# 3D IR-TRACC Zero-position Verification

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Service Bulletin

The THOR-50M frontal anthropomorphic Test device for Human Occupant Restraint is equipped with 3-dimensional position transducers in the chest and abdomen to measure deformation as injury parameters. The transducers are called 3D IR-TRACC and are an assembly consisting of 2 angle transducers and 1 displacement transducer. The combined output of two angles (φY, φZ) and displacement (DS0) allows to calculate a position of the end of the ribs in 3D space (DX, DY and DZ).

The 3-D analyses for chest and abdomen displacements in the THOR-M dummy are complex. Among other factors, this is due to the large number of variables involved. Therefore, a detailed step-by-step guideline how to implement the IR-TRACCs in the dummy and measurement system is important. The procedures and documentation for the 3D IR-TRACCs have recently been updated to help THOR users implement them as a reliable measurement device in their facilities. A new manual was issued focused entirely on 3D IR-TRACCs with the work flow for these sensors as guideline for its structure. Also a new zero-position template was issued, which helps collecting system calibration data in a structured manner. The new template supports implementation of calibration parameters in a suite of Data Acquisition Systems. Note that the underlying method of handling 3D IR-TRACCs has not been changed, but only the way of presenting the information to the users in a more structured and user friendly manner. Note also that the naming of variables in the manual and templates have been aligned with documentation currently under preparation for ISO.

## Implementation

The use of the new verification template was implemented in production September 2016.

*Figure 1: Three of the six varieties of devices used in THOR, upper thorax, lower thorax and abdomen, all right hand shown.*

Scope: 3D IR-TRACCs, models 472-3550, 472-3560, 472-3570, 472-3580, 472-4730-1 and 472-4730-2.

## Documentation

The document THOR-50M 3D IR-TRACC User Manual TF-472-6000-9900 provides a complete set of instructions dealing with 3D IR-TRACCs. The new manual includes complete description, exploded views, part lists of assemblies; definition of coordinate systems; transducer calibration and zero-position verification procedures and implementation in DA systems, ISO MME codes; data post processing; day-to-day handling and installation, etc. The manual can be downloaded from our web site, using the following link:

http://www.humaneticsatd.com/crash-test-dummies/frontal-impact/thor-m

Verification and calibration templates are included in calibration and verification fixtures, but for customers who already have the fixture, are also available for sale on a USB memory stick. For part numbers see Table 1. Contact your Humanetics Sales Representative for further information.

(Con't)

# 3D IR-TRACC Zero-position Verification (Con't)

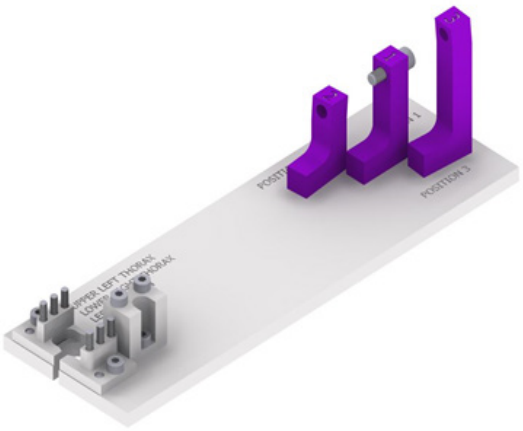
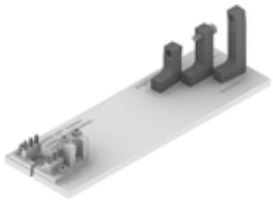


*Figure 2: TF-472-6000 3D IR-TRACC zero-position verification fixture.*

**Table 1: Overview of IR-TRACC calibration and zero-position verification.**

| Procedure | Fixture | Purpose | Documentation | Service Bulletin |
|---|---|---|---|---|
| **Displacement Calibration**  | Fixture TE-3700-IRKIT (or previous model TE-3600) | IR-TRACCs with **R4 and R5 revision** All models: 1D, 2D, 3D | IR-TRACC **Tubes In-Out** (TIO) Calibration Template and Written Procedure Part #11428 | IR-TRACC Tubes In-Out Calibration October 2015 |
| | | IR-TRACCs **up to R3 revision** All models: 1D, 2D, 3D | IR-TRACC **Harmonized** Calibration Template and Written Procedure Part #11427 | IR-TRACC Harmonized February 2014 |
| **2D Zero-Position Verification**  | TH-4000-2D | **2D IR-TRACC** assembly verification for WorldSID 50 and 5th and Q10 | 2D IR-TRACC **Zero-Position** Verification Template and Written Procedure Provided with Fixture | 2D IR-TRACC Zero-Position Verification October 2015 |
| **3D Zero-Position Verification**  | TF-472-6000 | **3D IR-TRACCs** assembly verification for THOR-50M | THOR-50M 3D IR-TRACC User Manual TF-472-6000-9900 and 3D Zero-Position Verification Templates part# 11600 | THOR-50M 3D IR-TRACCs September 2016 (this bulletin) |

(Continued)

# 3D IR-TRACC Zero-position Verification (Con't)

**Table 2: Recalibration Options**

| | | Tubes in-out IR-TRACC calibration | Harmonised IR-TRACC calibration | Y-axis angle calibration | Z-axis angle calibration | Zero-position 2D or 3D |
|---|---|---|---|---|---|---|
| 1 | **R4 and R5 IR-TRACCs - Single** | ● | | | | |
| 2 | **R4 and R5 IR-TRACCs in 2D Assembly** | ● | | ● | | ● |
| 3 | **R4 and R5 IR-TRACCs in 3D Assembly** | ● | | ● | ● | ● |
| 4 | **Up to R3 IR-TRACCs* - Single** | | ● | | | |
| 5 | **Up to R3 IR-TRACCs* in 2D Assembly** | | ● | ● | | ● |
| 6 | **Up to R3 IR-TRACCs* in 3D Assembly** | | ● | ● | ● | ● |
| 7 | **Up to R3 IR-TRACC*- Single including R4-R5 Tubes In-Out (TIO) Calibration Method** | ● | ● | | | |
| 8 | **Up to R3 IR-TRACCs* in 2D Assembly including R4-R5 Tube In-Out (TIO) Calibration Method** | ● | ● | ● | | ● |
| 9 | **Up to R3 IR-TRACCs* in a 3D Assembly including R4-R5 Tube In-Out (TIO) Calibration Method** | ● | ● | ● | ● | ● |

***** *without "R4" or R5" in the model number*