LOCO OPERATIONS

by

AVINASH PRAKASH

Professor (DT)

IRIMEE Jamalpur

Issues for Discussion

- Resources attached to loco Operation
- Loco Operation System- Role & Responsibilities
- Activities under Loco operation (Passenger)
  - Loco Link
  - Crew Link
- Activities under Loco operation (Goods)
  - Power Plan
  - Crew requirement
- Train Ordering (Passenger & Goods)
- Railway Board Instruction for Loco Operations
- Issues of Loco Operation
- Long Haul

Loco operation

Resources attached to Loco Operation

- Diesel Loco from Diesel Shed
- Fuel
- Running Staffs
- Non-Running Staffs
- Power Control
- Crew Booking Lobby
- Running Room
- Office

Diesel operations control management

- Diesel engine is a costly asset so an effective operations control management is required
- Loco requirement & its monitoring and crew requirement & their training are the parts of an effective operations control management
- Diesel engines moves across the divisions & Zones, so effective Central Power Control Organization is required.

Diesel Loco Operation Organization

At Railway Board level-

- Allotment and distribution
- Planning of development of the diesel loco maintenance facilities
- Daily Outage
- Analysing failure of diesel locos online with regard to the reliability of their performance.
- Rendering assistance of material from DLW/DMW and other railways to reduce the ineffective period
- Coordinating with RDSO/DLW/DMW for sorting out major design/vendor related issues, affecting reliability of locos.
- Utilization of locos, i.e., Engine Kms/day/ engine "In use" and ' On Line'

Diesel Loco Operation Organization

At Zonal Railways-

- Planning and utilization of diesel locos
- Distribution of diesel locos between different divisions on the railway
- Ensure daily outage target of diesel locos from sheds and their distribution over different divisions and railways.
- Co-ordinate with other railways for diesel operations.
- Daily utilization of diesel locos
- Reduce detentions to diesel locos on line
- Ensure timely dispatch of locos to base sheds for undergoing prescribed maintenance schedule (locos not to run overdue schedule)

Diesel Loco Operation Organization

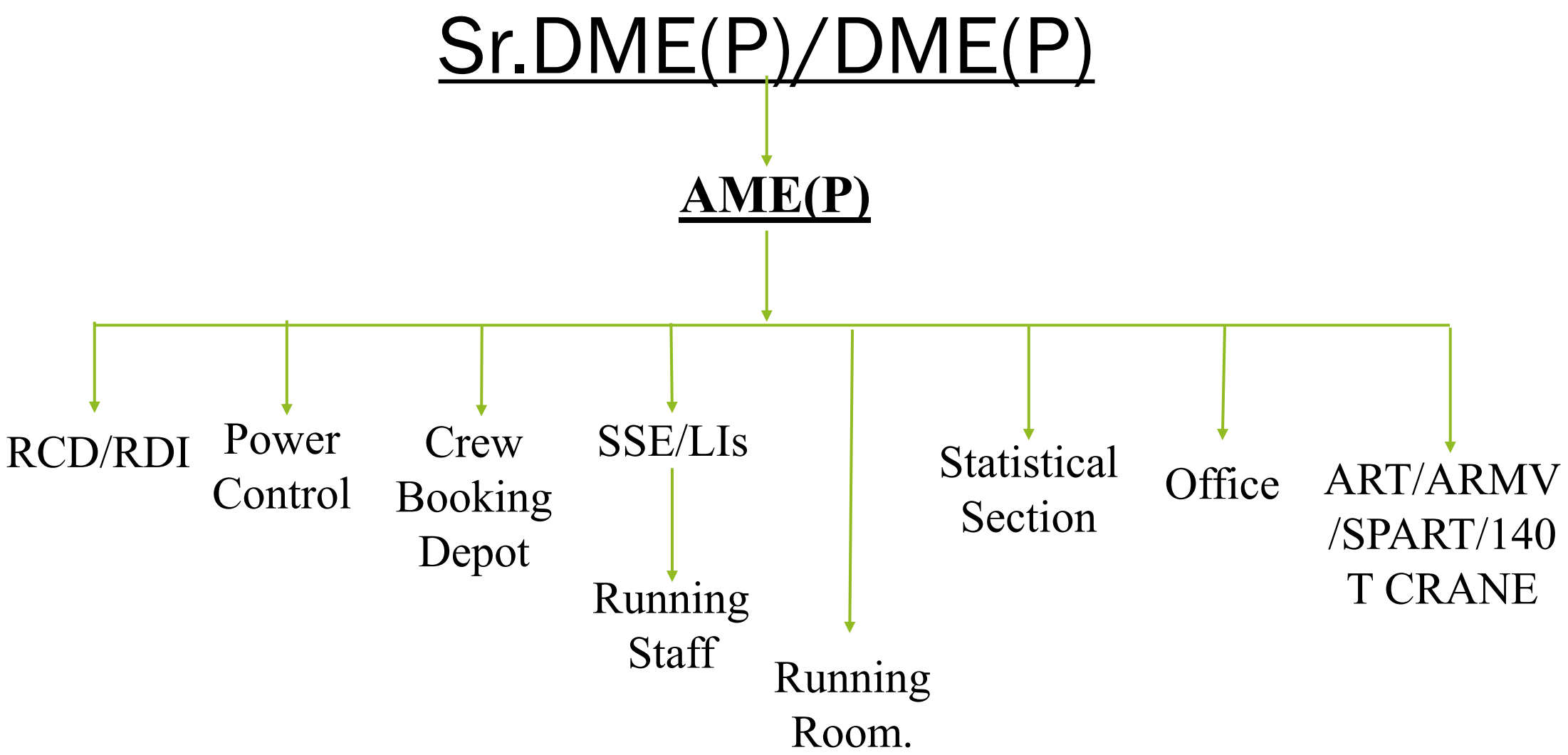
At Zonal Railways-

- daily position of diesel loco failures and its repercussions on punctuality of coaching and goods operation
- Analyse cases of loco failures and take remedial measures
- Timely Movement of disabled diesel locos
- Induction/Promotional and Refresher Training of running staff for diesel operation
- Keep a check on crew link for passenger services and 9 hours duty working for goods services
- Provision, maintenance and operation of HSD oil installation for fueling of diesel locos
- Ensuring fuel economy in operation

Diesel Loco Operation Organization

At Division level-

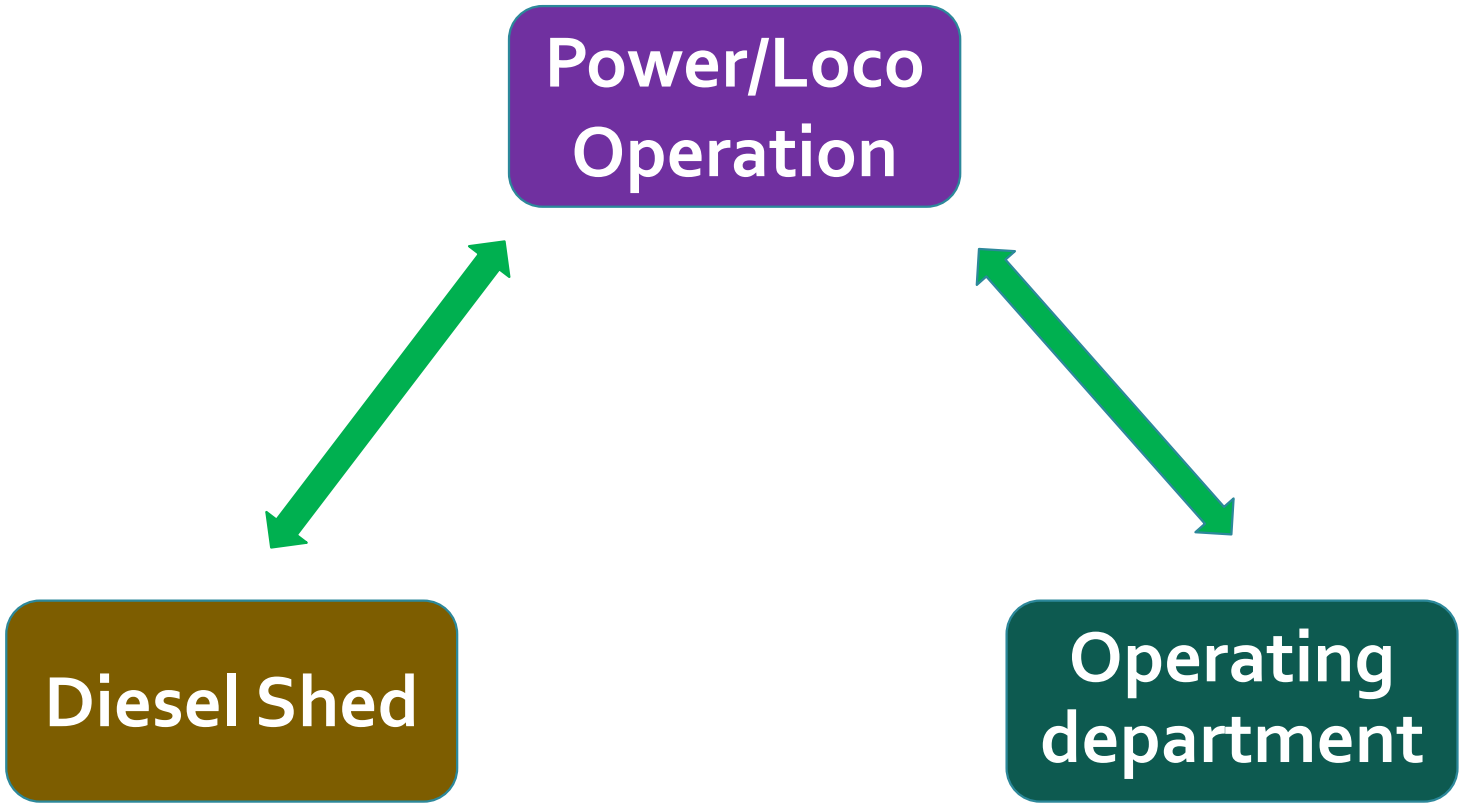
- On the division, the diesel operation is to be looked after by the Sr.DME(P)/DME(P).
- Fuelling Installations
- Assisted by Divisional Power Control Organization
- Diesel outage and availability
- Utilization
- Crews


Sr.DME(P)/DME(P)
AME(P)
RCD/RDI
Power Control
Crew Booking Depot
SSE/LIs
Running Staff
Running Room.
Statistical Section
Office
ART/ARMV /SPART/140 T CRANE

Diesel Loco Operation Organization

In Diesel Shed

- SSE/SE (running) working under Sr.DME (Diesel) in operating division will look after operational aspect of diesel locos in shed
- Maintaining close liaison with the Central and Divisional Power Control Organizations
- Maintain 4 hourly position of diesel outage
- Maintain minor schedule forecast register: trip, monthly, other higher schedules
- Keep record of important features like diesel loco failures, detentions, etc.


Power/Loco Operation
Diesel Shed
Operating department

Activities of loco operation

- Working out the requirement of Running Staff at each depot
- Implementation of 9-hours Rule
- 6 Monthly Review of Crew Requirement
- Streamlining the Operation by preparing
  - ✓ Loco Links (for Pass.)
  - ✓ Crew Links (for Pass.)
  - ✓ Power Plan (for Goods)

Diesel Loco Operation for Passenger Services

Loco links-

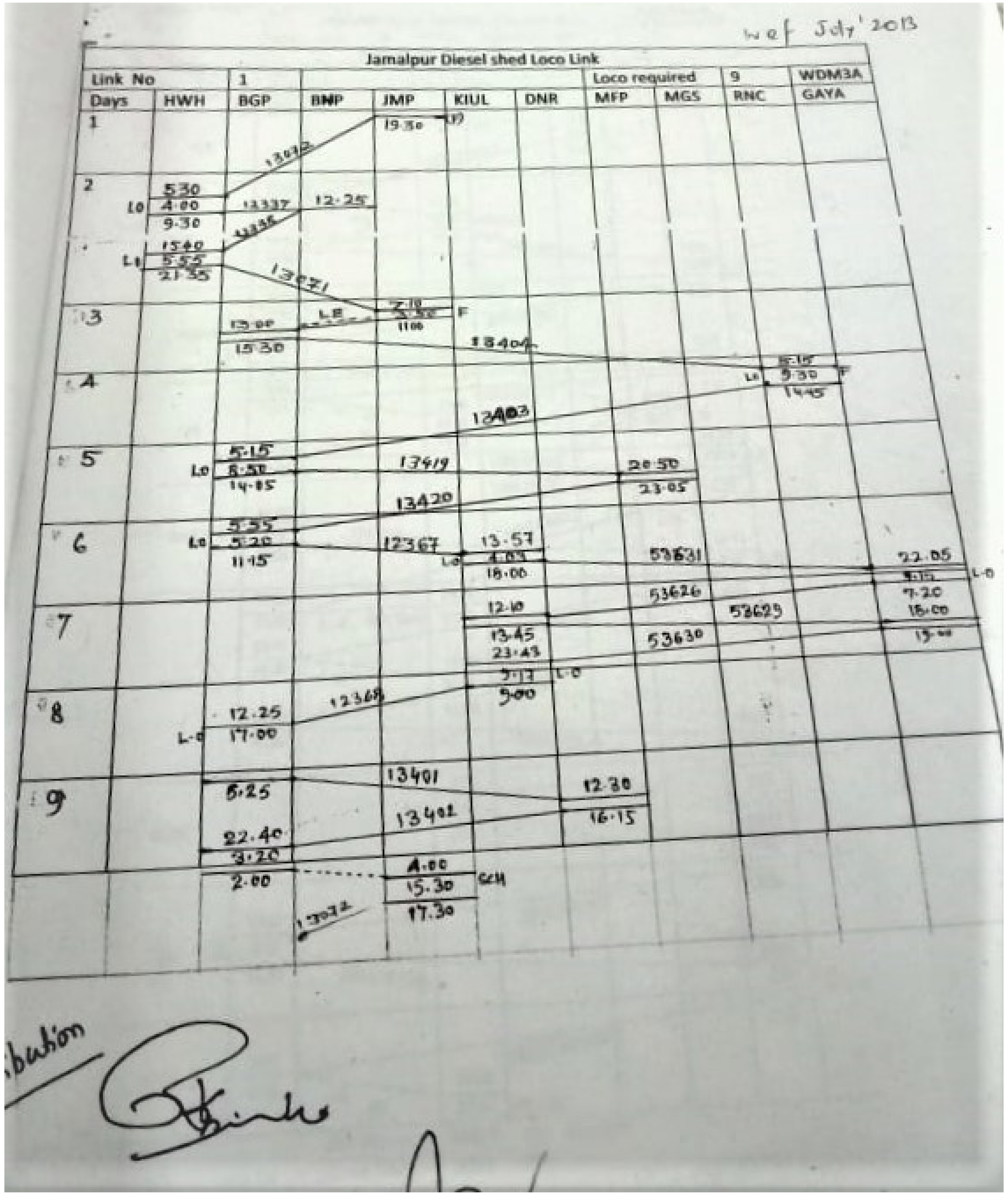
- Loco link is an arrangement of loco for working a set of trains from one station to another for Mail/Express/Passenger trains.
- Loco link gives the requirement of locos required to run the given number of trains.
- Loco link is prepared by HQ office in consultation with COM.

Diesel Loco Operation for Passenger Services

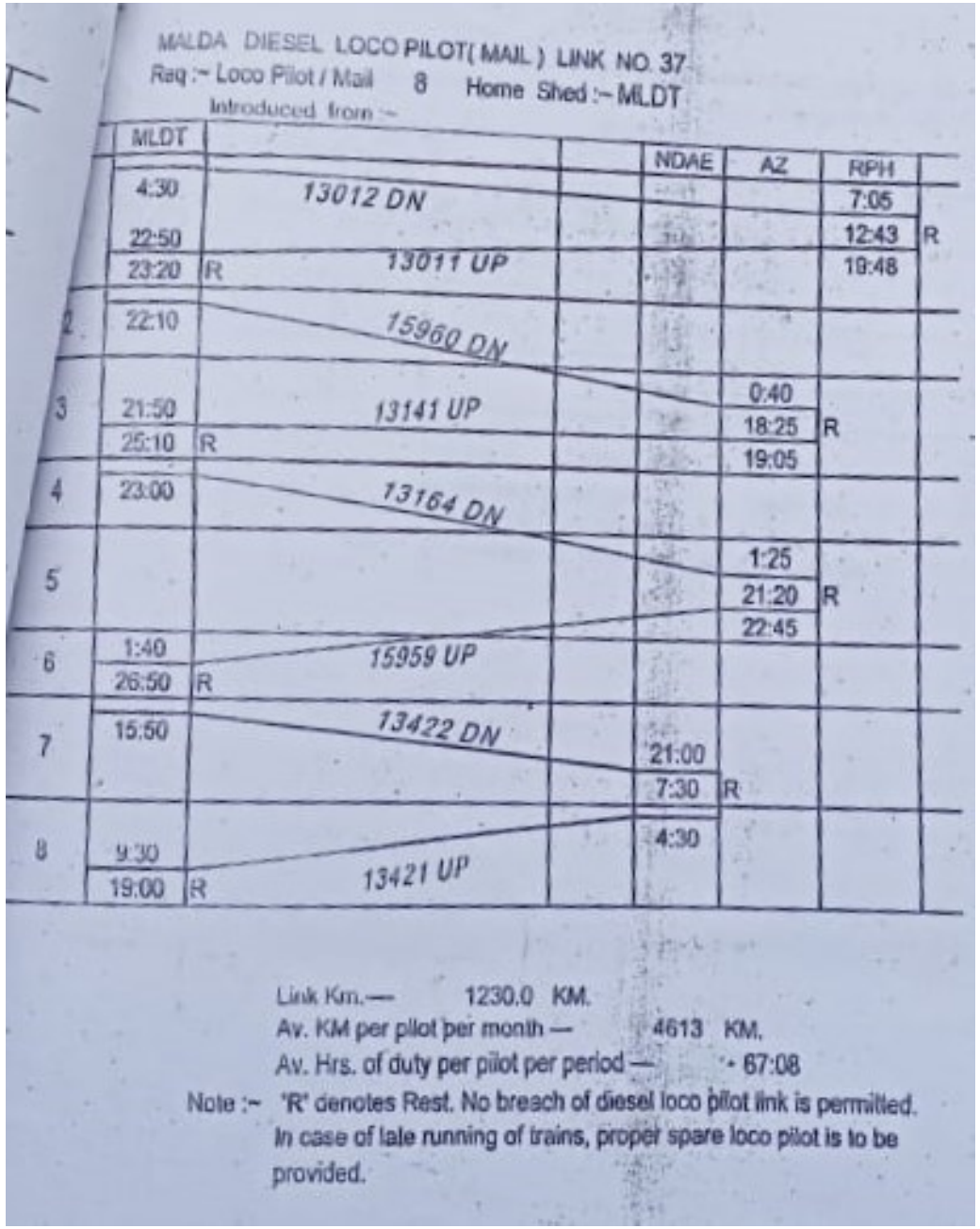
Factors to be considered while preparing a loco link:

- Availability of the Locos
- Trip Inspection (Mail/Express /Passenger locos are required to be given trip inspection within the link)
- Lie over period at destination station:
- Total Kms earned during trip should normally not exceed 5000 Kms.
- Fuelling locations.
- For every 30 locos in link, an additional overlapping loco shall be provided to cater for higher schedules

Loco Link


wef July' 2013
Jamalpur Diesel shed Loco Link
Link No
1
Loco required
9
WDM3A
Days
HWH
BGP
BNP
JMP
KIUL
DNR
MFP
MGS
RNC
GAYA
1
2
3
4
5
6
7
8
9
19.30
12.25
13337
13071
13404
13403
13419
13420
12367
53631
53626
53629
53630
12368
13401
13402
5.30
4.00
9.30
15.40
5.55
21.35
13.00
15.30
5.15
8.50
14.05
20.50
23.05
5.55
5.20
11.15
13.57
18.00
22.05
7.20
18.00
12.10
13.45
23.43
5.00
19.00
12.25
17.00
5.25
12.30
16.15
22.40
3.20
2.00
4.00
15.30
17.30

Crew Link



MALDA DIESEL LOCO PILOT(MAIL) LINK NO. 37

Req :~ Loco Pilot / Mail 8 Home Shed :~ MLDT

Introduced from :~

	MLDT			NDAE	AZ	RPH	
	4:30	13012 DN				7:05	
	22:50					12:43	R
	23:20	R 13011 UP				19:48	
2	22:10	15960 DN					
3	21:50	13141 UP			0:40		
	25:10	R			18:25	R	
					19:05		
4	23:00	13164 DN					
5					1:25		
					21:20	R	
					22:45		
6	1:40	15959 UP					
	26:50	R					
7	15:50	13422 DN		21:00			
				7:30	R		
8	9:30			4:30			
	19:00	R 13421 UP					

Link Km.— 1230.0 KM.

Av. KM per pilot per month — 4613 KM.

Av. Hrs. of duty per pilot per period — 67:08

Note :~ 'R' denotes Rest. No breach of diesel loco pilot link is permitted. In case of late running of trains, proper spare loco pilot is to be provided.

Diesel Loco Operation for Goods Services

Goods operation:

- The allotment of diesel loco for each division is worked out on the basis of number of through goods trains to be run daily on different sections.
- The number of diesel locos required for working the planned number of trains is arrived at on the basis of target of loco Kms per day per loco in use.
- Normally, utilization of 500 Km on BG double-line and 400 km on BG single – line per day per loco can be adopted.
- The actual targets should be fixed by each Railway taking into consideration the operating conditions prevailing on that Railway.

Diesel Loco Operation for Goods Services

Power Plan

- Power plan is prepared by a division for assessing their daily requirement of locos & Crew on a long term basis.
- It basically indicates the daily average number of locos required and planned for freight services, section wise for each division.

Diesel Loco Operation for Goods Services

Power Plan:

- Every six months, the running of goods traffic on a Railway is reviewed for each division
- Data of actual number of goods trains run are collected.
- Moreover, the goods train to be run during next six months is assessed
- While planning the goods train, availability of goods locos on railway is taken into account
- Zonal railway power plan is issued by the office of Chief Operating Manager (COM) of the Railway.

Diesel Loco Operation for Goods Services

Information available in a power plan:

- Number of trains to be run on division section-wise in UP and DN direction.
- Requirement of power for inferior services i.e. shunting work, railway material train, PQRS work of engineering department, etc.
- Outage of the loco on a division
- Target utilization of the locos,
- Net requirement (shortfall/excess) of locos (including the requirement for replacement of overaged locos and requirement for schedule maintenance of extra locos required).

Diesel Loco Operation for Goods Services

Power Plan

- Avg. no. of trains run on each section per day and Avg. hours on rail for last six months*;
- duly signed by Sr. DEE(Op)/Sr. DME(P) and Sr.DOM to be prepared.
- Section wise average freight POL for the last six months to be calculated as under :
  - –Bare POL = PDD + HOR + PAD
- 3.5% further growth and 10% bunching allowance to be demanded on Bare POL.

Power Plan

- Loco requirement for DMT, ART and other locos which remain in outage but not added in POL for the purpose of calculation of average kilometers to be added in the bare requirement.*
- To arrive at total POL, last six month average POL of shunting loco link WDS_6R, pilots and Mail lie over powers to be added in the POL calculated above.*
- Mail/Exp./Pass. loco requirement to be worked out on the basis of loco link.
- Add 10% for major repair allowance.

Power Plan

For shunting services

- work out number of points for 8 hours shunting, demand 0.33 POL.
- Add 1 loco as overlap against 6 loco.
- Add 10% for major repairs.

PROPOSED POWER PLAN OF MALDA DIVISION AS ON 01.05.20

ELECTRIC

SECTION	LENGTH(in N KM)	NO.OF TRAINS(UP+DN)	HOR	TOTAL HRS	LOCO
GMAN-MLDT-GMAN	98	30	6.72	201.60	8.40
GMAN-TDLE-GMAN	25	12	1.71	20.57	0.86
PRDG-MGLE-PRDG	25	16	1.71	27.43	1.14
AZ-NFK-AZ	160	0	10.97	0.00	0.00
GMAN-BGP-GMAN	272	4	18.67	74.61	3.11
GMAN-CLG-GMAN	130	4	8.91	35.66	1.49
JMP-KIUL-JMP	468	1	32.09	32.09	1.33
BGP-DUMK-BGP	230	0	15.77	0.00	0.00
BGP-MGR-BGP	120	6	8.23	49.38	2.05
TOTAL					18.38

YARD PILOT					
NFK DETN & SHUNTING	6 Loco@6 Hrs			36	1.50
MLDT-DETN	20 Locos@2 Hrs			40	1.67
MGLE DETENTION	8 Locos@8 Hrs			64	2.67
TOTAL					5.83
G.TOTAL					24.21

DIESEL

SECTION	LENGTH(inN KM)	NO.OF TRAINS(UP+DN)	HOR	TOTAL HRS	LOCO
GMAN-MLDT-GMAN	98	24	7.24	173.76	7.24
GMAN-TDLE-GMAN	25	2	1.85	3.70	0.15
PRDG-MGLE-PRDG	25	2	1.85	3.70	0.15
AZ-NFK-AZ	160	0			
GMAN-BGP-GMAN	272	4	20.09	80.36	3.34
GMAN-CLG-GMAN	185	6	13.66	81.97	3.42
JMP-KIUL-JMP	468	1	34.56	34.56	1.44
BGP-DUMK-BGP	230	8	16.98	135.88	5.66
BGP-MGR-BGP	120	10	8.86	80.60	3.69
TOTAL					25.09

YARD PILOT					
NFK DETN & SHUNTING	2 Loco@6 Hrs			12	0.50
CLG DETN & SHUNTING	3 Loco@6 Hrs			18	0.75
MGLE DETN & SHUNTING	3 Locos@6 Hrs			18	0.75
MLDT -DETN	10 Loco@2 hrs			20	0.83
YARD PILOT,MLDT-2,SBG-1,BGP-1& JMP-1	Proposed				5.00
YARD PILOT RELIEF LOCO	Proposed				1.00
SECTIONAL AND SDG PILOT	Proposed				12
ENGG.PILOT(BMT/CMT)	Proposed				2
JMP SHOP PILOT	Proposed				2
ART/MFD/CRANE-MLDT,SBG,JMP	Proposed				3
TOTAL					27.83
G.TOTAL					52.92

(MP/1072/Vol. I I, Dated 14.05.20)

14/05/2020

SR.DOM/ER/MLDT

DME(P)/MLDT 14/05/2020

Goods Crew Requirement

Different railways are following different criteria, as given below:-

A. Average no. of Drivers to work one pair of up & down number of anticipated trains as per Power Plan

B. Average of actual fortnightly performing crew-hours with a target of 104 hr

C. Standard no. of crew required to man a loco as per average loco outage

Goods Crew Requirement Method: A

Standard driver-hours to work a pair of up & dn. Train is calculated as :

Pre Departure Detention (PDD) =	2 hr.
Running time outward =	8 hr.
Outstation Rest =	10hr.
PDD towards HQ =	2 hr.
Running Time to HQ =	8 hr.
HQ Rest =	24 hr.

Total turn-round hours = 54 hr.

Goods Crew Requirement Method: A

- Requirement of driver to work one pair of train per day, is computed as :

  = (54 / 24) = 2.25 drivers.

- Add 30% LR = 2.25 + 0.3x2.25 = 2.925
- Add 10% as Trainee Reserve (TR)
- Trainee Reserve crew per pair of train = 2.925 x 0.1 = 0.2925
- Thus total requirement of drivers per pair of train = 2.925 + 0.2925 = 3.2175

= 3.22 drivers per pair of working Up & Dn train.

Goods Crew Requirement Criteria: A

Other than through goods requirement

- The drivers required to man stationary jobs in shifts, like Crew Controller, Power Controller, etc
- Drivers required for moving BT, MT, BD Train, Dead/Overdue engine, or locos on trial are added separately, based on general trend.

Goods Crew Requirement Criteria: B

Crew Requirement based on actual average performing hours

The requirement is calculated as following:-

a) Average Fortnightly performing hours of last 6 months (used only for working goods trains) = A

b) Required Fortnightly working hours per goods driver (104) = B

c) Bare requirement of goods drivers = (A / B) = C

d) Additional req. due to traffic fluctuation @ 10%=0.1xC = D

e) Revised Bare requirement = C+D = E

f) Leave Reserve @ 30% on bare req. = 0.3xC= F

g) Revised bare req. + Leave Reserve = E+F = G

h) Trainee Reserve (TR) @ T% on G = O.OTxG= H

I) Total Crew requirement = G+H = I

Goods Crew Requirement Criteria: C

Crew Requirement based on driver reqd. to man a loco

(a) Available hours per fortnight = 104 hrs.

(b) Available average duty hours = 7 hrs 25 min. per crew per day (104/14)

(c) Available loco crew hours per = 7 hrs 25 min -1 hrs 45 min crew per day for loco operation [30 min prior to sign ON+ +15min after sign OFF + 1 hr.PDD) = 5 hrs. 40 min

(d) Bare min. requirement of Crew to man loco for 24 hrs. = (24hrs / 5 hrs 40 min.) = 4.24 crew

Goods Crew Requirement Criteria: C

(e) Various allowance to be added, other than Leave Reserve

(I) Allowance for Traffic Fluctuation = 10% (to meet peak requirement, spare running, growth in traffic volume over gestation period of crew requirement)

(II) Trainee Reserve = 5% (Refresher course, Promotional course , conversion course, Air Brake training 3- phase loco training Safety camp/ seminar etc.)

(III) Total = 15%

(f) Total requirement of crew per single

Power outage without leave reserve = 4.24 + 15% of 4.24

= 4.24 + 0.64

= 4.88

Goods Crew Requirement Criteria: C

(g) Leave reserve @ 30% for leave (LAP, LHAP etc.)
Sparing staff for Misc duties viz. Selection suitability test etc.

Attending inquiries, joining time, court attendance, attending PNM) = 0.3 x 4.88

= 1.46

(h) Total Crew Requirement = 4.88 + 1.46

= 6.34 crew per loco

= at least 6 crew per loco

Note: The above yardstick does not provide for supervisory posts like CCNL/PCNL/LI etc.

Goods Crew Requirement

- Power Plan of a Railway gives the anticipated no. of section-wise, up & dn. Goods trains (SH, DH/MU). Then Standard Driver Hours required to work one pair of train, including LR & TR, gives the total requirement of drivers to work goods trains.
- Number of crews required at any point of time is directly related to number of loco units available on the division.
- For this purpose, Multis and Consists are taken as 1 loco unit.
- Crew review freight should be done based on the requirement of 7.6 crews/POL.(as per Operating manual)

EASTERN RAILWAY

Malda. Dated: 14.05.2020

No MP/1022/Vol.III.

Chief Motive Power Engineer ,
E.RLY/KOLKATA

Sub : Zero Base Crew Review of Malda Division as on 01.04.19.

The details proposal for Crew requirement of MLDT division is given below for your information and necessary action please.

RUNNING STAFF REQUIREMENT as on 01.04.19 of Malda Division

CATEGORY	LOCO OUTAGE	Loco Pt.(Mail)	Loco Pt.(Pass)	Loco Pt. (Goods)	Drafted Supervisor	Loco Pt. (Shunting)	Asstt. Loco Pt.	TOTAL
REQ. for Coaching Trains as per LINK	--	56	68	--		--	124	248
LEAVE RESERVE (30%)		17	21	-		-	38	76
TRAINEE RESERVE (10%)	--	07	09	--		--	16	32
TOTAL REQUIREMENT for COACHING Services	--	80	98	-		-	178	356
REQUIREMENT FOR GOODS : -								
CREW as per joint proposed power plan 01.07.17(7.05 per Loco)	53.77	--	--	379	-	--	379	758
For SPART/JMP=3				03	-	-	03	06
TOTAL GOODS DRIVER				382	-	-	382	764
Loco Pilot (Goods) for PCNL	--	--	--	-	05	--	--	05
Goods Driver for CCNL 1 each shift/MLDT,SBG,BGP&JMP	--	--	--	-	20	--	--	20
Drafted Supervisior: -	--	--	--	-	26	--	-	26
Loco pilot Shunting		--	--	--		--	--	
Shunting in Work Shop	2.0	--	--	--		12	--	12
Shunting in Diesel Shed in JMP in 3 shift	--	--	--	--		15	--	15
Shunting in MGLE to PDCL Siding in 3 Shift	--	--	--	--		05	--	05
Shunting in TDLE to NTPC/NFK siding in 3 Shift						05	-	05
Shunting in CLG to NTPC/CLG Siding in 3 Shift						05	-	05
Manning coaching Loco at SBG 2, JMP 1 MLDT 2, BGP 2	--	--	--	--		35	--	35
Extra 5% due to ALP is feeding category (Vide Member Staff D.O letter no. E(MPP)2016/1/8, dt - 21-04-2016)							28	28
Total Requirement Shunter	--	--	--	--		77	--	77
GRAND TOTAL :	--	80	98	382	26	77	588	1251

DA- Details Summary report attached

14/5/20

DIVISIONAL MECHANICAL ENGINEER (P)
EASTERN RAILWAY/MALDA

Lobby	Link No	Crew link during last review		Present crew link		Remarks
		No. of Trains	Bare crew required	No. of Trains	Bare crew required	
MLDT	3	2	2	2	2	
	6	12	11	12	11	53037/38 new (1)
SBG	7	10	12	10	12	53041/48 transfer from JMP (2)
	8	8	10	8	10	
BGP	11	10	7	10	7	Services of 53441/42 extended MDLE to DUMKA & 53443/44 MDLE to HSDA.
	12	16	13	16	13	New introduction 73454/53, 73463/64, 73451/52, 73461/62 & Termination of services of 53467/68, 53469/70, 53471/72, 53473/74, 53475/76, 53461/62, 53463/64, 53465/66, 23JM/24JM, 19JM/20JM
JMP	13	10	4	16	13	
Total		74	68	74	68	

i) Trains already taken over on Electric Traction : NIL.

ii) Trains to be taken over on Electric Traction shortly :

At present no Trains.

Therefore, requirement for pure Diesel crew and Diesel convertee crew is NIL.

Bare requirement of pure Diesel crew = 68
Total requirement of pure Diesel crew including LR & TR = 97.24 = 98

Total requirement of Diesel LPP = 98

c) **LOCO PILOT GOODS (LPG) :**

From Divisional Power Plan as 01.04.2019=55.72, holding is as under :

Goods service – 24.72

Sectional Coal Pilot - (CLG Coal Pilot - 1.50, GALE PT - 1.00, Sectional & Sdg. PT at BHW, BKLE, TLJ, MJ, RLJ, SLJ, SBG , MZC &PPT- 10.00) = 17.00

Yard Pilot - (JMP Yd PT - 1.00, MLDT Yd PT - 3.00, BGP Yd PT - 1.00, SBG Yd PT - 1.00, Relief for Power changing - 1.00, Engg. PT at BMT/CMT - 2.00, ART/MDF/Crane/MLDT, SBG & JMP - 3.00) = **12.00**.

Total outage = 53.72
LPG required = 379.07=379
For SPART/JMP = 3

Total LPG = 382
Convertee LPG for running 1 pair Electric Train in MLDT-PKR/BWN section - 6

Pure Diesel LPG = 382 - 6 =376

d) **DRAFTED SUPERVISOR : No change.**

Total required D/Sup = (Div/CNL - 20, PCNL & CPCNL/SDAH - 6) = **26 nos. as per previous review**.

Additional requirement = NIL.

e) LOCO PILOT SHUNTING :

LPS required at JMP shop (2/Shift) = 12 nos.
LPS required at MGLE to PDCL (1/Shift) = 5 nos.
LPS required at TDLE to NTPC/NFK (1/Shift) = 5 nos.
LPS required at CLG shunting (1/Shift) = 5 nos.
LPS required at JMP shed shunting (3/Shift) = 15 nos.
Manning locos at SBG - 2/Shift, JMP – 1/Shift, MLDT - 2/Shift & BGP - 2/Shift = 35 nos.

Total LPS required = 77 nos.
Additional required = NIL

ASSSTT LOCOI PILOT :

Required for M/Exp - 80
Pass - 98
Goods = 382
Total = 80 + 98 + 382 = 560 nos.

Extra 5% due to ALP is feeding category (Vide Member Staff D.O letter no. E(MPP)2016/1/8, dt - 21-04-2016)

Total ALP required = 560 x 1.05 =588 =588

CHIEF LOCO INSPECTOR :

For LP @ 1 for 25) (80+98+382) = 560/25 = 22.40=22.40
For LPS & ALP @ 1 for 50) = 77+588 = 665/50 = 13.30=13.30
Safety Counsellor = 01
Total = 22.40+13.30+1 = 36.70=37.0
Total required CLI considering @ 8% Leave Reserve & Trg. Reserve) = 39.96 = 40 nos.

Passenger Train Ordering

- Scheduled Passenger Trains do not require Train Ordering
- Train Advice is necessary only when
  - To be Cancelled
  - To Put Back
  - Any Change in the Schedule Shown in the Public /Working Time Table
- In Case of Unscheduled Trains
  - Trains are Ordered by Coaching Control in Conjunction with Power Control

Goods Train Ordering

Ordering of Goods train :

a. Train Notice number – Any number selected serially.
b. Train number of Goods train.
c. Loco number of the Goods train
d. Expected arrival ready time of the goods train at crew change point or in yard.

Complete Train Report

CTR form gives complete detail of train working.

Important information available is as under:

1. Train Name and No. with the name of crew.
2. Load of the train.
3. Engine No.
4. Intersectional running time of the train in between two crew change point.
5. Time loss or gain on various account.
6. Lube oil and fuel oil consumption
7. Utilization of engine hours.
8. Duty hours of the crew i.e. time of sign on/sign off.
9. Signal and track defects noticed by crew in brief.

This CTR form is signed by driver and guard of the train.

Loco Operation Instructions

- Geographical Boundaries of Locomotive
  - Diesel Loco not to be disturbed from the mail links
  - The multies of foreign railways should not be split on the other railway without prior approval from Board.
- Time loss due to speed Restriction

Loco Operation Instructions

- Running of Dead & Overdue Locomotives

- Dead locos which are not overdue monthly (M-2) or higher schedule, should be attended in the nearest shed, where facilities are available.
- Trip Schedules of Diesel locos should be undertaken at the nearest available shed. However, for the monthly schedule, the loco has to be sent to the home shed.
- Dead locos which are overdue monthly (M-2) or higher schedule, should be sent to home shed
- Dead or missed link Locos of Passenger services should be sent back to the home shed by the fastest available means working or otherwise.
- Dead Locos moving to the home shed should not be detached, if permitted by Board or by the Zonal railways

Loco Operation Instructions

Attaching/hauling of dead locomotives by Mail/Express/Super fast/Passenger trains: -

- Only one dead locomotive (diesel/electric) can be attached.
- Brake power of the train should be 100% excluding dead locomotive
- As far as possible, brake should work on dead locomotive. However, if it is not possible, then in the case of air-braked train, brake pipe and feed pipe of working locomotive shall be connected to brake pipe and feed pipe of trailing stock and dead locomotive will work as piped vehicle.

Loco Operation Instructions

Attaching/Hauling of dead locomotives by goods trains:

- Movement of maximum three locomotives (2 working+1 dead) with load is permissible subject to observations of all restrictions on operation of double/triple headed working locomotives in the section provided that brakes in dead locomotives are operational.

Escorting of dead Locomotives:-

- Escorting of locomotives (diesel as well as electric) attached to freight and passenger carrying trains is not necessary if the brakes including proportionate are fully operational and the dead locomotive is attached next to the train engine.
- The dead locomotive will continue to be escorted if attached in the rear of brake van or has defect in undergear equipment.

Line Haul Cost

- **Line Haul Cost:** It is the total all-inclusive unit-cost, incurred by Railways, to haul 1000 GTKMs of trailing load.
- It is calculated service-wise (for Coaching and Freight separately) and traction-wise (for Electric & Diesel traction separately).
- Only revenue portion of GTKM, (i.e. excluding weight of engine & departmental vehicles), is taken for calculation.
- It consists of following four elements:-

1. Traction Cost
2. Track & Signalling Cost
3. Other Transportation Cost
4. Provision & Maintenance Cost of Coaches and wagons.

Line Haul Cost

Line Haul Cost (Rs./1000 GTKM)					
SN	Year	Coaching		Freight	
		Diesel	Electric	Diesel	Electric
1	1990-91	58.99	63.88	39.70	34.94
2	1991-92	64.98	72.01	43.31	38.30
3	1992-93	77.25	80.50	49.13	43.17
4	1993-94	89.27	84.84	57.54	47.19
5	1994-95	99.58	94.33	65.51	52.37
6	1995-96	100.07	108.56	63.28	60.26
7	1996-97	112.97	119.67	72.61	68.34
8	1997-98	115.18	138.46	80.59	76.61
9	1998-99	129.78	137.20	76.98	76.04
10	1999-00	127.60	134.25	87.94	79.36
11	2000-01	159.25	142.29	103.90	82.33
12	2001-02	153.72	146.26	107.37	77.24
13	2002-03	166.50	160.93	110.44	77.35
14	Not Printed				
15	2004-05	177.17	138.72	118.31	70.72
16	2005-06	189.30	115.53	121.22	89.98
17	2006-07	206.01	127.44	129.25	79.82
18	2007-08	209.67	139.58	132.99	74.56
19	2008-09	251.49	165.00	170.69	86.55
20	2009-10	239.31	128.16	155.54	91.52
21	2010-11	269.72	143.55	164.55	96.95

Source:- Summary of ends results for coaching (table-12 & 13) & freight (table-17 & 18).

- In terms of Line Haul Cost (Summary of End Results 2015-'16), electric traction is cheaper by about 47% for freight traffic & 50% cheaper for coaching traffic, as compared to diesel traction. This is evident from table given below:-

LHC (In Rs.) per 1000 GTKMs (2014-15 year)			
Freight		Coaching	
Diesel	Electrical	Diesel	Electrical
265.09	139.65	373.51	186.08

Loco Hire Charge

- All India Engine Hour Cost(AIEHC) for recovery of Siding and Shunting Charges

Issues of Loco Operation

- Right Powering
- Duty Hours of Running Staff
- Tracking availability of Crew at HQ & on Run
- Loss of Run
- PDD
- Terminal detention

WDG4D(4500 HP) DRY RAIL

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4D (4500)			Track condition : Dry Rail				Weight of loco : 130.2 T			
Trailing load in tonnes at Km/h on tangent track										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	**START**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
LEVEL	**5400**	5400	5400	5400	5400	5400	5400	5400	4515	3570
1/500	**5400**	5400	5400	5400	5400	4255	3420	2750	2290	1895
1/400	**5400**	5400	5400	5400	4760	3715	3005	2430	2035	1690
1/200	**5400**	5400	5085	3660	2835	2245	1840	1510	1280	1080
1/150	**4990**	4990	3950	2855	2215	1760	1450	1190	1015	855
1/100	**3775**	3775	2720	1965	1530	1215	1000	820	700	590
1/50	**2145**	2090	1365	975	750	590	480	390	325	270

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4D (4500)			Track condition : Dry Rail				Weight of loco : 130.2 T			
Trailing load in tonnes at Km/h with 1° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	**START**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
LEVEL	**5400**	5400	5400	5400	5400	5400	5400	4710	3795	3045
1/500	**5400**	5400	5400	5400	4885	3810	3080	2485	2080	1730
1/400	**5400**	5400	5400	5400	4295	3365	2735	2215	1860	1555
1/200	**5400**	5400	4760	3430	2660	2105	1730	1415	1205	1015
1/150	**4805**	4805	3750	2710	2105	1670	1380	1130	965	815
1/100	**3665**	3665	2620	1895	1470	1170	965	790	675	570
1/50	**2110**	2050	1335	955	735	575	470	380	320	260

Annexure – III

Attacking speed Vs length of maximum negotiable stretch with exit speed

Load: 59 BOXN (CC+8+2t) = (5400 t) & Rail condition: Dry Rail (Standard)

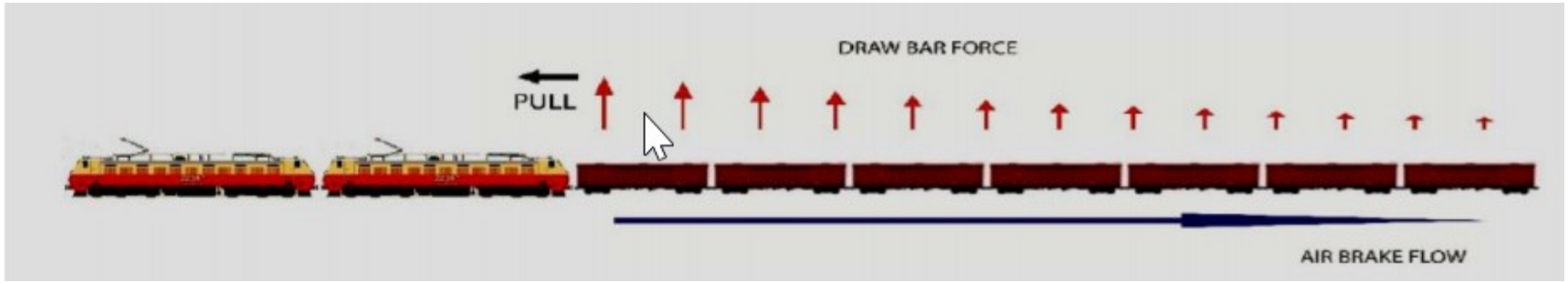
S. no.	Attacking Speed (Km/h)	2 WDM2		2 WDM3A		2 WDG3A		2 WDM3D		2 WDG4	
		Max. Stretch negotiable (Km)	Exit Speed (Km/h)	Max. Stretch negotiable (Km)	Exit Speed (Km/h)	Max. Stretch negotiable (Km)	Exit Speed (Km/h)	Max. Stretch negotiable (Km)	Exit Speed (Km/h)	Max. Stretch negotiable (Km)	Exit Speed (Km/h)
(A) Gradient 1 in 100 & 2° curves											
1	30	Not negotiable	Loco stalled	Not negotiable	Loco stalled	4.50	20	4.70	20	No limitation	20
2	40					6.00		6.50			>20
3	50					>10.00		>10.00			
4	60			0.30	20	>10.00		>10.00			
5	70			0.70		>10.00		>10.00			
(B) Gradient 1 in 125 & 2° curves											
1	30	0.50	20	0.65	20	No limitation	20	No limitation	20	No limitation	20
2	40	0.75		0.90			>20		>20		>20
3	50	1.00		1.30							
4	60	2.10		2.70							
5	70	4.00		5.00							
(C) Gradient 1 in 150 & 2° curves											
1	30	3.50	20	>10.00	20	No limitation	20	No limitation	20	No limitation	20
2	40	6.50					>20		>20		>20
3	50	10.00									
4	60	>10.00									
5	70	>10.00									

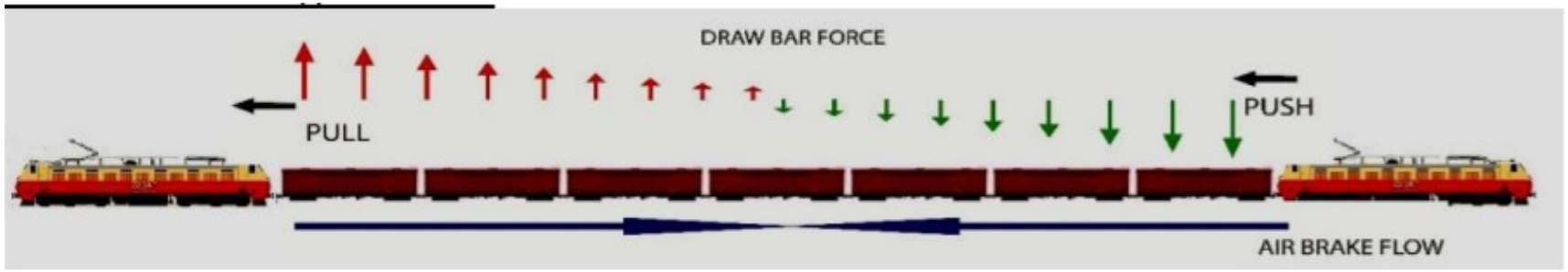
Note.: If curves are more than 2°, the maximum stretch negotiable is slightly less than the above specified values.

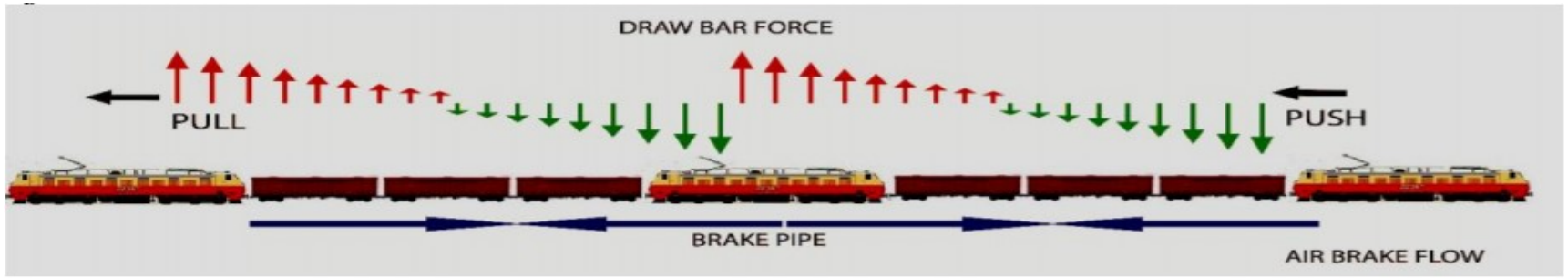
Distributed Power Control System

- DPCS by using Radio Frequency (RF) technology from leading locomotive.
- The locomotive in such system can be either in multiples i.e. all working in front or some may work in middle or rear of train.
- System reduces coupler forces when remote locomotive work either in the middle or rear of the train and therefore incidences of train parting are reduced.
- It has added advantages by increasing the speed of the rolling stocks as a result of reduction in the number of trains.
- Using Distributed Power Control System, total 4 Remote Locomotives can be connected in anywhere in the train consists.

Distributed Power Control System







Distributed Power Control System

Benefits of DPCS

- Reduced draft forces along a train will reduce the lateral force between wheel and rail on curves, thus reducing energy consumption and wear & tear on various running components.
- Another benefit is quicker application of standard air brakes. Under radio-controlled distributed power operation, the brakes are set at remote locomotives simultaneously with the command initiated on the lead locomotive, providing a more uniform air brake response throughout the train.
- Higher throughput due to Quick turnaround time.
- Reduce cutting train-path costs
- Reduce manpower Cost
- Reducing the high input associated with forming and splitting up trains

Long Haul Trains

- The East Coast Railway, on February 26, 2019, joined three freight trains as one unit ' **Python**' and ran it as a two km long goods train. The train had 147 wagons, three brake and guard vans along with four engines. It is fitted with distributed power wireless control system (DPWCS) and synchronized brakes.

- In May 2019 in SECR, '**Anaconda on Rails**' connected three freight trains as one unit of a 2-km long freight train with 177 wagons , the locomotives of which were run by a diesel crew, a loco pilot and an assistant loco pilot
- successfully ran between Bhilai and Korba rail stations
- The front loco commands (powered and brakes) the entire goods train through DPCS. The 2 km long train moves only with one set of crew — two in the engine and a guard instead of nine for three different goods train"


THANKS