

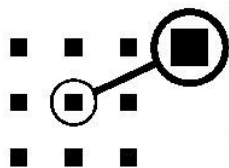
22C4

**22CX unitrol**

# 22C4

## INSTALLATION & OPERATION INSTRUCTIONS

22CX **unitrol** series



**FARMSCAN**

PART No: AM – 22C4V1

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# 1.0 Introduction

## 1.1 General Outline

The 22C4 tree planter will automatically activate a mechanism to plant trees a user defined distance apart.

The 22C4 has two modes of operation: automatic and manual. In automatic mode trees are planted regularly at the distance set, however in manual mode trees can be planted anytime. In manual mode a single key press plants a tree.

The 22C4 controller displays the speed in km/h or in mi/h and the live work rate is displayed as the number of plants planted per hour (p/h). Area worked and distance covered can be viewed with the touch of a button.

The 22C4 requires calibration of a wheel sensor, which after installation is easily done with the unit's in-built test function.

The 22C4 provides a "RUN/HOLD" function, which will stop accumulating data and stop the operation of the planting mechanism whenever the vehicle's ground speed is zero.

The 22C4's built in trip meter keeps records for up to 10 trips. Each trip will record the area covered and the number of trees planted. The "TOTAL" key displays overall area and distance covered as well as the total number of trees planted. Trip data can also be printed using the 22C4's print function.

## About this Manual

This manual contains the necessary instructions to operate and calibrate the 22C4 tree planter.

## 2.0 Installation

### 2.1 Monitor Installation

When installing the monitor use the brackets, securing knobs and mounting hardware supplied to mount the monitor. Keep the following points in mind when finding the best location for the monitor.

- The monitor should be installed in the cab, clearly visible to the operator but not subject to intense heat or moisture.
- Keep the unit away from radios or other electronic equipment to minimize any risk of interference. As a precaution all connection cables should take an alternative route to other cables in the cab, especially antenna cables or clutch, solenoid and engine kill switch cables.
- Mount the unit firmly on the bracket using securing knobs supplied (AH-861). Don't use substitute bolts into the monitor.
- When installing the wiring loom, ensure the green 12 way connector is inserted into the back of the monitor with the screws in the connector facing upwards.

**DO NOT force the connector. If it does not connect easily check that the connector is being inserted the correct way.**

- When running the tractor loom through the cab to the back of the monitor it may be easier if the green plug is removed so the cable can be inserted through a smaller diameter hole in the cab wall etc.

***Take note of the wiring of the green plug before removal.  
Refer to the back panel to make sure the cable  
colours correspond when rewiring the plug.***

- Use the cable ties supplied to secure the cable away from risk of damage.

## 2.2 Power connection

Do not connect power until all other installation is complete.

Connect **power cable** from tractor loom **direct** to 12-volt DC vehicle battery terminals to ensure a clean uninterrupted source of power.

**DO NOT** connect power cable to alternative power source such as the starter solenoid as damage may result.

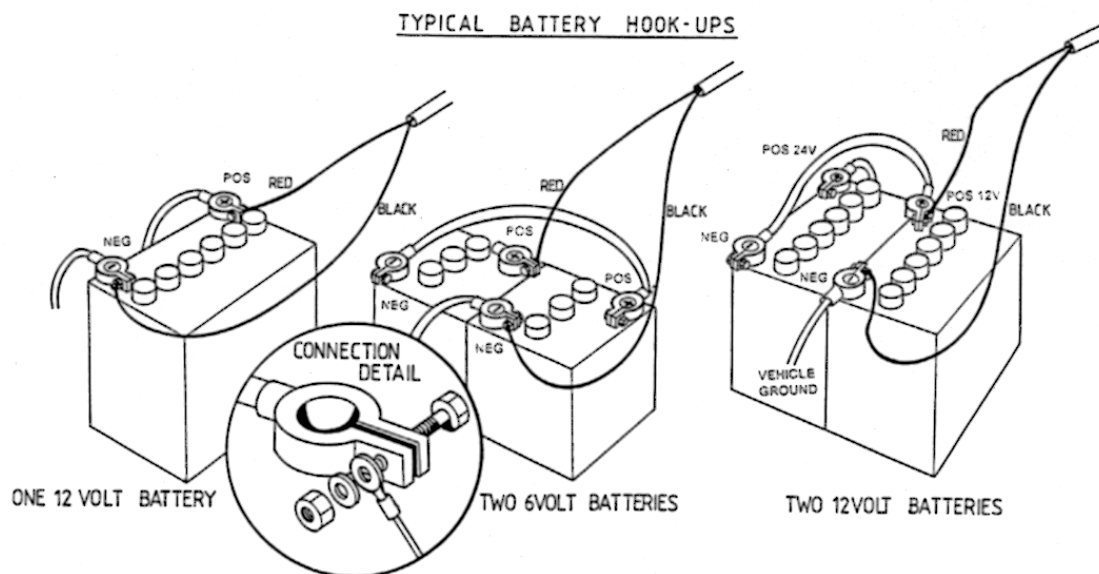
**DO NOT** connect other electrical equipment to the controller **power cable**.

Run the **power cable** away from radio antenna leads and mobile phones 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 Wiring Loom Installation

- Lay the implement loom out down the length of the machine and fasten with cable ties along the body of the machine.
- Don't tighten the cable ties at this stage. This allows the loom to be adjusted so that the connectors align properly with the wheel sensor and the tree planting machinery.
- When the wheel sensor has been installed and connected to the loom, align the loom so that there is the least amount of excess cable near the sensor and the planting machinery. When correct tighten the cable ties.

## 2.4 Wheel Sensor Installation

The wheel sensor supplied consists of a proximity sensor and a toothed disc to be fitted onto **any undriven** ground wheel. The sensor is activated every time a tooth on the disc comes into close proximity (1 – 4 mm max) with the sensor.

Follow the procedure below to install the wheel sensor.

### Wheel Sensor Installation Procedure:

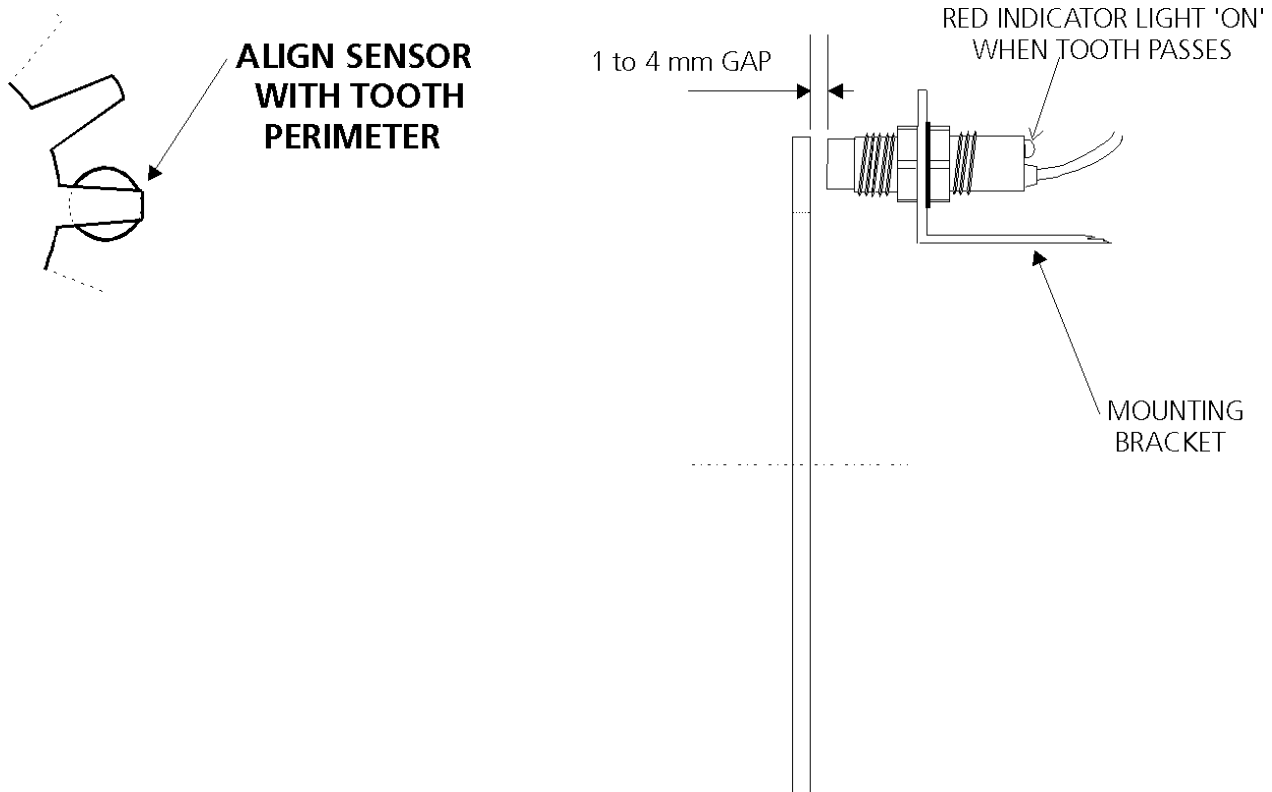
Bolt the toothed disc onto the wheel in a position that allows it to sweep directly past the proximity sensor on every rotation within 1 - 4 mm maximum range. See the diagrams below.

If the disc can not be mounted onto the wheel, mount it in a position so that the disc will turn as the wheel turns. The disc must turn in direct proportion to the wheel for accurate readings.

Mount the proximity sensor using the its bracket. The sensor must be rigidly bolted to an existing structure, ideally in a protected position.

If mounting the sensor to a steered wheel, make sure the sensor turns with the steering mechanism to maintain equal clearance between the target disc and the sensor from lock to lock.

Connect the sensor to the 3 cable supplied and use cable ties to secure cable away from potential damage points. Allow enough slack cable for axle movement and steering.



## 2.5 Connection to Planting Mechanism (solenoid)

Connect the two bare ended wires from the AC-200 cable to the solenoid/s of the planting mechanism. Make sure that the red wire is connected to the positive solenoid terminal and the black wire to the negative solenoid terminal.

At the rear of the monitor ensure that the red wire from the solenoid is connected to port 2 and The black wire from the solenoid is connected to port 9.


## 2.6 22C4 Port Connections

Port Number	Function
1	Solenoid
2	Solenoid
3	
4	
5	
6	Wheel
7	
8	12 Volts OUT
9	Ground
10	0 Volts Battery IN
11	12 Volts Battery IN
12	Remote Run/Hold



## 3.0 Operation

### 3.1 Power On/Off Key

To switch the unit **on**, press the  key.

Whenever the unit is switched **on** the display will run through a start up routine displaying the version of software and the program the unit is running.

e.g.

FARMSCAN 22C4

VERSION 1.0.0

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

If an upgraded program is installed, a new version number e.g. "VERSION 1.1.0" will be displayed.


After momentarily displaying the current program and version number, the monitor will then display the speed and the number of trees planted per hour.

e.g.

0.0kph 0.0P/H

If stationary the controller will immediately go into '**hold**' mode when first switched on, see section **3.12 Run/Hold Function** for an explanation of this alarm.

## 3.2 Imperial / Metric Key

Press the  key to change any readout on the display between metric and imperial.

e.g.

AREA 10.0Ha

AREA 25.0Ac

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

## 3.3 TIMER Key


Press the "TIMER" key to switch to manual control.

MANUAL CONTROL

Once in manual control, press the "TIMER" key again to plant a tree.

To leave manual control and return to automatic control press the "SPEED", "RATE", "TRIP" or "TOTAL" key.

## 3.4 Cal Key

Pressing the  key will step through a series of set up factors that need to be entered for the controller to work correctly. The calibration section of this manual explains each of these set-up factors in greater detail.

## 3.5 Test Key


The "TEST" key provides a means of testing that the sensors are working correctly. The test function is also used in the calibration procedures.

Press the  key and the "DISTANCE TEST" will appear.

e.g.


DISTANCE TST 0

The distance test enables the operator to test the wheel sensor mounted on the wheel. Each time the magnet passes the sensor the controller will beep and count the pulse.

To reset the pulse-count back to zero press the  key.  
RESET



### 3.6 Print Key



The print facility will print out trip area, and the number of trees planted in each trip (1-10) or in all trips. Use the optional 2040 Printer Kit connected to the adapter cable provided in the kit.

Press the  key and the controller will display the current trip to be printed.

e.g.

PRINT TRIP 1 ?

To print another trip e.g. trip 2, press the "TRIP" key and use the  or  arrow keys to select the required trip then press "PRINT" again.

To print all the trip information, select "PRINT" then use the  or  arrow keys to change the display to "PRINT ALL TRIPS".

e.g.

PRINT ALL TRIPS?



When the correct option is displayed press  key again and the display will say "PRINTING..." and the printer will begin to operate.

If there is no trip data the monitor will display "NO TRIP DATA" and printing will cease.


#### NOTE:

Each trip data takes **approx. 16 secs** to finish printing. "PRINTING ALL TRIPS" will take **approx 3 mins**.

### 3.7 Reset Key

To reset total area, total trees planted and total distance as well as trip area, trees planted in a trip and the timer, press the  key and follow the prompts on the screen. The  key can also be used to return the controller to the front screen quickly. See section **3.11 Rate Key** for further details.

### 3.8 Speed Key

Press the  key to display the current working speed.

e.g.


15Kph

### 3.9 Total Key

The "TOTAL" key is used to display total area covered, the total number of trees planted and the total distance travelled.


Area, number of trees planted and distance readings are only incremented when the unit is off

hold.

Press  key once to display total total number of trees planted.

e.g.

PLANTS 1025

Press  key again to display "AREA".

e.g.

AREA 150.0Ha

Press  key again to display total "DISTANCE"

e.g.


DISTANCE 2.325km

**TO RESET TOTALS** Press  key once to start reset process.

Total number of trees, total area and total distance are reset simultaneously; this can be done at the start of a planting program to keep overall records.

e.g.

RESET TOTAL ?

Press  again to complete reset process OR **to abort reset process**, press any other key.

After reset of totals you will have the **option** to reset all trip memories at the same time

e.g.

RESET ALL TRIPS?

Press  again to reset all trips OR **to abort reset of all trips**, press any other key.


### 3.10 Trip Key

The "TRIP" key allows the display of a sub total for area covered and trees planted. The "TRIP" function has 10 resetable memories to keep a tally of the areas and numbers of trees planted for 10 different plots.

To display the current "TRIP AREA" press  key once.

e.g.

TRIP 1 12.5Ha

Press  key again to display "TRIP 1" number of trees planted.


e.g.

TRIP 1 123P

**TO RESET TRIP MEMORY** Press  key to start reset process

e.g.

RESET TRIPS 1?

Press  key again to complete reset process OR **to abort reset process**, press any other key.

To change to another trip memory, press the  or  arrow keys to change the current trip number on display.

e.g.


TRIP 2 489

#### **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.

### 3.11 Rate Key

The rate readout is the number of trees being planted per hour.

Press the  key to display the rate readout.

e.g.

15kph 70P/H

### 3.12 Run/Hold Function

The unit has the facility to be put on hold using a remote run/hold switch. The remote run/hold switch must be wired to port 12 at the back of the unit.

The unit will go on hold whenever the remote run/hold switch is activated or speed is zero (wheel is stationary). When 'on hold' trip, total and distance functions will stop accumulating.

If the unit is put 'on hold' using a remote run/hold switch and the speed is not zero nothing will be planted until the unit is taken 'off hold' using the remote run/hold switch.

The "UNIT ON HOLD" message will re-appear every thirty seconds accompanied by an alarm to remind the operator that the unit is not accumulating.

eg.

UNIT ON HOLD

The unit will go "OFF HOLD" and the trip and total functions will begin to accumulate as soon as speed is detected or the remote run/hold switch is deactivated.

eg.



UNIT OFF HOLD



## 4.0 Calibration

### 4.1 General Outline

The 22C4 tree planter contains a level of calibration factors that must be entered before using the unit.

All calibration factors must be entered in **metric** units only. To adjust the factor displayed, use the

 or  arrow keys to change the displayed value.

Holding the  or  arrow keys will cause the numbers to change faster.

To save a calibration figure into memory, press the  "CAL" key after the required figure is set. The controller will then proceed to the next calibration function in that menu.

To exit from the calibration routine, press any other operation key (e.g. "RATE") to return the controller to normal operation.

### 4.2 Memory Backup

An inbuilt memory backup system will hold all calibrations and accumulated totals in memory whenever the power is switched off.

Memory will last for at least 3 months 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 been altered.

e.g.




In this case the operator must press the  "CAL" key to check and re-enter the correct factor. Save this factor by pressing  "CAL" key again. Press any other key (e.g. "SPEED") to return to the normal display.

## 4.4 Calibration Menu

Press the  "CAL" key at any time during operation to go into the Calibration Menu

### 4.4.1 Wheel Calibration Factor

The Wheel factor is the distance covered per rotation of the wheel. Carry out the procedure below to establish this value.

Press the  "TEST" key until "DISTANCE TST" is displayed.

e.g.


DISTANCE TST 0

Crawl the sprayer forward and stop when the "DISTANCE TST" beeps and counts up. (When the wheel magnet and sensor are aligned)

e.g.

DISTANCE TST 1

Peg the ground at the bottom centre of the sprayer main ground wheel tyre.

Press the  key to reset the "DISTANCE TST" counter to 0.

Drive forward in a straight line until the monitor has counted to approximately 10, stopping exactly on a beep count.

***(If you go past a beep don't reverse; go forward to the next beep.)***





e.g.

DISTANCE TST 11

Measure the distance from the peg to the bottom centre of the same tyre.

Divide the distance travelled by the number displayed on the screen.

e.g.  $15.7\text{m} \div 11 = \underline{1.427}$  wheel factor

Press the  key to enter the calibration menu. Press the  key twice to display wheel and use the  or  arrow keys to enter the wheel factor.

e.g.

WHEEL 1.427m

Press the  "CAL" key to set the width factor.




### 4.4.2 Width

Enter the width factor.

e.g.

WIDTH 5.00m


Press the  key to set the distance between trees.

### 4.4.3 Distance

The "DISTANCE" item is the separation between which trees are to be planted. Enter the desired separation distance.

e.g.

DISTANCE 10.00m

Press the  key to set the on time.

### 4.4.4 On Time

The "ON TIME" is how long the plant activation relay stays active for.

Enter a time, in increments of 0.1 of a second.

e.g.

ON TIME 2s

## 5.0 Parts List

ITEM	PART No.	DESCRIPTION	QTY
1	A-22CX	CONTROLLER	1
2	AH-406	MOUNTING BRACKET	1
3	AH-861	SECURING KNOBS	2
4	AC-200	2 CORE CABLE	1
5	AC-300	3 WAY PACKARD CABLE	1
6	AC-103	POWER CABLE	1
7	AA-2008P	PROX TYPE SENSOR	1
8	AH-531	PROX SENSOR TARGET	1
9	AH-398	PROX SENSOR MOUNTING BRACKET	1
10	AM-22CX	22C4 MANUAL	1
11	AM-200	2 YEAR WARRANTY CARD	1

## 6.0 Troubleshooting Guide

PROBLEM		POSSIBLE CAUSE / REMEDY
1.	CONTROLLER DOES NOT TURN ON.	<p>a) A fuse has blown. The controller uses internal poly-fuses which cut out if the monitor is drawing too much current and will automatically restore power when the fault has been repaired.</p> <p>b) Disconnect power cable at controller and test voltage is 12-13.8V DC from battery. Reconnect power to the controller and check that there 12V between pins 10 &amp; 11 on the green plug at the back of the controller.</p> <p>c) Check connections at battery are <b>clean</b> and tight at terminals, try with engine running.</p> <p>d) Check that <b>red</b> wire is to positive and <b>black</b> wire is to negative.</p> <p>e) Check that no other electrical device is connected to the same power cable - the power cable must be completely independent. Do not share power with other devices using the 22C4 loom.</p> <p>f) Connect controller direct to another 12 Volt battery known to be in good condition.</p> <p>g) Unable to locate fault – contact nearest Dealer.</p>
2.	LCD DISPLAY DROPS OUT OR GREY SQUARES APPEAR ON HALF THE READOUT	<p>a) If display rectifies when engine running this indicates battery is in poor condition or connections to battery are poor.</p> <p>b) If problem persists when engine running, then voltage supply is low or low current is a problem due to poor connections at battery or corroded inline fuse holder on loom.</p> <p>c) Clean battery terminals and power cable connections.</p> <p>d) Connect controller directly to an independent battery to prove if controller is OK.</p>
3.	CONTROLLER LOOSING CALIBRATION VALUES.	<p>a) Controller not connected directly to battery. Connect black from loom directly to negative and red to positive side of battery. Do not share power with any other devices using the 22C4 loom.</p> <p>b) If problem occurs regularly, then it is probably caused by outside interference. See "Interference Causes and Remedies" Troubleshooting Section 20.</p> <p>c) "CHECK CAL" may be caused by memory chip beginning to fail, usually after 3-5 years when in-built battery in memory chip runs out - see dealer for replacement.</p>
4.	SPEED READOUT TOO FAST OR TOO SLOW	<p>a) Recheck "WHEEL" calibration is measured correctly and entered in metres. eg. 2.445 metres.</p>

	<b>PROBLEM</b>	<b>POSSIBLE CAUSE / REMEDY</b>
5.	SPEED READOUT JUMPY	<p>a) Make sure target disc is facing sensor correctly as shown in "Wheel Sensor Installation" section 2.4. Use of an alternative target disc may cause problems due to the wrong spacing between teeth.</p> <p>b) Check that the target disc is present and the disc is 1 – 4 mm away from the proximity sensor as they pass. Target disc too far can cause jumpy speed.</p> <p>c) If the readout is jumpy, it indicates that the impulses from the wheel sensor are inconsistent. Check for poor or intermittent connections to sensor.</p> <p>Check sensor cable for physical damage, making sure cable has not rubbed through to the chassis due to sharp edges.</p> <p>d) If fault can not be found, press "TEST" key on controller until "TEST WHEEL" is displayed. Drive slowly forward and listen to the beeps. The sound should be rhythmic at a fixed speed. If the sound is jumpy, and wiring is OK, then replace sensor.</p> <p>e) If the beeps can be heard whilst stationary, then vibration or interference could be the cause. See Troubleshooting Section 9 " Interference Causes and Remedies".</p>
6.	SPEED READOUT INTERMITTENT OR STAYS AT ZERO	<p>a) Fault is probably a broken or intermittent connection to wheel sensor or perhaps a faulty sensor. Check all connections first.</p> <p>b) Make sure clearance between target disc and wheel sensor is 1-4 mm.</p> <p>c) Press "TEST" key until "TEST WHEEL" is displayed</p> <p>Disconnect wheel sensor from cable and use a short length of wire to short circuit across connector plug to wheel sensor cable (black &amp; blue wires) or (A and B).</p> <p>Controller in cab should 'beep' continuously whilst wires are short circuited. Now wriggle all connections from wheel sensor plug back to controller to try and make beep sound fail thereby isolating cause of fault.</p> <p>d) If wiring and controller can not be faulted, replace sensor.</p> <p>e) If no audible response from shorting out wiring at wheel sensor connection, short out progressively between wires 6 &amp; 9 at all points back to controller to isolate broken section of cable.</p> <p>f) Remove green 12 way plug at rear of controller and short circuit directly across pins 6 &amp; 9. If still no result return controller to dealer for repair.</p> <p>If wheel sensor connected direct into "WHEEL" input at rear of controller short out directly across ground (blue) and signal (black) connections instead.</p> <p>If no audible response direct into controller then return controller for repair to your nearest Farmscan Dealer.</p>

PROBLEM			POSSIBLE CAUSE / REMEDY
7.	TOTAL AND TRIP AREA INCORRECT	a)	Check "SPEED" readout is correct and steady - if not, this will affect the area totals. See Troubleshooting sections 4, 6 and 7.
		b)	Recheck "WIDTH" calibration is set correctly in <u>metres</u> .
8.	TOTAL AND TRIP AREA WON'T RECORD	a)	Check that "SPEED" readout is working. If not see Troubleshooting Section 6.

## 9. INTERFERENCE CAUSES AND REMEDIES

CAUSES	REMEDY
Noisy wire ignition leads on petrol engine or pump motor	Replace with carbon leads. Fit suppressors to coil and distributor.
Faulty alternator	Have alternator serviced
Other electrical equipment running off controller power cable.	Run separate power cable <b>direct</b> to 12 V battery for controller.
Controller upsets FM Radio	Boost aerial signal to radio – shield controller from radio – move controller and radio further apart.

# 7.0 Appendix

## 7.1 Tractor Loom Diagram

## 7.2 Implement Loom Diagram