



TPWS EVO speech unit product improvement overview

Introduction

The new PIC151 TPWS EVO Speech Unit is a direct fit, form, and functional replacement for the obsolete PIC057 AWS/TPWS Alarm & Speech Unit.

It ensures the accurate audible reproduction of Automatic Warning System (AWS) and Train Protection Warning System (TPWS) alerts while offering significant improvements in performance, reliability, and power efficiency.

It combines superior audio clarity with modern digital configuration to streamline fleet maintenance.



Definition

Project Reference	Item Name	Description
PIC151	TPWS EVO Speech Unit	The project reference for the Next-Generation audible indicator, providing enhanced spoken alerts for Train Protection & Warning System interventions.
PIC057	AWS/TPWS Alarm and Speech Unit	The project reference for the Legacy audible indicator, combining basic AWS sunflower tones with TPWS speech synthesised alerts.

Key performance improvements

- **Enhanced audibility:** The unit features a much clearer audible output and supports increased Sound Pressure Levels (SPL) to ensure alerts are clearly communicated to the driver.
- **Power efficiency:** The PIC151 uses nearly 50% less power when producing an equivalent SPL level compared to the legacy unit.
- **Modern connectivity:** It features an easy push-in "click-fit" connector for simplified installation and secure electrical connection.
- **Robust design:** The unit is housed in a ruggedised enclosure designed for cab-level mounting in the rail environment.
- **Modernised configuration:** Replaces outdated physical analogue volume setting with a validated PC App tool. Settings are now adjusted digitally via serial communications while the unit is installed on the vehicle, eliminating the need to return units to Unipart for manual setup. Cyber security techniques have been implemented in the tool, such as encryption and secure user access control; this tool can only be used by Unipart trained personnel.

RAM predictions

The PIC151 offers superior Reliability, Availability, and Maintainability (RAM) compared to its predecessor:

Metric	Legacy PIC057	New TPWS EVO (PIC151)
Failure Rate (per million hours)	0.74	0.578967
Mean Time Between Failure (MTBF)	340,540.54 hours	435,257.97 hours
Availability	99.90%	99.9999118%
Overhaul Interval	12 Years	35+ Years
Repair/Replacement Time	30 Minutes	23.02 Minutes
Calculated TFFR (per hour)	N/A	5.78967×10^{-7}

The unit's predicted reliability is greater than 17 times better than the minimum requirement (10^{-5}) for basic integrity applications.

Legacy compatibility and installation

- **Direct replacement:** The PIC151 is a "fit, form, and functional" equivalent to the PIC057.
- **Mechanical alignment:** It retains the same faceplate dimensions (98mm x 50mm) and mounting point distances (88mm horizontal, 30mm vertical) as the legacy version.
- **Easy migration:**
 - A cable adapter is available for simple replacement from the PIC057 version (Unipart CAT number 062/016455).
 - A cable assembly with customisable lengths is available for easy installation on new vehicles.
- **Line Replaceable Unit (LRU):** The PIC151 is classified as an LRU, designed for quick field replacement rather than component-level repair.

Standards and certification

The PIC151 is developed, validated, and certified for Basic Integrity applications in accordance with modern CENELEC standards.

It is compliant with the following:

- BS EN 50126-1/-2: RAMS Specification and Demonstration
- BS EN 50129: Safety-related electronic systems for signalling
- BS EN 50716: Software for railway applications
- BS EN 45545-2: Fire protection on railway vehicles
- BS EN 50155: Electronic equipment used on rolling stock
- BS EN 50121-3-2: Electromagnetic Compatibility (EMC)
- BS EN 50124: Insulation coordination
- GERT8075: AWS/TPWS Requirements
- RIS-0775-CCS: AWS/TPWS Requirements
- RIS-0707-CCS: Safety related control, command and signalling system failures
- BS EN 61373: Shock and vibration
- BS EN 60529: IP
- BS EN 60068: Temperature

Comparison specifications

Feature	Legacy PIC057	EVO PIC151
Weight	450g	475g
Face plate length	98mm	98mm
Face plate width	50mm	50mm
Face plate thickness	1.5mm	1.5mm
Body length	76mm	76mm
Body width	55mm	47.3mm
Body depth	101mm	101mm
Mounting point diameter	4.5mm	4.5mm
Horizontal distance between mounting points	88mm	88mm
Vertical distance between mounting points	30mm	30mm
Connector entry	End Entry & Side	End Entry & side
Nominal voltage	12.5 Vdc	12.5 Vdc
Operating voltage	8.75V – 15.625V	8.75V – 15.625V
Insulation resistance	500VDC >20MΩ	750VDC >20MΩ
Quiescent current	110mA	150mA
Maximum power rating	4W	10W

Feature	Legacy PIC057	EVO PIC151
Failure rate	0.74 Failures per million hours	0.578967 Failures per million hours
Mean time between failure	340,540.5405 hours	435,257.9681 hours
Overhaul	12 years at least	More than 35 years
Repair/replacement time	30 Minutes	23.02 minutes
Useful life	10 years	10 years (could extend under contractual agreement)
Availability	99.90%	99.9999118%
IP	IP4X	IP4X
LRU	Yes	Yes
SPL adjustment time	Hours	Minutes

References

1. PIC151-119 TPWS EVO Speech Unit Safety Case
2. PIC151-98 Validation Report
3. PIC151-78 TPWSfour EVO Speech Unit Datasheet
4. PIC151-97 TPWSfour EVO Speech Unit SRAC's
5. PIC151-92 TPWSfour EVO Speech Unit Installation Manual
6. PIC151-93 TPWSfour EVO Speech Unit Maintenance Manual
7. PIC151-94 TPWSfour EVO Speech Unit Operation Manual
8. PIC151-12 RAM Report
9. PIC151-11 Fire Assessment
10. PIC151-75 Part Numbers and Configuration Control
11. PIC151-1001 General Assembly Drawing
12. PIC151-6001 TPWS EVO Speech Unit In Vehicle Wiring Harness
13. PIC151-1003 Adapter Cable PIC057 to PIC151
14. PIC151-1004 MATING CONNECTOR KIT
15. PIC151-117 DoFC CE
16. PIC151-118 DoFC UKCA

For further information, please contact contactus@unipart.com