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GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

Fog Pilot Assistance System for Safety (FogPASS)



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Target group: Loco, Traffic & S&T Supervisors and Loco Pilots



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Fog Pilot Assistance System for Safety (FogPASS)

Introduction

This pamphlet covers System Overview, Working principle and technical details of various components of Fog Pilot Assistance System for Safety (FogPASS) for use in Indian Railways. FogPASS conforms to **RDSO Specification No. RDSO/SPN/201/2010, Ver. 2.0.**

System Overview

- ▶ FogPASS is a GPS based navigation device which helps the loco pilot to navigate during dense fog conditions.
- ▶ It is a low-cost, portable equipment to be carried by Loco Pilot to the locomotive while taking over duty-charge.
- ▶ It provides on-board real-time information (Display as well as voice guidance) to Loco Pilot regarding Location of fixed landmarks such as Signal, Level Crossing gate (Manned & Unmanned), Permanent Speed Restrictions, Neutral Sections etc. where the Loco Pilot's attention is required.
- ▶ Driver has to watch the landmark as per operating procedure.
- ▶ Driver has to get Signal Aspect (Red / Yellow / Green) etc. from physical track



- ▶ FogPAAS is a non-vital and non-signal system.
- ▶ It displays approach indications of next three approaching fixed landmarks in geographical order accompanied with voice message at ~ 500m on approach.
- ▶ It prevents the driver from disorientation due to dense fog.
- ▶ FogPASS reliably alerts the driver using GPS positioning about his location with respect to approaching landmarks.
- ▶ Route survey for collecting the GPS/GNSS co-ordinates of landmarks is required to be carried out separately & programmed into FogPASS.

Terminology

▶ **Landmark**

Fixed location such as Signal, level crossing gates, Permanent speed restrictions, neutral section or any other location as identified by the user as landmark.

▶ **Pre-warning distance**

It is the distance from a landmark from where the warning shall be given while approaching that landmark.

▶ **Short description of Landmark**

It is the text to be displayed on LCD panel in Loco Pilot's Cab to indicate about the approaching landmark. This may consist of Station code/LC gate No., its description in short, location etc.

General features of FogPASS

- ▶ Suitable for all types of sections like single line, double line, electrified as well as non electrified sections.
- ▶ Suitable for all types of electric and diesel locomotives, EMUs/MEMUs/ DEMUs.
- ▶ Suitable for train speeds up to 160 KMPH.
- ▶ Each FogPASS unit can store events essential for diagnostic purpose for a period of 15 days.
- ▶ It has built-in re-chargeable battery back-up for 18 hrs.
- ▶ It is portable, compact in size, light in weight (not more than 1.5 Kg including battery) and of robust design.
- ▶ Loco Pilot can carry the device easily with him to the locomotive on resuming his duty.
- ▶ It can be easily placed on the cab desk of locomotive.
- ▶ It is a standalone system.
- ▶ It is unaffected by weather conditions like Fog, Rain or Sunshine.



System Working

Location identification & Route Log

- ▶ FogPASS is an intelligent system having GPS/GNSS receiver with small antenna, which detects location of the locomotive when kept in the locomotive and continuously calculate the distance remaining to the next landmark(s) already loaded in the system by the user railway.
- ▶ The unit is capable of detecting its location correctly ± 10 meter if switched on anywhere on the track for which the route data is already programmed in the unit and after movement, it correctly displays the approaching landmark on the LCD screen.
- ▶ GPS/GNSS co-ordinates of all Landmarks as identified by the user along with their short description & location are fed to FogPASS which is programmable.
- ▶ The GPS co-ordinates shall be collected by carrying out route survey of the section separately.
- ▶ The FogPASS unit is capable of storing multiple route data in its memory.
- ▶ The system software enables the driver to easily select among the loaded routes using the key pad.

Pre-Warning, Display & Announcement

- ▶ Immediately after power ON, the software version number appears on the LCD display board and it is displayed for 10 seconds. The system then displays following message and it shall progress only after the message has been acknowledged by pressing “Enter” button:

“FogPASS is only a non-failsafe aid. LP to follow extant operating procedures. Press ENTER ”

- ▶ The System shall give warnings as per following scheme:

Approaching Landmark Type	Audio Warning	Visual Indication	Pre-Warning Distance
All Signals on route	[Location]+[Sig Type]	Sig-[Sig Name No.]	500M
All LC Gates excluding D-Class LC Gates	[Location]+LC-[LC Name No.]	LC-[LC Name No.]	500M
Any other Landmark	As defined by the user.		
The landmark types & pre-warning distances given above are only for Guidance and can be changed by the user depending upon local site conditions.			

- ▶ Once the FogPASS unit is within pre-warning distance of the approaching landmark, as prescribed in table above, it shall display following:

First (top) two lines of LCD in large fonts (size, 3/4" height)-

The short description & the remaining distance (in Meters) of the approaching landmark

Till the landmark is passed. It also makes audio announcement once to the loco pilot. The audio warning shall be different for different types of landmarks.

Next two lines in comparatively smaller fonts (size, 1/2" height)-

The short description & remaining distance of next two landmarks in geographical order.

- ▶ When the Locomotive actually crosses the first landmark (as per the position of the previous landmark fed in route data file),

The second landmark shifts to first line as immediate landmark on approach.

The third landmark also shifts to second line & new next landmark details appear on the third line.

The display module of the FogPASS unit is swiveling type for adjusting the direction for best viewing by the Loco Pilot according to the requirement.

The language of display as well as announcement shall be English only.

Other Features

- ▶ It is possible to change/add/edit the route data by re-programming the system with a new route data to make the unit suitable for a new section.
- ▶ This shall be protected by a password. Whenever route data file is altered, it would bear new version number.
- ▶ When system is in auto route selection mode, it shall select the route based on the location & direction of movement automatically. However, the route so selected shall be displayed on the LCD with voice prompt for confirmation from the Loco Pilot.
- ▶ The system shall not display or announce any landmark till the route is confirmed by the Loco Pilot.

Components & Accessories

The FogPASS unit consists of:

- ▶ FogPASS unit with in-built battery & GPS/GNSS Receiver
- ▶ GPS/GNSS antenna with magnetic base & cable of suitable length & connector at other end to connect to FogPASS unit.
- ▶ Charger.
- ▶ Software for uploading route details, for downloading event log & for generating managerial reports.
- ▶ Cable for connecting PC/ Laptop to FogPASS unit.

Main Components

GPS/GNSS Receiver

The unit shall have an in built GPS or GNSS Receiver having the following technical specifications:

- L1 Frequency C/A Code with 12 (or higher) independent Tracking Module (Channels).
- Autonomous Positional Accuracy better than 10 Meter.
- Suitable to work upto 250 KMPH speed.
- Built-in non volatile Real Time Clock (RTC) with battery backup option.

GPS/GNSS antenna

GPS/GNSS antenna along with its cable of sufficient length to connect to FogPASS unit kept on the cab desk, is provided with each FogPASS unit. The antenna is portable consisting of magnetic base which can be fixed on loco body outside.

In case quality of signal is not considered adequate by the system to correctly identify its location, the same shall be indicated on the LCD display.



Failure due to any error such as GPS/GNSS fix etc. is prompted to the Loco Pilot by means of loud audio beeps and flashing yellow LED.

Loco Pilot Interface

The Loco Pilot Interface comprises of the following:

- ▶ An LCD module (minimum size 6"X3", minimum 256x96 pixels)
- ▶ 4 Key pad switch panel to perform following functions:
(1) Menu (2) Up (3) Down (4) Enter



- ▶ Five LEDs each of 3 mm dia with following LED scheme:
 - Battery charging indication LED
 - Battery low indication LED
 - GPS/GNSS availability indication LED (Steady Yellow)/Error Detected (Yellow Blinking)
 - Up Track Selected indication LED
 - Down Track Selected indication LED
- ▶ Speaker:
A speaker for voice warning to the driver.
- ▶ Power Switch:
A Power switch to switch ON/OFF the device

Power Supply & Battery Backup

The battery is in-built, rechargeable & of Li-ion type. The battery capacity shall be sufficient to provide 18 hours back-up when fully charged. Pre-charged set will be provided to Loco Pilots.



Charger

A charger is provided for charging the in-built battery.

The input supply to the charger is to be taken from locomotive (110V DC \pm 35V in electric locomotives & EMU/DEMU and 72V DC \pm 25V in diesel locomotives). The charger is also suitable to work with 230V \pm 30% AC input supply.

The charger is capable of charging the fully discharged battery in not more than three hours.



Indications provided on

Charger/Adapter/FogPASS unit:

- Battery fully charged Indication.
- Low battery indication (below 2 hours backup)
- Battery under charging indication

Data Input & Output

A non volatile memory sufficient to hold route data and landmark data of minimum 2000 route kilometers & event log of at least 15 days is provided in the FogPASS Unit.

The system accepts data about the landmark in the prescribed format.

The event log stores each landmark passed during the journey along with date, time & speed. The location of warning with date & time are also be logged.

A USB port is provided for downloading of events on a USB drive directly through keypad.

Additional RS-232 port or any other standard port may be provided to the system for communication with PC/laptop.

The facility to add/edit/delete the route data & landmarks shall be protected through a password to ensure authentic operation.

Computer software is also provided for uploading of location data pertaining to the section.

Electrical Protection

The unit shall have suitable protection against short circuit and overload.

Upgradeability for GSM

The device shall have an interface for GSM Modem, for future and remote programmability. The unit shall have enough space available for placing such GSM Modem if the unit is upgraded in future.

Disclaimer

The information given in this pamphlet does not supersede any existing provisions laid down in Signal Engineering Manual, Telecom Engineering Manual, G&SR and any other manuals associated with train operation. This document is not statutory and instructions given in it are for the purpose of guidance only. If at any point contradiction is observed, then Rly. Board/RDSO guidelines or Zonal Rly. instructions may be followed.