

THUNDERBIRD



WEIGHING SYSTEMS

T30 Instruction Manual

Installation

Locate a weighing site that is well drained. For best weighing results, ensure the weigh bars and weighing platform are on a level hard surface (i.e. concrete), and free from contact of any obstruction. Do not use wooden platforms. Make sure the platform doesn't rock, pack with spacers if needed. If the installation has any flexing or twisting in the platform, inaccurate weights may occur. The weight should be evenly distributed over the top of the weigh bars.

When bolting the bars down, also eliminate any twisting of the platform. Avoid bolting everything down tight. If in a fixed situation, it is best practice to bolt the rear bars to the concrete, then bolt the platform or crush to the bars, then leave the front bars unbolted with only guide pins into the concrete. Shim the bars and crate with washers or similar pieces of metal so that no diagonal rocking motion occurs before tightening all of the fixings. This will minimize any flexing that could occur.

When weighing animals, be sure that their weight is totally on the weighing surface, and not leaning on fixed gates, rails, etc. If at all possible use a crush or weigh box, and place the weigh bars so that the whole structure is weighed. This will eliminate weighing errors if the animal does lean on any part of the structure.

Care and Maintenance

WARNING! DO NOT WELD TO THE WEIGH BARS OR ANY STRUCTURE THAT THEY ARE ATTACHED TO. The voltage and current from the welder can instantly destroy the sensitive strain gauges used to measure the weight. Welding currents create observable damage to the strain gauges, and will void your warranty. Remove the weigh bars from the structure before attempting to weld.

Care of cables is important to avoid erratic readings or breakdown. Plugs should be covered when not in use to avoid corrosion of contacts and to prevent moisture penetrating the cables. Even a thin film of moisture around the pins in the plug may cause erratic readings.

Do not allow the bars to remain wet or allow a build up of manure inside the bars for long periods of time. This will shorten the life of the weigh bars, can cause premature failure and may void your warranty. If the area does remain wet, remove the weigh bars when not in use. The weigh bars are sealed, and can be hosed out with low pressure water to keep clean.

Store the indicator in a dry area away from moisture when not in use. Although it has a gasket seal to prevent water ingress, repeated cycling of warm and cool from day to night in a damp area may cause a build up of moisture inside the indicator.

Do not transport weigh bars or load cells with a weight on them. If the vehicle goes over a bump, the resulting 'G' forces increase the effective weight applied, which may exceed the load cell capacity, causing damage to the load cells. Load cells that have had excessive weight applied to them are not covered by warranty.

Power

The T30 has internal Ni-MH batteries that can be recharged with the provided plug pack or by a 12V battery. It can also be powered by 4 x AA batteries. The AA batteries are inserted in a removable battery pack and placed in the battery compartment at the rear of the indicator.

A battery level indicator is displayed while the scale is operating, which gives an indication of the time remaining before the batteries go flat. The lowest segment will start flashing when the battery level is low and the charger is not plugged in. Turn off the indicator and replace or charge the batteries when this occurs.

To conserve the batteries, the T30 will turn itself off after 30 minutes if no keys have been pressed or the weight hasn't changed.

Note: All statistics will be lost if the internal batteries are flat and the AA batteries are removed without first turning off the indicator.

Good quality alkaline AA batteries will power the scale for up to 30 hours running time. Rechargeable AA batteries may be used, but the battery level indicator will not be as accurate.

The fully charged internal Ni-MH batteries will power the scale for up to approximately 8 hours of use. Ni-MH batteries will self-discharge over time though, so it's best to charge the scale overnight before use. It takes around 10 hours of charging to fully charge the internal batteries.

The battery indicator will flash a segment whenever the internal battery is charged, even when the scale is turned off. The segment flashing depends upon the battery voltage.

The indicator will display the battery condition during charging while it's turned off, and automatically shut down when the charger is removed or turned off.

Note: The internal batteries will not be charged if the charging voltage is less than 7.5V. The provided charger is rated at 9V, so will adequately charge the batteries.

Operation



The T30 has a water resistant 13 button keypad for a user interface. An extra large 40mm digit display provides the user with the ability to view the weight at a distance. The display also has other indications that are used at various times. All mode settings and changes are memorized at the time of change, so that the indicator will return to the previous set up when it is turned on.

The T30 contains highly stable and sensitive circuitry, which is designed to improve accuracy.

Following is a description of each button and what it does:

Off/On

This button does what it says. There is no power drained from the batteries when the scale is turned off.

When powering up, the indicator will display all relative segments for a short time, then the firmware version number, and then a tare is performed automatically after a short delay. If there was a weight on the load bars when the indicator was turned off, this weight is displayed if it hasn't changed, otherwise zero weight is displayed. The scale is

then ready for weighing. This means that no buttons need to be touched if the scale is used for weighing the same thing each time.

Tare

When pressed during normal weighing, the scale will display 4 dashes (----) and cancel any weight that exists on the weigh bars. After a few seconds the display will show zero weight, regardless of any weight (such as a weigh box) that may be present. The tare button also has other purposes that will be described during other various functions.

Mode

Mode selects the weighing mode. The current mode is displayed during normal operation. There are 3 available weigh modes, each with a different purpose. They are:

Livestock – (Cow icon) This mode is designed to weigh moving weights, such as animals. The indicator switches to a damping system that filters out sudden changes in weight, and averages many weight samples over a couple of seconds. Two weights are displayed at first at one second intervals, then there is a delay until the weight becomes stable, at which point the actual weight is displayed. The displayed weight will change if the indicator determines that the weight isn't quite right.

Livestock Locking – (Cow with a lock icon) Locking mode works the same as normal livestock mode, except that once a weight is displayed, any change in weight won't be shown until the change exceeds +/-5% of that displayed.

General – (Trolley icon) This mode is for weighing static weights and produce. The displayed weight is updated every second, and doesn't have any weight damping or zero tracking. It is suitable for weighing products that are slowly added to, such as weighing grain being augured into a bin.

Weigh

The weigh button has different functions depending on the mode setting.

In livestock locking mode, pressing the weigh button will cause a new weight reading to be taken and displayed, regardless of a change in weight.

In livestock and general modes, pressing the weigh button will cause the weight to be held on the display, even after the weight has been removed. The large lock icon will be displayed. This held weight will disappear automatically and a new weight will be displayed when another weight is applied onto the scale. Pressing the weigh button again when the weight has been removed will cause the display to return to zero.

Kg/lb

The indicator is capable of displaying weights in either pounds or kilograms. Alternate presses of this button swaps between units. The unit the weight is shown on the display.

Settings

Pressing the settings key once will cause the system capacity to be displayed. Pressing it again will cause the scale to return to normal weighing. The calibration mode may be entered by pressing the settings key once, and then pressing the down arrow key.

OK

The OK key is pressed to accept values selected during draft setup, stats, and calibration. It is also used to enter the animal's weight into stats when manual drafting.

Back

The back key allows you to go back to the previous step when calibrating or setting up the draft weights.

Draft

The T30 can visually draft in up to 5 ways. Pressing the draft key takes the T30 into the draft setup mode. Please refer to the draft setup procedure later in this manual.

Stats

The stats key causes the weighing and drafting statistics to be displayed. Please refer to the statistics section for a full description.

Up, Down, Back

These keys are used during calibration, statistics viewing and draft setup. Please see the relevant sections later in this manual.

Autotally

Autotally will only be active if draft values have been set up and drafting is turned on. When autotally is pressed, the display will show 'Autotally' if it's enabled, or no text if it has been disabled. See the section on Autotally later in these instructions.

Calibration

The T30 has the capability of being calibrated in the field. The electronics in this weighing system is very stable, and this calibration procedure should rarely need to be done. However, if the weights are critical, it is advisable that the scale be calibrated every year or two. If the load cells have been slightly overstressed, or specific errors have been displayed as described later, it is also advisable to re-calibrate the system before returning the scale for repair. It may be that recalibration will solve the problem. Re-calibration may not fix the problem if the weigh bars or load cells have been grossly overstressed.

To perform the calibration, a known fixed weight must be at hand. Also, if the indicator is not connected to standard Thunderbird load cells, the capacity of the total system and the number of load cells in the system must be known. The capacity should be printed on the label attached to the weigh bar or load cell. The test weight must be a minimum of 5% of the capacity of the system, and small enough to be able to balance easily on 1 weigh bar or load cell. The maximum test weight is the total capacity of the system divided by the number of weigh bars or load cells. For example, a 2 tonne system with 2 load cells would have a maximum test weight of 1 tonne. Similarly, a 500kg system with 2 bars has a maximum test weight of 250kg.

Each weigh bar or load cell is calibrated independently, and they must be removed from any structure that they're supporting before calibration starts.

The calibration procedure may be aborted at any time up until 'donE' is displayed by turn the indicator off. The **back** key may be used to repeat a procedure at any time.

When inputting a value, the **up** and **down** arrows may be pressed briefly to increase or decrease a value, or held down. When held down, the value will increase by 1 unit at a time until a tens digit changes, and then the value will change by 10 units at a time. Releasing the key will re-start the procedure.

The procedure is as follows:

1. Press the **settings** key once, and then press the **down arrow** key. 'CAL-' will be displayed. Press **OK** to continue, or the **settings, down arrow** or **weigh** key to exit. Press the **back** key to show the system capacity again.
2. If non-standard Thunderbird load cells or older Thunderbird load cells are used, the system capacity needs to be entered. Otherwise go to step 4. Use the **up** and **down** arrow keys to input the system capacity and then press **OK**.
3. If non-standard Thunderbird load cells or older Thunderbird load cells are used, the number of load cells needs to be entered. Otherwise this step is skipped. Use the **up** and **down** arrow keys to select the number of load cells and then press **OK**.
4. If there are 2 load cells in the system 'bAr1' will be displayed and 'zero weight' will flash, otherwise go to step 5. Press **tare, weigh** or **OK** to continue.
5. 'rdY?' will be displayed and 'zero weight' will be flashing. Remove any weight from load cell 1 (the load cell plugged into the left hand socket) and then press **tare, weigh** or **OK**. If there is only one load cell, pressing **back** will exit the calibration procedure.
6. 'Zero weight' will cease flashing, and '----' will be displayed for 4 seconds while samples are obtained and averaged from load cell 1 with no load.
7. 'Test weight' will start flashing after the samples have been taken, and the default test weight will be displayed. Use the **up** and **down** arrow keys to enter the known weight on hand that will be used for calibration. Press **OK** once the correct weight is displayed.
8. 'rdY?' will be displayed with 'test weight' still flashing. Place the weight on load cell 1 so that it is balanced evenly in the middle. Press **weigh** or **OK** to continue or the **back** key to go back to the last procedure.
9. 'Test weight' will cease flashing and '----' will be displayed for 4 seconds while samples are taken from load cell 1 with the weight applied.
10. If there was only 1 load cell in the system go to step 16. Otherwise 'bAr2' will be displayed and 'zero weight' will be flashing. Press **tare, weigh** or **OK** to continue, or the **back** key to go back to the previous procedure.
11. 'rdY?' will be displayed and 'zero weight' will be flashing. Remove any weight from load cell 2 (the load cell plugged into the right hand socket) and then press **tare, weigh** or **OK**. Press **back** to go back to the previous procedure.
12. 'Zero weight' will cease flashing, and '----' will be displayed for 4 seconds while samples are obtained and averaged from load cell 2 with no load.
13. 'Test weight' will start flashing after the samples have been taken, and the test weight used for bar 1 will be displayed. Use the **up** and **down** arrow keys to adjust the weight if necessary. Press **OK** once the correct weight is displayed.
14. 'rdY?' will be displayed with 'test weight' still flashing. Place the weight on load cell 2 so that it is balanced evenly in the middle. Press **weigh** or **OK** to continue or the **back** key to go back to the last procedure.
15. 'Test weight' will cease flashing and '----' will be displayed for 4 seconds while samples are taken from load cell 2 with the weight applied.

16. 'donE' will be displayed. This is the final step. If OK is pressed at this point the new settings will be committed to memory and a tare will be performed. Remove the test weight **before** pressing **OK**.

The new settings will be remembered until another calibration procedure is performed.

Drafting

The T30 has the ability to visually draft animals from 2 up to 5 ways.

For draft mode to work, weight boundary settings must be entered. The number of settings depends on how many ways the T30 is to draft. For example, for 2 way drafting only one setting is needed. Any weight greater than the setting falls into the high range, if the weight is lower or the same as the setting, it falls into the low range. For 5 way drafting, 4 weight boundaries need to be entered. If a weight is equal to the boundary, it'll be drafted into the lower range.

In visual drafting, the range that the weight falls into is indicated on the display. For 5 way drafting, the possible ranges are **LOW**, **LOW MID**, **MID**, **MID HIGH** and **HIGH**. Other drafting ways have varying combinations of these.

To start draft mode, follow this procedure:

1. Press **draft**. Draft will flash and 'dr 2' will be displayed.
2. Use the **arrow keys** to select the number of ways.
3. Press **OK** to accept the number of ways. A 4 digit number will appear. This is the lowest weight boundary setting.
4. Use the **arrow keys** again to adjust the weight, then press **OK**. Alternatively, if the value display is correct, press **OK** to accept the setting.
5. The next setting will appear if there are more than 2 ways of drafting. Repeat step 4 until all settings have been entered.

Draft mode is now on and the display will indicate which draft range the weight falls into.

To turn draft mode off:

1. Press **draft**. .OFF?. will be displayed.
2. Press the **down arrow** if you want draft to remain enabled.
3. Press either **OK** or the **up arrow** to turn draft mode off, the **weigh** key returns to normal weighing.

Autotally

Autotally is a feature that can automatically add weights to the statistics as each animal is weighed. No button pressing is necessary if the animals are co-operative.

Pressing the Autotally button alternately turns the Autotally mode on or off, and the text 'Autotally' is shown on the display if it is enabled. Autotally will only operate in one of the livestock modes, it will not be enabled in general mode.

When the Autotally button is pressed to enable the function, 'Clr?' will be displayed and flash. You have the choice of clearing the existing statistics in the indicator by pressing **OK** or the **up key**, or to add to the existing statistics by pressing the **down key**.

Autotally will function irrespective of whether drafting has been set up. If drafting is not enabled, only the overall statistics are collected. If drafting is enabled, both overall and drafting statistics are collected.

If autotally is enabled and a livestock mode is active, when a stable weight has been detected it is automatically added to the statistics. The weight will disappear from the display for 0.5 seconds to indicate that the statistics have been updated.

If an animal has not walked completely onto the weighing platform by the time that statistic is added, you can remove this latest statistic addition by pressing the **back** key. The displayed weight will disappear for 0.5 seconds again to confirm that the weight has been removed from the statistics. Once the animal is fully on the platform, you may add its weight by pressing the **OK** key, and the weight will disappear from the display again for 0.5 seconds. The **OK** key can only be pressed once while the animal is on the platform, and will not be available after the weight returns to zero.

A weight is added to the statistics only once automatically while a weight is applied, and the sequence will reset only after the weight returns to zero.

Statistics

Statistics may be accumulated on animals or objects weighed. The recorded weight is entered into an overall statistics collation, as well as draft statistics if draft mode is on. There are up to 5 sets of draft statistics, depending on how many ways the draft mode has been programmed for. This means that there are up to 30 separate statistical values recorded.

All statistics are remembered when the T30 is turned off, provided it is turned off using the on-off button. The statistics will not be saved if the battery is simply unplugged while the internal battery is flat. This applies also if the battery lead is accidentally disconnected. This feature is to allow a break in a weighing session, and then continue with the same session at a later time. The statistics must be cleared if a new weighing session is to be recorded. Otherwise the weights will be added to the old statistics.

There are 5 distinct values recorded for each range of statistics. They are;

- number weighed
- minimum weight
- maximum weight
- average weight
- total weight

To view the statistics, press **stats**. The overall number weighed will be displayed. Use the **arrow keys** to scroll up and down the overall statistics values. The statistic

displayed will be indicated on the screen. The statistics mode can be exited by pressing the **weigh** key.

If the draft mode is on, the draft statistics may be view by subsequent pressings of the **stats** button. The screen will indicate which draft statistic is being displayed by showing LOW, MID or HIGH, or a combination of two. Use the **arrow keys** again to scroll through the values for each draft range.

To exit the statistics display function, press **weigh**. Normal weighing will resume.

To reset the statistics, press **stats**, and then press **tare**. 'Clr?' will be displayed. Press the **up arrow** or **OK** to confirm, or the **down arrow** to keep them. All values will be reset to zero once the up arrow has been pressed.

There are 2 ways of adding to the statistics. They are:

1. **Manual entry.** **OK** must be pressed each time a weight is to be added to the statistics. The weight may be added in either livestock mode, and only the weight displayed at the time will be added. This method will not work if auto tally is on. For **livestock locking** mode, the statistic will only be added when **OK** is pressed after the large lock icon appears. For **livestock** mode, the statistic will only be added when **OK** is pressed after the cow icon disappears for 0.3 seconds. The weight will disappear from the display for 0.5 seconds to confirm that the weight has been entered into the statistics. Pressing the **back** key will cause the weight to be removed from the statistics if the weight is still applied, and pressing the **OK** key again after the back key has been pressed will add the weight to the statistics again, but only if the weight continues to be applied. These buttons will not work after the weight returns to zero.
2. **By autotally.** Autotally will only work in a livestock mode. Please refer to the Autotally section.

Note: The weight automatically recorded may not be the true weight if the beast pauses while moving on to the scale using autotally. Please refer to the Autotally section.

Increments

The T30 displays in varying weight increments, depending on a number of factors. These factors include the capacity of the system, the weighing mode, and the amount of weight applied. The guide below shows the increments used.

If system capacity is 200kg (440lb) or less;

- General - 0.1kg (0.2lb)
- Livestock - 0-50kg (0-110lb), 0.2kg (0.4lb)
50-200kg (110-440lb), 0.5kg (1lb)

For 201kg (441lb) to 2000kg (4400lb) load cell systems;

- General - 0-50kg (0-110lb), 0.1kg (0.2lb)
50-500kg (110-1100lb), 0.2kg (0.4lb)

500-1000kg (1100-2200lb), 0.5kg (1lb)
 >1000kg (2200lb), 1kg (2lb)
 Livestock - 0-100kg (0-220lb), 0.5kg
 100-500kg (220-1100lb), 1kg (2lb)
 >500kg (1100lb), 2kg (5lb)

For systems over 2000kg (4400lb);

General - 0-50kg (0-110lb), 0.2kg (0.5lb)
 50-500kg (110-1100lb), 0.5kg (1lb)
 >500kg (1100lb), 2kg (5lb)
 Livestock - 0-100kg (0-220lb), 1kg (2lb)
 100-1000kg (220-2200lb), 2kg (5lb)
 >1000kg (2200lb), 5kg (10lb)

Error Messages

The T30 has a very comprehensive self monitoring system that detects any problems that may occur. Should such a problem be detected, an error message will be displayed on the screen, for example 'Er36'. Most error messages displayed concern problems with the signal coming from the weigh bars or load cells. The signals from the sensitive strain gauges are extremely small. A load bar that has its rated capacity weight applied outputs less than 0.007 volts of signal.

Each load cell is sampled independently many times per second, which allows the T30 to continuously monitor any problems that could occur. One of these problems is an overload condition. Any bar that is overloaded will be displayed, even if the overload only lasts for a fraction of a second. This feature enables the user to minimize possible damage and ensure a more reliable weight, as well as extending the useful life of the scale.

If an error message is displayed, turn the indicator off, and closely inspect the cables connecting the weigh bars or load cells. If there is a cut in the outer sheath, or a squashed section of cable, it may have to be replaced.

If there doesn't appear to be any visible damage after inspecting the installation, contact your supplier or distributor, quoting the error number that appeared. They may be able to help with a cure.

The possible error messages are as follows:

Error	Explanation	Possible Cause/Remedy
Err	Load cells not plugged in properly	Connect load cells
Er01	Load cell 1 at minimum signal	Broken cable, new cable
Er02	Load cell 1 at maximum signal	Broken cable, new cable
Er03	Load cell 2 at minimum signal	Broken cable, new cable
Er04	Load cell 2 at maximum signal	Broken cable, new cable
Er09	A/D converter not communicating	Servicing required
Er13	No EEROM	Servicing required
Er15	3.3V low	Shorted cable or failure

Er28	No A/D samples	Servicing required
Er32	A/D converter timeout	Servicing required
Er36	Test weight < zero weight	Incorrect wiring, L/C inverted
Er38	No load cell in socket 1	Connect load cell 1
Er39	No load cell in socket 2	Connect load cell 2
Er40	Shorted identifier in socket 1	Wiring error, incorrect load cell
Er41	Shorted identifier in socket 2	Wiring error, incorrect load cell
Er42	Not enough span in load cell 1	Faulty load cell
Er43	Not enough span in load cell 2	Faulty load cell
Er44	Can't turn off	Servicing required
Er45	Circuitry mismatch	Servicing required

Troubleshooting

Problem	Cause	Remedy
Won't turn on	Batteries are flat	Fit new batteries
	A battery has been put in backwards	Fit batteries correctly
	Short in load cell cables	Disconnect cables and try. If still won't turn on, servicing is required.
	Faulty indicator	Return scale for service
Won't tare	Moving weight	The weight must be still and stable before the indicator is able to obtain a tare reading, make sure any weight on the load cells does not move.
	Poor installation	The load bars must be installed on a solid base such as concrete. Sitting the load cells on the ground is not satisfactory. Refer to the installation guide.
	Flexible platform	Any platform that may be used on top of load bars must be rigid, and the load must be spread over the entire bar. Timber paneling is not acceptable.
	Moisture in plug	Moisture is the most common cause of erratic weights in any scale. If there is moisture in the plug, undo the plug and thoroughly wipe out and dry all parts of the plug before reassembling.
Erratic weight	Moisture in plug	Moisture is the most common cause of erratic weights in any scale. If there is Moisture in the plug, undo the plug, and thoroughly wipe out and dry all parts of the plug before reassembling.
	Poor installation	The load bars must be installed on a such as concrete. Sitting them on the ground is not satisfactory. Refer to the installation section.
'OL' displayed	There is too much on the load cells	This error will self clear when the weight applied is removed.

Er15 is displayed	There is most likely a short in the weigh bar or its cable	If the cable is damaged it must be replaced. If the problem is in a weigh bar, return the complete scale for service.
'1 OL' displayed	There is too much weight on the bar indicated.	This error will self clear when the weight removed. This display could flash up for a fraction of a second if there is a momentary overload due to a heavy weight being put down.

Options

The T30 can be supplied with various load cell options. These are:

Easymove 500kg bars- 2 bars, 580mm in length designed for portability.
 Easymove 2000kg bars- 2 bars 580mm in length also designed for portability.
 Extender 3000kg bars- 2 bars 1000mm in length.

The 3000kg bars are designed to fit under cattle crushes or large weigh bins for maximum stability.

Specifications

Indicator:

Battery Voltage -	6Vdc (4 x AA batteries)
Charger Rating -	9Vdc 500mA
Supply Current:	
Indicator only -	10mA
System with 1 weigh bar-	39mA
System with 2 weigh bars-	68mA
Load Cell Excitation Voltage -	3.3Vdc
Load cell input sensitivity -	1.2-3.2mV/V
Maximum offset voltage:-	+/- 20mV
Accuracy -	Greater than 99%*
IP Rating -	IP56

Weigh Bars:

Gauge resistance -	120 Ohms
Offset Error -	Within +/- 10mV
Sensitivity -	1.35 – 2.1mV/V
Overload Capacity -	150% of rated capacity

*Provided installation is done correctly.

E&OE. This information was correct at the time of compilation. Changes may be made to improve the product.

WARRANTY THUNDERBIRD

Agricultural Scales

Thunderbird warrant all scale indicators and load cells against defective workmanship and faulty materials for 2 years from the date of purchase.

We undertake, at our option, to replace or repair free of charge each product, or part thereof, on condition that it is returned to our factory freight prepaid, and found on examination to be suffering from material or constructional defect. We cannot be held responsible for any repair other than those carried out by us or our authorized agent.

A photocopy of your proof of purchase and a request for warranty must also be returned with the item.

This warranty is void if the product is subject to improper use or handling, incorrect power input voltage, load cells found to have electrical damage caused by welding, damage through contact with chemicals, flooding, fire, explosion, excessive heat, lightning strikes, insect damage, moisture damage or damage to external wiring. Any warranty on load cells will become void if they are found to have been subject to excessive weight, or failure caused by corrosion due to excessive buildup of manure and moisture.

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For your records:

Model No.:

Serial No.:

Date of Purchase:

Place of Purchase:

Receipt No.: