



Australian Government
National Measurement
Institute

Bradfield Road, West Lindfield NSW 2070

Certificate of Approval
No 13/1/9

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

CubiCal Model TM5 Dimensional Measuring Instrument

submitted by Certified Instrument Corporation P/L
(formerly CubiCal Holdings Pty Limited)
PO Box 7064
McMahons Point NSW 2060.

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.

CONDITIONS OF APPROVAL

This approval becomes subject to review on 1 April 2014, and then every 5 years thereafter.

Instruments purporting to comply with this approval shall be marked with approval number 'NMI 13/1/9' 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.

The National Measurement Institute reserves the right to examine any instrument or component of an instrument purporting to comply with this approval.

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

Special:

Instruments are only approved for use for determination of the dimensions of a rectangular box and for the calculation of volume and/or 'dimensional weight' value of the item, for the purposes of determining freight or postal charges.

DESCRIPTIVE ADVICE

Pattern: approved 19 March 2004

- The CubiCal model TM5 dimensional measuring instrument comprising a TM5 module and a Symbol model SPT1700 PDA unit. May also be known as a Tallyman measuring system.

Variant: approved 19 March 2004

1. Using certain alternative model Symbol PDA units.

Technical Schedule No 13/1/9 describes the pattern and variant 1.

Variants: approved 12 March 2009

2. The model C8000 dimensional measuring instrument.
3. The model C8061 and model C8071 dimensional measuring instruments.

Technical Schedule No 13/1/9 Variation No 1 describes variants 2 and 3.

FILING ADVICE

Certificate of Approval No 13/1/9 dated 2 June 2004 is superseded by this Certificate, and may be destroyed. The documentation for this now approval comprises:

- Certificate of Approval No 13/1/9 dated 13 March 2009
- Technical Schedule No 13/1/9 dated 2 June 2004 (incl. Test Procedure)
- Technical Schedule No 13/1/9 Variation No 1 dated 13 March 2009 (incl. Notification of Change)
- Figures 1 and 2 dated 2 June 2004
- Figures 3 and 4 dated 13 March 2009

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



TECHNICAL SCHEDULE No 13/1/9

Pattern: CubiCal Model TM5 Dimensional Measuring Instrument

Submittor: CubiCal Holdings Pty Limited
PO Box 7064
McMahons Point NSW 2060

1. Description of Pattern

A CubiCal model TM5 dimensional measuring instrument (Figure 1) which is approved for use in measuring the linear dimensions of a rectangular box (rectangular parallelepiped – #) only, for the purposes of determining freight or postal charges. The dimensions determined may also be used for the calculation of volume and/or 'dimensional weight' value (*) of the item, also for the purposes of determining freight or postal charges. The maximum dimensions (i.e. length x width x height) of the rectangular box shall be 400 x 400 x 400 cm, the minimum dimensions 10 x 10 x 10 cm, and the scale interval of measurement (d) shall be 1 cm.

- (#) A rectangular box (rectangular parallelepiped) is a polyhedron having six faces that are parallel in pairs; each face is a parallelogram and adjacent edges are perpendicular.
- (*) A '**dimensional weight**' value is a calculated value deemed to be a weight value obtained by applying a conversion factor to the object's volume as calculated from the measured dimensions.

The instrument (Figure 1) is designed to be hand-held and comprises a TM5 module (Figure 2) which is plugged into a Symbol model SPT1700 'personal digital assistant' (PDA) unit, and may also be known as a Tallyman measuring system. The TM5 module comprises a steel tape measure with holes spaced every 1 cm; the holes are used by the TM5 to determine the dimension (length, width, height).

The dimensions are determined by manually extending the tape and pressing the tape read button to record the value along each side of the item being measured.

The Symbol model SPT1700 PDA unit is able to run "Tallyman" software which records the dimension values (and can record additional information), and which may also perform calculations to determine 'dimensional weight' values. The Symbol PDA also provides power to allow the TM5 module to operate.

The Symbol model SPT1700 PDA unit also incorporates a barcode reader that enables information regarding the item to be scanned.

Note: The tape is marked in both centimeters 'cm' and inch units. Inch units are not legal for trade, and the instrument shall be marked "USE OF INCHES IS NOT LEGAL FOR TRADE USE".

1.1 Tallyman Information Screen

When the Tallyman application is initiated, a welcome screen “Cubical Tallyman v1.06” is shown (for a short period). If the “Info” button on this screen is selected, an information screen “CubiCal TM5 Info” is displayed, which shows:

- Version numbers of the Tallyman software, the driver software, and the TM5 module firmware;
- A calibration count number. The calibration count is incremented whenever the calibration is altered, and the value of the calibration count may be included on the verification label to so that any unauthorised alteration of calibration is evident;
- A ‘calibration due’ date – this is for management purposes only;
- The conversion factor ‘F’ which is used in calculation of any dimensional weight value;
- Max, Min and d values of the instrument; and
- A statement that the instrument is “For the calculation of dimensional weight (DW kg) or volume (m³) of rectangular boxes only”.

1.2 Zeroing

It is important that the instrument is zeroed prior to any reading, by allowing the tape to be fully retracted into the TM5 module (by releasing the tape brake) whilst the PDA unit is turned on, and the Tallyman application is running.

Failure to zero the instrument in this way may result in readings which are less than the correct dimensions.

1.3 Typical Operation

- The barcode scanner of the PDA unit is used to read a barcode identifying the item to be measured.
- The tape is then extended along one side of the item (commencing with the tape fully retracted to ensure correct zeroing as indicated in 1.2 above), aligning the tape index (end protector) and the edge of the TM5 module to contact the edge of the item. The read tape button is then pressed and the unit ‘beeps’ once to indicate a successful reading of the dimension has been obtained.
- This is repeated for the other two dimensions of the item.
- The barcode of another item can then be scanned; the unit will then store the data relating to the previous item and measurements of the second item can be obtained.

NOTE: Instruments shall only be used as specified in the Special Condition of Approval.

1.4 Display Check

It is possible to carry out a check of the display elements in both on and off condition by use of the Symbol PDA unit screen contrast control, or by setting the screen into inverse mode (white on black rather than black on white). It may be necessary to consult the PDA manual to determine how either of these may be achieved.

1.5 Additional Features

The Tallyman unit has additional features including:

- Add to last tape measurement

This function can be used to make a measurement of one dimension by adding a number of measurements. For example, if one dimension was greater than the Max value of the instrument, it could be partially measured with one tape extension (& pressing the measurement button), the '+' key pressed, and then the other partial measurement made by another tape extension (and measurement button pressed).

- Multiple items of the same size

Where multiple items are the same size, it is possible to avoid measuring each item individually by entering the number of items prior to measuring one of the items.

- Default dimensions

It is possible to enter default dimensions. For example, where pallets with constant length and width measurements are used, pressing the 'F' key will enter the default dimensions and only the height measurement need be made.

- Entry of weight values

It is possible to enter a weight value for each item (by manually typing the value or writing it using the stylus). This may be used for example where charging is on the basis of the greater of the weight or the "dimensional weight value".

1.6 Printer

The Tallyman unit may be connected to a printer (including connection via an infrared or wireless networking link). In this case an adhesive ticket showing the three dimensions (and optionally also showing the calculated volume, the conversion factor and the 'dimensional weight' value) may be printed for attachment to the measured item.

The printout shall include a statement that "Dimensions shown are those of the smallest rectangular box that fully encloses the object", and where a dimensional weight value is included shall also include the statement "DW (Dim Wt) is a calculated value obtained by applying a conversion factor to the volume of the object".

1.7 Data Interfacing/Printing/Invoicing

The TM5 module and the Symbol SPT1700 PDA unit combination (the Tallyman unit) form a hand-held measuring device for the collection of measurement data. Such data may be printed immediately (as indicated in clause **1.6 Printer**), and/or it may be stored within the Symbol PDA unit and periodically downloaded to other computing equipment for storage and printing/invoicing purposes.

The measurement data may be downloaded by several means:

- Plugging the Symbol PDA unit into a 'synchronising cradle' connected to a personal computer. The 'synchronising cradle' may also be attached to a mains power adaptor, and can recharge the batteries of the Symbol PDA unit.
- Connecting the Symbol PDA unit to a personal computer via an infrared link.
- Connecting the Symbol PDA unit to a personal computer via a wireless networking system.

The personal computer has Tallyman PC software for the downloading of the Tallyman data files (and conversion into alternative data formats).

The downloaded information may then be processed using further computer applications for invoicing purposes.

The information downloaded shall, if required by the appropriate State or Territory trade measurement authority, be retained for subsequent checking or reference in case of any dispute.

1.8 Markings

Instruments carry the following markings:

Manufacturer's mark, or name written in full
Model designation	TM5
Serial number of the instrument
Year of manufacture
Pattern approval mark for the instrument	NSC No 13/1/9
Maximum object length	Max 400 cm
Minimum object length	Min 10 cm
Scale interval	d = 1 cm

Instruments shall also be marked "USE OF INCHES IS NOT LEGAL FOR TRADE USE".

1.9 Verification/Certification and Sealing Provisions

Provision is made for a verification/certification mark to be applied (in an area on the rear of the TM5 module).

Whenever the calibration of the TM5 module is altered a calibration code is incremented. This may be accessed as described in clause **1.1 Tallyman Information Screen**, and written on the verification/certification label so that any subsequent alteration of the calibration is evident.

Note: The software enabling calibration of the TM5 module is intended to be available to the manufacturer only.

2. Description of Variant 1

The CubiCal model TM5 dimensional measuring instrument using alternative model Symbol 'personal digital assistant' (PDA) units.

The pattern utilises the Symbol model SPT1700 PDA unit; this variant approves the use of compatible Symbol models in the 17xx and 18xx families, and similar compatible Symbol PDA units.

TEST PROCEDURE

Maximum Permissible Error at Verification/Certification

The maximum permissible error at verification/certification is:

± 1.0 cm for lengths from the minimum length to any value up to and including the maximum length capacity of the instrument.

Instruments shall be tested as follows:

- Test objects shall be used of known lengths such that each axis (i.e. length x width x height) is tested for at least five dimensions between and including the minimum and maximum lengths specified on the instrument nameplate. Each test object shall be rigid and with well-defined edges to simulate the edges of a rectangular box. The lengths shall be known to an uncertainty equal to or better than ± 2 mm.
- Using the instrument in the manner described in clause **1.3 Typical Operation** of the Technical Schedule (together with the user's manual supplied with the instrument), carry out at least three test runs for each length. Each measurement shall be within the maximum permissible error.
- Where the instrument provides volume or dimensional weight values, note the conversion factor displayed on the instrument (see clause **1.1 Tallyman Information Screen** of the Technical Schedule) and using three consecutive length measurements, display the calculated volume and the 'dimensional weight' value. These shall agree with values calculated from the displayed lengths and the conversion factor, rounded to the nearest significant digit.

- Ensure that information provided by any additional equipment (e.g. printing/ invoicing system) utilising data output from the TM5 module (and which is in use for trade) complies with the following:

- (a) Where volume is calculated, the volume must be calculated correctly.

Volume is calculated as $\text{Volume} = \text{Length} \times \text{Width} \times \text{Height}$

The volume shall either be shown in m^3 with six digits after the decimal place (e.g. $11 \text{ cm} \times 11 \text{ cm} \times 13 \text{ cm} = 0.001573 \text{ m}^3$) or a lesser number of digits may be shown, in which case the value shall be rounded to the nearest digit (e.g. 0.001573 m^3 would round to 0.00157 m^3 , or 0.0016 m^3 or 0.002 m^3).

- (b) Where 'dimensional weight' is calculated, the calculation must be correct. 'Dimensional weight' is calculated as:

'Dimensional weight' = Conversion factor \times Volume

Note: the conversion factor shall be displayed or printed by the additional equipment.

The 'dimensional weight' value shall be rounded to the last significant digit shown (e.g. $0.001573 \text{ m}^3 \times$ conversion factor of $167 \text{ kg/ m}^3 = 0.262691 \text{ kg}$; this may be shown rounded to 0.26269 kg , 0.2627 kg , 0.263 kg , 0.26 kg , 0.3 kg , or 0 kg – but should not be represented as, say, 0.0 kg).

- (c) The content and format of any printed information must be acceptable.

The printed information shall include the date and transaction number or other identification of the object and:

- At least the three dimensions in whole centimetres and including the cm symbol (e.g. $23 \times 13 \times 51 \text{ cm}$ would be acceptable, however $23.0 \times 13.0 \times 51.0 \text{ cm}$ is not).
- The calculated volume (if used) shall also be printed, rounded according to (a) above. The applicable units (m^3) shall also be printed.
- The calculated 'dimensional weight' (if used) shall also be printed, rounded according to (b) above. Where 'dimensional weight' is used, the calculated volume and conversion factor shall also be printed. Units for the 'dimensional weight' (kg), volume (m^3), and conversion factor (kg/m^3) shall also be printed.
- Other pertinent information (e.g. price rate and price) shall also be printed. This may include information regarding weight (Wt) derived from an approved weighing instrument.

- A notice that “Dimensions/Volume shown are those of the smallest rectangular box that fully encloses the object. ‘Dimensional weight’ is a calculated value obtained by applying a conversion factor to the volume of the object”.

The following abbreviations may be used in the presentation of this information:

Volume (vol), dimensional weight (DW), conversion factor (F), and weight (Wt).

- (d) When the information is displayed (e.g. on computer equipment) rather than printed, the information required and the format shall be similar to that required above for printing.

TECHNICAL SCHEDULE No 13/1/9

VARIATION No 1

Pattern: CubiCal Model TM5 Dimensional Measuring Instrument

Submittor: Certified Instrument Corporation P/L
PO Box 7064
McMahons Point NSW 2060

1. Description of Variants

1.1 Description of Variant 2

A CubiCal (aka Certified Instrument Corporation) model C8000 dimensional measuring instrument (Figure 3) which is similar to the pattern (model TM5) but which uses a different tape module, namely a model C80x (Figure 3) and a CipherLAB (Syntech Information Co. Ltd.) model 8001-L Portable Terminal (Figure 4) rather than the Symbol PDA unit described for the pattern.

The instrument is approved for use for the determination of the linear dimensions of rectangular box-shaped (parallelepiped (#), cuboidal) objects only. The objects shall have maximum dimensions (*Max*) (i.e. length × width × height) of 400 × 400 × 400 cm, minimum dimensions (*Min*) 10 × 10 × 10 cm, and with a scale interval of measurement (*d*) of 1 cm.

(#) A rectangular box (parallelepiped) is a polyhedron having six faces that are parallel in pairs; each face is a parallelogram and adjacent edges are perpendicular.

The C80x tape module comprises a steel tape measure with holes spaced every 1 cm; the holes are used by the C80x to determine the dimension (length, width, height).

The dimensions are determined by manually extending the tape (holding the tape brake button if necessary) and pressing one of the tape read buttons ('enter'/blue buttons) to record the value along each side of the item being measured.

The CipherLAB (Syntech Information Co. Ltd.) model 8001-L Portable Terminal is able to run CubiCal C80xx application software which records the dimension values together with identification of the item (e.g. barcode) and the number of items (where a number of identical items are involved). The CipherLAB Portable Terminal also provides power to allow the C80x module to operate, and incorporates a barcode reader that enables information regarding the item to be scanned. The CipherLAB Portable Terminal may be recharged using a separate recharging unit.

Note: The markings on the tape itself are not intended for trade use (hence the tape may be marked with values greater than 400 cm, however the CipherLAB Portable Terminal will not display or record readings exceeding 400 cm).

1.1.1 Information Screen

From the 'Main Menu' of the device, a 'Utilities Menu' can be accessed, from which an 'About' screen can be selected. The 'About' screen shows the software model identification "CubiCal 80xx" together with the following:

- The version number of the CubiCal software (Vers: 1.02);

- A 'calibration code' ("Cass. Calibration: ..."), the value of which shall be included on the verification label to so that any unauthorised alteration of calibration is evident. When initially produced, the C80x module ('cassette') has a 'calibration code' of 'FACTORY DEFAULT'. Subsequently, if the C80x module calibration is altered, the calibration code will change to '1', and then will increment successively for subsequent alterations of the calibration;
- The *Max*, *Min* and *d* values of the instrument, and
- A statement that the instrument is "For the calculation of volume (m^3) of rectangular boxes only".

Note: To correctly provide the calibration code, the CipherLAB Portable Terminal must be inserted into the CubiCal C80x module, and the C80x module must be in an active state (the C80x module may enter a sleep mode after a period of inactivity, in which case the calibration code may show as 'TAPEERROR') – to ensure the C80x module is in an active state, extend the tape.

1.1.2 Zeroing

It is important that the instrument is zeroed prior to any reading.

This is achieved by ensuring that the tape has been fully retracted into the CubiCal C80x module at the time that CipherLAB Portable Terminal is inserted into the CubiCal C80x module.

Failure to zero the instrument in this way may result in readings which are less than the correct dimensions.

1.1.3 Typical Operation

- Select 'Collect Data' from the 'Main Menu' of the instrument (the 'ESC', 'Enter' and up and down arrow buttons are used to navigate the menus).
- The barcode scanner of the CipherLAB Portable Terminal is used to read a barcode identifying the item to be measured.
- A number may be entered (representing a number of identical items, one of which is to be measured).
- The tape is then extended along one side of the item, aligning the tape index (end protector) and the edge of the Cubical C80x module to contact the edge of the item. The read tape button (Enter) is then pressed (if necessary the tape brake may be applied whilst the unit is brought into a more convenient position for operation).
- This is repeated for the other two dimensions of the item.
- The three dimensions are then displayed, together with the number or items (see second dot point above), and the calculated volume (shown as "vol m^3 : ..." – ' m^3 ' represents cubic metres, m^3). The calculation of volume assumes a rectangular box.

- The barcode of another item can then be scanned, the unit will then store the data relating to the previous item and measurements of the second item can be obtained.

NOTE: Instruments shall only be used as specified in the Special Condition of Approval.

1.1.4 Display Test

A display check (to check all pixels of the display in the on and off states) is available via the 'Utilities' menu of the instrument.

1.1.5 Data Interfacing/Printing/Invoicing

The model C8000 dimensional measuring instrument forms a hand-held measuring device for the collection of measurement data. Such data may be printed immediately and/or it may be stored within the CipherLAB Portable Terminal and periodically downloaded to other computing equipment for storage and printing/invoicing purposes.

The measurement data may be downloaded for printing/storage by several means:

- Plugging the CipherLAB Portable Terminal into a 'synchronising cradle' connected to a personal computer. The 'synchronising cradle' may also be attached to a mains power adaptor and can recharge the batteries of the CipherLAB Portable Terminal.
- Connecting the CipherLAB Portable Terminal to a personal computer via an infrared link.
- Connecting the CipherLAB Portable Terminal to a personal computer via a wireless networking system.

The downloaded information may then be processed using further computer applications for invoicing purposes (this may include calculation of a 'dimensional weight' (*) from the volume provided by the CubiCal model C8000.

- (*) A '**dimensional weight**' value is a calculated value deemed to be a weight value obtained by applying a conversion factor to the object's volume as calculated from the measured dimensions.

The printout shall include a statement that "Dimensions/Volume shown are those of the smallest rectangular box that fully encloses the object", and where a dimensional weight value is included shall also include the statement "DW (Dim Wt) is a calculated value obtained by applying a conversion factor to the volume of the object".

The information downloaded shall, if required by the appropriate trade measurement authority, be retained for subsequent checking or reference in case of any dispute.

Printing and invoicing may be carried out by equipment, and using software, which is not provided by Certified Instruments Corporation, however such equipment shall comply with requirements indicated in the Test Procedure.

1.1.6 Verification/Certification and Sealing Provisions

Provision is made for a verification/certification mark to be applied (i.e. by application of a destructible adhesive label on the C80x module).

The 'calibration code' (shown as Cass. Calibration ... in the 'About' screen) may be accessed as described in clause **1.1.1 Information Screen**, and shall be written on the verification/certification label so that any subsequent alteration of the calibration is evident (the calibration count may also be assessed via the 'Calibration #' item in the 'Utilities Menu').

Note: The software enabling calibration of the C80x module is intended to be available to the manufacturer only.

1.1.7 Markings

Instruments shall be marked as described for the pattern in clause **1.8 Markings** of Technical Schedule No 13/1/9, except for the following:

Manufacturer's mark, or name written in full	Certified Instruments Corporation P/L
Model designation	C8000

1.2 Description of Variant 3

The CubiCal (aka Certified Instrument Corporation) model C8061 and C8071 Dimensional Measuring Instruments which use alternative CipherLAB portable terminal models (the Cubical model C8061 uses the CipherLAB model 8061 and the Cubical model C8071 uses the CipherLAB model 8071).

These alternative CipherLAB models may have additional communication features such as wireless networking.

TEST PROCEDURE

The Test Procedure shall be as described for the pattern with the following variations:

- (a) Typical operation is as described in clause **1.1.3 Typical Operation** above.
- (b) Reference to the TM5 module shall be taken as referring to the Cubical model C8000 instrument.
- (c) Where there is reference to dimensional weight values and conversion factors, these tests shall be applied to equipment and software external to the CubiCal model C8000 which is carrying out such functions (if at all).

NOTIFICATION OF CHANGE

In Technical Schedule No 13/1/9 dated 2 June 2004, the reference to the name of the submitter should be amended to now read:

"Certified Instrument Corporation P/L"

NOTE: The date at which this approval becomes due for review has been amended following completion of a review.

FIGURE 13/1/9 – 1



CubiCal Model TM5 Dimensional Measuring Instrument (aka Tallyman)

13/1/9
2 June 2004

FIGURE 13/1/9 – 2



CubiCal Model TM5 Module

FIGURE 13/1/9 – 3



CubiCal (aka Certified Instrument Corporation) Model C8000 Dimensional Measuring Instrument



CubiCal (aka Certified Instrument Corporation) Model C80x Tape Module

FIGURE 13/1/9 – 4



CipherLAB Model 8001-L Portable Terminal