



HI-TRAC® 100 / HI-TRAC® 110 HI-TRAC® 90 / HI-TRAC® 88



HIGH SPEED WEIGH-IN-MOTION AND TRAFFIC COUNTER / CLASSIFIER SYSTEMS

BRIEF TECHNICAL OVERVIEW

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THE HI-TRAC® SERIES OF EQUIPMENT

The HI-TRAC 100, HI-TRAC 110, HI-TRAC 90 and HI-TRAC 88 are the high speed weigh-in-motion and vehicle counter/classifier series of equipment designed and manufactured by TDC Systems Ltd, England.

1. BASIC SYSTEM DIFFERENCES

HI-TRAC 100 is a permanently installed WIM system that will interface to 16 piezo sensors and 8 inductive loop sensors. The system incorporates temperature non-linearity compensation (TNL) and can be configured for 2, 4, 6 or 8 lanes:

Piezo / Loop / Piezo: - 8 lanes WIM – Dual Piezo (high accuracy)

HI-TRAC 110 is a permanently installed WIM/AVC system that will interface to 8 piezo sensors and 16 inductive loop sensors. The system incorporates loop profiling and can be configured in the following manner:

Loop / Loop: - 8 lanes Counter/Classifying
 Loop / Piezo / Loop: - 8 lanes Counter/Classifying (enhanced AVC) or
 8 lanes WIM - Single Piezo (low accuracy WIM)

HI-TRAC 90/HI-TRAC 90T is a permanently installed or a temporary (T) installed WIM/AVC system that will interface to 4 piezo sensors and 8 inductive loop sensors. The system incorporates temperature non-linearity compensation (TNL) and can be configured in the following manner:

Loop / Piezo / Loop: - 4 lanes Counter/Classifying (enhanced AVC) or
 4 lanes WIM - Single Piezo (low accuracy WIM)
 Piezo / Loop / Piezo: - 2 lanes WIM – Dual Piezo (high accuracy WIM)

HI-TRAC 88/HI-TRAC 88T is a permanently installed or temporary (T) installed AVC system that will interface to 8 inductive loop sensors. The system incorporates loop profiling and can be configured in the following manner:

Loop / Loop: - 4 lanes Counter/Classifying

2. ADVANCED FEATURES

2.1 LOOP PROFILING

The HI-TRAC series of equipment now includes a unique loop profiling feature which enhances the accuracy of vehicle classification especially in common chassis configuration (e.g. 3 axle HGV and 3 axle bus) as well as car/caravan/trailer configurations.

Incidence of vehicle miss-classification when using inductive loop sensors to record vehicle data has been significantly reduced by incorporating TDC Systems unique **Advanced Vehicle Loop Signature Identification Algorithm** function into the HI-TRAC 88, HI-TRAC 90 and HI-TRAC 110 equipment.

2.2 TEMPERATURE NON-LINEARITY (TNL) COMPENSATION

It is recognised that piezo sensors have different characteristics of output with variations of temperature due to a number of factors including type of road surface they are installed in and the type resin used for installation. To overcome this TDC Systems have developed a unique advanced automatic temperature compensation algorithm which is incorporated into all HI-TRAC WIM systems.

The variation of output against temperature is repeatable throughout the temperature range and this fact is used by the HI-TRAC WIM systems to maximise weight data accuracy. The HI-TRAC system determines variation of sensor output over a period of time (e.g. 7-14 days) by monitoring traffic weight variations against temperature on a per lane basis.

The HI-TRAC WIM uses **Temperature Non-Linearity (TNL) factors** per degree centigrade per lane to correct for temperature variation of sensor output. Each WIM lane has a temperature compensation profile built up from the TNL factors and these factors ensure that the recorded axle weight data is accurate throughout local variations of operating temperatures.

3. PERFORMANCE AND ACCURACY CRITERIA

General Performance Data:

Speed Range	5 to at least 180 KPH
Storage Capacity	4 Mbytes (Upgrade 6Mb, 8Mb)
Vehicle-by-Vehicle Storage	400,000 records – WIM data (4Mb) 600,000 records – AVC data (4Mb)
Lane Capacity	2 to 8 Lanes (as above)
Statistical File Storage	150 days
ATMS File Storage	50 Intervals
BINNED Data Storage	8 Bins, 1400 Intervals
Telemetry Options	GSM
Temperature Range	-20°C to +65°C
Classification	EURO 6 (default) User Configurable Up to 30 Classes (Loop systems) Up to 100 Classes (Piezo systems)

General Accuracy Data:

Speed	±1.5%
Gap	±0.5M up to 10M ±10% over 10M
Headway	±0.1Secs
Length	±7%
GVW	±10% (Piezo/Loop/Piezo) ±15% (Loop/Piezo/Loop)
Axle Load	±15% (Piezo/Loop/Piezo)
Axle Load	±30% (Loop/Piezo/Loop)
Axle Group Load	±10% (Piezo/Loop/Piezo)
Axle Group Load	±20% (Loop/Piezo/Loop)

General Classification Accuracy:

Motorbike	up to	95%
Cars/Vans	up to	97%
Cars/Vans + Trailer	up to	97%
Rigid HGV	up to	98%
Articulated HGV	up to	99%
Drawbar Trailer HGV	up to	99%
Buses and Coaches	up to	97%

4. HI-TRAC® DATA STORAGE CAPACITY

4.1 Vehicle-by-Vehicle Data Storage

Vehicle-by-Vehicle (VBV) data refers to data stored in the HI-TRAC battery-backed memory for each individual vehicle that is detected by the system. The system stores data on every vehicle detected by the system for 8 days. At the start of the next day (9th day), data recorded on the first day is overwritten hence there is always 7 full days data stored and available for download.

The HI-TRAC electronic unit provides 4 Megabytes of Vehicle-by-Vehicle (VBV) data storage. An average of 10 bytes (WIM) or 6 bytes (AVC) required to store all of the recorded data for a vehicle with all VBV parameters selected for storage the total capacity of the system is approximately 400,000 (WIM) or 600,000 (AVC) vehicles. Parameters stored on a vehicle-by-vehicle basis include:

- Date
- Time
- Serial Number (unique ID number)
- Vehicle Classification Index
- Vehicle Category
- Lane Number
- Direction
- Vehicle Straddling
- Validity Code
- Inter-Vehicle Spacing (Gap in cms)
- Headway (Time in msec between subsequent vehicle detections)
- Vehicle Length

WIM Data

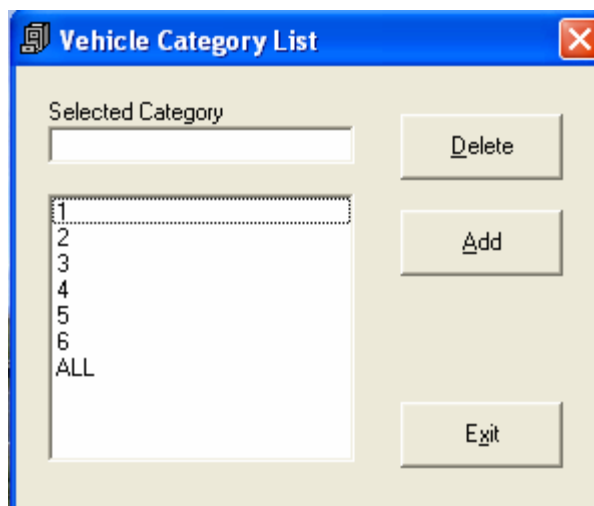
- Individual Axle Weight
- Gross Vehicle Weight

4.2 Standard Statistical Data Files

The HI-TRAC stores in battery-backed memory statistical data files for the previous 150 days of HI-TRAC operation. These data files include the following information:

- Average Speed per Vehicle Category per Lane per Day
- Traffic Volume per Vehicle Category per Lane per Day
- Traffic Volume per Hour per Lane per Day
- Average Speed per Hour per Lane per Day

The categories recorded in the Statistical Data files are defined in the Category List stored inside the HI-TRAC battery-backed memory. Viewing or modifying the Category List is accomplished using the HI-COMM 100 software package when connected to the HI-TRAC.



Up to 20 categories can be defined. These category names correspond to those defined in the 'Category' text box of the classification table.

4.3 Standard ATMS Data Files

ATMS (Advanced Traffic Management System) data files store vehicle data and fault monitoring information over a configurable time period from 1 minute to 12 hours. The data stored in each ATMS file includes:

- Start Date of ATMS interval
- Start Time of ATMS interval
- Period of ATMS interval
- Diagnostic Code for ATMS interval
- Occupancy per Lane for ATMS Interval
- Average Speed per Category per Lane for ATMS Interval
- Traffic Volume per Category per Lane for ATMS interval

The HI-TRAC stores 50 ATMS files for the previous 50 ATMS intervals. The oldest data file is overwritten at the start of a new ATMS interval.

A diagnostic code is stored with each ATMS file. This gives an indication of any system errors that may have occurred during the ATMS interval. The definition of diagnostic code may be viewed through the HI-COMM 100 software package. HI-COMM 100 will display a window similar to that below with a definition of the diagnostic code.

