WINDOWS BASED LOCOMOTIVE DIAGNOSTIC SYSTEM

ARC/WLDS/V1.0

USER MANUAL

May 2018

RELEASE 1.0

Advanced Rail Controls Private Limited

Bangalore-560092

INDEX

IMPORTANT NOTICE

This is a sophisticated microprocessor-based equipment and can be serviced only by trained skilled personnel. Opening the equipment by any unauthorized person will make the warranty null and void.

1.0 Introduction

The Windows based Locomotive Diagnostic System (WLDS) is used in 3-Phase Locomotive. Earlier, Indian Railways were using DOS based Diagnostic Tool and we supplied closely 150 systems to CLW and Zonal Railways. Further, we developed Windows based Diagnostic system which is suitable for MICAS S2 control system of 3-phase locomotive and does not need any upgradation or modification of the locomotive firmware or application software. This is the unique feature and is very safe as the existing proven software itself will be working in the locomotive.

Windows based Diagnostic System (WLDS) consisting of:

(a) Diagnostic Laptop
(b) Diagnostic tool
(c) MVB Signal Converter
(d) Cables and connectors
(e) Laptop chargers to work in Locomotives and Electronic Labs of Electric Loco Sheds

1.1 Scope of supply

SL.No.	Item name	Unit	Quantity /unit
1	Diagnostic Laptop, Model No: Tough book CF-54 pre- loaded with Windows-10 , Diagnostic software and Anti- Virus software	Set	One
2	AC Laptop adapter with 3 pin power chord on input side and DC jack female, USB type-B connector on output side	Set	One
3	DC Laptop adapter with Hand lamp socket input side and DC jack female, USB type-B connector on output side	Set	One
4	Diagnostic tool	No.	One
5	MVB Signal converter with 0.5Metre duly crimped with Gimota 9 pin Sub-D Male connector	No.	One
6	MVB Long cable (5 x 2 x 0.5mm2) 6.5Metre length duly crimped with 10 pin circular Female wire wrap	No.	One

7	connector on one side and Sub-D 9 pin Male connector on other end		
7	RJ-45 Male crimped cable of 1metre length	No.	One
8	Carry bag	No.	One
9	USB Flash drive 8GB	No.	One

2.0   Diagnostic Laptop

Panasonic make Toughbook model No. CF-54 Diagnostic Laptop supplied to run the Diagnostic software on Windows-10 Operating System. This model is a semi-rugged in durability. It has a 14" HD display with Intel graphics. There 3 USB ports and 1 Ethernet port are available. Diagnostic software is pre-loaded. For LDS operation execution, please see clause no.4.0

USB Port x 1

Power Adapter port
USB Port x 2
Ethernet Port

2.1   Diagnostic tool

The equipment is built around an ARM controller. The MVB interface module connects the controller through parallel bus and the loco VCU through MVB Electrical. The equipment can accept either 110V DC supply from locomotive battery or domestic power supply at 230V AC 50Hz through an adapter. The MVB Interface module is a detachable external device, miniature size, and has an Ethernet interface with the Laptop. Faster Data communication is possible with laptop through Ethernet. The MVB Interface Module provides connectivity to the loco VCU through MVB electrical. MVB signal Converter box provides MVB connection between stub line of MVB bus coupler card VCU rack and WLDS tool.

WLDS tool has USB TYPE -B Female connector for powering ON the device and has Ethernet connector for data communication between WLDS and Laptop.
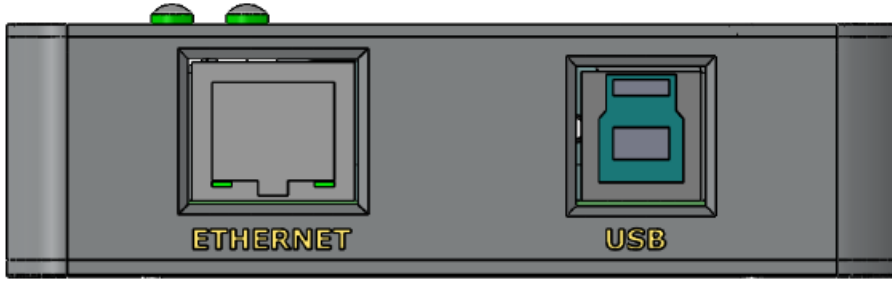
On the other side WLDS tool has Sub-D 9 pin Female connector for MVB communication.
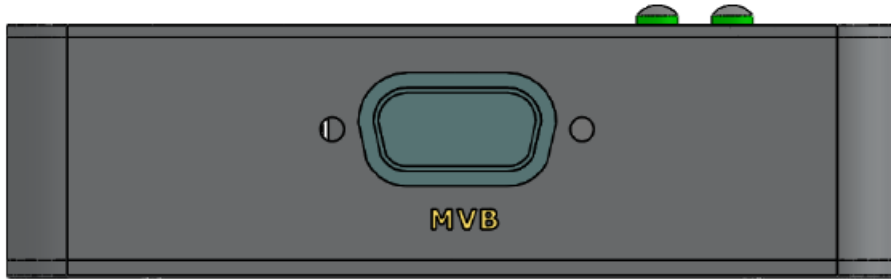
WLDS provides LED status indication for several operation.

LED Indication No.	LED Colour	Function	LED Status
L1	Yellow	MVB Write	Blinks Continuously during MVB write operation
L2	Yellow	MVB Read	Glows Continuously when MVB connected
L3	Yellow	MVB Read	Glows Continuously when MVB connected
L4	Green	MVB Lifesign	Blinks Continuously when Power is ON
L5	Blue	MCU_1.2V power indication	Glows Continuously when power is ON
L6	Orange	MCU_3.3V power indication	Glows Continuously when power is ON
L7	Yellow	MCU_5V power indication	Glows Continuously when power is ON
L8	Green	MCU Lifesign	Blinks Continuously when power is ON
L9	Red	MCU Error	Glows only when Error in the tool

2.2   MVB Signal Converter

MVB Signal Converter box provides MVB connection between Stub line of MVB Bus coupler card of VCU rack and WLDS tool.

MVB Signal Converter box has 10 pin circular Panel mount connector on one side for connecting with WLDS MVB port through 10 core shielded cable.

On the other side it has Sub-D 9 pin Male wire wrap connector in line with MVB short cable,10 core shielded of approximate length 0.5metres which is to be connected to MVB stub line of the MVB Bus coupler card of VCU rack.

10 pin Circular Male
panel mount Connector

MVB Short cable
(5 x 2 x 0.5mm2)

Sub-D 9 pin Male Wire
wrap Connector
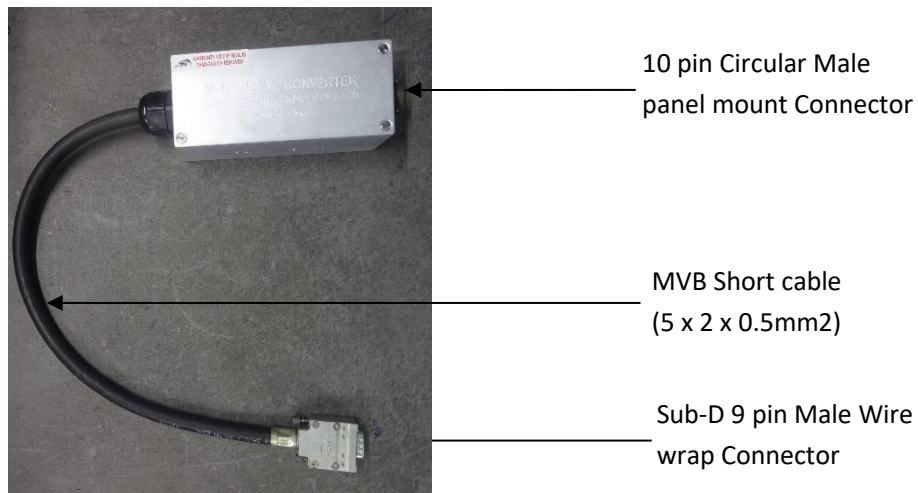
2.3   Cables and Connectors

Two individual cables are supplied along with the system. One is Ethernet cable crimped with RJ-45 Male connector on both the sides for data communication between Diagnostic laptop and WLDS tool. Approximate length of the cable is 0.9metres.

Other cable is MVB long cable, 10 core (5 x 2 x 0.5mm2) shield cable crimped with Sub-D 9 pin Male Gimoto wire wrap Connector on one side and 10 pin circular Female wire wrap connector on the other side. This cable connects the communication between WLDS tool and MVB Signal Converter side. Approximate length of the cable is 6.5metres.

Ethernet cable

RJ-45 Male Connector

MVB long Cable

MVB long cable
(5 x 2 x 0.5mm2)

10 pin Female wire wrap
circular connector

9 pin Male wire wrap
Sub-D connector

2.4 Laptop Adapters

Two individual Laptop chargers are supplied, one which works with 230V AC/50Hz supply and other charger which will work with 110V DC Loco battery.

Both the chargers is having two output voltages Viz, 15.6V DC available on DC female jack to charge Laptop battery and 5V DC available on USB type-B Male connector to power ON WLDS tool.

AC adapter is having 3 pin plug with cable which needs to be plugged in Electric Loco shed electronics Lab or any other place where 230V AC supply is present.

DC adapter is having hand lamp socket needs to be connected to 110V Loco battery provided on assistant driver desk in the Locomotive.

Note: User must connect USB type -B Male connector coming from adapters to WLDS tool to power it ON.

Adapter for ELS Electronics labs

USB type-B

DC Jack Female

AC to DC Adapter

Adapter for Locomotive

DC Jack Female

DC – DC converter

Hand Lamp socket

USB type-B

3.0 WLDS Connection diagram when using in Electronic laboratory
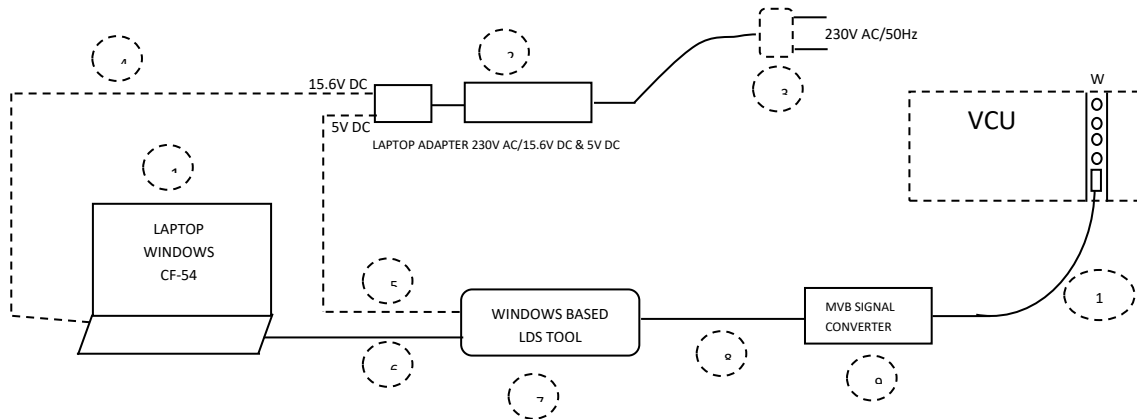
3.1 WLDS Connection diagram when using in Locomotive
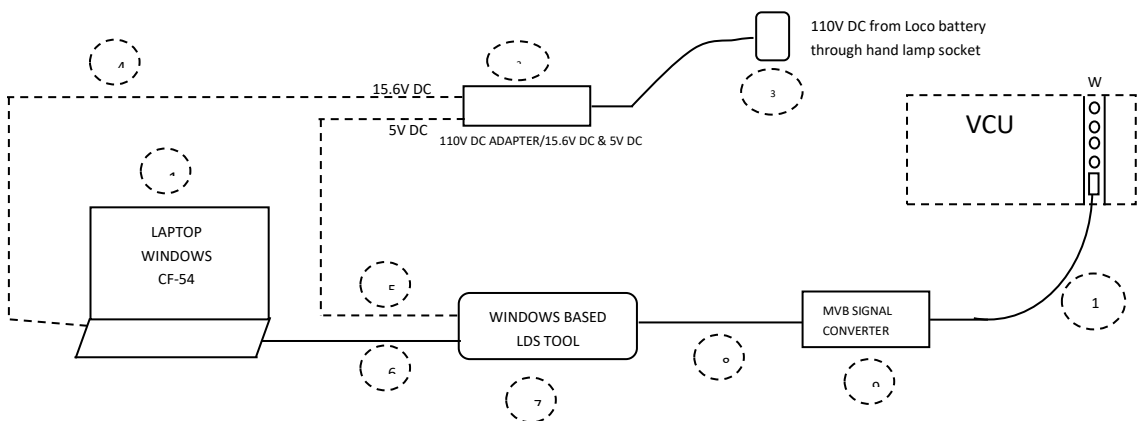
3.2 Interface Connection details

Sl. No	Peripheral Details	Remarks
1	Laptop Model No. Tough book CF-54 Make: Panasonic Operating System: Windows-10 Ethernet Port : 1 USB port : 2	Run the LDS software as explained in the clause no.
2	Laptop Adapter Input : 230V AC/50Hz Output : 15.6V DC/7A and 5V DC/3A	This adapter must be used in the ELS Labs. This adapter has two outputs Viz, 1. Cable connected with DC jack female (15.6V DC) to be connected to Laptop for battery charger. 2. Cable connected with USB type – B male (5V DC) to be connected to WLDS tool
2A (refer Clause 3.1)	Laptop Adapter Input : 110V DC	This adapter must be used in the 3-phase Locomotives.

	Output : 15.6V DC/7A and 5V DC/3A	This adapter has two outputs Viz, 1. Cable connected with DC jack Female (15.6V DC) to be connected to Laptop for battery charger. 2. Cable connected with USB type – B Male (5V DC) to be connected to WLDS tool
3	3 pin plug	This is the part of AC adapter needs to be connected to 3 pin AC sockets (230V/50Hz).
3A (refer Clause 3.1)	Hand lamp socket	This is the part of DC adapter needs to be connected to 110V Loco battery provided on assistant driver desk in the Locomotive.
4	Cable crimped with DC jack Female connector. Voltage available: 15.6V DC	Needs to be connected to Laptop for charging purpose.
5	Cable crimped with USB type-B Male connector. Voltage available: 5V DC	Needs to be connected to WLDS tool for powering the unit.
6	Ethernet Cable crimped with RJ-45 male connector at both the ends	This cable needs to be connected between Laptop and WLDS tool for data communication.
7	Windows based LDS (WLDS) tool	WLDS has below mentioned connectors: Ethernet port : RJ-45 Female panel mount for connecting with Laptop. USB port : Type-B Female panel mount for connecting with Adapter(AC/DC) to power ON. Sub-D 9 pin Female Connector for connecting to VCU through MVB signal Converter.
8	MVB Long cable 10 core shielded CLW approved cable duly crimped with Sub-D 9 pin Male connector on one side and 10 pin circular Female connector on other side. Cable length : 6.5metre	Cable crimped with Sub-D 9 pin Male connector has to be connected to WLDS side, cable crimped with 10 pin circular connector Female connector has to be connected to MVB signal converter end.
9	MVB Signal Converter	MVB Signal converter has below mentioned connector: 10 pin circular connector Male panel mount for connecting with WLDS tool.
10	MVB short cable 10 core shielded CLW approved cable duly crimped with Sub-D 9 pin Male connector on one	Cable crimped with Sub-D 9 pin Male connector has to be connected to MVB stub line provided on the MVB Bus

	side and directly in-line with MVB signal converter on other side. Cable length : 0.5metre	coupler card which is inserted on "W" slot of VCU rack.

4.0 Step by step explanation of LDS software tool execution

1. Connection:

- Connect WLDS tool and set up as explained in clause 3.0 and 3.1.
- Once connection is done switch ON LDS hardware, run the LDS software in diagnostic laptop, and find Login form.

2. Login Form:
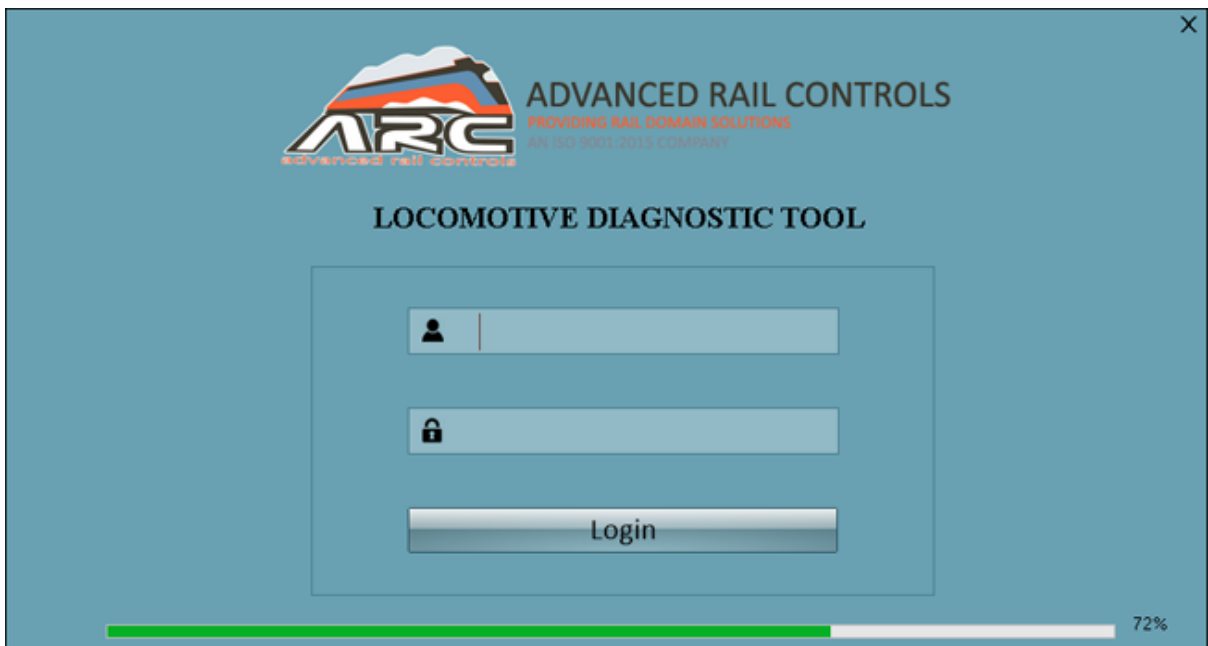
Login form of LDS software

User id: admin

Password: arc_wlds

Once user entered the username and password and click on login button the hardware is connected.

3. Menu Screen:
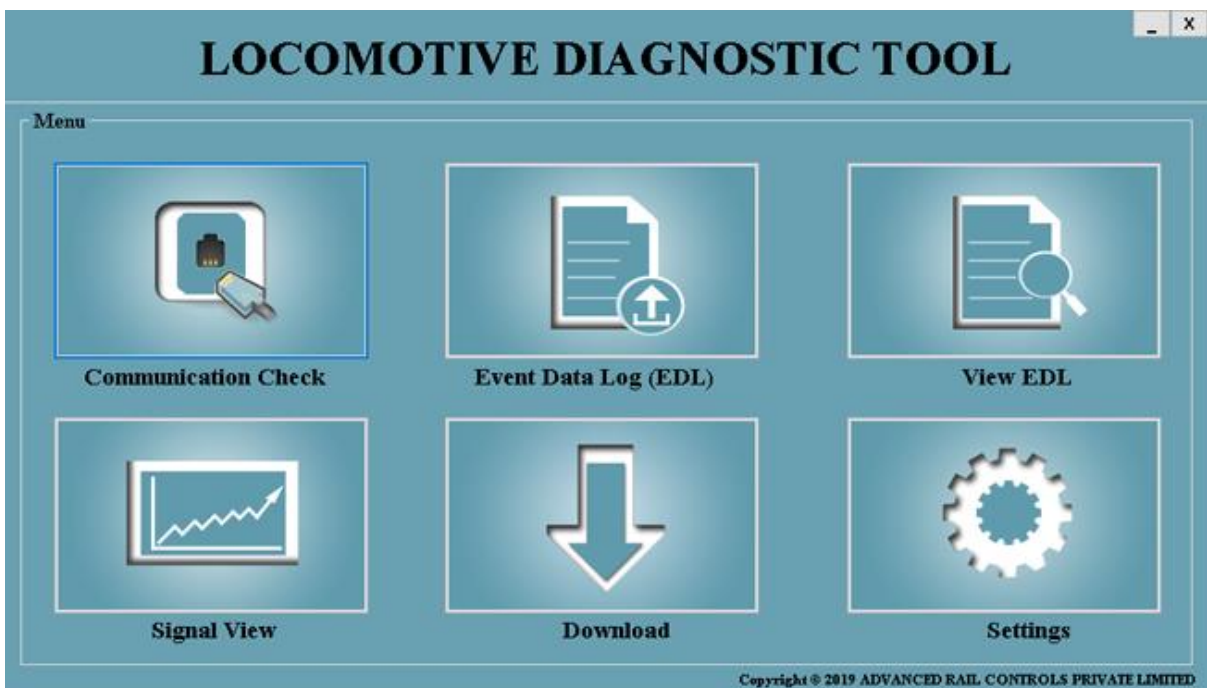
In menu Screen options will be shown such as

- Communication Check
- Event Data Log (EDL)

- View EDL

- Signal View

- Download

- Settings
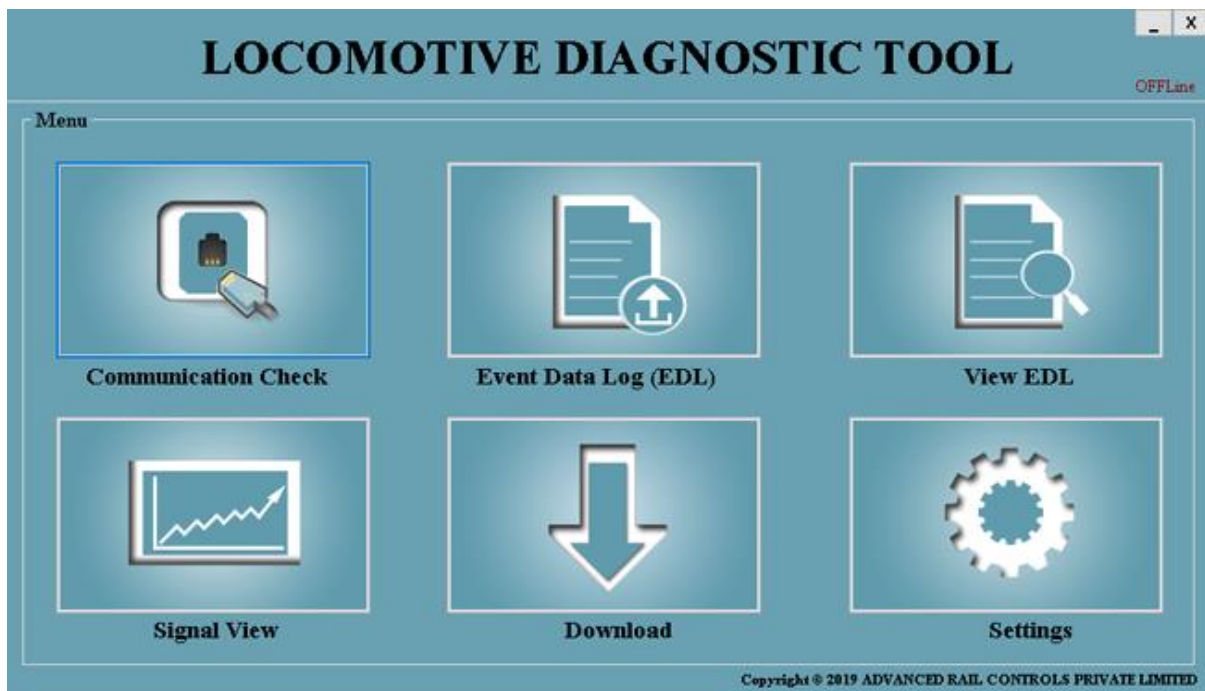
In case if the WLDS hardware is not connected with the laptop, the menu form will show as 'OFFLINE' as displayed above

4. Communication Check Form:
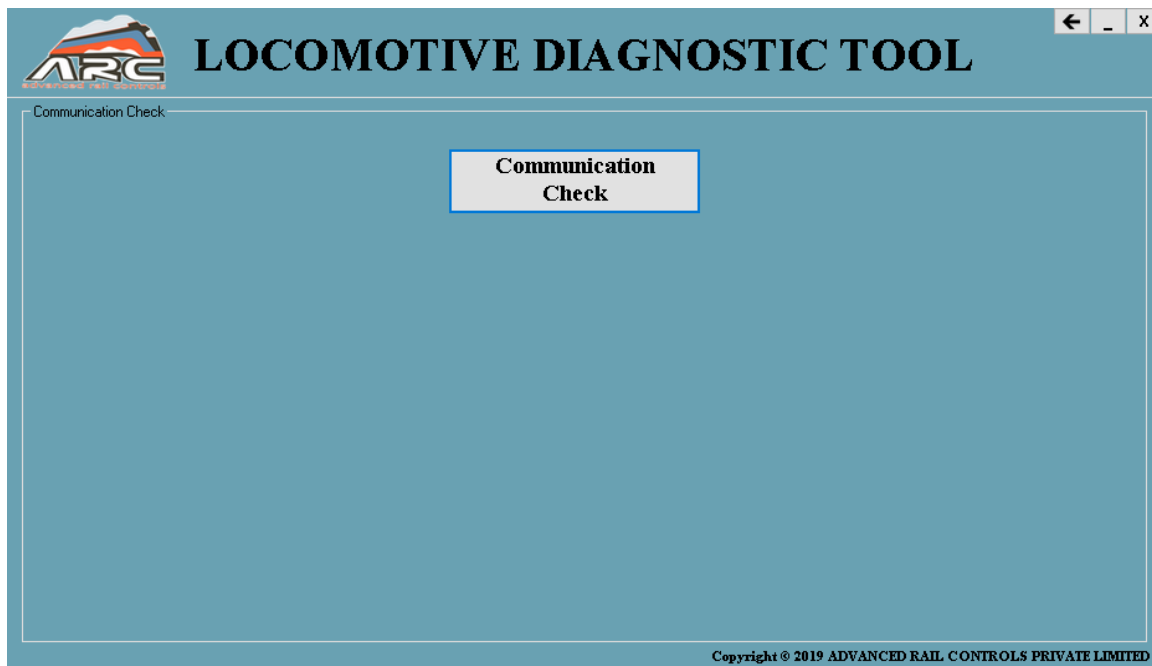
To check the connection user can click on communication check button.
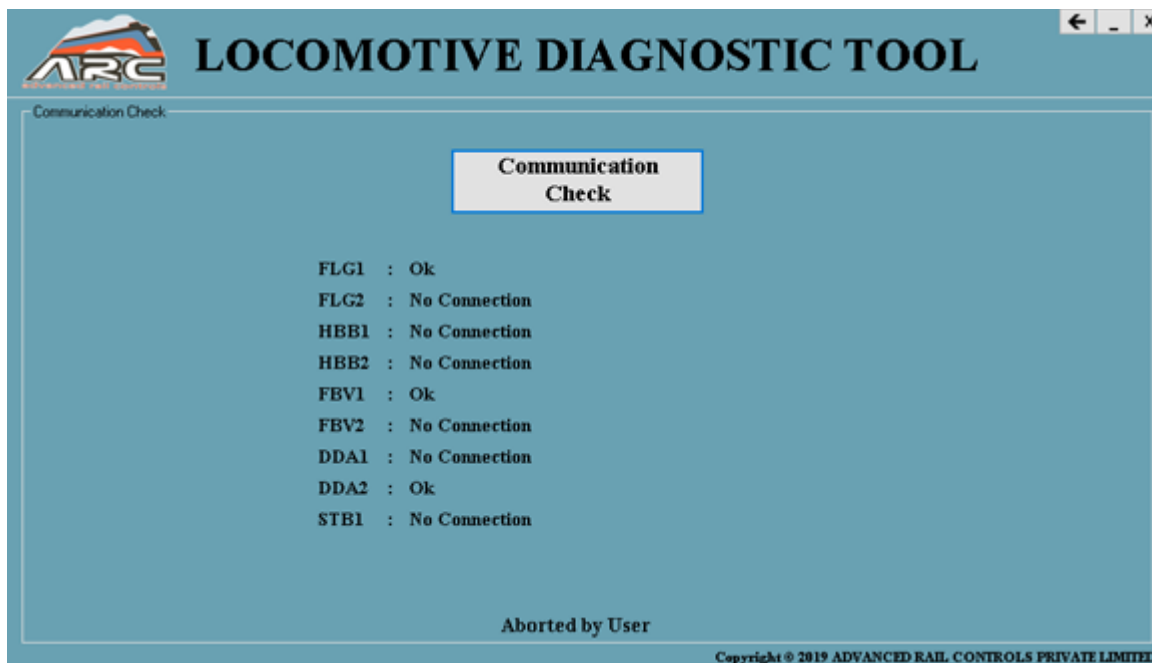
Comm check of particular processor if it is connected it will show 'ok' otherwise 'no connection'. In case user want to cancel the comm check once click on cancel it will show the message as Aborted by user
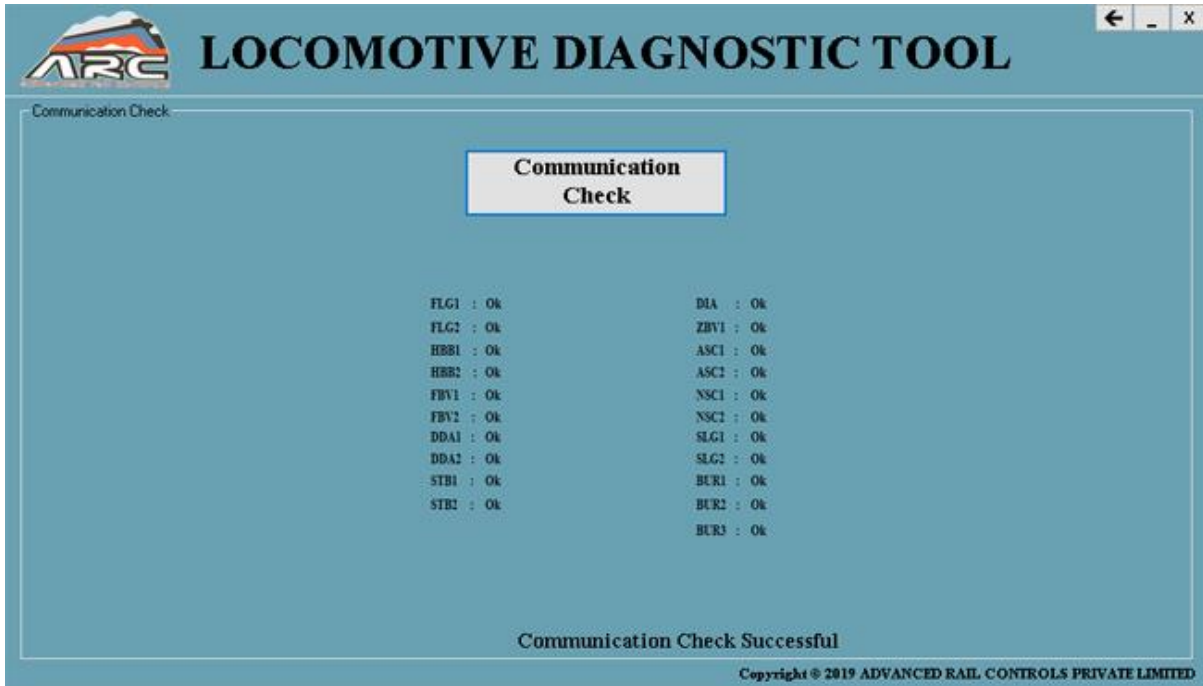
Comm check of all the processor if it is connected it will show 'ok' otherwise 'no connection'.

5. EDL Form:

When user click on EDL icon the EDL page will be displayed the options below such as
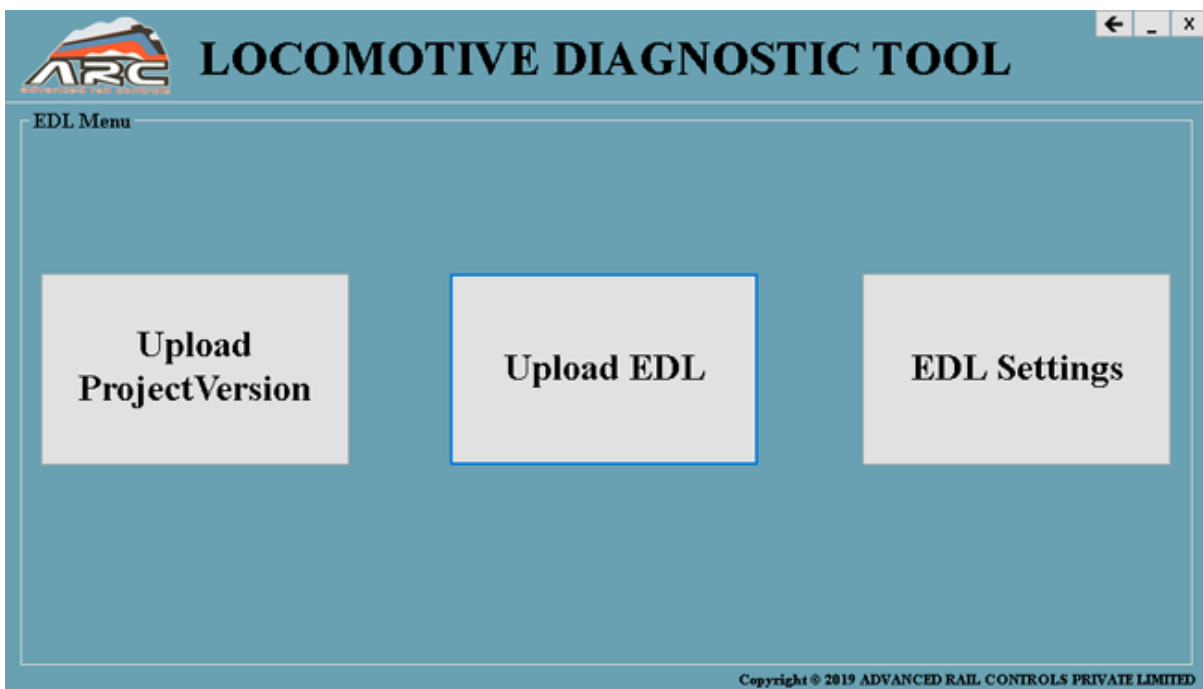
- Upload Project Version
- Upload EDL

- EDL Settings

Upload Project Version:

Browse for the FD file FDXXUK.ASC and FT file FTXXUK.ASC

If we add FD and FT file and click on upload then project version will be saved.

Clicking on upload button generates the xml form of file browsed, which will be Saved.

In EDL View, the Project Version will be displayed if the xml file is previously created.
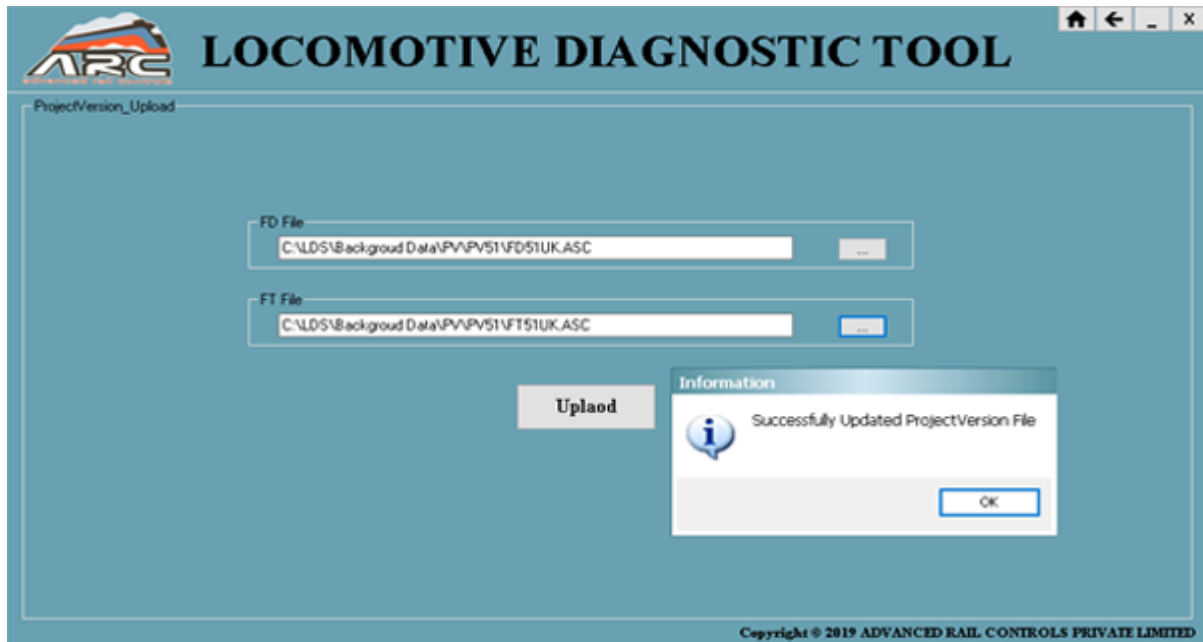
Upload EDL:

Click on Upload EDL Button to upload EDL (Loco Fault)
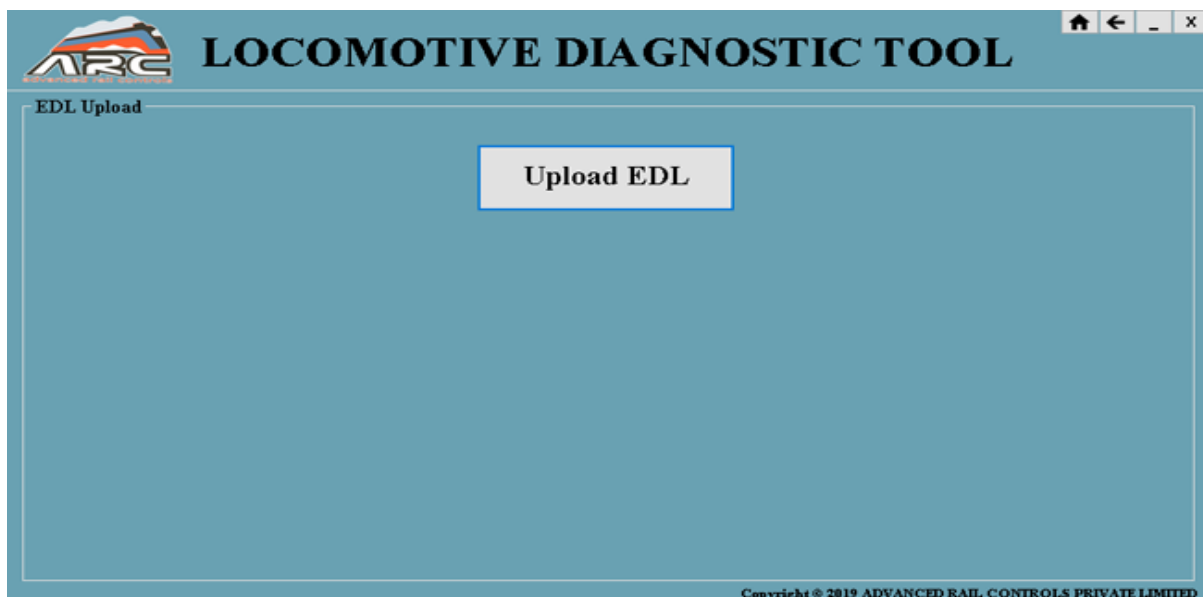
When user clicks on upload EDL button the EDL (Loco Fault) will be extracted from the processor.

To save EDL the following window will be displayed where user can save the file in specific folder and click on View EDL to view Loco Fault
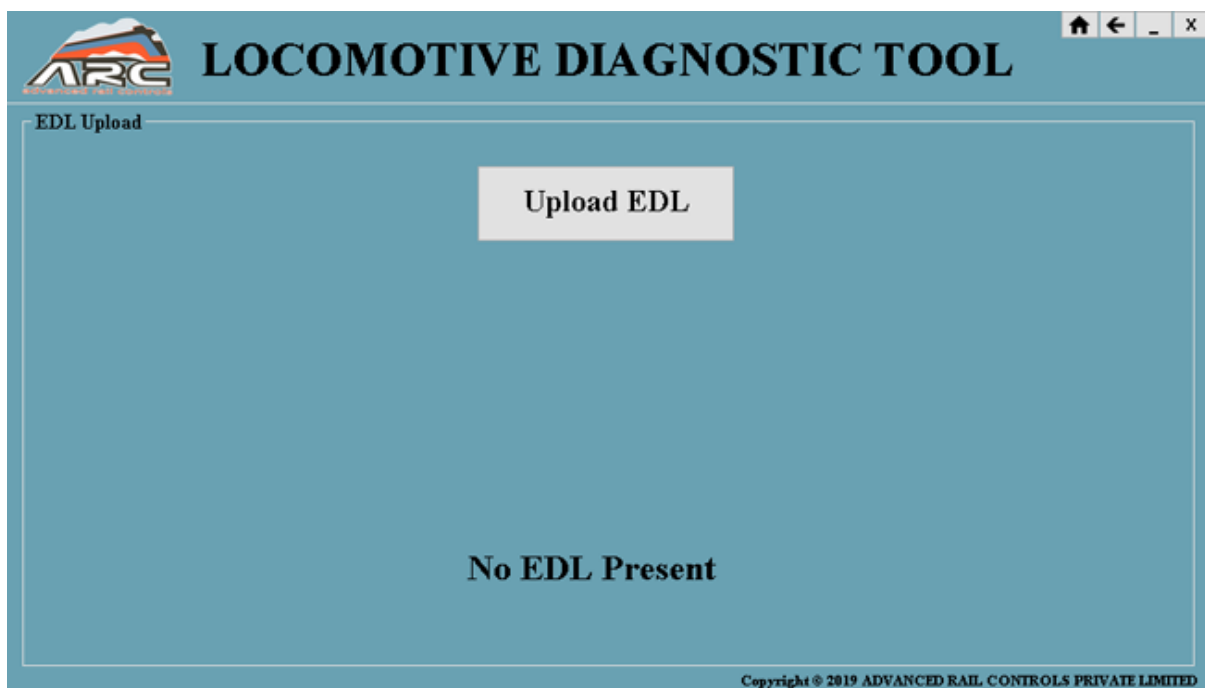
If EDL is not present when user clicks on upload EDL then it will display the message as 'No EDL present'.

EDL Settings:

When user clicks on EDL Settings button the page will be displayed and following options will be shown:
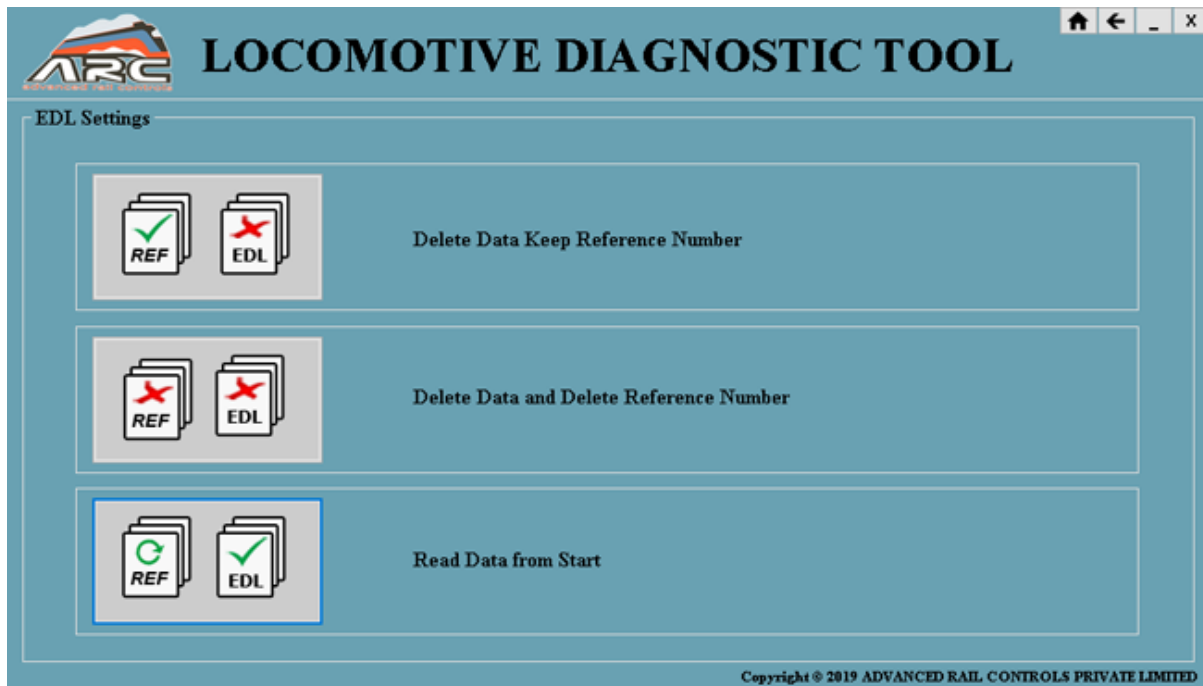
- Delete Data Keep Reference Number

- Delete Data and Delete Reference Number

- Read Data from Start

And if user clicks on the following option button the particular process will be done accordingly.

- Delete Data Keep Reference Number: - Loco Fault will be deleted and reference number will not be zero (start from old reference number).

- Delete Data and Delete Reference Number: - Loco Fault will be deleted and reference will set to zero.

- Read Data from Start: - Loco Fault will start from the Beginning.

6. View EDL:
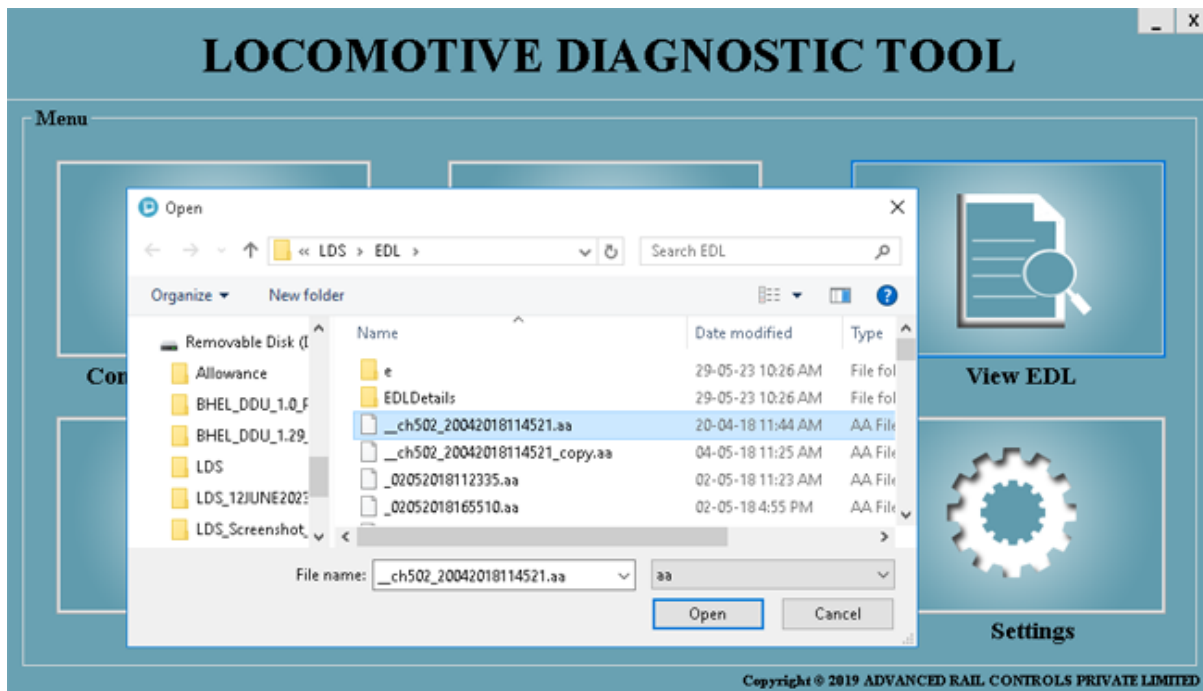
When user click on view EDL icon, dialogue box will be displayed to select the files after selecting the file the EDL information will be displayed as shown below.

Once EDL information is displayed and in that EDL information page user can check the information of particular reference number by clicking reference number
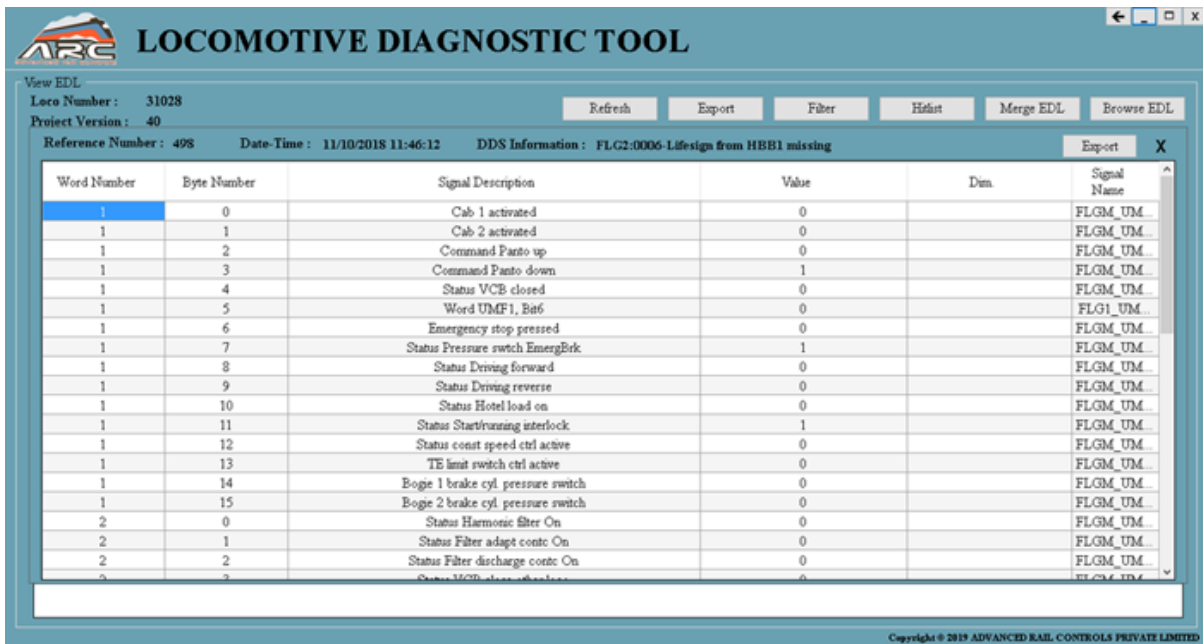
User can view background data of that particular reference no as shown above.
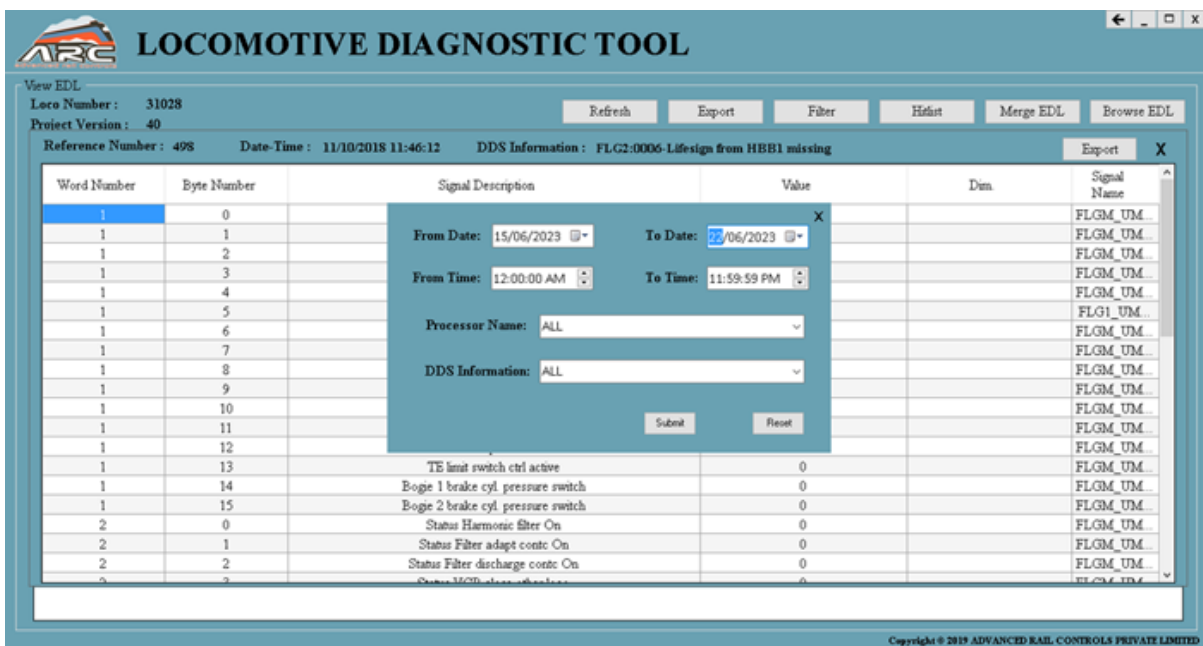
Filter: If user clicks on Filter button one popup window will be shown where user can select from date and to date, time, processor name, and EDL information.

And click on submit button all details will be displayed as shown as above

<u>Hitlist:</u> -If user click on hit list button the no. of times EDL has been occurred can be checked and if user wants to go back to the previous page just click on refresh button or Exit Hitlist Button.
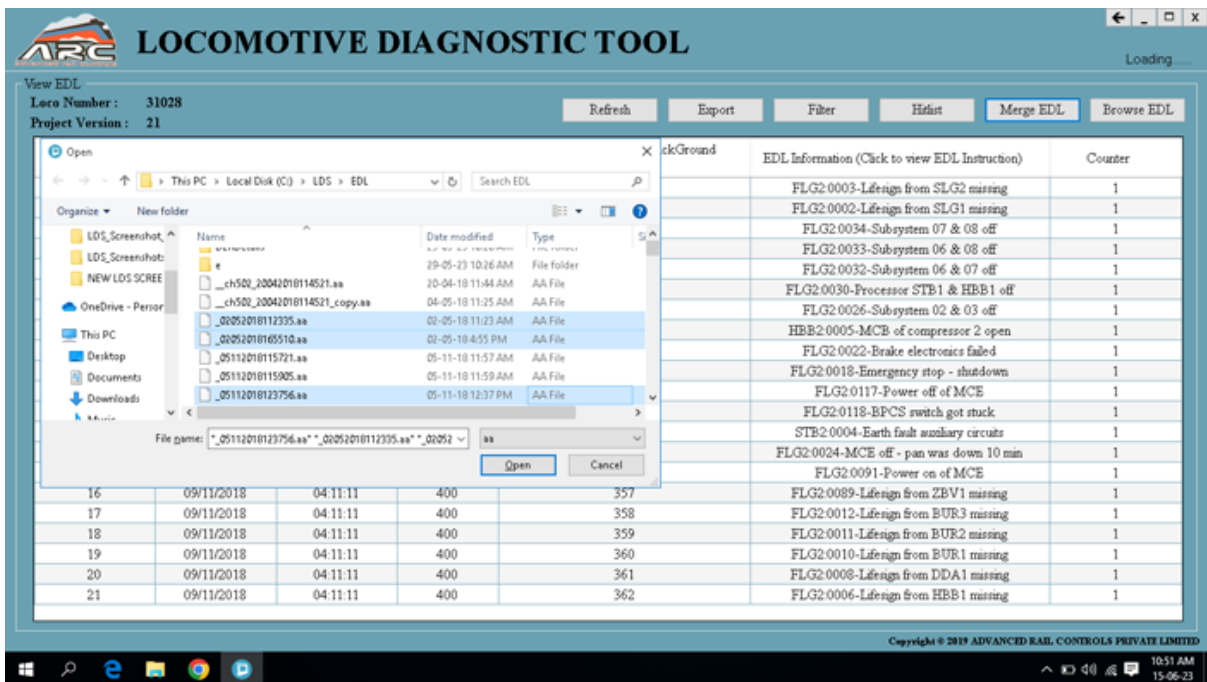
Merge: - If user clicks on merge button the pop-up window will be displayed where user can merge 2 or more EDL files and by clicking on open the EDL information of merge files will be displayed. Also, Files with same Loco Fault can be Merged to a single Fault file.

Browse EDL: - If user click browse button can select the different loco fault file.

- 4. Signal View:
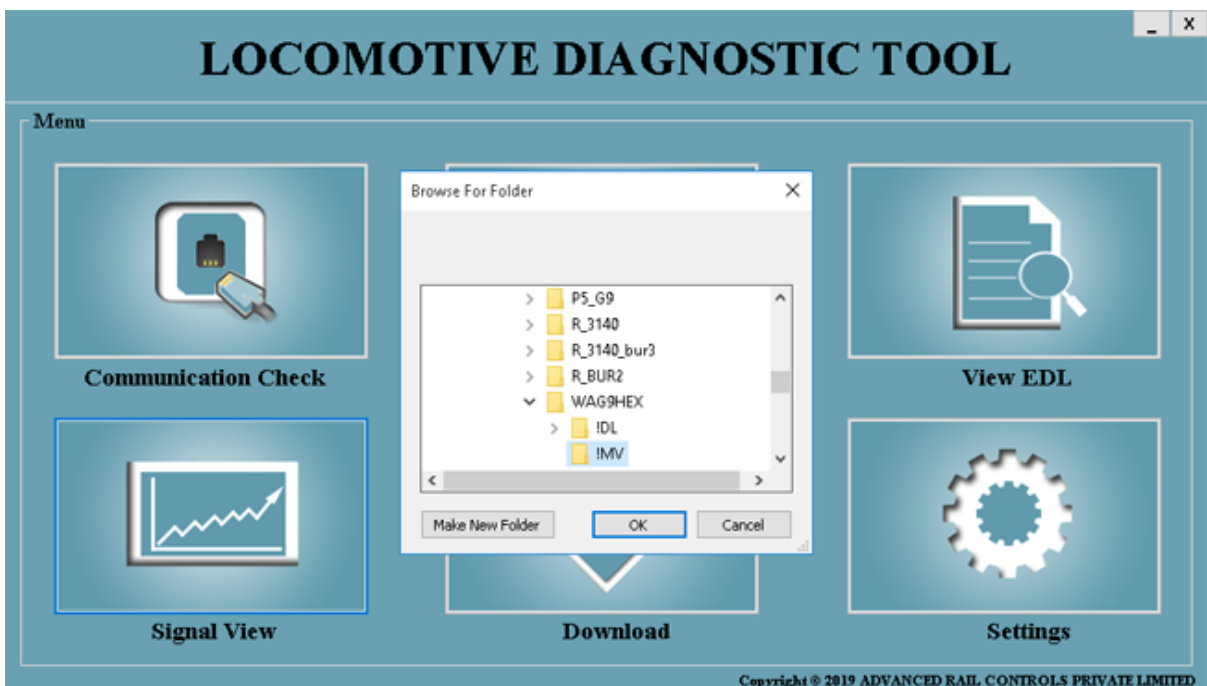
When user clicks on signal view icon the dialogue box will displayed where user need to select the Loco Processor Signal file from the folder after that signal view menu page will be displayed.
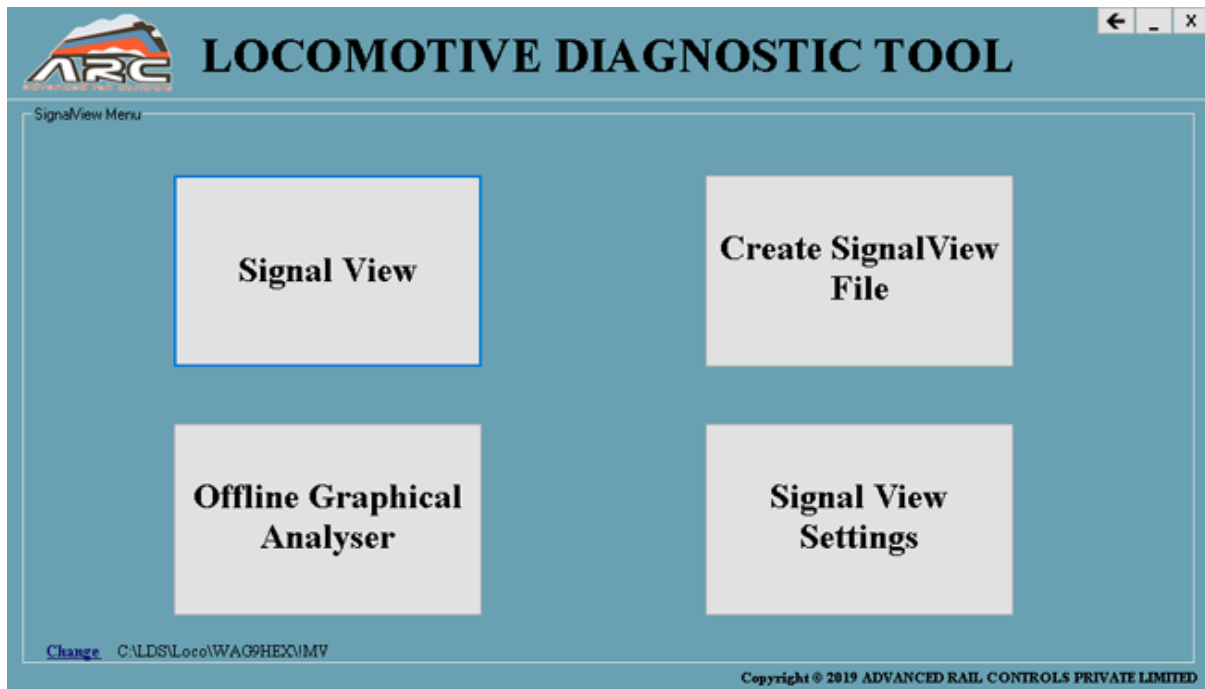
Where various options are there such as

- Signal View
- Create SignalView File
- Offline Graphical Analyser
- Signal View Setting.

Create SignalView File:

To create signalview file user should click on create signalview file the page will be displayed where various signals list will be shown in which up to 16 signals can be selected.
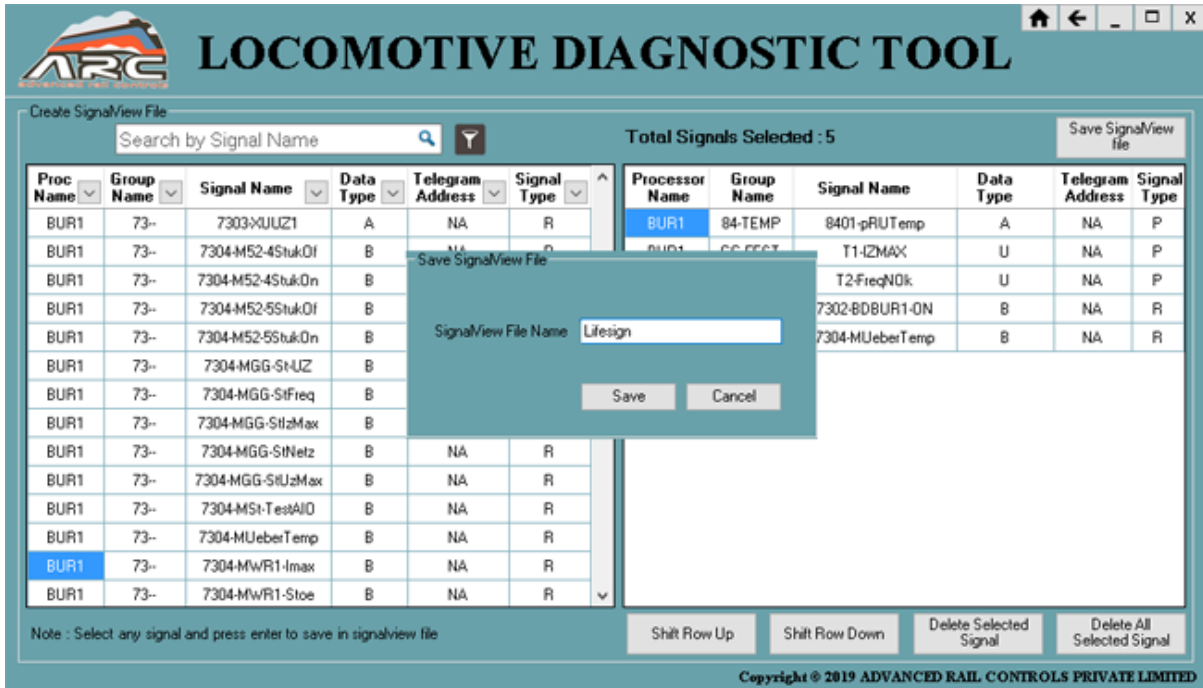
Or even particular signal can be searched by filter option provided in that after selecting the signals from the list then click on the save signalview button the pop window will be displayed where the file can be saved.

Even if user want to delete the signals by selecting the particular signal and then click on Delete Selected Signal button the particular signal will be deleted.

Signal View:
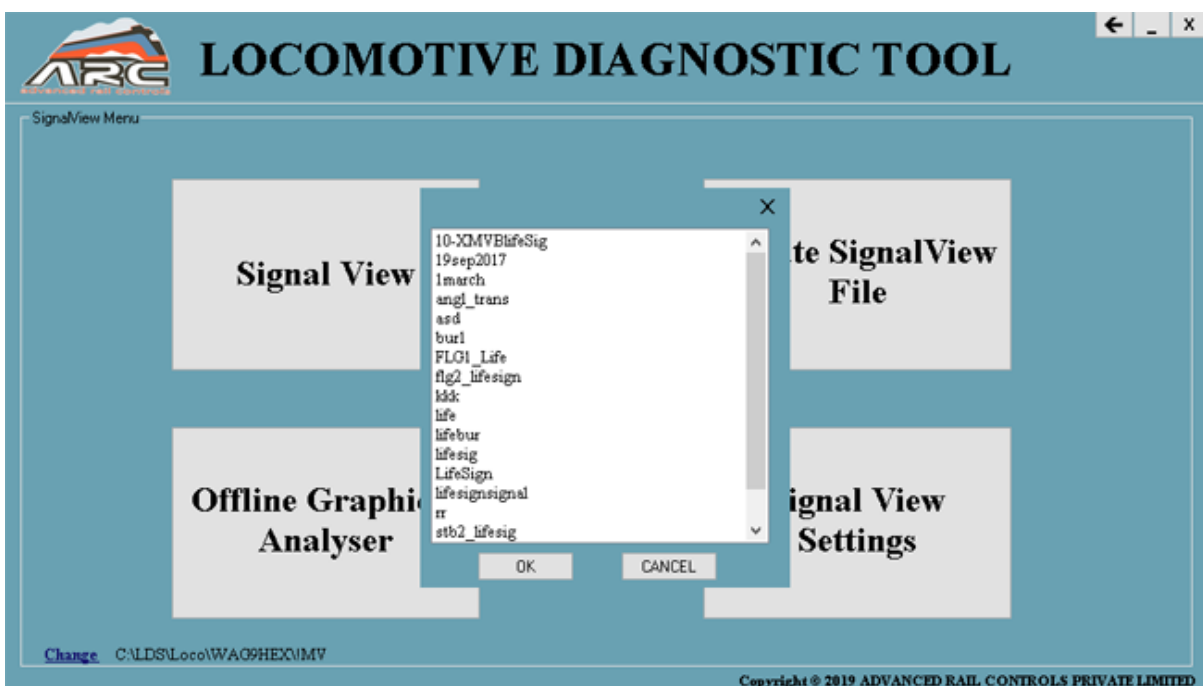
To check the status of a signal user should click on Signal View button where created file will be shown, in that user can select any signal it starts loading,
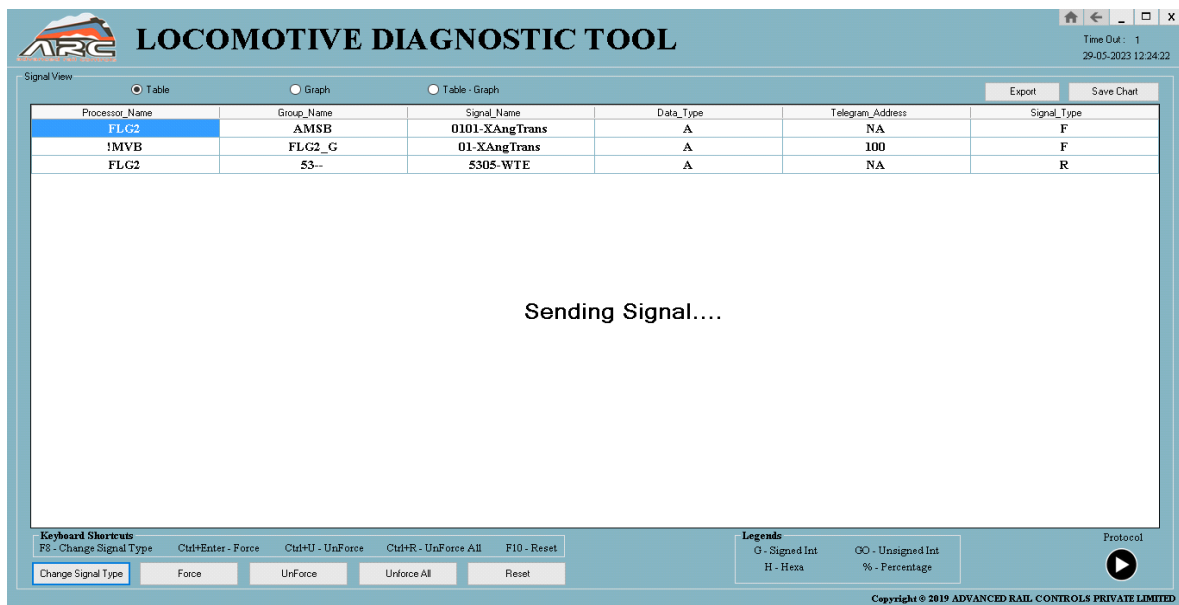
Once it is loaded the Signal View page is displayed where we user can view Signal View table as shown below.
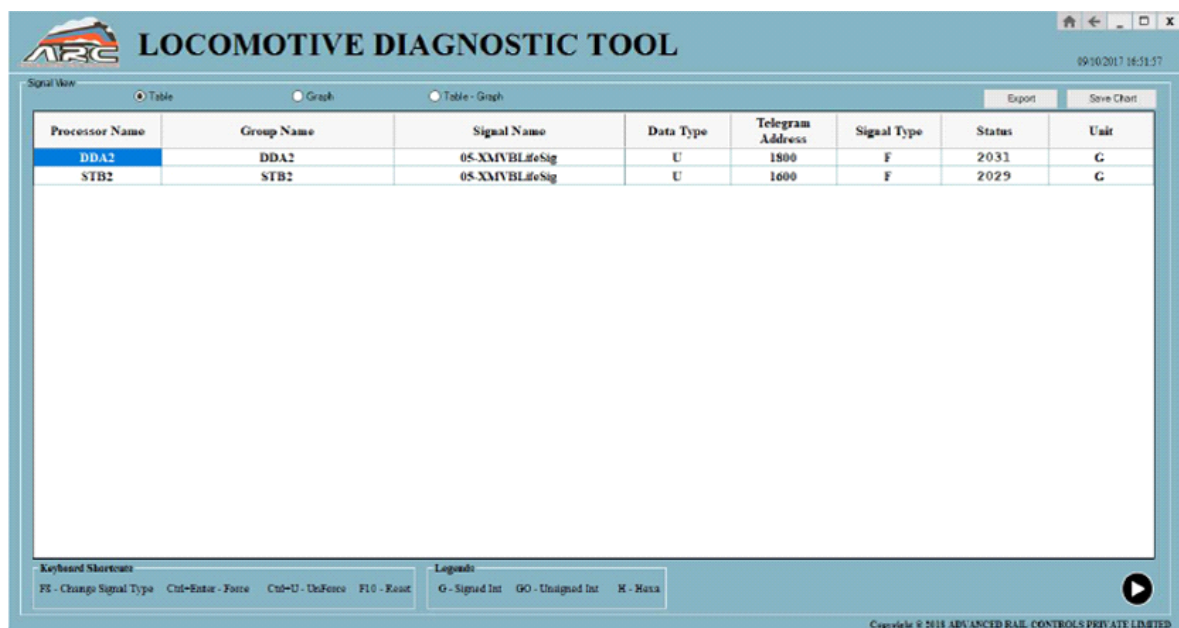
Even user can view graph and table graph, the graph can be seen of particular signal as shown below.
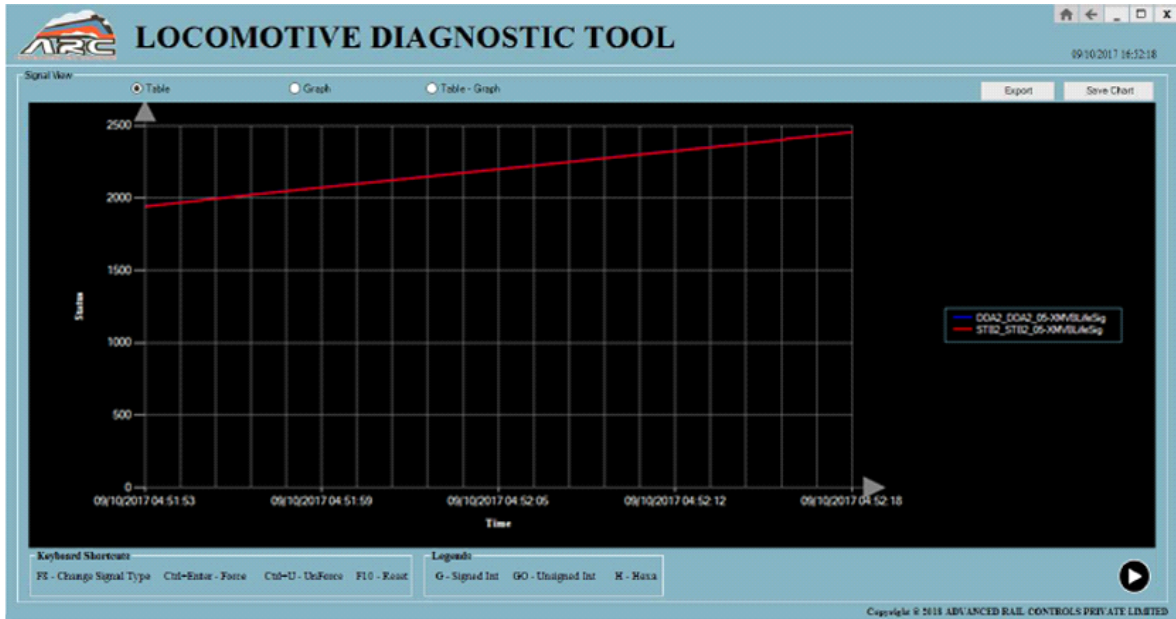
The graph of particular signal selected.
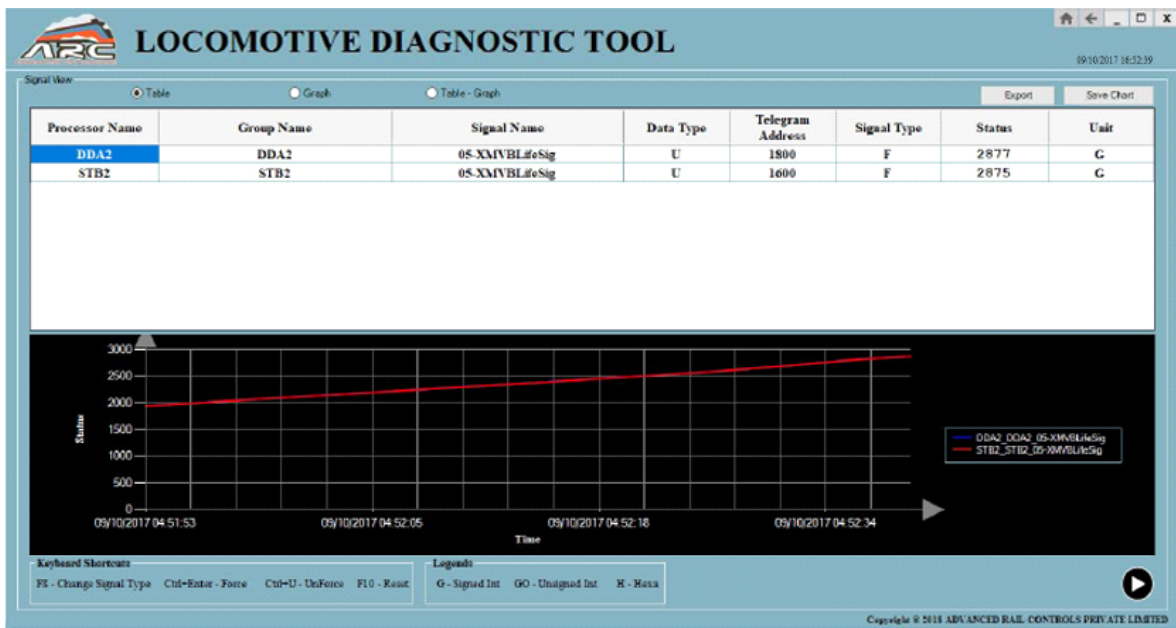
The both table and graph can be viewed as shown above page. Even user has two options in this page such as export and save chart.
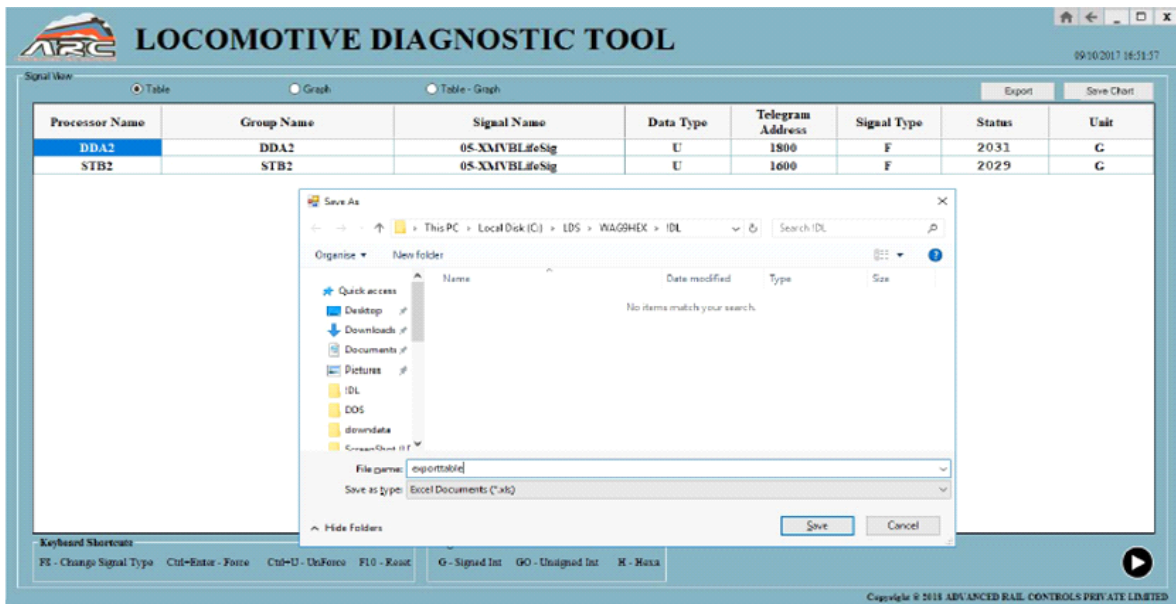
If user wants to export the table just click on export button pop up window will be displayed where table can be saved in specific folder.
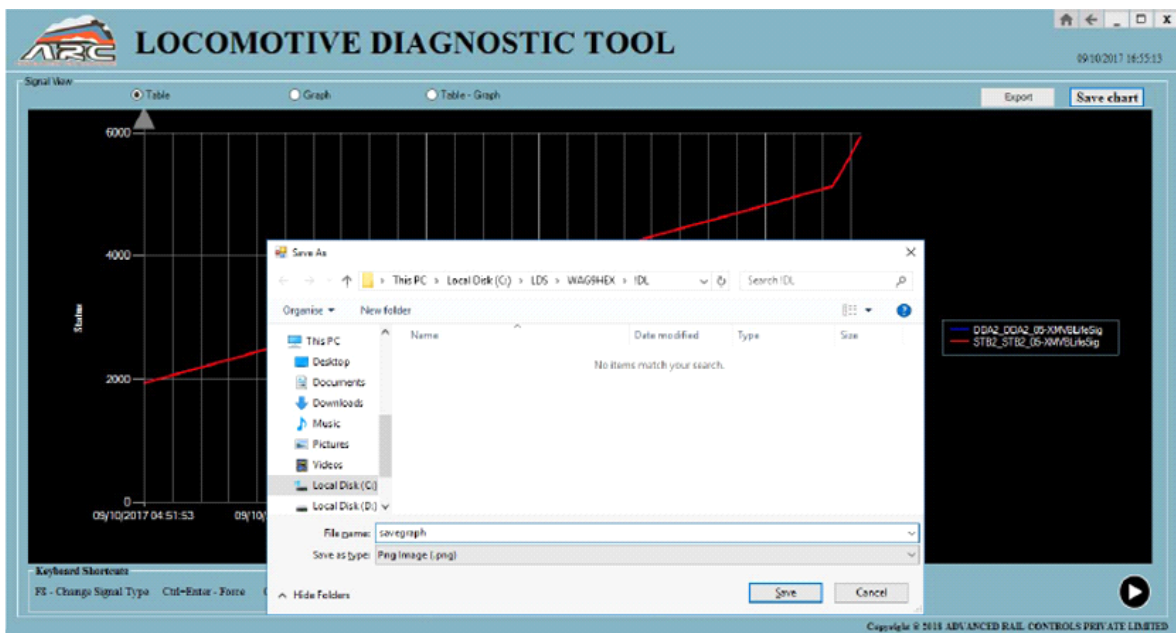
If user wants to save the graph just click on save chart button pop up window will be displayed where graph can be saved in specific folder.
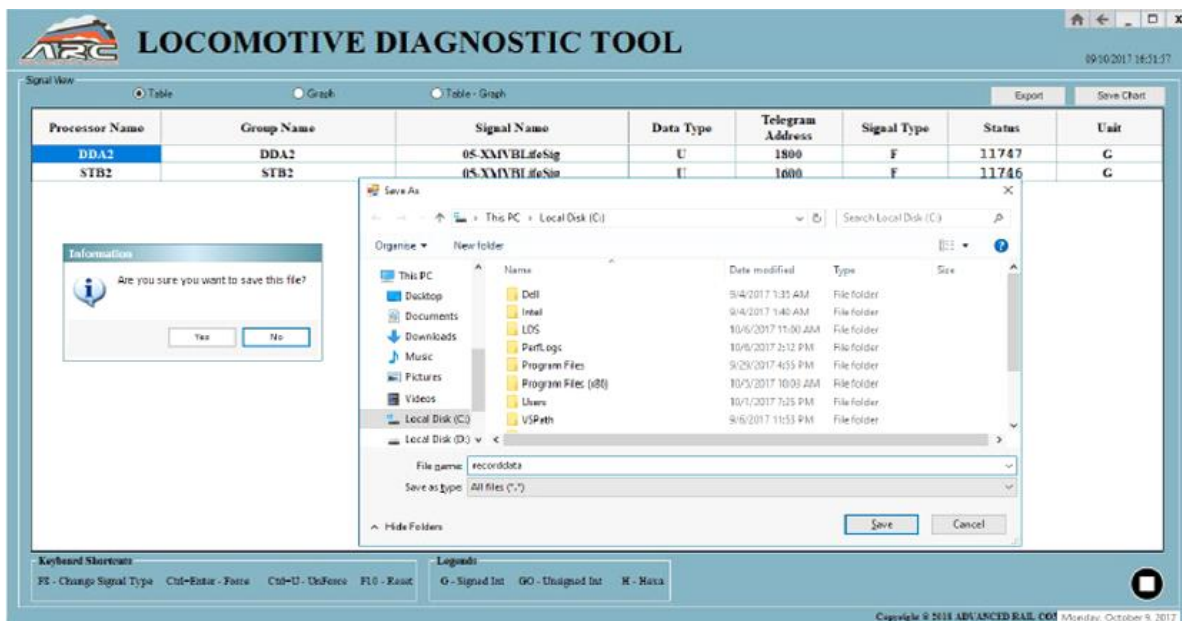
And one more option provided in Signal View page is to save protocol on any folder pop up dialogue box is shown on click of protocol start button the protocol will be saved and even user can stop it by clicking on stop button.

Offline Graphical Analyser:
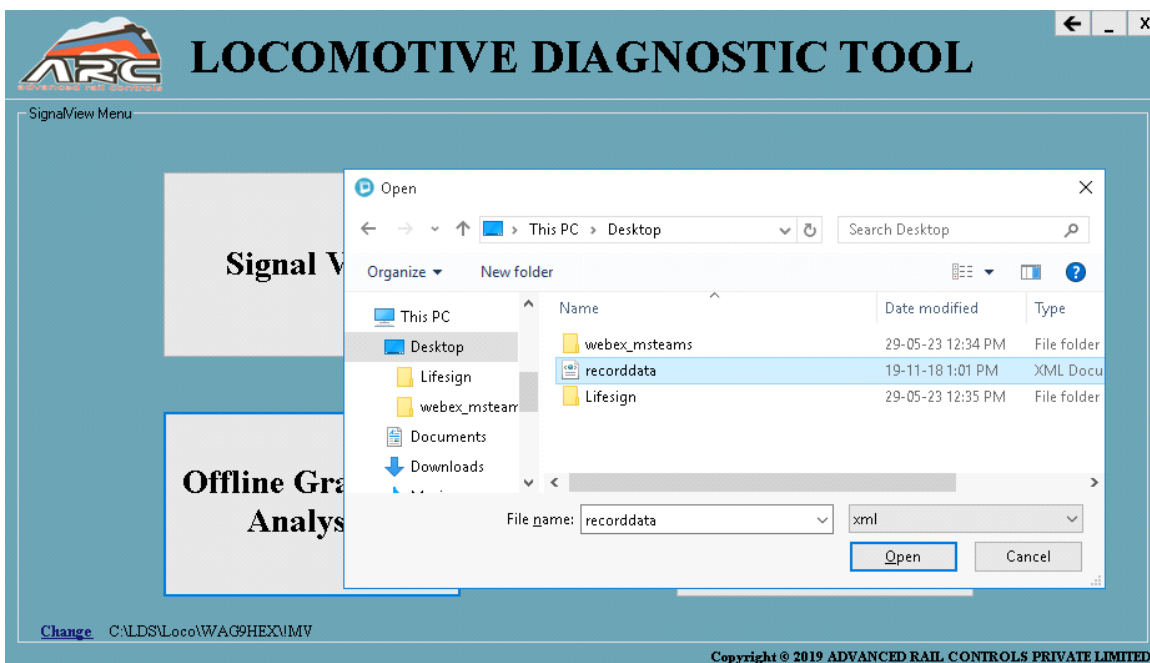
When user click on Offline Graphical Analyser button, a pop-up dialogue box will be shown and user has to select the recorded file, then the details of the file will be shown in a form of bar graph, line graph and table.
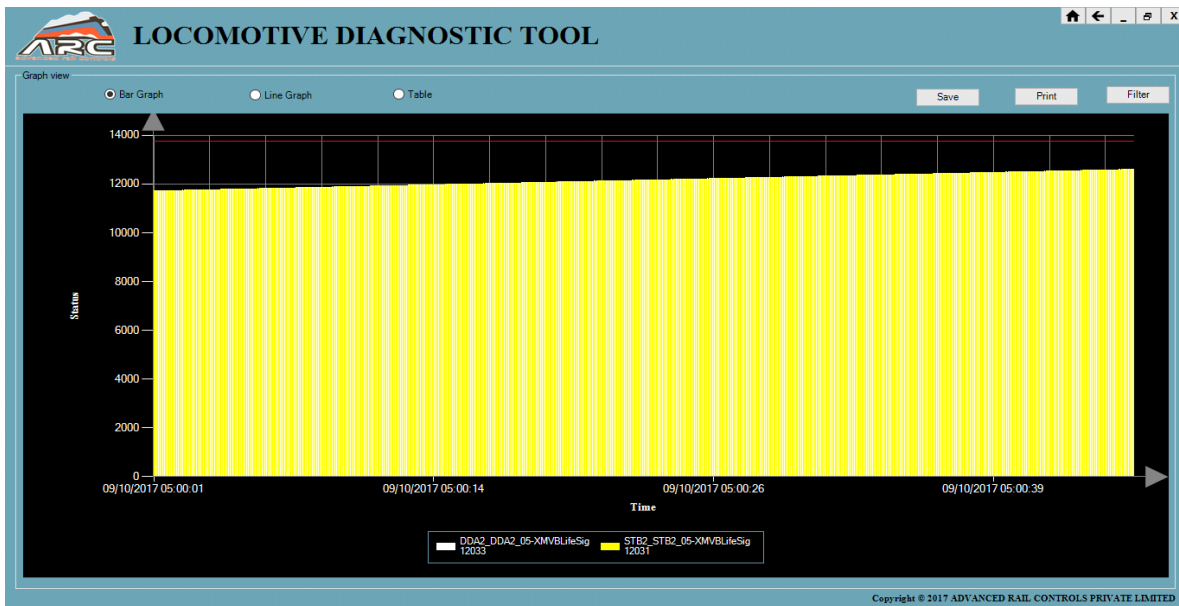
When user click on bar graph the graph can be seen of the signal selected.
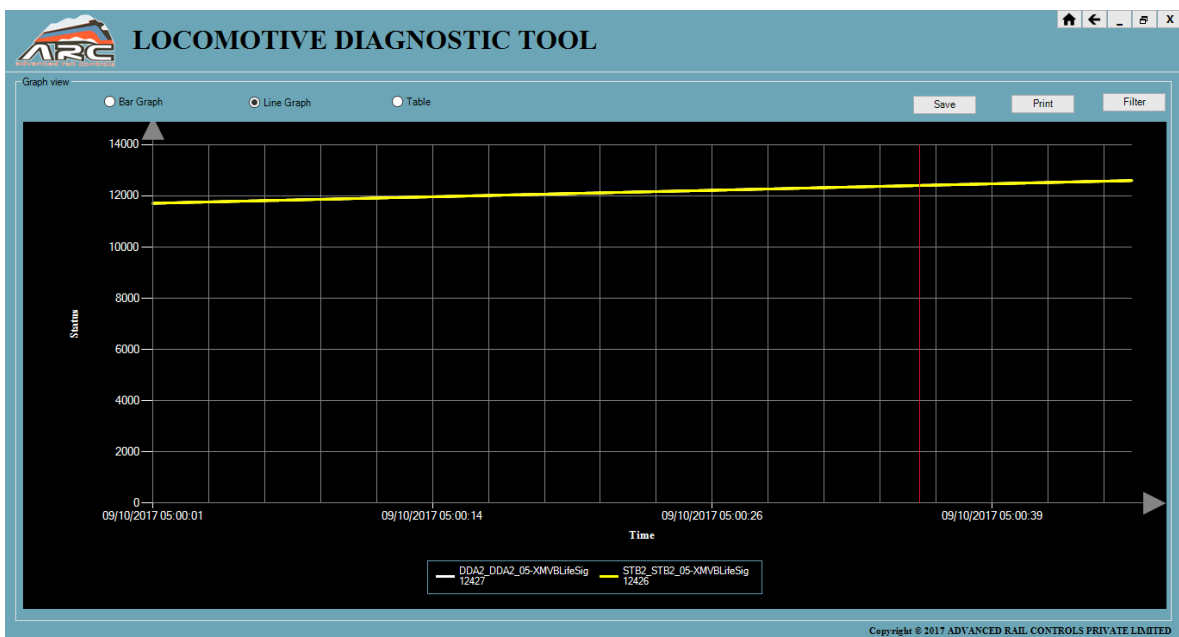
When user selects on line graph the line graph can be seen of the signal selected.
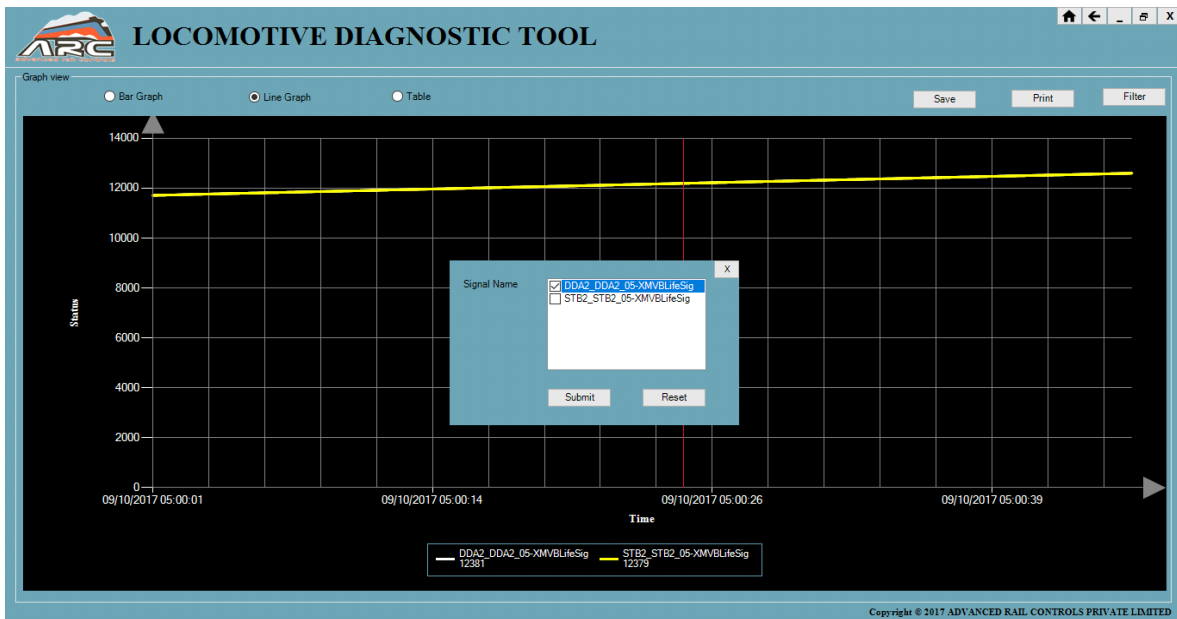
In the line graph, even user can use the filter option to select the signals.

When user clicks the table, the table will be displayed of the selected signals. And if user wants to save the table click on save pop up window will be displayed can save it in the specific folder and even can take printout of table.

Signal View Settings:
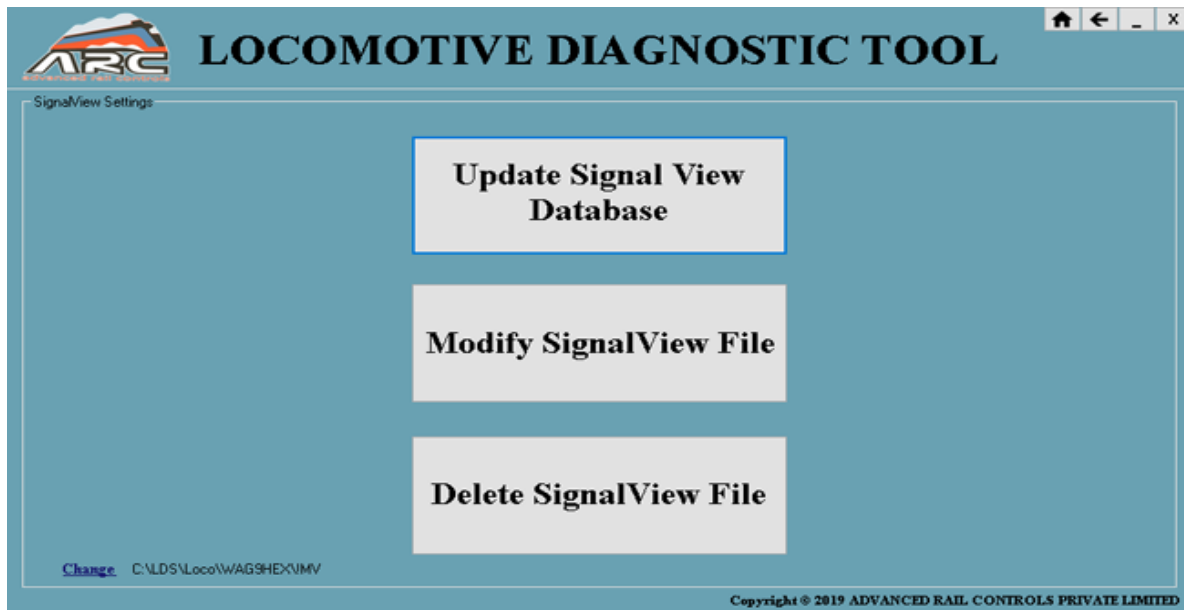
When user clicks on Signal View settings the options will be there such as

- Update Signal View Database,
- Modify SignalView File
- Delete SignalView File.

Update Signal View Database:

When user click on update Signal View, the above page appears and user needs to select the files and can select all the files by clicking select all check box or even can select any one file then click on Update Database Button then the file will get updated.

## Modify SignalView File:
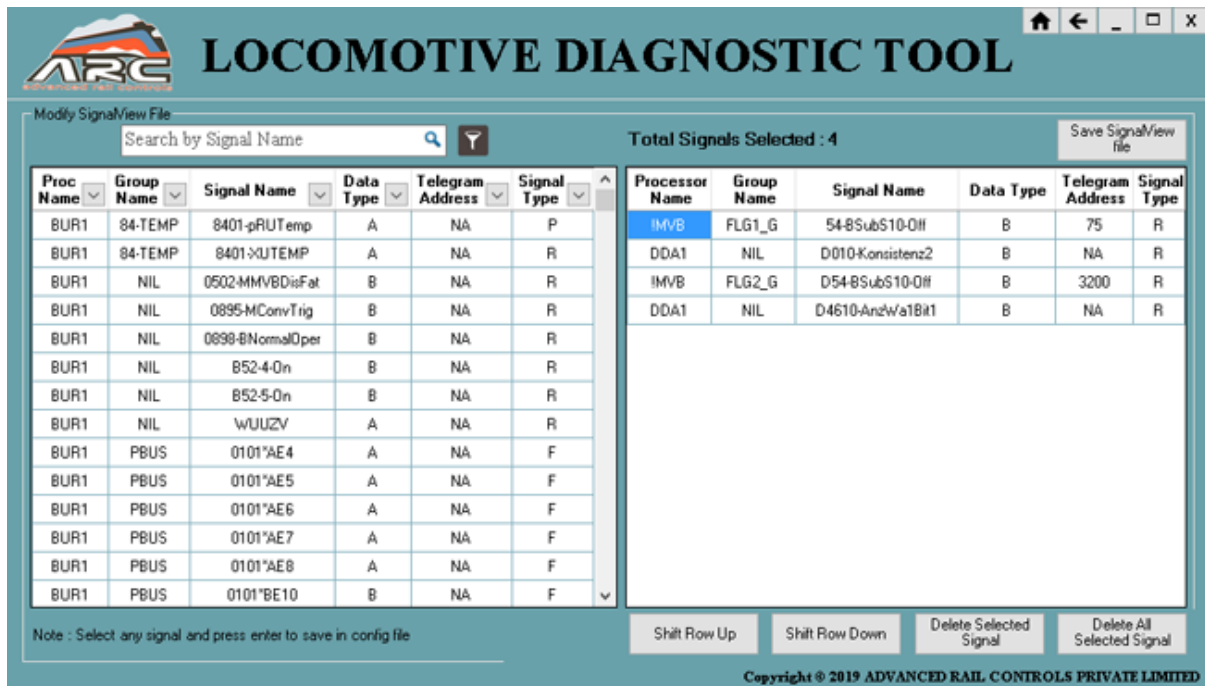
If user want to modify anything in the signalview file, user can click on the modify signalview file button. and then modification can be done by selecting and adding signals.

User can add or delete in the existing signalview file by clicking on save signalview file where old files will be replaced with the new signalview files.

To delete any signalview file user needs to click on Delete signalview File button then select file click which user wants to delete and click on delete button the file will get deleted.
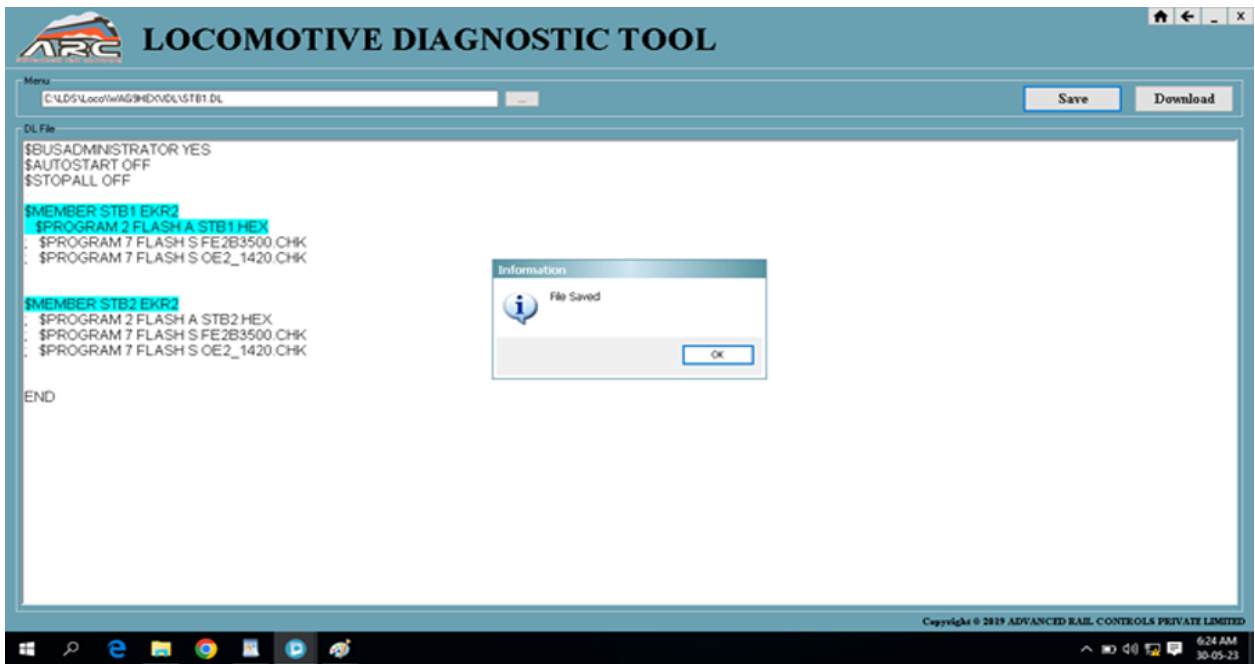
4. Download:
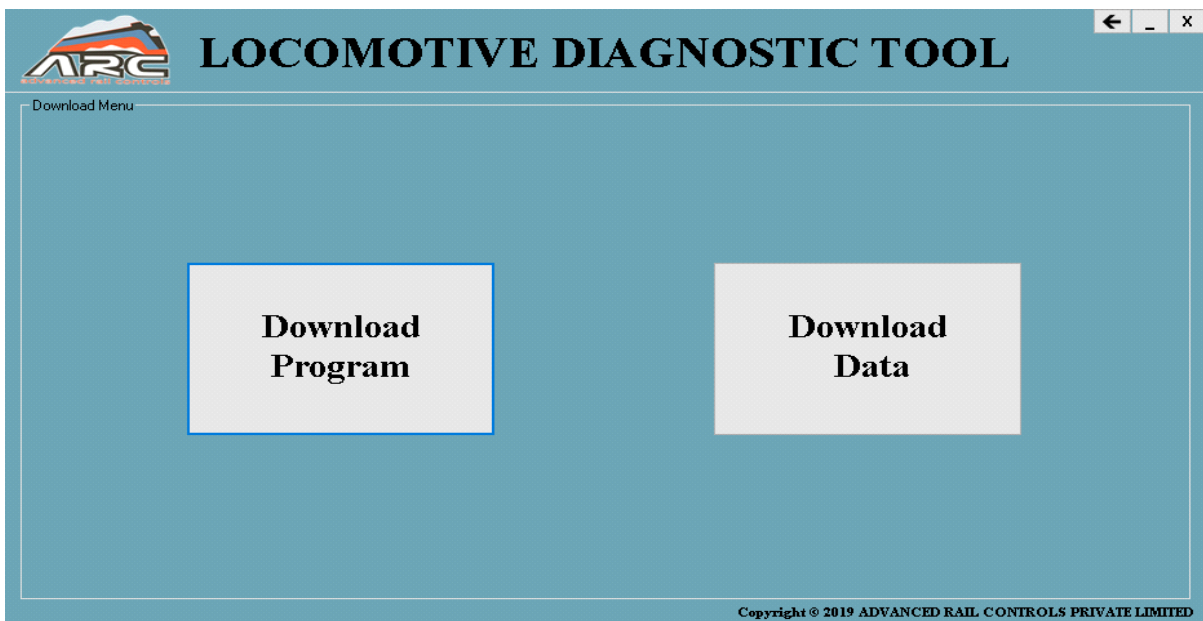
Click download button, user can see two options such as

- Download Program

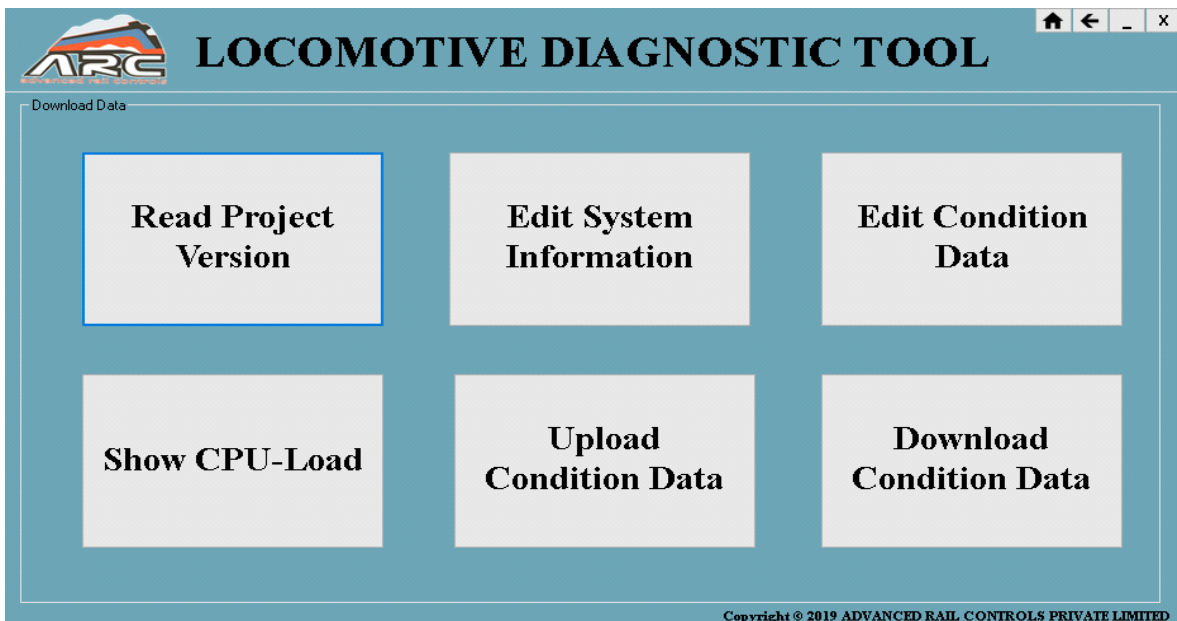- Download Data

Download Program:

On click Download Program button user will get the above page, where user need to select processor DL file then the above information will be displayed.

Save: - User can also save the file by just clicking on save button then the file will be saved. As well as user can also save the modified DL files.

Download: - By clicking on download Hex Files will be downloaded to the specified processor.

Download Data:

Click on download data Button the download Data page will be displayed where user can find options such as
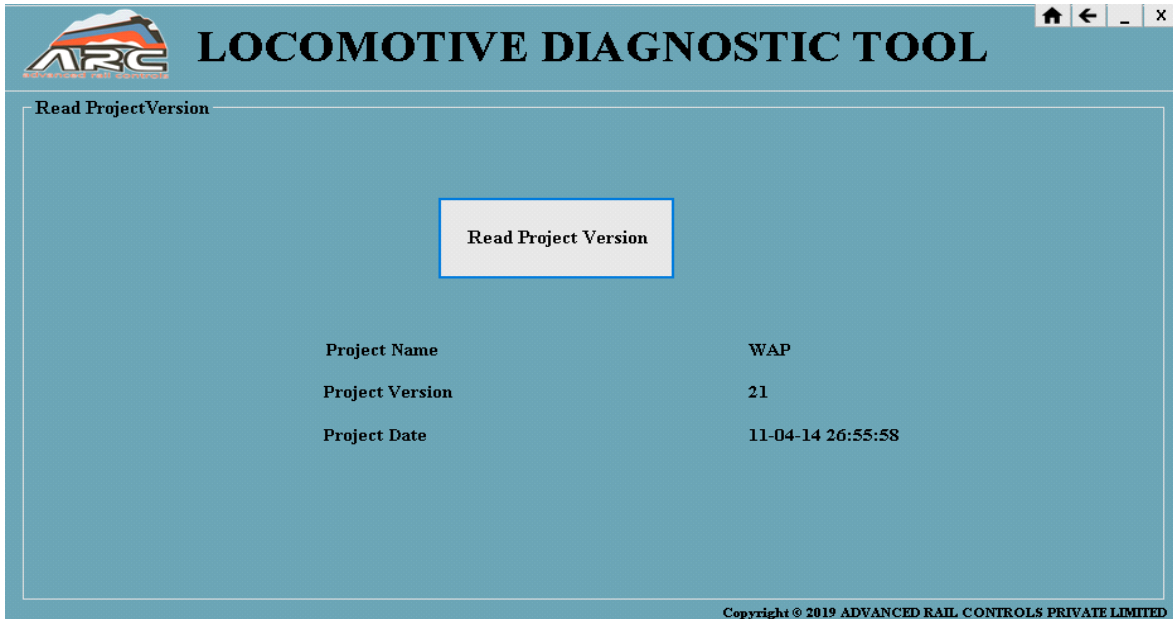
- • Read Project Version

- • Edit system information

- • Edit condition Data

- • Show CPU Load

- • Upload Condition Data

- • Download Condition Data

Read Project Version:

Click on Read Project Version Button then below shown page will be displayed.

Now, click on Read Project Version then user Can get the information about the project version in DIA Card as shown Below
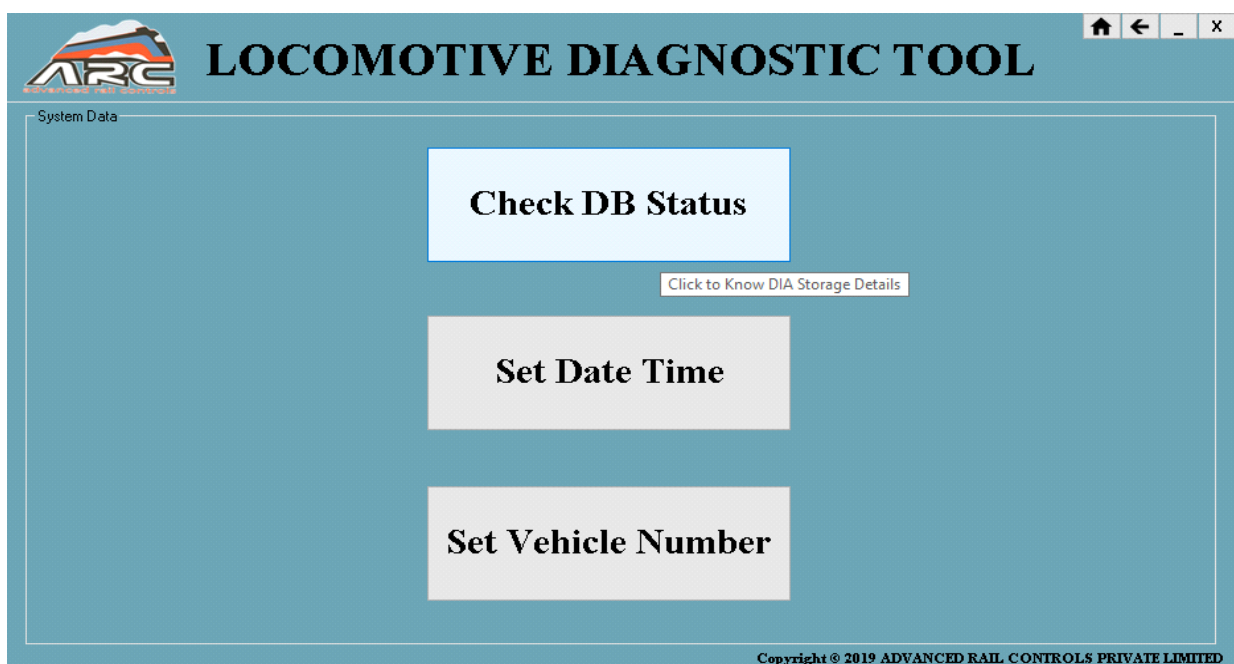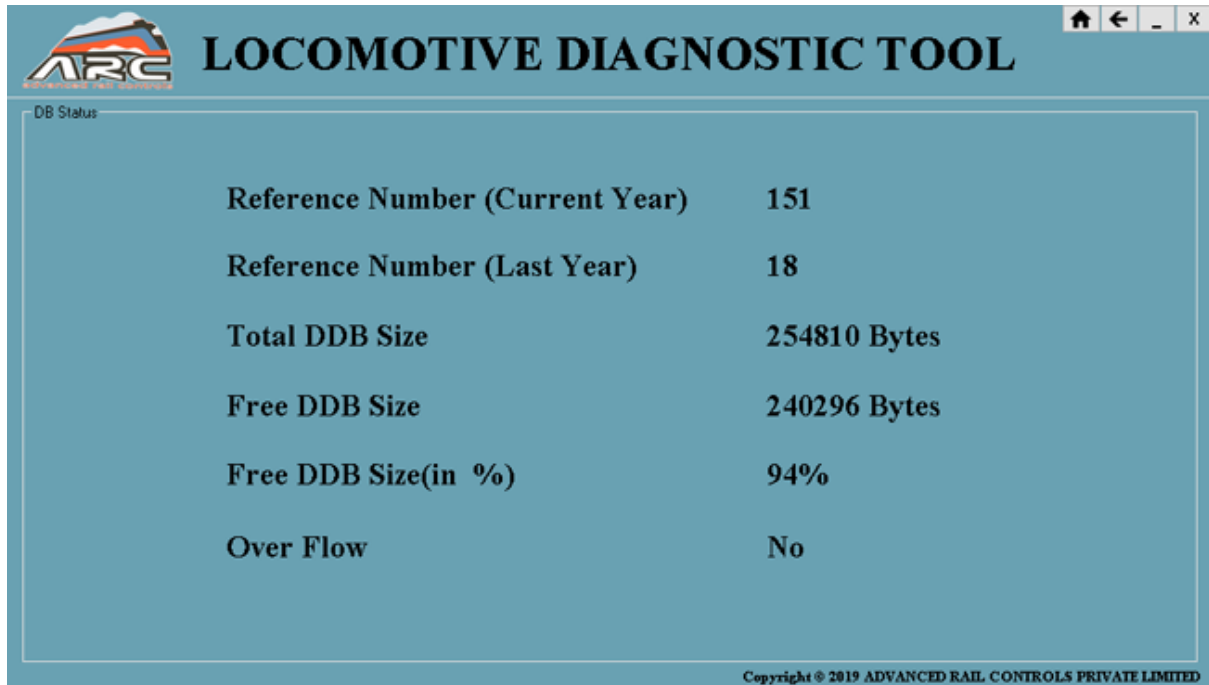
Edit system information:

On click of edit system information edit system page will be displayed where user can find three options such as

- Check DB status

- Check date and time

- Set Vehicle Number

Check DB status:

On click of check DB status button the DB status page will be displayed, user can check the database of DIA and status can be viewed as shown Below
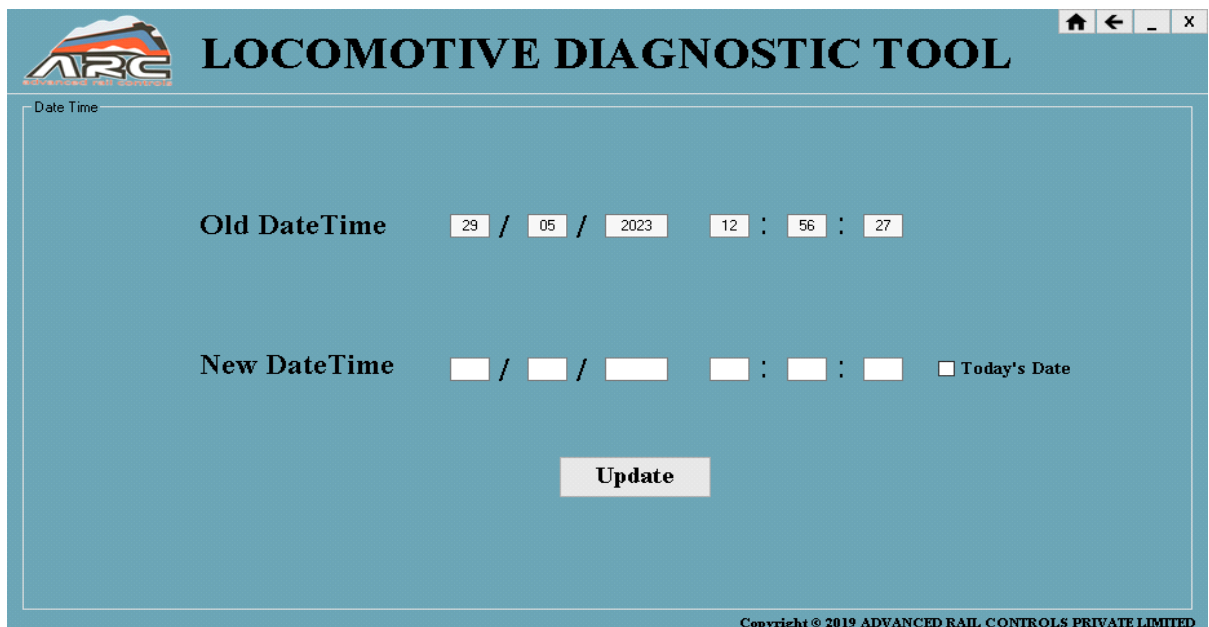

Check date and time:

On click of check date and time button the time date page will be displayed where old date and time will be displayed in that page.
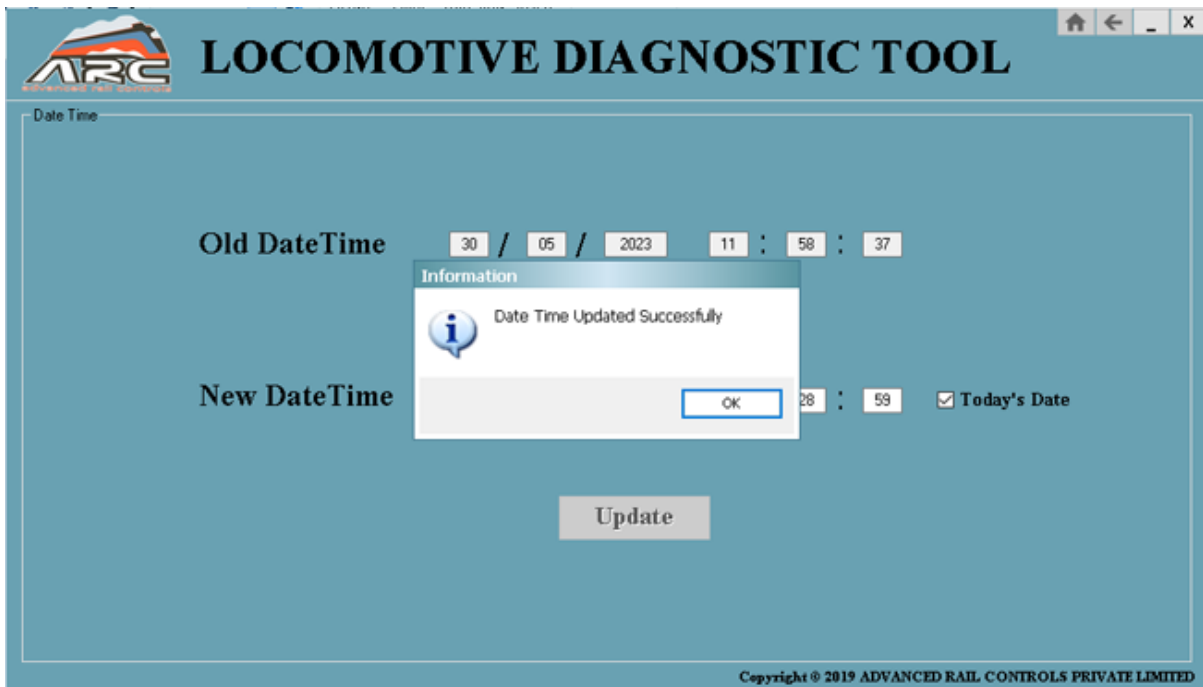
User can set new date and time or the user can also select today date then the present date and time will be set and then click on update button, date and time will be updated.

Set Vehicle Number:
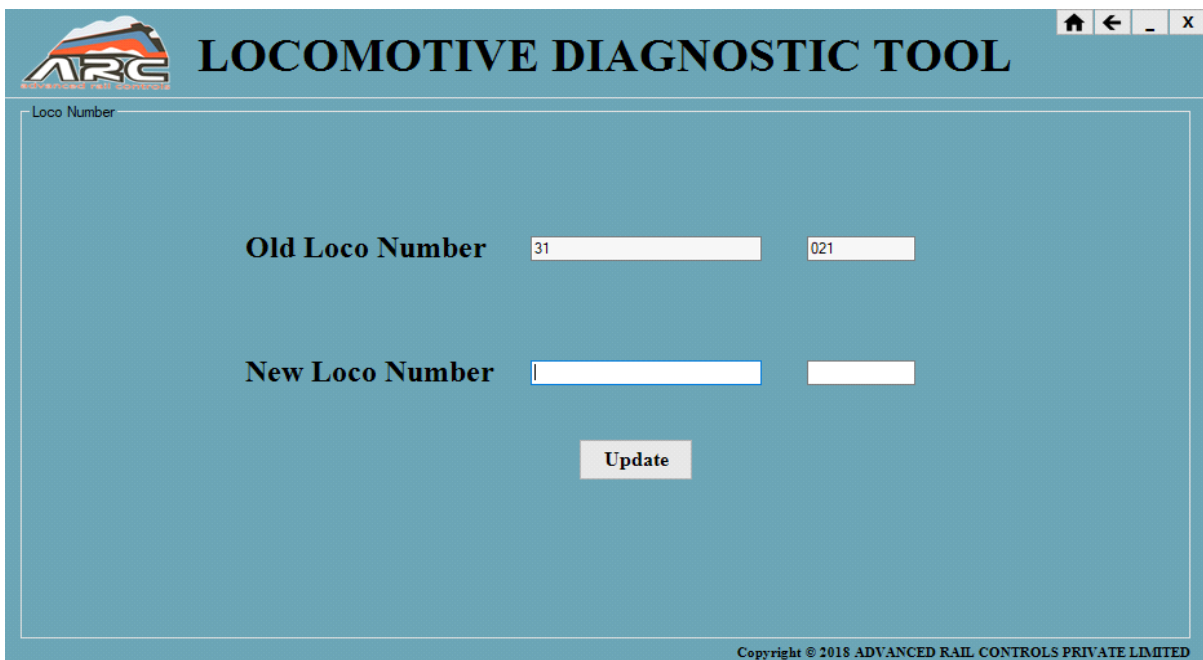
On click of set vehicle no the loco number page will be displayed in that old loco no. will be displayed.
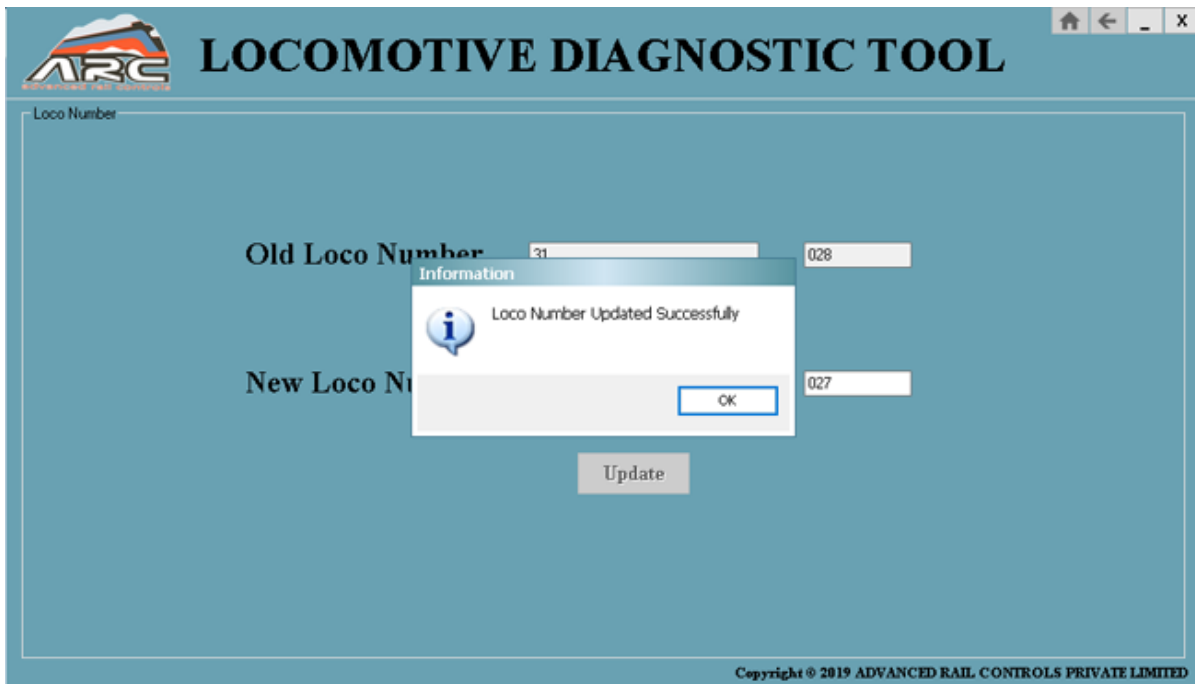
And user can update the new loco no and then click update it will be updated.

Edit condition Data:

On click of edit condition data the edit condition page will be displayed and in that the following parameters can be edited such as

- FLG1-56--Energy KWh+

- FLG1-56--Energy MWh+

- FLG1-56--Energy GWh+

- FLG1-56--Energy KWh-

- FLG1-56--Energy MWh-
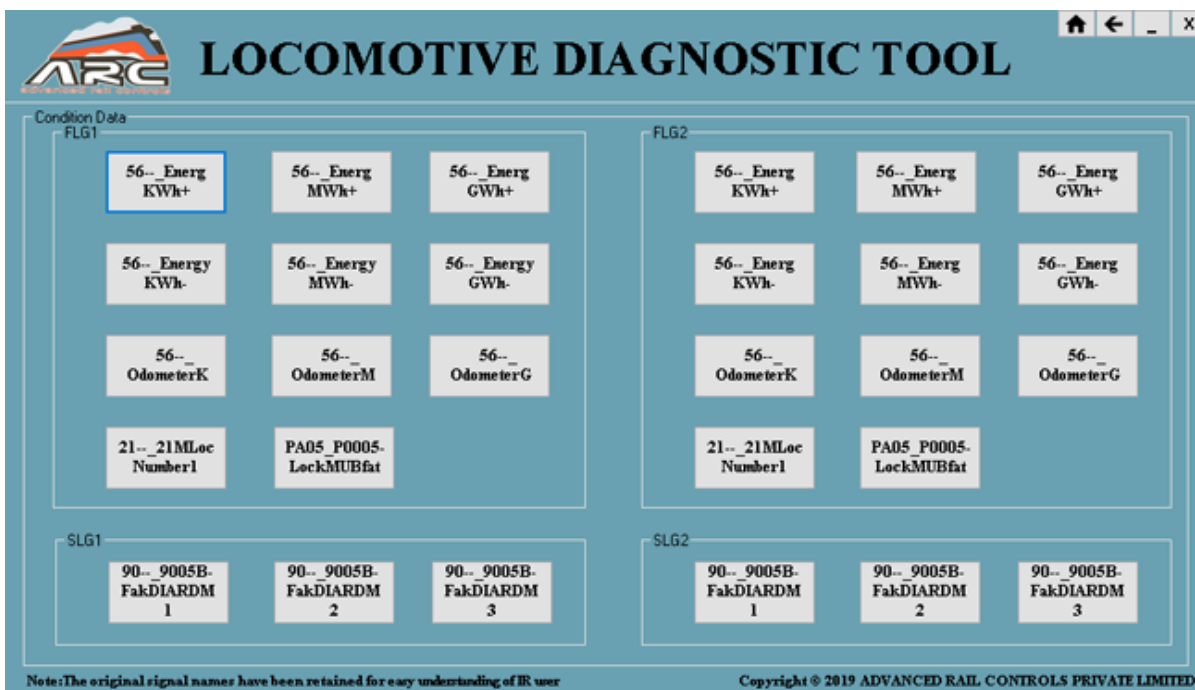
- FLG1-56--Energy GWh-

- FLG1-56-- Odometer_K

- FLG1-56--Odometer_M

- FLG1-56-- Odometer_G

- FLG1-21—21MLoc Number1

- FLG1-PA05_P0005-LockMUBfat

- FLG2-56--Energy KWh+

- FLG2-56--Energy MWh+

- FLG2-56--Energy GWh+

- FLG2-56--Energy KWh-

- FLG2-56--Energy MWh-

- FLG2-56--Energy GWh-

- FLG2-56-- Odometer_K

- FLG2-56--Odometer_M

- FLG2-56--Odometer_G

- FLG2-21—21MLoc Number1

- FLG2-PA05_P0005-LockMUBfat

- SLG1-90—9005B-FakDIARDM1

- SLG1-90—9005B-FakDIARDM2

- SLG1-90—9005B-FakDIARDM3

- SLG2-90—9005B-FakDIARDM1

- SLG2-90—9005B-FakDIARDM2

- SLG2-90—9005B-FakDIARDM3

The above parameters can be updated in this page. once user click on any parameter the above page will be displayed.
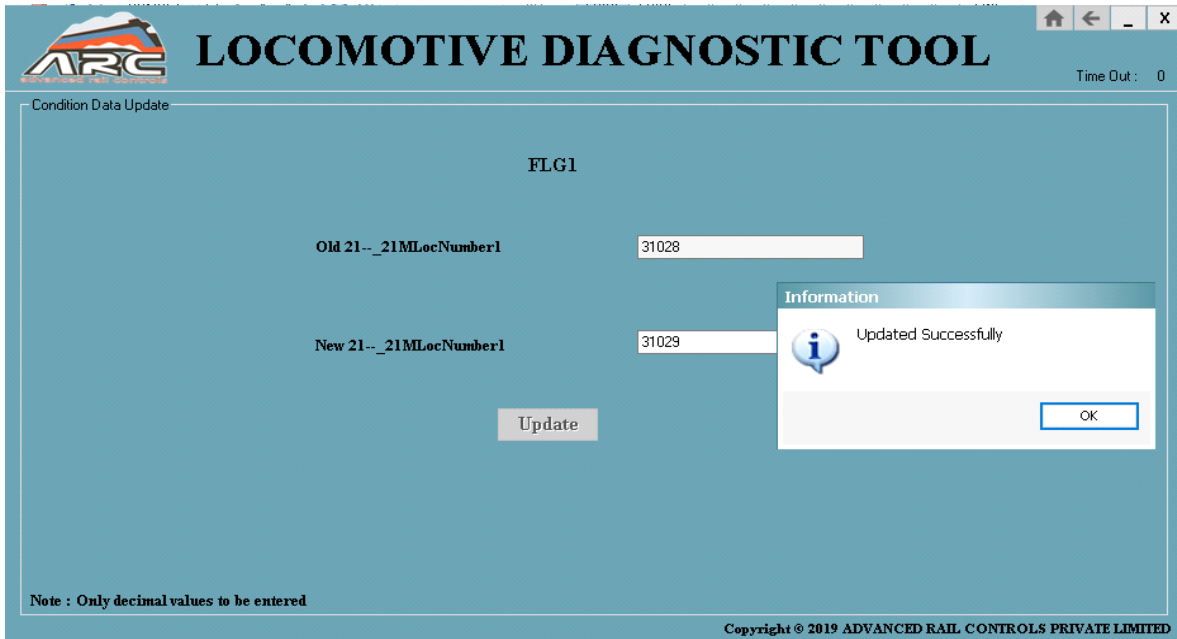
Update loco no once user click on update button the message box will be displayed "updated successfully".

Show CPU Load:
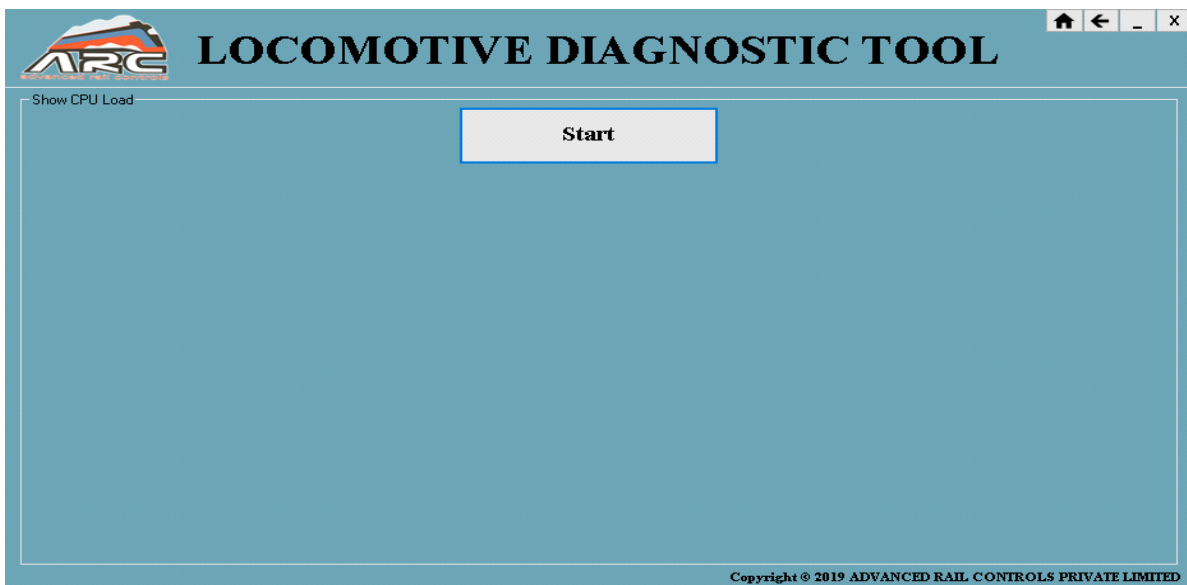
On clicking Show CPU Load, the above page will be displayed, to start the CPU user has to click on start
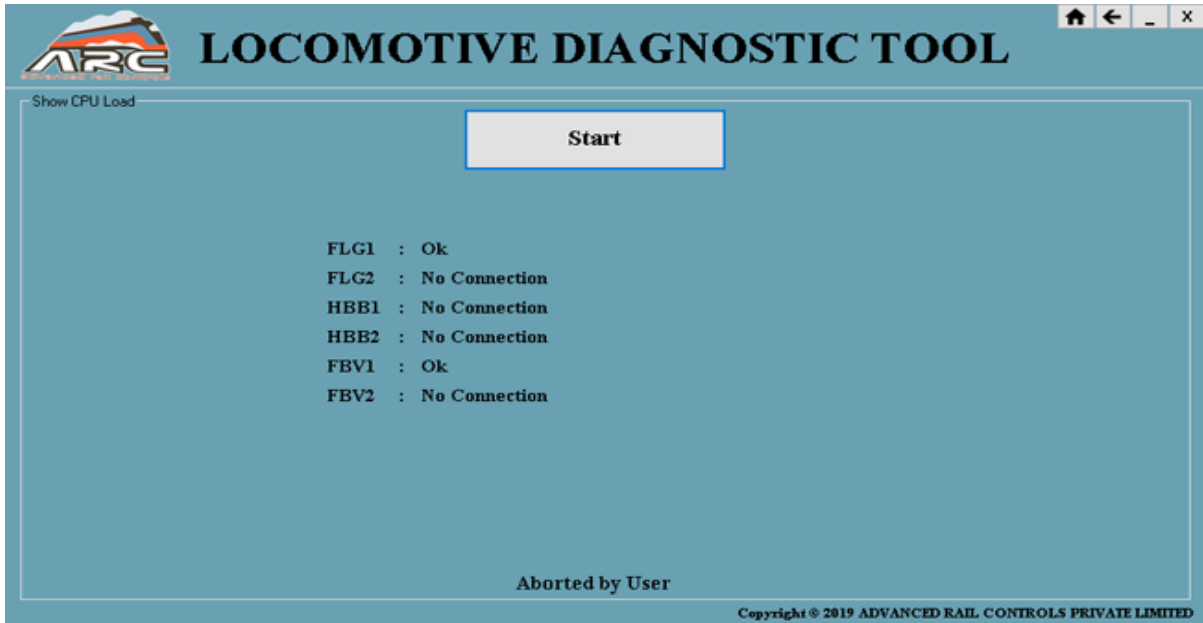
CPU Load of particular processor if it is connected it will show 'ok' otherwise 'no connection'. In case user want to cancel the CPU Load once click on cancel it will show the message as 'Aborted by user'.
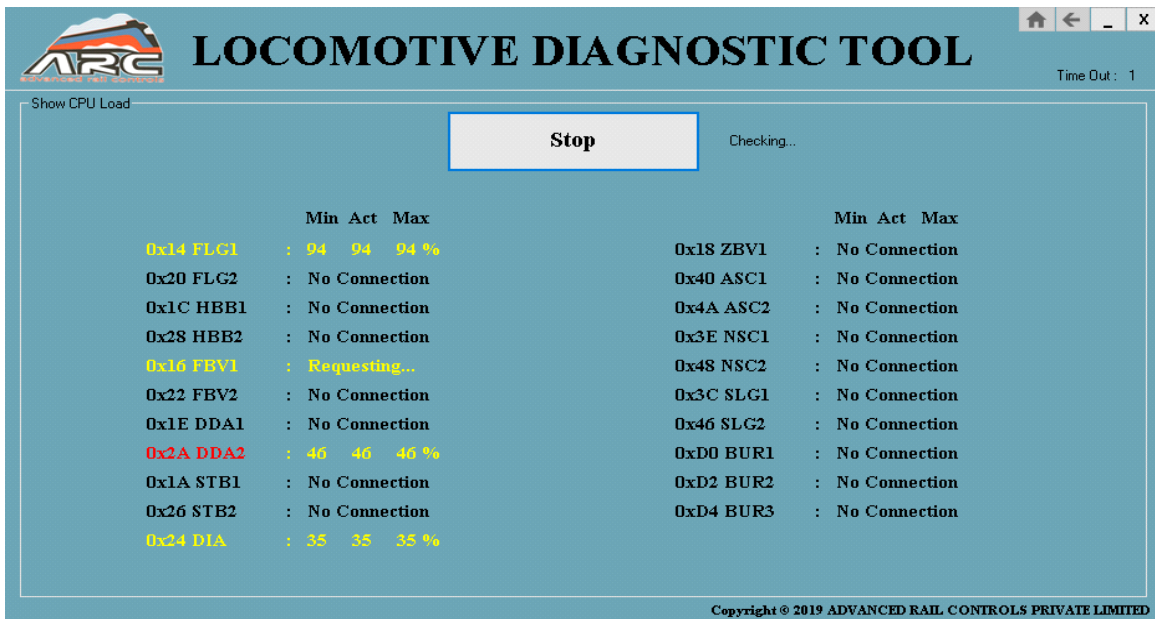
Here User can view or observe CPU usage of each processor.

Upload Condition Data:

On click of Upload Condition Data u, upload condition page will be displayed where user can find options such as

- Upload Condition Data

- View Upload Condition Data
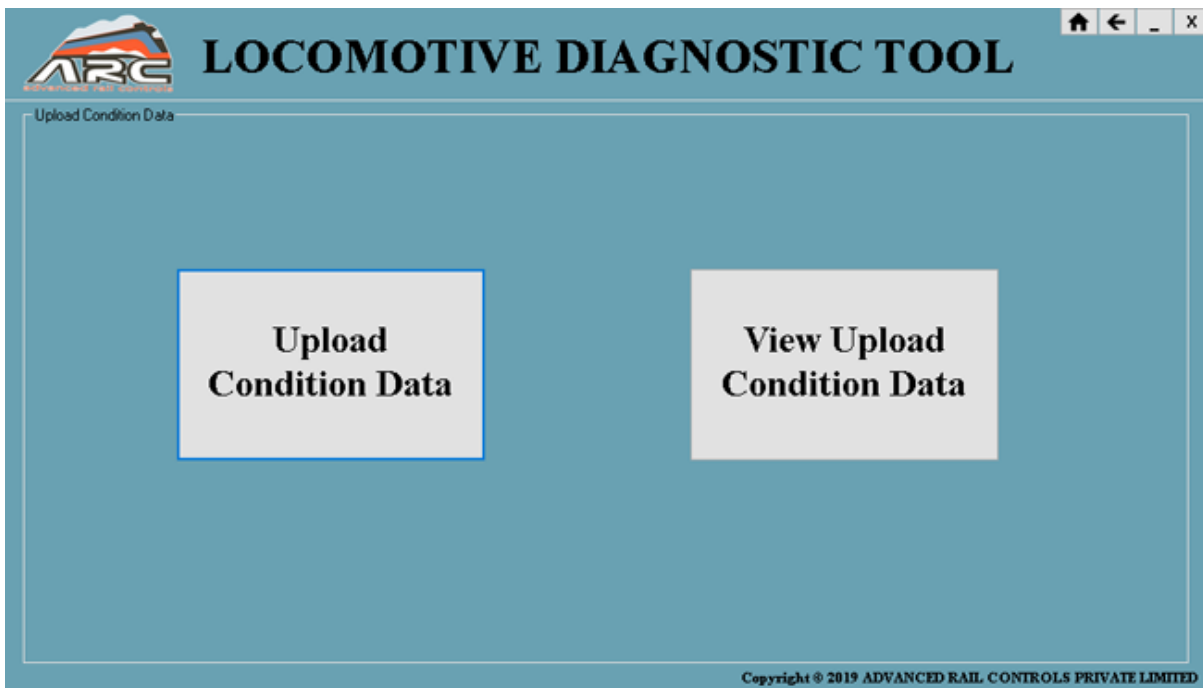
Upload Condition Data:

On clicking upload condition data the below page will be displayed.

On clicking Upload condition data, processor condition data will be stored in upload condition data as shown below
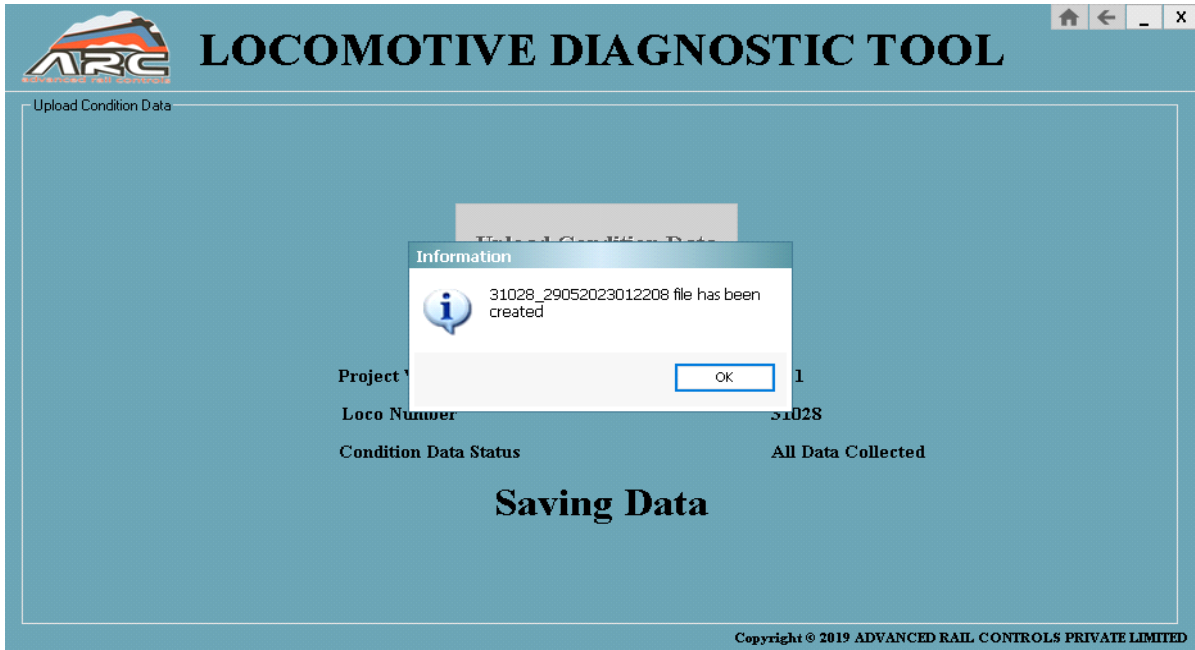
View Upload Condition Data:

On clicking view upload condition data, user can view all saved processor condition data at one place as shown Below.
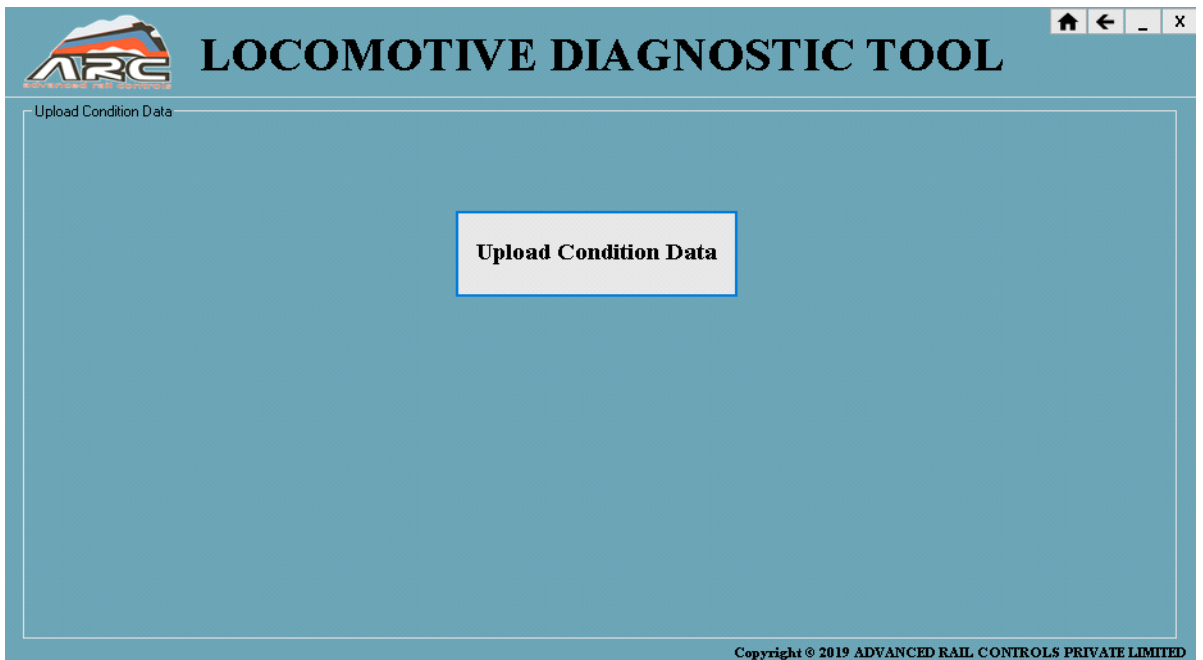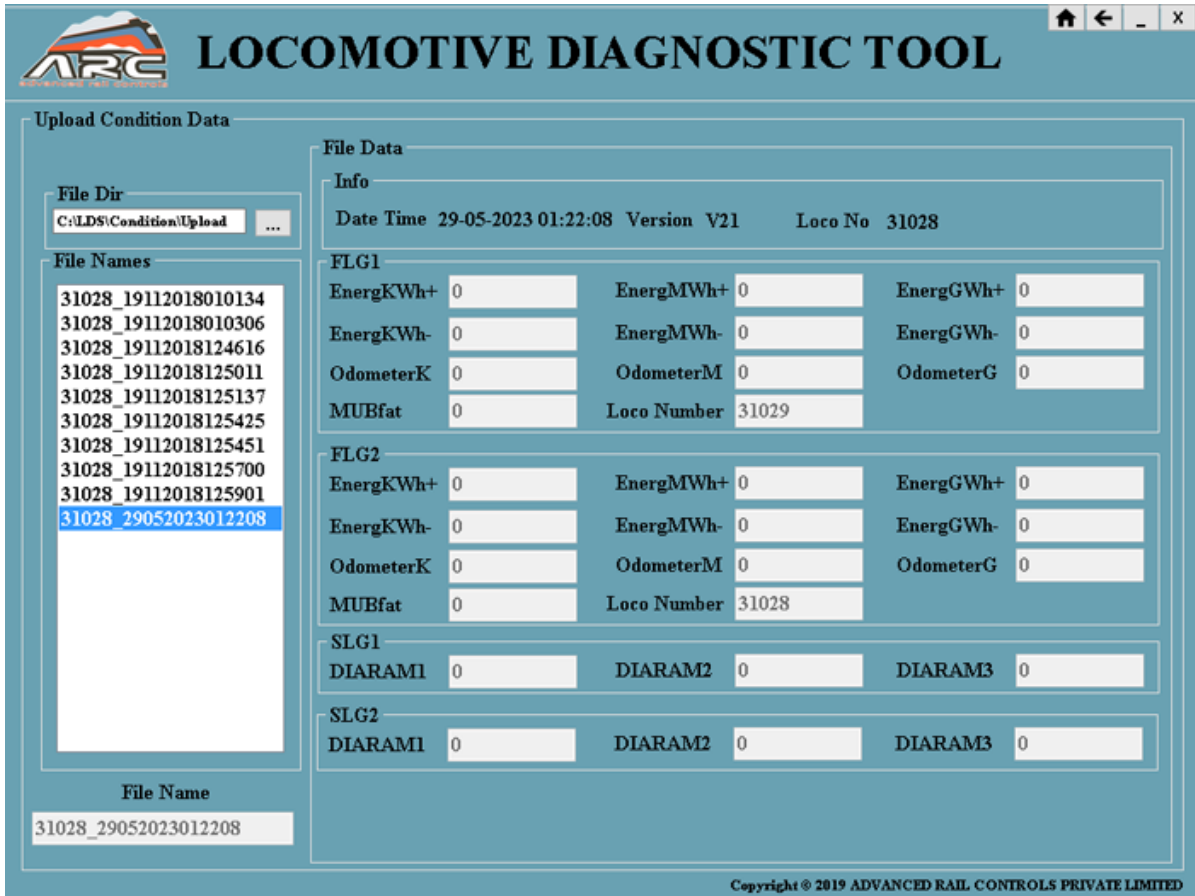
Download Condition Data:

On click of Upload Condition Data u, upload condition page will be displayed where user can find options such as

- Download Condition Data
- Create Download Condition Data
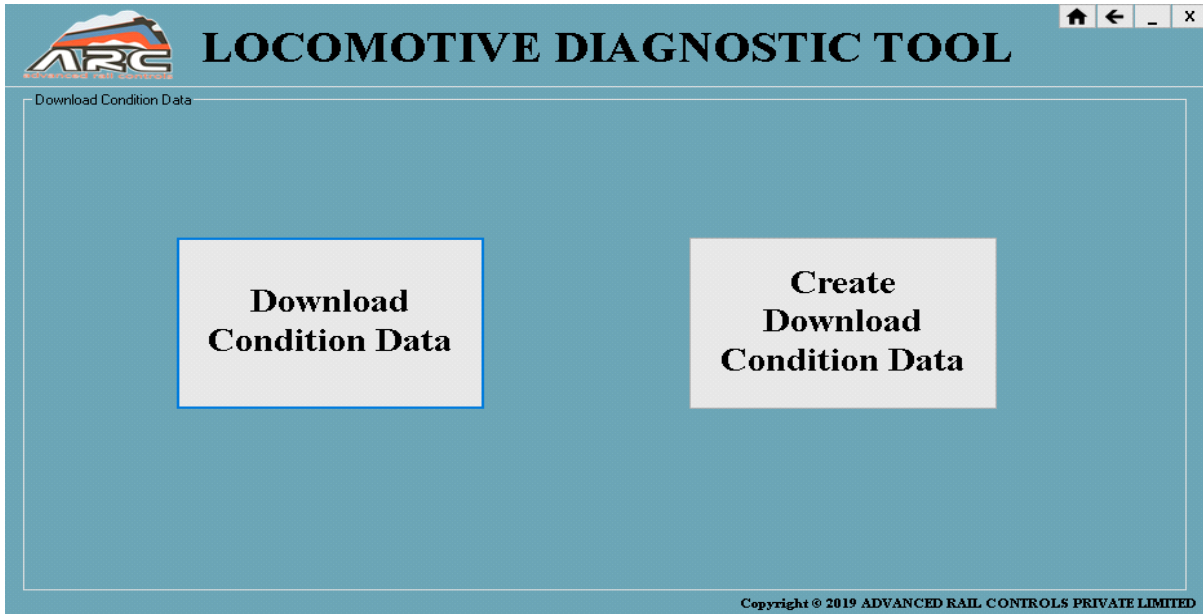
Create Download Condition Data:

On Clicking Create Download Condition Data user can create a file and save the pre-defined data as shown Below.

User can add condition data parameters and save the file by giving a file name and click on save button to save the file.
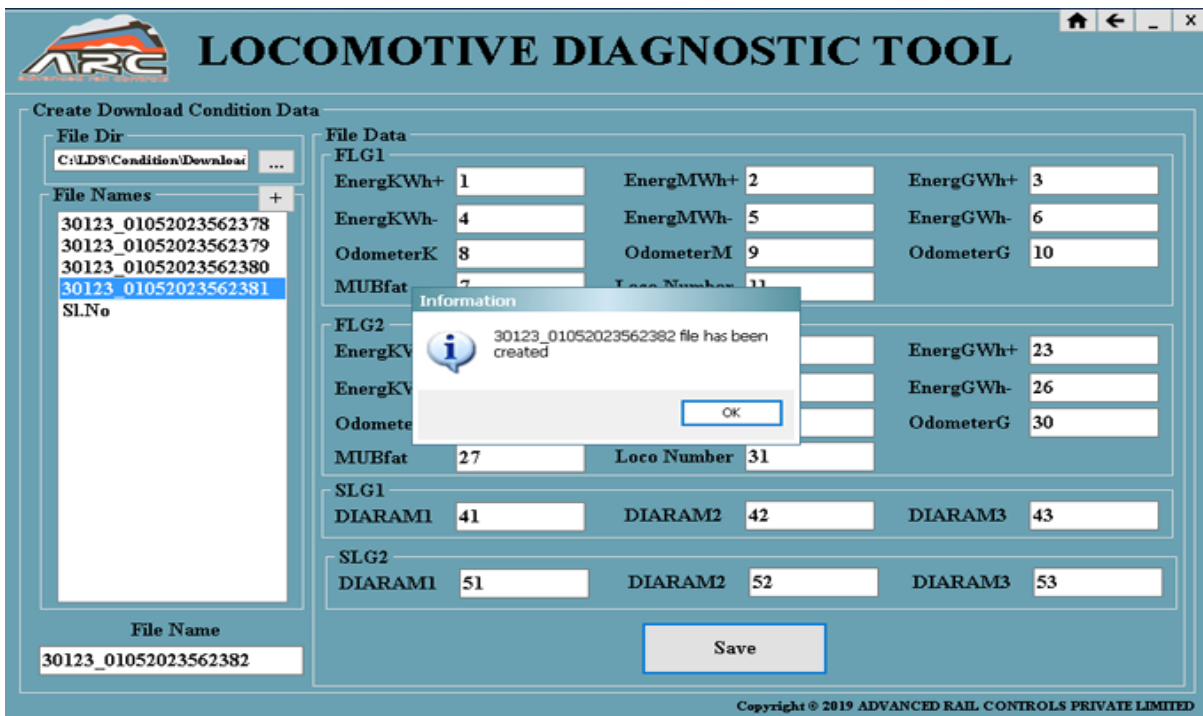
Download Condition Data:

User can also download all the saved condition data parameter at one place
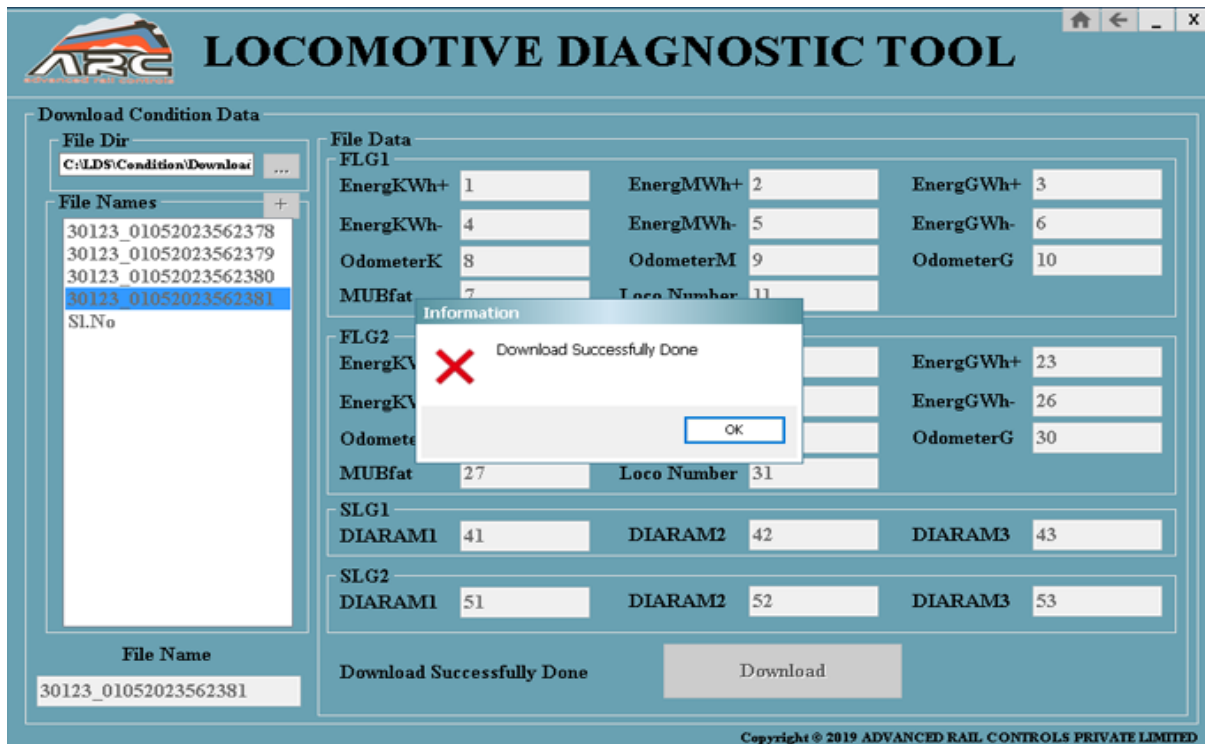
6. Settings:
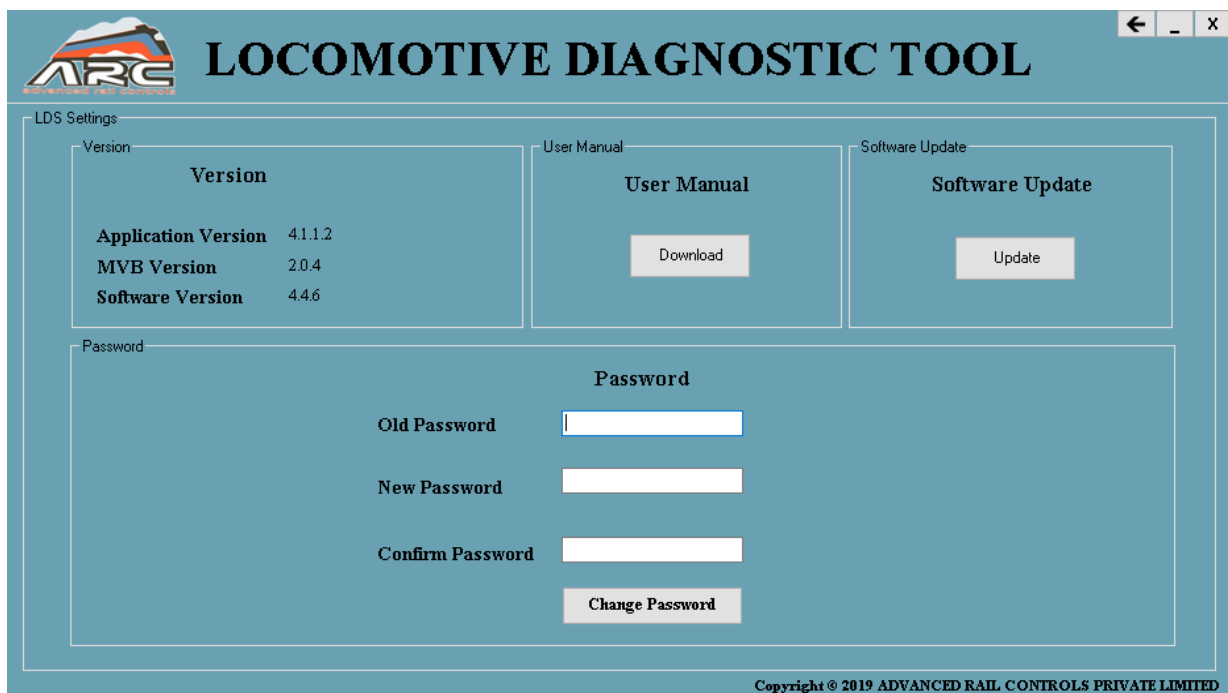
In settings user can change the password and can view the version of application and software and can download the user manual of LDS software in settings page.
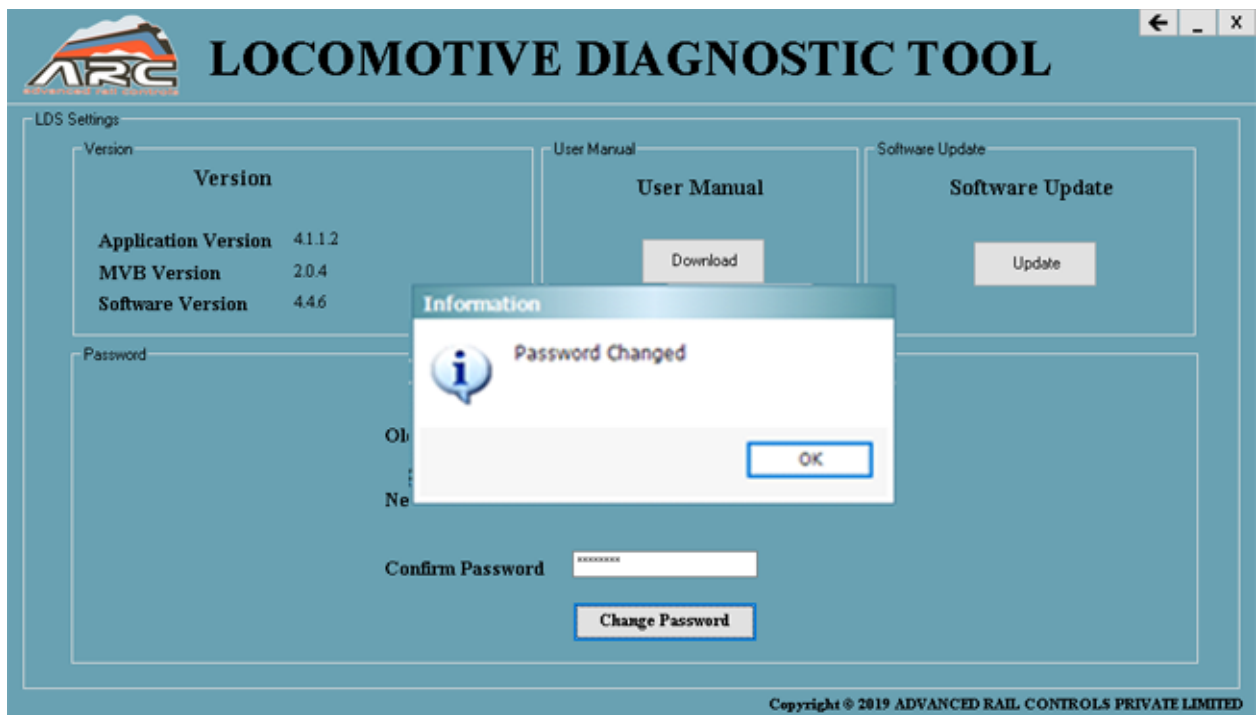
If user changes the password the message box will be displayed and if hardware is not found user can view it.
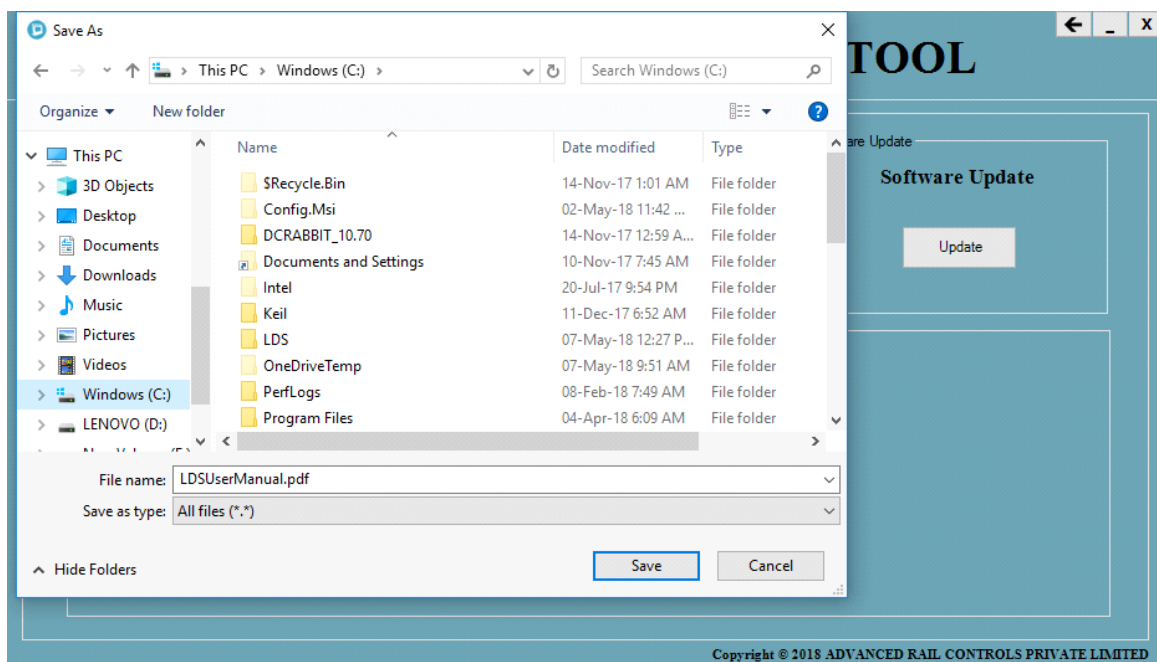
Click on download button in this page user manual will be downloaded and pop-up window will be displayed to save the download file in specific folder

- **Spare items and accessories**

SL.No.	Item name	UID NUMBER	Quantity /unit
1	Diagnostic Laptop, Model No: Tough book CF-54	2221140101	One
2	AC Laptop adapter	2210101506	One
3	DC Laptop adapter	331013172U	One
4	Diagnostic tool	4415151038	One
5	MVB Signal converter	3310131031	One
6	MVB Long cable (5 x 2 x 0.5mm2) 6.5Mere length	1112101406/2212101451	
7	10 pin circular connector Female wire wrap	1112151696	One
8	9 pin Sub-D connector Male wire wrap	221215162M	Two
9	Pin Plug	2212152694	Eighteen
10	RJ-45 Male crimped cable (both the sides)	1112102154	One
11	Hand lamp socket	221215122N	One

- **Contact Details**

  For any warranty/service related queries, please contact

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