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भारत सरकार - रेल मंत्रालय
अनुसंधान अभिकल्प और मानक समिति
लखनऊ - 226011
Government of India - Ministry of
Railways
Research, Designs & Standards
Organization, LUCKNOW - 226011

TECHNICAL CIRCULAR NO. ELRS/TC/0061-2000(Rev-0)

EL/3.1.39/2

Date: 27-1-2000.

Chief Electrical Engineer,

Central Railway, Mumbai CST- 400 001

Eastern Railway, Fairlie Place, Calcutta - 700 001

Northern Railway, Baroda House, New Delhi-110 001

Southern Railway, Park Town, Chennai -600 003

South Eastern Railway, Garden Reach, Calcutta -700 043

South Central Railway, Rail Nilayam, Secunderabad-500371

Western Railway, Churchgate, Mumbai -400 020

**Sub: Optimum deployment of Electric Locomotive for load 58
BOX 'N' (4700 t) on Indian Railways.**

To decide upon the optimum utilisation of present fleet of electric locomotive in service and new locos under production the following information was collected from the Railways-viz

- i) Details of routes where 4700 t loads are being hauled.
- ii) No of goods trains run on these sections and the directions of loaded empty movements.
- iii) Length of patches of 1 in 200, 1 in 150, 1 in 100 and steeper than 1 in 100 grades.
- iv) Details of the section where banker is provided.
- v) Stalling of trains, cause of stalling, type of loco, load section etc.

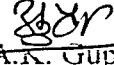
The above details as obtained from the Railways have been studied and analysed. Section-wise analysis of existing pattern and alternative's were recommended to Railways from time to time. Summary of these recommendations is enclosed. These are based on broad studies with computer simulations. As such, these recommendations are only for guidance. Railways should continue to decide specific cases depending upon actual operating conditions prevailing in the section.

Encl: As above

(A.K. Gupta)
for Director General(Electrical)

Copy to: Secretary (Electrical) Railway Board, Rail Bhawan, N/Delhi-110001.
(Kind Attn: Sri I.C. Sharma, EDEE(RS) for information, please.

Encl: As above


(A.K. Gupta)
for Director General(Electrical)

**SUMMARY OF OPTIMUM DEPLOYMENT OF ELECTRIC LOCOMOTIVE FOR LOAD : 58 BOX'N' 4700 T.
ON INDIAN RAILWAYS**

1.0 ON CENTRAL RAILWAY

S.NO.	SECTION	RULING GRADIENT	PRESENT WORKING PRACTICE	RDSO's RECOMMENDATION: & REFERENCE
1.	Korba - Nagpur - Bhusawal - Igatpuri	1 in 150 gradient for a length of 5 Km and 1 in 200 for a length of 2 Km	i) Single WAG7 loco for Nagpur-Bhusawal ii) Single WAG7 with a banker between Chalisgaon - Summit of Bhusawal - Igatpuri section	<u>EL/3.1.39/2 dt. 18.5.98</u> i) Single WAG7 with a banker in Paunar - Sevagram - Wardha and between Chalisgaon - Summit. ii) Twin WAG5 from Korba-Nasik
2.	Bhusawal - Khandwa - Itarsi	1 in 110 gradient for a length of 4 Km and 1 in 150 gradient for a length of 4 Km	Single WAG7 with a banker between (Nepanagar) - Dongergaon	<u>EL/3.1.39/2 dt. 18.5.98</u> i) Single WAG7 loco with a banker between Nepanagar - Dongergaon ii) Twin WAG5 loco iii) Single WAG9 loco
3.	Ghugus - Tadali - Wardha - Nagpur - Amla - Itarsi - Bhopal	1 in 60 & 1 in 70 for a length of 17 Km between Nagpur - Amla and 13 Km between Amla - Itarsi section.	Single WAG7 loco with a banker between Teagaon - Chichonda & Budni - Barkhera	<u>EL/3.1.39/2 dt. 18.5.98</u> 1. Single WAG7 with banker between i) Chikni Road - Nagri ii) Kohli - Meljpanora iii) Narkher - Pandhurana iv) Teagaon - Chinchwad v) Budni - Barkhera 2. Twin WAG7 without banker, this will improve running time.
4.	Now Katni - Bina - Bhopal	1 in 200 gradient with 2 deg curve for a length of 14 Km	Single WAG7 with a banker between Ganeshganj - Girwar	<u>EL/3.1.39/2 dt. 18.5.98</u> i) Single WAG7 with a banker between Ganeshganj - Girwar ii) Single WAG9 loco.

Note : WAG7 locomotive with gear ratio 16 : 65

2.0 ON EASTERN RAILWAY

S.NO.	SECTION	RULING GRADIENT	PRESENT WORKING PRACTICE	RDSO's RECOMMENDATIONS & REFERENCES
1.	Katrasgar - Gomoh - Mughalsarai	1. 1 in 146 with 3 deg curve for a length of 0.7 Km. 2. 1 in 200 for a length of 3.4 Km	WAG7 with Banker as diesel shunter between Katrasgar - Nitchitpur for a length of 4 Km.	<u>Ref : EL/3.1.39/2 dt. 27.5.98</u> i) Single WAG9 in run through condition. ii) Single WAG7 with banker between Katrasgar - Nitchitpur as per present practice.

2.	Kusunda -Gomoh -Mughalsarai	1 in 200 for a length of 3.4 Km, 1 in 211 for 0.1 Km etc	Single WAG7 with a banker between Kusunda - Tetulmani for a length of 4 Km	Ref : <u>EL/3.1.39/2 dt.27.5.98</u> Single WAG7 loco without banker.
3.	Pathradih – Pradhankhunta – Gomoh – Mughalsarai	1in 200 with 1.5 deg curve for a length of 13.2 Km.	Single WAG7 with a banker between Pathradih – Pradhankhunta for length of 22.4 Km	Ref : <u>EL/3.1.39/2 dt.27.5.98</u> Single WAG7 or WAG9 loco without banker.
4.	Bokaro Steel City – Rajabera – Gomoh	1in 200 and 1 in 100 for a length of 1.8 Km	Single WAG7 with a banker between Bokaro Steel City – Gomoh for a length of 21 Km	Ref : <u>EL/3.1.39/2 dt.27.5.98</u> Single WAG7 WAG9 loco in run through conditions
5.	Ray-Khilari-Sonenagar – Mughalsarai	1 in 182 for a length of 13 Km	Single WAG7 or single WAG 9 or twin WAG5 loco	Ref : <u>EL/3.1.39/2 dt.27.5.98</u> i) Single WAG9 loco ii) Single WAG7 loco in run through conditions iii) Twin WAG5 loco
6.	Patratu -Chopan – Mughalsarai	1in186 for a length of 13 Km	-do-	-do-
7.	Dankuni –Andal –Bokaro Steel City	1in 200 for a length of 6 Km	Single WAG7	Ref : <u>EL/3.1.39/2 dt.27.5.98</u> Single WAG7 or WAG9 loco
8.	Pathrdih-Andal-Dankuni	1in 200 for a length of 2.1 Km	-do-	-do-
9.	Barakar -Gomoh-Mughalsarai	1in 200 for a length of 6 Km	-do-	Ref : <u>EL/3.1.39/2 dt.27.5.98</u> Single WAG7 loco
10.	Barakar-Sitarampur-Bardhaman -Dankuni	1in 200 for a length of 3.1 Km	-do-	-do-
11	Mughalsarai -Gomoh-Bokaro Steel City	1in 200 for a length of 3.1 Km	-do-	-do-

Note : WAG7 locomotive with gear ratio 16 : 65

3.0 ON SOUTH EASTERN RAILWAY

S.NO.	SECTION	RULING GRADIENT	PRESENT WORKING PRACTICE	RDSO'S RECOMMENDATION: & REFERENCE
1.	Govra –Korba-Champa (UP Direction)	1 In 150 for a length of 2.5 Km	Single WAG7 loco	Report No. IR - 73 Single WAG7 loco with run through at Urga station
2.	Champa –Bilaspur –Durg (UP Direction)	1in150 for a length of 1.7 Km	-do-	SingleWAG7with run through at Home Signal of Akallara, Jairamnagar, starte of Baikunth and Home Signal Mandha station.
3.	Durg – Nagpur (UP Direction)	1 in150 for a length of 6.4 Km	-do-	i) Single WAG7 with a banker between Paniajob –Bortalao. ii) SingleWAG7 loco with run through conditions at Home Signal of Murhihar, Rajnandgaon, Dongargarh, Paniajob & Bhandara Road station.

4.	Jharsuguda – Tatanagar (Dn Direction)	1 in 150 for a length of 4.6 Km and 1 in 100 for a length of 4.0 Km length	Single WAG7 loco with Banker	<u>EL/3.1.39/2 dt.12.1.99</u> i) Single WAG7 with run through conditions at Home signals Dhutra, Bamba stations. ii) Single WAG7 with banker between Mahoharpur-Goilkhera
5.	Jharsuguda-Tatanagar (Up Direction)	1 in 100 for a length of 5 Km and 1 in 150 for a length of 2.5 Km	-do-	<u>EL/3.1.39/2 dt.12.1.99</u> Single WAG7 with run through at Home Signal Kansbahal station and with a banker between Sonakhan – Sogra & Tunia – Posita.
6.	Sini –Chandil (Dn Direction)	1 in 100 for a length of 1.5 Km	Single WAG7 loco	<u>EL/3.1.39/2 dt.12.1.99</u> Single WAG7 loco with banker between Kunki –Chandil
7.	Chandil –Tatanagar	1 in 100 for a length of 3.25 Km	-do-	<u>EL/3.1.39/2 dt.12.1.99</u> Single WAG7 loco with banker between Kunki – Birarajpur
8.	Tata –Chandil (Up Direction)	1 in 100 for a length of 2.0 Km	Single WAG7 loco	<u>EL/3.1.39/2 dt.12.1.99</u> Single WAG7 loco with a banker between Gamharia – Birarajpur
9.	Banspani –Dongaposi	1 in 125 for a length 6 Km	Multiple WAG7 loco	<u>EL/3.1.39/2 dt.12.1.99</u> Single WAG7 loco with a banker between Banspani – Dongaposi
10.	Chandil –Anara –Adra (Dn Direction)	1 in 100 for a length of 3.5 Km	Multiple WAG7 loco	<u>EL/3.1.39/2 dt.12.1.99</u> i) Single WAG7 loco with Banker between Chandil – Borabhum ii) Run through conditions at Kandadih and Chharra stations
11.	Chandil –Anara –Adra (Up Direction)	1 in 125 for a length of 2.5 Km	Ex.CNI Load is 3200 t	<u>EL/3.1.39/2 dt.12.1.99</u> Single WAG7 loco with banker between Purulia-Kantadihand run through at Barabhum station
12.	Rajabera – Bokaro Steel City	1 in 100 for a length of 1.7 Km	-do-	<u>EL/3.1.39/2 dt.12.1.99</u> Single WAG7 loco with run through at Rajbera & Tupkadih

Note : WAG7 locomotive with gear ratio 16 : 65

4.0. ON SOUTH CENTRAL RAILWAY

S.NO.	SECTION	RULING GRADIENT	PRESENT WORKING PRACTICE	RDSO's RECOMMENDATIONS & REFERENCE
1.	Balharshah - Kazipet – Sanatnagar	1 in 200 for a length of 1.0 Km, 1 in 150 for a length of 5.5. Km and 1 in 100 for a length of 4.0 Km	Twin WAG5 with a banker between Aler –Sanatnagar	<u>Ref: EL/3.1.39/2 dt. 21.5.98</u> i) Twin WAG5 with a banker for Aler –SNF. ii) Twin WAG7 without banker
2.	Dornakal - Kondapalli	1 in 200 for a length of 1.7 Km	Single WAG5 in run through conditions	<u>Ref: EL/3.1.39/2 dt. 21.5.98</u> i) Single WAG5 in run through conditions as presently being used. ii) Single WAG7
3.	Duvvada – Vijaywada	1 in 200 for a length of 6Km	Single WAG5 with a banker between Duvvada–Thadi	<u>Ref: EL/3.1.39/2 dt. 21.5.98</u> i) Single WAG5 with a banker ii) Single WAG7 without banker
4.	Duvvada - Vijaywada – Kondapalli	-do-	-do-	i) -do- ii) -do-
5.	Gudur –Renigunta	1 in 200 for a length of 10.0 Km	Single WAG5 with a banker	<u>Ref: EL/3.1.39/2 dt. 21.5.98</u> i) Single WAG5 with a banker as presently being used. ii) Single WAG7 without banker

Note : WAG7 locomotive with gear ratio 16 : 65

5.0 ON SOUTHERN RAILWAY

S.NO.	SECTION	RULING GRADIENT	PRESENT WORKING PRACTICE	RDSO's RECOMMENDATIONS & REFERENCE
1.	Renigunta - Madras Harbour Route	1 in 200 for a length of 5.5 Km	Single WAG5 with a banker between Renigunta –Pultur	<u>EL/3.1.39/2 dt 2.4.98</u> Single WAG7 loco
2.	Madras Harbour –Omalur- Metturdam	1 in 200 for length of 7.2 Km and 1 in 125, 1 in 100, 1 in 80, 1 in 66 between Omalur –Metturdam for a length of 29 Kms	Twin WAG5 loco between Madras - Omalur and the load is split up there after and taken to Metturdam by Twin WAG5 loco.	<u>EL/3.1.39/2 dt 2.4.98</u> i) Use of double WAG7 loco and will run through condition where grade is 1 in 66. ii) Twin WAG5 with a banker WAG5 between Omalur – Metturdam iii) Single WAG7 between Madras Harbour –Omalur with instructions "not to stop the train on 1 in 150, 1 in 110 and 1 in 100 gradients" thereafter use of one WAG7 as banker between Omalur- Metturdam.

Note : WAG7 locomotive with gear ratio 16 : 65

6.0 ON WESTERN RAILWAY

S.NO.	SECTION	RULING GRADIENT	PRESENT WORKING PRACTICE	RDSO's RECOMMENDATIONS & REFERENCE
1.	Bhopal –Maksi –Ujjain- Godhra- Baroda-Sabarmali	1in 150 gradient for a length of 4.2 Km and 1 in 200 gradient of length 5.9 km.	Single WAG5 in run through conditions at number of stations.	<u>EI/3.1.39/2 dt.13.5.98</u> i) SingleWAG7 loco ii) WAG5 Hitachi loco with 16: 65 gear ratio in run through condition.
2.	Baroda – Bhopal / Baroda- Mathura 40 BOX/BCN load	-do-	SingleWAG5with run through instructions between Godhra -- Ratlam.	<u>EI/3.1.39/2 dt.13.5.98</u> i) Single WAG7 loco ii) WAG5 Hitachi loco with 16 : 65 gear ratio in run through condition
3.	Godhra –Ratlam 4000 t (49 BTPN) load	1in 150 gradient and 1 in180 gradient for a length of 20 Km.	Single WAG7 in run through conditions.	<u>EI/3.1.39/2 dt.28.10.99</u> i) Single WAG7 loco with banker between Limkheda –Jekot.

Note : WAG7 locomotive with gear ratio 16 : 65

TC/0061-2000 (Rev.-0)

Ramesh Chandra
Executive Director Stds.Elect.

D.O.No.EL/3.1.39/2

Dt 27/28-10-1999.

My dear Malhotra,

Sub: Overloading of traction motors on WAG7 Locomotives.

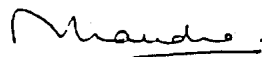
Ref: C.Rly. letter No.EL91/18/12 dt. 30-9-99.

The case of 49 BTPN (4000t) movement from Godhra to Ratlam by single WAG7 locomotive has been examined. The computer simulation has shown that 4000t load when hauled by single WAG7 on 1 in 150 up gradient (compensated) can at best clear a stretch of 6 km. For this it would be necessary that the attacking speed be 50 kmph and the exit speed will be 38 kmph. If the attacking speed is 40 kmph, then the exit speed will be 36 kmph and the stretch of 5 km can be so negotiated under run through conditions. For gradients of 1 in 130 for entry speed of 50 a length of 3.5 km can be negotiated with exit speed of 34 kmph and with entry speed of 40, stretch of 2.5 km can be negotiated with exit speed of 30 kmph. These figures have been worked out based on the consideration of overloading of traction motors.

I find from the gradient chart of the section that the section is practically a continuous up gradient of 1 in 150 between Limkheda to Jekot, that is between km 509.8 to 530.831, a continuous stretch of 21 km. I would recommend that you provide banker between Limkheda and Jekot for such loads for troublefree-service, better-section clearance time and to maintain good health of traction motors.

With best wishes,

Yours sincerely,


27.10.99.
(Ramesh Chandra)

Shri A.K.Malhotra,
Chief Elect.Loco Engineer,
Western Railway,
Churchgate,
Mumbai-400 020.

TC/0061-2000 (Rev.-0')

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भारत सरकार - रेल मंत्रालय
अनुसंधान अभिकल्प और मातृक संगठन
लखनऊ - 226011
Government of India - Ministry of
Railways
Research, Designs & Standards
Organization, LUCKNOW - 226011

No. EL 3.1.39/2

Dated 08/12.01.99

General Manager (Elect.)
South Eastern Railway,
Garden Reach,
Cullcutta-43

Sub: Analysis of Operational Conditions needed for running loads by single WAG7 Electric Locomotive with 16:65 Gear Ratio in Chakradharpur Division & Adra Division of S.E. Railway.

Ref: This Office letter of even number dated 9/10.12.98

Final report on study on train stalling of 58 BOX'N' loads hauled by single WAG7 Electric Locomotive on S.E. Railway was sent vide letter referred above. The report includes the analysis of stalling cases of Bilaspur & Nagpur Division and also recommended operational conditions in Para 5.8 of report. The similar analysis for Chakradharpur & Adra Division have also been done and in enclosed as Annexure for guidance of Railway.

2. The analysis of Kharagpur Division is not felt necessary as the gradient steeper than 1:200 at the stop signal are very few, and in Waltair Division, the operation is either with WAG6 in multiple or WAG5 consists.

(Ramesh Chandra)

Encl: As above

for Director General/Electrical

Copy to: Secretary (Elec.), Railway Board, Rail Bhawan,
New Delhi - 110001.

(Ramesh Chandra)

Encl: As above

for Director General/Electrical

T.C/0061-2000 (Rev-'0')

CHAKRADHARPUR DIVISION**1.0 LOAD: 58 BOX'N'**

Average: Number of trains operating per day.

DN DIRECTION**UP DIRECTION**

JSG -	BNDM	1.5	CNI-	JSG	3.0
JSG-	TATA	4.0	TATA-	JSG	1.0
JSG-	CNI	3.0	TATA-	BNDM	0.5
BNDM-	CNI	3.0	DPS-	JSG	0.5
BRMP-	TATA	0.17			
DPS-	TATA	0.5			
DPS-	CNI	3.0			

2.0 Operational Conditions needed for running loads by single WAG7 Electric Locomotive with 16:65 gear ratio.

2.1 Section: Jharusuguda (JSG) 514 km – Tatanagar (TATA) 249 km**2.1.1 DN Direction: JSG – TATA**

Condition	Location in km	Distance in km	Gradient	Remark
Run Through	508.0-506.0	2.0	1:150	H/S of Dhutra (505.4 Km)
Run Through	480.0-478.0	2.0	1:150	H/S of Bambra (477.5 Km.)
Banking	365.0-362.0	3.0	1:100	Manoharpur (372.9 Km.)-
Engine Ex.	369.5-365.0	4.5		Pusoita(361.9 Km.)-
MANOHAR-	357/18-355/18	2.0		Goilkera (345.4)
PUR	354.6-350.0	4.6		
GOILKERA	350.0-346.0	4.0		

2.1.1 UP Direction:

Condition	Location in km	Distance in km	Gradient	Remark
Banking Engine	451.0-456.0	5.0	1:100	Sonakhan – Sogra (450.1) (56.2)
Run Through	430/21 – 433.0	2.5	1:150	H/S Kansbahal (433.)
Banking Engine (TUNIA- POSOITA)	340.0-343.0 349.2-350.6 359.0-361.0	3.0 1.4 20	1:100 1:100 1:100	Tunia - Goilkera (338.0) (345.4) Mahadevsal – Posoita (350.4) (361.9)

2.2 Section : SINI (SNY) 404.3 Km – CHANDIL (CNI) 376.6 Km

2.2.1 DN Direction (SNY-CNI)

Condition	Location in km	Distance in km	Gradient	Remark
Banking Engine Ex KUNKI- CHANDIL	384.5 – 383.0 382.8 - 382.0 382.0 – 381.0 381.0 – 380.	1.5 0.8 1.0 0.8	1:100 1:400 1:100 1:100	H/s of Manikui (382.4 Km) & 1 Degree Curve. 2 Degree Curve.

2.2.2 UP Direction (CNI-SNY)

NIL

TC/0061-2000 (Rev.-‘0’)

2.3 Section: CHANDIL (CNI) 286Km- TATANAGAR (TATA) 249 Km

2.3.1 DN Direction:

Condition	Location in km	Distance in km	Gradient	Remark
Banking Engine Ex KUNKI- BIRARAJPUR	266.25 – 269.5	3.25	1:100	H/S of BIRP (265.5)

2.3.2 UP Direction (TATA-CNI)

Condition	Location in km	Distance in km	Gradient	Remark
Banking	260.75 – 261.0	0.25	1:100	With 3 Degree RH & LH Curve
Engine Ex	261.0 – 263.0	2.00	1:134	
GAMHAR IA- BIRARAJPUR	263.0 – 265.0	2.00	1:100	

2.4 Section: BANSPANI (BSPX) 399Km –DANGOAPSI (DPS) 366.5 Km

2.4.1 DN Direction (BSPX-DPS)

Condition	Location in km	Distance in km	Gradient	Remark
Banking	387.5 – 387.0	0.5	1:400	Starter of DJHR (387.5 Km)
Engine Ex	387.0 – 386.7	0.3	1:150	
BANSPANI- DANGOAP OSI	386.7 – 380.7	0.6	1:125	

ADRA DIVISION

1. LOAD : 58 BOX'N'

Average no. trains operating per day.

DOWN DIRECTION

CNI – ANR – DSEY	1.40
CNI – ANR – BKSC	0.03
VAA – JOC – DSEY	0.30
BJE – JOC – BURN	0.20
BKSC – RJB	2.20

UP DIRECTION

BJE – CNI	2.6
ADA – BKSC	1.9
MHQ – GMO	3.3
RJB – BKSC	4.9

2.0 Operational conditions needed for running loads by single WAG7 Electric Locomotive with 16:65 gear ratio.

2.1 Section: CHANDIL (CNI) 376.6 Km. – ANARA (ANR) 296.9 Km. – ADRA (ADA) 283.5 Km.

2.1.1 Down Direction (CNI – ANR – ADA)

Condition	Location in km	Distance in km	Gradient	Remark
Banking Engine Ex CHANDIL- BARA BHUM (354.2 Km.)	369.0 – 368.0 367.0 – 365.8 365.8 – 364.5 363.5 – 360.0	1.0 1.2 1.3 3.5	1:166 1:125 1:100 1:100	H/S of Nimdih 367.8 Km. At Up Gradient of 1:166
Run Through at KANTADIH (337.6 Km.)	341.25 – 339.3 339.3 – 337.8	1.95 1.50	1:166 1:125	H/S of Kantadih.
Run Through at CHHARRA (315.5 Km.)	317.5 – 315.75	1.75	1:100	H/S of Chharra

2.1.2 UP Direction (ADA – ANR-CNI):

Condition	Location in km	Distance in km	Gradient	Remark
Banking	327.5 – 329.2	1.7	1:166	H S of Tamna (329.6)
Engine Ex.	330.5 – 332.0	1.5	1:166	H S of Karmadih (337.6)
PURULIA	332.0 – 332.75	0.75	1:400	
(322.7 Km)	332.75 – 334.0	1.25	1:100	
-	334.0 – 334.5	0.50	1:200	
KANTADIH	334.75– 337.25	2.50	1:125	
(337.6 Km.)				
Run Through at BARABHUM (354.3)	352.2 – 353.6	1.40	1:100	H/S of Barabhum.

2.2 Section: RAJBERA (409.3 Km.) – BOKARO STEEL CITY (398.2 Km.)

UP Direction:

Condition	Location in km	Distance in km	Gradient	Remark
Run Through at RAJBERA (409.3 Km.)	405.2 – 406.5	1.30	1:100	H/S of Tupkadih
	406.5 – 406.8	0.30	1:400	
and TUPLADIH (404.6 Km.)	406.8 – 408.5	1.70	1:100	

Chief Electrical Engineer,
Eastern Railway,
Fairlie Place,
Calcutta – 700001

Sub : Optimum deployment of electric locomotives to haul 58 BOX 'N' loads.

Ref.: Your Letter No. EL/90/9/5/AKG dt. 13.4.98

The details of gradients, present operating systems, use of bankers as given in your letter have been studied and analysed. The comments of RDSO are as under :-

GENERAL:

On most of the sections single WAG7 is being used to haul 4700 t loads. Since the sections of Eastern Railway have gradients of 1 in 200, use of 16:65 gear ratio in all WAG7 locomotives shall reduce the current loading of tractions motors as compared to WAG7 locomotives of 18:64 gear ratio. RDSO have already issued modification Sheet No. WAG7/2 dt. 13.1.98 for implementation of the same in all WAG7 locomotives. An early implementation of the same shall help Eastern Railway in improving the reliability of WAG7 locomotives on Eastern Railway.

Section wise analysis for different. Routes is as under :-

I. KATRASGARH (KTH)–GOMOH (GMO)–MUGHALSARAI (MGS) SECTION

In this section 5 pairs of trains are running with 4700 t loads.

The section has a length of 415 Km and gradients of 1 in 146 with 3° curve for a length of 0.7 Km, 1 in 200 (maximum length 3.4 Km) etc. Presently diesel shunter is being provided as a banker engine between KTH – Nichitpur for a length of 4 Km. The 4700 t load is being hauled by single WAG7 locomotive.

Single WAG9 locomotive can haul 4700 t loads without banker in run through conditions.

Therefore the following alternatives emerge:-

- (i) Use of Signal WAG7 locomotive with banker engine between KTH- Nichitpur as per the present practice.
- (ii) Use of single WAG9 locomotive without banker in run through conditions.

II. KUSUNDA (KDS)–GOMOH (GMO)–MUGHALSARAI (MGS) SECTION

This section has 3 pairs of trains of 4700 t load.

This section has length of 400 Km and gradients of 1 in 200 for a length of 3.4 Km, 1 in 211 (maximum length 0.1Km) etc. as per the gradient information submitted in your above reference letter. Presently single WAG7 locomotive is being used with banker engine between KDS – TET for a length of 4 Km.

On study of this section single WAG7 locomotive with 16:65 gear ratio can haul 4700 t loads without banking arrangement.

On perusal of the working time table for Dhanbad division the ruling gradient for KDS – TET section is shown as 1 in 172 Up and Dn directions. Therefore the correct gradient on this section may be got checked up. For this study the gradient of 1 in 211 and 1 in 200 has been taken as advised in your letter.

Since presently banker is being provided, actual Track curvature may be checked up and got corrected.

Therefore the following alternative emerge: -

Use of Single WAG7 locomotive with 16:65 gear ratio without banker anywhere.

III. PATHRADI (PEH)–PRADHANKHUNTA (PKA)–GMO–MGS SECTION

Two pairs of trains are running on this section with 4700 t loads.

The section has a length of 421 Km and gradient of 1 in 200 for the maximum length or 13.2 Km, with 1.5 degree curve. Presently single WAG7 locomotive is running with banker arrangement between PEH – PKA for a length of 22.4 Km.

On study of this section it is found that the gradient is mostly 1 in 200. Therefore use of Single WAG7/WAG9 locomotives without banker arrangement should be sufficient to haul 4700 t loads on this section. In view of the above the following alternatives emerge:-

- (i) Use of Single WAG7 locomotive with 16:65 gear ratio without banker arrangement.
- (ii) Use of single WAG9 locomotive without banker arrangement.

IV. BKSC – RAJABERA – GMO – MGS SECTION

5 pairs of trains are running with 4700 t loads.

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The section has a length of 397 Km with gradient 1 in 200 and 1 in 100 (length of 1.8 Km).

Presently single WAG7 locomotive is running with banker arrangement between BKSC – GMO for a length of 21 Km.

On study of these sections single WAG7 with 16:65 gear ratio or single WAG9 locomotive can negotiate this section without banker arrangement anywhere. In view of the above following alternatives emerge:-

- (i) Use of single WAG7 loco 16:65 gear ratio without banker in run through condition. In computer simulation, the loco clears the rising grade (13 Km long) at 33 kmph by attacking at 59 kmph at the start of grade.
- (ii) Use of Single WAG9 loco without banker in run through condition.

V. RAY – KHILARI – SONENAGAR – MGS SECTION :-

14 pairs of trains are running on this section with 4700 t loads.

The section has a length of 500 Km with gradient of 1 in 182 for a length of 13 Km.

Presently Single WAG7 or single WAG9 or twin WAG5 locomotive is running in this section.

On study of this section the following alternatives emerge:-

- (i) Use of twin WAG5 locomotive.
- (ii) Use of Single WAG7 locomotive with 16:65 gear ratio in run through conditions.
- (iii) Use of single WAG9 locomotive.

VI. PTRU – GHD – MGS SECTION

3 pairs of trains are running with 4700 t loads.

The section has a length of 429 Km and gradient of 1 in 186 for 13 Km. Presently single WAG7 locomotive or twin WAG5 or single WAG9 is running on this section.

On study of the section, the following alternatives emerge:-

- (i) Use of twin WAG5
- (ii) Use of single WAG7 in run through conditions
- (iii) Use of single WAG9

VII. DKAE – ANDAL (UDL) – BKSC SECTION

3 pairs of trains are running with 4700 t loads in this section.

The section has a length of 312 Km and gradient of 1 in 200 for a length of 6 Km.

Presently single WAG 7 is running on this section.

On study of the section, following alternatives emerge:-

- (i) Use of single WAG7 loco as per the present practice.
- (ii) Use of single WAG9 locomotive for higher average speeds.

VIII. PEH – UDL – DKAE SECTION :-

3 pairs of trains are running on the section.

The section has a length of 272 Km and Single WAG7 is running 4700 t load with banker between PEM – PKA. The gradient is mostly 1 in 200 (Maximum length 2.1 Km).

On study of the section, single WAG7 can be used without banker for hauling 4700 t load.

Therefore following alternatives emerge:-

- (i) Use of single WAG7 with 16:65 gear ratio
- (ii) Use of single WAG9.

IX. BRR – GMO – MGS SECTION

1 pair of train is running in this section.

The section has a length of 440 Km and gradients of 1 in 200 for a maximum length of 6 Km.

Presently single WAG7 loco is running with 4700 t load.

On studying the section single WAG7 with 16:65 gear ratio can haul 4700 tonne load on this section.

X. BRR – STN – UDL – BWN – DKAE SECTION:-

14 pairs of trains are running on this section.

The section has a length of 218 Km and gradients of 1 in 200 for a maximum length of 3.1 Km.

Single WAG7 with 16:65 gear ratio shall be able to haul 4700 tonne loads on this section as per the present practice.

XI. MGD – GMO – BKSC SECTION:-

1 pair of train of 4700 tonne load is running on this section.

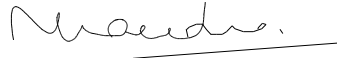
The section has a length of 398 Km and gradient of 1 in 200 for a maximum length of 3.1 Km.

Single WAG7 with 16:65 gear ratio shall be able to haul 4700 t loads on this section.

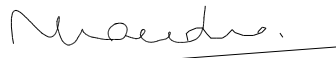
Stalling of Loads:-

To avoid stalling in bad weather conditions, it is suggested that preferably run through conditions may be maintained. For locations where it is difficult to provide run through conditions, assisting engine may be kept.

Eastern Railway is requested to examine the above suggestions and may conduct field trails on the chosen alternative and take suitable decisions best suited for train operation.


(Ramesh Chandra)
for Director General/ Elect.

Copy to: Secretary (Electrical), Railway Board, Rail Bhawan New Delhi – 110 001


(Ramesh Chandra)
for Director General /Elect.

Chief Electrical Engineer,
South Central Railway,
Rail Nilayam,
Secunderabad – 500 071

Sub: Optimum deployment of electric locomotives to haul 58 BOX 'N' loads.

Ref.: Your Letter No. E 223/ Electric Loco Trials dt. 31.3.98

The details of gradients, present operating systems, use of bankers as given in your letter have been studied and analysed.

It is noted that out of a total of 134 pairs of freight trains 37 pairs are 58 BOX 'N'. Operations of 58 BOX 'N' loads only have been analysed. The section wise analysis of different routes is as under:-

I. BALHARSHAH (BPQ) – KAZIPET (KZJ) – SANATNAGAR (SNF) SECTION

Out of 24 trains each way in BPQ – KZJ section, 8 are 58 BOX 'N' loads. In KZJ – SNF section out of 16 pairs only 8 are 58 BOX 'N' loads.

This section has a length of 383 Km and the loaded direction is from Balharshah to Sanatnagar via Kazipet. This section has got gradients of 1 in 100 (maximum length 4 Km), 1 in 150 (maximum length of 5.5 Km) and 1 in 200 (maximum length 1.0 Km).

Presently twin WAG5 locomotives are running in this section with banker between ALER and SNF.

Use of twin WAG7 locomotives can eliminate the present banker arrangement thus improving the operation of this section. Therefore the following alternatives emerge for this section:-

- (i) Use of twin WAG5 locomotives with banker arrangement from Aler to SNF as per the present practice.
- (ii) Use of twin WAG7 locomotive without banker arrangement anywhere.

II. DORNAKAL (DKJ) – KONDAPALLI (KT) SECTION

Out of 20 trains each way, 4 are 58 BOX 'N' loads.

This section has a length of 108 Km and a gradient of 1 in 200 (maximum length of 1.7 Km). Presently single WAG5 is running 4700 t load with run through conditions. Use of single WAG7 locomotive can further improve the running by avoiding stalling of loads in bad weather conditions. Therefore the following alternatives emerge:-

- (i) Use of Single WAG5 locomotive in run through condition as per the present practice.
- (ii) Use of single WAG7 locomotive (16 :65 gear ratio) which can start and haul 4700 t loads on 1 in 200 gradient therefore, improving the running even in bad weather conditions.

III. DUVVADA (DVD) – VIJAYWADA (BZA) – GUDUR SECTION:-

Out of 20 pairs of trains in DVD – BZA section, 8 are 58 BOX ‘N’ loads. In BZA-GDR section out of 26 pairs of trains, 4 pairs are of 58 BOX ‘N’.

The section has a length of 611 Km and gradients of 1 in 200 for a maximum length of 6 Km. Presently single WAG5 is hauling 4700 t loads with banker for a length of 6 Km between DUVVADA (DVD) – THADI (THY).

Use of single WAG7 (16:65 gear ratio) on the section can eliminate the use of banker engine along with improved running on the section. Therefore following alternatives emerge:-

- (i) Use of single WAG5 locomotive with banker engine in between DVD-THY as per the present practice.
- (ii) Use of single WAG7 (16:65 gear ratio) locomotive without banker anywhere on the section.

IV. DUVVADA (DVD) – VIJAYAWADA (BZA) – KONDAPALLI (KT) SECTION:-

Out of 20 pairs of trains in this section, 8 are 58 BOX ‘N’ loads.

This section has a length of 341 Km and has gradients of 1 in 200 for a maximum length of 6 Km. Presently single WAG5 is hauling 4700 t loads with banker for a length of 6 Km between DVD – THY.

Use of single WAG7 (16:65 gear ratio) on the section can eliminate the use of banker engine along with improved running on the section. Therefore following alternatives emerge:-

- (i) Use of single WAG5 locomotive with banker engine in between DVD-THY as per the present practice.

(ii) Use of single WAG7 (16:65 gear ratio) locomotive without banker anywhere on the section.

V. GUDUR – RENIGUNTA SECTION:-

Out of 8 pairs of trains in this section, 3 are of 58 BOX 'N'.

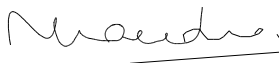
This section of 81 Km length has mostly gradients of 1 in 200 (maximum length 10 Km).

Presently banker is being provided in the section while working 4700 t loads with single WAG5 locomotives.

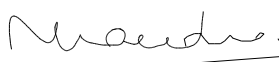
Use of single WAG7 (16:65 gear ratio) locomotives can eliminate the use of banker on the section. Therefore following alternatives emerge:-

- (i) Use of single WAG5 locomotive with banker engine.
- (ii) Use of single WAG7 (16:65 gear ratio) locomotive without banker anywhere.

South Central Railway is requested to examine the above suggestions and may conduct field trials on the chosen alternative and take suitable decisions best suited for train operation.


(Ramesh Chandra)
for Director General/Elect.

Copy to: Secretary (Electrical), Railway Board, Rail Bhawan New Delhi – 110 001


(Ramesh Chandra)
for Director General/Elect.

No. EL/3.1.39/2

Dt. 14.5.98
18.5.98

Chief Electrical Engineer,
Central Railway,
Mumbai CST

Sub: Optimum deployment of electric locomotives
to haul 58 BOX 'N' loads.

Ref: Your D.O. Letter No.L.253.AC.128 dt. 2.3.98

The details of gradients, present operating systems, use of bankers as given in your letter have been studied and analysed. All the data given by you is for 58 BOX 'N'. It is presumed that 40 BCN loads are not plying in your section. The comments of RDSO are as under:-

GENERAL:

On most of the sections single WAG7 is being used to haul 4700 t loads. Since the sections on Central Railway are graded sections of 1 in 200 and 1 in 150, use of 16:65 gear ratio in all WAG7 locomotives shall reduce the current loading of traction motors as compared to WAG7 locomotives of 18:64 gear ratio. RDSO have already issued modification sheet No. WAG7/2 dated 13.1.98 for implementation of the same in all WAG7 locomotives. An early implementation of the same shall help Central Railway in improving the reliability of WAG7 locomotives on Central Railway.

Section wise Analysis of different routes is as under:-

I. NGP-BSL-IGP Section (690 Km):-

(a) NGP – BSL Analysis:-

This section has gradients of 1 in 200 1 in 165, 1 in 150 and 1 in 120 for a maximum length of 5 Km (1 in 150) and 2 Km for 1 in 120 in a run of 382 Km between NGP and BSL.

Presently 4700 tonne load is being hauled by single WAG7 loco with the overloading of traction motor, at certain locations. As per RDSO current recording report No. IR-64 of Oct-97, the banker was recommended in Paunar- Sevagram-Wardha section.

(b) BSL – IGP Section Analysis:-

Presently banker is being used between CSN & SUM on BSL – IGP section for a length of 78 Km in a total run of 308 Km. of BSL, and IGP, with single WAG7 as train engine.

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Computer simulations have been done for running of 4700 t load in the above section with single WAG7 locomotive and single WAG9 locomotive. Due to rising gradients of 1 in 132 in BSL-IGP and 1 in 120 in NGP-BSL, single locomotive either WAG7 or WAG9 is not able to negotiate. Therefore, use of banker is justified. Further simulations have been done by using twin WAG 5 locomotives in NGP – BSL –IGP section and it has been found that twin WAG5 is able to negotiate the above gradients and the use of banker will be eliminated.

It is understood that these loads are coming from South Eastern Railway starting from Korba and going to Nasik via BSL - Durg-AQ-BSL-NK route. With the running of higher “Axle Load wagons for which the work is in advanced stage, the 58 BOX, ‘N’ load shall be increased from 4700 t to 5141/5466 tonnes in above one year’s time. For these wagons this route has been identified by Railway Board. These loads cannot be hauled by single WAG7 and will need twin WAG5 locos. Thus, in future we may have to resort to twin WAG5 operation on the entire route.

In view of the above following are the alternatives:-

- (i) Single WAG7 with banker at following locations:
 - Paunar – Sevagram – Wardha
 - CSN - SUM
- (ii) Twin WAG5 right from Korba to NK. No baning is required anywhere.

II. BSL-KNW-ET Section (301 Km):-

This section has rising gradients of 1 in 110 (4 Km long) and 1 in 150 (4 Km long).

Presently 4700t loads are running on these section by providing banker for a length of 20 Kms between NPNR – DGW section in total run of 301 Kms of BSL – KNW – ET section

Computer simulation have been done by running 4700t load in the above section with single WAG9 locomotive and it has been found that single WAG9 locomotive is able to negotiate the above section in run-through condition at an average speed of around 50 kmph on the graded section where presently banker is being provided with single WAG7 locomotive. Similarly computer simulation were done with twin WAG5 locomotive and they are also able to negotiate the section without need of any banker.

In view of the above following are the alternatives:-

- (i) Single WAG 7 with banker between NPNR – DGW
- (ii) Twin WAG 5 without banker
- (iii) Single WAG 9 without banker

III. Ghugus – Tadali- Wardha- Nagpur – Amla-Itarsi-Bhopal (582 Km)

Presently this section is running 4700 t load with single WAG7 locomotive with banker in two sections i.e. in TEO –CCD (length 17 Km), and BNI-BKA (length 20 Km) in a run of 582 Km between Ghugus – Tadali- Wardha- Nagpur – Amla-Itarsi-Bhopal.

Overloading has been recorded by RDSO as per the traction motor current measurements report No. IR-64 of Oct-97. As per the report Banker is required at additional three locations viz :-

- (i) Chikni Road – Nagri
- (ii) Kohli – Metipanora
- (iii) Narkher- Pandhurana

due to over loading of traction motors.

Computer Simulations have been done on Ghugus – Tadali- Wardha- Nagpur – Amla-Itarsi-Bhopal section by running twin WAG7 locos. The twin WAG7 is able to negotiate this section without need of banker at an average speed of 50 kmph on sections where presently banker is provided. Therefore, use of twin WAG7 will improve the operation on this section and will eliminate the overloading of traction motors also. It is understood that 4700 tonne loads are originating from coal mines near Balharshah/ Ghugus. Therefore from Balharshah/ Ghugus itself twin WAG7 can be provided. Twin WAG5 is not enough for this duty.

In view of above following alternatives emerge:-

(i) Single WAG7 with banker at following five locations:-

- Chikni Road - Nagri
- Kohli – Metipanora
- Narkher - Pandhurana
- TEO - Chinchwad
- Budni – Barkhera

(ii) Twin WAG7 without banker anywhere. This will also improve the running time substantially.

IV. NKJ – BIN – BPL (400 km)

Dn direction is running empty loads with ruling gradient 1:90.

Up direction is loaded direction having ruling gradient of 1 : 200 with 2 degree curve. Compensated gradients are, therefore, sharper than 1:200, as stated in your letter. The compensated gradient comes to 1:172. This may please be got confirmed.

Presently single WAG7 is running on this section and banker is provided between Ganeshganj – Girwar section for a length of 14 Km in a total run of 400 Km.

Computer simulations have been done with single WAG7 loco with 16:65 gear ratio and it is able to negotiate this section at an average speed of 35 Kmph on the graded section of Ganeshganj – Girwar. However it causes traction motor overloading as per RDSO Report No. IR-62 of April 97 needing banker.

In view of the above following alternatives emerge:-

- (i) Single WAG7 loco with banker at Ganeshganj – Girwar
- (ii) Single WAG9 loco without banker.

Central Railway is requested to examine the above suggestions and may conduct field trails on the chosen alternative and take suitable decisions best suited for train operation.



(Ramesh Chandra)
for Director General/Elect.

Copy to: Secretary (Electrical), Railway Board, Rail Bhawan New Delhi – 110 001



(Ramesh Chandra)
for Director General/Elect

Chief Electrical Engineer,
Western Railway,
Churchgate
Mumbai – 400 001

Sub: Optimum deployment of electric locomotives to haul 58 BOX 'N' loads.

Ref.: Your D.O. letter No. EL/91/18/12 dt. 17.3.98

The details of gradient, present operating systems, usage of bankers, as given in your letter have been studied and analysed. Sectionwise analysis of existing pattern and alternative/s are given below for your information:-

(I) Bhopal-Maksi-Ujjain-Godra-Baroda-Sabarmati:

Existing Pattern:- This section is having rising gradient of 1 in 150 & 1 in 200 for maximum lengths of 4.2 Km and 5.9 Km respectively. Presently the 4700 tonne train is being hauled by single WAG5 locomotive by issuing instructions of run through signals between a number of stations.

Analysis:- Theoretically 4700 t loads on 1 in 150 up gradient require a traction motor current of 1150 amp to generate a tractive effort of 35.6 t at 10 kmph speed. As per the permitted values of traction motor current from the short time loading curve No. KFT-3760 (copy enclosed) of M/s Alstom for TAO traction motors permitted loading is for 5 minutes for a current of 1150 Amps. Similarly the short time loading curves of Hitachi traction motors No. GEL –1075 (copy enclosed) the permitted loading is for a period of 11 minutes. Therefore WAG5 with TAO motors can be run on 1 in 150 gradients for a length of only 0.8 km and Hitachi traction motor WAG5 locos can be run for a length of 1.6 Km (Considering the available speed of 10 Kmph on 1 in 150 gradient while hauling 4700 t loads). Since the negotiated 1 in 150 gradient has a maximum length of 4.2 Km it is clear that the traction motors as well as the transformers and the associated equipments are getting over loaded for both types of WAG5 locomotives (TAO & Hitachi) as high as six times in case of TAO traction motor locos and 2.6 times in case of Hitachi locos.

Alternatives: To avoid the above problem the following alternatives can be adopted:-

- (i) Use of single WAG7 locomotive with 16:65 gear ratio on this route shall eliminate the problem of overloading of traction motors and transformers. Also it will avoid stalling of 1700 tonne loads on 1 in 200 gradients as single WAG7 with 16:65 gear ratio can start and haul 4700 loads (Haulage chart enclosed).

- (ii) The existing WAG5 Hitachi locos can be converted to 16:65 gear ratio from the present 18:64 gear ratio so that the traction motor current gets reduced to a value of 1000 Amp from the present value of 1150 Amp. Therefore at 10 Kmph speed of 1 in 150 gradient the permitted loading length comes to nearly 4 km from the transformer loading point of view because the loading of 120% is permitted on transformer for a period of 30 minutes i.e. $750 \times 1.20 = 900$ Amps per motor. Therefore 1000 Amp per motor the transformer loading shall be for a period of nearly 25 minutes i.e. giving a loaded length of 4 Kms on 1 in 150 gradient.

(II) Godra – Ratlam

Presently 4000t loads of 48/49 BTPN loaded wagons are being run from Sabarmati side to MTJ/BPL. This section has got rising gradients of 1 in 150 for a length of 6.2 Kms and the trains are being hauled by single WAG7 locomotives by issuing run through instructions on different stations where these gradients fall. There have been stalling cases due to OHE/DJ tripping / equipment failures in the locomotives / drizzling as single WAG7 locomotive with 18:64 gear ratio cannot start 4000 t load on 1 in 150 gradient.

Alternative: On studying the above section use of single WAG7 locomotive with 16:65 gear ratio instead of existing 18 : 64 gear ratio is ideal for this route because 4000 t loads can be started and hauled on 1 in 150 gradient by single WAG7 locomotive having 16:65 gear ratio. This will help in elimination the use of bankers/double headings whenever loads get stalled due to abnormalities.

(III) 40 BOX/BCN in BRC-BPL or BRC-MTJ sections:

Presently single WAG5 is being used to haul 40 BOX/BCN loaded rakes with run through instructions on GDA-RTM section. The section has long stretches of 1 in 150 and 1 in 180 for a length of as high as 20 Kms. Loads are at times getting stalled and cleared by banker/double heading.

Alternative :

- (i) **Use of Single WAG7 loco:-** On studying the above section use of single WAG7 of either gear ratio (18:64 or 16:65) is recommended as it can start and haul 40 BCN/BOX loads on 1 in 150 gradients. This will also avoid stalling of loads and use of bankers.

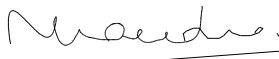
(ii) Use of single WAG5 in run through condition:-

- (a) **WAG5 (TAO)** : on study of WAG5 (TAO) loco the permitted length of 1 in 150 which can be negotiated comes to 11 Km at a speed of 24 kmph for a tractive effort of 26.2 tonnes. Therefore even in run through WAG5 (TAO) is going to be overloaded.
- (b) **WAG5 (Hitachi) 18:64 gear ratio:-** WAG5 (Hitachi) 18:64 gives a permitted loading length of 18 Km from transformer loading point of view on 1 in 150 grade for a tractive effort of 27.4 t and speed of 43 kmph. Therefore it is marginally overloaded in run through conditions.
- (c) **WAG5 (Hitachi) 16:65 gear ratio:-** WAG5 (Hitachi) 16:65 gives a permitted loading length of 27.5 km from transformer loading point of view for a tractive effort of 27 t and speed of 50 kmph giving sufficient margin.


Therefore use of Hitachi WAG5 locos of 16:65 gear ratio is recommended on this section for run through conditions.

Western Railway is requested to examine the above suggestions and may conduct field trails on the chosen alternative and take suitable decisions, best suited for train operations. RDSO will be too glad to provide any assistance.

Encl: As above


(Ramesh Chandra)
for Director General/ Elect.

Copy to: Secretary (Electrical), Railway Board, Rail Bhawan, New Delhi – 110 001.


(Ramesh Chandra)
for Director General/ Elect.

T.C/0061-2000- (Rev-'0')

Chief Electrical Engineer,
Southern Railway,
Headquarters Office ,
Electrical Branch,
Park Town,
Chennai-600 003

Sub: Optimum deployment of electric locomotives to haul 58 BOXN load

Ref: Your letter No. E.162/ET/4/41 dt. 3.3 98

The details of gradients, present operating systems, usage of bankers, as given in your letter have been studied and analysed. Section wise analysis of existing pattern and alternative/s are given below for your information :-

(i) Renigunta – Madras Harbour Route :

Existing Pattern :- This section is having rising gradients of 1 in 200, 1 in 150 and a small patch of 0.4 Km of 1 in 90. Presently the 4700 t train is being hauled by single WAG5 loco, with additional one WAG5 loco as banker between Renigunta and Puttur section to negotiate a rising gradient of 1 in 200. Standing instructions have also been issued not to stop the train between Puttur and Aarkonam, where there are rising gradients of 1 in 200 for a length of 1 to 1.5 Kms i.e. the train is negotiating the gradient of 1 in 200 in momentum. Further from Aarkonam to Madras Harbour there are mostly down gradients and the loco is able to negotiate a small section of 0.6 Km length of 1 in 150 rising gradient and 0.4 Km length of 1 in 90 rising gradient by single WAG5 locomotive.

Alternative :- On study of this section it has been found that single WAG7 locomotive can eliminate the use of banker in Renigunta – Puttur section and also present operating restrictions in Puttur – Aarkonam section will not be required. This will improve train operations as a result of elimination of banker attachment and detachment and also total running time will improve since WAG7 is a higher H.P. loco, Refer haulage chart enclosed.

(ii) Madras Harbour – Omalur – Metturdam:

Existing Pattern : This route is having rising gradients of 1 in 200, 1 in 150, 1 in 100 and 1 in 90 between Madras Harbour –Omalur section. Between Omalur – Metturdam section (29 km long) there are rising gradients of 1 in 125, 1 in 100, 1 in 80 and 1 in 66 for lengths varying from 1.8 km to 0.4 km. Presently 4700 t loads are being hauled by use of WAG5 in multiple between Madras Harbour to Omalur, thereafter from Omalur to Metturdam the load of 4700 t is split up and taken to Metturdam with WAG5 multiple locos.

From the data given by you it is not clear as to why the load of 4700 t is being split up for haulage between Omalur and Matturdam. It appears that the split up load is being run with the incoming multiple WAG5 locomotives and an additional engine is being provided at Omalur for these two loads which are formed by splitting up of the original 4700 t load coming from Madras Harbour. This aspect may please be clarified.

Alternatives:-


Alt. I – Use of 2 WAG7 instead of 2WAG5:- With the use of multiple WAG7 locomotives, it is possible to start and haul 4700 t loads on gradients of upto 1 in 80. However the gradient of 1 in 66 for a length of 1 km can be negotiated in momentum between Omalur and Metturdam. This will help in avoiding the splitting up of 4700 t loads and improve the train running on this section.

Alt. II – Instead of splitting the load at Omalur, use one WAG5 as Banker:- Use of banker engine, single WAG5, between Omalur – Metturdam can also help in running through the 4700 t loads on this section.

Alt. III – Use of single WAG7 locomotive between Madras Harbour to Omalur with the instructions “not to stop the train on 1 in 150, 1 in 110 and 1 in 100 gradients” and thereafter use of banker, one WAG7 locomotive, between Omalur to Metturdam.


Southern Railway is requested to examine the above suggestions and may conduct field trials on the chosen alternative and take suitable decisions, best suited for train operations. RDSO will be too glad to provide any assistance.

DA: As above



(Ramesh Chandra)
for Director General/ Elect.

Copy to: Secretary (Electrical), Railway Board, New Delhi –1 for information.



(Ramesh Chandra)
for Director General/ Elect.

T.C/0061-2000 (Rev.-‘0’)