

# UNIMETER 2000



## INSTALLATION AND OPERATION INSTRUCTIONS

VERSION 9.0

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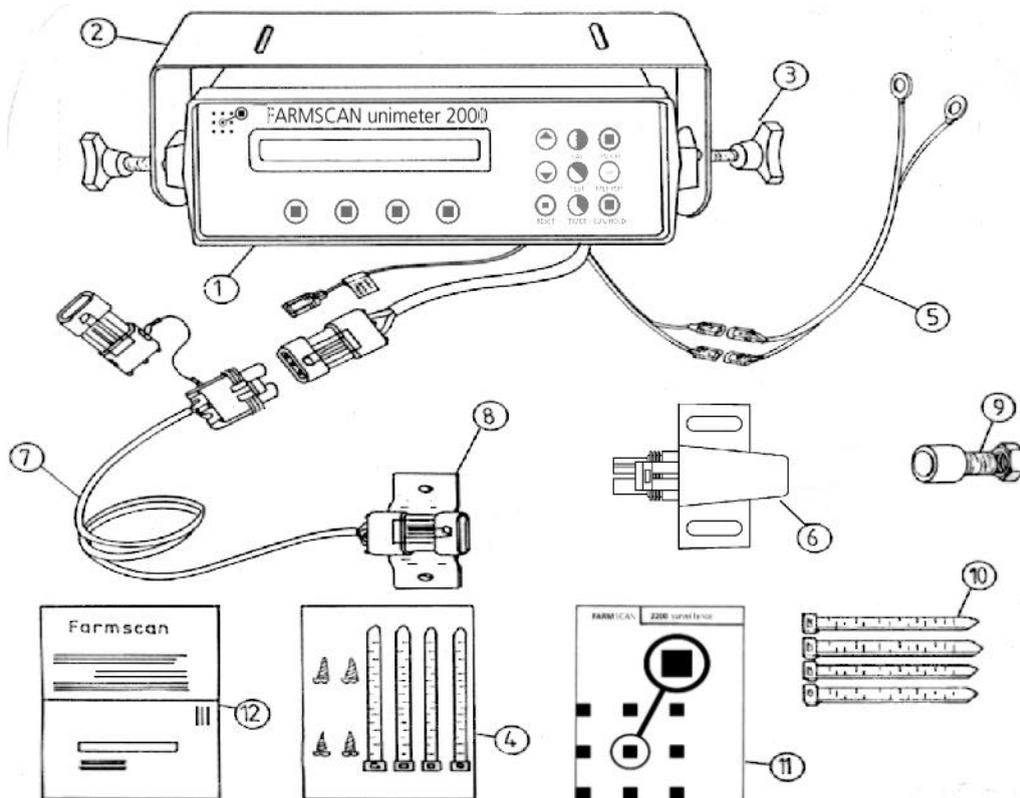
# PARTS LIST - 2000 UNIMETER KIT

REF	PART No.	DESCRIPTION	QTY
1	A-2000/2	UNIMETER MONITOR	1
2	AH-406	MONITOR MOUNTING BRACKET	1
3	AH-861	FINGER SCREWS (1/4" x 3/8)	2
4	AH-408	UNIVERSAL HARDWARE PACK	1
5	AC-101	8M POWER CABLE	1
6	AA-110C	REED TYPE SENSOR (PACKARD, BLACK)	1
7	AC-205	2 WAY 5M PACKARD EXTENSION CABLE	1
8	AH-400	CABLE MOUNTING BRACKET	1
9	AA-133	WHEEL MAGNET AND NUT	1
10	HG-706	CABLE TIES 290 x 5.0mm	20
11	AM-2000/V9.0	2000 INSTRUCTION MANUAL V9.0	1
12	AM-200	FARMSCAN 2YR WARRANTY CARD	1

## OPTIONAL PARTS LIST

### Shaft Option

PART No.	DESCRIPTION
1009P	Slow Shaft Sensor (Reed Type - black)
1010	Fast Shaft Sensor (Coil Type - yellow)



## COIL AND REED TYPE SENSORS

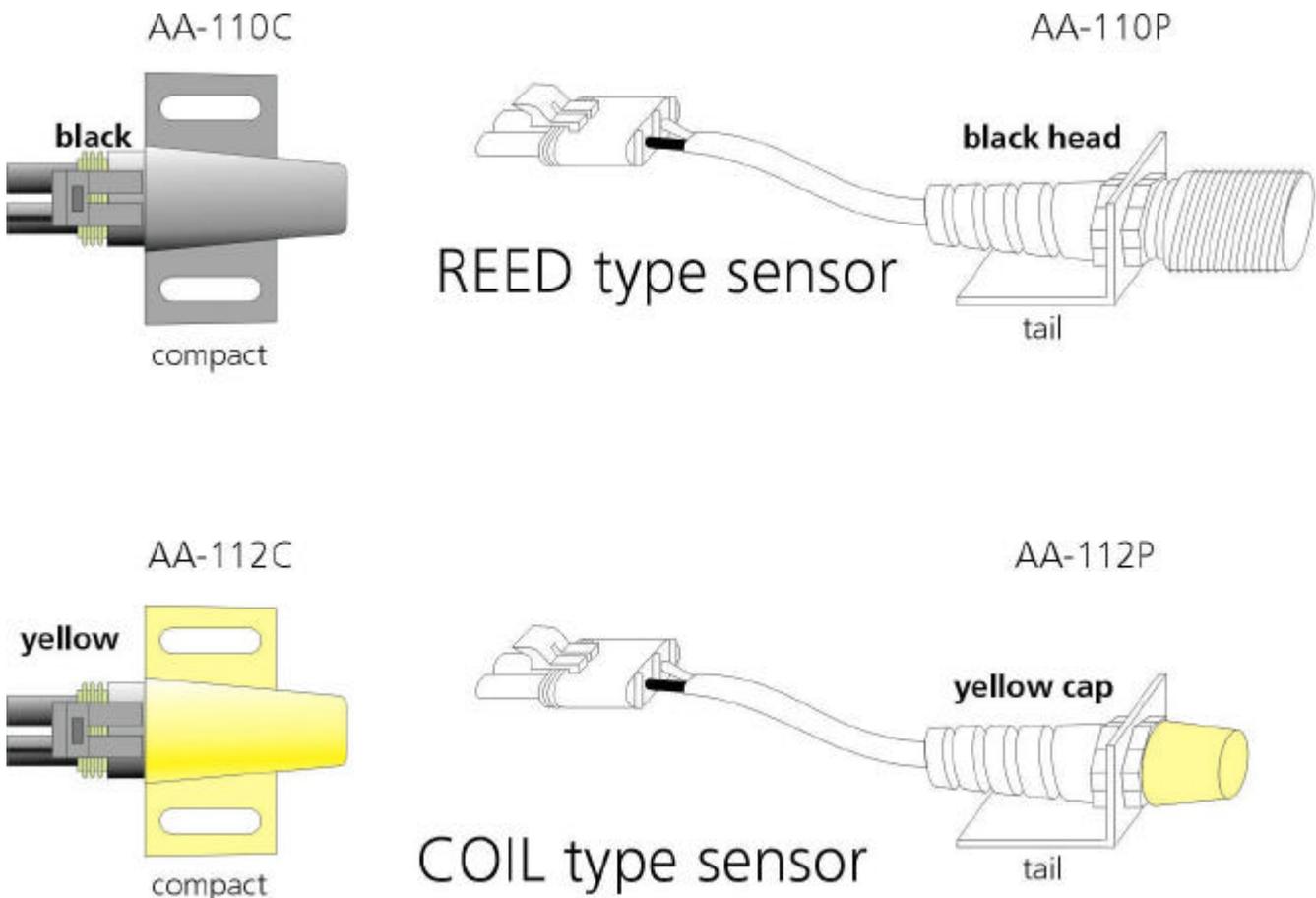
There are two optional shaft sensors available from Farmscan: the coil and the Reed type.

Coil sensors are used to sense **high** rpm speeds and they have a yellow body (AA-112C) or a yellow cap (AA-112P). Coil sensors are best used in the range from 100 to 9999rpm. Typical applications for coil sensors are fan rpm, spinner rpm and high speed shaft rpm.

Reed type sensors are used to sense **low** rpm speeds and are black in colour for both the AA-110C and AA-110P types. Reed type sensors are best used in the range from 1 to 1500rpm. Typical applications include wheel rpm and slow speed shaft rpm.

Reed sensors send square wave pulses whenever a magnet passes by the sensing head. Whereas coil sensors output sine wave pulses whenever a magnet passes by the sensing head.

Both sensor types coil and Reed are made in the compact style and the tail style. See below for a picture of the two types of sensors.



## 1.0 GENERAL OUTLINE

The 2000 UNIMETER is designed to fit virtually any tractor or implement to record both **total** and **trip** areas, to display working speed and to monitor shaft speed with setable shaft high and low alarm points. All readouts may be displayed in metric or imperial equivalents.

The **optional** shaft sensor is fitted directly on the shaft whereas the wheel sensor (6) and magnet (9) must be fitted to any undriven ground wheel. If you fit the sensor to a driven wheel, the speed and hectare readings will be wrong if wheel slippage occurs. The sensor is best fitted on the front wheel of a 2WD tractor or on an implement wheel when installed on a 4WD or front assist tractor.

Another alternative is to fit the wheel sensor together with a shaft magnet (AA-117) onto a metering shaft which is driven off the ground wheel. Such as an implement or the tail shaft of a tractor.

The 5 metre sensor cable supplied will reach the shaft to be monitored as well as the front wheel of a 2WD tractor. In the case of the wheel sensor it may be extended to reach an implement wheel by using an optional 5 or 10 metre sensor cable as an extension.

<b>OPTIONAL:</b>	AC-205	5m	2 WAY SENSOR CABLE
	AC-210	10m	2 WAY SENSOR CABLE

If using the sensor cable as an extension to the rear of the tractor, use the cable-mounting bracket (Ref 8 on parts table) to secure the connector away from hydraulic contamination and make sure dust caps are installed when the cable is not being used.

A separate hold wire may be connected via any switch to automatically stop the area, distance and timer functions when travelling but not working.

## 2.0 INSTALLATION

### 2.1 MONITOR INSTALLATION

The monitor is not waterproof and therefore must be installed in a tractor cab or must be protected against moisture. The warranty does not cover moisture damage.

As a precaution against interference do not install the monitor directly near 2 way radios. Use the bracket and securing knobs supplied to mount the unit in a convenient location, directly visible to the operator and not subject to extreme heat.

**NOTE:** The LCD Display will appear black if temperature exceeds 50° Celsius.

## 2.2 POWER CONNECTION

Do not connect power until all other installation is complete.

Connect independent POWER CABLE DIRECT to 12 volt DC vehicle battery terminals.

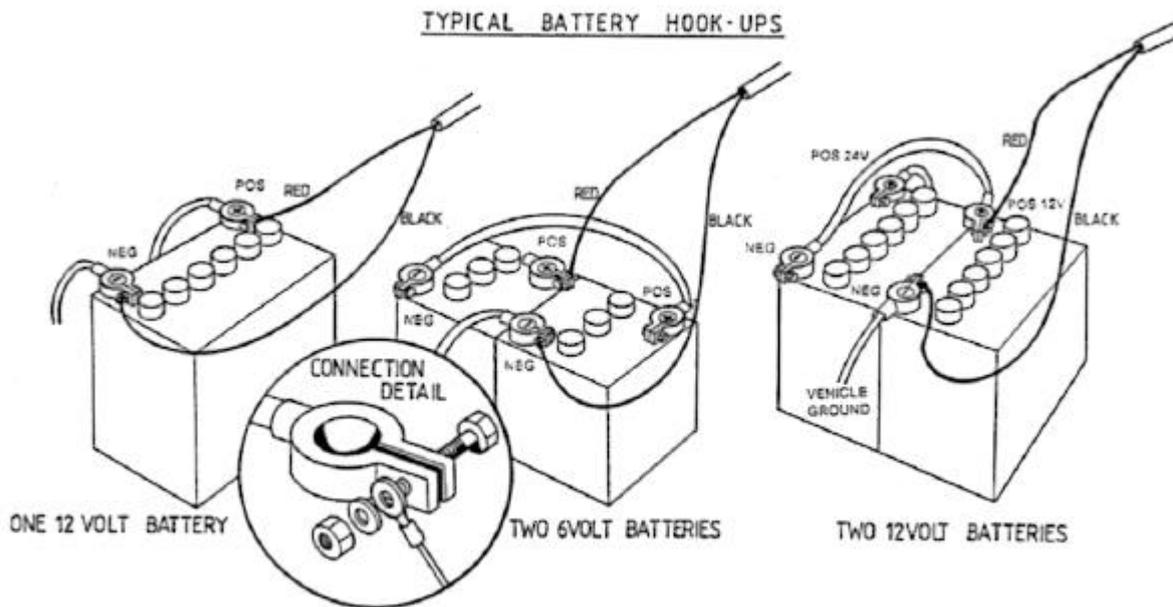
**DO NOT** connect power cable to alternative power source (eg starter solenoid) as damage will result.

**DO NOT** connect any other electrical equipment to monitor power cable.

Try to run the power cable away from radio antenna leads or wiring to solenoids or electric clutches.

Use cable ties supplied to secure power cable away from risk of damage. Connections to battery terminals must be clean and tight.

**WARNING** - Disconnect power cable when arc welding



## 2.3 WHEEL SENSOR INSTALLATION

The magnet, fitted to the wheel must sweep past the sensor once per rotation as shown, with a clearance of 15-20mm. Do not use substitute magnets.

The sensor (black) and magnet must face end to end.

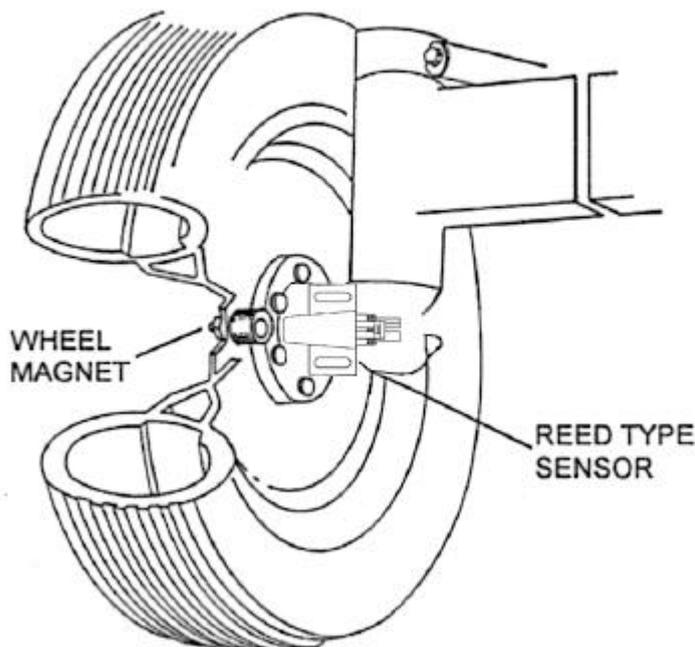
Locate the magnet as near to the hub as possible to gain maximum ground clearance. If unable to bolt magnet through hub, it can be screwed into a 1/2" U.N.F. tapped hole or screwed into the nut brazed onto the hub.

If mounted onto a steered wheel be sure the sensor moves on the same axis as the wheel to maintain equal clearance when turning and ensure cable is not pulled tight when turned from lock to lock.

As the sensor is not affected by moisture or mud the main precaution is to protect the sensor and cable from physical damage. As a precaution, keep the wheel sensor cable away from, aerial leads, engine kill switch cable or wires to electronic clutches and solenoid valves. Use cable ties supplied to secure sensor cable and connect to monitor.

### NOTE:

For an alternative installation to the speed sensor see the next page where a shaft magnet is fitted onto a metering shaft driven off the ground wheel of an implement, or the front tailshaft of a tractor.





## 2.4 SHAFT SENSOR INSTALLATION (Optional)

The **optional** shaft sensor is used to monitor the speed of the shaft. The sensor consists of a magnet and a reed type sensor.

The magnet, fitted to the shaft must sweep past the sensor once per rotation as shown, with a clearance of 10-15mm. Do not use substitute magnets.

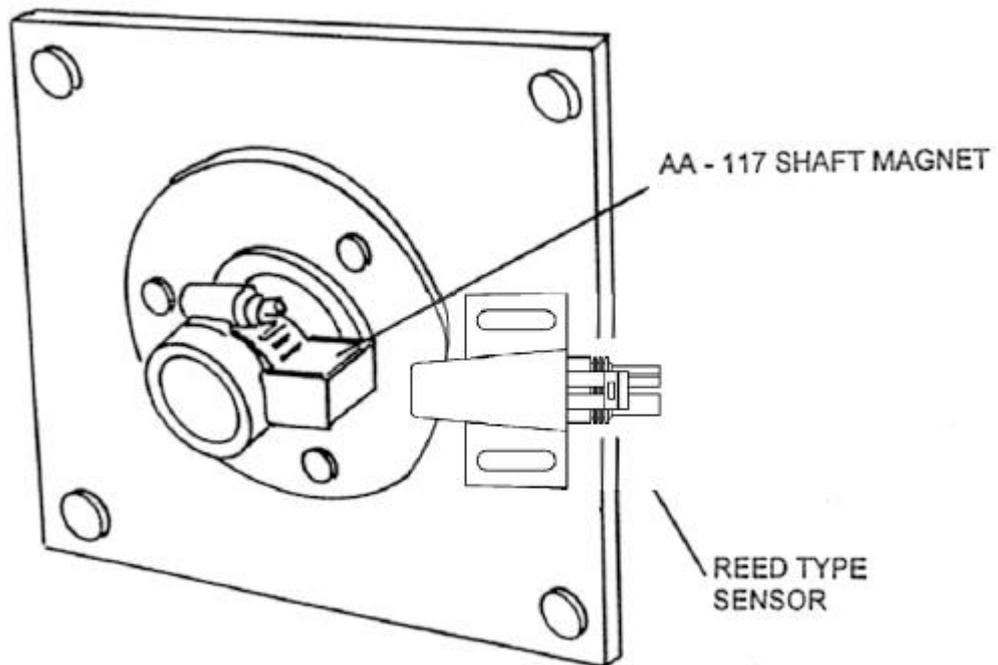
Clamp the shaft magnet (part no. AA-117 obtainable from your local Farmscan dealer) around a shaft or lock collar, which is driven by a ground wheel. The clamp is adjustable from 19 - 38mm in diameter. The magnet may be transferred to a larger clamp if necessary.

The sensor and magnet must face end to end.

As the sensor is not affected by moisture or mud the main precaution is to protect the sensor and the cable from physical damage. As a precaution, keep the shaft sensor cable away from, aerial leads, engine kill switch cables or wires to electronic clutches and solenoid valves. Use cable ties supplied to secure sensor cable and connect into monitor.

### NOTE:

As an alternative to the wheel sensor installation given on page 5, this installation can be followed to measure speed by installing a shaft magnet onto a metering shaft driven off the ground wheel of an implement or the front tailshaft of a tractor. A shaft magnet and the appropriate sensor (coil or REED) depending on shaft speed must be ordered from a Farmscan dealer (part no. AA-117).



## 2.5 REMOTE RUN / HOLD CONNECTION

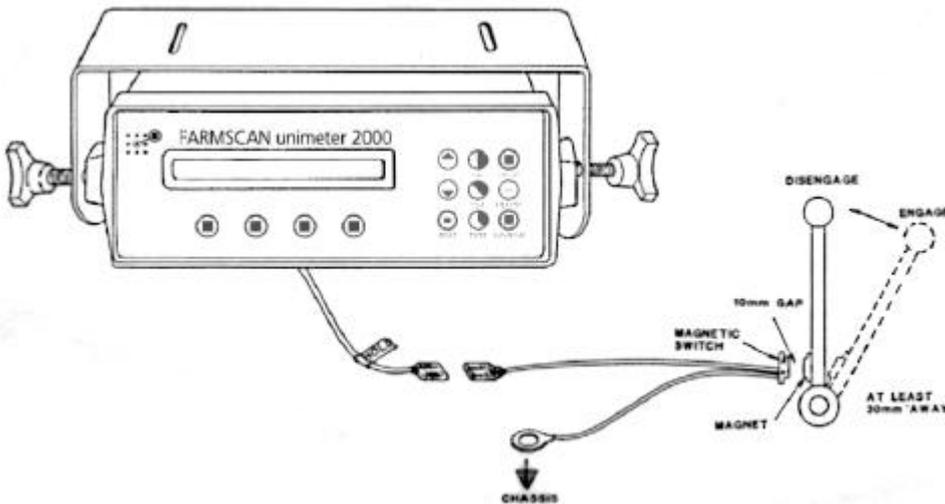
The UNIMETER will go into 'HOLD' mode whenever the single wire marked 'HOLD' is connected to the tractor chassis or battery negative.

When in "HOLD" mode, the unimeter will hold the area, distance and timer functions. The hold connection can be made by any switch that is activated whenever machinery is disengaged. Alternatively, use an optional mechanical or electrical standby.

If the remote 'RUN/HOLD' option is not required (you can still use the key pad for manual RUN/HOLD) do not connect the 'HOLD' wire.

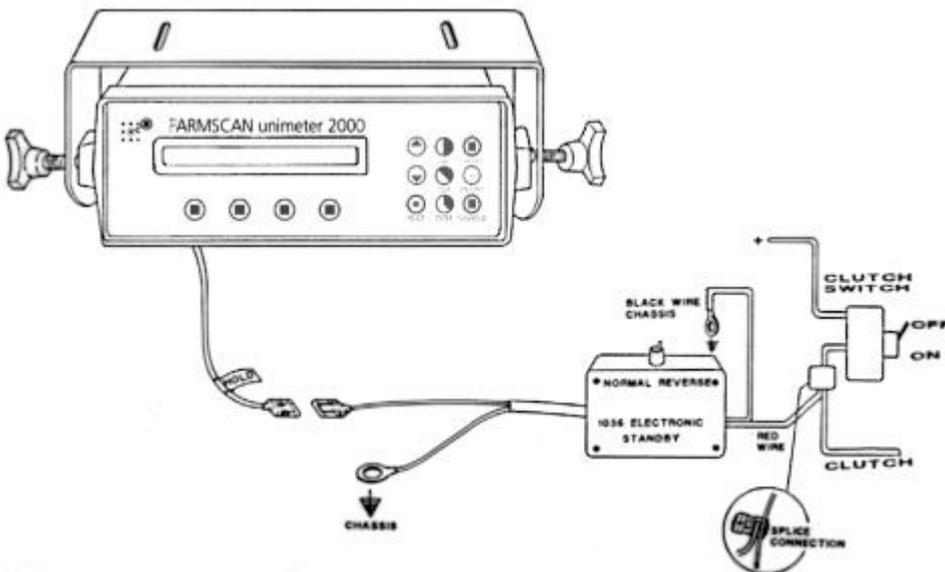
### Option 1 - 1037 MECHANICAL STANDBY

The mechanical standby consists of a magnetic switch that activates when the magnet is in close proximity to the switch.



### Option 2 - 1036 ELECTRONIC STANDBY

The electronic standby works by any existing electrical equipment eg clutch that is deactivated to stop machinery.



## 3.0 OPERATION

### 3.1 POWER ON/OFF KEY

To switch the monitor 'ON', press the 'ON/OFF' key for approximately one full second until the display is activated.

Whenever the monitor is switched 'ON' the display will firstly confirm which software program is installed in your unit.

eg 

UNI METER 2000
-------------------

This is immediately followed by the version number

eg 

VERSI ON      9. 0
--------------------

The version number indicates which generation of functions and features are programmed into your unit.

If ever an upgraded program is installed, a new version number eg VERSION 9.1 will be displayed.

After momentarily displaying the current program and version number, the speed readout will be displayed.

eg 

SPEED 0. 0 Kph ORPM
---------------------

If the "MONITOR ON HOLD" warning is active, press the "RUN/HOLD" key to deactivate the hold function.

### 3.2 IMPERIAL/METRIC KEY

Press the "IMP/MET" key to change any readout on display between metric and imperial equivalents.

eg 

SPEED 10. 0 Mph 100 RPM
----------------------------

SPEED 16. 0 Kph 156RPM
------------------------

#### NOTE:

"IMP/MET" key is not active during calibration. All calibration factors must be entered in **metric** values.

### 3.3 RUN/HOLD KEY

The "RUN/HOLD" key has dual functions, press it once to place the "MONITOR ON HOLD", and press again to place the "MONITOR OFF HOLD".

eg



When in 'HOLD' mode, the 'TOTAL AREA', 'TRIP AREA', 'DISTANCE' meter and 'TIMER' are stopped.

The monitor will repeat the "MONITOR ON HOLD" warning with an audible beep every 30 seconds to remind the operator everything is on hold. Alternatively, the hold function may be activated by using the remote hold wire. See section 2.5.

**NOTE:** The remote hold function has priority when activated; the front panel 'RUN / HOLD' key is disabled.

### 3.4 TEST KEY

The "TEST" key simply provides a visual and audible indication that the wheel and shaft sensors are working OK and is used to assist with wheel calibration and testing.

Press "TEST" key to display test wheel function. Press "TEST" key again to display the shaft test function.

eg



eg



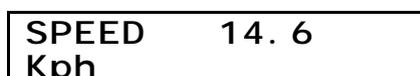
Whenever the wheel magnet or shaft magnet sweeps past the sensor an audible beep and count will be displayed if the sensor is working properly.

To reset test wheel or test shaft by pressing the "RESET" key.

### 3.5 SPEED KEY

Press the "SPEED" key once to display ground speed

Eg



Press the "SPEED" key again to display current work rate expressed as hectares per hour.

Eg 

AREA	43.2
HA/H	

### 3.6 TOTAL KEY

The "TOTAL" key is used to display total area and total distance.

Press "TOTAL" key once to display **total area** worked.

Eg 

TOTAL	2750 Ha
-------	---------

The total area can be reset at the start of a sowing / harvest season and left to accumulate daily to keep track of overall areas worked.

To reset total area press "RESET" key once to start reset process.

eg 

RESET	TOTAL?
-------	--------

Press "RESET" again to complete reset process OR to abort reset process, press any other key to escape.

After reset of "TOTAL" you will have the option to reset all trip memories at the same time

eg 

RESET	ALL
TRIPS?	

Press "RESET" again to reset all trips OR to abort reset of all trips, press any other key to escape.

Press "TOTAL" key again to display **total distance**.

eg 

DI ST	45.65 KM
-------	----------

To reset total distance press "RESET" key once to start reset process.

eg 

RESET	DI ST?
-------	--------

Press "RESET" again to complete reset process OR to abort reset process, press any other key to escape.

### 3.7 TRIP AREA KEY

The "TRIP AREA" key allows the display of a sub total area for each separate plot of land worked. The trip area function has 10 resetable memories to keep tally of the areas worked in different plots.

To display the current trip memory press "TRIP AREA" key

eg TRIP 1 56.2 Ha

To reset trip memory press "RESET" key to start reset process

eg RESET TRIP 1?

Press "RESET" key again to complete reset process OR to abort reset process, press any other key to escape.

To change to another trip memory, press 'UP' or 'DOWN' key to change the current trip number on display.

eg TRIP 2 0.00 Ha

#### NOTE:

Previously engaged trips can be viewed or reactivated by using the 'UP' and 'DOWN' keys to display and hence activate any one of the 10 trip memories 1-10. Whichever trip number is displayed will be active when working.

### 3.8 FUNCTION KEY

In the standard 2000 UNIMETER, pressing the function key displays the main screen.

eg SPEED 10.1 Kph 570 RPM

Refer to additional instructions for special functions.

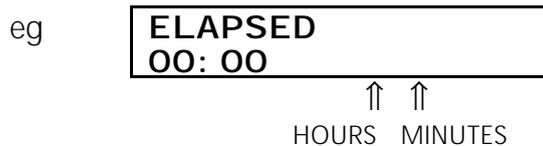
### 3.9 TIMER KEY

The "TIMER" key allows display of the **elapsed time** of machine operation.

The **elapsed** timer can be **reset** to zero at any point. The "RUN/HOLD" key will stop / start the elapsed timer.

If required the **elapsed** timer may be programmed with an elapsed time alarm point which can serve as a warning of a due maintenance interval.

Press the 'TIMER' key to display the elapsed timer.



To reset elapsed timer press the 'RESET' key.

#### TIMER ALARM

An elapsed time alarm may be set to activate after the 'ELAPSED' display counts up to a set point.

To set timer alarm press 'TIMER' key again to display "SET TIMER".

Use 'UP' and 'DOWN' key to set duration of time to elapse before alarm will activate.



To start timer press 'TIMER' key to display "ELAPSED TIME" then press 'RESET' to start timer counting up from zero.

To cancel timer press 'TIMER' key to display "SET TIMER" then press 'RESET' to zero, timer alarm.



## 4.0 CALIBRATION

### 4.1 GENERAL OUTLINE

Variable factors that apply to the Farmscan 2000 Unimeter must be entered into the calibration memory before operation.

Press the 'CAL' key to step through the calibration functions as follows:

1. WIDTH
2. WHEEL SIZE
3. S Lo ALARM
4. S Hi ALARM
5. TEST WHEEL
6. SHAFT TST

All calibration factors must be entered in **metric** units only. To adjust the factor displayed, use the 'UP' and 'DOWN' arrow keys to change the displayed value. Holding the 'UP/DOWN' keys will cause the rate of change to quicken.

To save a calibration figure into memory, press the 'CAL' key, the Unimeter will then proceed to the next calibration function.

Any other operation key (eg. speed) will return the monitor to normal operating procedures.

### 4.2 MEMORY BACKUP

An inbuilt memory backup system will hold all calibrations and accumulated totals in memory for at least 1 month after disconnection from the 12 Volt DC power source.

### 4.3 CALIBRATION WARNING

A calibration checking system incorporated into the system will warn you if any calibration factors are lost from memory or change value without your knowledge.

If for any reason a calibration factor does change value, a continuous series of beeps will sound and the display will indicate which calibration factor has altered.

eg

CHECK WHEEL CAL

In this case the operator must press the 'CAL' key until the incorrect factor is found, then enter the correct factor. Save this factor by pressing 'CAL' key again. Press any other key (eg. speed) to return to normal display.

## 4.4 WIDTH CALIBRATION

This is the effective working width of the implement.

- (1) Measure the implement width in metres.
- (2) Press 'CAL' key to display "WIDTH"

eg 

W I D T H    0 . 0 0 0 M
--------------------------

- (3) Use 'UP' and 'DOWN' keys to enter the width.

NOTE: You can allow for slight under/over lapping to keep Area tally accurate.

- (4) Press 'CAL' key to save the calibration figure, (the display will automatically move to wheel size calibration). If any other operation key is pressed before the 'CAL' key, the new calibration figure will not be stored.

## 4.5 WHEEL OR TAILSHAFT CALIBRATION

The wheel factor is a measurement of the distance travelled per pulse from the sensor mounted opposite a wheel or shaft magnet. A pulse is generated each time the magnet sweeps past the sensor.

Measurement procedure is best carried out under paddock conditions due to variations in Tyre loading between hard and soft ground when measuring.

Recheck measurements when ground conditions vary greatly.

### MEASUREMENT PROCEDURE

- (1) Press monitor 'TEST' key to display test wheel counter.

eg. 

T E S T   W H E E L    0
--------------------------

- (2) Drive slowly forward and stop exactly on a pulse 'Beep', then press 'RESET'.
- (3) Peg ground at bottom centre of any ground wheel as a starting point. Then drive forward for at least 25 metres and stop exactly on a pulse 'Beep', if you overshoot, go to the next beep. DO NOT REVERSE.

eg. 

T E S T   W H E E L    1 2
----------------------------

 (12 pulses)

- (5) Now measure the exact distance travelled and divide by the number of pulses counted.  
eg 25.65 metres ÷ 12 = 2.137 metres / pulse

- (6) Press 'CAL' key to display "WHEEL" calibration factor and use 'UP' and 'DOWN' keys to set correct factor.

eg. 

W H E E L    2 . 1 3 7 M
--------------------------

- (7) Press 'CAL' again to save "WHEEL" factor.

## 4.6 SHAFT ALARM

Shaft high (Hi) and shaft low (Lo) alarms can be set. When the shaft rpm is outside these limits the unit will alert the operator with a 'beep' and either display "SHAFT Hi" or "SHAFT Lo".

Press the 'CAL' key in succession to display the 'S LOW ALM' set point.

e.g. 

S LOW ALARM	0
-------------	---

Enter a shaft low and high alarm point in rpm. Press the 'CAL' key to save the entered alarm points. Setting an alarm point to zero automatically disables that alarm.

## 4.7 REMOTE RUN/HOLD CALIBRATION

If the 'RUN / HOLD' facility is being activated remotely, the connection may be either to an existing switch that turns power 'ON' to run the machine, e.g. electric over hydraulic control. Alternatively, power may be 'OFF' when the machine is operating, e.g. an electric clutch that is normally engaged **without** power and disengages **with** power on.

Press the 'CAL' key in succession to display the 'RUN / HOLD' calibration.

When the remote 'RUN / HOLD' calibration is set to "DISABLED", then only the front panel 'RUN / HOLD' key is able to be used.

e.g. 

RUN/HLD DI SABLED
-------------------

To activate the remote 'RUN / HOLD' function for power on to run, use 'UP' / 'DOWN' keys to set "RUN / HOLD ACTIVE ON".

e.g. 

R / HLD ACTIVE ON
-------------------

To activate the remote 'RUN / HOLD FUNCTION' for power off to run, set 'RUN / HOLD ACTIVE OFF'.

e.g. 

R / HLD ACTIVE OFF
--------------------

Whenever the monitor is in 'RUN MODE' (active), the front key panel RUN / HOLD can still be used to place the monitor in 'HOLD' mode.

## 5.0 TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE / REMEDY
1. POWER WON'T STAY ON.	a) ON / OFF Key must be pressed for approximately 1 second to "LATCH" the start up process. b) If grey squares appear on half the screen, then the supply voltage is too low - must be 11 Volts or more. c) Check that Power Cable is connected <u>DIRECT</u> to battery terminals and that connections are <u>CLEAN</u> and tight. <b>NOTE:</b> It is normal for power to go off whenever the engine is started due to momentary low voltage.
2. NO RESPONSE FROM ON /OFF KEY	a) Check Power Cable at both Monitor and Battery end for loose or dirty connections and make sure no other equipment is connected to same power cable. b) Check polarity of power cable is correct. Red to +ve and Black is -ve. c) Use a voltmeter to check power at monitor end of power cable is 11 Volts or more. d) If the voltage OK, then remove 2 screws from rear of Monitor and check internal fuse. Replace with type M205 1 Amp fuse only. e) If voltage and fuse OK, then return Monitor to your nearest Dealer or Authorised Service Agent for repair.
3. HECTARES TALLY WRONG	a) Check that WHEEL and WIDTH calibration factors are measured and set correctly. b) Is machine overlapping or underlapping? c) Is the unit counting headlands? - Fit a standby option See page 7 d) Switch to SPEED readout and make sure reading is constant at a constant speed. Could be cable or sensor damage if speed readout is jumpy. e) Is the magnet and sensor facing end to end? f) Is the proper magnet being used? g) Is the magnet too far away from sensor? (15-20 mm gap with wheel magnet or 10-15 mm with shaft magnet). h) Is the magnet staying in line with the sensor on corners? i) Is the wheel loose? j) Is the sensor on a non-driven wheel / or shaft driven by a wheel? - Tractor drive wheels cause over reading.

	k) Replace wheel / shaft sensor, if none of the above.
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## 5.0 TROUBLESHOOTING CONT.

PROBLEM		POSSIBLE CAUSE / REMEDY
4. HECTARES OR SPEED DOESN'T WORK	<ul style="list-style-type: none"> <li>a)</li> <li>b)</li> <li>c)</li> <li>d)</li> </ul>	<p>Check that WHEEL and WIDTH calibration factors are properly entered.</p> <p>Press 'RUN / HOLD' key to make sure monitor is 'OFF' hold. If monitor stays on 'HOLD', disconnect remote hold wire to isolate cause of fault.</p> <p>Check magnet and sensor are properly aligned with a 15 – 20mm gap.</p> <p>If still no response follow, SENSOR AND CABLE TEST PROCEDURE page 18.</p>
5. SHAFT RPM DOESN'T WORK.	<ul style="list-style-type: none"> <li>a)</li> <li>b)</li> <li>c)</li> </ul>	<p>Press 'RUN / HOLD' key to make sure monitor is 'OFF' hold. If monitor stays on 'HOLD', disconnect remote hold wire to isolate cause of fault.</p> <p>Check magnet and sensor are properly aligned with a 15 – 20mm gap.</p> <p>If still no response follow, SENSOR AND CABLE TEST PROCEDURE page 18.</p>
6. TRIP OR TOTAL HECTARES DON'T RESET	<ul style="list-style-type: none"> <li>a)</li> <li>b)</li> <li>c)</li> </ul>	<p>Press 'TOTAL' or 'TRIP' key first to select area to be cleared.</p> <p>Reset key must be pressed twice to clear the figures.</p> <p>If hectares still don't reset, return unit to your nearest Farmscan dealer or authorised service agent.</p>
7. HECTARES COUNT UP ON THEIR OWN WITHOUT MOVING	<ul style="list-style-type: none"> <li>a)</li> <li>b)</li> <li>c)</li> <li>d)</li> </ul>	<p>Switch off all other electronics to eliminate electrical interference as the cause.</p> <p>If switching off electronics eliminates the fault, ensure that the sensor or power cables are not running alongside wiring from other electronic devices, and / or physically move the position of the monitor in relation to the other equipment.</p> <p>If petrol engine in close proximity, stop engine to see if interference is caused by engine ignition system. NOTE: Carbon ignition leads must be fitted to spark plugs and coil to stop interference.</p> <p>Disconnect sensor from cable at wheel / shaft. If problem stops, replace sensor.</p> <p>Make sure Monitor has independent power cable, wired direct to battery +/- terminals.</p>

e)	If unit still counts hectares, return unit to your local Farmscan dealer or authorised service agent.
----	---

## 6.0 SENSOR & CABLE TEST PROCEDURE

1. Switch UNIMETER on.
2. Check that "WHEEL" and "WIDTH" calibration factors are entered correctly.
3. Press 'TEST' key. Display should read zero

eg.

TEST WHEEL	0
------------	---

4. Disconnect sensor from cable, at the sensor end.
5. Use a pair of long nose pliers to intermittently short across the pins of the sensor cable. The test counter should count up and beep. If test counter responds, then replace sensor.
6. If no response, reconnect sensor and repeat test at tractor breakaway plug (if used). At this point if the test counter responds, then the cable between the breakaway plug and the sensor is at fault. If still no response at tractor breakaway plug, repeat test at connection directly into the monitor.
7. If no response directly into monitor then return unit to your nearest Farmscan dealer or authorised service agent.
8. To check sensor use a multimeter on Ohms range. Connected directly across sensor connections, when the magnet and sensor align multimeter should read **zero**. (Needle swings full scale to the right). When magnet away from sensor, meter needle should not move (Digital multimeter should read open circuit).