



Australian Government

National Measurement
Institute

Bradfield Road, West Lindfield NSW 2070

Certificate of Approval

NMI 13/1/15

Issued by the Chief Metrologist under Regulation 60
of the
National Measurement Regulations 1999

This is to certify that an approval for use for trade has been granted in respect of the instruments herein described.

Tally Clerk Model LVS 'Load Volume Scanner' Dimensional Measuring Instrument

submitted by LoadScan Limited
(formerly Tallyclerk Pty Ltd)
Now of 105 Higgins Road
Dinsdale Hamilton 3243
New Zealand

NOTE: This Certificate relates to the suitability of the pattern of the instrument for use for trade only in respect of its metrological characteristics. This Certificate does not constitute or imply any guarantee of compliance by the manufacturer or any other person with any requirements regarding safety.

This approval has been granted with reference to document NMI R 129, *Multi-dimensional Measuring Instruments*, dated July 2004.

This approval becomes subject to review on 1/10/19 and then every 5 years thereafter.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern approved – interim certificate issued	2/09/09
1	Pattern approved – certificate issued	11/03/10
2	Variant 1 approved – certificate issued	14/02/14
3	Pattern and variant 1 amended (instrument class) & reviewed – certificate issued	29/09/14

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI 13/1/15' and only by persons authorised by the submitter.

It is the submitter's responsibility to ensure that all instruments marked with this approval number are constructed as described in the documentation lodged with the National Measurement Institute (NMI) and with the relevant Certificate of Approval and Technical Schedule. Failure to comply with this Condition may attract penalties under Section 19B of the National Measurement Act and may result in cancellation or withdrawal of the approval, in accordance with document NMI P 106.

Auxiliary devices used with this instrument shall comply with the requirements of General Supplementary Certificates No S1/0/A or No S1/0B.

Signed by a person authorised by the Chief Metrologist to exercise their powers under Regulation 60 of the *National Measurement Regulations 1999*.

A handwritten signature in black ink, appearing to read 'Dr A Rawlinson', with a horizontal line underneath.

Dr A Rawlinson

TECHNICAL SCHEDULE No 13/1/15

1. Description of Pattern

approved on 2/09/09

A Tally Clerk model LVS 'Load Volume Scanner' dimensional measuring instrument (Figures 1 and 2) which is approved for use for the determination of the volume of flowable solids such as sand, soil, gravel and agricultural materials. The material is measured in conventional trucks and trailers whilst the vehicle is moving through a defined scanning area. Results obtained from the system indicate the volume of the load as it sits in the container of the vehicle at the time of measurement (i.e. the instrument does not take account of any settling or expansion of product which may occur during transport, storage or use).

Instruments may be fitted with output sockets (output interfacing capability) for the connection of auxiliary and/or peripheral devices.

The pattern is nominally considered to be a 'Class 5' instrument

Note: The pattern and components described as 'Tally Clerk' units may also be known as 'LoadScan' units of the same model.

1.1 Details

The pattern is approved to measure certain materials having a maximum volume of 35 cubic metres and a minimum volume of 1 cubic metre, per vehicle tray, with a scale interval of 0.1 cubic metres. The system may measure the volume of a truck and trailer/s up to a maximum of 70 cubic metres where the volume in any one tray is a maximum of 35 cubic metres. Outside these values over or under range messages are provided without the volume indication, except that below the minimum volume a volume indication may be shown but not printed.

The volume of the load is measured as the vehicle is driven through the defined scanning area at a maximum speed of nominally 6 km/h. Error messages are provided where the vehicle speed is excessive or not sufficiently constant.

The pattern includes a scanning head and an operators' console; a message board indicator (see clause **1.5 Additional Indications** below) and a printer may also be fitted.

The system must provide the operator and the vehicle driver with a clear view of the result of the measurement displayed on the indicator (this may be provided by the operators' console, a message board indicator, or a printer).

The scanning area must be relatively flat, smooth, in one plane and close to level. It must be suitable for vehicle access with an area of at least 12 metres long and 3 metres wide. The scanning head is mounted over the centre of the scanning area with a clearance of from 5 to 6.5 metres.

1.2 Operation

The system uses laser scanning range-finders oriented longitudinally and transverse to the scanning area.

An LED message board indicator (where fitted) instructs the driver when the instrument is ready to begin measuring. The vehicle is driven through the scanning area at a constant speed. As the vehicle passes below the scanning head, the laser scanners measure the profile of the entire vehicle.

This measurement data is then used to computationally determine the volume of the material loaded in the tray of the vehicle. The result is then displayed on the operators' console, a message board indicator (where fitted) and may also be printed.

The system has two modes of operation that may be used to calculate the volume:

(i) **Database mode**

- Vehicles are initially scanned while empty to generate a reference profile of the container and the information is stored into the database. Reference scans may expire after a period of time (which may be specified by the relevant trade measurement authority), and a new reference scan must be completed and recorded into the database. When vehicles are subsequently measured the volume of the load is computed by measuring the difference between the reference scan and the new measurement data.
- In this mode of operation vehicles are identified by either manually entering details into the operators' console or automatically using an RFID tag installed on the vehicle.

(ii) **In-Out mode**

In this mode of operation the vehicle must be scanned initially and may be either empty or loaded. A subsequent scan of the vehicle is then used to determine the volume which may be added or removed from the original scan. This mode of operation requires the vehicle to be scanned twice for every measurement result.

1.3 Scanning Head

The Tally Clerk model LVS scanning head (Figure 1) comprises two SICK Optic model LMS-221-30106 laser scanners and an RFID tag reader. The scanning head is mounted on a gantry at the centre of the scanning area. During scanning, each laser dimensioning head measures and transmits the longitudinal and transverse profiles of the vehicle and its load to the operators' console.

1.4 Operators' Console

The Tally Clerk model LVS operators' console (Figure 2) consists of an Advantech PPC-L127 touchscreen computer system or equivalent (#) running Microsoft Windows XP operating system and Tally Clerk 'Load Volume Scanner' software version 2.1-xxx. The operators' console provides a user interface and performs the computation of the measurement data received from the scanning head, and displays the result.

A docket/ticket printer may also be connected.

A prominent notice indicating 'Volume indicated is that at the time of measurement', or similar wording, shall be provided adjacent to each indicator and on any printout.

- (#) 'Equivalent' is defined to mean other proprietary equipment of the same or better specifications requiring no changes to the software specified in this approval for satisfactory operation of the system.

1.5 Additional Indications

A PolyComp LED message board indicator or equivalent (#) (Figure 3) may be connected to the operator console to provide an indication and prompts/error messages for the vehicle driver.

A prominent notice indicating 'Volume indicated is that at the time of measurement', or similar wording, shall be provided adjacent to each indicator and on any printout.

- (#) 'Equivalent' is defined to mean other proprietary equipment of the same or better specifications requiring no changes to the software specified in this approval for satisfactory operation of the system.

1.6 Checking Facilities

The Tally Clerk model LVS 'Load Volume Scanner' dimensional measuring instrument checks that scanning area is clear and that the scanning head is properly aligned before the system is initialised to begin measuring.

If excessive dust, steam or fog is in the scanning area sufficient to prevent correct operation is detected then a 'Visual Pollution' error message will be displayed.

If the vehicle speed is uneven, too fast, too slow or if the vehicle travels outside the scanning area, an error message will be displayed describing the nature of the error.

The profile of the vehicle being measured and that of a reference measurement of that vehicle are compared, and an error message is displayed where a significant difference is detected. This profile checking ensures that a load cannot be scanned if the tray is covered or the edges of the tray cannot be detected.

1.7 Descriptive Markings and Notices

- (a) Instruments carry the following markings (in the vicinity of the indicating device):

Manufacturer's mark, or name written in full	(#)
Model designation	
Serial number of the instrument	
Year of manufacture	
Pattern approval number	NMI 13/1/15	
Maximum volume per tray	35 m ³	
Maximum volume	70 m ³	
Minimum volume	1 m ³	
Verification scale interval	0.1 m ³	
Maximum speed	6 km/h	

- (b) A prominent notice indicating 'Volume indicated is that at the time of measurement', or similar wording, shall be provided adjacent to each indicator and on any printout.

- (#) Manufactured by 'Tallyclerk Pty Ltd' or 'LoadScan Limited'.

1.8 Verification Provision

Provision is made for the application of a verification mark.

1.9 Sealing Provision

Sealing of configuration properties are protected using password protection. An access log provides a record when settings are modified and is accessible from a button on the loading screen when the system is powered on.

2. Description of Variant 1

**approved on 14/02/14
amended on 29/09/14**

A LoadScan model LVS-3 (*) 'Load Volume Scanner' dimensional measuring instrument which is similar to the pattern (model LVS) except that the scanning head is now fitted with two SICK Optic model LMS511-20100 laser scanners (instead of the scanners described for the pattern).

The Tally Clerk model LVS operators' console now uses LoadScan (or Tally Clerk) 'Load Volume Scanner' version 3.0-xxx software.

(*) The model number may also include a digit alphanumeric suffix representing the type of mounting structure used – this is not considered to be metrologically significant.

Variant 1 is nominally considered to be either a 'Class 5' instrument or a 'Class 2' instrument

TEST PROCEDURE No 13/1/15

The maximum permissible errors (mpe) at verification are:

For a 'Class 5' instrument

$\pm 2.5\%$ of load; or $\pm 1.5 e$ whichever is the greater.

For a 'Class 2' instrument

$\pm 1\%$ of load; or $\pm 1.5 e$ whichever is the greater.

Instruments shall be tested as follows:

(a) Test loads shall be created using a suitable material (maintaining constant volume).

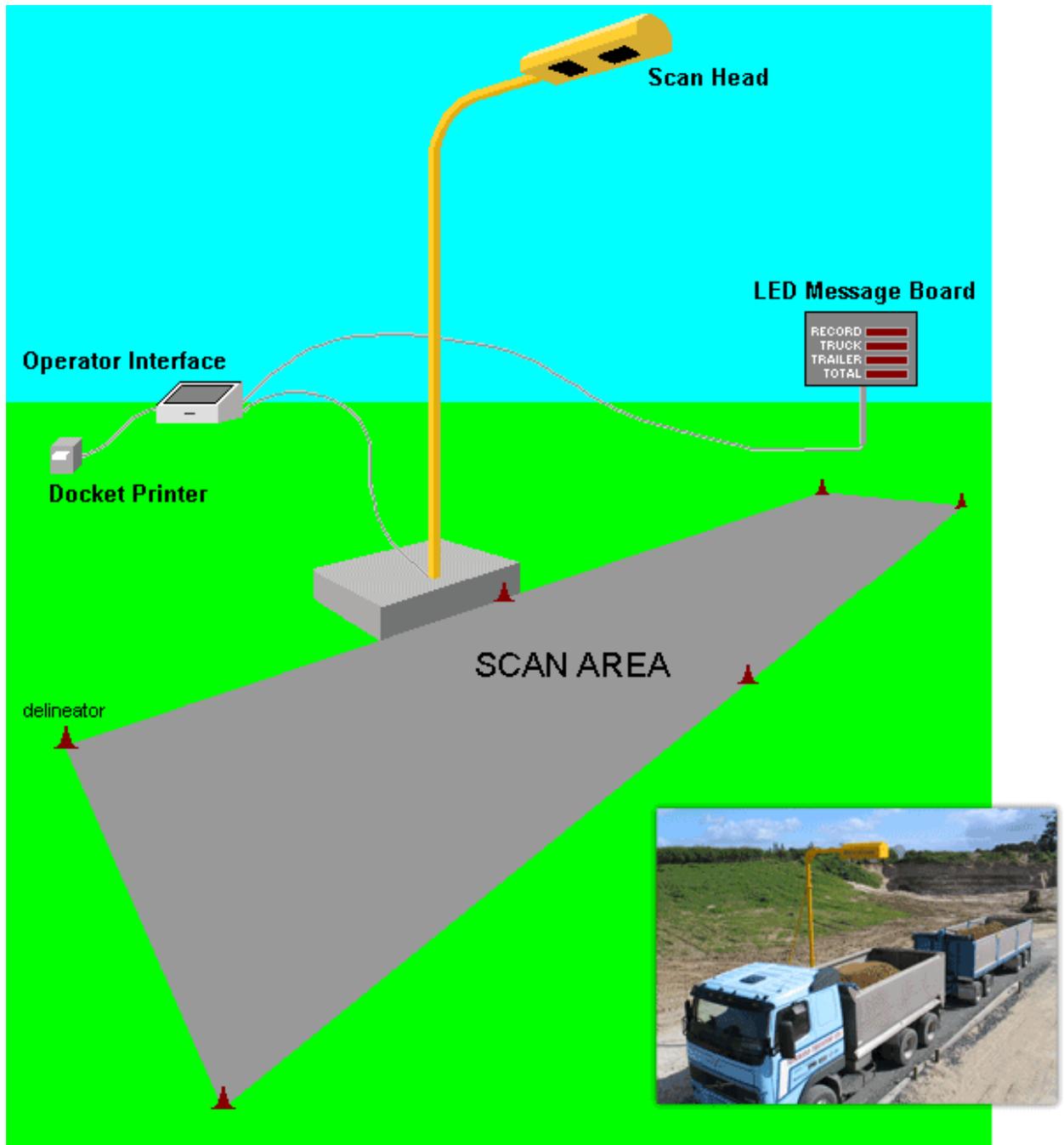
The volume of the test load shall be determined to an uncertainty of one-fifth of the maximum permissible error or less (refer to document NMI R129, *Multi-dimensional Measuring Instruments*).

Test objects approximating the shape of a load and with geometry that facilitates determination of volume by measurement of linear dimensions may be used to generate test loads in a suitable test container. A raised floor or rigid objects covering the entire test container floor such that no edges are visible may be placed in the test container, supporting the test objects, to simulate loads at larger volumes.

Alternative methods to achieve suitable test loads may also be acceptable, however, such alternative methods should be endorsed by the National Measurement Institute before being applied.

- (b) Scan the vehicle at least twice while empty to obtain and confirm a zero volume reading.
- (c) Perform five test measurements at each of at least three different loads. The loads shall near (as close as practical using multiples of the measuring container) minimum, maximum and halfway between the limits of volume for the instrument.
- (d) Check that any printed docket or ticket contains the correct format and data and includes the notice 'Volume indicated is that at the time of measurement' as per the typical samples shown in Figure 4.
- (e) Check that when the vehicle does not travel through the scanning area at a consistent speed, is outside the scanning area, or when the load is covered, that a suitable error message is displayed. A test for error messages where the load is below the minimum or above maximum capacity may also be carried out. Where the instrument is to be used with vehicles travelling in both directions, a check to ensure similar performance in both directions may be carried out.

FIGURE 13/1/15 – 1



Tally Clerk (or LoadScan) Model LVS 'Load Volume Scanner'
Dimensional Measuring Instrument

FIGURE 13/1/15 – 2



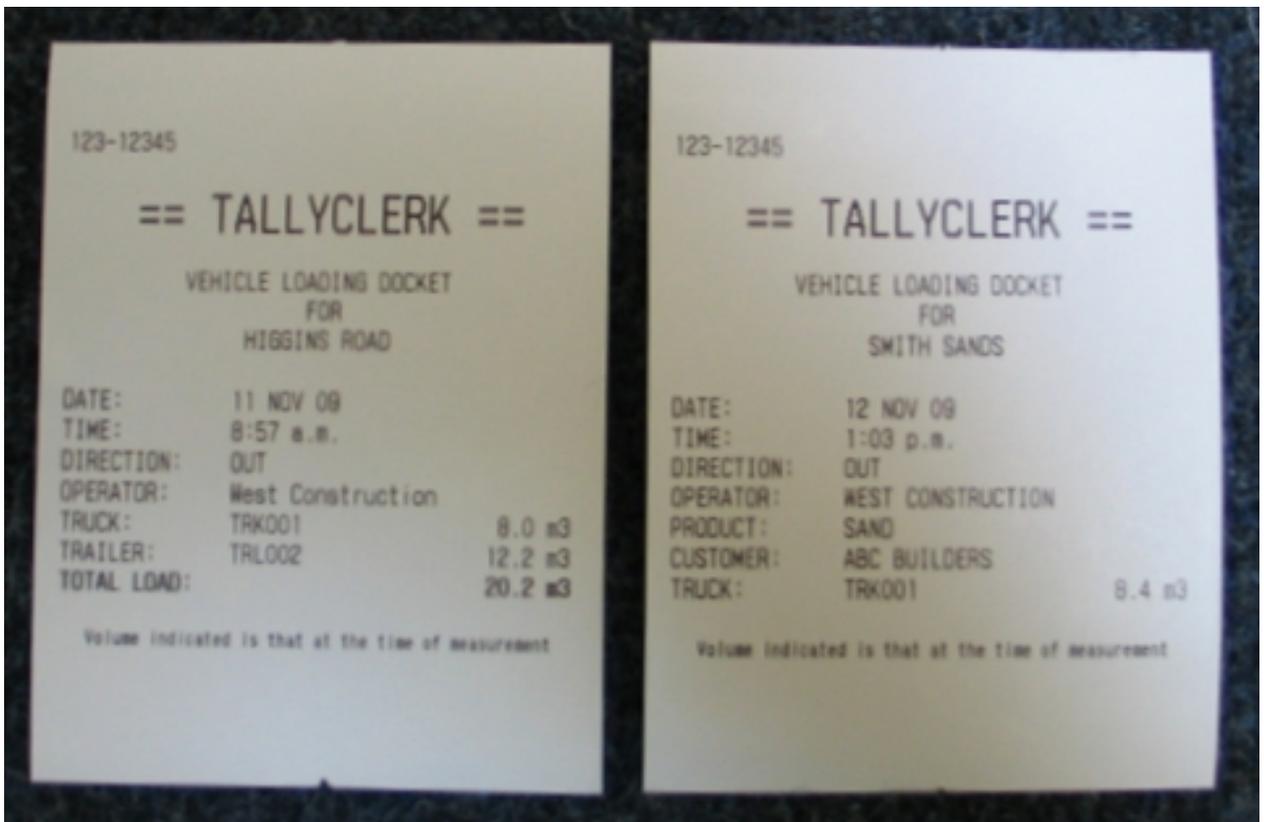
Tally Clerk Model LVS Operators Console (Typical Alternative Housings)

FIGURE 13/1/15 – 3



Typical Alternative PolyComp LED Message Board Indicators

FIGURE 13/1/15 – 4



Typical Sample Printouts
(including notice described in the Technical Schedule)

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