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Test Receiver SW
User Manual
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Approvals

Revision	Name	Title	Signature
04	Edward Li	General Manager	

Revision History

Revision	Date	Responsible Person	Description
01	Oct 14, 2016	Derek Soo	Initial Release
02	Dec 8, 2017	Derek Soo	Added new crc error count
03	Jan 23, 2019	Derek Soo	Added accumulated line count
04	May 12, 2020	Derek Soo	Removed Appendix A

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DEFINITIONS AND ABBREVIATIONS

The following terms and/or abbreviations are used in this manual:

TABLE 1: ABBREVIATIONS

Term	Definition
IRDI	Infrared Data Interface – communications interface which uses infrared technology to transmit data.
SAE J2799	The SAE standard that defines the serial packets that are sent via infrared, from a fuel cell vehicle to a hydrogen station.

APPLICABLE DOCUMENTS

The following documents are recommended as reference material.

TABLE 2: REFERENCE DOCUMENTS

Document Reference	Document Title	Document Number
[1]	SAE J2799 technical information report	J2799

1 SCOPE

This user manual provides an overview of the **Test Receiver Tester Software,** used to read the IR communication at a hydrogen fueling station. This manual also includes a troubleshooting section.

2 INTRODUCTION

The **SAE J2799 standard** is a method of communicating information such as tank pressure and tank temperature from a hydrogen-powered vehicle to a hydrogen fueling station, during a fueling operation, using infrared. This communication is used to ensure that the hydrogen fueling is conducted in a controlled and safe manner.

3 REQUIREMENTS

This section provides the list of equipment needed.

TABLE 3: REQUIRED EQUIPMENT

Item	Part #	Description
1		Desktop or laptop computer, Windows 7 or higher
2	200504	Test Receiver Software
3	200545	USB adapter for Test Receiver (Escha) with RS485 output
4	200327	Test Receiver (ENR)

3.1 HARDWARE SETUP OVERVIEW

Figure 1 illustrates the hardware setup required.

FIGURE 1: OVERVIEW OF REQUIRED HARDWARE

4 GETTING STARTED

The Test Receiver Software is a simple interface to test an Test Receiver and to read IRDI data.

4.1 INSTALLING THE SOFTWARE

See Appendix A for software installation.

4.2 SOFTWARE QUICK START GUIDE

Figure 2 shows the test software interface when it is connected and running:

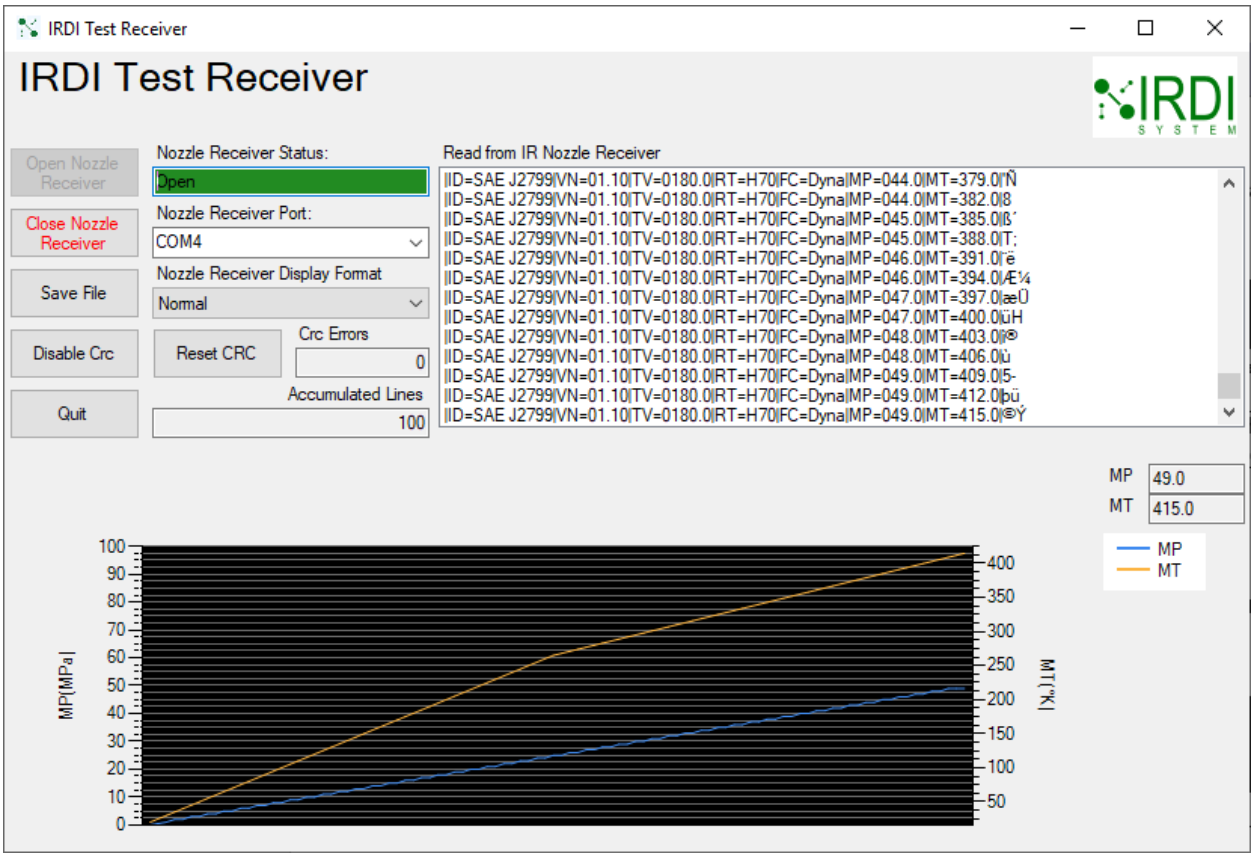

FIGURE 2: TEST RECEIVER SOFTWARE

Table 4 gives an overview of the features available:

TABLE 4: TEST RECEIVER SOFTWARE FEATURES

Feature	Description
Open Nozzle Receiver	Searches USB port for a Nozzle Receiver. IF found, Nozzle Receiver Status indicator will show IR Nozzle: Connected and Ready
Close Nozzle Receiver	The light is on when the HHT is powered up.
Save File	Saves the contents of the Read from Nozzle Receiver dialog to a text file.
Nozzle Receiver Status	Shows the current status of the Nozzle Receiver communications.
Nozzle Receiver Port	Indicates the virtual serial communications port resource occupied by the Test Receiver.
Nozzle Receiver Display Format	Changes the display format of the contents of Read from IR Nozzle Receiver dialog.
Read from IR Nozzle Receiver	The ASCII text interpreted data received by the IR Nozzle Receiver.
MP & MT Chart	A waveform chart that simultaneously plots the Measured Pressure (MP) and Measured Temperature (MT) data received.
Disable/Enable & Reset CRC Errors	When enabled, re-calculates the CRC field and compares it to the CRC that was originally calculated. A count of CRC errors is shown.
Accumulated Lines	Shows the number of lines (IRDI Frames) read and displayed in the MT & MT chart. (Reset when Nozzle Closed/Opened)
Quit	Disconnect from IR Nozzle Receiver and close the Test Receiver program.

Table 5 outlines typical usage of Test Receiver Software:

TABLE 5 : TEST RECEIVER SOFTWARE TYPICAL USAGE

Feature	Description
STEP 1	Install the Test Receiver SW on a computer, as per Appendix A.
STEP 2	Plug in Test Receiver to PC using the supplied USB adapter cable.
STEP 3	Run the Test Receiver SW.
STEP 4	Press the "**Open Nozzle Receiver**" button - the Nozzle Receiver Status should indicate "**IR Nozzle: Connected & Ready**".
STEP 5	If any IRDI data is being received, the green Rx LED on the USB adapter cable will flash and the ASCII interpreted data will be displayed.
NOTE	To disconnect from Test Receiver and Close the Test Receiver SW, Press "Quit".

Troubleshooting should errors appear:

- Ensure secure and correct wiring connections.
- Verify Serial Port has been automatically installed.
- Ensure nothing is obstructing line-of-sight between Test Receiver and IRDI Transmitter.
- Open Test Receiver to run again.
- If no data is displayed, it could be the result of a defective Test Receiver.

4.3 SOFTWARE DETAILS

Test Receiver Software allows the user to examine IRDI Data Packets sent from a Hydrogen Surface Vehicle (Transmitter) to be received by a Pressurized Hydrogen Dispenser (Nozzle). The message format is defined by the SAEJ2799 standard.

This section provides a simplified description of the IRDI data packets and tools for troubleshooting.

4.3.1 Infrared Data Messages

The user can receive these messages via a user-supplied infrared data receiver, and can view these messages using Test Receiver Software.

Each infrared data message is a text string of fixed length, with a fixed set of fields, as per the following example:

|ID=SAE J2799|VN=01.10|TV=0180.0|RT=H70|FC=Halt|MP=004.0|MT=044.0|ùÃ

The vertical lines (“|”) in the above string separate the individual fields that make up the infrared data message. Each field begins with the field identifier (e.g. “TV”), followed by the “=” symbol and the numeric value assigned to that field (e.g. “0180.0”). For example, in the above message, TV (tank volume) has the value 0180.0, which means that the tank volume is 180 l (litres).

The meaning of each field in the infrared data message is as follows:

TABLE 6 : INFRARED DATA MESSAGE FIELDS

Field Identifier	Definition	Range of Values
ID	Name of the communication protocol – in this case, SAE J2799	SAEJ2799
VN	Version number of the communications protocol	00.00 – 99.99
RT	Receptacle type – style of hydrogen receptacle used on the vehicle	H25, H35, H50 and H70
TV	Tank volume – the volume of the hydrogen tank in the vehicle	0000.0 – 5000.0 litres
FC	Fill command – indicates the type of hydrogen fill in progress, or the reason for the fill's termination	DYNA, STAT, HALT and ABORT
MP	Measured pressure – the pressure reading of the hydrogen tank in the vehicle	000.0 – 100.0 MPa
MT	Measured temperature – the temperature reading of the hydrogen tank in the vehicle	16.0 – 425.0 K
OD	Optional data – any characters, up to a total of 16, as defined by the customer; used to transmit customer-specific information	Any characters, NOT INCLUDING the "|" ASCII character or the "$7C" hexadecimal character
ùÃ	Checksum (CRC)	Varies depending on the checksum (CRC)

4.3.2 Checksum (CRC) Errors

By default, a checksum (CRC) is re-calculated for each received IRDI data packet string. The CRC Errors field displays a running total of CRC errors or discrepancies detected. Figure 2 and Figure 4 show a total of 4 CRC errors detected since the software was initialized.

Pressing the RESET CRC button will reset the CRC Errors count to 0. Figure 3 shows CRC Errors = 0 as displayed if the RESET CRC error is pressed, or if there were no CRC Errors detected.

FIGURE 3: CRC ERRORS RESET (OR NO ERRORS DETECTED)

To minimize computation resources, this feature may be disabled by pressing the DISABLE CRC button. The text in the button will change to ENABLE CRC and the RESET CRC and CRC Errors will be disabled and greyed as shown in Figure 4.

FIGURE 4 : CRC CHECKSUM DISABLED

Each IRDI data link frame is considered a line. The number of lines read in the current session (as displayed in MT & MT chart) is shown in Figure 5.

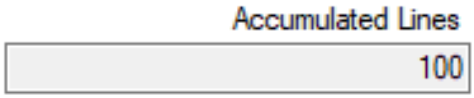

FIGURE 5 : ACCUMLATED LINES READ

4.3.3 Save File

The SAVE FILE button will open a dialog to save the contents of the Read from IR Nozzle Receiver dialog as a plain text file. For recall, be sure to name your saved session files clearly with the file extension '.txt'. The session contents may be saved for data session logging, troubleshooting, or for closer examination.

Note that each time *CLOSE NOZZLE RECEIVER* and OPEN NOZZLE RECEIVER is pressed, a new session is started. Contents of Read from IR Nozzle Receiver dialog will be deleted and CRC Errors and Accumlated Lines will be reset to 0.

Appendix A: INSTALLING USB DEVICE DRIVERS

Install the Test Receiver USB adapter device drivers by doing the following:

TABLE 7 : ENABLE AUTOMATIC DRIVER INSTALLATION

Action	
STEP 1	Start up the computer and ensure internet connectivity.
STEP 2	Open **Devices and Printers** by clicking the Start button , and then, on the Start menu, clicking **Devices and Printers**.
STEP 3	Right-click the name of your computer, and then click **Device installation settings**.
STEP 4	Click Yes, do this automatically (recommended), and then click Save changes.
STEP 5	If you're prompted for an administrator password or confirmation, type the password or provide confirmation. If Yes is already selected, click Cancel to close the dialog box.
STEP 6	Insert Test Receiver USB adapter into PC USB port.
STEP 7	Drivers should install automatically. (may take several minutes)
NOTES	If driver download fails, the USB driver installer can be downloaded and installed manually from: http://www.ftdichip.com/Drivers/CDM/CDM21224_Setup.zip

Verify that Test Receiver USB adapter device is inserted to the PC USB port correctly and enumerated by Windows.

TABLE 8 : VERIFY TEST RECEIVER DEVICE DRIVER INSTALLATION

Action	
STEP 1	Open **Device Manager** by clicking the Start button , and then, type "devmgmt.msc" in the search box, and then press ENTER.
STEP 2	Expand device in the computer's device tree labelled: "Ports (COM & LPT)".
NOTES	Test Receiver should appear as: "USB Serial Port (COM4)" (or similar)

INSTALLING THE IR NOZZLE RECEIVER TESTER PROGRAM

To install the IR Nozzle Receiver Tester program, do the following:

TABLE 9 : COPY TEST RECEIVER SOFTWARE TO THE TEST PC

Action	
STEP 1	Copy the two program files to a new folder on the computer. The two files are needed to run the IR Nozzle Receiver Tester program. (TestReceiver.exe and TestReceiver.exe.config)
STEP 2	To run the TestReceiver program, double-click on the **"TestReceiver.exe"** application.
NOTES	***Recommended:*** Right-click on the "**TestReceiver.exe**" application and select "Create Shortcut". Copy the shortcut to the desktop.