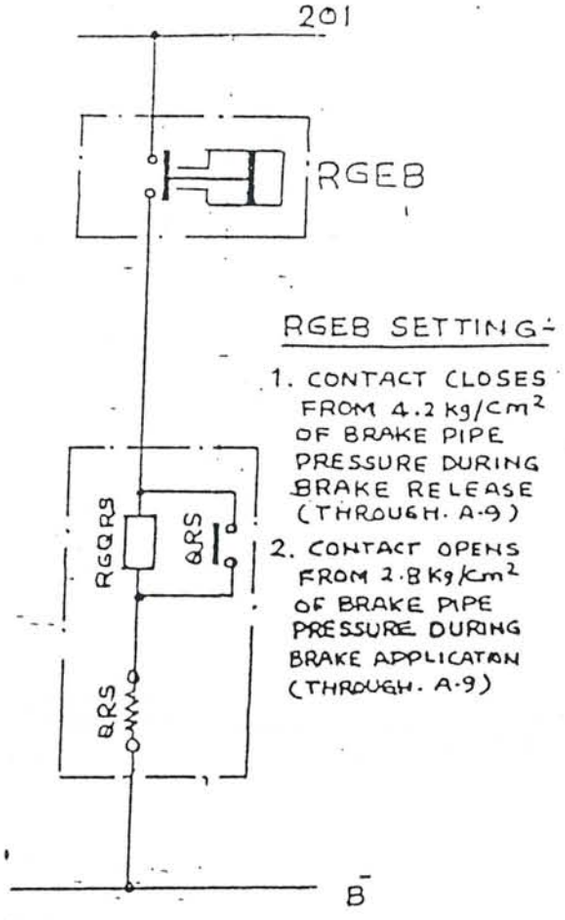
2. WHEN RGEB-1 CLOSES (TRAIN PARTING IN VAC STOCK) → GR COMES TO '0', AUDIO-VISUAL ALARM AS WELL AS FLASHER LIGHT OPERATES.

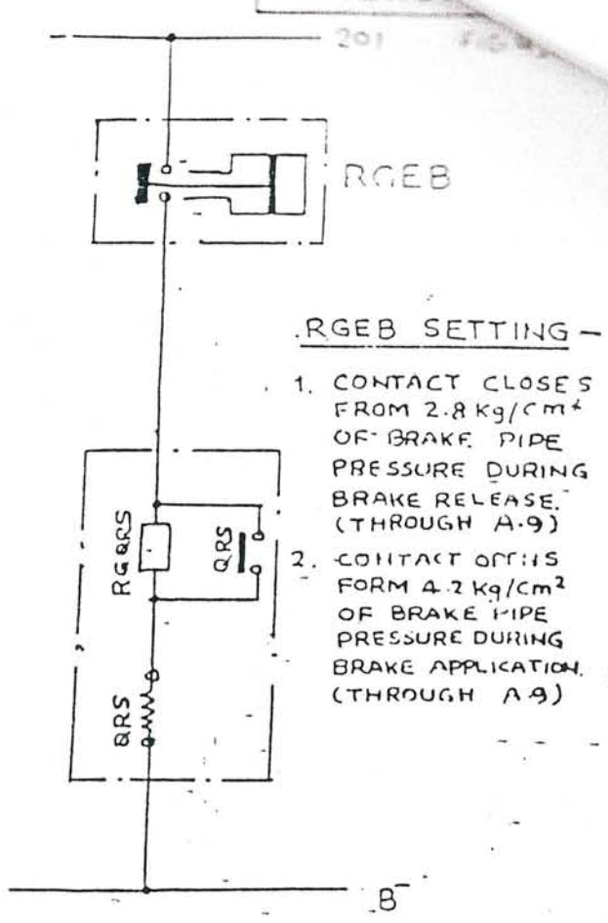
3. WHEN P_2 CLOSES i.e TRAIN PARTING IN AIR BRAKE STOCK. → GR COMES TO '0', AUDIO-VISUAL ALARM AS WELL AS FLASHER LIGHT OPERATES.

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ANNEXURE







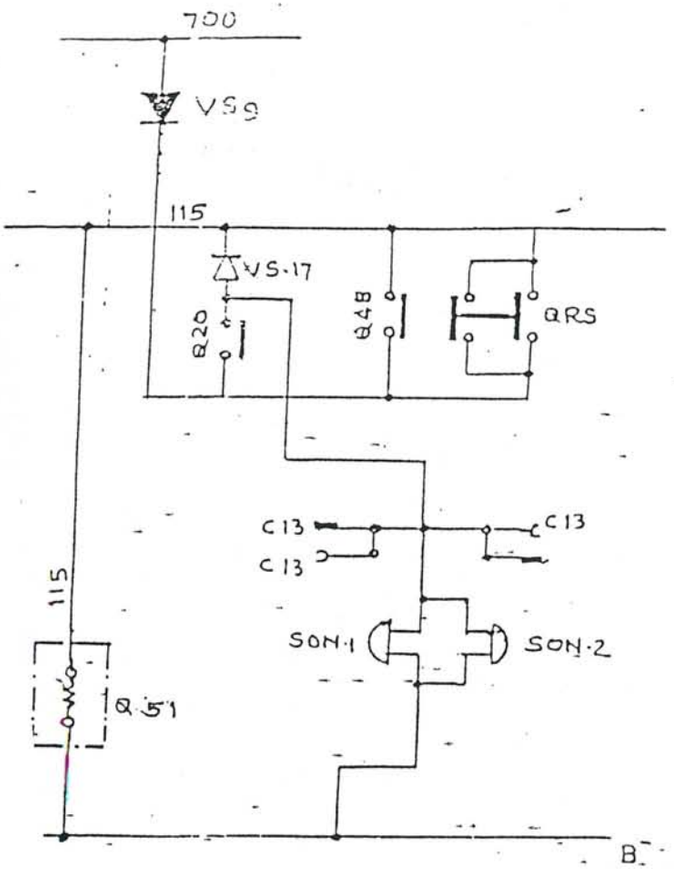
JEW CONTROL CIRCUIT FOR
)RS-2 FOR AIR BRAKE AS
... DUAL BRAKE LOCOS.

FOR AIR BRAKE LOCOS

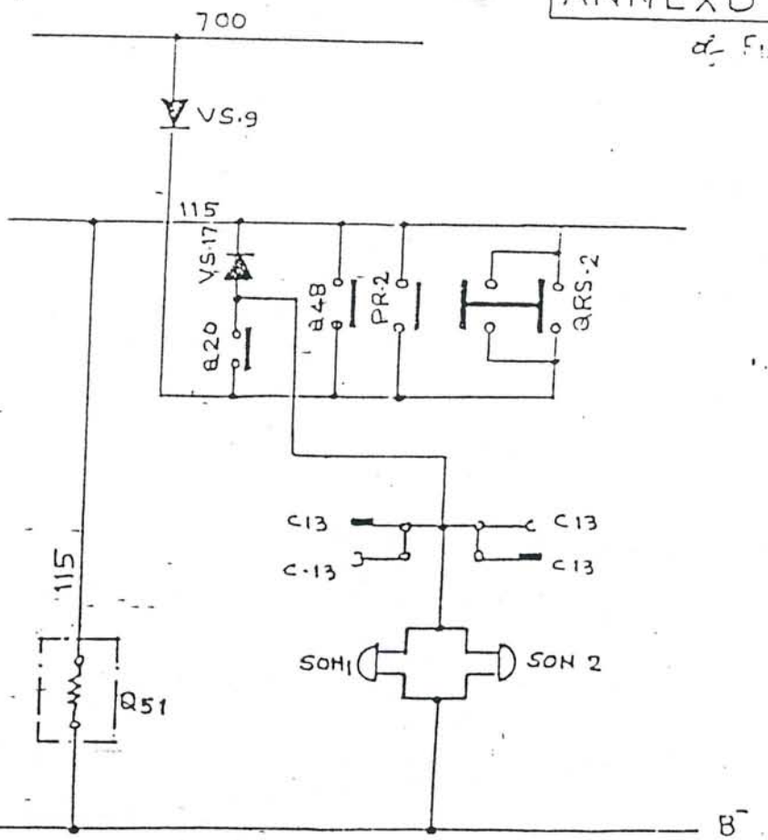
FOR DUAL BRAKE LOCOS

EXISTING CONTROL CIRCUIT FOR QRS

ANNEXURE



ISTING Q-51 CONTROL CIRCUIT



MODIFIED Q.51 CONTROL CIRCUIT

ODIFICATION REQUIRED IN ELECTRIC CONTROL CIRCUIT IN ASSOCIATION ITH CIRCUIT FOR AUTOMATIC OPERATION OF FLASHER LIGHT WELL AS AUDIO-VISUAL INDICATION