MALMS PhotoBench Engineer

USER GUIDE

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1.0 Introduction

The MALMS PhotoBench, tunnel and reporting software allow the lighting technician to accurately test light fixtures prior to installation on the airfield. Correct use of the system, and a little experience will soon allow the technician to rapidly identify issues with individual fixtures and correct them.

Using this system, it is easy to detect issues such as an incorrectly fitted lamp, or ageing filament which are not able to be rapidly identified by visual inspection alone. This results in the knowledge that a refurbished (or new) fixture being installed on the airfield is fully serviceable prior to fitment and verification with an in-situ MALMS Mobile test.

Maintenance time can be reduced by testing a fixture recovered from the airfield and analysing the data to identify which procedures need to be performed on that fixture to bring it back to the required standard.

1.1 MALMS PhotoBench Engineer

PhotoBench Engineer comprises a major upgrade of the original MALMS PhotoBench with the following new features :

- Integration with MALMS Engineer allowing complete life cycle of light fixtures to be recorded
- Support for RFID tagging of light fixtures allowing easy selection of required photometric test
- Integration with MALMS Cloud and dashboard
- Testing of bi-directional lights with different beam standards at each side
- Testing of omni-directional lights

2.0 Hardware

The hardware consists of the workshop turntable, tunnel, and data collection PC.

At the end of the tunnel is an array of highly sensitive optical sensors. The turntable will power up the fixture, and direct the beam of light down the tunnel onto the sensors. The light levels and colour will be measured, and the fixture rotated by a fraction of a degree before the light levels are measured again; the process being repeated many times for each fixture. This will result in many vertical "stripes" of light reading data being gathered by the data collection PC, which will then analyse the results and provide detailed reports of the fixture's performance.

Depending upon your configuration, you may have either a "Left Hand" or "Right Hand" tunnel. The picture shows a "Right Hand" tunnel. A "Left Handed" configuration tunnel would have the tunnel attached to the left hand side of the turntable.

2.1 Indicators

The Turntable has 5 indicators and a Vacuum Fluorescent display for text messages. The indicators are shown in the following photograph, and from left to right are:

- Internal Power Good
- Turntable controller Good
- Turntable moving
- Lamp Fail
- Lamp Pass

2.2 Display Messages

The display below the indicator lamps may display one of several messages. These messages are listed in the table below.

Message	Description
	No power to system, or PC software not running.
REMOTE WAIT	Message received from PC, awaiting further information.
REMOTE OK	Communication with PC is good.
NO LOAD	A test has begun, but no load has been detected connected to the lamp terminals; Check that you have connected the lamp, if this message persists then it is possible the lamp has failed.
LOAD SHORT	A test has begun and the system has detected a short circuit across the lamp terminals.
12.0V 2.22A 25W	During testing a moving display will normally show the current lamp's characteristics in terms of Voltage, Current and Wattage detected by the system.

2.3 Controls

The turntable has only three controls, shown in the photograph below;

- The green pushbutton will reset the controller in the event it detects overrun.
- The red on/off switch applies mains power to the system.
- The Emergency stop button kills power to the system immediately on activation.

2.4 Adapter Plates

Adapter plates are used to allow different sized light fixtures to be installed on the turntable.

As standard two adapter plates are delivered with the system, 8 inch and 12 inch, though custom plates may be supplied if required. Contact TMS support or TMS Sales if this might be required.

Each adapter plate can be customised to the mechanical configuration of the customer's lights by fixing the adapter plate pins as required.

One bracket for elevated fixtures is also shipped with the system, again custom brackets for different elevated fixture configurations can be supplied on request.

2.5 RFID Reader

The RFID scanner is located on the surface of the turntable.

As a fitting is installed on the adapter plate, present the tag to the scanner as shown in the photograph below. The scanner will beep and flash an LED to indicate the tag was scanned successfully. The PC screen should also update to show the details of the scanned fitting.

Note that it is also possible to fit a second hand held scanner for use away from the turntable if required.

2.6 Installing a Light onto the turntable

Lights can be installed onto the turntable whilst power is applied to the system. The action of opening the lid of the turntable will prevent the turntable from rotating and the light from being illuminated. It is important to place the light onto the turntable in the correct orientation for the system to correctly test the light. If the light is incorrectly placed on the turntable, it may fail it due to azimuth error as the system may "see" an incorrect beam pattern.

For all unidirectional fixtures the light must be installed so as to shine down the tunnel.

For un-toed bi-directional fixtures (eg runway centre line lights) the orientation doesn't matter. If there are different colour beams then the software will work out which side is which from the colour of the beams.

For toed bi-directional fixtures (eg edge lights) the light must be installed with the correct orientation. Whether the tunnel is to the left or to the right the light should be installed with the toe pointing away from the operator. That is as though the operator was standing on the edge of the runway looking into the runway centre line.

This is shown in the diagrams below :

For a tunnel to the right of the turntable :

Bi-direction Toe (Edge Service)
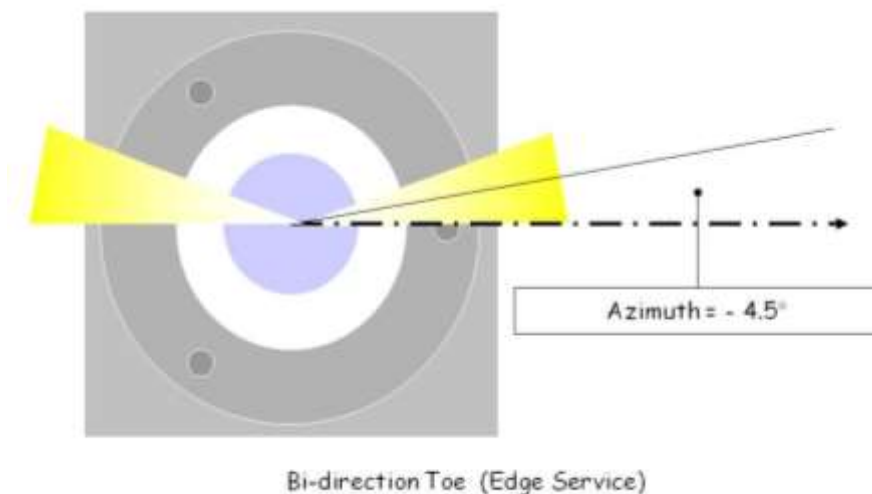
For a tunnel to the left of the turntable :

Bi-direction Toe (Edge Service)
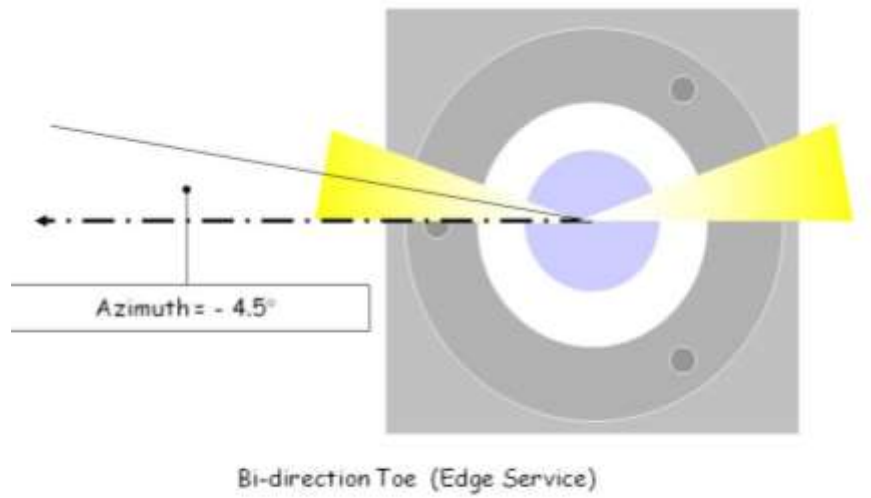
3.0 Software

3.1 Security / Log in

The diagram below shows the front screen of the PhotoBench Engineer program:
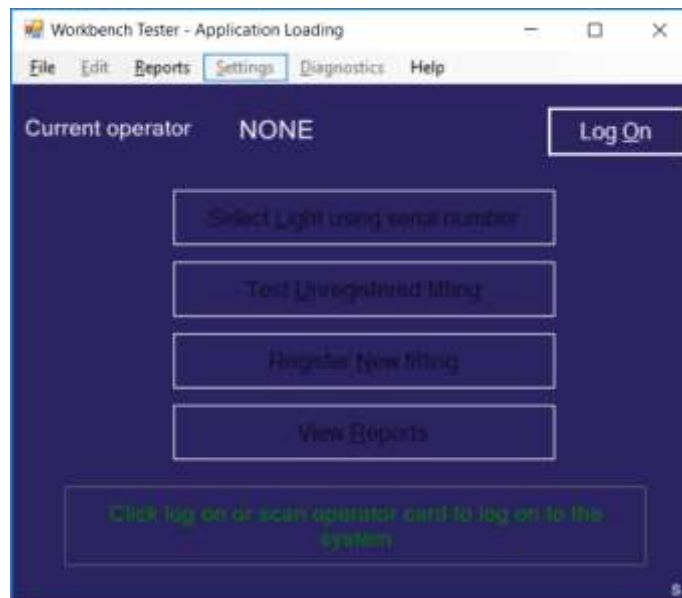
In this example no user is currently logged in.

Operator log in can be disabled if required via the System Settings function. However, if Operator Login is enabled then only limited functionality will be allowed until an operator has logged on, hence in the example above most functions are greyed out.

Log on may be accomplished either by scanning an operator RFID card or by password entry.

If a card is available, then simply scan the card to log on. For password entry click the Log On button. The log on dialog is then displayed as shown below. Select the user name and type the password (case sensitive) and then click Log In.

When logged in the screen changes as shown below:
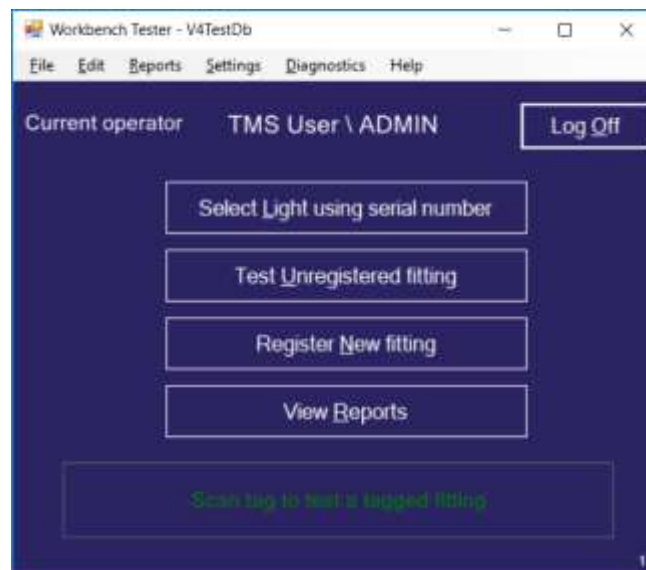
There are two levels of operator, User and Administrator. Users have rights to use basic functions such as running a test on a light but do not have rights to edit system functions such as test criteria. Administrator users have rights to all system functions.

In general, Users only need to use the buttons on the main screen (though there are some menu functions which are available to Users), Administrators may need to use the menu bar.

In the example above the operator is TMS User and has Administrator rights and hence all buttons and menu functions are enabled.

To log off, click the Log Off button. Note that there is a configurable time out in the system settings function that will automatically log out the current user after the configured time period to prevent the system being left unprotected.

3.2 User Functions

User functions are those available from the large buttons on the main screen. They comprise testing a fitting, registering a new fitting, running reports etc.

3.2.1 To run a photometric test of a fitting.

First the fitting to be tested must be selected. If the fitting is tagged and is known to the system, then just scan the tag. If the fitting is not tagged but is known to the system, then click :

Then select the fitting from the dialog below:

If the fitting is not known to the system then it must either be first registered (see Register new fitting below) or it can be run as an unregistered fitting (see Test Unregistered fitting below - 3.2.6 Register New Fitting).

Once the light to be tested has been identified the dialog below is displayed:

This dialog shows the details of the selected fitting, ie the serial number and the type of the fitting.

The fitting should now be mounted on the turntable and plugged into the power cable.

All that is then required is to close the door of the turntable to initiate the test.

So, for a tagged fitting, all that is required is to scan the tag of the fitting, mount it on the turntable and close the door.
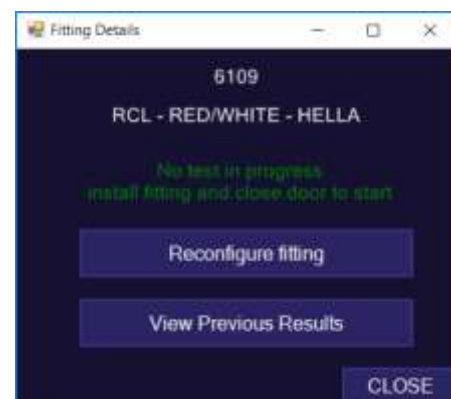
Note that the Fitting details display also allows other functions:

The fitting may be reconfigured (eg. the fitting might have had a filter change so that it is now WR instead of RR)

The previous test results of the fitting may be displayed.

These functions are discussed below.

3.2.2 Test Results Form

As soon as the turntable door is closed the test starts and the blank test results form is displayed as shown on the right.

As the test proceeds the status is shown in green, ie in the example shown the Side A of the fitting is being tested.

While the test is in progress (or after the test has completed) the work done on the fitting can be entered.

This comprises clicking the actions taken (e.g. in the above: LED replaced, Prism Replaced etc) and / or typing a free form text in the Comment field. Note that the Work Actions can be modified in the system edit functions.

When the test completes the result is displayed as shown below:

This example shows a successful test. Both beams are within specification and so there is a tick for both beams and an overall tick showing the fitting has passed.

Candela, Elevation, Azimuth and Colour are shown for both beams.

An Isocandela diagram is shown for both beams.

The example shown to the right is an unsuccessful test result.

In this case side B has failed due to the azimuth being out of specification.

From version 1.2.12 Azimuth and Elevation out of limits are not flagged as errors. The field will be highlighted in amber to indicate a potential problem but the beam and light will be shown as good with a green tick. Candela and Colour discrepancies will still cause the beam and light to be failed.

Note that the left / right arrows on the screen can be used to scroll forward / backward through previous results for the fitting.

3.2.3 Reconfigure Fitting.

This function is called by clicking the Reconfigure fitting button on the Fitting Details display which is shown after a fitting tag has been scanned or a fitting has been selected using its serial number.

The function allows the details of a fitting to be changed if for example a different filter has been fitted which has changed the colour of the fitting.

The Reconfigure fitting is shown on the right.

The fitting type may be changed by selecting the new type from the pull-down list.

The fitting reference (ie Serial Number) may be changed.
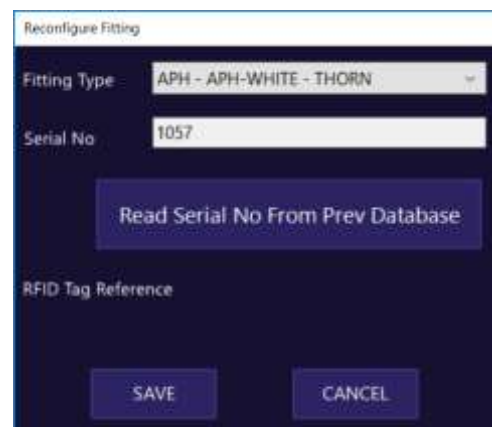
The tag reference is shown but cannot be changed as this uniquely identifies the fitting.

3.2.4 View Previous Results

This function is available from the Fitting Details display. The function shows the last test result for the chosen fitting and the Left / Right buttons can then be used to scroll backwards / forwards through the results for the fitting.

3.2.5 Test Unregistered Fitting
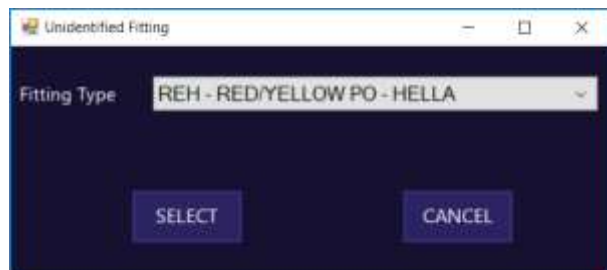
This function is entered by clicking :

Test Unregistered fitting

It allows a fitting to be tested without identifying the fitting to the system. In this case no data will be stored as the system has no details of the fitting to store the data against.

The form displayed is shown on the right. Select the type of the fitting from the pull-down menu and click Select.

A test of the selected type will be initiated, and a Test Form as described above is displayed which will eventually show the result of the test.

3.2.6 Register New Fitting

This function is entered by clicking :

Register New fitting
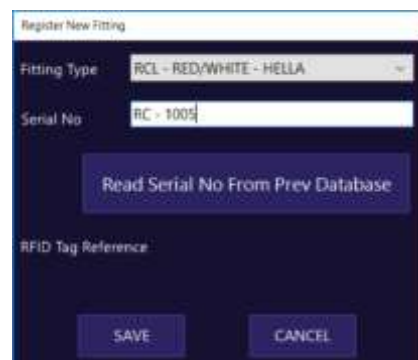
It allows a new fitting to be entered into the system, if necessary, with the associated RFID tag reference.

Select the type of the fitting using the pull-down list.

Enter the serial number or other reference for the fitting.

Then optionally read the tag of the fitting with the scanner which is then displayed on the form.

Then click SAVE to store the new fitting in the database.

3.3 Administrator Functions

These functions are only enabled when an operator with administrative rights is logged on to the PhotoBench program.
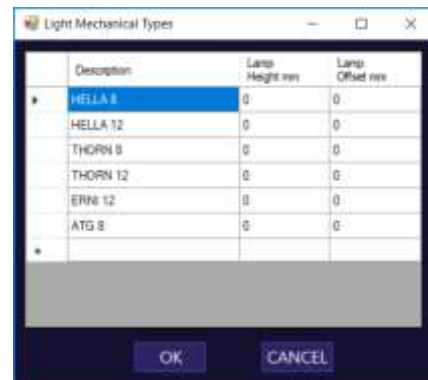
The functions are accessed through the menu bar at the top of the main screen.

3.3.1 Working with Grids

Many of the programs used to configure MALMS Engineer (ie many of the functions called from the Edit menu) utilise grids to edit, add and delete data from the database. This section covers functions that are generically used in these grid programs.

A typical grid is shown on the right.

To overwrite a field, click the field to highlight it as shown and then type the new contents.

To modify a field, click once on the field to highlight it and then a second time to position the text cursor for editing.

To insert a new line, click on the left most field of the bottom row (as marked initially with an *) and type. The TAB key moves on to the next column.

To delete a row, highlight the row as shown by clicking on the left most row header. Then press the delete key on the keyboard.

Generally, delete does not delete the data from the database, it just marks it as Not Valid so that any historical references to the data are still there.
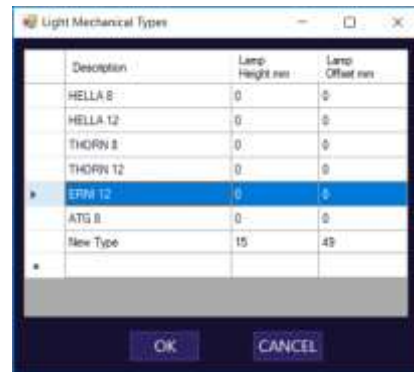
In general, no changes to the database are applied until the OK button is clicked. Clicking the Cancel button cancels all changes leaving the database unchanged (it normally shows an Are You Sure dialog to prevent accidental loss of changes).

3.3.2 Database Fundamentals

The fundamental item in the database is the Fitting which represents the data relating to one light fitting tested on the system.

Each Fitting comprises a Fitting Type and other data relating to it such as its serial number, RFID tag code etc.

The Fitting Type defines data that applies to a number of fittings of the same type. This data comprises the tests to be applied to each of the beams of the light (both colour and geometry) and the mechanical structure of each light of that type.

Each type of photometric test is defined by its test criteria. This defines the shape of the beam, the azimuth and elevation and the expected candela readings from the related standard.

The Mechanical Type of a fitting defines the size of the fitting, width and height and optionally, if the system is part of a MALMS Engineer system implementing torque measurement of installed fittings, then the torque requirements can also be entered.

3.3.3 File Menu

The file menu has the following options :

- Log on – allows operators to log on / off
- Select Language – allows the system language to be selected
- Exit – exits the application
- Save Backup saves a backup file of the database
- Restore Backup restores a previous backup file to the database

Save / Restore Backup

This function is not required where the PhotoBench database is hosted on the TMS cloud since backups are handled by TMS on the cloud server.

The backup function saves a complete copy of the PhotoBench database to a local backup file in the folder TmsPhoto\workshop\backup.

The restore function restores a previously saved file backup file. The function first displays a form as shown on the right showing all available backups for this database. The list is sorted from earliest to latest so the latest backup will be the lowest in the list.
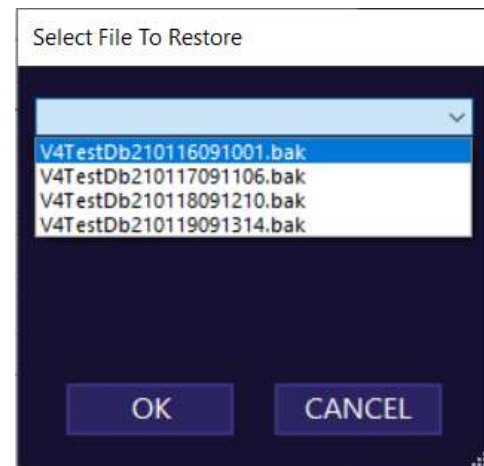
3.3.4 Edit Menu

Fittings

The Edit Fittings form is shown on the right.

The display can be filtered by fitting type to reduce the number of items on the display.

Each fitting requires a reference (e.g. the serial number), the type of the fitting from the pull-down menu and the fitting RFID tag code (optional).

The RFID tag can be entered by highlighting the fitting row by clicking the header of the row or highlighting the RFID Tag cell of the fitting and then reading the tag on the PhotoBench tag reader.

If the system is part of a MALMS Engineer system, then the status of each fitting is tracked. So the fitting has a Location (STORE or INSTALLED) indicating whether the fitting is in the workshop or installed on the airfield and a Status (MAINTENANCE or AVAILABLE) indicating whether the fitting is available to be installed on the airfield. When a fitting is removed from

the airfield it is set as requiring MAINTENANCE and when it is successfully tested on the PhotoBench it is set to AVAILABLE.
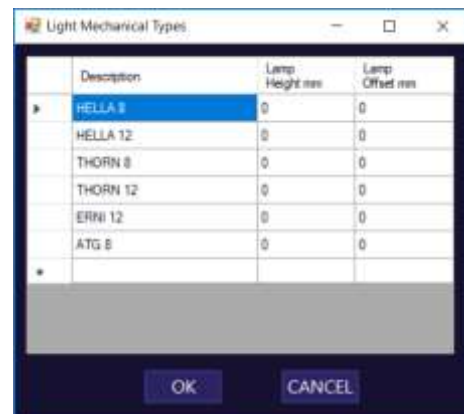
The Location and Status can be viewed and if necessary modified via the Edit Fittings form.

Import From Clipboard allows fitting details to imported from another document possibly a spreadsheet. The clipboard must be in TAB separated text format with 5 columns to match the grid shown above. The import will fill in the grid from the clipboard contents and then the OK button will need to be clicked in order to validate and save the data.

Mechanical Type

A number of mechanical types can be set up which are then allocated to a fitting type and then to individual fittings.
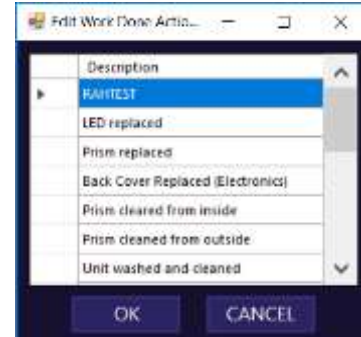
Each Mechanical Type comprises a lamp height (mm's above the level of the PhotoBench adaptor plate) and a lamp offset (mm's offset of each beam from the centre of the fitting).

Work Actions

Each time a fitting is tested the operator can enter the maintenance actions that have been applied to the fitting prior to the test. This list of actions can be edited via this function.
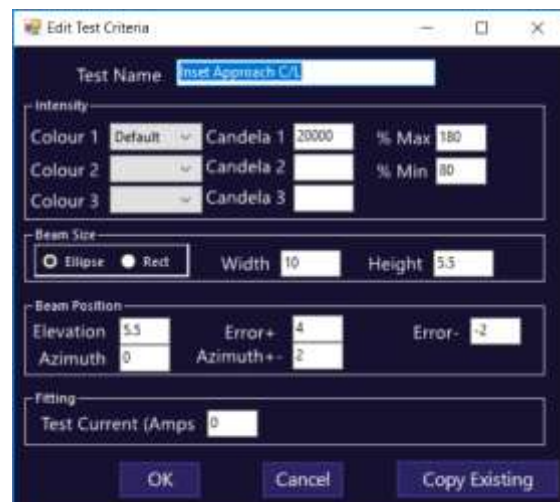
Test Criteria

Each test criteria defines the geometry and standards of the test to be applied to a fitting light beam. Each test generally relates to a specific entry from one of the international airfield lighting standards.

The intensity defines the candela value for each of the colours defined in the relevant international standard.

Note that the colour "Default" is included in the drop down, this is included only for

compatibility with test criteria imported from existing PhotoBench systems which didn't have this function.

The Max / Min specifies the % of the candela reading for each colour that will be applied in making a pass / fail conclusion to the test.

Beam Size defines the shape of the beam (ellipse or rectangle) and the angular half width and half height of the beam (in degrees).

Beam Position defines the angular horizontal offset from centre (Azimuth) and vertical offset (Elevation) of the beam in degrees. The degrees of error to be applied in making a pass / fail conclusion to the test can also be entered in this section.

The test current to be applied during the test can also be entered. Generally this is left blank to default to the standard (6 amps).

When the Test Criteria function is selected the following form is displayed.

From here an existing criterion can be edited by selecting the test from the pull down menu and clicking Edit Test.
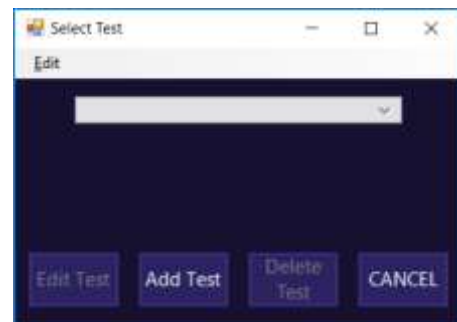
A new criterion can be added by clicking Add Test. In this case a new criterion can be typed from scratch or an existing test can be copied and then modified by clicking the Copy Test button on the Criteria form of the new test.

An existing criterion can be deleted by selecting the test from the pull down and then clicking Delete Test. Note that the criterion is still saved in order to display the details of previously performed tests, however the criterion will no longer be shown wherever tests can be selected. Note that a criterion may not be deleted if any fitting types are currently enabled that utilize the test.

The Edit function on the menu bar can be used to import a set of test criteria from an existing MALMS PhotoBench system using the original PhotoBench software. It is recommended that this is done only once when the system is upgraded and is done under the supervision of TMS personnel performing the upgrade.

Users

Users can be edited or added / removed to / from the system using this function.

Each user must be allocated a level of access rights (ADMIN or USER).
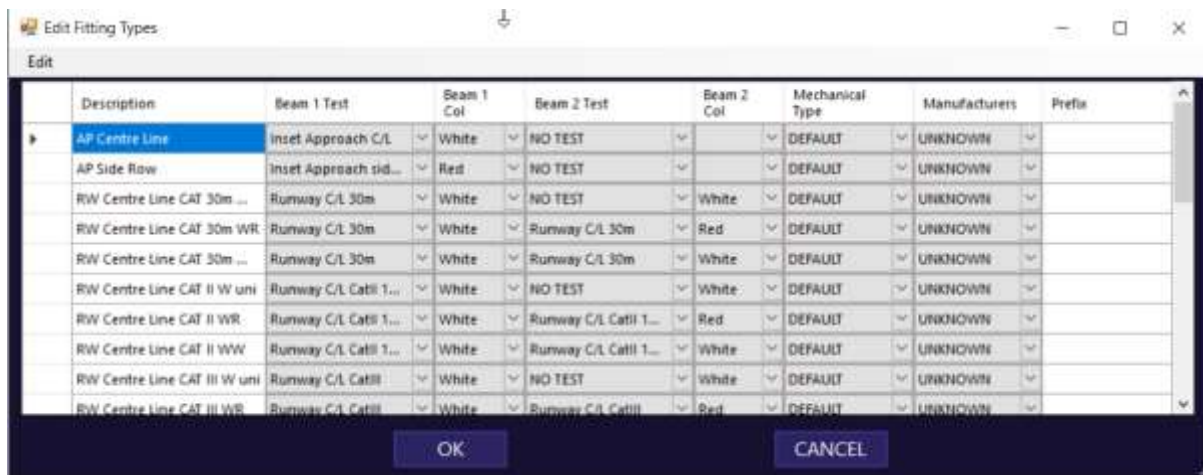
Each user must be allocated a password and / or a code from an RFID access card. The RFID code may be entered either by highlighting the
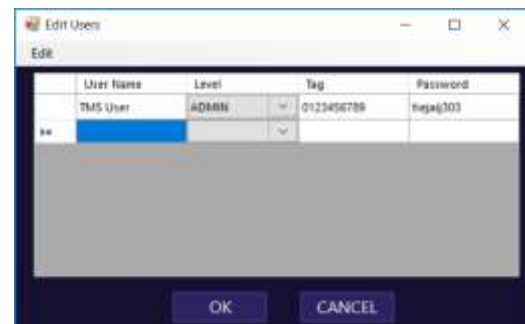
whole row of the user (by clicking the row header) or highlighting the tag cell for the user and then reading the access card on the tag reader.

Fitting Types

Test Criteria and Mechanical Types must have been set up before Fitting Types may be configured.

The Fitting Types are shown in alphabetical order of the description column. Clicking the header row of any column re-orders the table alphabetically based on the selected column. A second click on the column header re-orders by reverse alphabetical.

Each fitting type may have one or two beams. Select a colour and a Test Type for each beam of the light type.

Also select a Mechanical Type for the Light Type.

The Prefix is used when creating a number of new lights from the light type using the Create Lights function (see below).

Once Light Types have been configured, they can then be used to create light fittings based on the template created.

Note that each system is shipped with a standard set of light types and test criteria based on international airfield lighting standards.

Right Clicking a row on the grid provides two useful features :

- Add Colour Text copies the two colours selected and appends this to the Fitting Type description
- Copy Line copies all the line right clicked to the bottom line of the grid allowing multiple similar entries to be easily created.

Edit | Add From Clipboard allows fitting type details to imported from another document possibly a spreadsheet. The clipboard must be in TAB separated text format with 8 columns to match the grid shown above. The import will fill in the grid from the clipboard contents and then the OK button will need to be clicked in order to validate and save the data.

Create New Fittings

This function provides an easy way
to create a number of fittings of
the same type with sequential
serial numbers.

Select the fitting type from the
pull-down menu.

The system then searches for
existing fittings with the prefix
defined for the selected fitting
type. It then shows the next

number to be used based on the outcome of the search. This number can be changed if
required.

Now read the tag of the next fitting to
be created in the system. The tag id is
shown on the form as shown.

Click CREATE NEXT FITTING.

The fitting is then created with the serial number shown.

The Next Number increments allowing the next fitting to be created by reading the tag and
clicking CREATE NEXT FITTING.

In this was any number of fittings of the selected type can be created in the database.

Synchronise MALMS Engineer

These functions allow the PhotoBench to integrate with MALMS Engineer. This means that
any new fixture registered with the PhotoBench will be transferred to MALMS Engineer along
with any test data relevant to those fixtures.

Hence, when a fixture is installed on the airfield MALMS Engineer can read the tag of the
new fixture and can check that this fixture has been tested as serviceable and can check that
it is compatible to the photometric context of the location into which it is being installed.

MALMS Engineer also maintains a database of the location and status of all fixtures and of
the life cycle of them.
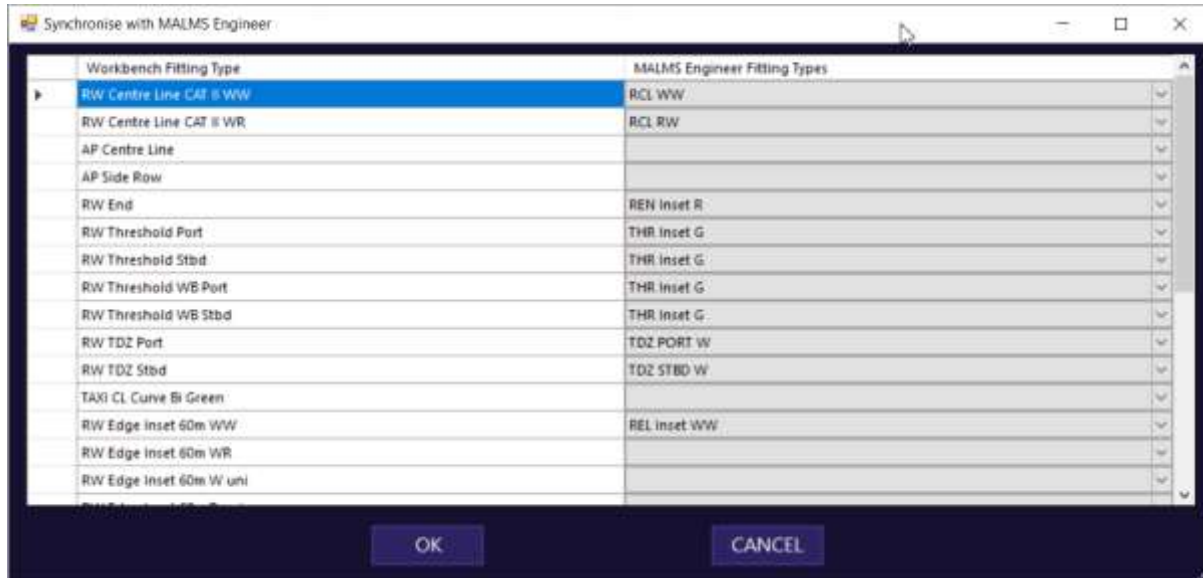
Recording a tested fixture at a location can also update the photometric serviceability of the
runway without performing a second photometric survey of the runway (called Rapid
Serviceability).

Contact TMS support to set up the database links from the PhotoBench to MALMS Engineer.

Once this is done it is necessary to configure a cross reference between the Fitting Types in the PhotoBench with the MALMS Engineer fitting types.

Select **Synchronise MALMS Engineer | Fitting Types** from the edit menu which shows the cross reference table as below

For each configured Workbench Fitting type in the left hand column select the MALMS Engineer fitting type from the pull down menu in the right hand column.

Once this is done then all data for any fixtures or any tests for fixtures of one of the types in the cross reference table will be transferred automatically to MALMS Engineer.

However, to transfer data for any fixtures registered before the cross reference table was configured select **Synchronise MALMS Engineer | Fittings.** This shows the form on the right.

In this case the software has determined that there is one fitting that has not been transferred to MALMS Engineer. Press OK to transfer this data.
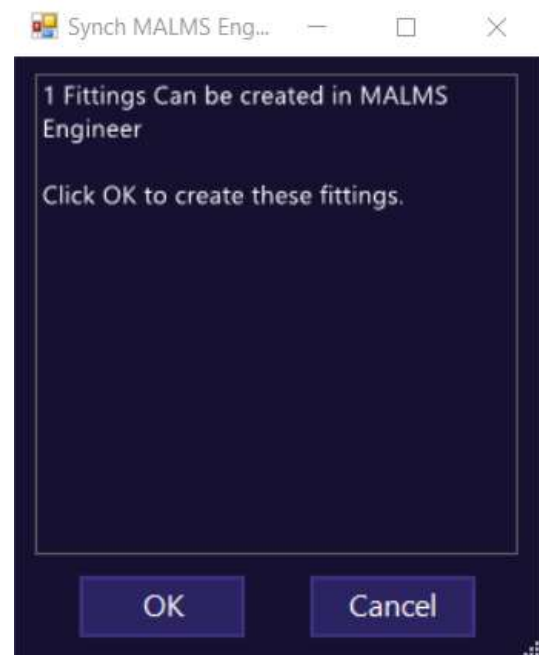
3.3.5 Settings Menu

System Settings

This function allows the system to be configured as required. It is recommended that this function be used with care, preferably under the supervision of TMS support personnel.

Database Type should only be set up by TMS Support and is usually set to SQL Server.
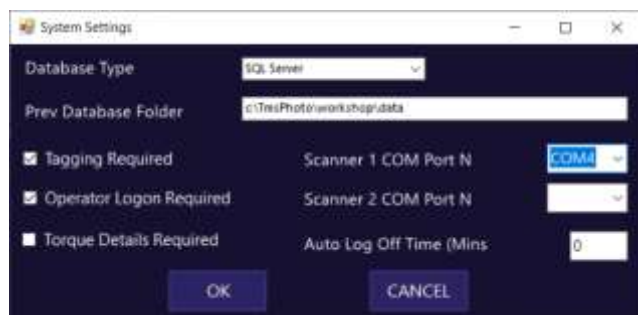
Prev Database Folder is only specified for systems that have been upgraded for the original PhotoBench software where the original Foxpro database remains on the system. This specifies the folder containing the previous database. This allows serial numbers used in the previous system to be re-used without re-typing.

The Tagging Required tick box determines whether the system will use a tag scanner.

If Operator Login is not clicked, then no log on will be required and all system functions will be available.

Two tag scanners can be set up on a system. Each will have an associated serial port, select the serial port (eg COM4) for each via the associated pull-down menu.
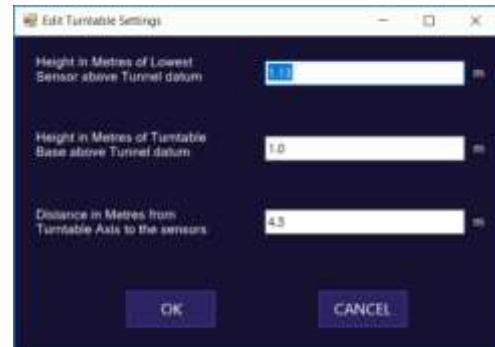
If Operator Log On is configured, then a time out can be configured (in minutes) so that an operator will automatically be logged off if the system is inactive for the specified period.

Turntable Settings

This function allows the geometry of the turntable to be configured.

Tunnel datum is typically the laser alignment plate, (although any other suitable datum may be used providing both heights are entered relative to this).

Enter the height of the lowest sensor and the height of the top of the turntable adaptor plate above the chosen datum.   For example:

- Fit the laser alignment plate
- Ensure the turntable & alignment plate are level.
- Measure the height of the laser beam above the plate - L
- Measure the height of the center of the lowest sensor above the laser beam – S

The height of the lowest sensor above the plate is then L+S. Ideally L+S would be about 100mm to place the sensor at 1 degree elevation above a 20mm high inset fitting (See Mechanical Type). In this example L might be 14mm and S 87mm. This would give a sensor height of 0.101 metres and a turntable base height of 0.0

Enter the distance, in metres, from the turntable axis to the sensor (not the back panel). This can be measured with a laser distance meter and is typically a little over 4.5m.

3.3.6 Diagnostics Menu

This allows the various system diagnostics to be run. The Diagnostic menu is disabled while other windows are open, such as **Fitting Details** and **Test Results**. If a test has been started it is also necessary to close the **Workshop** window after using the task bar to make it visible.

Select one of the options to run the diagnostic:

- CAN Bus
- Sensors
- Light
- Monitor
- Manual
- Turntable

For more detail on these functions see 5 PhotoBench diagnostics

4.0 Additional Version 2 Features

The version 2 software incorporates advanced features aimed primarily at lighting manufacturers requiring more data on the light output than many airfield workshops.

In summary the following features were added :

- Calculation of Maximum and Minimum candela values within the main beam
- Testing of lights against the Min / Max and Min / Std ratios as defined in the ICAO and FAA standards
- Selection of either FAA or ICAO algorithms for measuring light output
- Option of calculating both FAA and ICAO algorithms after a single test
- Measurement of the full beam of omni directional lights to FAA algorithms

Note that these extra features are disabled as default and can only be enabled by the TMS support team.

4.1 Results Form with Additional Data

In this case the light has been configured to test by both ICAO and FAA algorithms.

Side A has failed as the light is over the configured maximum of 130% of standard candela for both ICAO and FAA algorithms.

Side B has failed on both ICAO and FAA % of candela standard below 100% but also on the ratio of the beam minimum (2266) to beam standard (5000) being below 0.5 as specified by the FAA standard.

When BOTH is configured the following data is displayed for both beams :

- Beam Average Candela and % of standard according to ICAO algorithm
- Beam Axis Average Candela and % of standard according to FAA algorithm
- Ratio of beam maximum to beam minimum. This must be less than 3 for the ICAO standard.
- Ratio of beam minimum to beam standard. This must be > .5 for the FAA standard
- Beam maximum candela (within the main beam)
- Beam minimum candela (within the main beam)
- Estimated beam elevation in degrees
- Estimated beam azimuth in degrees
- Colour of the beam

Note that elevation and azimuth out of the limits set for the light type will only be flagged as a warning (field background in amber) and will not cause a test fail.

Ratios can also be configured on a per light type basis (see below) to only be flagged as warnings rather than to cause a test to fail.

Any parameter causing a test fail will have the background displayed in red.

For lights configured as FAA all the above parameters are displayed except the ICAO candela and percent.

For lights configured as ICAO all the above parameters are displayed apart from the FAA candela and percent and the minimum / standard ratio as this is not required by the ICAO regulation.

Note that for lights with a standard of 20 candela or less, the maximum / minimum and ratios based on these are not calculated or displayed. This is because the light levels or so low that the maximum and minimum measured are not reliable.

4.2   Omni Directional Lights

This version allows omni directional lights to be tested over nearly the entire 360 degree sweep of the light.

Lights should be configured with both side A and side B with a beam width of 90 degrees. This will then show 180 degrees of the light on each side.

A sample result is shown below :
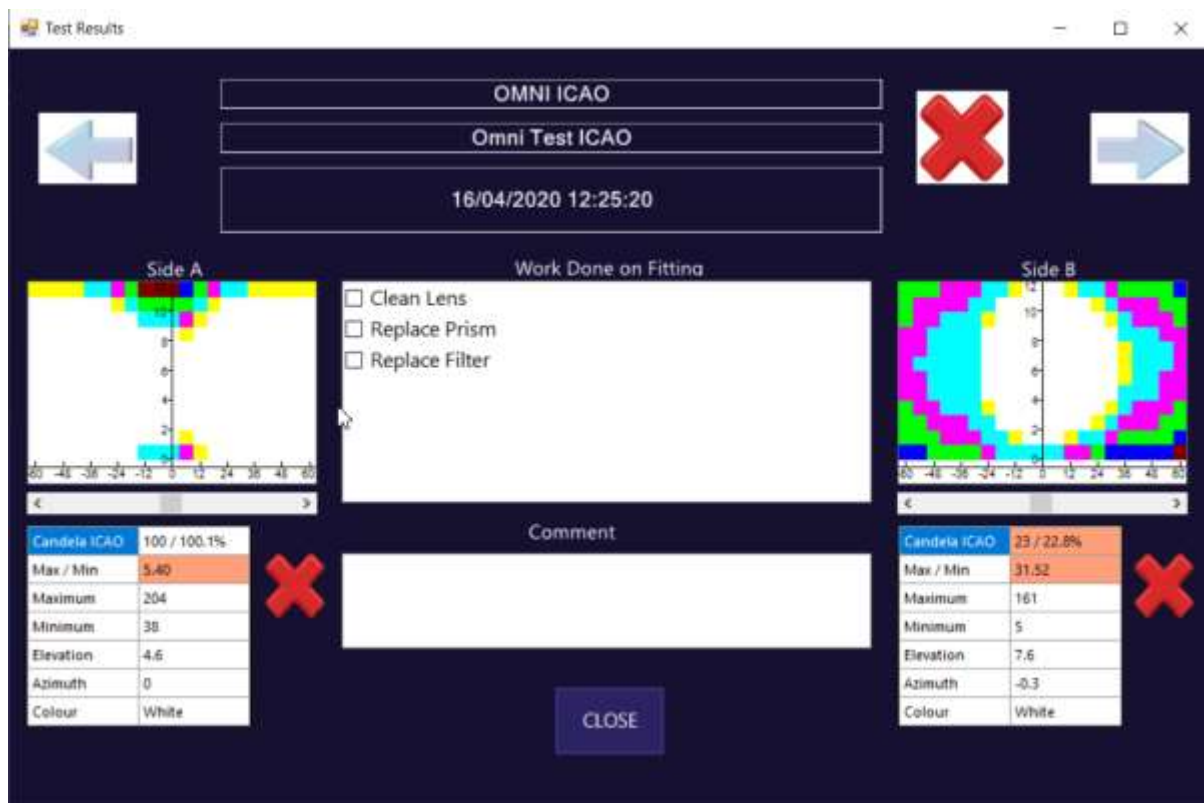
Note that each isocandela has a slider bar underneath to allow the full range of the beam to be examined.

The parameters displayed are the same as for directional lights discussed above. The beam maximum, minimum and average are calculated according to the FAA regulation utilising horizontal and vertical slices of the light.

Note that due to mechanical safety limits on the turntable it is generally only possible to see maybe 160 degrees of each side of the light.

4.3 Fitting Types Configuration

As shown below, 2 extra columns have been added to the Light Types configuration :

Test Type can be ICAO, FAA or BOTH and indicates the test(s) to be applied to lights of this type. If Default is selected then the default type for the installation will be used, this is pre-set by TMS before the system is shipped.

The disable ratios tick box indicates that the tests on the ratio fields (min / max and min / std) should only be warnings for this light and shouldn't cause test failures.

Note that in this case, if a spreadsheet is imported it must have 10 columns to match the 10 columns on the grid.

5.0 PhotoBench diagnostics

5.1 Communication tests

The **CAN bus**, **Sensors** and **Light** tests are started from the PhotoBench Engineer diagnostics menu. The programs can be exited by using the Esc key or the Alt+F4 key combination. Mouse presses on the window will also exit the program (like the MALMS tablet touch screen). Do not exit the programs via the Windows Close menu.

Always exit from the program before closing PhotoBench Engineer or shutting down the PC.

5.2 CAN bus test

Continuously checks basic communication between the PC and the turntable. A normal system will show counts indicating the communication bus activity.


```
MALMS - Test CAN hardware                    Tailor Made Systems Ltd.
                                                                [X]




Starting CAN OK
Testing bus: 1401/0   Rate 327.768/0
```
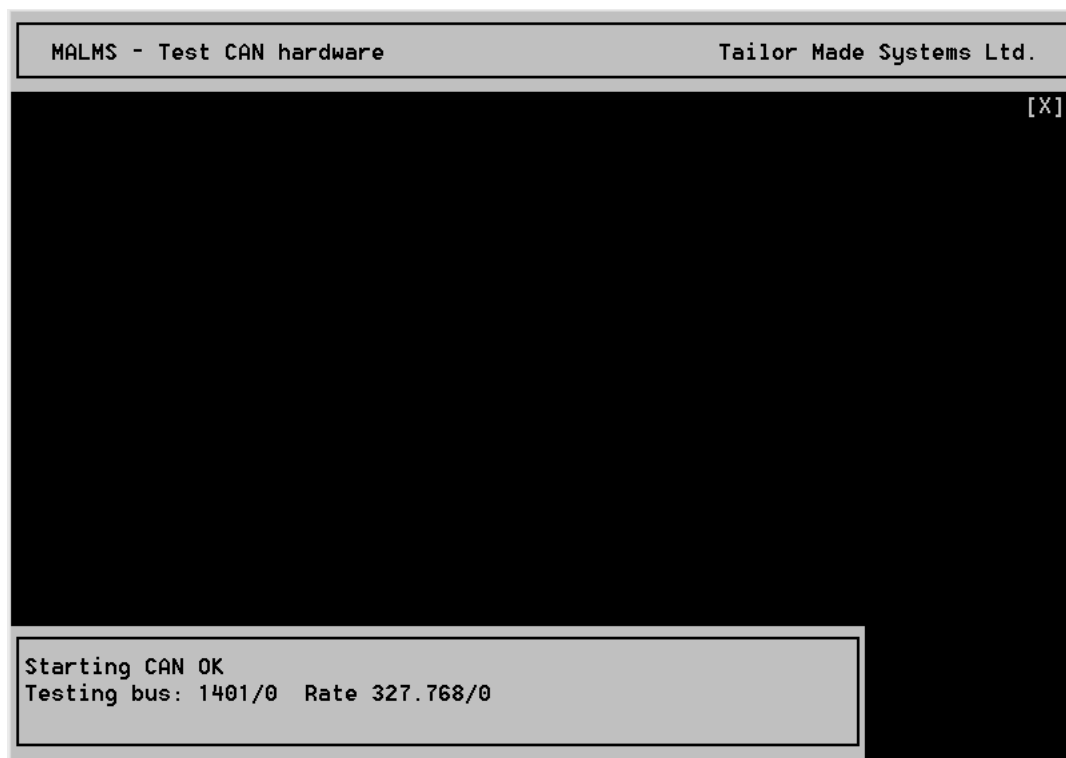
A failure is indicated below. Check the turntable is turned on. Check the cable is connected to the PC and the turntable. See also document *I-1112-A WST Troubleshoot CAN network problems.pdf* .


```
Starting CAN OK
Testing bus:
CAN bus error passive Bad CAN bus! 0/64   Rate 0/0
```

5.3 Sensors

Continuously checks basic communication to all the light sensors in the PBSA (PhotoBench Sensor Array) and the turntable electronics. A normal system will show counts indicating the communication bus activity. Can help identify faulty devices or intermittent connections.

```
 MALMS - Test CAN hardware                    Tailor Made Systems Ltd.

                                                                 [X]

                                                    TM7 Wrkshp ok
                                                    TM7 Wrkshp ok
                                                    TM7 Wrkshp ok
                                                    TM7 Wrkshp ok
ok                                                  TM20 ok
ok                                                  TM20 ok
ok                                                  TM20 ok
ok                                                  Sens ok
ok
ok
ok
ok
ok            ok
ok            ok
ok
ok


 Starting CAN OK
 Testing bus: 2016/0   Rate 164.155/0
```

Items not responding will show in red. The example below shows the turntable electronics responding but the PBSA is disconnected or not powered up.

```
 MALMS - Test CAN hardware                    Tailor Made Systems Ltd.

                                                                 [X]

                                                    TM7 Wrkshp ok
                                                    TM7 Wrkshp ok
                                                    TM7 Wrkshp ok
                                                    TM7 Wrkshp ok
JS12                                                TM20 ok
JS11                                                TM20 ok
JS10                                                TM20 ok
JS9
JS8
JS7
JS6
JS5
JSG          WSY
JS3          WSB
JS2
JS1


 Starting CAN OK
 Testing bus: 5593/14  Rate 98.2141/0
```

Items not responding will show in red. The example below shows the turntable lamp power supply PCB is not responding.

```
MALMS - Test CAN hardware                    Tailor Made Systems Ltd.

                                                                  [X]
                                              TM7 Wrkshp ok
                                              TM7 Wrkshp ok
                                              TM7 Wrkshp ok
                                              TM7 Wrkshp ok
ok                                            TM20 BAD
ok                                            TM20 BAD
ok                                            TM20 BAD
ok
ok
ok
ok
ok
ok          ok
ok          ok
ok
ok



 Failed to configure devices.
 Failed to configure devices.
 Failed to configure devices.
```

5.4   Light

Monitors the light sensors readings. Useful for checking that they all return reasonable dark values and respond to light, such as a torch or light fitting. Can be used, with a torch, to check that sensors are positioned in the correct vertical order.

```
MALMS - Test CAN hardware                    Tailor Made Systems Ltd.

TM7                                                               [X]
                                              Sens ok


0.03
0.02
0.02
0.00
0.00
0.00
0.00
0.00
0.00        0.03             0.727 0.000
0.00        0.03
0.00
0.00



 Starting CAN OK
 Testing bus: 14/0   Rate 61.1418/0
```

There are keyboard commands available for use by TMS engineers:

l   Logs changes in light levels to the diagnostic file

L   Logs the current light level to the diagnostic file

s   Run a 30 minute intensity scan

a   Set the lamp current

```
 MALMS - Test CAN hardware                  Tailor Made Systems Ltd.

                                                                [X]




   521
   521
   521
   521
   522
   521
   522
   522
   521       549         0.452 0.411 White
   521       404
   522           Lamp:45.201V 45.201V 5.500A 248.61W
   522

 Average lux over 0.050 sec
 Enter amps:5.5

```
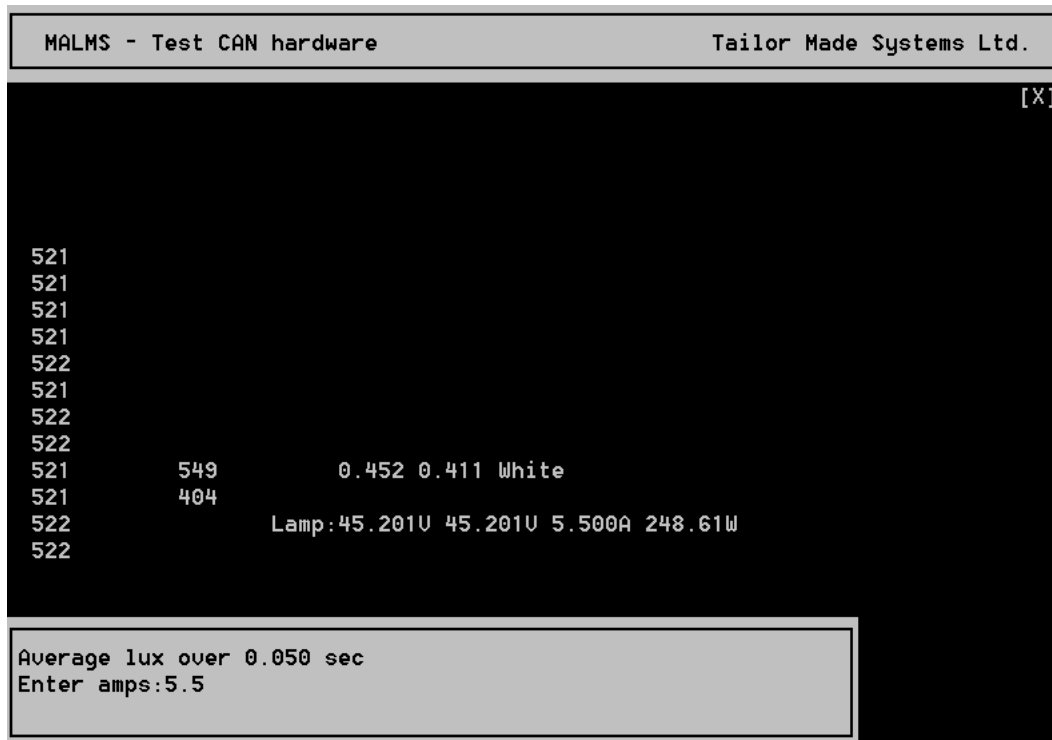
Cursor keys change the displayed values.

5.5   Turntable system tests

The **Monitor**, **Manual** and **Turntable** tests are started from the PhotoBench Engineer diagnostics menu. The programs can be exited by using the Alt+F4 key combination. Do not exit the programs via the Windows Close menu.

Always exit from the program before closing PhotoBench Engineer or shutting down the PC.

5.6   Monitor

Monitor is a sub-set of the normal turntable control program that operates in a passive mode with no turntable movement. It monitors the state of the turntable hardware, switches, shaft encoder and light sensors.

clk	Clockwise limit switch	Normally 0, 1 for activated
aclk	Anti-clockwise limit switch	Normally 0, 1 for activated
ref	Turntable reference pulse	Normally 0, 1 when turntable at reference position
mot	Motor controller status output	Normally 0, 1 in fault condition
saf	Safety door switch	0 for door open, 1 for door closed
ovr	Overrun switch	Normally 1, 0 in fault condition

There is one keyboard command available for use by TMS engineers:

f   Turn the light fitting on for 15 seconds (the safety door must be shut)

5.7   Manual

Manual is a turntable control program that can test and calibrate turntable movement, check light sensors and lamp power supply, and provide additional diagnostic information for TMS.

In the example below the program reports that at least one sensor is not communicating, use the **Sensors** diagnostic test to identify the failure.
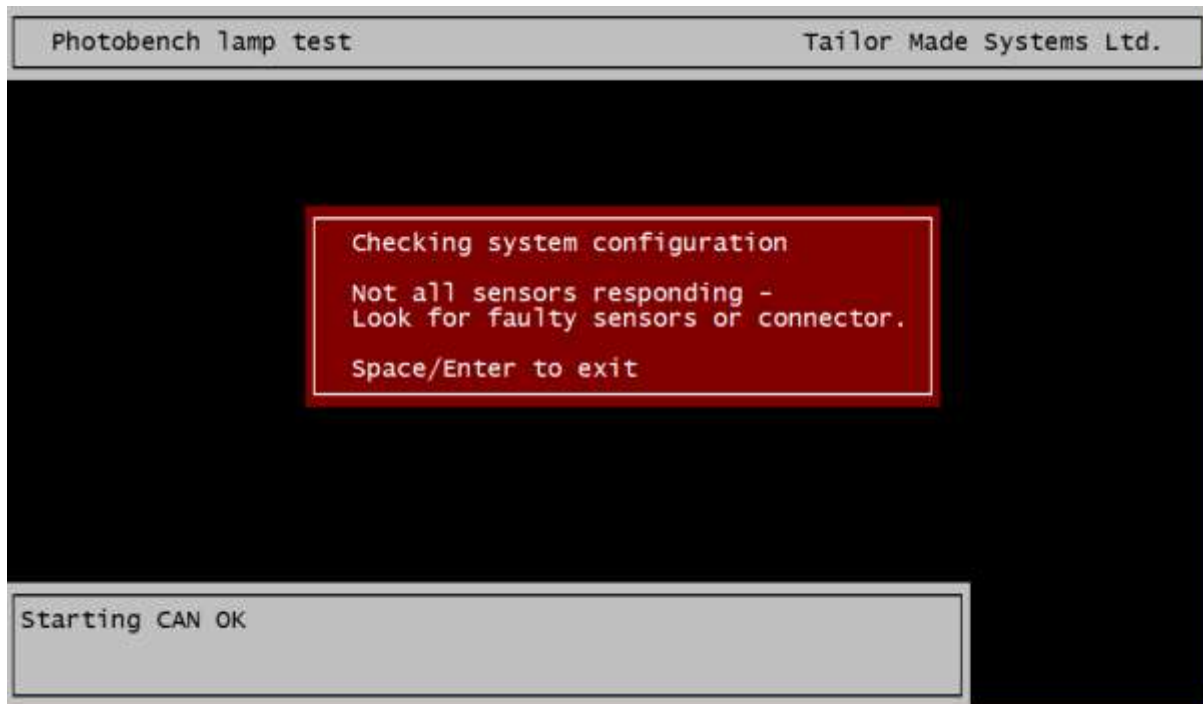
In the example below the program reports that the turntable has failed to move following a keyboard command.
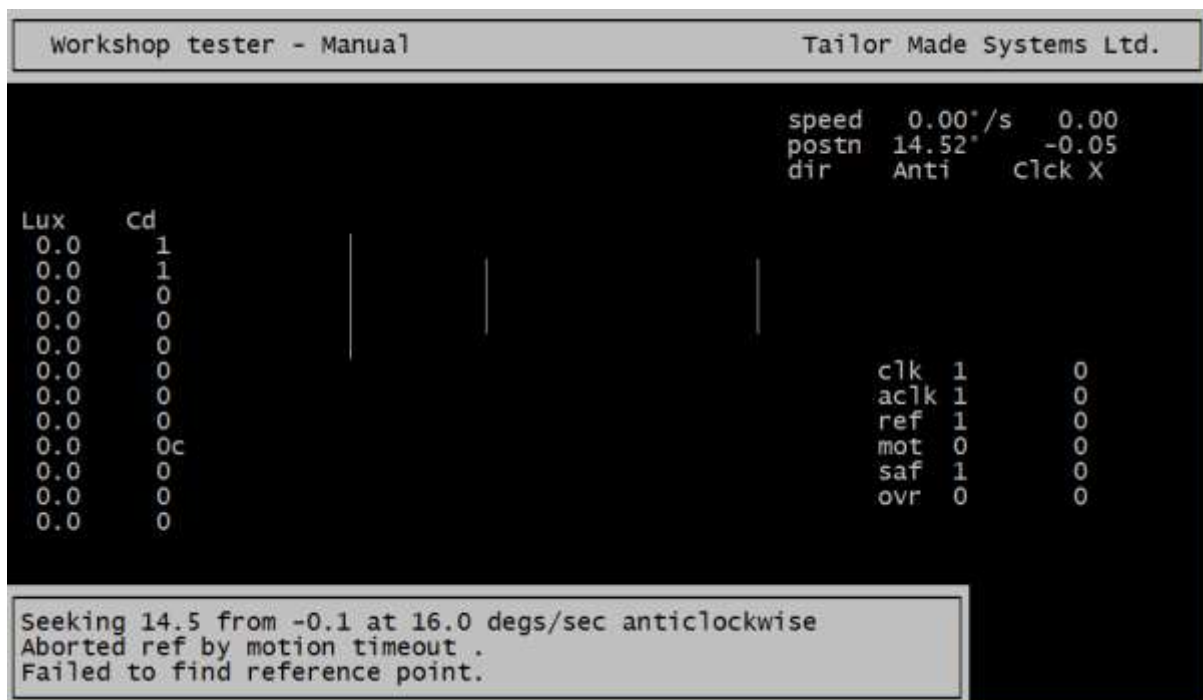
There are keyboard commands available for use by TMS engineers:

a   Move the turntable to the side A axis calibration position

b   Move the turntable to the side B axis position

9   Move the turntable to be 90 degrees from the fitting axis

e   Move the turntable to the encoder reference position

r   Reset the electronics

→   Move the table clockwise

←   Move the table anticlockwise

Shift+ →   Inch the table clockwise

Shift+ ←   Inch the table anticlockwise

Ctrl+ →   Move the table clockwise, ignore the overrun limit

Ctrl + ←   Move the table anticlockwise, ignore the overrun limit

Alt+L   Set the axis calibration position. See *I-1061-E Turntable Alignment.pdf*

f   Turn the light fitting on for 15 seconds

1,2 or 3   Turn off the test, pass and fail lights

Alt+1,2 or 3   Turn on the test, pass and fail lights

Esc   Abort any action in progress

5.8   Turntable

Turntable is very similar to the **Manual** diagnostic except that it does not require or use the PBSA (PhotoBench Sensor Array).

5.9   Diagnostic window appearance

The diagnostic and turntable control windows should appear as above provided that the window properties are set. This is usually done when the software is installed (using the *Programs\WorkConsole.reg* file). These settings are required for each Windows user.

In the Properties | Options tab it is essential that Use legacy console is selected:
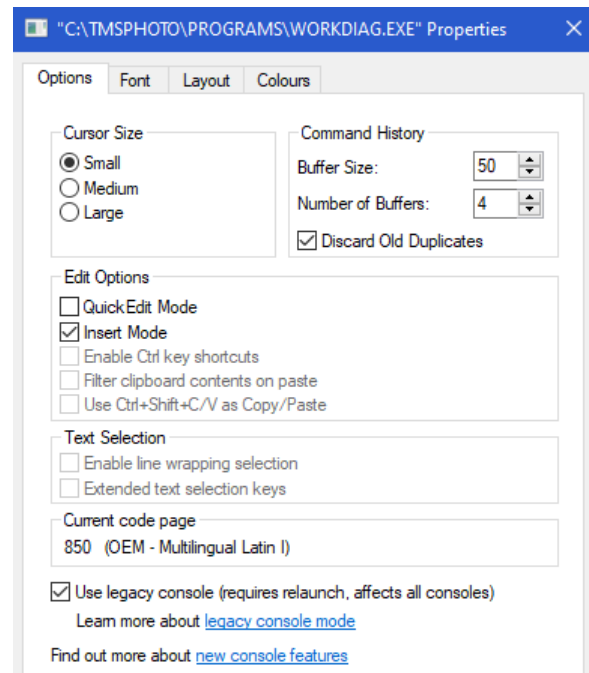
In the Layout tab it is essential that the widths are the same, usually 80, and the heights are the same (between 25-30) :
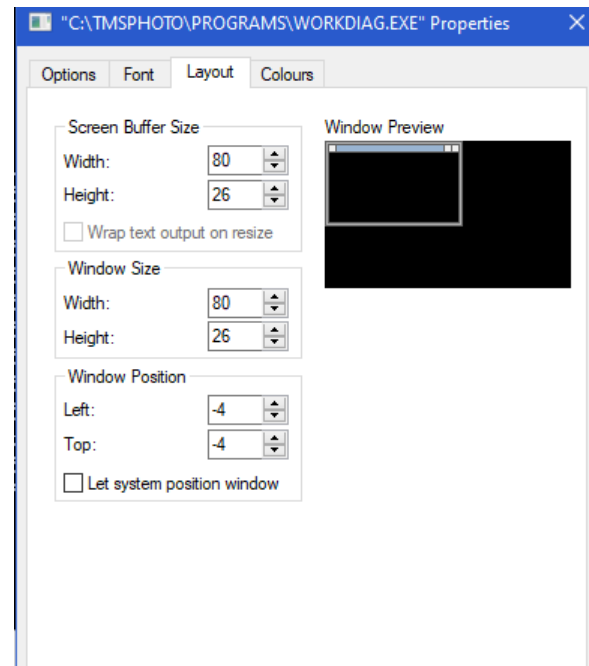
In the Font tab set the font & size to suit your screen and preference:
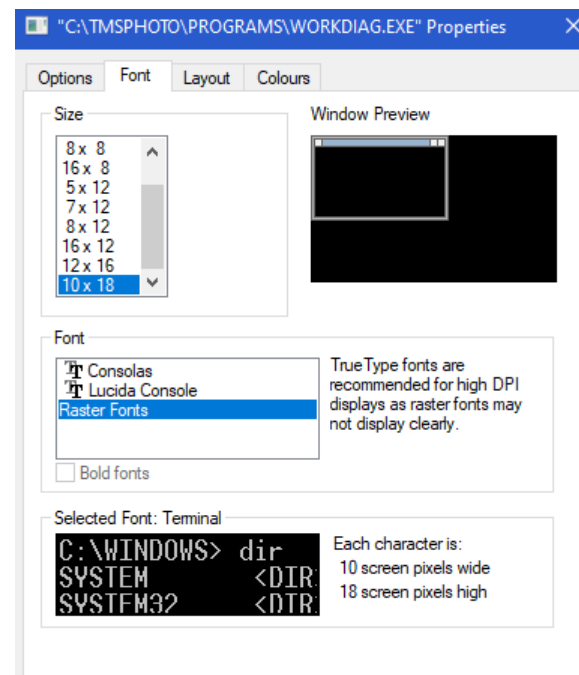
6.0   Recovering from table overrun

The turntable protects from excess rotation by detecting overrun and shutting power to the motor. To restore operation:

- Stop the turntable control program using Esc and then Alt+F4
- Check the table & fitting to ensure no restrictions or cable tangle.
- Restore power to the motor using the green push button
- Run Diagnostic Manual mode and check position A is correct

Table overrun should not happen during normal operation. Repeated overruns indicates a problem with the hardware, table calibration or improper shutdown.

7.0 PhotoBench Engineer Reports

The reports defined here are those that are available on a "stand-alone" PhotoBench system, ie one that is not connected to a MALMS Engineer system.

A MALMS Engineer connected system has a broader range of reports delivered via the MALMS dashboard. For details of these reports look at the document :

MALMS Cloud and Dashboard Reporting.pdf

On entering the PhotoBench reports the following display is shown :
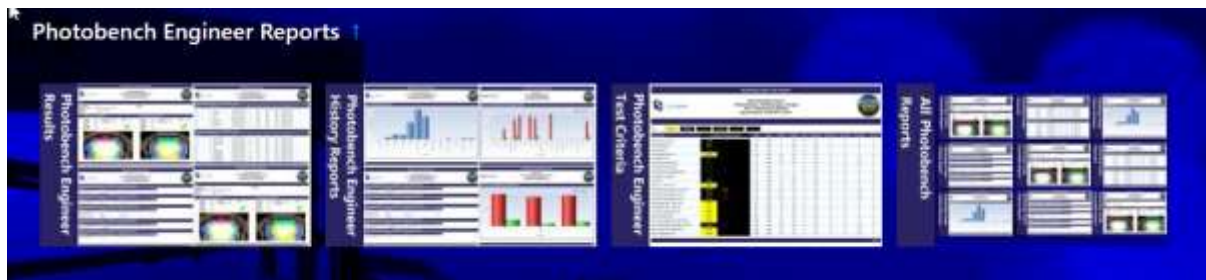
The first three tiles drilldown into a number of individual reports as described below. The fourth tile gives access to all 6 PhotoBench reports.

Results reports drills down to :

7.1 PhotoBench Engineer Isocandela Report7.1 PhotoBench Engineer Isocandela Report

7.2 PhotoBench Engineer Summary (By Day)

7.3 PhotoBench Engineer Summary (By Type)

History Reports drills down to :

7.4 PhotoBench Engineer History Report

7.5 PhotoBench Engineer Actions Summary

Drills down to :

7.6 PhotoBench Engineer Test Criteria

7.1 PhotoBench Engineer Isocandela Report
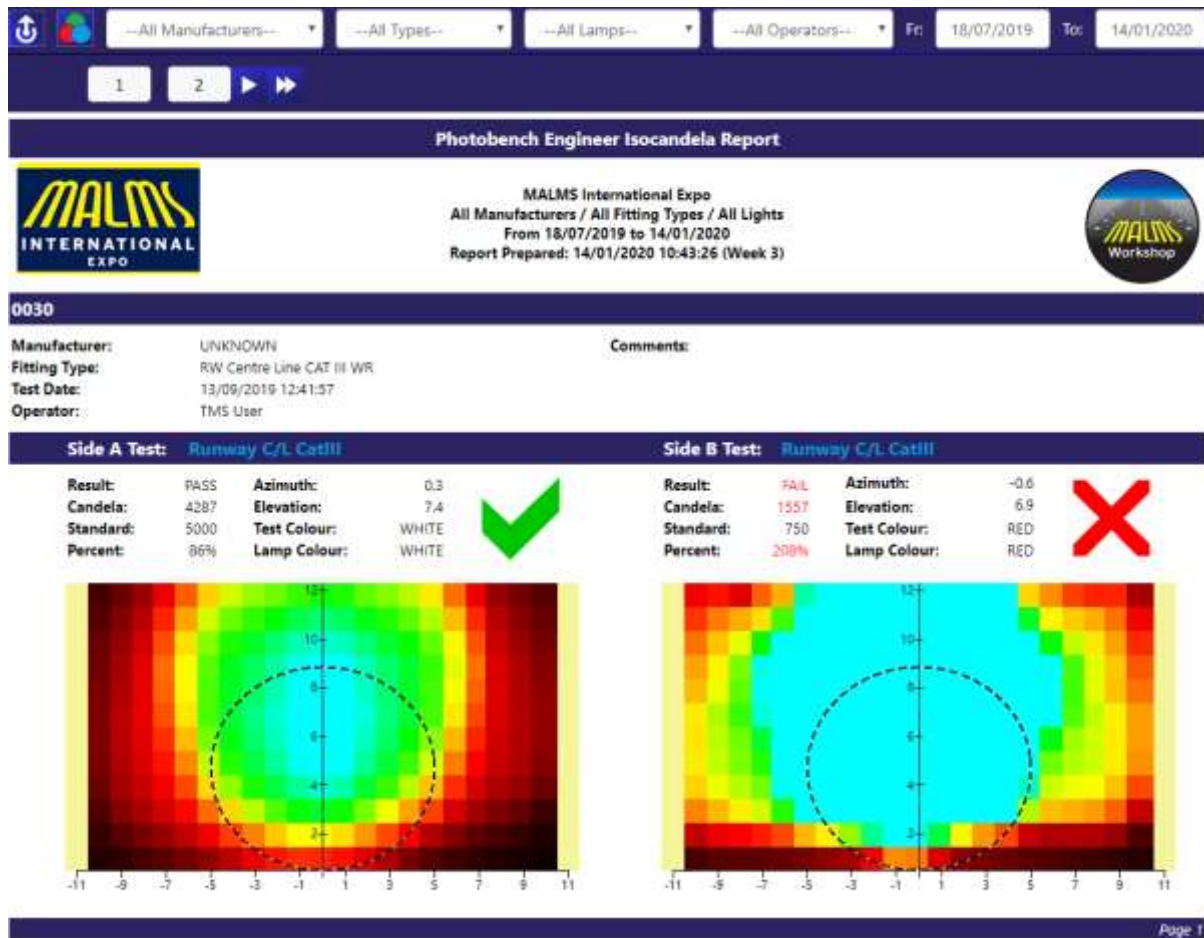
Description

This report shows results and Isocandelas from PhotoBench Engineer runs on fittings.

Possible Filters

(Note the filter bar only appears when the report is run from the **Standard Reports** tile, when it can involve multiple tests. From drill downs it will show a single test only)

- Palette   (Single palette, Default Colourful)
- Manufacturer   (All, single Manufacturer. Default All Manufacturers)
- Type   (All, single Type. Default All Types)
- Lamp   (All, single Lamp. Default All Lamps)
- Operator   (All, single Operator. Default All Operator)
- From Date   (Default 180 days ago)
- To Date   (Default is today)

Header Information

- Airport logo
- Airport name

- Manufacturer/Type/Lamp filter selection
- From/To dates selected
- Date prepared plus week number

Summary Information

- Lamp Serial Number
- Manufacturer of the fitting
- Fitting Type
- Test Date
- Operator who performed the test
- Comments – optional text entered at the time of the test

Data Shown
- Side A Test and Side B Test with data shown as applicable:
    - The name of the test used
    - Result – Pass/Fail
    - Candela value for tested side of lamp.
    - Standard - the candela value which is expected
    - Percent of which the value is compared to the standard.
    - Azimuth
    - Elevation
    - Test Colour – the colour detected by the test
    - Lamp Colour – the expected colour of the lamp
    - Pass/Fail (Tick/Cross)
    - Isocandela diagram

Drill Down from this Report to:
- [PhotoBench Engineer Test Criteria Report](#)   (Click test name)

Warnings/Alarms
- Reasons for failure are shown in RED, these can be:
    - Candela/Percent
    - Test Colour
    - The overall result is shown in RED if a fail
    - The overall status is shown as a RED X if a fail
- Warnings are shown in ORANGE, these can be:
    - Azimuth
    - Elevation

Footer Information
- Page Number

Additional Notes

- From the standard reports tile the report may contain multiple pages with a single page per test.

- One or two sides of the lamp will be shown on the report depending on the type of the fitting.
- Orange is more advisory as this isn't a full fail. These are only shown for Azimuth and elevation.
- The look of the Isocandelas can be changed using the palette filter.

7.2 PhotoBench Engineer Summary (By Day)

Photobench Engineer Summary

MALMS International Expo
All Manufacturers / All Fitting Types / All Lights
From 14/01/2019 to 14/01/2020
Report Prepared: 14/01/2020 12:03:43 (Week 3)

Date: 13/09/2019

Time	Operator	Manufacturer	Fitting Type	Reference	Side	Candela	Standard	%	Azim	Elev	Col	Res
12:41:57	TMS User	UNKNOWN	RW Centre Line CAT III WR	0030	A	4287	5000	86%	0.3	7.4	WHITE	✔
12:41:57	TMS User	UNKNOWN	RW Centre Line CAT III WR	0030	B	1557	750	208%	-0.6	6.9	RED	✘
11:38:40	TMS User	UNKNOWN	RW Centre Line CAT III WR	0030	A	4288	5000	86%	0.2	6.9	WHITE	✔
11:38:40	TMS User	UNKNOWN	RW Centre Line CAT III WR	0030	B	1549	750	207%	-0.3	6.9	RED	✘

Date: 12/04/2019

Time	Operator	Manufacturer	Fitting Type	Reference	Side	Candela	Standard	%	Azim	Elev	Col	Res
14:42:33	Paul Smith	HELLA	RW Centre Line CAT III WW (DEMO)	123	A	6490	5000	130%	-0.5	4.5	WHITE	✔
14:42:33	Paul Smith	HELLA	RW Centre Line CAT III WW (DEMO)	123	B	41	5000	1%	-4.3	5.1	WHITE	✘
14:02:18	Paul Smith	THORN	RW Centre Line CAT III WW (Thorn) uni	TMS-0001	A	6464	5000	129%	-0.6	4.6	WHITE	✔

Date: 25/03/2019

Time	Operator	Manufacturer	Fitting Type	Reference	Side	Candela	Standard	%	Azim	Elev	Col	Res
15:35:30	Paul Smith	UNKNOWN	RW Centre Line CAT III WW	8134	A	6407	5000	128%	0.0	4.7	WHITE	✔
15:35:30	Paul Smith	UNKNOWN	RW Centre Line CAT III WW	8134	B	6387	5000	128%	-0.3	4.9	WHITE	✔
12:16:31	Paul Smith	UNKNOWN	RW Centre Line CAT III WR	0030	A	4276	5000	86%	-0.7	7.0	WHITE	✔
12:16:31	Paul Smith	UNKNOWN	RW Centre Line CAT III WR	0030	B	1613	750	215%	-0.5	6.9	RED	✘
12:03:12	Paul Smith	UNKNOWN	RW Centre Line CAT III WW	8134	A	6464	5000	129%	0.3	4.7	WHITE	✔
12:03:12	Paul Smith	UNKNOWN	RW Centre Line CAT III WW	8134	B	6369	5000	127%	0.0	4.9	WHITE	✔

Page 1

Description

This report provides tabular data about all the PhotoBench Engineer tests on fittings during the time period specified, grouped by day.

Possible Filters

- Manufacturer (All, single Manufacturer. Default All Manufacturers)
- Type (All, single Type. Default All Types)
- Lamp (All, single Lamp. Default All Lamps)
- Operator (All, single Operator. Default All Operator)
- From Date (Default 180 days ago)
- To Date (Default is today)

Header Information

- Airport logo
- Airport name
- Manufacturer/Type/Lamp filter selection
- From/To dates selected
- Date prepared plus week number

Summary Information

- Date when test was performed

Data Shown
- Time when the test was performed
- Operator performing test
- Manufacturer
- Fitting Type
- Reference – serial number of fitting
- Side - A or B
- Candela value recorded
- Standard value we are hoping to achieve
- The percentage of standard achieved
- Azimuth error
- Elevation error
- Colour of light recorded
- Result (Tick/Cross)

Drill Down from this Report to:
- PhotoBench Engineer History Report   (Click link from Reference)
- PhotoBench Engineer Isocandela Report   (Click link from Time)

Warnings/Alarms
- Reasons for failure are shown in RED, these can be:
    - Candela/Percent
    - Test Colour
    - The overall result is shown in RED if a fail
    - The overall status is shown as a RED X if a fail
- Warnings are shown in ORANGE, these can be:
    - Azimuth
    - Elevation

Footer Information

- Page Number

Additional Notes

- The report will show a new header for each day within the time period selected. The report may have multiple pages.
- This is a tabular data for the **PhotoBench Engineer Isocandela Report**.
- Orange is more advisory as this isn't a full fail. These are only shown for Azimuth and elevation.

7.3 PhotoBench Engineer Summary (By Type)

Description

This report provides tabular data about all of the PhotoBench Engineer tests on fittings during the time period specified, grouped by fitting type.

Arrive at this Report from:

- Standard Reports Tile
    - All Manufacturers/Fitting Types/Lamps with the configured tile period in days
- My Reports Tile
    - User defined filter

Possible Filters

- Manufacturer   (All, single Manufacturer. Default All Manufacturers)
- Type   (All, single Type. Default All Types)
- Lamp   (All, single Lamp. Default All Lamps)
- Operator   (All, single Operator. Default All Operator)
- From Date   (Default 180 days ago)
- To Date   (Default is today)

Header Information

- Airport logo
- Airport name
- Manufacturer/Type/Lamp filter selection
- From/To dates selected
- Date prepared plus week number

Summary Information

- Manufacturer
- Fitting Type

Data Shown
- Date and Time of test performed.
- Operator performing test
- Reference – serial number of fitting
- Side - A or B
- Candela value recorded
- Standard value we are hoping to achieve
- The percentage of standard achieved
- Azimuth error
- Elevation error
- Colour of light recorded
- Result (Tick/Cross)

Drill Down from this Report to:
- PhotoBench Engineer History Report   (Click link from Reference)
- PhotoBench Engineer Isocandela Report   (Click link from Date/Time)

Warnings/Alarms
- Reasons for failure are shown in RED, these can be:
  - Candela/Percent
  - Test Colour
  - The overall result is shown in RED if a fail
  - The overall status is shown as a RED X if a fail
- Warnings are shown in ORANGE, these can be:
  - Azimuth
  - Elevation

Footer Information

- Page Number

Additional Notes

- The report will show a new header for each manufacturer and fitting type. The report may have multiple pages.
- This is a tabular data for the **PhotoBench Engineer Isocandela Report**.
- Orange is more advisory as this isn't a full fail. These are only shown for Azimuth and elevation.

7.4 PhotoBench Engineer History Report

Description

Tabular data giving all test and remedial actions taken by light fitting.

Arrive at this Report from:

- PhotoBench Engineer Summary Reports
    - For the selected Manufacturers/Fitting Type/Lamp with the period in days
- Standard Reports Tile
    - All Manufacturers/Fitting Types/Lamps with the configured tile period in days
- My Reports Tile
    - User defined filter

Possible Filters

- Manufacturer   (All, single Manufacturer. Default All Manufacturers)
- Type   (All, single Type. Default All Types)
- Lamp   (All, single Lamp. Default All Lamps)
- Operator   (All, single Operator. Default All Operator)
- From Date   (Default 180 days ago)

- To Date   (Default is today)

Header Information

- Airport logo
- Airport name
- Manufacturer/Type/Lamp filter selection
- From/To dates selected
- Date prepared plus week number

Summary Information

- Manufacturer
- Fitting Type
- Reference

Data Shown

- Date and Time of test performed.
- Operator performing test/action
- Action performed – **Side A Test**, **Side B Test** or **Action Type**
- Result (Tick/Cross) – only shown if a test
- The location of the fitting when the action was performed

Drill Down from this Report to:

- [PhotoBench Engineer Isocandela Report](#)   (Click link from Action if a test)

Warnings/Alarms

- Result is a cross rather than a check mark if failed.

Footer Information

- Page Number

Additional Notes

- All history of tests will be shown within this report within the selected period
- Actions performed will be shown as well as tests

7.5 PhotoBench Engineer Actions Summary

Description

A chart showing counts of remedial action types taken during the period specified.

Arrive at this Report from:

- Standard Reports Tile
  - All Manufacturers/Fitting Types/Lamps with the configured tile period in days
- My Reports Tile
  - User defined filter

Possible Filters

- Manufacturer   (All, single Manufacturer. Default All Manufacturers)
- Type   (All, single Type. Default All Types)
- Lamp   (All, single Lamp. Default All Lamps)
- Operator   (All, single Operator. Default All Operator)
- From Date   (Default 180 days ago)
- To Date   (Default is today)

Header Information

- Airport logo
- Airport name
- Manufacturer/Type/Lamp filter selection
- From/To dates selected
- Date prepared plus week number

Summary Information

- None

Data Shown

- A single page showing a bar chart with a bar for each **Action Type**.
- **Action** name is shown on the x-axis.
- The number of actions carried out is shown on the y-axis
- The number of actions carried out is shown as an exact value above each bar.

Drill Down from this Report to:

- None

Warnings/Alarms

- None

Footer Information

- Page Number

Additional Notes

- The report can be used to see which remedial actions are most commonly used for the filtered manufacturer and fitting type.

7.6 PhotoBench Engineer Test Criteria

Photobench Engineer Test Criteria

MALMS International Airport V4
All Manufacturers / All Fitting Types / All Lights
From 11/04/2016 to 11/05/2016
Report Prepared: 02/09/2019 16:19:24 (Week 36)

Key: Default | White | Red | Yellow | Green | Blue

Test Name	Average Candela/Colour	Min	Max	Width	Height	Rect	Elevation	Min Elev	Max Elev	Azimuth	Azi Err
Runway C/L CatIII	5000 750	70	180	5	4.5	E	4.5	-1	4	0	2
TDZ Starboard	5000	85	180	5	3.5	E	5.5	0	4	4	2
Runway end	2500	80	225	6	2.3	E	2.5	-1	4	0	2
Inset Approach C/L	20000	80	180	10	5.5	E	5.5	-2	4	0	2
Threshold Port	10000	75	230	5.5	4.5	E	5.5	-2	4	-3.5	2
Threshold Starboard	10000	75	200	5.5	4.5	E	5.5	-2	4	3.5	2
Threshold Wing Port	10000	75	180	7	5	E	5.5	-2	4	-2	2
Threshold Wing Starboard	10000	75	180	7	5	E	5.5	-2	4	2	2
Threshold Straight	10000	75	180	5.5	4.5	E	5.5	-2	4	0	0
TDZ Port	5000	85	180	5	3.5	E	5.5	0	4	-4	2
Taxi C/L 15m -Thorn-N (6A/13)	400	85	250	3.5	3.5	R	4.5	0	0	0	0
Taxi C/L -Thorn-W	200	85	230	10	3.5	R	4.5	0	0	0	0
Inset Runway Edge W+A Port	10000 4500	90	180	6.5	3.5	E	3.5	-1	4	-3.5	2
Inset Runway Edge A+R P	4000 1400	90	185	6.5	3.5	E	3.5	0	0	-3.5	2
Inset Runway Edge A+R S	4000 1400	90	185	6.5	3.5	E	3.5	0	0	3.5	2
Inset Approach Side Row	5000	80	180	10	5.5	E	5.5	-2	4	0	2
STOPBAR -LED- HELLA	200	85	230	10	3.5	R	4.5	0	0	0	0
LED Inset Approach C/L	20000	95	180	10	5.5	E	5.5	-2	4	0	2
LED Runway end	2500	80	225	4	2.3	E	2.5	-1	4	0	2
LED Inset Approach Side Row	5000	100	180	10	5.5	E	5.5	-2	4	0	2
LED Inset Runway Edge A+R Po	4500 1100	95	185	6.5	3.5	E	3.5	0	4	-3.5	2
LED Threshold Starboard	10000	100	200	5.5	4.5	E	5.5	-2	4	3.5	2

Page 1

Description

A summary of the parameters which the different fitting types are tested against.

Arrive at this Report from:

- PhotoBench Engineer Isocandela Report
    - For the selected test name
- Standard Reports Tile
    - All Manufacturer/Type with the configured tile period in days
- My Reports Tile
    - User defined filter

Possible Filters

- Manufacturer   (All, single Manufacturer. Default All Manufacturers)
- Type   (All, single Types. Default Types)

Header Information

- Airport logo
- Airport name

- Manufacturer/Type filter selection
- Date prepared plus week number

Summary Information

- Key (Default, White, Red, Yellow, Green, Blue) – signifies either default candela or different candela values for different colours, up to 3

Data Shown
- Test Name
- Average Candela – default or candela values for different colours, up to 3
- Min % of standard
- Max % of standard
- Width of beam
- Height of beam
- Rect (this is the shape of the brightest part of the beam, whether it is rectangular or eclipse.)
- Elevation
- Min Elevation
- Max Elevation
- Azimuth
- Azimuth Error leeway

Drill Down from this Report to:
- None

Warnings/Alarms
- None

Footer Information

- Page Number

Additional Notes

- The test criteria are defined within the PhotoBench Engineer software.
- If the report is run from the PhotoBench Isocandela Report then just one row will be shown for the applicable test.

8.0 Appendices

Appendix A – Turntable Alignment

The following procedure should be followed when the alignment of the turntable needs to be set or checked and is required during the commissioning process or if it has system been moved.

The Laser Adaptor Plate is an adaptor plate as previously discussed equipped with a laser to allow the alignment of the turntable to be checked. A Laser Adaptor Plate is shipped with every system and should be kept in a safe place until required.

1. Place the Laser Adaptor Plate on the turntable, ensuring that the 3 alignment holes are located correctly on the mounting studs.

2. Turn system on and start MALMS Workshop program

3. Close turntable safety door

4. Select Forms / Run Workshop / Diagnostics / Manual

5. Press "E" key – this will rotate the turntable until it finds the encoder reference point

6. Press "A" key – this will rotate the turntable until it reaches position A

7. Open the safety door and turn laser on

8. Look down tunnel to observe where the laser is pointing

9. If the vertical position of the laser dot is not correct (normally it is set to be 78mm below the centre of the lowest sensor) the height of the array can be moved or the turntable feet adjusted. If the turntable has been moved, or the feet adjusted, the turntable should be checked to ensure it is level. If it is not level adjust the turntable feet. Note: If it is necessary to remove the bolts that fix the turntable to the tunnel they should be replaced after levelling.

10. If the laser dot is not on the vertical axis of the sensor array move the table until it is in the correct position as follows:

    | "←" | To move turntable anticlockwise |
    | "→" | To move turntable clockwise |
    | "**Shift**" + "←" | To move turntable anticlockwise slowly |
    | "**Shift**" + "→" | To move turntable clockwise slowly |

11. Repeat until alignment is correct

12. Store the alignment calibration by

   "Alt" + "L"
   followed by
    "Y" to confirm.

13. Save calibration data to file by exiting the program using

   "Alt" + "F4"

14. Run the MALMS Workshop program again

15. Select Diagnostics | Manual

16. Check alignment as follows:

   "B"   To move turntable to position B
   "A"   To move turntable to position A
   Open safety door and check laser dot is in the correct place.
   Close safety door and exit with "Alt" + "F4"

17. Exit from the Workshop program with File | Exit or "Alt" + "F4"

18. Use **TMS Photometrics | Explore data** to find the *TMSPhoto* folder, navigate to *TMSPhoto\Workshop\To_TMS* and email the files to Support@malms.aero

Appendix B – Turntable Maintenance Schedule

The following schedule is recommended for ongoing maintenance of the MALMS Photometric Bench Tester. In normal operating environments, very little maintenance is required, however the following schedule of checks is recommended.

Every time the system is used:

Turntable :
- Check all LED displays are operational and illuminated.
- Check controls are not loose or damaged.
- Check door opens and shuts freely.

PC :
- Check the connectors and that the PC is operational.
- Note, if the CAN cable has become disconnected it must be reconnected to the add-in card within the PC and not the standard COM port.

Array Sensors:
- If access is readily available to the sensor array without removing the tunnel side panel, check that the sensor array lenses are clean and free from contamination. Under normal circumstances there should be little or no contamination able to get inside the tunnel. Cleaning if required should be performed using an antistatic foam cleanser, and a dry lint-free cloth. A suitable cleaner is Electrolube CTC400H (Farnell part number 130-473) Under no circumstances should the arrays be disassembled in an attempt to remedy any fault or contamination of the lenses.

Monthly Checks:

The alignment of the turntable should be checked using the laser adapter plate using the procedure described in Appendix A.

Annual Checks:

Sensor Array:
Annually, the sensor array should be returned to TMS for calibration and service.

This is normally covered under a support contract, otherwise would be a chargeable procedure. TMS will provide a certificate of calibration which can be shown to any regulators if requested.

Turntable:
The side panel of the turntable may be removed, and the internals of the turntable cleaned for dust build up. Ideally use a small vacuum cleaner to remove any debris from within the turntable. Nothing should be inserted into the bottom of the turntable unless the system is switched off and the mains power removed.

Software:
MALMS Photometric Bench Tester software undergoes a continual process of product improvement. Customers with support contracts are eligible for free software upgrades on an annual basis.

Appendix C – Electrical Installation Guide

NOTE : All wiring is to be carried out by a suitably qualified person in accordance with local regulations and ordinances.

This document is provided for guidance only. The MALMS PhotoBench cabinet requires a 230V (or 115V) AC supply (50/60 Hz) rated at 10A (20A) minimum. The AC supply to the cabinet should be connected via a Double-Pole Isolating switch and protected by a Type C Miniature Circuit Breaker or fuse. The cabinet must be connected directly to a safety earth (via the mains wiring) to ensure operator safety.

Note. An RCCB (or similar device) should not be used due to the high earth leakage current of the cabinet electronics. Wiring to and inside the cabinet should use a suitably rated three-core mains cable and be routed as shown below :
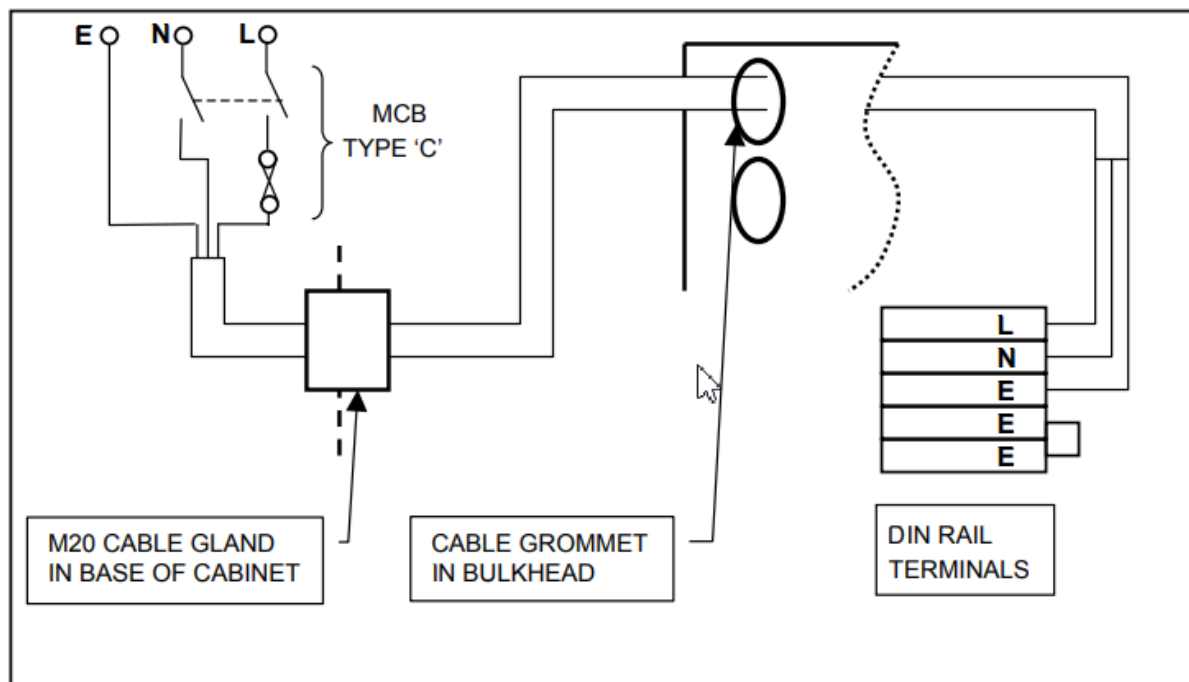
Appendix D – Glossary

Azimuth

The angle measured in degrees away from the centre or "straight ahead" position. +ve Azimuth is defined as an offset to the right, and –ve Azimuth is an offset to the left.

Beam Axis

The Beam Axes are the horizontal and vertical lines which would cross at the centre point of the beam of light.

Candela

A Candela is the SI unit of luminous Intensity, weighted to match the response of the human eye. A common candle emits light with an intensity of approximately one Candela.

Elevation

The angle measured in degrees above or below the horizontal position. +ve Elevation is upwards, -ve elevation is downwards.

Isocandela diagram

An isocandela diagram is a detailed "map" of the light output of a fitting measured in Candelas. The map is shown in colour-coded form.