

# OPERATION MANUAL

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## Masterweigh 1 Integrator

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Web-Tech Australia Pty Ltd

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**Head Office:**

11 Electronic Street  
EIGHT MILE PLAINS QLD 4113

Phone: (07) 3841 2844  
Fax : (07) 3841 0005

PO Box 4006  
EIGHT MILE PLAINS  
BRISBANE QLD 4113  
AUSTRALIA

**Sydney Office:**

Phone: (02) 9757 2296  
Fax: (02) 9899 6585

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- MW1-DIS
- MW1 LINKS
- MW1 TACHO
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- WT-5013
- MW1-100

# KEYBOARD AND LAYOUT FUNCTIONS

## KEYBOARD LAYOUT

1	2	3	4
5	6	7	8
9	0	C	MENU
-	./+	ABORT A	ENTER E

Masterweigh 1 can operate in a protected security or open mode depending on the initial security configuration. See "Security" for set up details. The following text assumes that the operator has gained access to the system.

## SECURITY CODES

If Masterweigh 1 has been ordered with the security pass system activated, entry to the menus will be restricted. (Two four-digit codes will have been supplied to nominated persons in your company).

One code (low level) allows the code holder limited access to any data in the menus, for inspection only. The other code (high level) is needed for access to menus and to make modifications to constants, start calibration sequences, etc. Note that no access is given if no code is entered.

If security codes have been activated, on pressing the Menu key, the computer waits for the four-digit code. If no attempt is made to enter a code then the display returns to MRMT format after 30 seconds. If an invalid code is detected, the display returns to MRMT format immediately. If a security code is detected then limited or complete access is gained to the menus, as appropriate. Once the menu format is exited the code will have to be re-entered for further access.

## KEY FUNCTIONS

### Menu

This key switches between the main display mode showing "Mass Rate/Mass Total" (MRMT) and the "Menu" mode.

### (-) and (./+)

When in "Menu" mode, pressing the (+) or (-) key once will go forward or backward one menu entry. If either key is held down, the menu changes will repeat at a rate of approx. 5 per second. When entering data, the (./+) key is the decimal point.

### A/Abort

When in the "Menu" mode and entering changes or new data, this key enables the user to abort the changes and restore the existing entries. The top-level menu screen is then displayed.

### C/Cancel

Similar to "Abort", except that the current screen data only is cancelled and the existing entries restored. The display remains at the current screen.

### E/Enter

In menu mode, the key accepts the default setting or confirms any data entered and moves to the next level in the operating sequence.

In MRMT display mode, if the "Enter" key is pressed, the current CPU (central processor unit) status is displayed and also the number of times the CPU has been restarted.

If the display is flashing, the CPU fault status may be viewed by pressing the enter key in the MRMT display mode.

## MENU ENTRY 1 – Parameter Setup

The setup menu is used for initial setup of the Masterweigh, for examination of these parameters whenever desired and during periodic recalibrations.

1

Menu entry: 1 Parameter setup
----------------------------------

2

Current Capacity = 1000.000tonnes/hour Enter new capacity? 0.00
--

3

Mass total increment = 1.000 tonnes Enter new inc. (1 - 0.001)? 0.000
--

4

WARNING: Calibration data Do Not Modify - Press A to continue
--

5

Calibration zero = 4.365 millivolts Enter new zero ref.? 0.000
---

6

Precision ref. = 34.315 millivolts Enter new precision ref.? 0.000
---

7

Current pulse width = 300m/s 1 = 100, 2 = 200, 3 = 300
---

8

Press E for LCD test, else press E When display test is complete, Press E
--

1. At Menu Entry 1, press Enter to examine or modify these parameters.

2. The current weigh capacity is displayed. A new value may be keyed-in. Then press Enter to continue. Otherwise press Enter with no data entry to retain existing values and continue. This value sets the 100% point for the 4-20mA mass rate output signal. Note that

the system can measure mass rates above this value (assuming the instruments remain within their normal operating range), and higher values will be shown on the screen and totalised. However, the 4-20mA mass rate output signal will show 20mA for all mass rates above this value.

Note that units can be changed to tons, lbs or kg if preferred, within Menu Entry 18.

3. This entry displays and allows alteration to the mass total increment. This increment is used for both the mass rate and the mass total displays.

Enter the new value required and press the Enter key. No change is made if Enter is pressed without data entry.

Note that the increment set is the increment required to cause one pulse output from the electronic counter. Also, do not change the increment in normal operation, as the change in setting will invalidate any existing accumulated mass total.

4. A warning message now appears, since the user shouldn't usually change the following parameters.

5. During initial setup and periodic recalibration, zero reference and precision reference millivolt figures must be entered. The data is keyed in and Enter pressed to save the values. The values shown here should be the same as those engraved on to the main board. If no data is entered but the enter key is pressed then no data change is made.

6. See 5 above

---

## MENU ENTRY 1 – Parameter Setup

---

7. This step displays and allow alteration to the remote counter pulse width. This value is limited to the values shown. Pressing one of the numeric keys on the keypad that corresponds to the values shown, will set that value as the pulse width. One pulse is output each time the mass total increases by one increment (as set in step 3 above).

Enter a pulse width that will match the remote counter response time. Consider the following when selecting this value: The pulse output can go no faster than the value you just selected, but the accumulation of the mass total may, and so the remote totaliser will fall behind the actual mass total. E.g. if the pulse width is set to 100mS, then at it's fastest rate, the output will be on for 100ms, then off for 100ms. This will give a maximum output of 5 complete pulses per second (100mS on and 100mS off = 200mS per total pulse). Therefore, if the feeder is running faster than 5 increments per second (Max 18000 increments per hour), then the remote total will be wrong. Eg for an increment value of 0.01tonnes, the limit will be 180tph.

8. Press E to test the display or A to abort the test. This step tests the display by turning on each display segment, which will show up any faulty segments.

## MENU ENTRY 2 – Pulses per Belt Revolution Calibration

This calibration is carried out with the belt moving. The number of complete belt revolutions over a time period are counted by the operator, and the Masterweigh counts the pulses returned from the speed sensor device. The revolutions are then entered using the keypad and the pulses/rev calculated by the Masterweigh and then saved.

To enable the revolutions to be counted, a point on the belt should be marked with paint, and a suitable point on the framework chosen close to the belt. The count is then started as the belt mark passes this point and stopped as the mark again passes this point after the greater of 5 minutes or 5 belt revolutions.

1

Menu entry: 2 Pulse per rev = 1000 Revs =5
---

2

Manual entry of Pulses/Rev 0 or press Enter to continue
--

3

Manual entry of No of Revs 0 or press enter to continue
--

4

To start belt pulse count, Press E Pulse counted = 0 Time = 0
--

5

To stop belt pulse count, Press E Pulses counted = 0 Time = 0
--

6

Enter number of belt revolutions? Pulses counted = 0 Time = 0
--

7

Pulses per belt revolution = 0 Press E to save, otherwise press A
--

1. At Menu Entry 2, press Enter to proceed with calibration.

2. If the pulses per rev are known, then manually key in the number of pulses and press E. Otherwise simply press E to continue.

3. Manually key in the number of revs (for the above number of pulses) and press E. Otherwise press E to continue.

4. At the moment the belt mark passes the fixed point chosen, press E to start the Masterweigh counting pulses, and start counting revolutions. Note that the display panel will show the counting.

5. After at least 5 minutes, press E again to stop the count as the mark passes the fixed point.

6. Key in the number of revolutions counted, and press E to confirm.

7. Press E to save the number of pulses/rev just calibrated, otherwise press A to abort and return to the original values (if any).

## MENU ENTRY 3 – Load Zero Calibration

This menu entry enables the operating zero to be calibrated. A specified number of belt revolutions are run (as determined by Menu 2), with no material or calibration weights on the belt. If the zero is correct then the mass total accumulated over the period will be zero.

The display shows the currently stored value in millivolts, as read at the load-cell input including any contribution made by the autozero function.

Note that the zero value is automatically adjusted if the excitation voltage changes.

1

Menu entry: 3 Zero cal. = 2.563mV      2.563mV ZTrck
---

2

Manual entry of Zero Error,      0.000mV or press Enter to continue
--

3

Press E to continue Mass rate = 0.000
--

4

(Zero reset) To Start zero cal, Press E Mass rate = 0.000      Revs = 0.0
--

5

To Abort zero calibration, Press A Mass rate = 0.000      Revs = 0.0
---

6

To calculate new calibration, Press E Mass total = 1.150      Revs = 10
--

7

Zero error = 2.756 millivolts Press E to save, otherwise press A
---

1. At Menu Entry 3, press Enter to proceed.

2. (Optional) Using a digital voltmeter, measure the belt zero error value (in millivolts) at the loadcell, or read the mV level displayed in menu 8.

Manually key in the value to the Masterweigh and press the Enter key to accept. Otherwise, press Enter with no data entered to continue with no change.

Note that entering this value does not negate the need to perform a zero calibration.

3. The live zero error is now displayed as a mass rate. Press Enter for the loadcell calibration procedure.

4. The mass total will now display zero. Check that the belt is empty, and then press the Enter key to begin the zero calibration test.

5. The difference between the current loadcell zero and the actual load reading is accumulated over the test duration, which is the total number of belt revolutions specified in menu 2.

The test can be aborted at any time by pressing the Abort key. If the test is aborted, the "working copy" of the load zero is reinitialised from the stored load zero calibration value. This "working copy" normally includes contributions from both the load zero calibration (as carried out in this menu entry) and the auto zero tracking function. It is thus possible by entering the menu to this level and then aborting to reinitialise the working copy of the load zero and remove any auto zero tracking contribution.



## **MENU ENTRY 3 – Load Zero Calibration (Cont'd)**

---

6. This display will come up automatically when the belt has completed the required number of revolutions. The measuring phase of the test has finished and the resulting mass total is displayed. This mass total should be approximately zero, however if non-zero then a new loadcell zero may be required.

Press the Enter key to display the millivolt offset resulting from this test.

7. The new loadcell zero, or offset, is displayed in millivolts. Press the Enter key to save this value as the new loadcell zero, or press Abort to exit without saving.

## MENU ENTRY 4 – Fixed Weight Calibration

This menu entry allows the automatic calibration of the load-cell span. The test is run over a preset number of belt revolutions, as set in Menu 2, during which calibration weights (or weigh chains) are placed on the belt or weighframe. A mass total is accumulated in the course of the test. This total is then compared with an expected or "target" weight and the span adjusted accordingly. A load zero calibration should generally be performed (Menu 3) before running this procedure. The display shows the currently stored loadcell span value.

1

Menu entry : 4 Fixed weight calibrate, span = 222.1
--

2

Manual entry of Span Factor, 0.000 or press Enter to continue
--

3

Current Target Weight = 120.8 tonnes Enter new value? 0.000 tonnes
---

4

Press E to continue Mass rate = 0.000
--

5

To Start span calibration, Press E Mass rate = 0.000 Revs = 0.0
--

6

To Abort span calibration, Press A Mass rate = 1543.00 Revs=2
--

7

To calculate new calibration, Press E Mass total = 120.000 Revs = 10
---

8

New span factor = 223.580 Press E to save, otherwise press A
---

9 (Seen only if span invalid)

Span of 345678.123 is invalid Press A to continue
--

1. Press Enter when at Menu Entry 4 to proceed.
2. At this stage the belt span factor can be set manually by entering the desired span factor and pressing the Enter key. If no value has been entered, then no change is made to the stored value and the next level is entered.
3. The target weight is the mass total that is expected over the number of belt revolutions as currently set (Menu 2) when the calibration weights are in place and hence are simulating a load on the weigh frame. This target weight may at this point be changed to suit the calibration weights being used. Note that this value will generally be determined by running this procedure and recording the result, immediately after performing an empirical calibration. (Menu 5).

If a new value is entered then pressing the Enter key will save this as the new target weight. If the Enter key is pressed without entering a target weight, then no change to the stored value occurs.

4. The current mass rate is shown, the number of belt revolutions is zeroed. Press the Enter key to start the test.
5. Once started the test will run until the currently specified number of belt revolutions has been counted. (Refer Menu 2).
6. During this step the weight is totalised over the specified number of belt revolutions, after which time the totalisation is automatically stopped. If the Enter key is pressed during the test, then the totalisation will be terminated, with a mass total of zero. The test can be aborted at any time by pressing the Abort key.

## **MENU ENTRY 4 – Fixed Weight Calibration (Cont'd)**

---

7. The resulting mass total is displayed along with the number of belt revolutions counted. Press the Enter key to calculate the new span calibration factor.

8. The new derived load-cell span is displayed. Press the Enter key to save this value as the new loadcell span. Press the Abort key if this value is not to be stored, and the previous span value will be used for the span.

9. Should the span value calculated be outside the range 0.1 to 3000 then the Masterweigh will display a warning message. Under these circumstances the new span will not be saved, and the unit will revert to the value previously stored.

## MENU ENTRY 5 – Empirical Span Calibration

This menu entry enables the entry of manual belt totalisations and the resultant re-calculation of the loadcell span. To use this calibration facility, it is necessary to weigh a quantity of material with the belt scale and then to accurately determine the actual mass of that material by independent means (ie. via a weighbridge). The two totals are then entered and the Masterweigh computes the new span factor.

1

Menu entry : 5 Empirical calibration, span = 211.7
---

2

Enter weighbridge total? 0.000
--------------------------------

3

Enter belt scale total? 0.000
-------------------------------

4

New span = 205.6, Previous=211.7 Press E to save, otherwise press A
--

1. At Menu Entry 5, press Enter to proceed.
2. Enter the exact mass total, as measured by the weighbridge or other accurate method. Press Enter when the data is correct.
3. Enter the mass total as measured by this Masterweigh unit. Press Enter.
4. Press Enter to store the new span value as the loadcell span calibration factor. Press Abort if no update is required.

## MENU ENTRY 6 - Null Level

This entry displays the level below which the load is considered to be zero, and the mass rate display will show zero, no increment of the mass total will occur, no pulses will be output to the e.m. pulse counter and the mass rate analog output will be set to 4.0mA.

1

Menu entry : 6 Null level = 20.000 tonnes/hour
---

2

Max mass rate = 20.237 Press clear to reset max
--

3

Enter a new null level? 22 Mass rate = 20.657 tonnes/hour
--

1. At Menu Entry 6, press Enter to proceed.
2. This feature traps and displays the maximum mass rate and can be used to determine the null level. (See note below)
3. Key in the new null level of zero. Press Enter when the data is correct.

**Note:** The null level is used to mask variations in mass rate caused by variations in the belt weight, due to the belt splice etc. To select the null level, observe the mass rate shown over several belt revolutions with the belt running completely empty (i.e no product or calibration weights). Take note of the highest mass rate reached, and then enter a value slightly higher than this level. E.g. if the max mass rate was 20 select 22 as the null level. On a correctly installed and aligned weigher, this figure should be approximately 1% of capacity.

## MENU ENTRY 7 – Auto Zero Tracking

This entry specifies the level below which automatic zero tracking occurs and the number of belt revolutions required before a new zero level is established in the Masterweigh.

The auto zero mode will not be entered, or continue unless the mass rate remains below the specified level. The value is normally set at approximately 1.5% of capacity. A qualifying time delay period is also provided to ensure that the belt is completely free of material.

Should it be necessary to clear the present auto zero value, then this can be done by entering Menu 3 (load zero calibration), then aborting after starting the test. A "z" will be displayed at the right hand side, bottom line, of the main mass rate/mass total display, when the auto zero conditions are met and the Masterweigh is collecting data for a possible new zero level. Note: The auto zero tracking procedure is inhibited under the following conditions: -

- Masterweigh not in the mass rate / mass total display mode

or

- Input tachometer frequency less than 5.0Hz.

1

Menu entry : 7 Zero track if < 20.0 for 5 revs
---

2

Auto zero level = 20.000 tonnes/hour Enter new level? 0.000
--

3

Auto zeroing period = 5 revs Enter new period? 0
---

4

Delay before auto zeroing = 60 secs Enter new delay? 0
---

1. At Menu Entry 7, press Enter to proceed.
2. Enter the new autozero level in mass rate units and press the Enter key. If the Enter key is pressed with no data entry then the stored value remains unchanged.
3. Enter the period required (in belt revolutions) over which autozeroing occurs. Note that the number of belt revolutions should be chosen such that the total zeroing period is of the order of 15 minutes or more. This will ensure that accurate zero levels are produced.
 

**Note** that the actual zero level used by the Masterweigh will not be updated until a zeroing period has been completed. If a new value is entered and the Enter key is pressed then that value is saved, otherwise no update occurs.
4. This entry enables the qualifying delay time to be set. Choose a time that will ensure that all material is off the belt. The delay time commences when the mass rate falls below the minimum level set above.

## MENU ENTRY 8 – Loadcell Input

This entry displays the loadcell input in millivolts. The displayed value is unaffected by the load zero, load calibration, and zero tracking functions. In addition to the loadcell value, the entry displays the excitation voltage as currently sensed by the Masterweigh. It is displayed to the nearest volt only, i.e. 10V implies a voltage in the range 9.501 to 10.5V. The excitation value is updated once every 3 minutes. This display is provided to enable a user to confirm that the Masterweigh is correctly sensing the excitation voltage and thus that all links etc. are correctly installed. Incorrect excitation sensing will result in inaccurate and unstable mass rate measurements.

1

Menu entry : 8 Load cell = 16.235mV, (Exitn. = 10V)
--

1. This menu is for display only.

## MENU ENTRY 9 - Tacho Frequency

This entry displays the current tacho frequency in hertz, (the input range is 5Hz to 1000Hz) and switches between software or hardware inputs.

1

Menu entry : 9 Tacho Frequency=50.005 Hertz
--

2

Tacho source = Hardware Press Clear to change, Enter to accept
---

3

Tacho source = Simulated Press Clear to change, Enter to accept
--

1. Press "E" to enter the menu to select the source of the tachometer signal.
2. Press "C" to change (or toggle) between the available pulse sources which are :
  - Hardware – input signal to the system as generated by the speed sensor ( magnetic pick-up or optical tachometer )
  - Simulated – an internally generated 100Hz signal that is always on.
3. Press "E" to accept and return to the Menu Entry 9.

## MENU ENTRY 10 – High Alarm Setpoint

This entry displays the level that must be exceeded by the mass rate, for the period specified, before a high alarm is generated. When the alarm is generated, the high alarm relay is energised. The alarm indication is cleared, the relay is de-energised, and the delay period reset as soon as the mass rate returns below the high alarm set point.

1

Menu entry : 10 High alarm = 800.000 Delay = 60 secs
---

2

High alarm level = 800.000 tonnes/hour Enter new level? 0.000
--

3

Alarm delay = 60 secs Enter new delay? 0
---

1. Press the Enter key at Menu Entry 10 to change the settings.

If no change is keyed in and the Enter key is pressed, the values are unchanged. If an alarm level of zero is entered, then the high alarm is disabled.

2. Enter the period required, in seconds, for the mass rate to exceed the high alarm level, before high alarm is generated.

Then press the Enter key. If no data is entered and the Enter key is pressed, then no change occurs to the stored delay.

## MENU ENTRY 11 – Low Alarm Setpoint

This entry specifies the level below which, and the delay that must be exceeded before a low alarm output is generated. When the alarm is generated, the low alarm relay is energised. The alarm indication is cleared, the relay is de-energised, and the delay period reset as soon as the mass rate returns above the low alarm set point.

1

Menu entry : 11 Low alarm = 100.000 Delay = 60 secs
--

2

Low alarm level = 100.000 tonnes/hour Enter new level? 0.000
---

3

Alarm delay = 60 secs Enter new delay? 0
---

1. Press the Enter key at Menu Entry 11 to change the settings.

2. If no change is keyed in and the Enter key is pressed, the values are unchanged. If an alarm level of zero is entered, then the alarm function is disabled.

3. Enter the delay (in seconds) required before a low alarm is generated, then press the Enter key. If no data is entered and the Enter key is pressed, then no change occurs to the stored data.

## MENU ENTRY 12 – Print Parameters List

The data to be printed is output via the RS232 serial data port, which is provided on the Masterweigh. The communication parameters are as follows:

Baud Rate	19.2kB	Stop Bits	1
Data Bits	8	No Parity Check	

1

Menu entry : 12 Press E, to print parameter list
---

1. Press the Enter key at Menu Entry 11 to print the current stored values of the various weigh parameters.

Note that some versions of software have had this feature disabled. The menu will still be present, but pressing the Enter key will do nothing.

## MENU ENTRY 13 - Auto/Manual Control of MW PID Output

The current operating mode of the PID output, "Auto" or "Manual", is displayed at the bottom right corner of the display. Additionally, when the PID output is in manual mode an upper case "M" is displayed in the bottom right corner of the main "mass rate/mass total" menu.

1

Menu entry: 13 PID O/P Auto/Manual      Mode = Auto
--

2

Rate = 286.472 S.P. = 300.0 O/P = 53% +/- controls O/P,    Press Enter when done
---

3

PID O/P Mode =    Auto Press Clear to change, Enter to accept
--

1. Press Enter key at Menu Entry 13. The current measured values of mass rate, PID setpoint and the manual mode PID output settings are displayed

2. When operating in automatic mode, the PID output performs as previously, the output being based on the current mass rate, PID setpoint and PID constants. When operating in manual mode, the PID output is forced to the value

displayed (for the manual mode PID output) as a percentage of 4-20mA. The value of the

manual mode PID output can be increased or decreased by using the '+' or '-' keys. The keys increment/decrement the output in 0.5% steps, to take advantage of the maximum analog output resolution of the Masterweigh. The +/- keys are auto repeating if pressed for more than one second, to allow fast setting of the desired manual mode PID output value. Note that when manually entering PID values, the values can roll over. Eg. if the current value is 100% and the + key is pressed, the output will become 0%. If the current value is 0% and the - key is pressed, the output will become 100%. The PID value can also be set by 2-digit key entry ie a PID value of 56% can be entered by pressing the 5 and then the 6 digit keys. The range of the manual mode PID output is automatically limited to values between 0 and 100% (4-20mA). Press the Enter key to move to the next level.

3. Pressing the Clear key toggles the current PID output mode and the display will indicate any mode changes. Pressing the Enter key will accept the PID output mode currently displayed and return to Menu Entry 13.



## MENU ENTRY 14 – PID Parameters

The Masterweigh includes a proportional/Integral/Differential (PID) control loop for use in controlling mass flow rate. The PID variable for the controller is the current mass flow rate as displayed by the Masterweigh. The output from the controller is via a 4-20mA analog output (channel 2). The controller output is updated once per second, and would normally be used to control belt speed.

1

Menu entry : 14 PID parameters      PID action: forward
--

2

Local setpoint = 800.000 tonnes/hour Enter new value? 0.000
--

3

Proportional term = 0.700 Enter new value? 0.000
---

4

Integral term = 0.050 Enter new value? 0.000
---

5

Integral lower limit = -0.500 Enter new value? 0.000
---

6

Integral upper limit = 0.800 Enter new value? 0.000
--

7

Differential term = 0.000 Enter new value? 0.000
---

8

Output offset term = 0.000 Enter new value? 0.000
--

1. Press Enter at Menu Entry 14.
2. Enter a new set point in mass units if required. This value will only be used in the control algorithm if the setpoint mode is set to "Local" in Menu 15. Pressing Enter without typing new data will move the display to the

next entry without altering the stored data.

3. Enter a new proportional gain term if required, or press Enter only to leave data unchanged.

**NOTE:** The proportional term is "normalised" by the Masterweigh such that a gain of 1, an error of 100% full load capacity (as currently set in Menu 1), will cause a full scale (100%) out current.

4. Type in a new integral term, or Enter only to leave data unchanged.

**NOTE:** The integral term is "normalised" by the Masterweigh such that with an integral term of 0.01 and an error equal to the current capacity (as set in Menu 1), 1% will be added to the current output level each 0.5 second. (Or say 10% for an integral term of 0.1)

5. This entry allows the operator to prevent Masterweigh decrementing the integral term below a set value, thus preventing "wind-up".

6. This entry allows the operator to prevent Masterweigh incrementing the integral term above a set value, thus preventing "wind-up".

7. Enter a new differential term, or press Enter to retain existing data. The differential (or derivative) term is normalised such that with a differential term of 1, a change in error equal to the current capacity in 1 second, will cause an instantaneous output of 100%.

8. Enter a new output offset term if required, or press Enter only to leave the current output unchanged.

**Note:** The output offset term is "normalised" by the Masterweigh such that, with an output offset term of 0.1, the normal PID controller output will have added to it a value equal to 10% of full-scale.

## MENU ENTRY 14 – PID Parameters (Cont'd)

9

Feed forward term = 1.000
Enter new value? 0.000

10

PID action: Forward Enter new value?		
Forward = 1	Reverse = 2	0

11

Volumetric restart period =	5 sec
Enter new value? (Max 20)	0 Sec

12

Volumetric restart threshold =	5,0 %
Enter new value? (Max 50)	0.0%

13

To zero accumulated Integral press E
Else press A

9. The feed-forward control component operates by multiplying the set point value by the entered feed-forward term and adding the result onto the PID control algorithm calculated output value.

Feed-forward control has a beneficial effect on controller response time and stability when the process being controlled has a long time delay. The feed-forward term can be set to zero for control applications where it is not required. Enter the new value for the feed-forward term. If no value for the feed-forward term is entered, then no change is made to the currently stored value.

10. This changes the PID action between forward and reverse, which will invert the PID output action from 4-20mA to 20-4mA

11. Enter the new Volumetric restart period, (maximum period allowed is 5 sec) and then press the Enter key. If the Enter key is pressed with no data entry then the stored value remains unchanged.

12. Enter the new Volumetric restart threshold, (maximum value allowed is 50%) and then press the Enter key. If the Enter key is pressed

with no data entry then the stored value remains unchanged.

13. It may be desirable to zero an accumulated integral in the PID controller; for example, after the Masterweigh is left operating when the belt has been stationary for some time. At this stage pressing the Enter key will zero the accumulated integral. If abort is pressed instead, then the current accumulated integral will remain unchanged.

The **volumetric restart** feature works in the following way. When the belt stops (detected by the tachometer input being less than 5Hz), the MW1 stores the PID output value 1 second before the belt stopped. When the belt is restarted, and the stored value is above the "Volumetric Restart Threshold", then the PID output is held at the stored value for the "Volumetric Restart Period". If the setpoint was changed while the belt was stopped, the PID output value will be set to a value of the stored value multiplied by the ratio of the current setpoint over the setpoint when the belt stopped. There is a divide-by-zero test in case the setpoint was set to 0 when the belt was stopped; in which case the output is not scaled.

The Volumetric Restart Threshold is used to prevent the system from oscillating, where if the PID goes low enough to stop the belt, and the belt is then restarted the output will be held at the previous value, which will stop the belt, etc, etc, etc. If the PID value recorded when the belt stopped is below the Volumetric Restart Threshold, a normal restart will occur, i.e. no Volumetric Restart action.

## MENU ENTRY 15 & 16 – Remote Setpoint

The Masterweigh can accept a feed rate setpoint from the keypad or by reading a current flowing in an external 4-20mA current loop. (Note: The setpoint can also be set from the RS232 communications port. This is easily achieved with the multi-drop Masterweigh network adaptors, which are an optional supply. Please contact Web-Tech if you require more information on the Masterweigh Network. )

If the remote signal input is enabled, the input signal is converted to a mass rate where 4mA represents 0 units and 20mA represents full scale belt capacity.

The remote setpoint is displayed in Menu 16 in units of mass.

1

Menu Entry : 15 Remote Setpoint Mode = On
--

2

Remote Setpoint = On Press Clear to change, Enter to accept
--

3

WARNING: Calibration Data Do Not Modify – Press A to continue
--

4

Remote Setpoint 4mA Press Clear to calculate new calibration
---

5

Remote Setpoint 20mA Press Clear to calculate new calibration
--

At Menu Entry 15, press Enter to proceed.

1. The remote setpoint will be displayed as "On" or "Off" depending on whether remote setpoint operation has been enabled or not.

2. Pressing "C" (Clear) will toggle the remote setpoint operation either "On" or "Off".

3. The display drops through on pressing "E" to the above warning message. If you do not wish to calibrate the current loop input, press "A". To calibrate the input, press "E", and perform the following steps to calibrate the remote setpoint.

4. Press "C" while injecting a 4mA signal from an external device.

5. Press "C" while injecting a 20mA signal from an external source as above.

The display will now revert back to Main Menu 15 heading displaying:

Menu Entry 15 Remote Setpoint Mode = ON
--

This menu displays the current setpoint value, and the setpoint mode, as below:

Menu Entry: 16 Setpoint = 1001.334 tonnes/hr.      Remote
--

If the setpoint is set to a value below the null level as set in menu 6 the PID 4-20mA output is set to 4 mA. The display will show Nulled as shown below.

This feature prevents the Masterweigh from starting the belt when the remote setpoint is used to stop the belt and noise on the 4-20mA signal may be interpreted as a signal.

Menu Entry : 16 Setpoint = 0.074 tonnes/hr	Nulled Remote
---	------------------

## MENU ENTRY 17 – Modification of Filter Constants

Filtering can be applied to the following functions:

- Displayed mass rate
- 4-20mA mass rate output
- cascade controller output to PID controller ( ie. remote setpoint )
- mass rate output to PID controller
- PID controller output.

The level of filtering is specified by a constant, which may be in the range 1 second to 120 seconds. Time constants greater than 120 seconds have the same effect as a 120 second constant. A time constant of 1 second is equivalent to no filtering. Time constants greater than 1 second introduce a delay in the rate of change of the filtered function.

1

Menu entry : 17 To modify Filter factors press Enter
---

2

Display Time constant is	1 secs
Enter new Time constant	0

3

Rate O/P Time constant is	1 secs
Enter new Time constant	0

4

Cascade Time constant is	1 secs
Enter new Time constant	0

5

PID I/P Time constant is	1 secs
Enter new Time constant	0

6

PID O/P Time constant is	1 secs
Enter new Time constant	0

1. Press Enter to modify the display filter time constant.

2. The display mass rate filter time constant is shown. When a time constant of greater than 1 is selected, the main mass rate display is damped. A new value for the display filter constant may be entered.

3. The 4-20mA mass rate output filter time constant is now displayed. A new value for the mass rate output filter constant may be entered.

4. The time constant for cascade control to PID input filter is displayed. A time constant of greater than 1 will cause the cascade input signal to be damped before being applied to the PID control algorithm. A new value for the Cascade filter constant may be entered.

5. The PID controller input filter time constant is displayed. A time constant of greater than 1 will cause the mass rate signal, which is fed back to the PID input, to be damped before it is applied to the PID control algorithm. A new value for the PID input filter constant may be entered.

6. The PID controller output filter time constant is displayed. A time constant of greater than 1 will cause the PID control algorithm output signal to be damped before it is output via the 4-20mA output. A new value for the PID output filter constants may be entered. Operation now returns to Menu Entry 17.

**Note: At each step, pressing the Enter key will save the new value. If a new value has not been entered, then the current value is unchanged.**

## MENU ENTRY 18 – Modification of Displayed Units

The displayed units for mass rate may be selected from one of the options shown below. The displayed units for mass total will be the same as those selected for mass rate. The belt speed displayed in menu 19 will be shown in meters/sec or feet/min depending on the units selected for MRMT.

1

Menu entry : 18 To modify displayed Units, Press E
---

2

1 = tonne/hr	2 = kg/hr	3 = kg/min
4 = ton/hr	5 = lb/hr	6 = lb/min

1. Pressing the Enter key will advance the display to the select mass units.

2. To select the required mass rate unit's press the appropriate number key associated with it, then press the Enter key.

Numbers greater than 6 will not change the currently displayed mass total and mass rate units.

Pressing the Enter key without entering a new unit number will not change the currently displayed units.

## MENU ENTRY 19 - Belt Speed Indication

This entry displays the current belt speed in metres/second or feet/minute, depending on the mass rate units selected in menu 18. The calculation is based on the total belt length in metres.

1

Menu entry : 19 Belt speed = 3.10 metre/second
---

2

Current belt total length = 200.000 m Enter new belt total length 0.000 m
--

3

Enter measured belt speed in m/minute 0.000 Press E for belt length
--

4

Calculated belt length = 197.698 metres Press E to Save, otherwise press A
---

1. This entry shows the current calculated belt speed. Press Enter once to enter new total belt length in metres.

2. The current value for the belt length is shown. If the belt length is known, enter it here.

3. If the belt length is not known, and an accurate belt speed has been physically measured from the belt itself, the Masterweigh can calculate the belt length. Enter the measured belt speed in the units shown, then press E to calculate the new belt length.

4. If you entered a belt speed, this value will be the calculated belt length. If it seems correct, Press enter to save the value, or abort to ignore the calculation. Note that if you entered a belt length in step 3 and not a belt speed in step 4, this value will be meaningless. Press E to continue.

---

## MENU ENTRY 20 – Clearing Mass Total

---

Menu entry : 20 Press C, to clear Mass Total
---

1. When the mass total on the "mass rate/mass total" display (MRMT) is to be zeroed, press C at Menu Entry 20. The integrator then cancels all totalised figures.

Press Menu, then Enter to return to the MRMT display.

## RESETTING MASTERWEIGH

Under some circumstances Masterweigh's memory can be corrupted so that correct operation of the unit is not possible. This condition can occur if Masterweigh has been subjected to severe electrical noise or spikes.

These phenomena usually occur on 240/110V AC power lines, however they can also appear on the loadcell input cables as well as the tachometer cables. Masterweigh has been protected as far as possible; however, severe noise or spikes can get through.

Once any part of memory has been corrupted Masterweigh will detect it and automatically flag an error. If the corruption has only changed data, an error may not be detected and some erroneous results may occur. The only way to clear the memory of this data is by re-initialising.

Switching off and on will not clear the memory. The act of re-initialising causes all the calibration data to be lost and replaced by default factory data. The calibration data specific to your application can easily be re-entered if you have kept a note of what was in the menus.

Menu 1 however, does have specific data which is engraved on the main PCB under Calibration zero and Precision ref.

**LOG ALL CALIBRATION DATA, AS YOU MAY NEED TO MANUALLY RE-ENTER IT AT A LATER DATE.**

**TO RE-INITIALISE MASTERWEIGH PROCEED AS FOLLOWS:**

(For software versions 2.9 & over only)

1. Switch off Masterweigh.
2. Simultaneously press the Minus and Enter keys.
3. With both the above keys pressed switch Masterweigh on.
4. The display will now show the message:

Press C to Configure  
Any other key to continue

5. Now press the C key and Masterweigh will return to normal running mode.
6. To check that configure has been accepted, press E key. Display will read:

System normal - Reset = 3 (+ to clear)  
Configure = 2 (- to clear)

Note: Each time Masterweigh is powered up, reset figure increments one count. Configure number remains the same unless another configure is attempted, whereupon the count increases by one.

7. Press E key to return to running mode.
8. Values in all menu entries will now default to factory values.
9. Ensure precision zero and span voltages are entered in Menu 1 correctly before entering all other data values in following menus.

**REMEMBER:  
YOU MUST EITHER RECALIBRATE OR  
ENTER YOUR ORIGINAL CALIBRATION  
DATA.**

---

## FACILITIES AVAILABLE

---

### Introduction

The Masterweigh is a precision microprocessor based instrument for accurate integration of mass totals in belt scale and weighfeeder applications. A wide range of facilities are provided, each of which is described below.

Note that detailed information relating to the keyboard operating command procedures is to be found earlier in this manual.

### Load Cell Input and Excitation

The Masterweigh is designed to accept a loadcell millivolt signal in the range 0 to 32 millivolts with a resolution of approximately 4 microvolts.

An on-card voltage source provides excitation for the load-cell. This source can provide excitation for up to seven 350 ohm loadcells in parallel.

The excitation is not precisely controlled, but is maintained within approximately 1 percent of the set value. The Masterweigh monitors the excitation voltage and automatically compensates for any voltage change, which may occur.

The excitation is adjustable over a wide range to enable optimum performance to be obtained from a wide variety of loadcells.

The Masterweigh may be configured to provide either a positive excitation voltage referenced to ground (unipolar) or a plus/minus (bipolar) voltage, by configuration of links. The positive voltage is continuously adjustable from +9 to +12 volts. The negative voltage is set at -12 volts. The Masterweigh is factory set for a unipolar excitation of 10 volts.

Following adjustment of the excitation, allow a minimum of 30 seconds for the Masterweigh to update its internal excitation reading before proceeding with calibration functions.

The approximate value of the excitation voltage sensed by the Masterweigh is displayed in Menu 8. This should match the voltage sensed at terminals 19 and 20, if link LK3 is correctly installed, and should be checked when configuring the Masterweigh. (Allow 30 seconds for update of display after adjusting the excitation).

Incorrect configuration of excitation sensing will cause erratic mass rate readings.

The millivolt input accepts either a differential millivolt signal or a half-bridge input and will operate accurately over a common mode range of minus 8 to plus 8 volts. The input is overload protected to plus or minus 35 volts on either terminal with the Masterweigh energised, and plus or minus 20 volts on either terminal when not energised. Transient overload capacity is much higher than this continuous rating, and depends on the duration of the overload.

The analog digital conversion is performed using voltage to frequency conversion techniques, thereby providing excellent rejection of signal noise over a wide frequency range.

With the exception of short periods allocated to self-calibration and reading of the auxiliary input channel, the Masterweigh is continuously monitoring the load-cell input rather than periodically sampling, as is the case for systems which use dual-slope integrating converters. This results in a more accurate measurement of the rapidly fluctuating input signal from the load-cell.



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## FACILITIES AVAILABLE (CONT'D)

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### Loadcell Input and Excitation (Contd.)

Careful design of the input circuitry ensures excellent rejection of common-mode signals both AC and DC.

Note: The excitation voltage regulators are overload and short-circuit protected, however, short circuiting of the excitation output will interfere with normal operation of analog input circuitry and the RS232 interface.

**Caution: Application of an external voltage source to the excitation terminals may cause serious damage to the Masterweigh.**

No calibration or adjustment of the Masterweigh analog inputs is required, other than the calibration of the current loop input in menu 15. Gain and zero are automatically adjusted by the reference. This automatic calibration is repeated once every 30 seconds, whenever the Masterweigh is energised.

After energising the Masterweigh, always allow a minimum of thirty (30) seconds for this automatic calibration to be performed before initiating a span or zero calibration sequence. (Note: If Masterweigh has not been energised for some time, allow 3 minutes before initiating the above).

An auxiliary analog input channel has been provided for sensing of a 0 to 20mA signal for cascade control or blending functions. The input includes a 1 ohm burden on the current loop, and thus drops 20 millivolts at 20mA. It is not an isolated input, and thus the current loop must include an appropriate ground reference.

The input will operate over a common mode range of -8 to +8 volts. The loop supply would normally be earthed at the transmitter end. It must be earthed at one point only. The input circuitry provides excellent common mode rejection of AC noise, however, the peak AC noise voltage must not exceed 8 volts.

If the Masterweigh is not earth referenced, then one side of the auxiliary input must be connected to the adjacent ground (shield) terminal to provide a voltage reference point. (Refer to Section "Earthing" for a discussion of the earth reference link).

The maximum allowable input overload current is 500mA. The maximum allowable continuous voltage on either input terminal is plus or minus 35V DC or AC measured with respect to the Masterweigh ground (plus or minus 20 volts with the Masterweigh de-energised).

Note: The auxiliary input may be converted to a millivolt input by removing the current shunt resistor R22. The input will then have the same characteristics as the loadcell input.

### Tacho Input and Supply a) Electrical Characteristics

The tacho input is designed to accept a voltage input of 2.5 to 50 volts peak and so will accept either a TTL or sinusoidal voltage input. The input threshold voltage is +1.2 volts at the positive input with respect to the negative input. The negative input is directly connected to the Masterweigh grounds. Avoid earthing this input in the field, as it will create ground loops.

The tacho input will not accept frequencies in excess of 900 Hz (approx.).

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## FACILITIES AVAILABLE (CONT'D)

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### Tacho Input and Supply (Contd.)

A regulated +5 volt supply is provided for energising a digital pulse generator. This supply is rated at 200mA maximum and is overload and short-circuit proof with fold-back current limiting.

It may be necessary to briefly remove the load after removing a short circuit in order to reset the protection circuit. Short-circuiting of the tacho +5 volt supply will not affect the Masterweigh CPU operation.

**CAUTION: Application of an external voltage source to the tacho supply terminals may cause damage to the Masterweigh.**

### b) Frequency Selection

The tacho generator should be selected and fitted to provide a frequency input to the Masterweigh within the range 5 to 1000 Hz, to ensure compatibility & accurate measurement.

Note that the tacho frequency has no effect on the rate at which the load cell signal is sampled.

### Pulse Output

The Masterweigh provides a pulse output for external accumulation of the mass total. One 100-millisecond pulse is output each time the least significant mass total digit displayed is incremented by 1 count. A minimum of 100 milliseconds is guaranteed between pulses, thereby providing a maximum pulse rate of 5 pulses per second. (100 milliseconds on, plus 100 milliseconds off).

**NOTE:** Pulse width can be changed in Menu 1 to 100m/s, 200m/s or 300m/s.

The output is a current-limited transistor driver, which can drive loads of up to 500mA. It is short-circuit protected. The driver operates with any supply voltage up to 45 volts DC and can use either an internal or external supply as required.

The internal supply is an unregulated DC supply of normal 28 volts. It is brought into circuit by appropriate configuration of links on the Masterweigh board. This internal supply is rated to a maximum continuous current of 400mA and may vary over the range 25 - 35 V DC, depending on mains voltage fluctuations and load.

Note that this supply can also be used for the analog output current loops. To use an external supply, reconfigure the links and connect a DC supply to the "28V DC" terminal adjacent to the pulse output. The pulse output is optically isolated and floats independent of the Masterweigh ground. The 28V DC supply provided on the Masterweigh is isolated from the digital ground to allow configuration of a fully isolated pulse or analog output. The 28V DC supply is rated at 400mA maximum and is overload and short-circuit protected.

### Analog Outputs

The Masterweigh provides two independent, fully isolated analog output channels. The outputs operate over a 4-20mA range and provide a resolution of better than 0.5%. They operate as a loop-powered configuration and therefore derive their operating power from the 4mA residual loop current. A minimum of 20 volts is required to operate with zero ohms load, rising by 1 volt for every 50 ohms of load, ie. 30 volt supply required for 500 ohm load.

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## FACILITIES AVAILABLE (CONT'D)

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### Analog Outputs (Contd.)

The output can operate with supply voltage of up to 50 volts and provides excellent rejection of power supply ripple and noise. The loop power supply thus need not be heavily filtered or regulated.

An unregulated DC supply is provided on the Masterweigh board, which can be used to energise the analog loops and the external pulse counter.

This supply provides a nominal 28V DC and is isolated from the Masterweigh ground. Links are provided on the board to enable this supply to energise either or both the analog outputs.

Note that if a common supply is used for the two outputs, they are no longer independently floating and cannot be referenced to separate earthing points.

To use an external loop supply, configure the links on the board appropriately and connect the external supply in series with loop in question.

Shorting the calibration link associated with each channel allows the span calibration of the outputs to be easily performed. This forces the digital input to full scale and allows easy adjustment of the full-scale current using the potentiometer provided.

There is no provision for zero adjustment on the analog outputs.

### Earthing

The Masterweigh power supply provides transformer isolation from the mains input and can thus be operated in a floating mode if required.

For safety reasons it is recommended to reference the unit to earth. This is achieved by installing the soldered earth link "ETH LK" located adjacent to the main power connector J1. This link is normally installed at the factory and may be cut if it is desired to "float" the unit.

### Display Backlighting

The liquid-crystal display used in the Masterweigh provides LED backlighting for improved readability under adverse light conditions.

Should backlighting not be required then it can be disabled by removing link 15. Note that inserting link 15 while the unit is running may cause a reset to occur. If EL backlighting is being used (there is a yellow or black transformer in position U57, not a resistor), it is recommended that link 15 not be installed unless the inverter output is connected to a display module (Connector J2), as damage to the inverter may otherwise result.

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## USER CONFIGURATION

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Refer to Dwg. T144-12 `Link Configuration Details`.

### LK1 Excitation Selection

This link allows the user to select either a unipolar or bipolar excitation voltage.

Refer also to Section "Load-cell Input and Excitation".

Unipolar is used for excitation voltages in the range 9 to 13 volts. Selecting bipolar allows a plus/minus excitation with a total voltage within the range 21 to 25 volts.

### LK2 On-Board Half Bridge

This link allows use of input devices, which have a half bridge configuration.

When linked for half bridge input, the negative side of the `loadcell` input is disconnected from the terminal block (J6), and instead connected to an on-board half bridge circuit. This half bridge is energised from the excitation as supplied to the external device.

The zero point is adjustable via RV2. (Refer to Section "Potentiometer Adjustments, RV2").

### LK3 Excitation Feedback Sensing

The Masterweigh monitors the excitation voltage level, to enable correction for small voltage fluctuations. If the gain of the unit is changed to allow a different input voltage range, then this link must be changed to provide the appropriate excitation sensing voltage.

Link (LK7) determines the gain of the input, and thus the appropriate configuration of LK3.

Refer "Link Configuration Detail" drawing for options.

### LK4, LK5 Precision Reference Selection

The Masterweigh continuously calibrates its input circuitry against its precision reference source.

When the gain of the unit is changed via link 7, these 3 links must be re-configured as shown on the "Link Configuration Detail" drawing.

Note: The auto calibration of the unit via the precision reference affects all inputs and displayed quantities, including the millivolts displayed in menu 8.

To confirm that this auto calibration is working correctly, check the zero and scaling of the millivolt display against a meter, accurate within 0.1 %.

### LK7 Analog Gain Selection

This link selects between the two alternative input voltage ranges.

The input voltage ranges available are:-0 - 35 mV and 0 - 3.5 V

Note that the Masterweigh will read inputs of more than double these nominal full scale values, however a linearity error of the order of 0.25% may be introduced at these levels.

Note: Links LK3, LK4, LK5 and LK6 must be re-configured when LK7 is changed.

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## USER CONFIGURATION (CONT'D)

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### LK8, LK9 External Pulse Counter Power Supply

These links allow the Masterweigh to be configured to use either an internal or external power supply for the pulse counter output. Please refer to Pulse Output Section for details. When linked for external supply, an external power supply must be connected between terminals 5 ('EXT 28V DC') and 7 ('Gnd').

### LK10, LK11 Full-scale Calibration: Analog Outputs

When installed, these two links force their respective analog output channels to full scale to simplify the calibration procedure.

With the exception of the microprocessor output latches and opto isolators, all normal circuitry of the respective analog output channel is used, thus providing a useful check of the D/A converter, output amplifier, and pass transistor.

Refer Section "Potentiometer Adjustments, RV4, RV5" for calibration details.

Ensure that these links are removed after calibration or testing, to allow normal output current control.

### LK12, LK14 Analog Output Supply Selection

These links allow the Masterweigh to be configured to use either an internal or external loop power supply for each of the two analog output channels.

Note that these outputs are "loop powered" and thus do not have separate power supply terminals.

If external loop supply is selected, an appropriate power supply must be connected in series with that current loop.

### LK13 Memory Map Select

This link is provided to enable possible elimination of the monitor EPROM at a later date. The link is factory installed to select the 27256 EPROM with a base address of 0000.

### LK15 Power Supply for Electro Luminescent Backlighting

If EL backlighting is being used (there is a yellow or black transformer in position U57, not a resistor), installing this link connects power to the DC to AC inverter which supplies approximately 100V AC to the backlighting panel in the display module. If the board is set up for LED backlighting (there is a resistor in position U57), this link connects power to the LED backlight.

Note: Connecting or disconnecting the backlighting while the Masterweigh is running may cause the system to reset due to current inrush into the inverter circuit. It is recommended that the inverter not be energised without a display module connected. (Display module connects at J2).

### LK16, LK17, LK18

LK16 is not currently allocated.

Links LK17 and LK18 form part of the standard RS232 interface. They allow the user to select the state of the two data control inputs to the Masterweigh.

DTR - Data Terminal Ready and  
RTS - Ready To Send

Install links LK17 and LK18 in all cases except where it is specifically required that one or both of these signals originate from the external serial device. RTS can be used by an external device to suspend data transmission.

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## POTENTIOMETER ADJUSTMENTS

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### RV1 Excitation Level Adjustment

This potentiometer allows adjustment of the excitation output voltage, as discussed in Section "Facilities Available, Load-cell Input and Excitation".

The excitation voltage may be monitored at terminals 19 and 20 on screw terminal block J6.

### RV2 Half Bridge Zero Adjustment (Not used by Masterweigh)

This adjustment is used only when the on-board half bridge is enabled (LK2).

The potentiometer should be adjusted so that there is a small positive voltage input, as displayed on menu 8, when the external half bridge device is at its minimum output state.

### RV3 Low Voltage Threshold Adjustment

#### a) Function

The Masterweigh incorporates a low voltage detection circuit on the +5 volt logic supply to ensure that spurious CPU operations will not occur during start-up, shut down or "brown-out".

The circuit clamps a reset on the unit whenever the supply is not within specification. The circuit includes 0.15 volts of hysteresis and operates as follows: -

- . Below 4.70V - Continuous reset to CPU
- . Above 4.85V - Normal run mode
- . Reset is released at 4.85V on rising supply
- . Reset activates at 4.70V on falling supply

This potentiometer is normally set and sealed at the factory.

#### b) Initial Set Up

Connect an adjustable DC supply to pins 5 and 12 of J1. (Mains supply board disconnected).

Connect a meter to the +5V rail of the Masterweigh and a logic probe to the system reset pin. (Pin 6 of U43).

Slowly increase the input voltage until the reset condition clears. Note the voltage at which this occurs.

Adjust RV3 until the reset clears at 4.85V with a rising input. Verify that the reset reactivates at approximately 4.7V with a falling supply.

### RV4, RV5 Analog Output Span Adjustment

Potentiometers RV4 and RV5 are used to adjust the full-scale output current of the analog output channels. The output circuit is designed to have a zero error sufficiently low such that no adjustment is necessary.

To adjust an output channel, first ensure that a suitable power supply is connected in the loop. Connect an accurate current meter in series. Using the calibration links LK10 and LK11, force the output to full scale. Use the potentiometer to set the current to the desired level - usually 20.0mA.

Note that when using a one and a half digit meter of limited resolution, it may be preferable to set the current at 19.98mA to allow a lower meter range to be used.

### RV6 Display Viewing Angle Adjustment

Adjust this potentiometer for optimum display viewing conditions. Note that some darkening of the display may occur with large increases in ambient temperature. Normal contrast will return as the temperature returns to normal.

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## RS232 INTERFACE

---

### Description

The Masterweigh unit provides a general purpose RS232 interface port. This port enables connection to a VDU, printer or another computer, for remote information display, or print out of the system configuration parameters.

The interface is normally configured for operation at 19200 Baud, with eight data bits and one stop bits. There is no received parity check, and no transmitted parity bit.

The maximum recommended transmission distance is 100 metres, using a shielded cable, however, this depends on the environment in which the cable is being run.

### Print Function

The primary use of the RS232 port to a Masterweigh user is to enable print out of all system set-up parameters. Such a print out may be done to a display terminal, or a hard copy unit.

If a "receive only" device (no keyboard) is being used, then the parameter print out may be initiated from the Masterweigh keyboard via Menu 12. All system parameters are listed, with English language descriptions for ease of interpretation. Note that this feature is not available with all versions of software.

### Commands Available

Note: HHHH is a hexadecimal number  
 [ ] indicates an optional parameter.

This list of commands is available on software version AUSR\_F02. Earlier versions of software may have slightly different commands available.

#### Basic Commands:

? - Displays the list of available commands.

**Time** - displays the time since the Masterweigh was last restarted or reset, in the format HH:MM:SS.

**Tacho** - displays the current tacho frequency in hertz.

**VF** - displays the instantaneous load cell input in terms of counts from the V to F converter, where 8000 counts = nominal full scale.

**Header** - displays the EPROM header information and software version number.

**Configure** - resets all parameters to default if the "C" key on the Masterweigh keypad is pressed after initiating this command. Use this command to initialise a new board, or to reinstate the non-volatile memory, if its contents have become corrupted.

**Restart** - software restart of the Masterweigh

**Outoff** - freezes the current loop outputs at their current value. To restart, use the restart command. Web-Tech technicians should only use this command.

Note: Add the suffix -R after a command to execute it repeatedly, or -RL to execute repeatedly and feed a new line. These options are only available on the commands Time, Tacho, and VF.

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## RS232 INTERFACE (CONTD.)

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### Automatic logging commands

The Masterweigh has been equipped with several commands that provide repetitive listings of certain parameters, to allow logging of these parameters. The logs will continue to print the data until any byte is sent to Masterweigh from the communications port or the Masterweigh is reset.

Logging commands available are:

**TCLOG** - starts a log of the tachometer input frequency in hertz, writing a new value on a new line approximately 5 times a second.

**LCLOG** - starts a log of the load cell input signal in milli-volts, writing a new value on a new line approximately 5 times a second.

**MRLOG** - starts a log of the following parameters: Mass Rate (in mass rate units), setpoint (in mass rate units), PID output (in %), tachometer frequency (in hertz), load cell input (in mV). The list of values are all sent on one line per sample with space delimiting, and each sample is on a new line (ie CR and LF is sent after each sample). This log produces one sample (one copy of the value of each parameter) per second.

### Modbus interrogation commands

The Masterweigh can be interrogated and controlled via a sub-set of the modbus commands, which are Query and Modify. If you wish to use these commands, please contact Web-Tech for the protocol format and the address listing.

Other commands available on earlier software versions are:

**DUMP HHHH [HHHH]**

Hexadecimal memory dump over specified range.

**IDUMP HHHH**

Interactive display of memory contents in a range of formats. Type? For a list of options when IDUMP.

**FREE** Displays units of free CPU time.

**PARAMETERS** Displays all current system parameters.

**EXIT** Exit to the debug monitor. (May require change of Monitor EPROM).



## MEMORY COMPONENTS

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### 1. EPROMS

The Masterweigh uses 1 or 2 EPROMS, one for program storage (U2: 27256, essential), and one for storage of the monitor (U6: 2764, optional), which normally will never be changed.

The EPROM sizes are as follows: -

Monitor: 2764, 8 kB available, 2 kB used  
(Note: Only 2 kilobytes are addressable in this EPROM location on the Masterweigh board).

Program: 27256, 32 kB available, 24 kB used (version 9)

(Note: EPROMS must be 250ns or faster).

The windows on the EPROMS should be covered when not being erased, to prevent accidental erasure.

The program EPROM includes a check sum, which is continuously verified during normal operation. Errors are flagged on the main display.

**CAUTION: Always ensure EPROMS are inserted with correct orientation. Reverse insertion will destroy the EPROM**

### 2. STATIC RAM

The Masterweigh uses 2 kB of low power static RAM.

### 3. NOV-RAM

NOV-RAM is the non-volatile memory in which all configuration data is stored. 256 bytes are provided.

This technology does not use batteries and will store data indefinitely without power.

Checksums are maintained on all data in NOV-RAM to detect data corruption or hardware failure.

Refer to the following Section "Hardware Self Checks".

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## HARDWARE SELF CHECKS

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### Introduction

The Masterweigh software performs a number of internal checks to ensure system integrity. Should any fault be detected, the display will commence flashing and a fault message will be displayed if the enter key is pressed when the display is in the MRMT mode.

### EPROM Checksum

The program data in EPROM is checksummed at startup and repeatedly whilst the system is running.

The checksum is stored in the 3rd and 4th locations of the EPROM and is the complement of the two LS bytes of the total of all bytes in the EPROM.

### RAM Check

The RAM is checked at start up using a simple read/write test, bottom up then top down. Any error detected will be flagged by a flashing display.

Note that since all RAM is used by the Masterweigh this test can be performed only at start up when the RAM is not in use.

### NOV-RAM Checksum Error

This indicates that data has been altered in the NOV-RAM, or in the RAM image of the NOV-RAM, without the checksum having been recomputed. This would generally indicate a software problem or operator corruption of data. This message will also be displayed if the data stored in the NOV-RAM has been corrupted (or not previously configured).

To correct a NOV-RAM checksum Error in the field, try the following procedure:

RAM Image corrupted - turn off the power momentarily to recall the correct data from NOV-RAM.

**IF THE ABOVE FAILS, REFER TO PAGE MW19 - "RESETTING MASTERWEIGH".**

---

## HARDWARE SETUP AND TROUBLESHOOTING

---

### Initial Set up

Items, which will need initial calibration and possibly, periodic recalibration are as follows:

- 
- . Power supply under voltage level setting
- . Analog output span adjustment
- . Precision reference voltage calibration

### Power Supply Voltage Level Sensing

An undervoltage detection circuit is incorporated in the Masterweigh to ensure that spurious CPU execution does not occur during start up, shut down or 'brown out'.

Refer to Section "Potentiometer Adjustments, RV3" for further information.

### Analog Output Span Adjustment

Each of the two analog output channels include a potentiometer for adjustment of the full scale span.

Refer Section "Potentiometer Adjustment, RV4, RV5" for further information.

Note that there is no provision for adjustment of the zero on these analog outputs. Should either zero out by greater than 0.4 mA at the 4.0 mA level then check for "out-of-spec" components.

### Precision Reference Voltage Calibration

The Masterweigh employs state-of-the-art auto-calibration techniques to establish and maintain highly accurate analog input circuitry. An extremely stable voltage source provides zero and span reference inputs.

Masterweigh uses these to establish the zero offset and gain of the input circuit, and thus compensates for drift due to temperature and ageing of components. It also means that the initial gain and zero offset of the analog to digital conversion and pre-amplifier circuitry is not critical, and thus component tolerances may be relaxed.

Note that the auto-calibration includes the effect of all components, which affect the accuracy of the load-cell input.

The reference circuit provided, although very stable with temperature and time, is not tightly controlled as far as initial voltage is concerned. It is therefore necessary at an early stage in the set up of the unit, to measure the actual reference voltages and to enter them into the system for storage in NOV-RAM. The values should then be checked whenever maintenance of the Masterweigh is undertaken.

Ensure that the meters used for checking the voltages are accurate to better than 0.1 % of reading at a measured voltage of 25 millivolts.

### The voltage calibration proceeds as follows: -

- Obtain a very accurate, high resolution digital voltmeter suitable for measurements at 5 and 25 millivolts with a minimum accuracy and resolution of +/- 5 microvolts for both measurements.
- Using pointed probes, connect the meter negative to the shunt on LK6 and the positive negative to the shunt on LK5, this is the "zero calibration" value and should be approximately 5 millivolts.
- Keeping the negative on LK6, move the positive to the shunt on LK4. This is the "span

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## HARDWARE SETUP AND TROUBLESHOOTING (CONT'D)

---

calibration" value and should be between 25 and 35 millivolts.

Using the keypad, access menu 1 and enter the zero and span values, and save on return to the main display. Allow thirty (30) seconds for the system to recalibrate in accordance with the new values.

### Analog Circuitry Notes

The input is an 8 channel differential multiplexer chosen for its input overvoltage withstand capability, low leakage current, and matching of on resistance between channels.

The AD524 instrumentation amplifier is chosen for its excellent gain and zero stability, common mode rejection, and low input bias and offset currents.

Whilst the exact zero setting is not critical, it is important that we have a "live" zero to ensure satisfactory operation of the voltage to frequency (V/F) converter, with a zero volts sign at the load-cell input.

#### **The zero is established by R71 and R72 and can be checked as follows:**

Apply a short-circuit to the load-cell input and, if no load-cell is connected to establish a ground path, make a connection between the input and the analog ground (shield) terminal to ensure that the input does not float outside the common-mode range of the input circuitry. With the Masterweigh operating normally measure the voltage at pin 9 of the AD524.

Since the multiplexer selects the load-cell input for 23/25ths of the input time, the voltage seen on a sampling digital voltmeter is typically quite stable and will be that signal due to the

Load cell input. (Ignore occasional deviant readings due to sampling of the cascade input).

The signal level due to the shorted input should be approximately 1 percent of full scale or at that point AD524, Pin 9, approximately 30mV, and not less than 20 mV. **Note** that this voltage is measured with respect to analog ground (Pin 6 of the AD524).

The V/F converter operates over the frequency range 0-200 kHz, for a voltage range after the AD524 of 0-3.2 volts (corresponding to a load-cell input of 32 millivolts).

Note that the V/F converter will accept inputs of up to 10 volts, as configured, with a corresponding frequency of approximately 600 kHz. Some loss of linearity occurs above 200 kHz however.

### Watchdog Circuit

The Masterweigh incorporates a watchdog circuit to ensure that a restart will occur should CPU execution be upset by some extraordinary event. The watchdog time-out period will be in the range 1-2 seconds. The watchdog may be disabled for hardware debugging purposes by temporarily removing C30.

### Signature Analysis

A 16 pin DIL pad arrangement is provided in line with the 8 CPU data lines to allow fault isolation on boards with CPU address, data, or control line faults. To use this facility, the 8 tracks between the pads would be cut and a socket soldered into place. The socket then provides access to the data lines.

A 16-pin DIL header can be used to restore the connection after any bus fault is rectified.

---

## FIELD TERMINAL STRIP

---

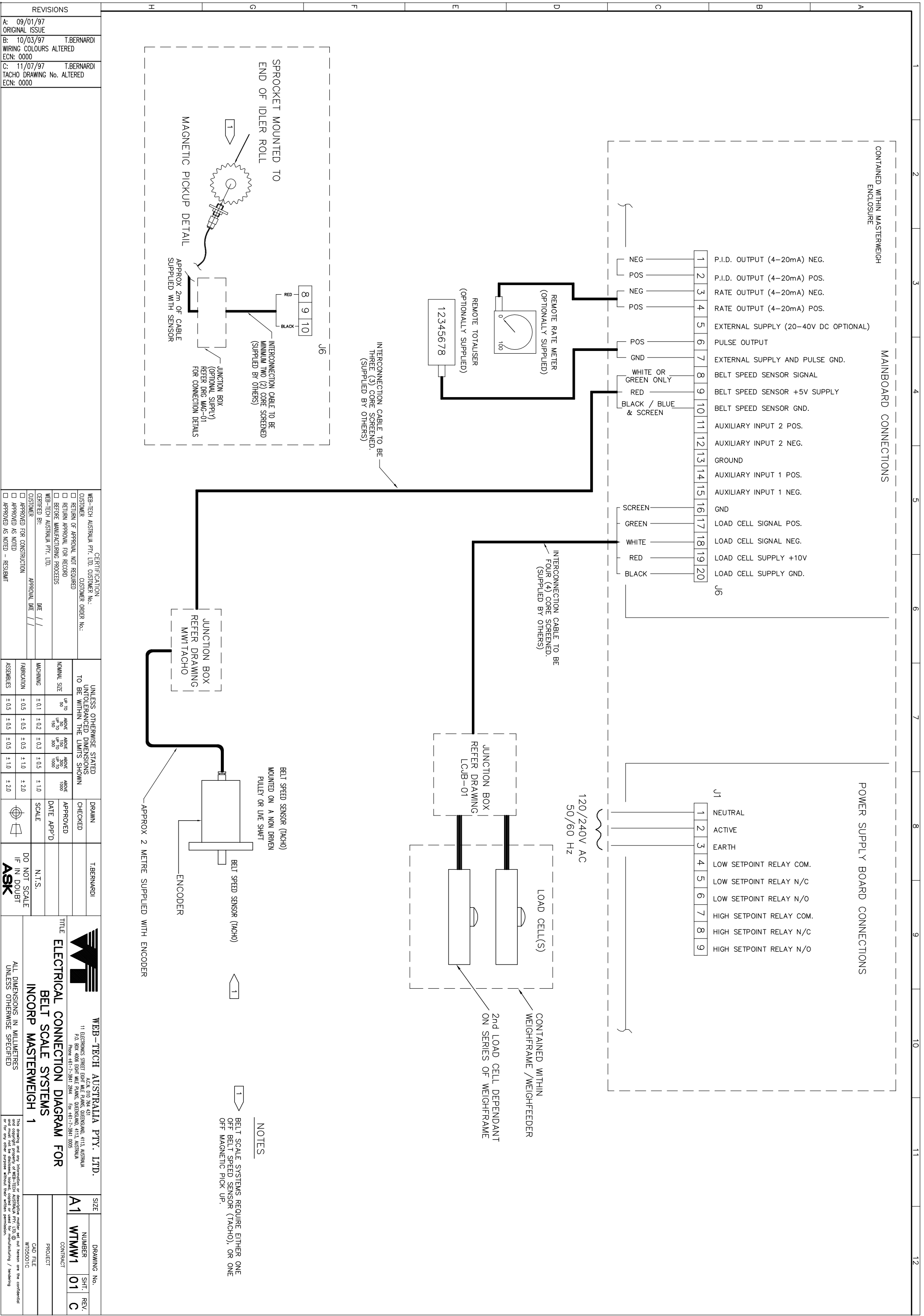
**TERMINAL**

No.			
		19	Load-cell excitation, positive output (9-13V)
1	P.I.D O/P 2, 4-20 mA, current in	20	Load-cell excitation, negative output (0 or -12V).
2	P.I.D O/P 2, 4-20 mA, current out.		
3	Rate O/P 1, 4-20 mA, current in		
4	Rate O/P1, 4-20mA, current out.		
5	External +28 V, (20-40 volt external supply for pulse output)		
6	Pulse output, (0-500 mA)		
7	Ground for external supply and pulse output		
8	Tacho pulse input, (2.5 to 50 volt, 5 to 800 Hz)		
9	Tacho generator supply, (+5V, 200 mA	max.)	
10	Digital ground for tacho generator.		
11	Auxiliary input 2, 0-20 mA, current in		
12	Auxiliary input 2, 0-20 mA, current out		
13	Ground: Reference and/or shield for auxiliary inputs.		
14	Auxiliary input 1, 0-20 mA, current in		
15	Auxiliary input 1, 0-20 mA, current out		
16	Ground/shield for load cell input		
17	Load cell input, 0-32 mV, positive input		
18	Load cell input, 0-32 mV, negative Input		

# DATA SHEET

Customer: ..... Conveyor Designation: .....  
 Model: ..... Load Cell Cap./Type: ..... Date: .....  
 Serial No: ..... Material: ..... Data by: .....  
 Contract No: ..... Order No: .....  
 VN No: .....

Menu	Masterweigh Data
1	Parameter Setup: Capacity ..... Inc. .... Zero Ref ..... mV Precision Ref. .... mV
2	Pulses ..... per Belt Rev .....
3	Zero Calibration ..... mV Z Track ..... mV
4	Fixed Weight Calibration: Span ..... Target Weight .....
5	Empirical Span .....
6	Null Level .....
7	Autozero Tracking: Zero Track if < ..... for ..... Rev Delay Time ..... secs
8	Load-cell Output: Static (No Load) ..... mV Static (with Weights) ..... mV Dynamic (No Load) ..... mV Dynamic (with Weights) ..... mV
9	Tacho Frequency ..... Hz
10	High Alarm Setpoint ..... Delay ..... secs
11	Low Alarm Setpoint: ..... Delay ..... secs
13	PID Auto/Manual .....
14	PID Parameters: Current Setpoint ..... Prop Term ..... Integral Term ..... Integral Lower Limit ..... Integral Upper Limit ..... Differential Term ..... Output Offset Term ..... Feed Forward Term .....
15	Cascade On/Off ..... Master Full Scale ..... Slave Rate .....
16	Cascade Input = ..... % of 4-20 mA
17	Filter Factors: Display ..... secs Rate O/P ..... secs Cascade ..... secs PID I/P ..... secs PID O/P ..... secs
18	Displayed Units: tons / lbs / kgs / tonnes
19	Belt Speed ..... m/s Belt Length ..... m



REVISIONS	
A:	09/01/97 ORIGINAL ISSUE
B:	10/03/97 T.BERNARDI WIRING COLOURS ALTERED ECN: 0000
C:	11/07/97 T.BERNARDI TACHO DRAWING No. ALTERED ECN: 0000

CERTIFICATION	
WEB-TECH AUSTRALIA PTY. LTD. CUSTOMER NO.:	
CUSTOMER ORDER NO.:	
CUSTOMER:	
<input type="checkbox"/> RETURN OF APPROVAL NOT REQUIRED	
<input type="checkbox"/> RETURN APPROVAL FOR RECORD	
<input type="checkbox"/> BEFORE MANUFACTURING PROCEEDS	
WEB-TECH AUSTRALIA PTY. LTD. APPROVAL DUE //	
CERTIFIED BY:	
<input type="checkbox"/> APPROVED FOR CONSTRUCTION	
<input type="checkbox"/> APPROVED AS NOTED	
<input type="checkbox"/> APPROVED AS NOTED - RESUBMIT	

UNLESS OTHERWISE STATED UNTOOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN						
NOMINAL SIZE	UP TO 50	50 TO 150	150 TO 300	300 TO 1000	1000 TO 2000	2000 TO 20000
MACHINING	± 0.1	± 0.2	± 0.3	± 0.5	± 1.0	± 2.0
FABRICATION	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0	± 2.0
ASSEMBLIES	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0	± 2.0

DRAWN	T.BERNARDI
CHECKED	
APPROVED	
DATE APP'D	
SCALE	N.T.S.
DO NOT SCALE	IF IN DOUBT
<b>ASK</b>	

WEB-TECH AUSTRALIA PTY. LTD.	
11 ELECTRONICS STREET BORN MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA	ACN: 010 764 431
P.O. BOX 4088 BORN MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA	TEL: 61-7-5511 2544 FAX: 61-7-5511 0003
<b>ELECTRICAL CONNECTION DIAGRAM FOR BELT SCALE SYSTEMS INCORP MASTERWEIGH 1</b>	
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED	

DRAWING NO.	SIZE
WTMW1	A1
01	
C	

LINE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
	M	d	s	s		r	d	t	e		=									0	.	0		t	o	n	n	e	s	/	h	o	u	r						
	M	d	s	s		t	o	t	d	l	=									0	.	0		t	o	n	n	e	s											

'-'/'-' (ALTERNATING)

'A' OR 'M'

'\*' (ASTERIX)

'\*' (ASTERIX)

'Z','E' OR 'I'

NOTES

SYMBOL

LOCATION

DESCRIPTION

ALTERNATING '-' AND '-'

LINE 1, COLUMN 40

THE ALTERNATING '-' AND '-' SIGNS IS AN INDICATION OF CORRECT OPERATION OF THE COMPUTER.

'A' OR 'M'

LINE 2, COLUMN 32

THE SYMBOL 'A' INDICATES THAT MASTERWEIGH IS IN THE P.I.D AUTOMATIC MODE. THE SYMBOL 'M' INDICATES THAT, MASTERWEIGH IS IN THE P.I.D MANUAL MODE.

'\*'

LINE 2, COLUMN 34

WHEN AN ASTERIX IS DISPLAYED THE HIGH SETPOINT RELAY HAS BEEN ACTIVATED.

'\*'

LINE 2, COLUMN 36

WHEN AN ASTERIX IS DISPLAYED THE LOW SETPOINT RELAY HAS BEEN ACTIVATED.

'Z'

LINE 2, COLUMN 40

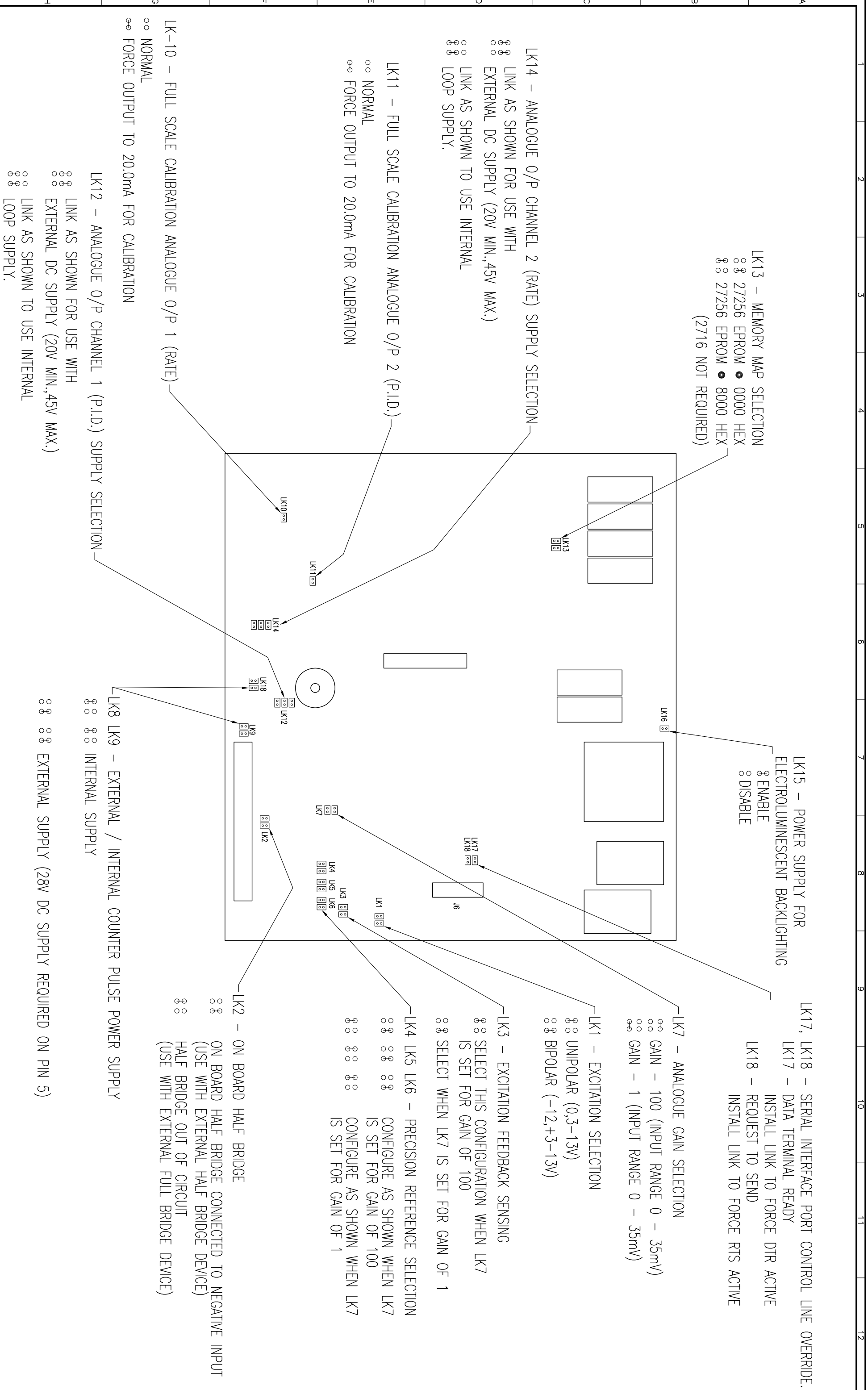
WHEN THE SYMBOL 'Z' IS DISPLAYED, MASTERWEIGH IS IN THE PROCESS OF AUTOZERO TRACKING. IF THE SYMBOL 'E' APPEARS, REFER TO THE RELEVANT SECTION OF THE MANUAL.

REVISIONS
A: 20/11/00 ORIGINAL ISSUE 0000

UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN	
NOMINAL SIZE	UP TO 50 ± 0.1
	AGOVE 50 UP TO 150 ± 0.2
	AGOVE 150 UP TO 300 ± 0.3
	AGOVE 300 UP TO 1000 ± 0.5
	AGOVE 1000 ± 1.0
MACHINING	± 0.1
FABRICATION	± 0.5
ASSEMBLIES	± 0.5

<b>WEB-TECH AUSTRALIA PTY. LTD.</b> 11 BERRINGS STREET, EAST WILKINS, QUEENSLAND, 4113 AUSTRALIA P.O. BOX 408, SOUTH BRISBANE, QUEENSLAND, 4101 AUSTRALIA Phone: 061-752911, 2641 Fax: 061-752912, 2641	
<b>MASTERWEIGH 1 INTEGRATOR</b> <b>DISPLAY FORMAT</b>	
DRAWN: TONY BERNARDI CHECKED: - APPROVED: - DATE APP'D: - SCALE: 1:1	DO NOT SCALE IF IN DOUBT <b>ASK</b>
SIZE: A1 DRAWING NO.: MW1-DIS. NUMBER: A PROJECT: MW1-DIS. CUSTOMER: - CAD FILE: -	ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED This drawing and any information or assistance provided hereon are the confidential property of WEB-TECH AUSTRALIA PTY. LTD. and must not be disclosed, copied or used for manufacturing / tendering or for any other purpose without their written permission.





LK13 - MEMORY MAP SELECTION  
 ☹☹ 27256 EPROM ● 0000 HEX  
 ☹☹ 27256 EPROM ● 8000 HEX  
 (2716 NOT REQUIRED)

LK15 - POWER SUPPLY FOR  
 ELECTROLUMINESCENT BACKLIGHTING  
 ☹ ENABLE  
 ☹ DISABLE

LK17, LK18 - SERIAL INTERFACE PORT CONTROL LINE OVERRIDE.  
 LK17 - DATA TERMINAL READY  
 INSTALL LINK TO FORCE DTR ACTIVE  
 LK18 - REQUEST TO SEND  
 INSTALL LINK TO FORCE RTS ACTIVE

LK7 - ANALOGUE GAIN SELECTION  
 ☹☹ GAIN - 100 (INPUT RANGE 0 - 35mV)  
 ☹☹ GAIN - 1 (INPUT RANGE 0 - 35mV)  
 ☹☹ GAIN - 1 (INPUT RANGE 0 - 35mV)

LK1 - EXCITATION SELECTION  
 ☹☹ UNIPOLAR (0.3-13V)  
 ☹☹ BIPOLAR (-12,+3-13V)

LK3 - EXCITATION FEEDBACK SENSING  
 ☹☹ SELECT THIS CONFIGURATION WHEN LK7  
 IS SET FOR GAIN OF 100  
 ☹☹ SELECT WHEN LK7 IS SET FOR GAIN OF 1

LK4 LK5 LK6 - PRECISION REFERENCE SELECTION  
 ☹☹ ☹☹ ☹☹ CONFIGURE AS SHOWN WHEN LK7  
 IS SET FOR GAIN OF 100  
 ☹☹ ☹☹ ☹☹ CONFIGURE AS SHOWN WHEN LK7  
 IS SET FOR GAIN OF 1

LK2 - ON BOARD HALF BRIDGE  
 ☹☹ ON BOARD HALF BRIDGE CONNECTED TO NEGATIVE INPUT  
 (USE WITH EXTERNAL HALF BRIDGE DEVICE)  
 ☹☹ HALF BRIDGE OUT OF CIRCUIT  
 (USE WITH EXTERNAL FULL BRIDGE DEVICE)

LK8 LK9 - EXTERNAL / INTERNAL COUNTER PULSE POWER SUPPLY  
 ☹☹ ☹☹ INTERNAL SUPPLY  
 ☹☹ ☹☹ EXTERNAL SUPPLY (28V DC SUPPLY REQUIRED ON PIN 5)

LK12 - ANALOGUE O/P CHANNEL 1 (P.I.D.) SUPPLY SELECTION  
 ☹☹ LINK AS SHOWN FOR USE WITH  
 ☹☹ EXTERNAL DC SUPPLY (20V MIN.,45V MAX.)  
 ☹☹ LINK AS SHOWN TO USE INTERNAL  
 LOOP SUPPLY.

LK-10 - FULL SCALE CALIBRATION ANALOGUE O/P 1 (RATE)  
 ☹☹ NORMAL  
 ☹☹ FORCE OUTPUT TO 20.0mA FOR CALIBRATION

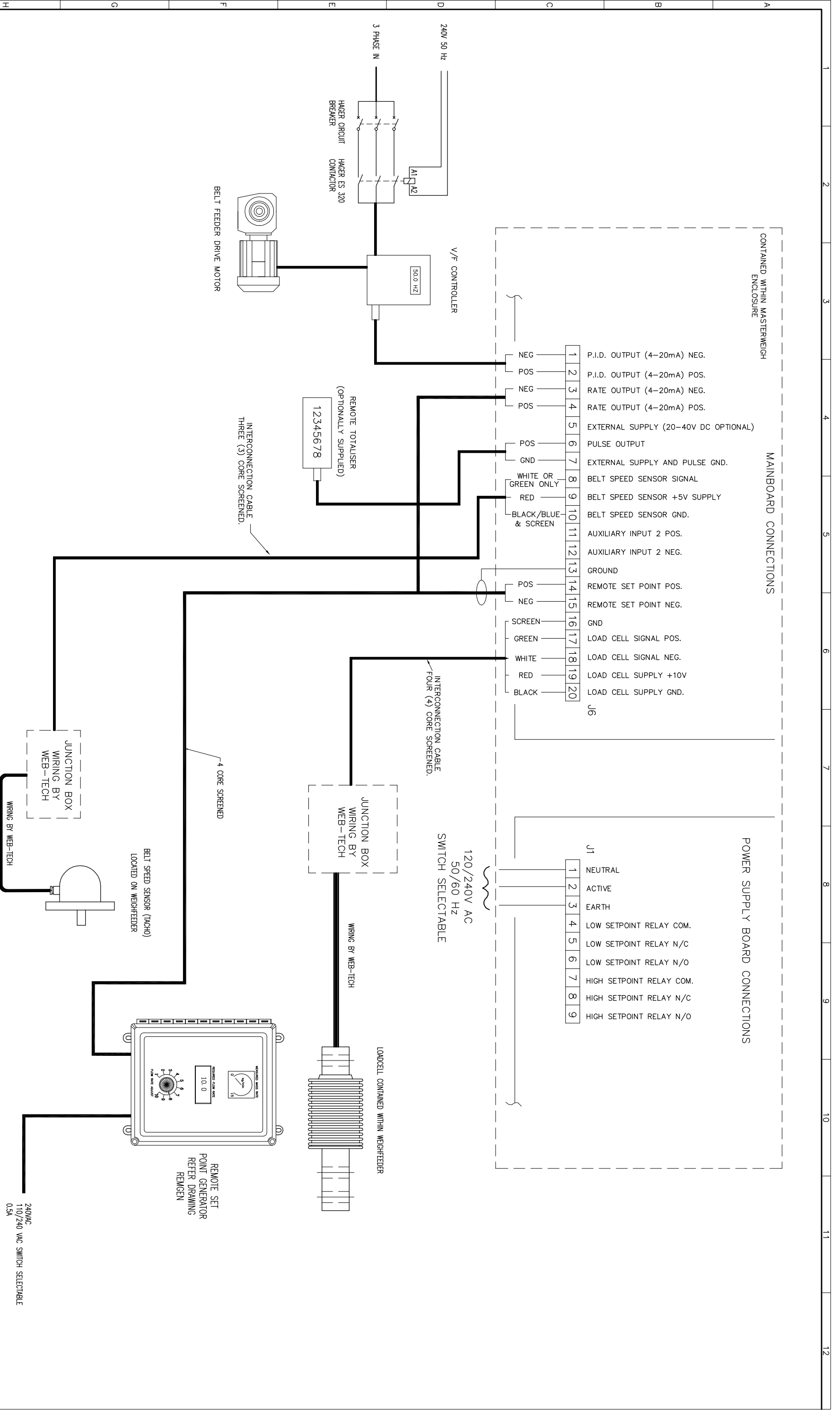
LK11 - FULL SCALE CALIBRATION ANALOGUE O/P 2 (P.I.D.)  
 ☹☹ NORMAL  
 ☹☹ FORCE OUTPUT TO 20.0mA FOR CALIBRATION

LK14 - ANALOGUE O/P CHANNEL 2 (RATE) SUPPLY SELECTION  
 ☹☹ LINK AS SHOWN FOR USE WITH  
 ☹☹ EXTERNAL DC SUPPLY (20V MIN.,45V MAX.)  
 ☹☹ LINK AS SHOWN TO USE INTERNAL  
 LOOP SUPPLY.

REVISIONS		UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN		DRAWN	TONY BERNARDI	TITLE	WEB-TECH AUSTRALIA PTY. LTD.	SIZE	DRAWING No.
A-	20/11/00 ORIGINAL ISSUE 0000	NOMINAL SIZE	UP TO 50 ±0.1	CHECKED	-	MASTERWEIGH 1 INTEGRATOR	11 ELECTRONICS STREET EAST, MELBOURNE VIC 3048 P.O. BOX 4098 EAST WILEY PLAINS, MELBOURNE VIC 3048 Phone 461-7-2841 2844 Fax 461-7-2841 0005	A1	MW1LINKS.
		MACHINING	50 TO 150 ±0.1	APPROVED	-	LINK CONFIGURATION DETAILS			REV.
		FABRICATION	150 TO 500 ±0.5	DATE APP'D	-				A
		ASSEMBLY	500 TO 1000 ±0.5	SCALE	1:1				
			1000 TO 2000 ±1.0	DO NOT SCALE IF IN DOUBT	ASK				
			2000 TO 5000 ±2.0						
			5000 TO 10000 ±2.0						
			10000 TO 20000 ±2.0						
			20000 TO 50000 ±2.0						
			50000 TO 100000 ±2.0						
			100000 TO 200000 ±2.0						

ALL DIMENSIONS IN MILLIMETRES  
 UNLESS OTHERWISE SPECIFIED

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NOTE: THIS DRAWING IS FOR GENERAL REFERENCE AND DOES NOT NECESSARILY COMPLY WITH LOCAL ELECTRICAL CODES

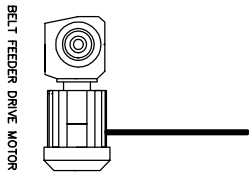
REVISIONS		CERTIFICATION		UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN		DRAWN		T. BERNARDI		TITLE		WEB-TECH AUSTRALIA PTY. LTD.		SIZE	
A:	11/03/99 ORIGINAL ISSUE	WEB-TECH AUSTRALIA PTY. LTD. CUSTOMER No.:		UP TO 30	± 0.1	APPROVED	CHECKED			ELECTRICAL CONNECTION DIAGRAM FOR K-TRON WEIGHFEEDER UPGRADE MASTERWEIGH 1 & REMOTE POINT GENERATOR		11 ELECTRONICS STREET MELBOURNE, VIC 3000 AUSTRALIA P.O. Box 4617-2881 2844 A.C.N. 010 764 431 Tel: 461-7-2881 Fax: 461-7-2841		A1	DRAWING No.
		RETURN OF APPROVAL NOT REQUIRED		UP TO 30	± 0.1	DATE APP'D				ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED		A11		WTM1	SHT. I. REV.
		BEFORE MANUFACTURING PROCEEDS		300	± 0.2	SCALE				This drawing and any information or descriptive matter set out hereon are the confidential and copyright property of WEB-TECH AUSTRALIA PTY LTD. No part of this drawing or any other purpose without their written permission.		PROJECT		02	A
		CUSTOMER	APPROVAL DATE	1000	± 0.5	DO NOT SCALE IF IN DOUBT	ASK					CONTRACT			
		APPROVED FOR CONSTRUCTION			± 1.0							CAD FILE			
		APPROVED AS NOTED			± 2.0							PROJECT			
		APPROVED AS NOTED - RESUBMIT										WT05013A			

MAINBOARD CONNECTIONS

P.I.D. OUTPUT (4–20mA) NEG.  
P.I.D. OUTPUT (4–20mA) POS.  
RATE OUTPUT (4–20mA) NEG.  
RATE OUTPUT (4–20mA) POS.  
EXTERNAL SUPPLY (20–40V DC OPTIONA

GROUND

13



BELT FEEDER DRIVE MOTOR

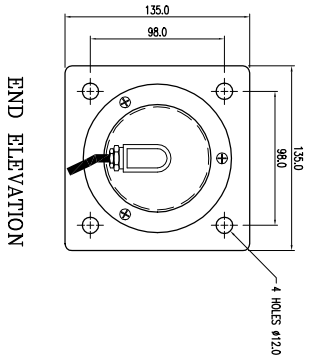
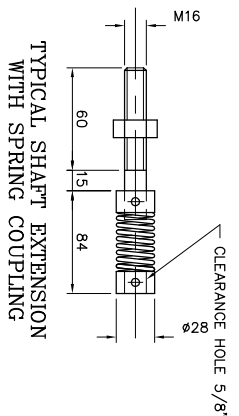
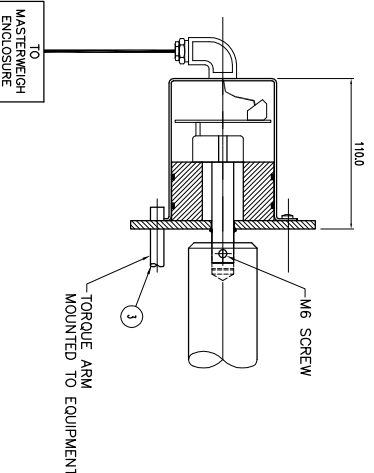
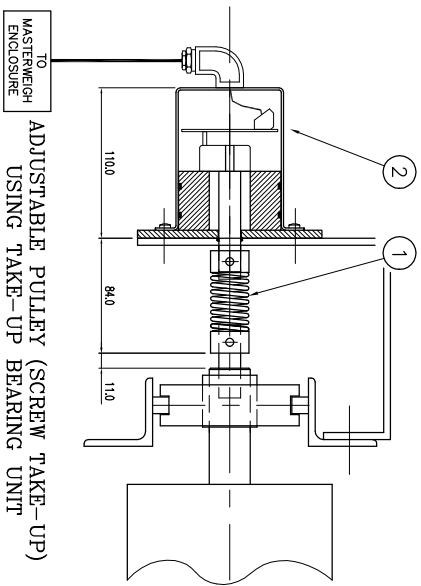
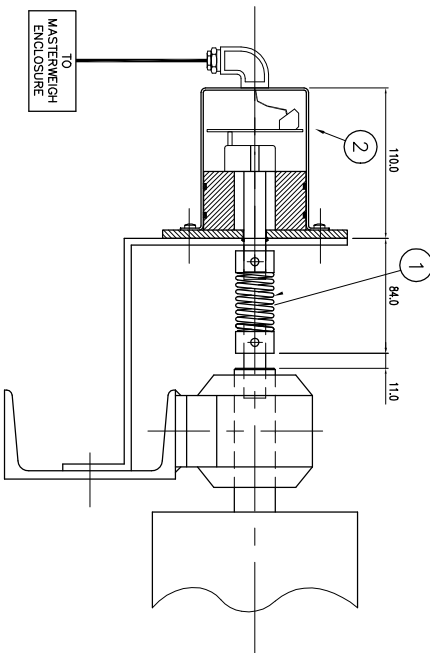
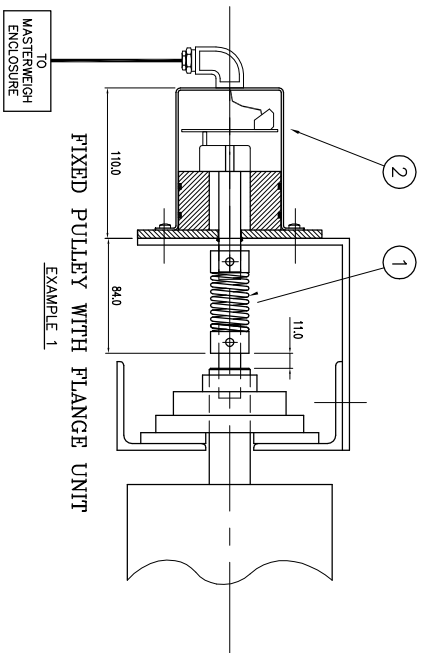
INTERCONNECTOR CABLE TO BE  
TERMINATED ON THE OTHER END  
(SUPPLIED BY OTHERS)



NOTES

1 VARIABLE FREQUENCY CONTROLLER REQUIRED FOR VARIABLE SPEED WICH BELT FEEDERS ONLY. REFER TO CONTROLLER MANUAL FOR TERMINATION DETAILS.

REVISIONS	
A:	21/12/88 ORIGINAL ISSUE
B:	19/04/89 L.H. SPEED SENSOR DIMS CHANGED
C:	05/10/95 A.M. ROGERS 1. CABLE EXIT MOVED 2. SENSOR DIMS MODIFIED
RMD:	1013
D:	21/02/96 DAVID ALLIX EXAMPLE 4 ADDED ECN: 0098
E:	13/03/00 T.BERNARDI DIMENSIONS ADDED ECN: 0098



- NOTES :**
1. THIS DRAWING SHOWS TYPICAL EXAMPLES ONLY.
  2. IT IS RECOMMENDED THAT THE ROTARY SHAFT ENCODER (TACHO) AND SPRING COUPLING BE SHROUDED TO PROTECT AGAINST MECHANICAL DAMAGE.
  3. EXAMPLE 3. BRACKET COUPLING BOLTS TO BE LOOSENED BEFORE ADJUSTING PULLEY TAKE-UP TO ALLOW FOR THE REALIGNMENT OF THE SHAFT ENCODER AND RETIGHTENED FOLLOWING ADJUSTMENT.

UNLESS OTHERWISE STATED TO BE WITHIN THE LIMITS SHOWN		DRAWN		APPROVED	
FINISHING	± 0.1	DATE	APPD	SCALE	SCALE
FABRICATION	± 0.5	DATE	APPD	SCALE	SCALE
ASSEMBLY	± 0.5	DATE	APPD	SCALE	SCALE

3.1.1	TORQUE ARM	ROTARY SHAFT ENCODER (TACHO)	5/8" S/S SPRING COUPLING	4 HOLES #120
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

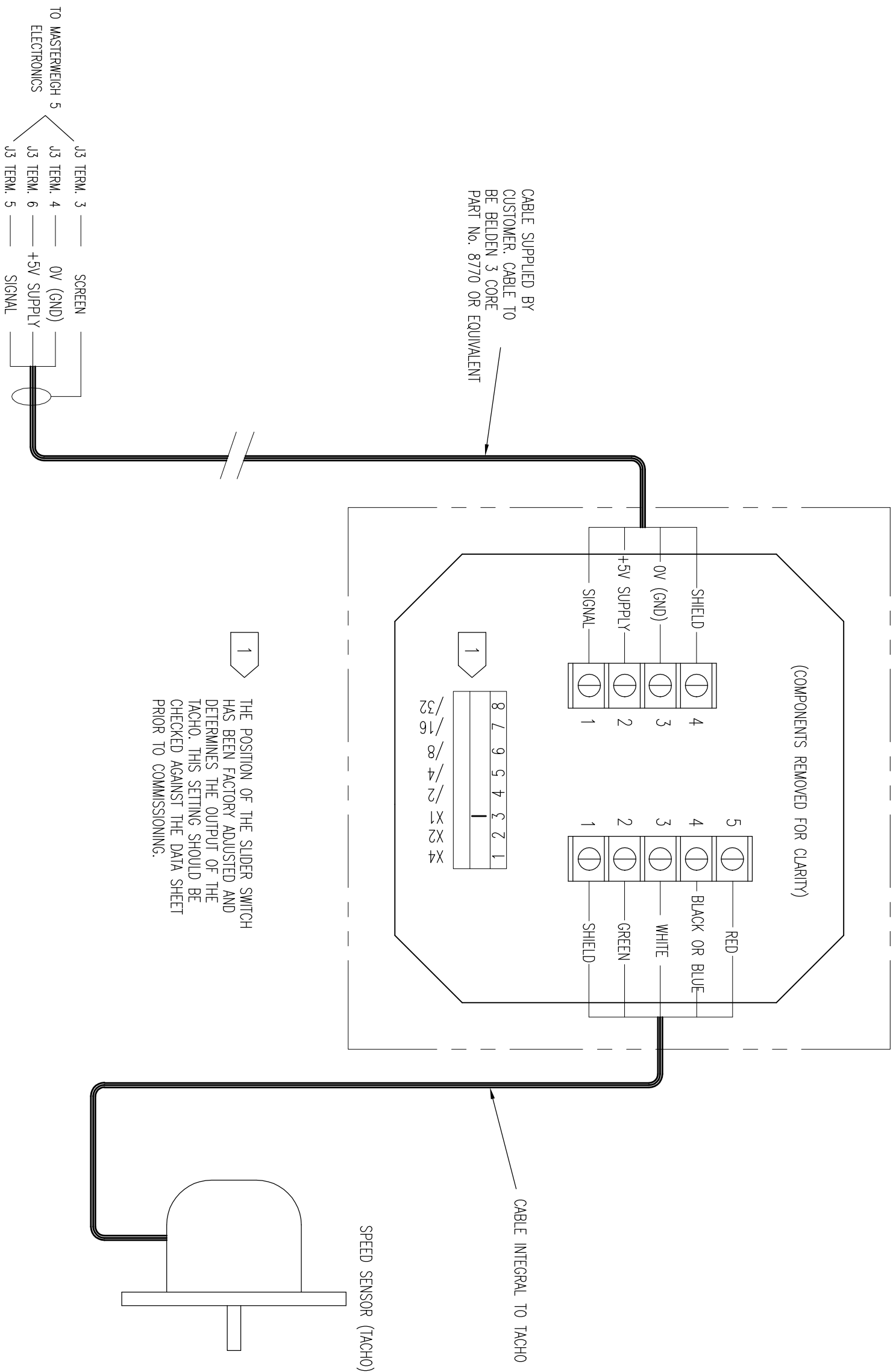
**TYPICAL INSTALLATIONS OF ROTARY SHAFT ENCODER IN CONDUCTION WITH CONVEYOR BELT SCALES**

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED

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11 ELIZABETH STREET, MELBOURNE, VIC 3000, AUSTRALIA  
Phone: (03) 4811-2911, 4811-2944 Fax: (03) 4811-2911, 4811-2944

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SPEED SENSOR (TACHO) JUNCTION BOX



REVISIONS
A: 12/10/98 ORIGINAL ISSUE

DRAWN	L.HARTLEY
CHECKED	L.HARTLEY
APPROVED	L.HARTLEY
DATE APP'D	12/10/98
SCALE	N.T.S.
DO NOT SCALE IF IN DOUBT	<b>ASK</b>

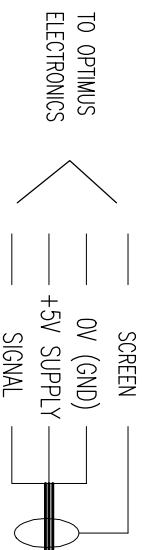
**WEB-TECH AUSTRALIA PTY. LTD.**  
 11 ELECTRONICS STREET, EAST WILEY PLAINS, QUEENSLAND, 4113, AUSTRALIA  
 P.O. BOX 4008, EAST WILEY PLAINS, QUEENSLAND, 4113, AUSTRALIA  
 Phone: +61-7-3941 2844 Fax: +61-7-3941 0005

**"CUP" TYPE TACHO JUNCTION BOX WIRING (WITH MULTIPLICATION), & CONNECTIONS TO MASTERWEIGH 5 INTEGRATOR**

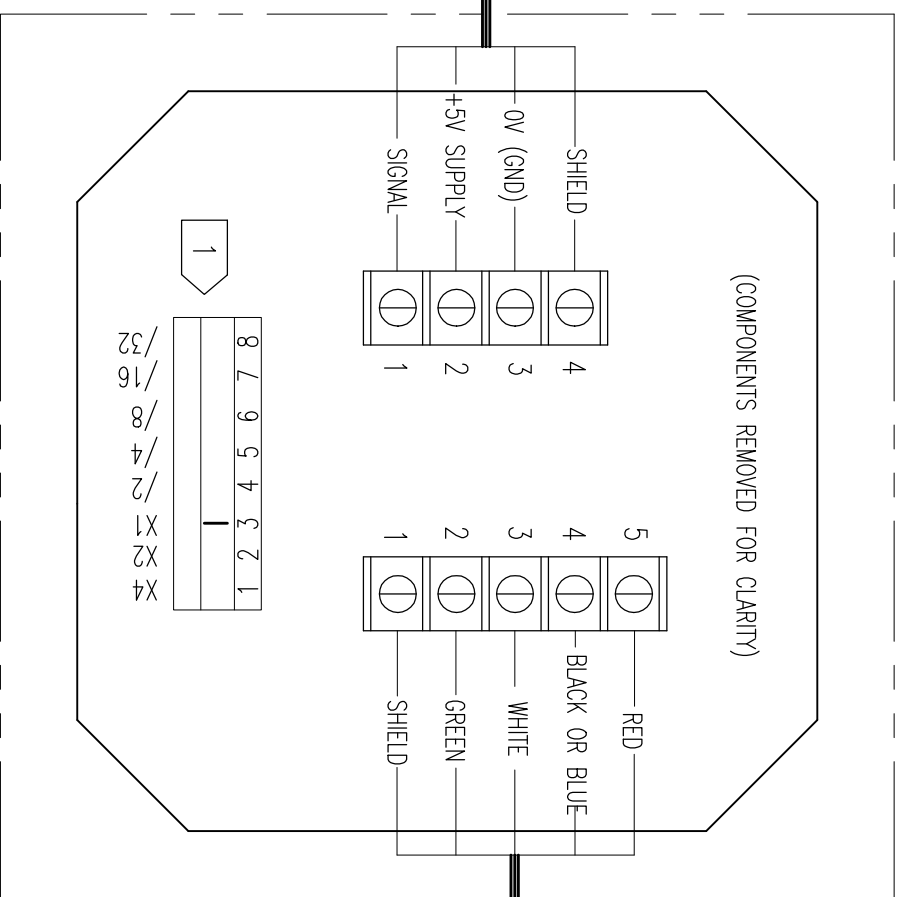
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SIZE	A1
DRAWING No.	JB010006
NUMBER	A
PROJECT	JB010006
CAD FILE	

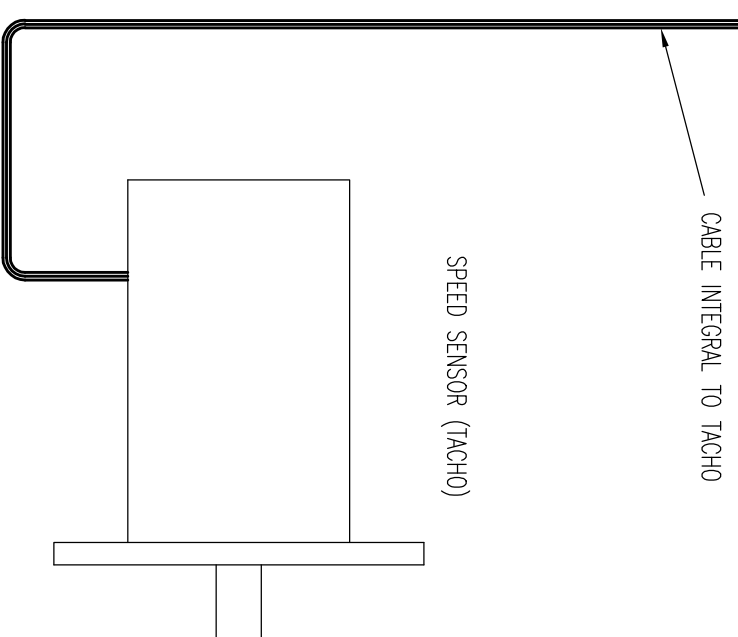
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CABLE SUPPLIED BY CUSTOMER. CABLE TO BE BELDEN 3 CORE PART No. 8770 OR EQUIVALENT

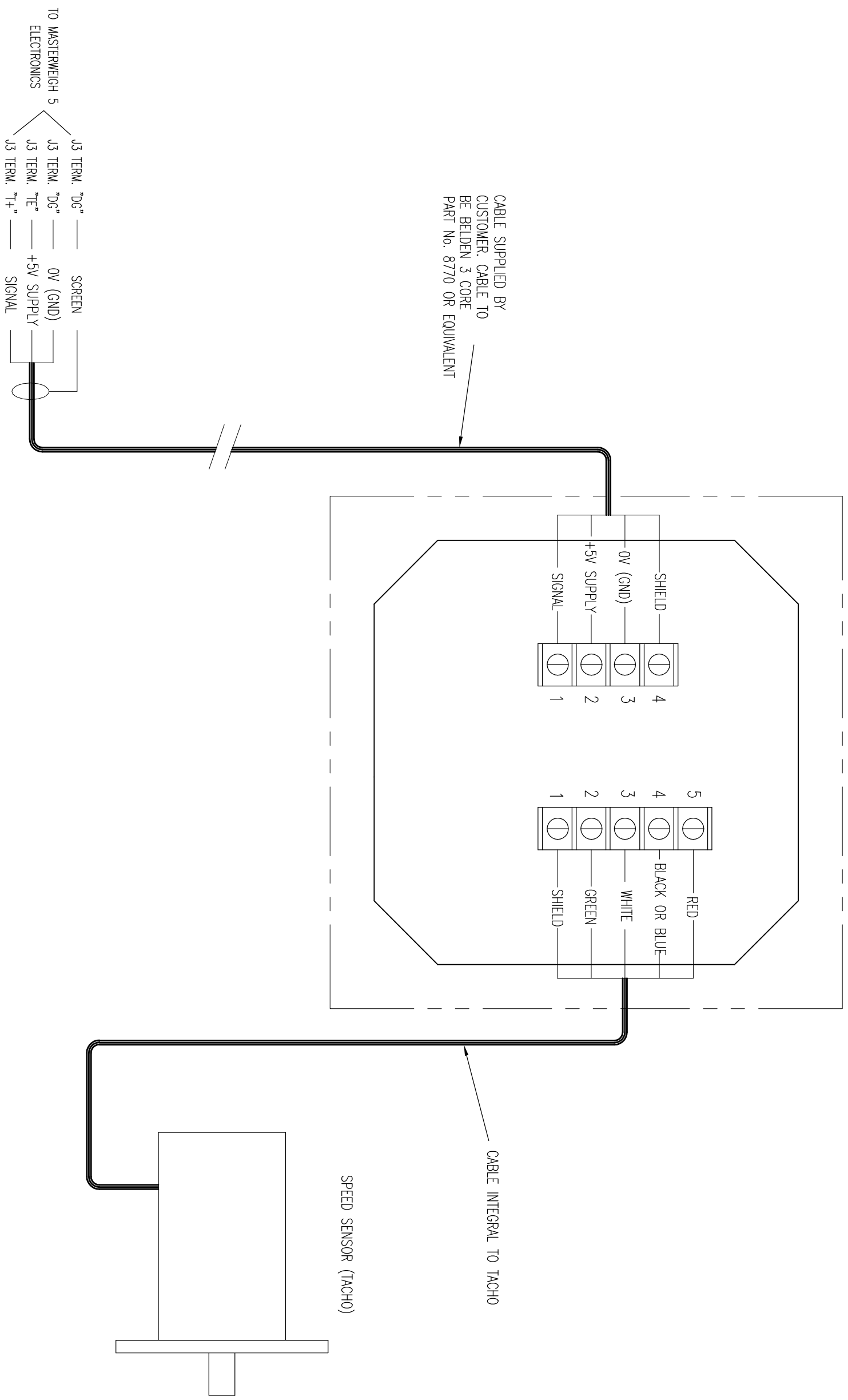


1 THE POSITION OF THE SLIDER SWITCH HAS BEEN FACTORY ADJUSTED AND DETERMINES THE OUTPUT OF THE TACHO. THIS SETTING SHOULD BE CHECKED AGAINST THE DATA SHEET PRIOR TO COMMISSIONING.



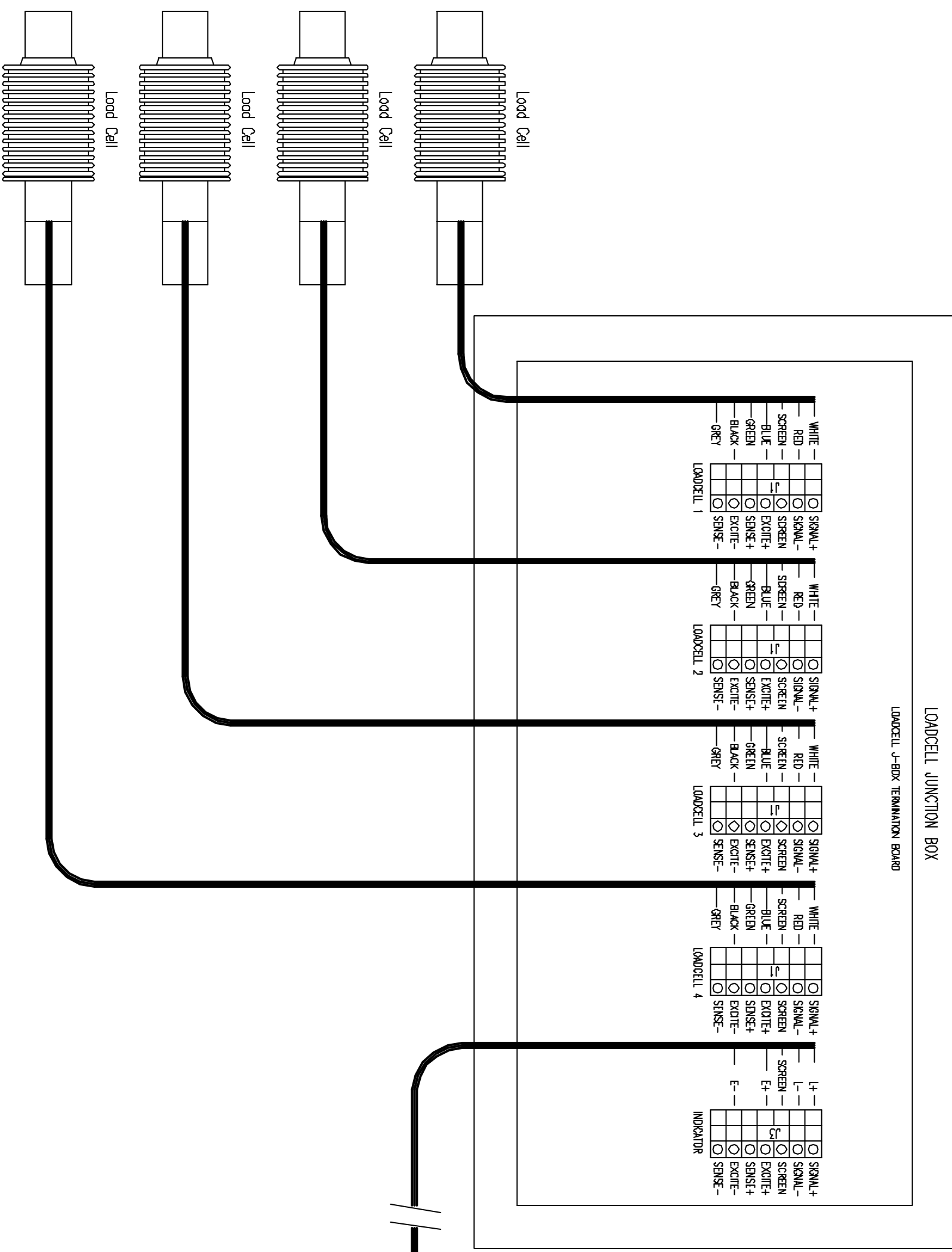
REVISIONS A: 20/10/98 ORIGINAL ISSUE		DRAWN: L.HARTLEY CHECKED: L.HARTLEY APPROVED: L.HARTLEY DATE APP'D: 20/10/98 SCALE: N.T.S.		DO NOT SCALE IF IN DOUBT <b>ASK</b>	
		WEB-TECH AUSTRALIA PTY. LTD. 11 ELECTRONICS STREET NORTH BRISBANE, QUEENSLAND, 4113, AUSTRALIA P.O. BOX 4026 SOUTH WILEY PLAINS, QUEENSLAND, 4113, AUSTRALIA Phone +61-7-3841 2844 Fax +61-7-3841 0005		SIZE: A1 DRAWING No.: JB010011B REV: A	
TITLE <b>TACHO (S/S) JUNCTION BOX WIRING (WITH MULTIPLICATION).</b>		PROJECT: JB010011B CUSTOMER:		This drawing and any information or descriptive matter set out hereon are the confidential and proprietary information of WEB-TECH AUSTRALIA PTY. LTD. and shall not be disclosed, copied or used for manufacturing or for any other purpose without their written permission.	

SPEED SENSOR (TACHO) JUNCTION BOX

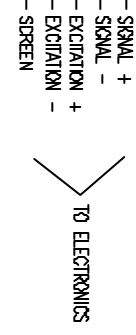


REVISIONS	
A: 26/10/98 ORIGINAL ISSUE	
DRAWN	L.HARTLEY
CHECKED	L.HARTLEY
APPROVED	L.HARTLEY
DATE APP'D	26/10/98
SCALE	N.T.S
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<p><b>TACHO (S/S) JUNCTION BOX WIRING (WITHOUT MULTIPLICATION), &amp; CONNECTIONS TO MASTERWEIGH 5 INTEGRATOR</b></p>		A1	JB010014
<p>ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED</p>		NUMBER	REV.
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		PROJECT	
		CAD FILE	

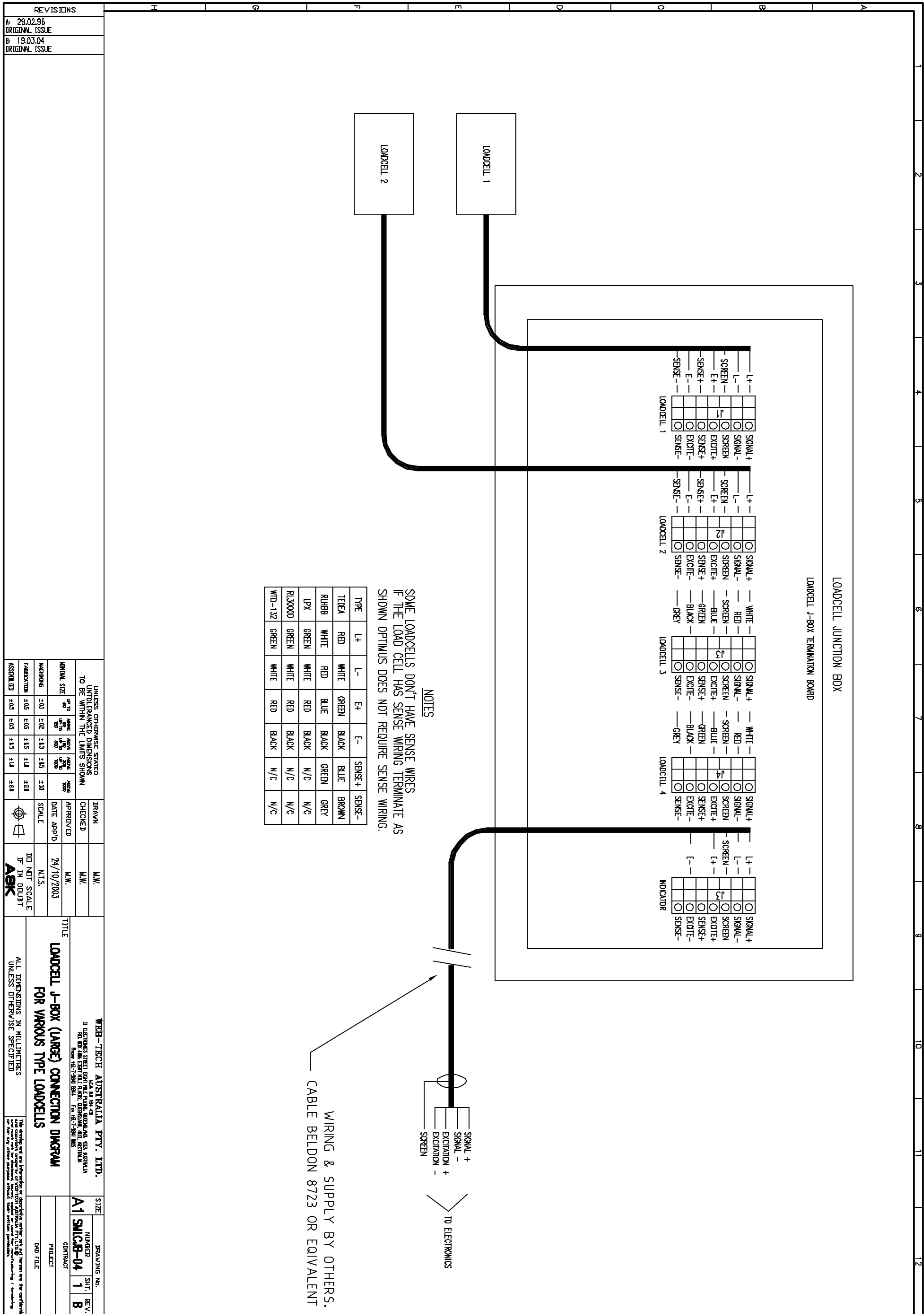


**NOTES**



<b>REVISIONS</b> A 29.02.96 ORIGINAL ISSUE		UNLESS OTHERWISE STATED UNTOBERANGED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN		DRAWN CHECKED APPROVED DATE APP'D SCALE		N.W. N.W. N.W. 24/10/2003 N.T.S.		TITLE <b>LOADCELL J-BOX (LARGE) CONNECTION DIAGRAM          FOR 4 SINGLE ENDED BEAM TYPE LOADCELLS</b>		SIZE <b>A1</b>		DRAWING NO. <b>SMCJB-02</b>		SH'T. REV. <b>1 8</b>	
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED		W&B-AUTOTECH AUSTRALIA PTY. LTD. 31 DUMFRIES STREET EIGHT HILL PARK MERRIMAN VIC. 3044 TEL: 03 945 0047 FAX: 03 945 0048 WWW.W&B-AUTOTECH.COM.AU		DO NOT SCALE IF IN DOUBT <b>ASK</b>		PROJECT CAD FILE		ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED		PROJECT CAD FILE		PROJECT CAD FILE		PROJECT CAD FILE	





NOTES  
 SOME LOADCELLS DON'T HAVE SENSE WIRES  
 IF THE LOAD CELL HAS SENSE WIRING TERMINATE AS  
 SHOWN OPTIMUS DOES NOT REQUIRE SENSE WIRING.

TYPE	L+	L-	E+	E-	SENSE+	SENSE-
TEDEA	RED	WHITE	GREEN	BLACK	BLUE	BROWN
RHBB	WHITE	RED	BLUE	BLACK	GREEN	GREY
IPX	GREEN	WHITE	RED	BLACK	N/C	N/C
RL3000D	GREEN	WHITE	RED	BLACK	N/C	N/C
WTD-132	GREEN	WHITE	RED	BLACK	N/C	N/C

WIRING & SUPPLY BY OTHERS.  
 CABLE BELDON 8723 OR EQUIVALENT

<b>REVISIONS</b> A: 29.02.96 ORIGINAL ISSUE B: 19.03.04 ORIGINAL ISSUE		UNLESS OTHERWISE STATED UNDIMENSIONED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN		IIRAVN CHECKED DATE APP'D: 24/10/2003 SCALE: N.T.S.		M.W. M.W. N.T.S.		TITLE <b>LOADCELL J-BOX (LARGE) CONNECTION DIAGRAM</b> FOR VARIOUS TYPE LOADCELLS		WTB-TTECH AUSTRALIA PTY. LTD. 11 DEPTON'S STREET, DEPTON, VIC 3087 PO BOX 146, EAST HELL ROAD, DEPTON, VIC 3087 Phone: +61-7-3811 8811 Fax: +61-7-3811 8815		SIZE: A1 NUMBER: SMLCB-04 SHT.: 1 REV.: B		DRAWING NO. PROJECT CAD FILE	
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