सत्यमेव जयते

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

Annexure – B
KAVACH
Loco Pilot's Operation-cum-indication Panel
(LP-OCIP (DMI))
Display Requirements
Amendment-2

Issued by

S &T DIRECTORATE
RESEARCH, DESIGNS & STANDARDS ORGANISATION
MINISTRY OF RAILWAYS
MANAK NAGAR

LUCKNOW – 226 011

FOR FIELD TRIAL

अआमासं RDSO
रेल अग्रदूत Transforming Railways
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MANISH KUMAR GUPTA	Digitally signed by MANISH KUMAR GUPTA Date: 2023.08.11 10:33:30 +05'30'	RAVINDRA NATH SINGH	Digitally signed by RAVINDRA NATH SINGH Date: 2023.08.11 10:37:27 +05'30'	Pavan Kumar Gudavalleti	Digitally signed by Pavan Kumar Gudavalleti Date: 2023.08.10 13:46:22 +05'30'	: Page 1 of 39
Manish Kumar Gupta SSE/S&T		R. N. Singh AIE/S&T/RDSO/SC		G. Pavan Kumar ED/Tele-II		

Amdt	Date of issue	Amendment
1	10.10.2022	• B4.4.5 (c) This circle shall be equally divided into 125 divisions with each division indicating a speed difference of 2 kmph.
		• B4.6.4 (e-7) distance from vertical & horizontal boundary line modified as 660 and 20.
		• B4.7.3 (d) message to be displayed in added in item 58, 59, 60.
		• B7.8 Option for selection of train configuration is modified as per suggestion of Wagon Dte.
2	11.08.2023	• Cl. B4.6.4.3 (a) modified inline with Annexure-C for display of signal abbreviation.
		• CL B4.7.3 (d)-44: Brake Testing – LE Brake applied, BC X.YY Kg/ cm^2 is added.

B1   Introduction

B1.1   This document sets forth a general, operational, system, technical, functional, and performance requirements for Onboard KAVACH Driver Machine Interface so that there is clear and consistent understanding between the Loco Pilot and the KAVACH system.

B1.2   The specifications for the LP-OCIP (DMI) panel shall achieve a commonality between the various vendors. This shall be as:-

B2   Scope

B2.1   This document defines the interface between the loco pilot and the on-board Onboard KAVACH unit by detailing: Information to be displayed to the loco pilot in response to operational situations. This includes visual information for speed and distance monitoring, the symbols and text messages as well as audible information.

B3   Definition and Acronym

Acronym / Term	Description / Definition
LP-OCIP (DMI)	Loco Pilot operation cum Indication Panel (Driver Machine Interface)
Unit	All across the document unit is defined as each pixel size for a 800 X 600 screen resolution.
MA	Movement Authority
RGB	Red Green Blue Pattern
X Location	The pixel value along the horizontal scale.
Y Location	The pixel value along the vertical scale.
X.XX	Number Decimal Point Number Number format
Microsoft Sans Serif or Helvitica	A font variation available by default with the text editors
DS-Digital	A font variation available for download in the internet

B4   Arrangement Of Information

B4.1   Basic Display

B4.1.1   The Display shall support a resolution of 800 (width) X 600 (height).

B4.1.2   The default background colour shall be Black (coded BLK).

B4.1.3   There shall be a default border width of size 1 unit and colour GREY (coded GRY) across all the objects that are added in the screen.

B4.1.4   All the given text shall be in White colour (coded WHT) unless a specific colour in mentioned against it.

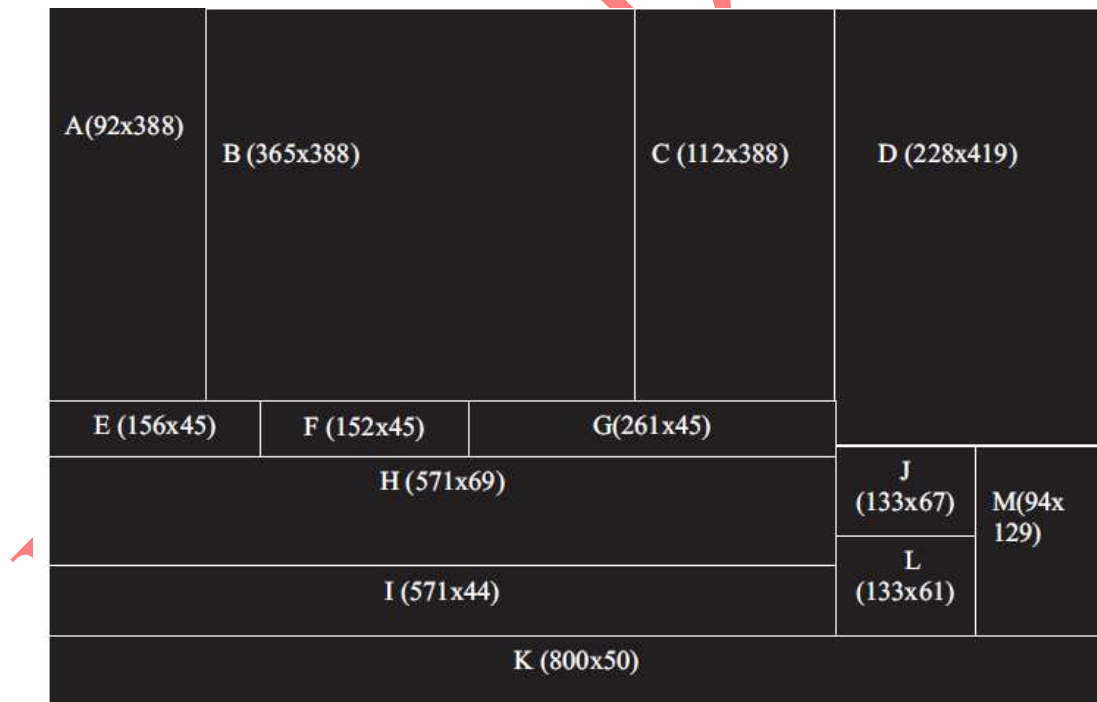B4.1.5   The RGB pattern of the various colours used across the display screen shall have the following values.

MANISH KUMAR GUPTA — Digitally signed by MANISH KUMAR GUPTA Date: 2023.08.11 10:33:30 +05'30'	RAVINDRA NATH SINGH — Digitally signed by RAVINDRA NATH SINGH Date: 2023.08.11 10:37:27 +05'30'	Pavan Kumar Gudavalleti — Digitally signed by Pavan Kumar Gudavalleti Date: 2023.08.10 13:47:14 +05'30'	: Page 3 of 39
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Table B.2: Colour Combinations for DMI

S.No	Colour Name	Code	Red	Green	Blue
1	White	WHT	255	255	255
2	Black	BLK	0	0	0
3	Light Grey	LGY	128	128	128
4	Medium Grey	MGY	150	150	150
5	Grey	GRY	192	192	192
6	Light Blue	LBL	0	139	206
7	Yellow	YLW	223	223	0
8	Light Orange	LOR	255	165	0
9	Orange	ORG	255	128	64
10	Red	BRD	255	0	0
11	Light Green	LGR	128	255	0
12	Green	GRN	0	255	0
13	Dark Green	DGR	0	128	0

B4.2 **Display Screen**

B4.2.1 The Display screen shall have the divisions a follows

ISO 9001: 2015	Effective from 11.08.2023	RDSO/SPN/196/2020	Version 4.0 d3 -	**Amdt-2**

Document Title : Specification of Kavach (The Indian Railway ATP)-LP-OCIP Display Requirement -**Annexure-B**
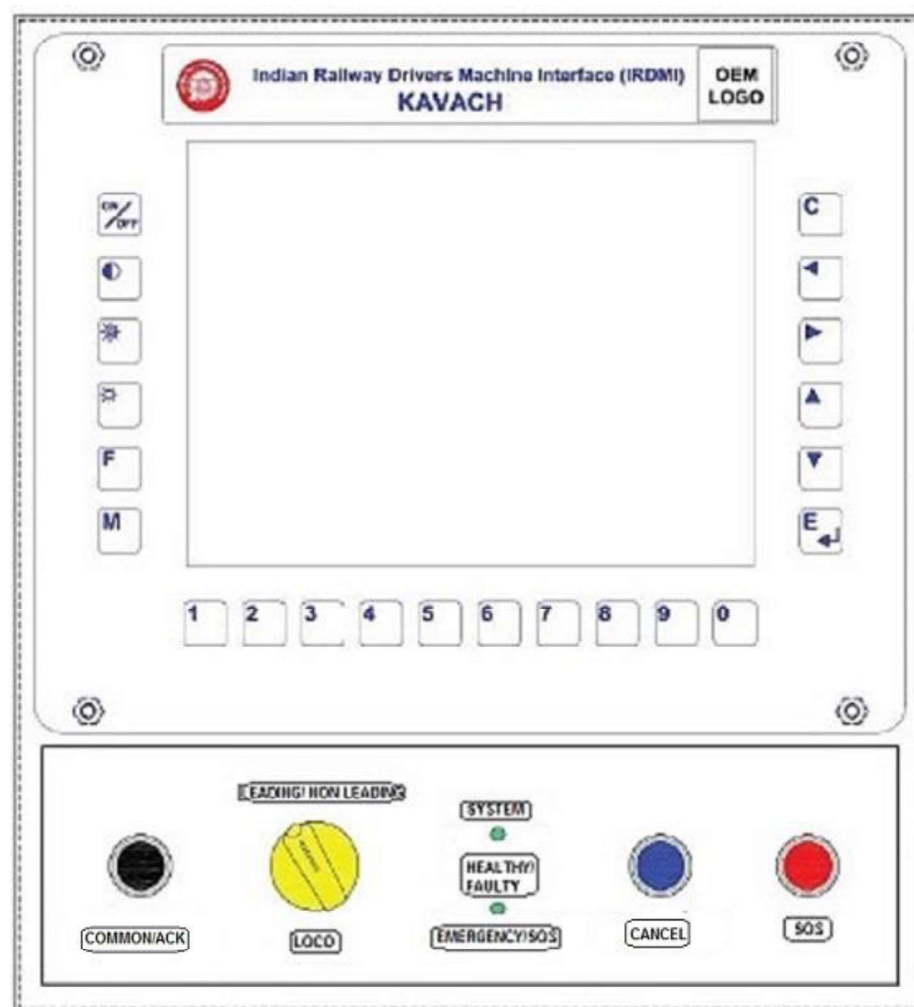
Figure B.1: DMI Outer View for Locomotive

Note:

(i)   LEDs.

(a)   System LED is Bl colour (Green & Red)

System Healthy- Green Colour

System Faulty: Red Colour

(b)   Emeregency/SOS LED is Bl colour (Green & Red)

Default: Green Colour

SOS- Red Colour

(ii)   Push Buttons

a)   SOS-Red Colour

b)   Cancel-Blue Colour

c)   Common/Ack-Black colour

(iii)   Rotary Switch knob is Yellow colour

(iv)   The bottom box shall be removed for self propelled vehicle. Leading or Non-leading switch is not required is such cases. The buttons and indication shall be suitably located on Loco pilot desk

B4.2.2   The various text layouts along the screen shall be as follows.
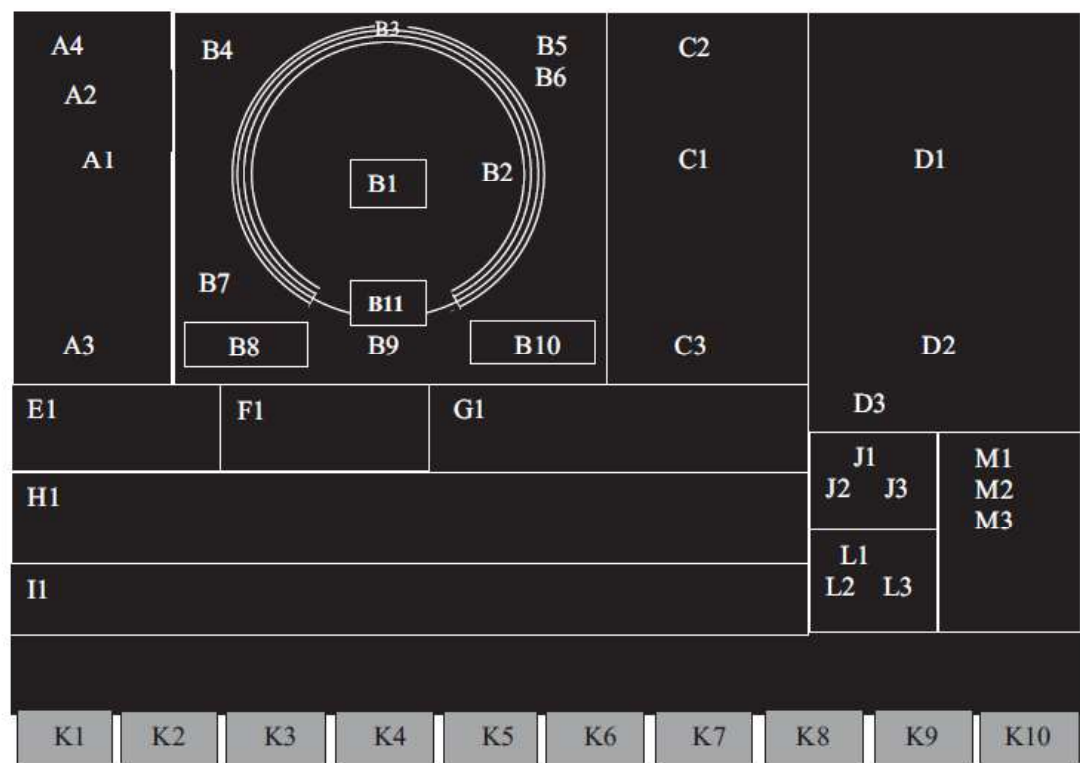
S.No	Re-gion	Description
1	A1	Target Distance Bar Graph
2	A2	The Text "Target Distance" has to be provided.
3	A3	The distance (in meters) to be displayed here in number format followed by "m".
4	A4	Description for Target Distance (Turnout / PSR / TSR/EOA / SoS/Collision)
5	B1	A Circle of diameter 52 units to display the Speed value in number format
6	B2	Region for indicating the speed divisions.
7	B3	Region to show in colour the status of the train speed.
8	B4	Loco Id (Alaphanumeric or Numeric)
9	B5	Date Display Location
10	B6	Time Display Location
11	B7	Speed Limit Information in Number format
12	B8	Braking Symbol Indicating type of brake applied
13	B9	Absolute Location
14	B10	Symbol of the KAVACH operating mode
15	B11	Section Speed (in Kmph) Information
16	C1	Movement Authority Bar Diagram
17	C2	The Text "Mov. Authority" is to be displayed
18	C3	The MA value in Numbers is to be displayed in this location.
19	D1	Aspect, Direction Information
20	D2	The value of the approaching signal distance in meters is to be displayed at this location.
21	D3	The name of the approaching signal post, direction, and line information is to be displayed here in words.
22	E1	Calculated Deceleration Constant Value
23	F1	Train Length information
24	G1	Onboard KAVACH Operating mode in text
25	H1	System Generated Messages Display
26	I1	Context based Messages display.
27	J1	Radio Signal Antenna
28	J2	The Text "RF" is to be displayed here
29	J3	The signal strength given in bars are to be given here
30	L1	Tag ID
31	L2	Direction of Movement of Train (N / R)
32	L3	Next Tag Distance (applicable only for Normal tags)
33	M1	Tag read indication for last tag
34	M2	Tag read indication for last to last tag
35	M3	Tag read indication for last to last to last tag

| MANISH KUMAR GUPTA Digitally signed by MANISH KUMAR GUPTA Date: 2023.08.11 10:33:30 +05'30' | RAVINDRA NATH SINGH Digitally signed by RAVINDRA NATH SINGH Date: 2023.08.11 10:37:27 +05'30' | Pavan Kumar Gudavalleti Digitally signed by Pavan Kumar Gudavalleti Date: 2023.08.10 13:48:52 +05'30' | : Page 7 of 39 |
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B4.3   **Region A**

B4.3.1   The region A shall encompass the A1, A2, A3 and A4 descriptions in itself.

B4.3.2   This region shall have dimension of 92 X 388 unit.

B4.3.3   If there is no Target Distance, then this area shall not display anything and be blank.

B4.3.4   The Target Distance shall show a maximum distance of 2000m.
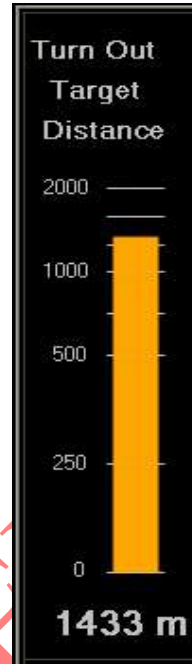
B4.3.5   **Region A1**

(a)   The A1 region shall be used to display the approaching Target distance / bar graph as applicable for that moment.

(b)   The distances from the border lines are given below.

(c)   The Logarithmic scale shall start from 0, and have a uniform marking of width 30 units width and heights as given in figure below. The thickness shall be 1 unit.
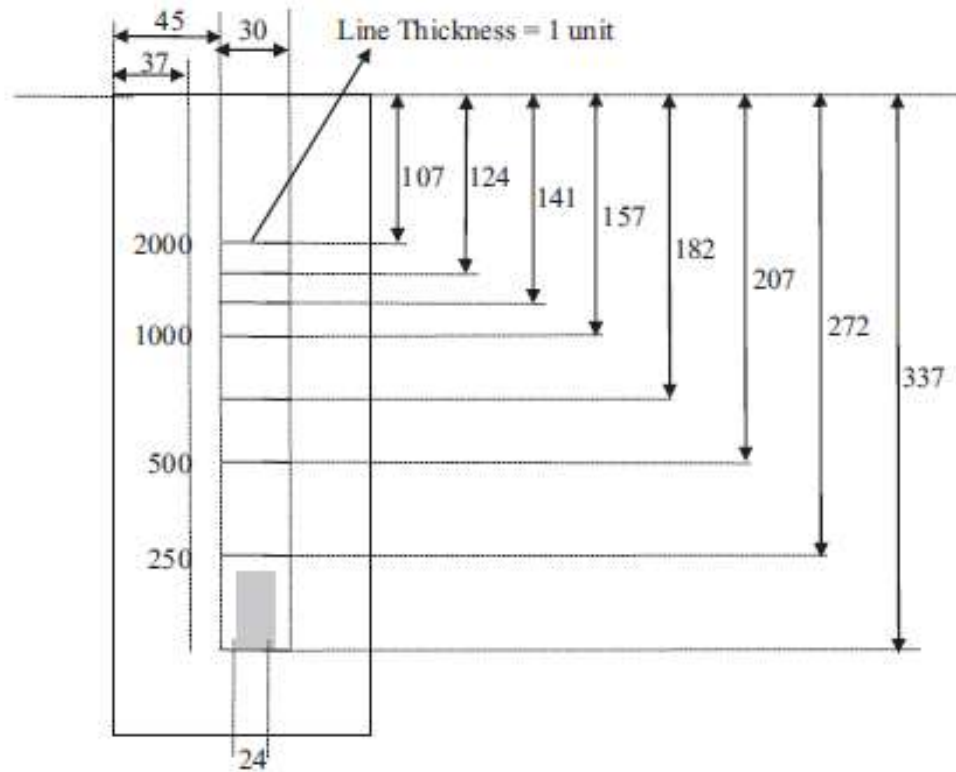
(d)   All the text shown in the figure above shall be of font Microsoft sans serif or Helvetica font with size 14 and font style Regular.

(e)   The given Target Distance shall be displayed with a bar of Light Orange colour (coded LOR) starting from 0 to the Target Distance specified.

(f)   The Light Orange shall be of width 24 units and shall appear in the middle of the uniform scale markings.

B4.3.6   **Region A2**

(a)   The Region A2 shall be a part of region A.

(b)   There shall be a heading Target Distance identifying distinctly as to what is being displayed below. The Text "Target" and "Distance" position shall comply to the measurements given in the following figure.

(c)   The text is of Microsoft sans serif or Helvetica font with size16 and font style Regular.

B4.3.7 **Region A3**

(a) The Region A3 shall be a part of region A.

(b) The Target Distance received shall be indicated in 4 digit number format followed by space and followed by 'M' below the bar diagram. Eg: as 0211m.

(c) The Text is of font DS-Digital font or Helvetica with size 20 and font style Normal.

B4.3.8 **Region A4**

(a) The region A4 shall be a part of region A.

(b) The text shall be of Font Microsoft sans Serif or Helvetica with size 19 and font style Bold.

(c) The region shall display the type of target distance (EOA / Turn Out / TSR/PSR/Collision / SoS).

B4.4 **Region B**

B4.4.1 The region B shall encompass the B1, B2, B3, B4, B5, B6, B7, B8, B9, B10 and B11 regions.

B4.4.2 The region shall have the 365 X 388 unit dimension

B4.4.3 Region B shall be used for Speed Distance Monitoring.

B4.4.4   **Region B1**

(a)   B1 region shall display the speedometer. A circle of diameter 52 units shall be displayed. This circle shall have a projected arm pointer. By default this arm pointer shall point to the current speed marking indicated by the Onboard KAVACH unit. By default the pointer shall be pointing to the speed at which the loco is running.
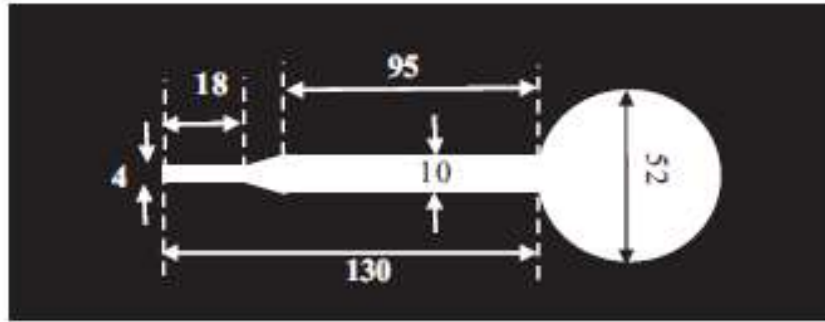
(b)   At the center of this circle the speed value shall be displayed in number format.

(c)   At the center of this circle the current speed value shall be displayed with a font Microsoft sans serif or Helvetica with font style BOLD and the font size as 23. The text in between on the speed pointer shall be in Black colour (coded BLK)

B4.4.5   **Region B2**

(a)   Region B2 shall show the speedometer and shall have the following specifications.

(b)   It shall display the speed from 0 to 250   kmph. The speed divisions shall be across a circle of outer diameter 314 units. It shall be divided between the angle -149 to +149, with 0 degrees pointing to the top.
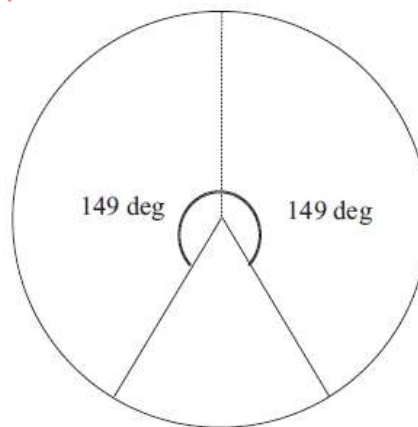
(c)   This circle shall be equally divided into 125 divisions with each division indicating a speed difference of 2 kmph.

(d)   The Starting indicator at 149 degree with 0 degree pointing to the top shall indi-

cate 0 kmph. The final indicator or 125th indicator or the -149 degree shall indicate 250 kmph.

(e)   At every 10th division the speed value indicated by this marking is to be provided in text. The Speed value in text shall have the font Microsoft sans serif with font style regular and the font size as 15.
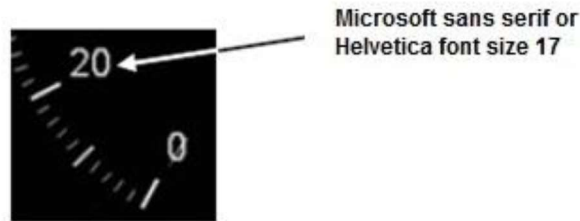
(f)   The Dial marking at these locations shall be of length 17 units and width 2 units to the inside of the circle.
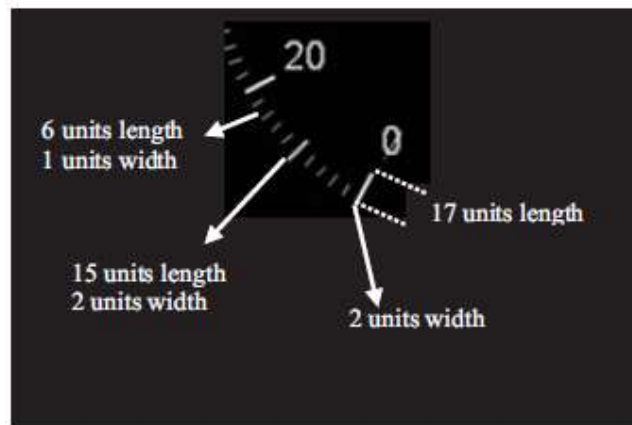
(g)   For every 5th marking indicating speeds of 10 kmph, 30 kmph, 50 kmph to upto 250 kmph the speed dial shall show a marking of 15 unit length and 2 unit width.

(h)   The rest of the markings shall be of size 6 unit in length and 1 unit in width.
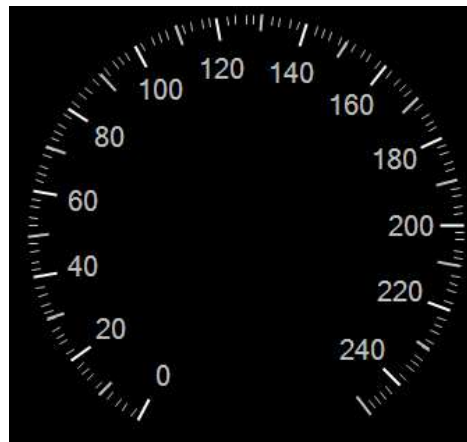
B4.4.6   **Region B3**

(a)   Region B3 shall be used to indicate with the colours prescribed the region in which the loco is presently running in. Region B3 is a set of three circle segments superimposed in each other with the outermost having a diameter of 356 units. The Mid circle has the diameter of 336 units and the innermost has 316 units diameter. All circles are to have same center.

(b)   In SR modes the permitted speed shall be indicated with a speed hook as shown in the below image.

(c)   If the speed of the train is within the permissible speed limit then the region between the outer circle and the mid circle shall be in LIGHT GREEN Colour (Coded LGR). To mark as the edge the area between the mid circle and the innermost circle shall also be marked in LIGHT GREEN (coded LGR) for a length as specified for a single speed division.

(d)   Travelling at a high speed and approaching a loop line limit is to be done by indicating the target speed with the Dark Green colour (coded DGR). It is indicated in the figure below.
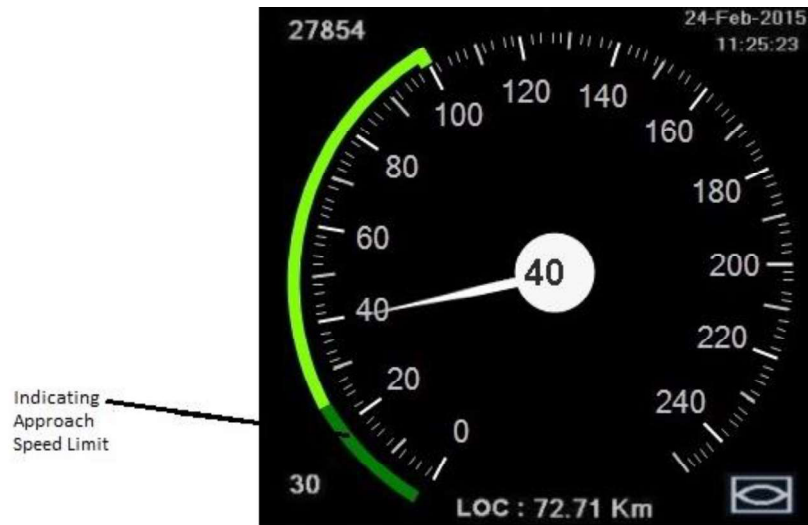
(e) If the loco has crossed the permissible speed limit and the KAVACH unit is yet to take action then the colour of the pointer and the region in the Outer circle to the innermost circle shall turn to Light Orange (coded LOR).

(f) When the Onboard KAVACH applies brakes the previously Light Orange (coded LOR) section shall turn Red (Coded BRD).

(g) The Speed Pointer pointing to the current speed of the train shall be in White colour (coded WHT) for the period when the current speed in less than or equal to the Permissible speed.

B4.4.7 **Region B4**

(a) Region B4 shall be defined for display of the Loco Id.

(b) Region B4 shall be a part of region B.

(c) The text shall be displayed with a font Microsoft sans serif or Helvetica with font style BOLD and the font size as 23.

(d) No boundary lines shall be displayed around this text.

(e) The text shall start from the X location 100 and Y location 9 of the Display screen

B4.4.8   Region B5 and B6

(a)   Region B5 shall be used to display the date Information and the region B6 shall be used to display the Time information.

(b)   Region B5 shall be a part of Region B

(c)   The text shall be displayed with a font Microsoft sans serif or Helvetica with font style BOLD and the font size as 11.

(d)   No boundary lines shall be displayed around this text.

(e)   The date format shall be DD-Mmm-YYYY, with Mmm indicating the first three letters of the name of the Month with the first letter being capital and the rest small.

(f)   The Time format shall be HH:MM:SS shown in 24 hour format.
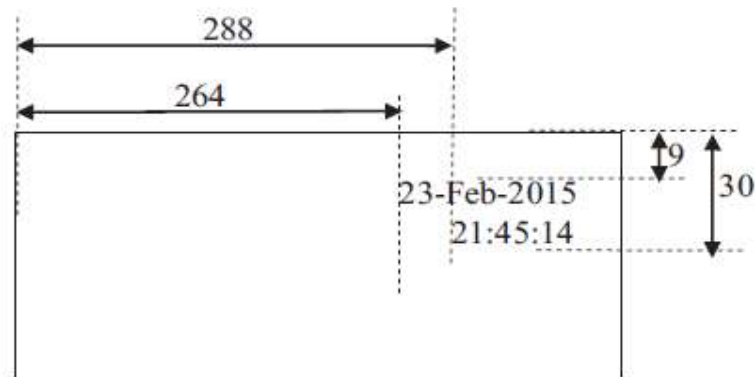
B4.4.9   Region B7

(a)   The Region B7 region shall be used to display the number text of the Next Lower Speed limit imposed.

(b)   Region B7 shall be a part of Region B.

(c)   The text shall be displayed with a font Microsoft sans serif or Helvetica with font style BOLD and the font size as 24.

(d)   If there is no value to be displayed then this area is to be blank.

(e)   No Boundary line shall be displayed around this text.
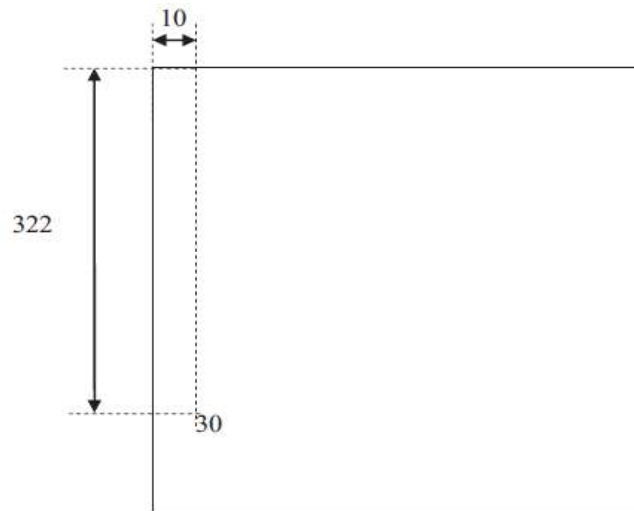
B4.4.10   **Region B8**

(a)   Region B8 shall be a part of Region B.

(b)   This region is defined to display the type of brakes currently being applied by the Onboard KAVACH system.

(c)   The brake application involving the action taken by the Loco Pilot shall not be shown.

(d)   If the Onboard KAVACH system is not initiating any brakes then this area is to be left blank.

(e)   No Boundary lines are to be displayed around this text.

(f)   The brake symbol for Normal brake, Full Service Brake, and the Emergency Brakes given in the table below are to be used.

S.No	Name of Brake	Symbol	Name of the Image file
1	Normal Brake		NB.bmp
2	Full Service Brake		FSB.bmp
3	Emergency Brake		EB.bmp
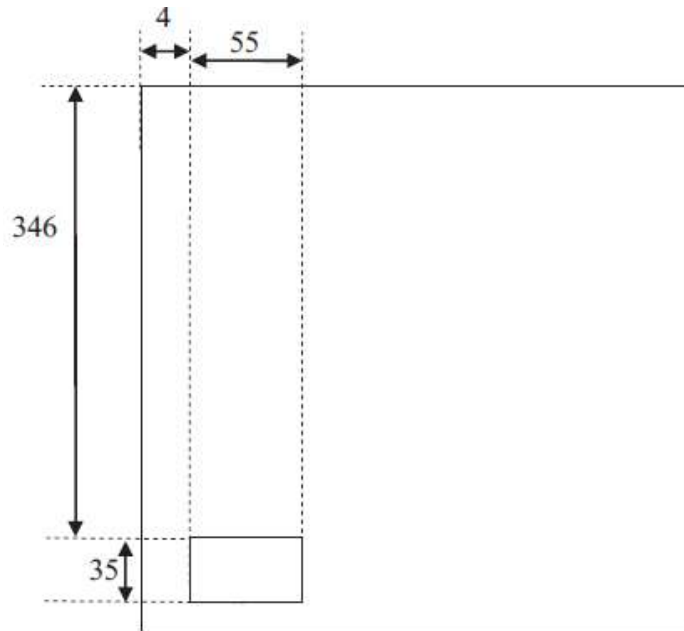
B4.4.11 Region B9

(a) Region B9 shall be a part of Region B.

(b) The Absolute location, received from the tags, at various intervals along the track and further computed by the Onboard KAVACH is to be displayed on the screen at this location.

(c) The text is to be displayed with a font Microsoft sans serif or Helvetica with font style BOLD and the font size as 22.

(d) It has to be displayed as follows: LOC followed by ':' followed by space followed by the absolute location 61.54 followed by "km".

(e) No Boundary lines are to be displayed around this text.
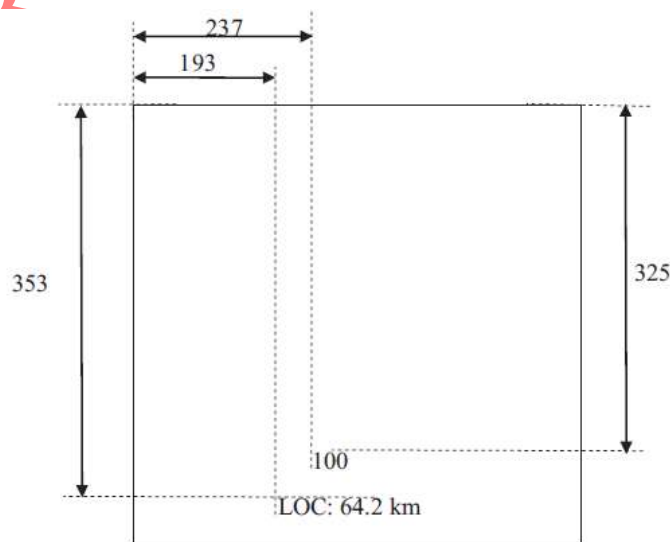
B4.4.12   **Region B10**

(a)   The area of B10 shall be 55 (width) X 35 (height).

(b)   Region B10 shall be a part of region B.

(c)   The value shall start from the X location 398 and Y location 346 of the Display screen

(d)   The Symbol defined for the various modes of the Onboard KAVACH shall be shown in this location.
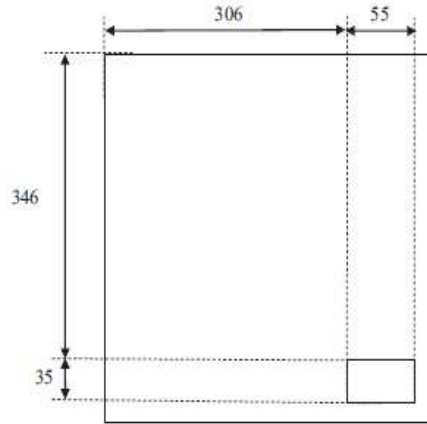
S.No	Name of Mode	Symbol	Name of the Image file
1	Stand By		SBMode.bmp
2	Staff Responsible Mode		SRMode.bmp
3	Limited Supervision Mode		LSMode.bmp
4	Full Supervision Mode		FSMode.bmp
5	Override Mode		OVMode.bmp
6	On Sight Mode		OSMode.bmp
7	Trip Mode		TripMode.bmp
8	Post Trip Mode		PtripMode.bmp
9	Reverse Mode		REVMode.bmp

10	Shunt Mode		SHMode.bmp
11	Non Leading Mode		NLMode.bmp
12	System Failure		SFMode.bmp
13	Isolation Mode	Not Applicable	ISMode.bmp

B4.4.13   Region B11

(a)   Region B11 shall be a part of region B.

(b)   The section speed (in kmph) shall be displayed in this region in numerical format with size 24.

B4.5   Region C

(a)   The Movement Authority shall be displayed in this area in the logarithmic scale.

(b)   The region shall have the 112 X 388 unit dimension.

B4.5.1   Region C1

(a)   The Display of the MA on the logarithmic scale shall be in Light Blue colour (Coded LBE), with the Light Blue colour showing the distance upto which the train can move safely.

(b)   The MA shall be shown with Horizontal lines of 35 units long and 1 unit thickness at steps of 0m, 100m, 200 m, 250 m, 500 m, 1000 m, 2000 m, 3000m and greater than 3000 m shown as +++.

(c)   The numeric value shall be shown for 250 m, 500 m, 1000m, 2000m, and +++ m. For the others the numeric value of the scale shall not be shown.

(d)   The text shall be displayed with a font Microsoft sans serif or Helvetica with font style BOLD and the font size as 17.

(e)   The distances at which the markings need to be placed are as follows.
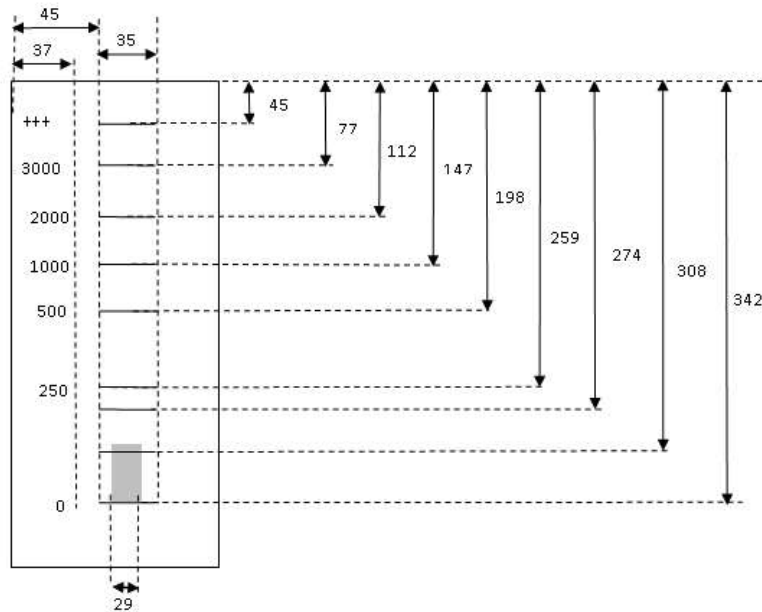
B4.5.2 Region C2

a. The Heading shall be shown here as Mov. Authority.

b. The text shall be displayed with a font Microsoft sans serif or Helvetica with font style BOLD and the font size as 17.

c. The text shall start from the X location 464 and Y location 14 of the Display screen.
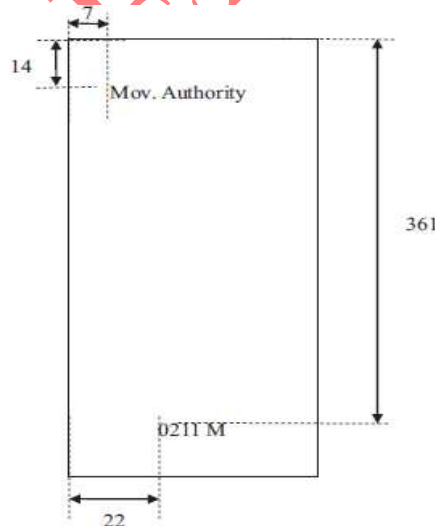
B4.5.3 Region C3

(a) The distance of the MA in 5 digit accuracy shall be displayed at this location. The units shall be in meters. Eg 00442m

(b) The Text is of font DS-Digital font with size 18 or Helvetica with font size 20 and font style Normal.

(c) The text shall start from the X location 477 and Y location 361 of the Display screen.

B4.6 **Region D**

B4.6.1 The area shall encompass the Region D1, Region D2 and D3 region.

B4.6.2 The region shall have the 228 X 419 unit dimension.

B4.6.3 The Region D region shall be used for the Signal aspect display, signal description and signal distance.

B4.6.4 Provision to display the Danger aspect, Warning aspect, Caution aspect is mandatory.

B4.6.4.1 **Region D1**

(a) The signal aspect are to be shown in 4 circles with YELLOW (Coded YLW) at the top, followed by GREEN (Coded GRN), then followed by YELLOW (Coded YLW) below it, and then by RED (Coded BRD). The circles depicting the Signal Aspect shall be 2 units thick and of White Colour (Coded WHT)

(b) Provision shall be given for display of Calling On, or IB signal, or Gate signal, or Auto Signal or Auto Gate Signal. The Calling-on / IB / Gate / Auto / Auto Gate can happen one at a time. So One circle filled with White colour smaller than the circles used for aspect shall be used with a 'C' or 'IB' or 'G' or 'A' or 'AG' in its center to differentiate between the various signals.

(c) The Letter 'C'/"IB/'G'/'A'/'AG' shall be displayed with a font Microsoft sans serif or Helvetica with font style BOLD and the font size as 20.

(d) If there are no signal aspects to be shown then there shall be no display of the Signal post with signals. The area shall be black blank screen.
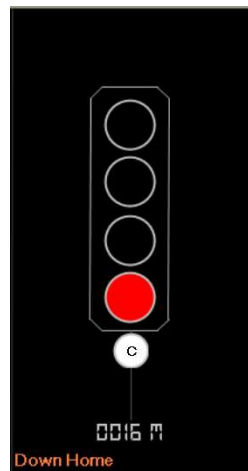

Table B.4: Route symbol and location

MANISH KUMAR GUPTA	Digitally signed by MANISH KUMAR GUPTA Date: 2023.08.11 10:33:30 +05'30'	RAVINDRA NATH SINGH	Digitally signed by RAVINDRA NATH SINGH Date: 2023.08.11 10:37:27 +05'30'	Pavan Kumar Gudavalleti	Digitally signed by Pavan Kumar Gudavalleti Date: 2023.08.10 13:55:51 +05'30'	:
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(e)   Provision shall be given to display the direction information. The direction information of the 6 routes are to be given. The images of them are given in the table below.

S.No	Symbol	Name of the Image file	Distance from Vertical Boundary Line (X)	Distance from Horizontal Boundary Line on Top
1		route1.bmp	587	24
2		route2.bmp	580	59
3		route3.bmp	585	85
4		route4.bmp	706	24
5		route5.bmp	715	59
6		route6.bmp	710	85
7		Stencil.bmp	660	20

B 2.4.6.4.1.1   **Dimensions**
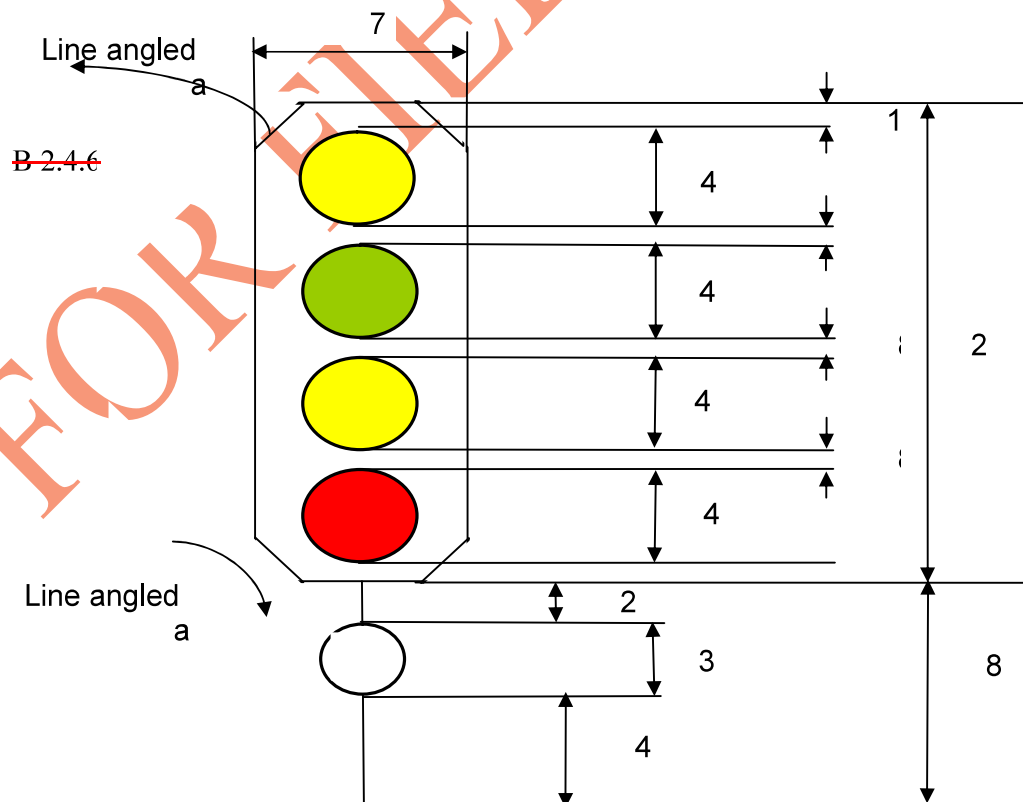
B4.6.4.2 **Region D2**

(a)   The approaching signal distance shall be shown in this region.

(b)   The number shall be of 4 digits and in meters.

(c)   The Text is of font DS-Digital font or Helvetica with size 20 and font style Normal.
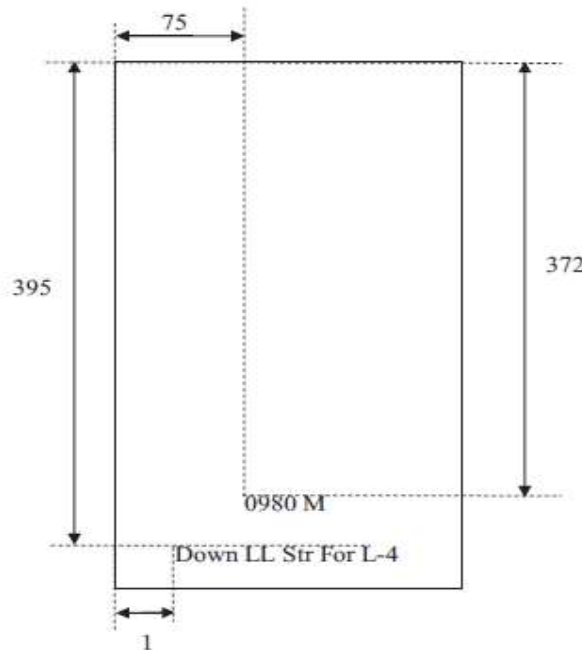
B4.6.4.3 **Region D3**

(a)   The traffic direction, approaching signal post name, and line number information shall be given in this location.

It shall be one of the following.

A14 to a9 (As per Annex-C)	Type of Signal	Abbreviation on DMI
Various Distant Signals & Auto Signals		
Undefined	Nothing to be displayed of DMI	
010000	Distant Signal	Dist
010001	Inner Distant Signal	Inr-Dist
010010	Gate Distant Signal	Gate-Dist
010011	Gate Inner Distant Signal	Gate-Inr-Dist
010100	IB Distant	IB-Dist
010101	IB Inner Distant Signal	IB-Inr-Dist
010110	Automatic Signal (Excludes Gate Stop Signal in Auto Territory)	Auto
010111	Semi Automatic Signal with A-Marker Lit	Semi-Auto
100100	Semi Automatic Signal without A marker lit	

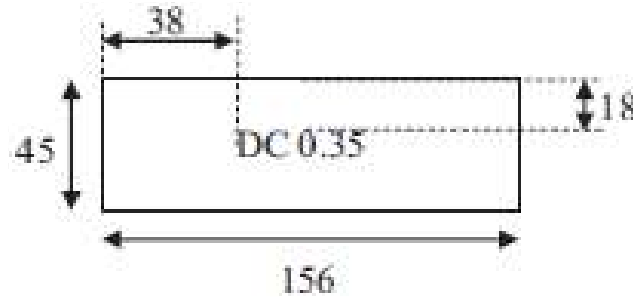| **Varoius Home signal**		
011000	Home Signal without Junction Route Indicator	Home
011001	Main Home with Junction Route Indicator	Home L-X
011010	Routing Home Signal without Junction Type Route Indicator	R-Home
011011	Routing Home Signal with Junction Type Route Indicator	R-Home L-X
Various types of Starter Signals		
011100	Routing Mainline Starter leading to Route x	M/L-Str L-X
011101	Routing Loop line Starter leading to Route x	L/L-Str L-X
011110	Intermediate Starter Signal	Int-Str
Other Misc Signals		
000001	Advance Starter Signal	Adv-Str
000010	IB Stop Signal	IB-Stop
000011	Gate Stop signal	Gate-Stop
000100	Calling On Signal	Calling-On
000101	Advance Starter cum Gate Signal	Adv-Str-cum-Gate
000110	Gate cum Distant Signal	Gate-cum-Dist
000111	Advance Starter cum Distant Signal	Adv-Str-cum-Dist
100011	Gate Stop Signal in Auto Territory	Auto-Gate
100101	Advance Starter-cum-Gate Inner Distant Signal	Adv-Str-cum-Gate-ID
100110	Gate cum Inner Distant	Gate-cum-Inr-Dist
100111	Gate Inner Distant-cum-Distant Signal	Gate-Inr-Dist-cum-Dist
101000	IB Signal cum Gate Distant Signal	IB-cum-Gate
101001	IB cum Gate Inner Distant Signal	IB-cum-Gate-ID
101010	IB Signal cum Gate Distant	IB-cum-Gate-Dist
101001	IB Signal-cum-Gate Inner Distant	IB-cum-Gate-Inr-Dist
101010	IB Signal-cum-Distant Signal	IB-cum-Dist
101011	Advanced Starter-cum- IB Distant	Adv-Str-cum-IB-Dist
101100	Starter-cum- IB Distant Signal	Str-cum-IB-Dist
101101	Stop Board/Buffer Stop	Stop Board
101110	Gate cum IB Distant Signal	Gate-cum-IB-Dist
101111	Gate cum IB Inner Distant Signal	Gate-cum-IB-ID

(b)   The text shall be displayed with a font Microsoft sans serif or Helvetica with font style BOLD and the font size as 17. The text shall be shown in ORANGE (Coded ORG) colour.

B4.7   **Region E**

(a)   The Deceleration Constant shall be shown in this area.

(b)   The region shall have the 156 X 45 unit dimension.

(c)   The value shall be shown as DC followed by single space followed by X.XX (Number Decimal Point Number Number) format only.
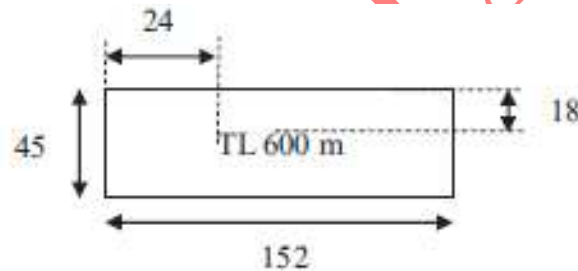
(d) The text shall be displayed with a font Microsoft sans serif or Helvetica with font style Regular and the font size as 19.
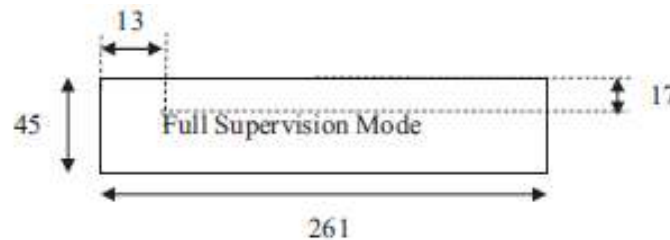

B4.7.1 Region F

(a) The Train Length shall be displayed in this region.

(b) The region shall have the 152 X 45 unit dimension

(c) It shall be displayed as following eg: TL followed by single space followed by train length calculated followed by m.

(d) The text is to be displayed with a font Microsoft sans serifor Helvitika with font style Regular and the font size as 19.

B4.7.2 Region G

(a) The current Onboard KAVACH mode (full form) in text is to be displayed here.

(b) The region shall have the 261 X 45 unit dimension.

(c) The text shall be displayed with a font Microsoft sans serif or Helvetica with font style Regular and the font size as 19.

B4.7.3 Region H

(a)   The Messages for the user shall be displayed in this region.

(b)   The region shall have the 571 X 69 unit dimension.

(c)   The text is to be displayed with a font Microsoft sans serif with font style BOLD and the font size as 24/22/18(to accommodate in one line).
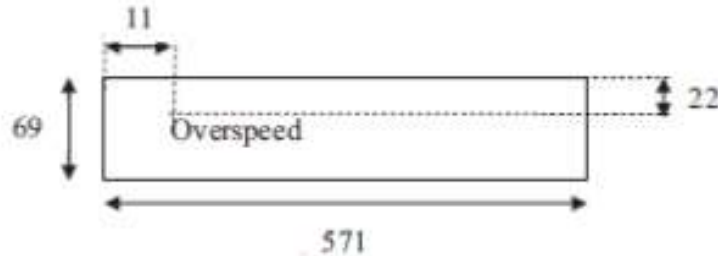
(d)   Messages to be displayed shall be from the following list

S.no	Message List for Region H
1.	System Fault , Isolate or Restart KAVACH
2.	Ack Loco stop in Block Section, SOS Generates in XX s
3.	Emergency Brake Bypassed(EB Cock Closed), No Traction
4.	Train Tripped, Select P_Trip
5.	Brake Applied, Dead End Detected
6.	Brake Applied, Movement in StandBy Mode
7.	Brake Applied, Rollback Detected
8.	Reverse Movement Not Allowed, Use REV mode
9.	Stand By mode-CAB input is not Active.
10.	Ack SR mode – KAVACH Territory Exit
11.	Ack SR mode – Radio Comm Fail with Station
12.	Ack SR mode – No Section Speed Info
13.	Ack SR mode – Tags missing
14.	Ack SR Mode- Direction unknown
15.	Ack SR mode- GPS Fail.
16.	Ack LS mode – Radio Comm Fail with Station
17.	Ack Repeated Red signal Override
18.	Head On Collision with Loco XXXXX in YYYY m
19.	Rear End Collision with Loco XXXXX in YYYY m
20.	Override selected, Pass Signal in XXXs
21.	Reverse Mode Expires in XXXXm or YYYs
22.	Manned LC Gate XXXX approaching in YYYYm
23.	Unmanned LC Gate XXXX approaching in YYYYm
24.	LS mode Waiting for Radio Comm with Station
25.	LS mode Waiting for Section Speed Info
26.	Both Leading & Non-leading Inputs are Active
27.	Train Length Computation in Progress
28.	Train Length Computation Success (XXXXm)
29.	Train Length Computation Fail (XXXXm)
30.	Train Length Computation Aborted

| 31. | TurnOut in XXXXm with Speed Limit YYYkmph |
32.	TSR in XXXXm with Speed Limit YYYkmph
33.	PSR in XXXXm with Speed Limit YYYkmph
34.	End of Authority in XXXXm
35.	KAVACH Territory Entry
36.	System Self Test in Progress
37.	System Self Test Success
38.	System Self Test Fail – XXXX
39.	Brakes Testing – Waiting for MR X.YY(X.YY)Kg/cm^2
40.	Brakes Testing – Waiting for BP X.YY(X.YY)Kg/cm^2
41.	Brakes Testing – NSB Applied, BP-X.YYKg/cm^2
42.	Brakes Testing – FSB Applied, BP-X.YYKg/cm^2
43.	Brakes Testing – EB Applied, BP-X.YYKg/cm^2
44.	Brake Testing – LE Brake applied, BC X.YY Kg/ cm^2
45.	Brakes Testing Success
46.	Brakes Testing Fail (NSB,FSB, EB)
47.	Brakes Testing Fail, Press ACK for Retest Brakes
48.	Select Train Configuration, Press Config Button
49.	Select Staff Responsible or Shunt Mode
50.	Approaching Radio Hole in XXXXX m.
51.	ACK OS Mode
52.	Loco/Train is in Fouling Zone, Normalize the reverser
53.	SR/SH Mode- ETCS –ETCS Territory Entry
54.	FS Mode- ETCS –ETCS Full Supervision Mode
55.	ACK SR Mode – ETCS Territory Exit
56.	Ballise Default telegram received
57.	Waiting for Traction Command
58.	Traction cut-off Command fail
59.	Fouling Mark RFID Tag read.
60.	Neutral Section approaching in XXX m
61.	Braking system malfunction

For TSR & for PSR, information shall be displayed from a distance of 1500 m on approach of a TSR/PSR.

(e) Whenever, there are more than one scenario leading to multiple messages, the messages pertaining to first and second targets (for Head ON/Rear End Collision, Turnout, PSR, TSR, LC Gate Approach) shall be displayed alternatively each for two seconds (configurable).

B4.8   **Region I**

(a) Context based fault numbers and the fault messages shall be shown in this region.

(b) The region shall have the 571 X 44 unit dimension.

(c) The text shall be displayed with a font Microsoft sans serif or Helvetica with font style BOLD and the font size as 21 .

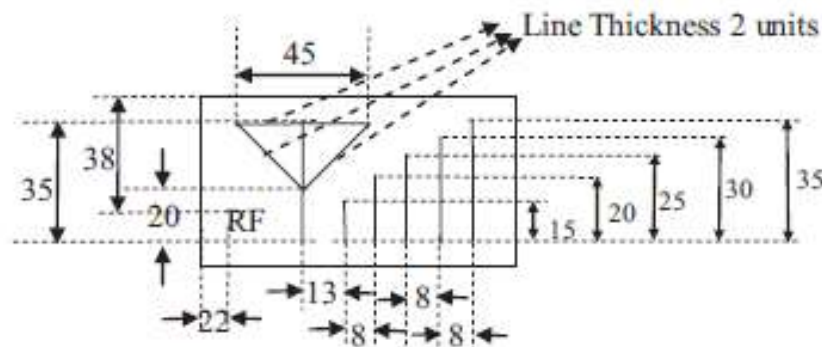| MANISH KUMAR GUPTA — Digitally signed by MANISH KUMAR GUPTA Date: 2023.08.11 10:33:30 +05'30' | RAVINDRA NATH SINGH — Digitally signed by RAVINDRA NATH SINGH Date: 2023.08.11 10:37:27 +05'30' | Pavan Kumar Gudavalleti — Digitally signed by Pavan Kumar Gudavalleti Date: 2023.08.10 14:02:26 +05'30' | : |
| Manish Kumar Gupta SSE/S&T | R. N. Singh AIE/S&T/RDSO/SC | G. Pavan Kumar ED/Tele-II | Page 27 of 39 |
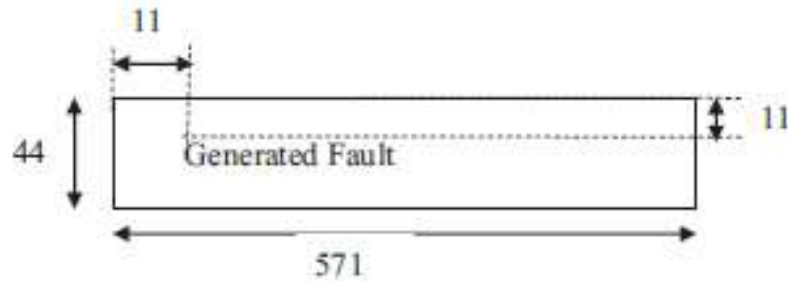
(d) Messages to be displayed in Region I shall be from following list

S.no	Message List for Region I
1	SOS – Self Loco (Manual)
2	SOS – Self Loco (Stopped in Block section)
3	SOS – Self Loco (Train Parted)
4	SOS – From Loco XXXXXX (Manual)
5	SOS – From Loco XXXXXX (Stopped in Block section)
6	SOS – From Loco XXXXXX(Train Parted)
7	SOS – From Station XXXXX (SOS to All Locos)
8	SOS – From Station XXXXX (SOS to This Loco)
9	Over Speed, Please Reduce Speed
10	Brake Applied, Speed Limit Exceeded
11	FSB will be applied in YYYS
12	EB will be applied in YYYS
13	BIU Isolated
14	XXXXXXX Train Type selected

B4.9   **Region J**

(a) The Region J shall be used for the display of Radio packets strength.

(b) The area of Region J shall be 133 (width) X 67 (height). The symbol for receiving antenna and the signal strengths are shown by subsequent lines near it to the count of 5.

(c) **Dimensions**

Note: The Vertical lines depicting the signal strengths and the RF Tower shall be of 4 units

thick.

B4.9.1 **Region J1**

The Region J1 shall have the image as shown in the figure above of a standing antenna.

B4.9.2 **Region J2**

The Text "RF" shall be written in this location.

B4.9.3 **Region J3**

(a) The Region J3 shall show the signal strength displayed as bars of height as shown in the figure. If the previous 5 packets are received correctly then the signal strength shall be shown in full. The number of bars shall be equal to number of packets received in last 5 cycles.

(b) The train is in a section of line without radio coverage i.e. Radio hole region shall be displayed with symbol as:-

B4.10 **Region L**

(a) Region L shall be used for displaying the last RFID Tag read in Microsoft Sans-serif or Helvetica font with size 16.

(b) The area of Region L shall be 133 (width) X 61 (height).

B4.10.1 **Region M**

(a) The display of the tags passed by the locomotive shall be given in a diagrammatic format as tags laid on a track. If any tag is missed then that particular tag should be made red (coded BRD).

(b)　　If an expected tag is crossed it shall be indicated with Dark Green colour (Coded DGR) else it shall be of Grey colour (Coded GRY).

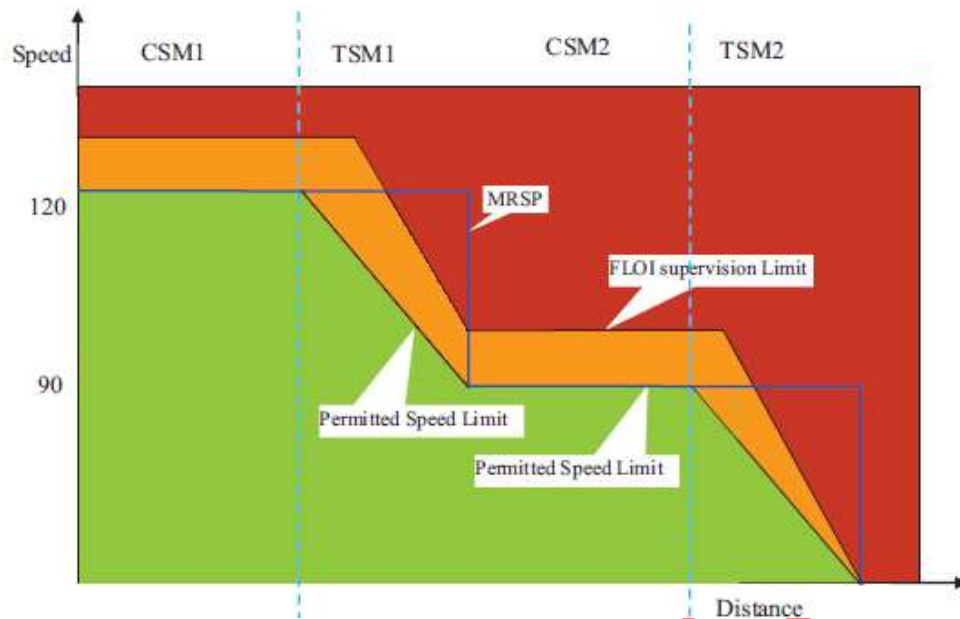(c)　　The area of Region M shall be 94 (width) X 129 (height).
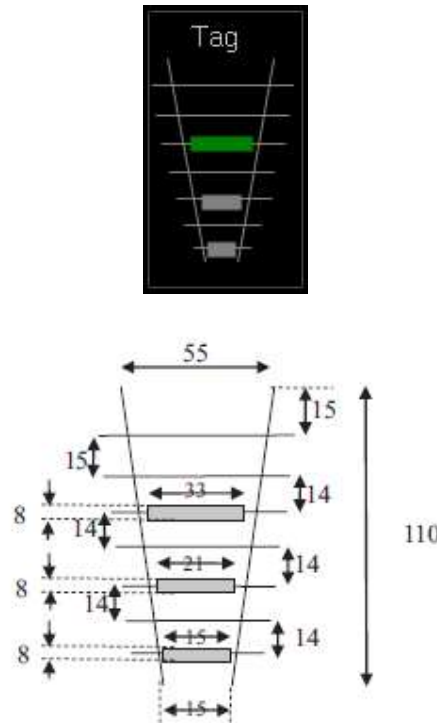
B4.10.2　If "INFO" button along with "CNFM" button is pressed then the following minimum information shall be displayed.

  i.　Executive software check sum (CRC) of Onboard KAVACH system.

  ii.　Health/link status of RFID Reader or BTM, BIU, GPS/PPSGSM, Pulse generator, Cabinet Input and Radio Modem.

  iii.　Latest KMS Key information.

B4.11　Speed and Distance Monitoring

B4.11.1　The Speed Distance Monitoring shall be indicated in colours as follows for different speed levels, such as CSM,TSM, FLOI and MRSP.

CSM: Ceiling Speed Monitoring

TSM: Target Speed Monitoring

FLOI: First Level Of Interference

MRSP: Most Restrictive Speed Profile

B4.11.2 When the speed is within the permissible limit then the speed indicator shall be in white (Coded WHT) as indicated in the picture below.

B4.11.3 When the speed just touches the permissible limit, the speed indicator shall change colour to yellow. Further increase in the speed value from the permissible speed limit shall indicate an Orange colour (Coded ORG) between the Outer circle and the Inner circle covering the middle circle as discussed in region B3. However the Per-

missible speed limit is between the outer circle and the middle circle.

B4.11.4 During the First Level of Intervention when the system is applying the brakes to stop the train the speed pointer and the area between current speed and the permissible speed shall be made Red (Coded BRD).

B5   Display Keys

B5.1   **Key K1**

B5.1.1   Key K1 shall be used for the Post Trip Operation.

B5.1.2   The screen name for this key is P_TRP.

B5.1.3   If the Onboard KAVACH applies brakes and the train went past the signal post then it is the trip mode. The user can move to the next screen by pressing P_TRP key.

B5.2   **Key K2**

B5.2.1   Key K2 shall be used to enter the Reverse Mode.

B5.2.2   The screen name for this key shall be REV.

B5.3   **Key K3**

B5.3.1   Key K3 shall be used for Override command.

B5.3.2   The screen name for this key shall be OVRD.

B5.4   **Key K4**

B5.4.1   **Key** K4 shall be used for entering Shunt Mode.

B5.4.2   The screen name for this key shall be SHNT.

B5.5   **Key K5**

B5.5.1   Key K5 shall be used for entering Manual Brake Test.

B5.5.2   The screen name for this key shall be MBT.

B5.6   **Key K6**

B5.6.1   Key K6 shall be used for entering Staff Responsible Mode.

B5.6.2   The screen name for this key shall be SR

B5.7   **Key K7**

B5.7.1   Key K7 shall be used for Configuration.

B5.7.2   The screen name for this key shall be CONFIG.

B5.8   **Key K8**

B5.8.1   Key K8 shall be used for Spare purpose.

B5.8.2   The screen name for this key shall be BLANK.

B5.9   **Key K9**

B5.9.1   Key K9 shall be used for Confirm.

B5.9.2   The screen name for this key is CNFM.

B5.10   **Key K10**

B5.10.1 Key   K10 shall be used for displaying current train parameters

B5.10.2 The screen name for this key is INFO.

B6   **Key Press:**

B6.1   Whenever a key from K1 to K7 is pressed, it should be followed by the pressing of K9 as Confirm within 10 seconds. For this 10 sec the key which is pressed must be highlighted and shall remain the same until K9 is pressed or 10 sec time-out happens.

B6.2   If the Key K9 is pressed then the key image should be highlighted and then de-highlighted immediately to give the impression that the key is pressed.

B7   **Train Configuration Details**

B7.1   **Entry to Configuration Menu**

B7.2   Pressing the Key K7 shall enable the user to enter into the CONFIG menu.

B7.3   The key options that are enabled must be shown specifically above the Display keys.

B7.4   The arrow keys shall also be enabled for the UP and DOWN movement.

B7.5   Selecting an option shall be done by moving the cursor UP and DOWN and then pressing the Enter (E) key.

B7.6   The screens to be displayed shall be as follows. There is no particular text   position or particular font size or font being specified for the texts in this menu. But whatever texts being displayed should be legible.

B7.7 **Option for selection of Light Engine (default)**
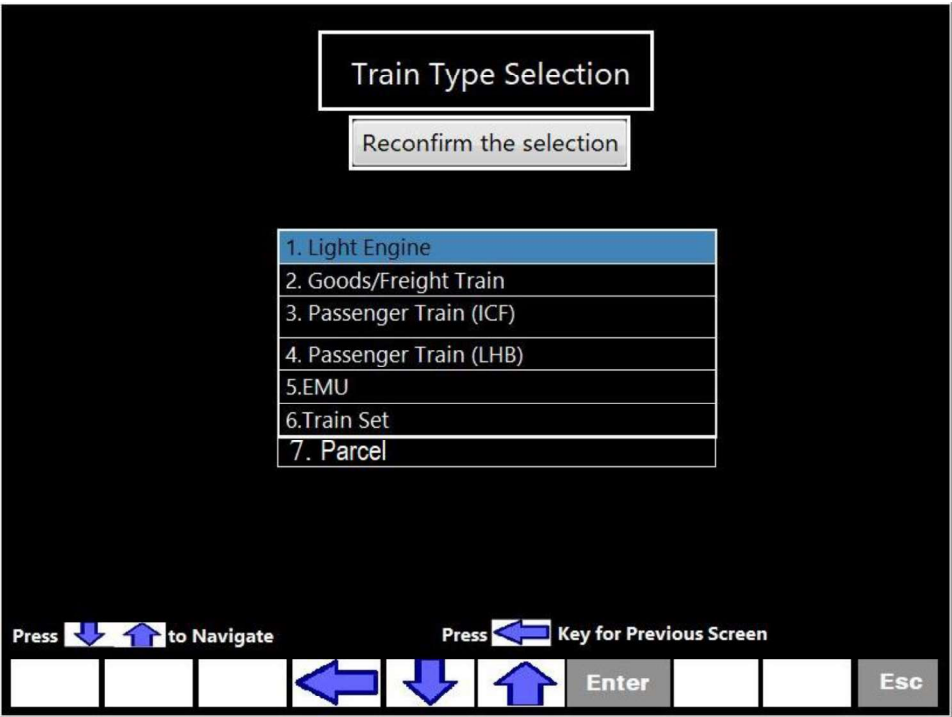
B7.7.1 **First Option window:**
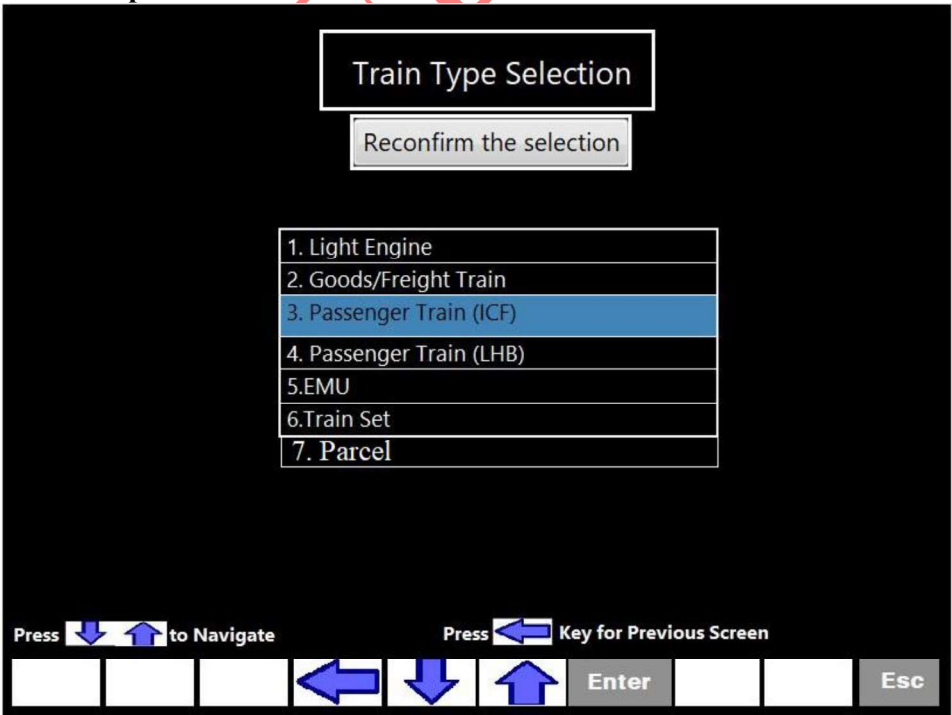
B7.7.2   **Second window for passenger selection after reconfirmation**

B7.8   **Options for Goods / Freight selection**

B7.8.1   **Second window option for Type Wagon/ Freight**

B7.8.2   **Third window option for selection of Wagon/ Freight**

Note:

(i) If a selection is done then the next screen must reconfirm the same options with different order.

(ii) The Grey in colour will be automated calculated value.

(iii) For the "Passenger, Good/Freight number selection" parameter

(a) Pressing "+" soft key will increase number by each press 1 and by pressing "++" soft key the number will increase the number by 5.

(b) Similarly by Pressing "-" soft key will decrease number by each press 1 and by pressing "--" soft key the number will decrease the number by 5.

(iv) For the "Braking efficiency" parameter

a. Pressing "+" soft key will increase braking efficiency parameter by 1% and by pressing "++" soft key the braking efficiency will increase by 5%.

b. Similarly by pressing "-" soft key the braking efficiency parameter will decrease by 1% and by pressing "- -" soft key the braking efficiency will decrease by 5%.

B7.9 Wagon list

S No	Wagon Name	Type of wagon	Normally no of wagon in rake	Legth of Wagon (Over coupling (in meter)	Tare Weight (In Tonnes)	Gross Load (In tonnes)
1.	BCN/BCNA	Covered	42	15.429	27.2	91.28
2.	BCNHL	Covered	58	10.963	20.8	91.6
3.	BOXNHL	Open	58	10.963	20.52	91.6
5.	BTPN/BTFLN	Tank	50	12.420	27	81.0
6	BTPGLN/BTALN	Tank	35	17.529	47.97	80.1
7.	BLCS	Container	45	A-Car-14.554 B-car-13.141	19.2 18.1	100 100
8.	BRN	Flat	43	14.645	23.3	91.6
9	BOBRN	Hopper	58	10.6	25.61	89.28
10	BCFCM	Cement	59	10.713	23.1	91.6
11	BTAP`	Food grain	47	12.329	27.319	87.68

Note: Propagation time (Time Lag) and Deceleartion value will be provided as per Motive Power Dte and shall be configured based on the trial.

B7.10 The options for various train configurations are displayed for example purposes

| MANISH KUMAR GUPTA Digitally signed by MANISH KUMAR GUPTA Date: 2023.08.11 10:33:30 +05'30' | RAVINDRA NATH SINGH Digitally signed by RAVINDRA NATH SINGH Date: 2023.08.11 10:37:27 +05'30' | Pavan Kumar Gudavalleti Digitally signed by Pavan Kumar Gudavalleti Date: 2023.08.10 14:11:20 +05'30' | : Page 38 of 39 |
| Manish Kumar Gupta SSE/S&T | R. N. Singh AIE/S&T/RDSO/SC | G. Pavan Kumar ED/Tele-II | |

only. The comprehensive list for various train configurations will be issued through a Technical Advisory Note. Change in these options for train configuration shall not affect the executive software.

B7.11   There shall not be any need to select train configuration for a self-propelled train like EMUs, DEMUs, Train Set etc., The Loco shall transit to SR or SH Mode after standby mode as per the request of Loco Pilot. The default train length shall be the maximum length of formation generally fed in the shed during installation of KAVACH.