



INDIAN RAILWAYS

TRACK MACHINES DIGEST

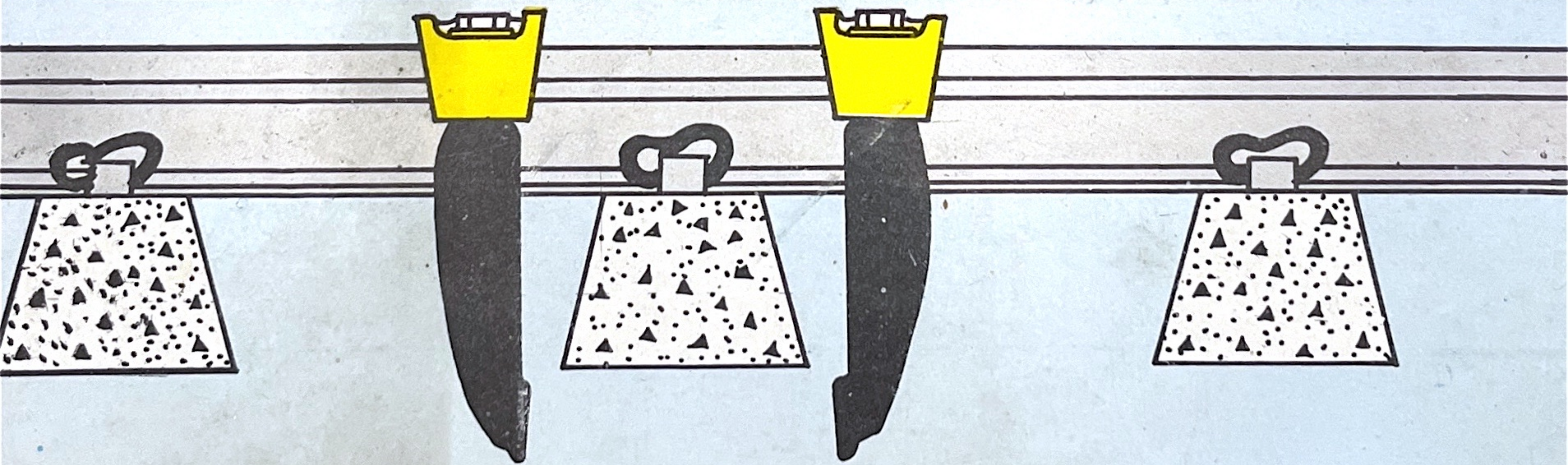
भारतीय रेल, रेलपथ मशीन डायजेस्ट

YEAR 2

ISSUE 6

QUARTERLY

OCT — 1993



SPEED CLEARANCE PARTICULARS OF SOME OF THE NEW TRACK MACHINES ISSUED BY R.D.S.O.

SL. No.	Machine Type	Model No.	MG/BG	Letter No. & Date	Final/Provisional	Speed in Km/h	
						Self	Train formation
1.	Mobile Flash Butt Welding Machine	K 355 APT	BG	CT/TMM/SCC dt. 25.8.87	Provisional	60	50
2.	(i) Automatic 'On Track' Ballast Tamper 08 Series-Duomatic	08-32	BG	CT/TMM/SCC dt. 14.9.87	Final	60	50
	(ii) Automatic 'On Track' Ballast Tamper 08-Series-Unomatic	08.16	BG	CT/TMM/SCC dt. 14.9.87	Final	60	50
3.	Points & Crossing Tamping Machine (Plasser India)	PLM 07-275-S	BG	CT/TMM/SCC Dt. 29.3.88	Provisional	40	40
4.	Dynamic Track Stabiliser	DGS 62N	BG	CT/TM/SC/DGS 62N Dt. 22.6.89	Provisional	60	50
5.	Tamping Lining & Lifting Machine	09-32 CSM	BG	CT/TM/SC/09-32 CSM Dt. 9.8.89	Provisional	60	40
6.	Points & Crossing Tamping Machine	08-275 UNIMAT	BG	CT/TM/SC/08-275 UNIMAT Dt. 9.8.89	Provisional	60	40
7.	Ballast Cleaning Machine	RM-80	BG	CT/TM/SC/RM-80 Dated 9.8.89	Provisional	40	30
8.	Tamping Lining & Levelling Machine	08-32 M84	MG	CT/TM/SC/08-32-M-84 Dated 9.8.89	Provisional	40	25
9.	Rail Grinding Machine	RGM x16	BG	CT/TM/SC/RGM Dated 31.1.90	Provisional	60	40
10.	Ballast Regulator (KERSHAW)	56-3	BG	CT/TM/SC/BR Dated 31.1.90	Provisional	60	40
11.	Track Relaying Train (M/s Tamper Corpn./USA)	P811-S	BG	CT/TM/SC/TRT Dated 2.7.90	Provisional	5	50
12.	UTV 502 L Machine (M/s Tamper Corpn./USA)		BG	CT/TM/SC/UTV Dated 29.6.90	Provisional	60	40
13.	Light on Track Tamper (M/s Speed Crafts Pvt. Ltd. Patna)	PHOOLTAS 6LDT	BG	CT/TM/SC/LTT Dated 14.1.91	Provisional	15	-
14.	Ballast Cleaning Machine	RM-76 UHR	BG	CT/TM/SC/RM-76-UHR Dated 9.9.91	Provisional	40	30
15.	Light 'On Track Tamper' (M/s Speed Crafts Pvt. Ltd., Patna)	PHOOLTAS	MG	CT/TM/SC/LTT/MG Dated 9.10.91	Provisional	15	-
16.	Shoulder Ballast Cleaning Machine	FRM-80	BG	CT/TM/SC/FRM/80 Dated 22.1.92	Provisional	40	30
17.	Conveyor & Hopper Unit (Part of Ballast Cleaning Machine)	MFS-40	BG	CT/TM/SC/MFS-40 Dated 27.1.92	Provisional	-	30
18.	Points & Xing Changing Machine (M/s AMECA/Italy)	AMECA T-28	BG	CT/TM/SC/P&CCM/ AMECA Dt. 27.10.92	Provisional	10	Max. permissible speed of well type wagon, on which only, it is allowed to be loaded for transportation.
19.	Points & Crossing Tamping Machine	UNIMAT 08-275-3S	BG	CT/TM/SC/08-275/ UNIMAT Dt.1.2.93	Provisional	60	

: DEPLOYMENT OF CSM'S - PERFORMANCE & FAILURES :

By Sh. P.K. Divakaran AEN/TT/CRLY/Jhansi

INTRODUCTION:

We have been using UT and Duomatic Machines till 1989. These machines were capable of tamping 600 and 1400 sleepers respectively per effective hour with single insertion.

Due to heavy traffic density and lesser duration of blocks availability for maintenance, it has become inescapable to go in for high out-put tamping machines. Accordingly Railway Board placed orders for the procurement of CSM's. Eight nos. such machines have been allotted to Central Railway. First Machine was received

on 7.11.89 and commissioned on 3.12.89.

SCOPE OF WORK:

Central Railway has got 5627.72 KMs of track nominated for mechanical maintenance, spread over its seven divisions. These machines are deployed for the maintenance of the above nominated track.

PERFORMANCE:

The performance of CSM's on Central Railway during 1992-93 is as indicated below:

M/C No.	Gross Block Hrs.		No. of Spells	KMs Tamped
902	422	40'	373	401.70
908	497	45'	435	475.52
913	495	15'	410	430.59
918	638	05'	441	681.76
921	642	30'	475	662.55
924	473	25'	357	438.35
927	419	05'	360	410.88
	3588'	45"	2851	3501.35

8th Machine CSM 938 was commissioned during April 93.



The average block per spell during the above period per machine was 1 hour 16 min. Similarly traffic block permitted per machine per spell during 91-92 was 1 hour 13 min. and up to August 93, it was 1 hour 11 minutes.

The facts which largely affect the performance of the machines are as follows:-

i) Less duration of block:

- As can be seen from the above statement, less duration blocks are permitted with increased No. of spells. This results in accumulation of unproductive time such as travelling and setting up etc. and the productivity suffers.
- Quality & out put of the work also suffer due to increased No. of ramp-ins and ramp-outs.
- Consumption of HSD oil per Km. of track tamped also increases due to unproductive engine hours.

ii) Insufficient preparatory work:

- Spacing and squaring of sleepers not done properly.
- Insufficient ballast cushion and less ballast near tamping zone:- Less cushion leads to failure of different components of the machine such as breakage of tamping tools, failure of small squeezing cylinders etc. besides improper packing of sleepers.
- Machine working in SWP area:- The shoulder spacing restricts the working of the machine on fish plated joints. This either causes damage to the sleepers or the joint is altogether left un-attended.

iii) **Utilisation of machine on bad soil area/unstabilized formation:**

- Repeated attention is required where track is laid on bad soil/unstable formation because the track parameters do not hold for longer periods.

iv) **Block timings**

Uncertainty of block timings hampers maintenance of the machines. This causes increased number of failures during block, affecting productivity.

v) **Failures of the machines:-**

The details of the sample survey conducted on the following CSMs is as under:-

Machine No.	902	908	913
Date of Commissioning	3.12.89	18.5.90	21.8.90
Nature of failures	No. of failures	No. of failures	No. of failures
Squeezing cyl. piston locking bolt breakage			
i) Small Sq. Cyl.	10	12	21
ii) Big Sq. Cyl.	-	-	-
Failure of Sq. Cyl. seals.			
i) Small Sq. Cyl.	77	67	85
ii) Big Sq. Cyl.	73	30	36
Satellite axle support Cyl. seals.	7	4	4
Servo valve mal-functioning	5	1	-
Relay S4-7002	4	4	5
MWM Engine			
i) Fuel pump	1	1	1
ii) Thermostat	-	-	1
iii) Compressor	2	-	4
iv) Other Major problems.	Starter fly wheel ring re-placed:2	Cylinder head gas-kets replaced	Replaced cyl. liners, pistons & piston rings.
Malfunctioning of satellite drive	1	2	2
Cross level Ckt.	2	4	3
Attention to tamping bank	1	2	4
Breakage of cardon shaft.	1	-	-
Tamping unit up & down cyl. piston rod.	2	4	1
System pump	1	-	-
Tamping depth transducer cord	2	3	3
Breakage of small Sq. cyl. body (female) near eye.	-	1	1

From the above it can be seen that the majority of the failures were due to small squeezing cylinders. By checking of this particular failure the performance of the machines can be considerably improved. The breakage of piston locking screw was largely due to the infringement of the tools. The breakages are controlled to some extent by ensuring that the tools are not touching each other and also by increasing the cross sectional area at the point of failure.

Another aspect noticed regarding the failure of the squeezing cylinder is that the phosphorous bronze piston is getting compressed during the course of working. This leads to development of play between the piston and the piston locking screw. This makes the locking of the piston screw by the grub screw ineffective. The piston locking screw slowly unwinds and the failure takes place. This tendency is seen even in imported piston assembly. A cast iron piston was tried in place of PB piston. The assembly is still under trial and has so far worked for 70 KMs without failure.

One of the reasons for the failure of the seals was poor quality of the seals. This has been eliminated by using seals made out of imported material. The gland bush also plays an important part to enhance the life of the seals. It is often seen that metal is eroded from the lower edge of the seal groove. Presently a gland bush is made out of cast iron and put on CSM 902 on trial basis. After working for about 80 Kms, the assembly was opened and checked for metal erosion. No erosion was noticed and condition of the seal was also good.

Failure of the hydraulic hoses was another serious problem. This not only affects the productivity but also increases consumption of hydraulic oil. The failure of the pipe from the end fitting due to slipping is more as compared to bursting.

Normally, manufacturers of the pipes do not manufacture end fittings. Usage of crimped fitting at every place is not possible because in such a case the number of spare pipes to be stocked will be much more. Recently it has been seen that fittings made by M/S Supreme Hydraulics Faridabad are having good match with Super seal made Hydraulic pipes and give satisfactory service.

Performance of MWM Engine:-

It has been made a practice to call the service representative from M/S Greaves Cotton & Co. to inspect the engine at a regular interval of 250 hours of working. But it is often experienced that the approach of the service representatives is not scientific in investigating the problem. They do not bring proper testing tools with them. In the absence of the required testing apparatus, they suggest heavy repairs

which may not be necessary at that stage. This also involves additional expenditure and increased down time.

Supply of spares is another problem area. The spares received, some times do not fit the engine. A new fuel pump which was received from M/S Greaves Cotton needed calibration before fitting to the engine. The cost of the spares quoted is also not consistent. A thermostat which was quoted earlier for Rs. 3916 is now quoted for Rs. 1,14,000/- (one lac fourteen thousand).

A concentrated effort by all the using Railways will be required to improve the situation.

Tamping Banks:

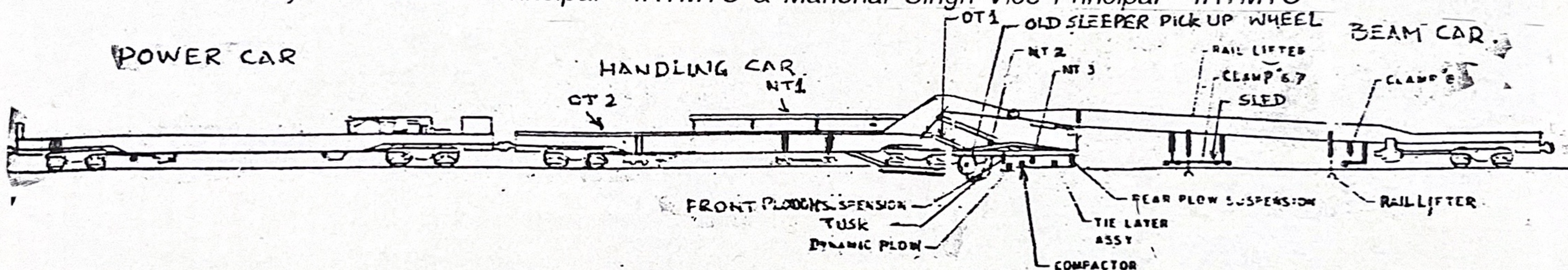
Timely attention to tool arm bushes, particularly of those connected to the small squeezing cylinder is required so as to reduce related failures. These bushes wear at a faster rate. In-

sufficient ballast cushion and removal of the tamping tools by hammering, add to the problem. Local replacement of bushes do not stand for more than two months. Recently M/S Plasser India was approached for overhaul of the tamping banks. They have offered to overhaul the tamping bank at a cost of about Rs. 5 Lakhs excluding the cost of the bearings. But the repair is guaranteed for only 1,00,000 tamping cycles, which comes to roughly 60 to 70 Kms. of working. If the specification of the material and the correct tolerances which are to be kept while assembly are known, better results can be produced with local attentions.

The above quoted failures are few examples which affect the performance of the machine. Efforts are being made to bring down such failures. Reduced failures, coupled with increased traffic block may further improve the performance of the machines.

: TRACK RELAYING TRAIN :

By K.P. Mathur Principal - IRTMTC & Manohar Singh Vice Principal - IRTMTC



Due to Increased frequency of trains, load and speed, the punishment to track has increased and time to maintain, has progressively reduced. This calls for track renewals, with heavy track structure using 60 Kg. UIC rails, & concrete sleepers with elastic fastenings.

Earlier this work was being done with the help of semi mechanised system called Plasser Quick Relaying System. This being dependent on manual labour to a great extent, quality of track produced was not very good, on one hand, it was slow and prolonged speed restrictions, starting from 15 kmph to sectional speed, had to be imposed, on the other hand. Due to above we were not able to cover the arrears of track renewals.

This called for fully mechanised and improved system of track relaying which is quick as well as economical, 'detentions to train's is minimum, speed restriction starts from 40 KMPH to sectional speed.

By relaying track with TRT following objectives are achieved:-

1. Substantial reduction in operational cost.
2. Better quality of track.
3. Longer life of track after renewal.
4. Minimise the disruption of service created by manual work.

All machines working at renewal site work in complete harmony:

SALIENT FEATURES:

- a. TRT is a step forward for complete mechanisation of track renewal work.

- b. No need to prefabricate panels.
- c. Concrete sleepers loaded on modified BRH's are directly taken to site and relayed one by one. (Fastenings of old track are removed in advance)
- d. New rails unloaded at site on shoulders and duly paired or fish plated, are exchanged with old rails along with sleeper renewal.
- e. It copies alignment of old track.

THE MACHINE:

TRT (Track Relaying Train) as the name indicates, is a complete train consisting of the following:

- A There are three cars in TRT called:
 - a. Beam car.
 - b. Handling car
 - c. Power car.

B. Old rail pick up unit

These cars are followed by required No. of modified BRHs for carrying new sleepers and 1 No. empty BRH to start receiving old sleepers at the time of starting the work, later BRH's which become empty, as relaying proceeds, receive old sleepers.

All BRHs, power car and part of handling car have gantry track with special joints to bridge the gap between the vehicles on either side over which two gantries run. These gantries bring new sleepers from BRH and place on new tie conveyor and take old sleepers from old tie conveyor to empty BRH. Rear gantry brings new sleepers to

intermediate place and takes old sleeper from there to rear empty BRH, to compensate for lead, front gantry operates in the remaining portion.

TRT is having following sub machines.

1. Lip cutter for cutting reverse jaw lip of CST-9 sleepers, used in case, the TRT is working, on CST-9 sleepers. If reverse jaw sleepers are physically removed use of lip cutter is not required.
2. Clip applicator - For fitting pendrol after laying of track.
3. Old rail pick up Unit - To pick up old released rails after relaying work.

4. New sleeper Platform (Attached to new tie conveyors NT1, NT2 and NT3 for handling new sleepers for laying).

5. Old sleeper Platform (Attached to old tie conveyor OT1 and OT2 for handling old sleepers after they are picked up from track)

6. Self guiding rollers (For-threading in and out new & old rails)

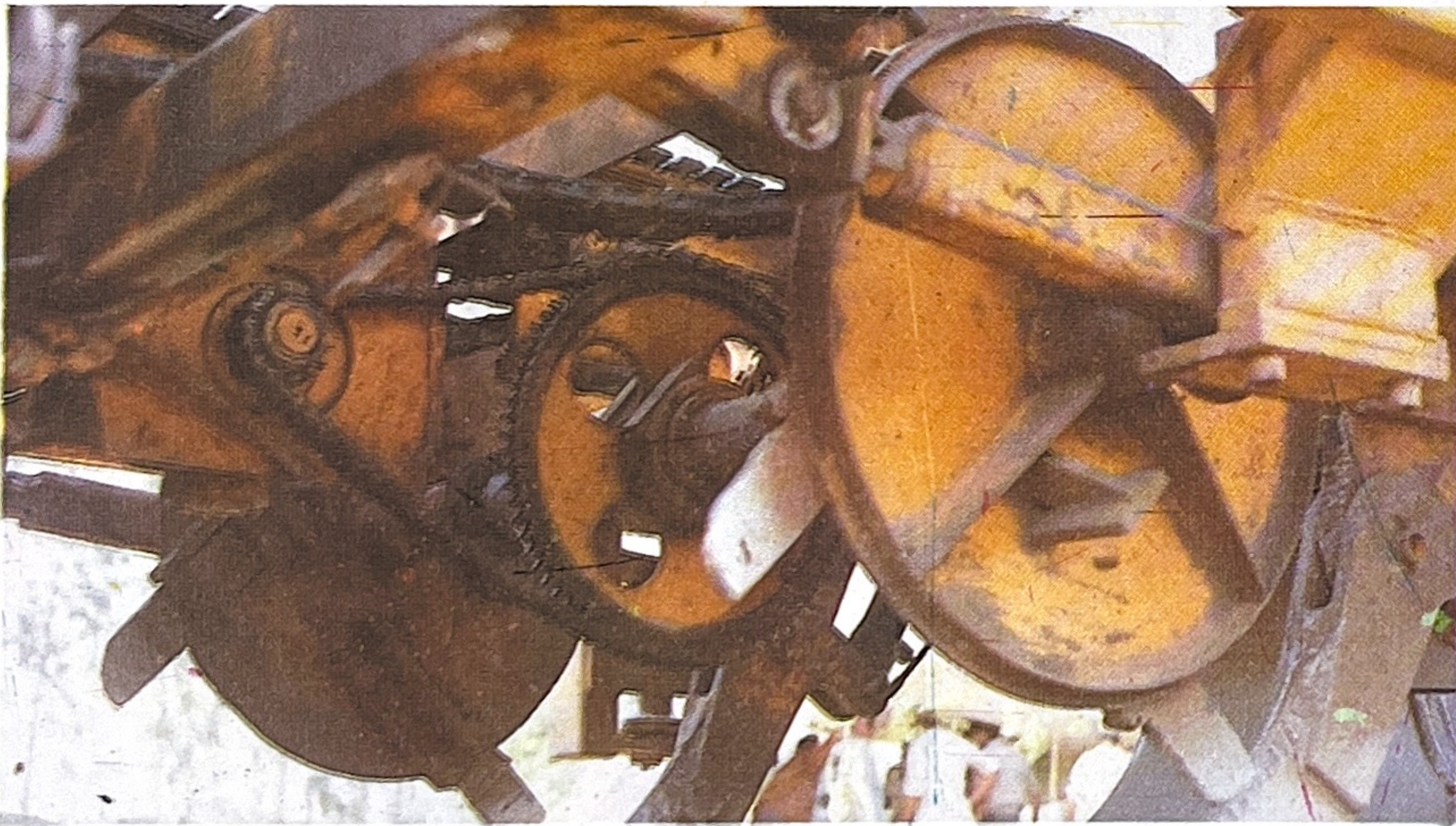
7. Sleeper inverting unit (In case of steel trough sleepers there is no need to operate this unit)

8. Indexing wheel (For control of spacing of sleepers.)

9. Brakes (For sleepers) & squaring arrangement.

TRT has following main units:

1. Sled (To support idle bogie of handling car and beam car)
2. Old sleeper pickup unit (used to pickup old sleepers from track)



3. Dynamic plough (To level the ballast bed and consolidate it)



BEAM CAR: (22.34M Long)

This car is hinged with handling car and have a common bogie and one independent bogie. Below this car, all the working units like old sleeper pickup, dynamic plough, sleeper flipper, Indexing wheel, new tie conveyor NT3, self guiding roller for guiding in and out rails etc. are provided. If sleeper spacing is changed indexing wheel has to be changed.

SLED is hung from this car when not in use.

HANDLING CAR: (21.05M Long)

This car has one independent bogie and one common bogie with beam car. All the conveyors are provided on this car, the other end of this car is hinged with beam car.

POWER CAR: (14.81 M Long)

This is a four axled vehicle

On this car of TRT power unit is provided on half the car and remaining half is utilised for loading of sleepers. Power unit is, Cummins NTA-855 Four stroke cycle, Turbocharged, After cooled, in line 6 cylinder diesel engine. Maximum rating 360 BHP at 2100 RPM, continuous rating 295 BHP at 1800 RPM.



SLED:

It is a fabricated structure, consisting of two longitudinal beams with cross beams, top of which corresponds to rail table and bottom of the beam has got rollers with a gap of about a centimeter in between. These rollers travel on rail seat of sleepers, after the rail is removed. It is used to support the common bogie wheels of handling car and beam car making available about 30 Mts. space for relaying jobs. For CST-9 sleepers, SLED is chain type instead of roller type.

BASE DEPOT:

Base depot should cater to the following requirements:

- Unloading & stacking of sleepers from rake with the help of 300 mm widened portals and their loading on modified rake. (If sufficient No. of modified BRH's are available this can be avoided)
- Unloading of old sleepers, their stacking and despatch.
- Daily maintenance & Repair of track machines.
- Accommodation for office, store & residential accommodation for officers & staff.
- Proper lighting and watering arrangements.

When the base depot becomes too far from site of work the TRT machine is

kept at near by station and only rake with old sleepers is brought to the base depot. and 2nd rake loaded with new sleepers is taken to the site of work.

STARTING PROCEDURE:

- To start work, either a cut has to be made in the track or 10'-3" piece of rails have to be removed. In either case rails behind the cut have to be spread taking the machine forward till sled comes on the gap.
- Lower sled on to rail seats, crib out sleepers 10 Nos behind sled.
- Back machine up until common bogie is on the sled and lock the wheels.
- Spread rails under handling car and fasten these in to rollers
- Old tie pick up wheel and dynamic plough are now situated over the place from where sleepers have been removed.
- Lower old sleeper pick up wheel and plough.
- Set the cam wheel on to rail and commence lifting old ties and dropping new ones by advancing the machine.
- Continue work up to 30' before finishing block.

STOPPING PROCEDURE:

- Cut rail where you want to stop work and stop pulling spikes.
- Advance machine untill sled reaches this point, unlock wheels and move wheels on track.
- Un-lock sled and raise, plough and old sleeper pick up wheel to continue till last sleeper is picked up and raise these and lock.
- Stop dropping of sleeper after last needed sleeper is dropped.
- Release rails from clamps.

SPEED RESTRICTIONS AFTER WORK:

Since the quality of track produced by TRT is very good, the traffic is allowed at 40 KMPH just after relaying with out packing. After first & second tamping, speed is raised to 60&80 KMPH respectively and after third tamping the speed is raised to normal.

It normally takes 10 days to bring speed to normal. If DGS is used, it takes only 6 days to raise the speed to normal. After first packing and application of DGS the speed is raised to 75 KMPH and after ballasting and 2nd packing with application of DGS the speed is raised to normal.

DIESEL REQUIREMENT:

On track renewals done with the help of TRT, diesel requirement is quite heavy as such arrangement for imprest etc. should be properly made. A rough idea about diesel requirement is given below.

1. TRT	- @ 35 Lit/Hr x 5Hrs	= 175 Lit
2. Gantry	- @ 15 Lit/Hr x 5 Hrsx2	= 150 Lit cranes
3. Lip cut-	- @ 5 Lit/Hr x 5 Hrsx2	= 50 Lit ter & Clip applicator
4. Portal	- @ 10 Lit/Hr x 5 Hrsx2	= 100 Lit cranes (basedepot)
5. Tie	- @ 35 Lit/Hr x 4 Hrs	= 140 Lit tamber
6. DGS	- @ 35 Lit/Hr x 4 Hrs	= 140 Lit
7. UTV	- @ 25 Lit/Hr x 5 Hrs	= 125 Lit
8. UTV crane	@ 15 Lit/Hr x 5 Hrs	= 75 Lit
Per day consumption		= <u>955 Lit</u>

If BCM is also working at site, this quantity will be raised by 400 Lits

STAFF REQUIREMENT:

The following staff is needed to operate the TRT.

MACHINE OPERATORS:

Main panel operator	-	1	CM
Gantry operator	-	2	CMs
Pick up wheel operator	-	1	Fitter
Sled operator	-	1	Fitter
Old platform operator	-	1	Fitter
New rail inserter	-	1	Fitter

AUXILIARY OPERATORS:

New pad laying	-	2	Kh.
Sleeper inverter	-	2	Kh.
New fitting distributor	-	2	Kh.
Clip applicator	-	1	Fitter
Lip cutter	-	1	Fitter
General fitter	-	1	Fitter
Supervisors FO/CFO	-	2	N0s

Khallasi	-	8	Nos
			(General purpose)

UTV operator	-	1	CM
Fitter	-	1	No

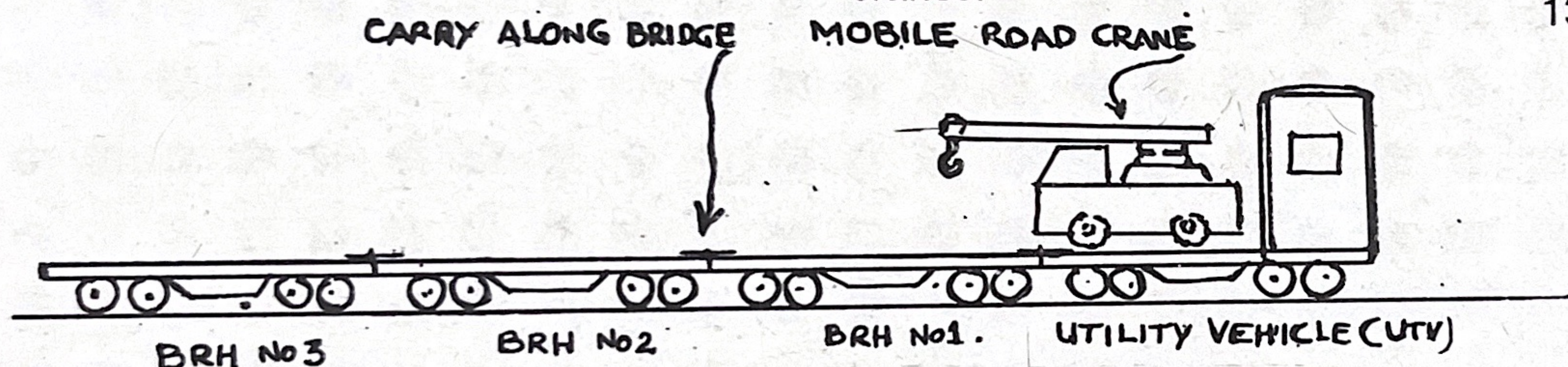
OLD RAIL PICK UP UNIT:

This unit consists of one UTV (Utility Vehicle) powered with 350 HP engine for travel transfer of the unit along with 3 No.'s end less BRHs bridged with the help of hinged plates. On UTV one crane 10 to 12 tonne capacity is mounted. This crane travels on BRHs first it comes to BRH No. 2 and loads rails which are cut by gas on BRH No. 3, and then moves to BRH No. 1 for loading BRH No. 2 and finally on to UTV for loading BRH No. 1. Care of other running line has to be taken and in electrified section vertical lift of jib has to be controlled.

PRECAUTIONS:

1. No. hand to be kept on modified BRH rails for gantries
2. Man in gantry crane must fasten belts.
3. Rear gantry must control speed towards end of rake.
4. A common point has to be decided for exchange of load by gantry cranes.

5. Bridge between BRH's must be inspected daily.
6. While travelling with locomotive, gantry must not move and jaws must rest on seepers.
7. When gantry is moving jaws must be fully lifted.
8. While parking both the wheels of gantry must be on single BRH.
9. All broken sleepers and eccentrically placed wooden sleepers should be removed in advance.
10. Sled cannot jump a gap of two sleepers in which case wooden blocks have to be inserted to pass the SLED.
11. With change of sleepers some parts like sleeper stop, brake etc. will need change
12. All loose assemblies to be fastened properly.
13. If there is change in type of sleeper of the track being renewed, the tusk of sleeper pick up unit will have to be changed.



OLD RAIL PICK-UP SYSTEM. DO YOU KNOW THAT (TRT)

1. Power of TRT Engine 360 HP at 2100 RPM.
2. Hydraulic tank capacity 1700 Lit. Diesel tank cap-820 Lit.
3. Driving pressure - 200 Kg/cm² slow & fast.
4. System pressure low pressure 130 Kg/cm² High pressure 200 kg/cm².
5. There are two portal cranes powered by 150HP at 2200 with cummins 6 BT engine. Hyd. tank capacity 465 lit. and diesel tank capacity 380 lit each.
6. Dynamic plough pressure 130 kg/cm²
7. There are 10 pumps on TRT.
8. Emergency pack up system has been provided on TRT.

Note: IRTMTC accepts no responsibility for the views expressed by authors.

Editor	Sh. K.P. Mathur, Principal, IRTMTC, Allahabad.
Asstt. Editor	: Sh. Manohar Singh, Vice Principal, IRTMTC, Allahabad.
Publisher	: IRTMTC - ALLAHABAD
Advisory Board	: Sh. R.N. Verma, Director/TM/Rly. Bd/NDLS., Sh. Umesh Kumar/ Dy. CE/TT/NDLS. Sh. O.P. Narang, Dy. CE/TT/CPOH/Allahabad. : Sh. C.P. Tayal, Joint Director/TM/RDSO/Lucknow.
Printer	: Chief Printing & Stationary Supdt. N. Rly. Sakurbasti/NDLS. at Public Printing (Delhi) Services C-80, Okhla Industrial Area, Phase-I, New Delhi Tel. 6811935, 6811431