

SIGNAL LAMP

1. INTRODUCTION

Signal lamp is a special type of tungsten filament incandescent lamp having short and straight filament. The cap and holder of lamp are so designed that filament is always at the focal point of the lens system of the signal.

2. TYPE OF SIGNAL LAMPS

2.1 Two pole two pin signal lamps

S N	Type of Lamp	Volts	Watts	Specific Life (Hours)	Use
1	SL 16	12 V	12 W	1000	Search light signal
2	SL 13	6 V	12 W	1000	Multi lamps route indicators with series connections.
3	SL 5	12 V	4 W	1000	i) Repeaters and indicators of signals and points. ii) Multi lamp type route indicators with parallel connections iii) Electric lighting of semaphore signal.

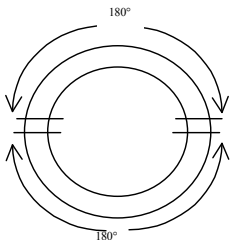
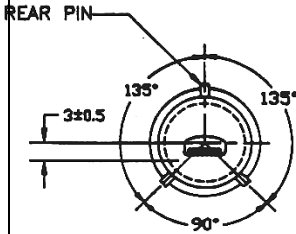
2.2 Two pole Three pin signal lamps

S N	Type Of Lamp	Main Filament		Auxiliary Filament		Specific life (hours)	Use
		Volts	Watt	Volts	Watt		
1	SL 18	12 V	24 W	-	-	1000	OFF aspect of multi unit colour light signal
2	SL 17	12 V	16 W	16 V	12 W	1000	Junction type route indicators where series circuit is use.
3	SL 21	12 V	24 W	16 V	12 W	1000	ON aspect of colour light signal
4	SL 33	110 V	25 W	-	-	1000	Junction type route indicator and shunt signal.

2.3 Type of Cap

- a) BA 15d -Cap. : Such type signal lamp cap is use in two pin two pole lamp i.e. SL5, SL13, SL16
- b) B.22/25x26 (3 pin): Used in three pin two pole or three pin three pole signal lamp

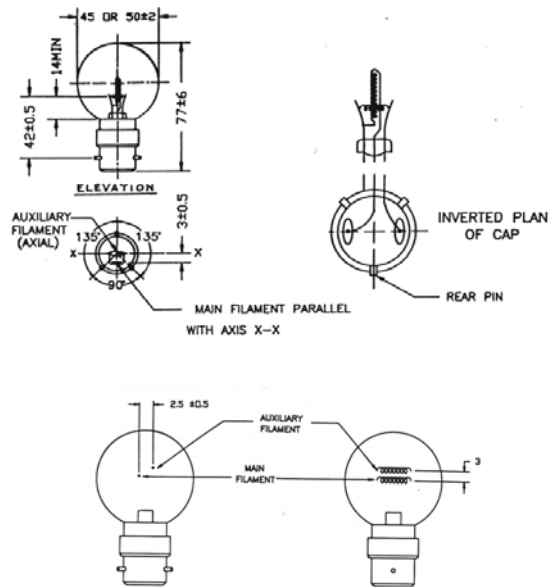
2.4 Type of signal lamp holder:

Sr. No	Type of signal lamp Holder	Designed	Use
1	Two pin two pole lamp holder.	i) Suitable for two pin two pole lamp. ii) Has two grooves at 180 degree 	Shunt signal and Calling-On signal
2	Three pin two pole lamp holder.	i) Suitable for three pin two pole lamp. ii) Have three grooves at different angle i.e.90, 135, and 135 degree. 	Multi- unit colour light signal
3	Three pin three pole lamp holder.	i) Suitable for three pin three pole lamp ii) Have three grooves same as Three pin two pole lamp. iii) Three wire terminals for a) Main filament b) Auxiliary filament c) Common terminal	With three pin three pole lamp in Multi aspect colour light signal



3. Triple pole double filament signal lamp:

The common connection of both filaments is connected with the lamp cap, which one end of each filament is connected to the cap shell.



3.1 Advantage of triple pole double filament signal lamp

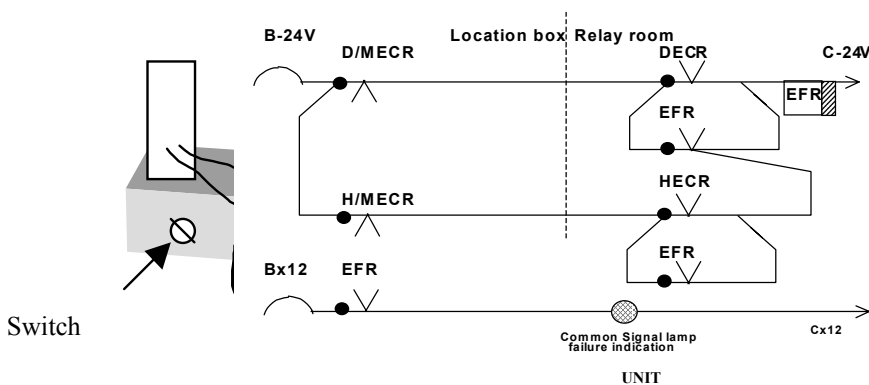
- i) Both filaments have equal lumens value.
- ii) The second filament start glowing after the main filament is fused.
- iii) Only one filament is lit at one time.

3.3 Disadvantage of SL 35 lamp:

The two filament positioned perpendicular to each other due to this hot spot is developing at the center of the vertical filament when the horizontal filament in service at first. This hot spot is liable to cause its snap, when initial surge current passed through it after the failure of first filament.

3.4 Circuit arrangement for signal lamp failure relay.

When main filament fuses, MECR relay become drop and through its back contact auxiliary filament lit up and signal lamp failure relay (EFR) pickup through MECR back contact and stick through its own front contact and common signal lamp failure indication lamp lit up at cabin or station continuous.



SIGNAL LAMP MAIN FILAMENT FAILURE INDICATION CIRCUIT

EFR signal lamp failure relay is made slow to release 150 mili second to avoid indication during change of aspect of signal.

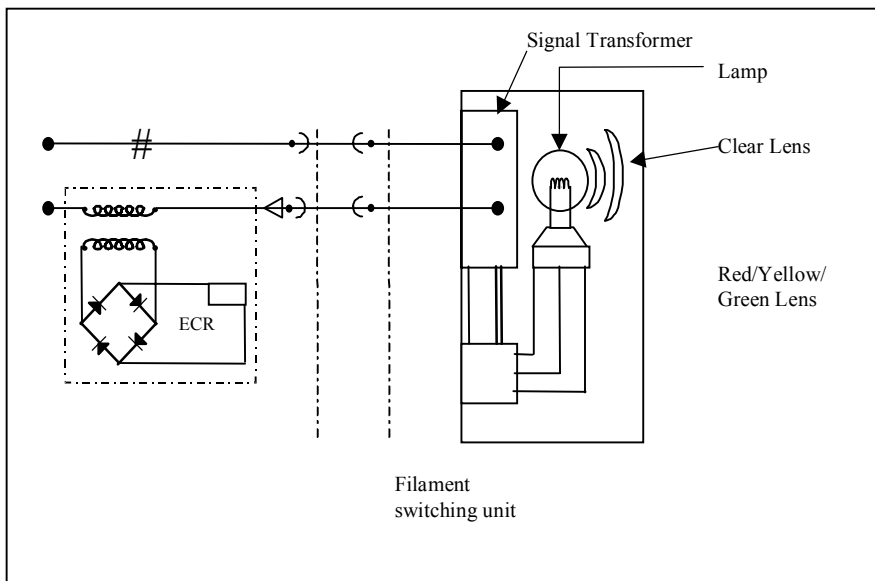
4. LED based signal lighting unit :-

LED based signal lighting unit is the replacement of signal lamp and has two components (LED aspect and current regulator) LED aspect is suitable to fit an light unit frame in existing CLS housing and current regulator in place of CLS transformer. LED based signal units work at 110V ±15% AC and draw 125-130 MA current.

CURRENT REGULATING DEVICE

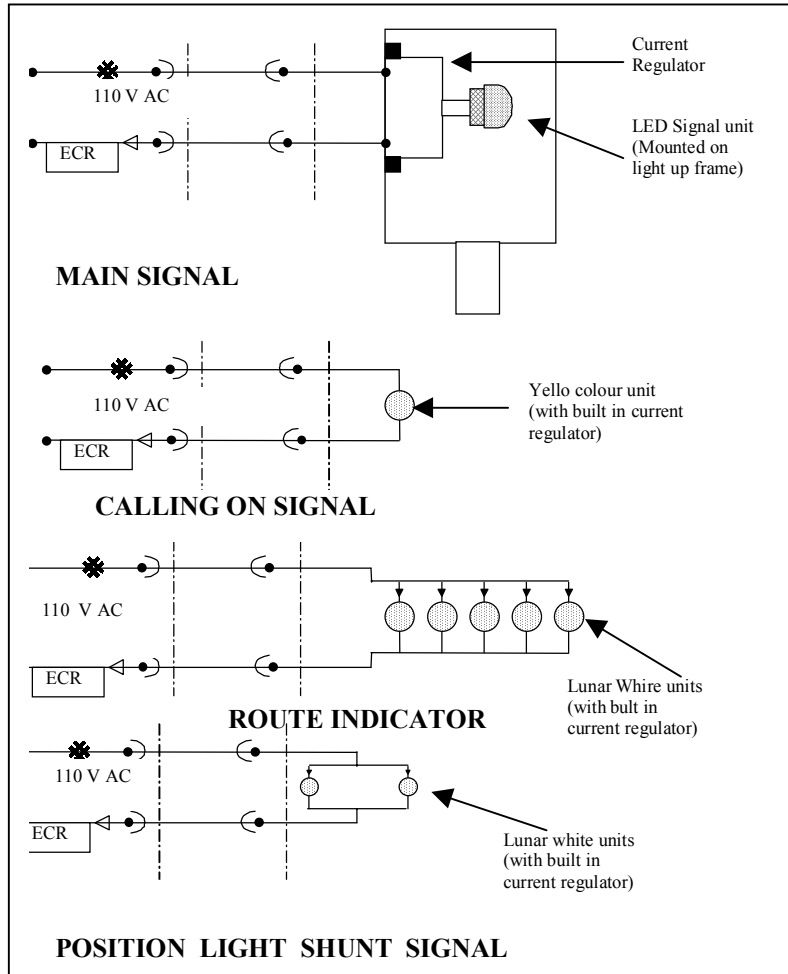
It is surface mounted LED based signal unit with transparent cover of UV painted in dull Matte finish, so that sun light or head light of loco may not reflected to avoid misleading aspect.

Circuit of Triple Pole Signal Lamp



4.1 Circuit arrangement: -

When the main filament fuse, MECR relay drops and through its back contact, auxiliary filament is lit up by means of lamp filament switching unit and common signal lamp failure indication is lit up at cabin.



4.2 Type of LED based signal unit.

- RED
 - GREEN
 - YELLOW
- } MAIN SIGNAL
- YELLOW Calling ON signal.
 - LUNAR WHITE Route signal, and Position light shunt signal

4.3 Advantage:

- i) Life is 1,00,000 hours.
- ii) No focusing and maintenance required.
- iii) Less than ½ power consumption.

5. Maintenance of Electric Signal lamp.

5.1 Pre testing.

Signal lamps must be tested before they are installed on signal. A record of testing of lamps should be maintained as per table given below:

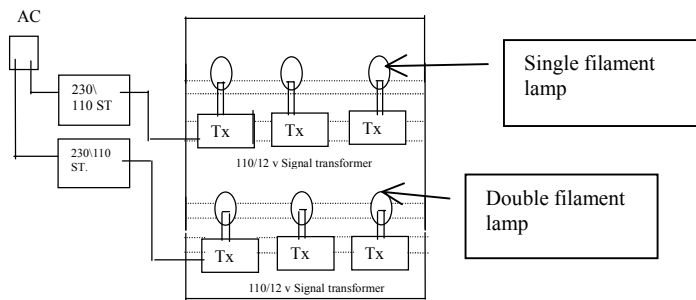
Table for Bulb testing:

Sr. No.	Type of Bulb	Firms Name	Lot no.	Manu. Date	Date of testing		Total no. of bulb for testing	Bulb fused during testing
					Start	Finish		
1	2	3	4	5	6	7	8	9

The following points shall be followed during testing:

- a) Lamps shall be operated in the vertical position cap up.
- b) Lamps shall be tested for 6 hours.
- c) Testing shall be under ON-OFF condition for one minute each continuously.
- d) Testing voltage should be 10.5 V on lamp terminal
- e) Separate signal transformer should be used for each lamp.
- f) Single filament and double filament lamp shall be tested separately.

g) Testing arrangement shall be performed as under:



h) Total number of signal lamps for testing shall not be more than the capacity of main transformer. (230/110 V)

5.2 Records of Signal lamp failure:

Signal lamp failure should be maintained as under given in table:

S N	Type of Signal lamp and make	Lot no.	Lamp testing date	Voltage on lamp holder terminals	Lamp replacement date
1	2	3	4	5	6

5.3 Replacement Schedule

- a) Single filament lamp : 80 days or as per instruction given by CSTE of Railway.
- b) Double filament lamp : 30 days or as per instruction given by CSTE of Railway.

Triple pole double lamp : i) OFF aspect of filament Signal lamp, only when One filament fuse.
 ii) ON aspect of Signal lamp, as per replacement schedule or instructions of CSTE of Railway

5.4 General

1. Care must be exercised when replacing lamp to see that the pins in the base are turned to the end of the slot.
2. Applied voltage may not be more than 90% of the rated voltage of the lamps. For 12 V signal lamp it should not be more than 10.8 V
3. Lamps should be stored in suitable container provided with thermocol packing on the inner surface.

6. Trouble Shooting

For Single filament and double filament Signal lamp

Sr	Trouble	Remedy
I. Signal controlling Relays are in pickup		
1.	Supply is available on lamp holder terminals but lamp is not lit up.	Spring contact of lamp holder is loose and contact is not making properly same replace.
2.	Spring contact of signal lamp holder are correct and in proper tension.	Signal lamp is fused same replace with similar lamp.
II. Signal lamp frequently fails.		
1.	Voltage on signal lamp is more than prescribed voltage.	Adjust voltage up to 10.8 volts.
2.	Rainwater is falling in signal unit.	Fix proper gasket of signal unit cover.
III Signal is giving intermittent failure.		
1.	Cap of signal lamp is loose.	Replace signal lamp.
2.	Signal lamp in the base is not turned to the end of the slot of bulb holder.	Insert lamp properly.
3.	Soldering of the bulb is defective or not in uniform.	Replace signal lamp.
4.	Spring contact of signal lamp holder giving intermittent break due to loose tension.	Make proper tension and adjust.

For SL 35 (A &B) Signal lamp

IV Both filament lit up		
1	MECR relay defective or contact of relay is dray solder	Replace MECR relay or attend soldering.
V Bulb fused by one or both filaments but buzzer not ringing & indication not lit at cabin.		
1	DC Voltage fuse blown off	Replaced fuse.
2	DC Voltage supply not going	Check 8-way strip

	out from 8-way strip	
3	MECR back contact defective or dry solder.	Replaced MECR relay or re-solder back contact.
4	Buzzer become defective and indication lamp fused	Replaced buzzer and indication lamp.
VI Main filament of signal lamp is OK but auxiliary filament lit up.		
1	Wire on H-type transformer is loos due to vibration	Tight wire terminal of H type transformer.
2	Rectifier of equipment is defective.	Replace rectifier.

7. DO'S AND DONT'S

7.1 Do's

1. Lamps must be replaced with similar lamps.
2. Lamps shall be replaced immediately after main filament of signal lamp becomes fused.
3. A record shall be maintained for replacement of signal lamps
4. Voltage must be checked on every visit on signal transformer (Input and Output voltage) and on the signal lamp holder terminal.
5. Nut of lamp holder must be proper tight, and chuck nut and washers are provided.
6. In case of SL35A and SL35B signal lamps 2nd filament shall be checked by opening the supply of 1st filament and indication at cabin or station where provided shall be verified.
7. Nut and bolt of MECR unit H-type transformer and common pole plate shall be checked may be loose by the vibration and see that MECR relay is working properly.
8. Before replacing of SL 35 (A &B) signal lamp, common pole plate shall be made press by hand then bulb should be removed from signal lamp holder, it may be possible that bulb may be free from its cap.
9. Nut and bolt of bracket fixed with signal unit also of the signal lamp holder fixed on bracket are not loose.
10. See contact spring of lamp holder is proper in tension and contact is making properly and not are rusty.

7.2 Dont's

1. Do not remove the lamp for cleaning of signal lenses.
2. Do not apply voltage more then 90% of the rated voltage, of signal lamp. And shall not be more than 10.8 V.
3. Do not use any lamp with out being tested.
4. Do not store lamps in signal unit or cable termination box.

5. Do not carry lamps in the toolbox.
6. Do not use discoloured, unshaped filament and loose cap lamps.
7. Do not use any screwdriver or pliers for making tension of bulb holder spring while lamp lit, it may be a cause of short circuit of supply.

