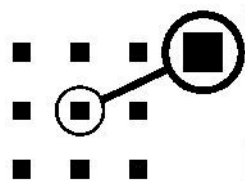


22CX unit**rol**

22C6

INSTALLATION & OPERATION INSTRUCTIONS

22C6 Liquid Controller



FARMSCAN

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1.0 Introduction

1.1 General Outline

The 22C6 liquid controller provides ground speed related control of liquid products being delivered at low volume through a single boom or liquid distribution system.

The controller will automatically maintain the selected target spray rate regardless of speed or pressure variations within the limits of **pump capacity and nozzle/orifice size**.

The system employs a low volume flowsensor and stainless steel ball control valve to throttle the main delivery line. A pressure sensor provides live feedback of the operating pressure and has an alarm function to warn of sudden pressure loss if a hose becomes disconnected.

The control valve opens automatically when the vehicle starts moving and closes when you stop or turn the MASTER switch off.

An optional master valve is available to allow instant stop/start control of spray when turning at headlands.

The 22C6 provides a "DUMP" function, which allows flushing of the spraylines when stationary.

Rates can be increased or decreased on-the-run in preset steps using the UP/DOWN keys or rates can be changed under GPS control when the controller is connected via the serial port to a Farmlap Guidance System or another computer-based product with GPS rate mapping and controlling software.

The 22C6 keeps a TOTAL of areas covered and volume applied, plus TRIP records for up to 10 sub areas.

About this Manual

This manual contains the necessary instructions to install, operate and calibrate the 22C6 spray controller.

2.0 Installation

2.1 Controller Installation

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

- The controller 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 controller.
- 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.

22C6 Port Connections

Port Number	Function	Colour
1	Flow Control Valve	BLUE
2	Flow Control Valve	YELLOW
3	Pressure	VIOLET
4	Flow Sensor	BROWN
5		
6	Wheel	WHITE
7		
8	12 Volts OUT	RED
9	Ground	BLACK
10	0 Volts Battery IN	BLACK
11	12 Volts Battery IN	RED
12	Master Valve Output	PINK

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.

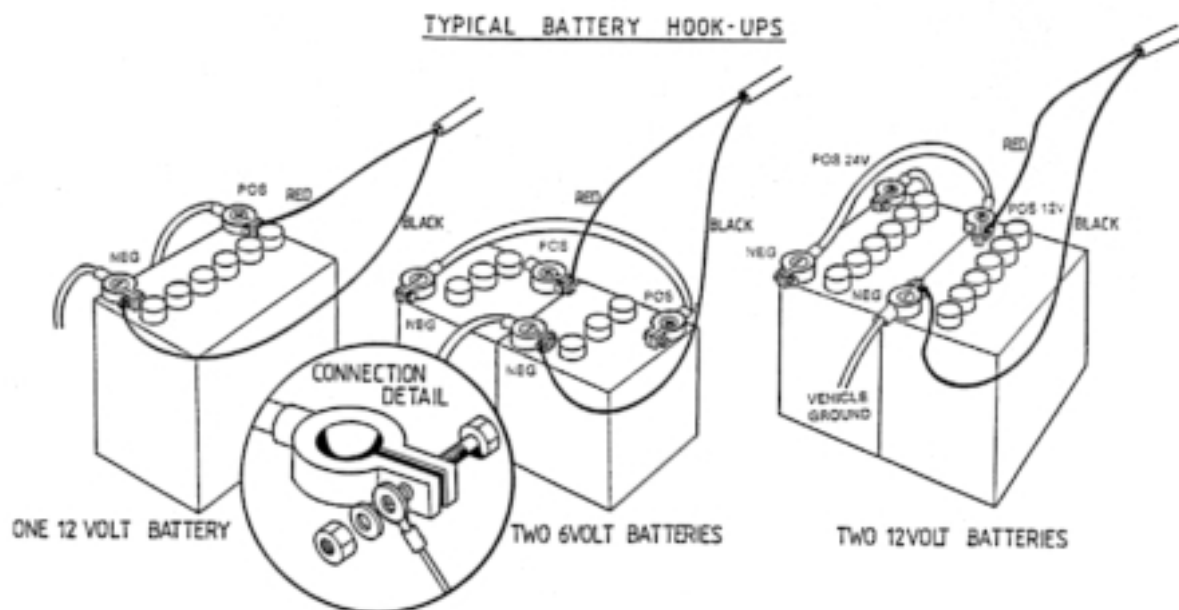
DO NOT connect other electrical equipment to the 22C6 controller **power cable**.

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.

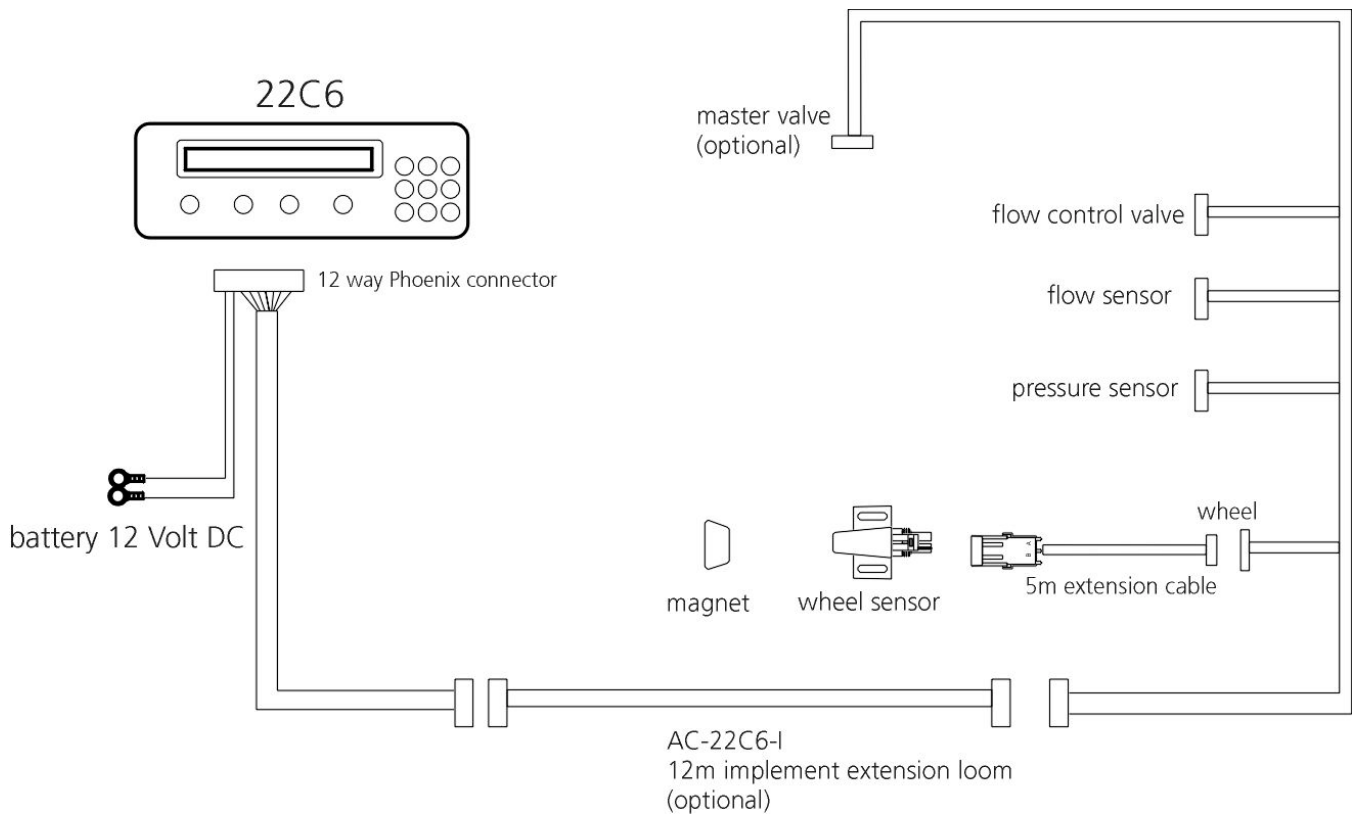
Connections to battery terminals must be clean and tight.

! 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 sensors (wheel and flow) and the spray boom solenoids.
- When the sensors have been installed and connected to the loom, align the loom so that there is the least amount of excess cable near the sensors. When correct tighten the cable ties.



2.4 Wheel Sensor Installation

The wheel sensor supplied, consists of a reed type sensor and magnet to be fitted onto **any undriven** ground wheel. The sensor is activated every time the magnet sweeps past the sensor. Follow the procedure below to install the wheel sensor.

Wheel Sensor Installation Procedure:

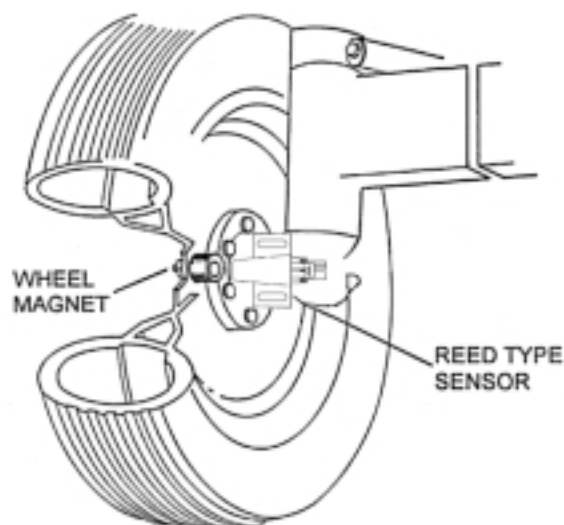
Araldite one button magnet onto the wheel in a position that allows it to sweep directly past the wheel sensor within 10-15 mm on every rotation. For large wheels operating at less than 5 km/h, fit a wheel magnet exactly opposite the first magnet.

The magnet should be located as near the hub as possible to get the best ground clearance.

The sensor must be rigidly bolted to an existing structure, ideally in a protected position.

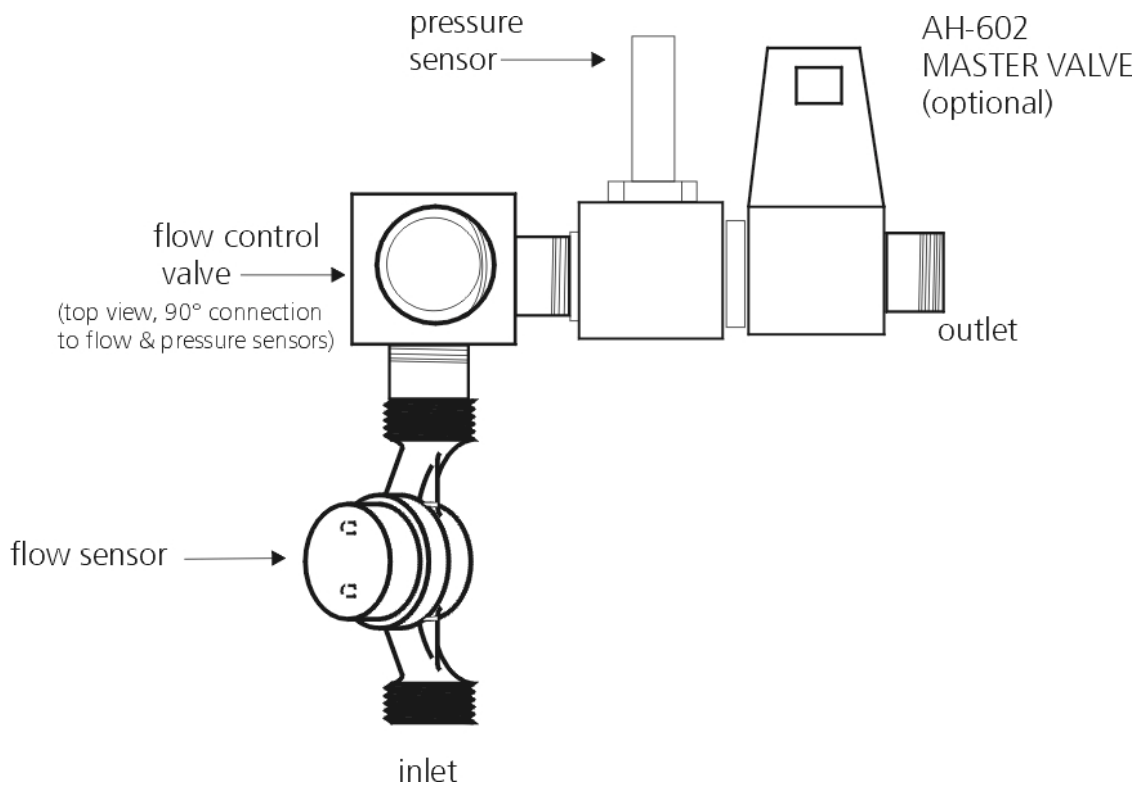
If mounting the sensor to a steered wheel, make sure the sensor turns with the steering mechanism to maintain equal clearance between the magnet and the sensor from lock to lock.

Connect sensor to 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 Spray Installation

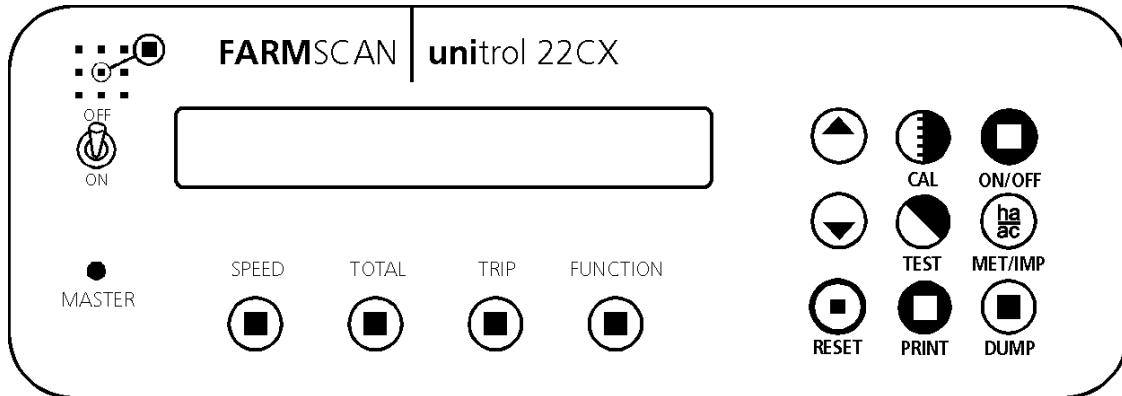
The diagram below shows the installation scheme for the flow control valve, flow sensor, pressure sensor and optional master valve (instant stop/start spray).




NOTE:

See page 20 section 4.5 to enable optional master valve for operation.

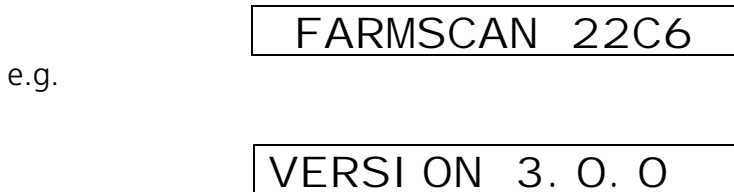
3.0 Operation



3.1 Power On/Off Key

To switch the monitor **on**, press the  key

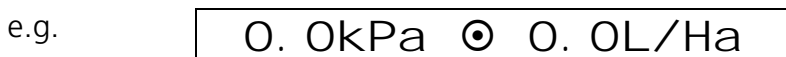
Whenever the monitor is switched **on** the display will run through a start up routine displaying the version of software and the program the monitor is running.



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 3.10" will be displayed.

The monitor will then display the main operating screen.



If the "MASTER" switch is **off**, the monitor will display "Unit on Hold" every 30 seconds. See section **3.13 Run/Hold Function** for an explanation of this alarm.

3.2 Master Switch

The MASTER switch governs operation of the flow control valve and opens or closes the optional MASTER Valve (if used).

MASTER ON – When the MASTER switch is ON, the flow control valve will automatically start to control the rate when ground speed exceeds 0.5kph. The faster you travel the more the valve will open to maintain the target rate.

MASTER OFF – When the MASTER switch is OFF, the control valve will close regardless of ground speed. The monitor will go into hold mode and stop accumulating area, distance and volume used.

MASTER VALVE – If using the optional MASTER VALVE, the flow control valve will hold the working pressure whenever the MASTER switch is turned off. This feature allows instant stop/start control of liquid at headlands.

NOTE: Master Valve must be activated from CAL menu, see section 4.5 page 20.

3.3 Dump Key

The Dump Key is used to flush the spraylines and adjust the system pressure before operating.


Press the DUMP key  and switch the MASTER ON to fully open the flow control valve.

The UP/DOWN keys can be used to adjust the pressure while dumping.

To Adjust System Pressure

1. Start pump recirculating to tank.
2. Switch MASTER ON and press DUMP key to fully open flow control valve.
3. Adjust pump revs and/or pressure relief valve to attain a reading of at least 50kpa higher than the maximum requirement for operation.

3.4 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.

3.5 Cal Key

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

3.6 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.

DI STANCE 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 monitor will beep and count the pulse.

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

Pressing the  key again will display "FLOW TST".


e.g.

FLOW TST 0

The "FLOW TST" display should increment together with a regular beep that becomes faster as the flow rate increases until the beep becomes an almost constant tone.


NOTE:

To test the flow sensor, the "MASTER" switch must be flicked on and the pump operating.

To reset the flow count press the  key



3.7 Print Key



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

Press the  key and the monitor 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**.

3.8 Reset Key

To reset total area & litres or gallons sprayed, distance, trip area & litres or gallons and timer, select the function to be reset, then press the  key and follow the prompts on the screen. The  key can also be used to return the monitor to the base target rate quickly. See section **3.12 Rate Key** for further details.

3.9 Speed Key

Press the  key to display the current working speed and flow rate.


e.g.

15Kph	7. 6L/m
-------	---------

3.10 Total Key

The "TOTAL" key is used to display total area covered, total liquid sprayed and the total distance travelled.

Area, amount sprayed and distance readings are only incremented when the unit is off hold.

Press  key once to display total "AREA".

e.g.

AREA	150. 0Ha
------	----------

Press  key again to display total amount sprayed.

e.g.

LI TRES	255. 8L
---------	---------

Press  key again to display total "DISTANCE"

e.g.


DI STANCE	2. 325km
-----------	----------

TO RESET TOTALS Press  key once to start reset process.

Total area, total amount sprayed and total distance are reset simultaneously; this can be done at the start of a spraying 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.


3.11 Trip Key

The "TRIP" key allows the display of a sub total for area covered and weight applied. The "TRIP" function has 10 resetable memories to keep a tally of the areas and weights for 10 different plots or loads.

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

e.g.

TRIP 1 12.5Ha

Press  key again to display "TRIP 1" weight


e.g.

TRIP 1 0.85t

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 0.00t

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.

3.12 Rate Key

The rate readout is the application rate per hectare or acre.

Press the  key to display the rate readout.

e.g.

150kPa  70L/Ha

The 22C6 will display both pressure (kpa or psi) and the spray rate.

Press the RATE key again to display tank volume used.

eg.

2000L 70L/Ha

The tank volume can be reset when **stationary** only.



Press the RESET key to start the RESET

eg.

RESET TANK? 70L/Ha

Press RESET key again to clear the tank volume.

When the RATE key is pressed the target rate is first displayed, then within 3 seconds the live rate will be displayed. See section **4.4.1 Target Rate** for information on setting the target rate.


To increase or decrease the spraying rate while operating use the  or  keys. The amount of change in the rate from each press of the arrow keys can be set to any amount, e.g. 5, 10, 20 L/Ha per step up or down from the standard target rate. This is referred to as the **STEP SET**. See section **4.4.2 Step Set** for instructions on changing the step set.

When the rate has been changed an arrow will appear on the display. This arrow reminds the operator which way the rate has been adjusted from the target rate.


-  Target Rate
-  Below Rate
-  Above Rate

e.g.

150kPa  77L/Ha

To return back to the base target rate quickly, press the  key.

e.g.

150kPa  70L/Ha

If the monitor cannot achieve the desired rate, the monitor will display one of the following alarms.

RATE TOO LOW

e.g.

RATE TOO HIGH

3.13 Run/Hold Function

The run/hold function is activated by the "MASTER" switch on the front panel. The unit will go on hold whenever the "MASTER" is switched **off**. Also, whenever the speed is zero (wheel is stationary), the controller will go 'on hold'.

When 'on hold' trip, total and distance functions will stop accumulating.

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

e.g.

UNI T ON HOLD

The controller will go "OFF HOLD" and the trip and total functions will begin to accumulate as soon as speed is detected and the "MASTER" is flicked **on**.

e.g.

UNI T OFF HOLD

Instant Stop/Start

An optional MASTER VALVE can be fitted after the flow control valve to instantly Stop and Start liquid delivery when turning at headlands. See Installation page 7.

When the Master Valve is switched off at working speed, the flow control valve will hold the working pressure at that point. When the Master switch is turned on, the liquid delivery will resume at the same pressure.

4.0 Calibration


4.1 General Outline

The 22C6 liquid controller contains three levels of calibration menus:

1. Level 1 calibration menu – Easily accessible and used to change settings that may vary frequently.
2. Level 2 calibration menu – Changes the display language, enables the MASTER valve option, allows you to change the printer header.
3. Level 3 calibration menu – Accessible through a simple sequence of key presses and used to calibrate the flow control valve.

All calibration factors in levels 1, 2 and 3 must be entered before operation. 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  key after the required figure is set. The monitor 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 monitor to normal operation.

4.2 Memory Backup

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

Calibration values will be held in memory and do not depend on a memory backup battery. However, accumulated total values are stored in memory backed up by a battery and will last for at least 3 months after disconnection from a 12 Volt 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.

e.g.



CHECK CALS!

In this case the operator must press the  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 Level 1 Calibration Menu


Press the  key at any time during operation to go into the calibration menu

4.4.1 Target Rate

With target displayed, the  or  arrow keys can be used to set the Base Target spraying rate.

e.g.

TARGET 100L/Ha

Press the  key to proceed to Step Set.

4.4.2 Step Set

The step set is the amount the target rate can be changed up or down when using the arrow keys to change the rate on the go. e.g. 5, 10, or 50 L/HA steps.


Use the arrow keys to set the steps as desired.

e.g.



STEPSET ↑↓ 5 L/HA

NOTE:

If operating under GPS rate map control, the step set may be used but your selection will be automatically overridden anytime the computer commands the rate to change.

Press the  key again to proceed to the wheel factor.

4.4.3 Width

The width is the effective width over which liquid is being sprayed. Use the  or  arrow keys to enter the width in metres.

e.g.

WI DTH 10.00m

4.4.4 Wheel

The wheel factor is the distance covered per rotation of the wheel. Follow the procedure below to establish the wheel cal factor.

To calculate Wheel Cal Factor

1. Move equipment into field conditions for accurate measurement.
2. Move forward to align wheel magnet and sensor (stop on a beep).
3. Press TEST key on monitor to display WHEEL TEST and press RESET to clear the wheel pulse counter.

e.g.

DI STANCE TST	0
---------------	---

4. Peg ground at bottom centre of wheel.
5. Drive forward in a straight line for at least 25 metres and stop on a wheel pulse update. Do not reverse if you miss a pulse, go forward.
6. Measure the distance travelled in Metres and divide the distance by the number of pulses counted.
EG: 26.5m travel divided by 18 pulses = 1.472 m per pulse wheel cal.

Eg.

DI STANCE TST	18
---------------	----

7. Repeat the test to check accuracy, then press CAL to enter the WHEEL calibration.

Eg.

WHEEL	1.427m
-------	--------

4.4.5 Slow Hold Speed

When the sprayer is forced to travel too slow, a loss of full spray pattern can occur due to low pressure at the nozzles.

The resulting stripping effect can be avoided by setting a **slow hold speed**, which will make the controller hold pressure when ground speed falls below a set point.

If slow hold is set for 8kph,

e.g.



SLOW HOLD	8Kph
-----------	------

below 8kph the spray pressure is held constant.


WARNING: Operating below the **slow hold speed** will result in over application and activation of the "RATE HIGH" alarm.

To Determine SLOW HOLD SPEED

1. Calibrate 22C6 as normal for the required rate.
2. Start spraying at normal speed then slow down until nozzle fan pattern begins to deteriorate. Take note of the ground speed readout when this happens and use this point for the slow hold speed.

Use the  or  arrow keys to enter the desired slow hold speed.

To disable the slow hold function set the slow hold speed to **zero**.

Press the  key again to calibrate the flow sensor.

4.4.6 Flow Sensor Calibration

The flow sensor calibration factor is the number of pulses per litre (PPL) generated by the flow sensor. The PPL factor of every flow sensor is unique and will vary slightly depending on liquid viscosity.

The default flow sensor calibration factor is 45.6 ppl with water.

Important: After installing the system, the PPL factor should be checked with actual product before operating the controller. Follow the procedure below to establish the correct PPL factor.

Flow Cal Procedure:

1. Turn MASTER switch OFF and start pump recycling to tank.
2. Disconnect main delivery hose at a point after flow sensor and feed into a measuring bucket. Press TEST key to display FLOW TEST, then switch MASTER ON briefly to prime delivery hose.

Eg

TEST FLOW 0

3. Empty measuring bucket and press RESET key to clear FLOW TEST pulse counter.
4. Switch MASTER ON to start calibration run and measure out approximately 20 litres of product, then switch MASTER OFF.
5. Measure exact quantity of product delivered, then divide the number of test pulses by the quantity of product.
EG: 905 pulses divided by 21.5 litres = 42.1 pulses per litre.

Eg

TEST FLOW 905

6. Repeat the test to ensure an accurate result.
7. Press CAL key to display FLOW CAL and enter correct pulse/litre factor.

Important:

Perform calibration with the actual product for accurate results.

Recheck calibration when changing nozzles or if operating at significantly higher or lower pressures

To Set Pulses/L Flow Cal Factor

1. Press "CAL" key to display "PULSES/L" factor.

eg

PULSES/L 45.6

2. Use '▲' and '▼' keys to set the correct "PULSES/L" factor.

eg

PULSES/L 130

3. Press the "RATE" or "SPEED" key to return to the normal display.

4.4.7 Alarms

Pressure Alarm Points

As the flow control valve responds to variations in speed or changes in rate, the pressure indication will increase or decrease accordingly.

The option is available to set upper and lower pressure alarm points. Set Hi and Lo alarm points to zero until the spray controller is fully operational, then introduce alarm points outside the operating range. Follow the steps below to set the pressure alarm points.

The low pressure alarm point is useful to detect a sudden loss of pressure if a delivery hose becomes disconnected.

To set pressure alarm points

1. Press the "CAL" key to display "LOW PRESS"

Eg

LOW PRESS 284

2. Use the arrow keys to enter a pressure low alarm.
3. Press the "CAL" key again to display "HI PRESS"
4. Use the arrow keys to enter a pressure high alarm.



NOTE:

Set zero for no alarm point on either the low or high pressure alarm points.

Tank Alarm

Entering a tank volume in this screen enables the tank alarm function. The 22C6 will sound the alarm "TANK LOW" when 90% of the tank volume entered in this screen has been used.

Enter the volume of the tank typically used. For example if only 800L are used in a 1000L tank enter 800L.

Use the  or  arrow keys to enter the volume.

4.5 Level 2 Calibration Menu

In this menu the MASTER valve option is enabled and the display language and printer are set up. At present the display language can be set to Danish, English (default) and German. The header on the printer dockets the 22C6 prints can be customised.

To Change Language Setting

Press the "CAL" key to display the "TARGET" screen as seen in section 4.4.1. Then press and hold the "CAL" key and the following screen will be displayed.

LANGUAGE ENGLISH

Press the up and down arrow keys to select a different display language. The display will be set to this language when pressing any other key such as "RATE" to exit the level 2 calibration menu.

Enabling the MASTER Valve

After setting the display language press "CAL" to display the following screen.

MASTER NO

To use the installed MASTER valve for instant stop/start spraying change NO to YES. Press any other key except the "CAL" to exit. Pressing the "CAL" key will display the screen below.

Selecting the Printer

In the MASTER valve enable/disable screen press "CAL" to display the following screen.

PRINTER FARMSCAN

The above is the default setting if you are using a printer supplied by Farmscan. If you are using an OEM printer press the up or down arrow key to display "PRINTER OEM".

To Customise the Printer Header

Once the printer has been selected press "CAL" to display the following screen.

HEADER FARMSCAN

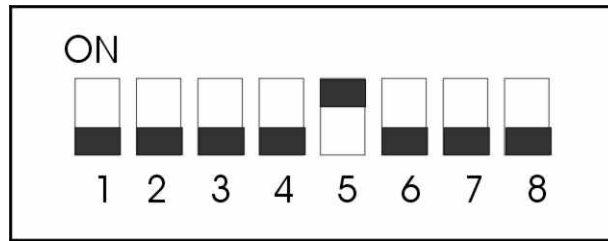
A header with a maximum of 9 characters can be set in this screen.

When entering this screen the cursor will be under the "F" in "FARMSCAN" use the up and down arrow keys to change the letters and press the "CAL" to move the cursor to the right. The "RESET" key clears the header text allowing you to start again.

Press and hold the "CAL" key to return to the language setting screen. Press any other key to exit. Upon exiting the screen the header set will be appear on the top of the docket when trips are printed.

Printer Dip Switch Setting

To print from the supplied printer make sure the dip switch under the paper roll on the printer is set as shown below.



4.6 Level 3 Calibration Menu

This menu is used to set the flow control valve response time.

To Set Flow Control Valve Response Time:

Press the "CAL" key until "TARGET RATE" is displayed. Then press the "SPEED", "TEST" and "PRINT" keys simultaneously to access the valve calibration menu. The "VALVE RESP" screen will be displayed.

VALVE RESP 5

This value controls how quick the valve is driven to reach the set point. The default value is 5. If after setting a value you find that the system takes too long to reach the set rate ("L/Ha"), increase this value, or if it overshoots continuously decrease this value.

5.0 Parts

ITEM	PART No.	DESCRIPTION	QTY
1	A-22CX	CONTROLLER WITH 22C6 SOFTWARE	1
2	AH-406	MOUNTING BRACKET	1
3	AH-861	SECURING KNOBS	2
4	AC-22C6-T	TRACTOR LOOM	1
5	AC-22C6-I	LIQUID FERTILIZER IMPLEMENT LOOM	1
6	AA-110P	WHEEL SENSOR	1
7	HM-102	WHEEL MAGNETS	2
8	AA-109	PRECISION PRESSURE SENSOR 600 kPa	1
9	AM-22C6V3	22C6 INSTRUCTION MANUAL	1
10	AM-200	2 YEAR WARRANTY CARD	1

Optional Parts

PART No.	DESCRIPTION	QTY
AH-602	MASTER VALVE	1
AC-22C6-E	EXTENSION LOOM	1

6.0 Troubleshooting

PROBLEM		POSSIBLE CAUSE / REMEDY	
1.	CONTROLLER DOES NOT TURN ON.	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.
		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 & 11 on the green plug at the back of the controller.
		c)	Check connections at battery are clean and tight at terminals, try with engine running.
		d)	Check that red wire is to positive and black wire is to negative.
		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 such as foam markers, using the 22C6 loom.
		f)	Connect controller direct to another 12 Volt battery known to be in good condition.
		g)	Unable to locate fault – contact nearest Dealer.
2.	LCD DISPLAY DROPS OUT OR GREY SQUARES APPEAR ON HALF THE READOUT	a)	If display rectifies when engine running this indicates battery is in poor condition or connections to battery are poor.
		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.
		c)	Clean battery terminals and power cable connections.
		d)	Connect spray controller directly to an independent battery to prove if controller is OK.
		e)	Disconnect control valve - if problem goes away then this confirms insufficient current available from power cable.
3.	CONTROLLER LOOSING CALIBRATION VALUES.	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 such as foam markers, using the 22C6 loom.
		b)	If problem occurs regularly, then it is probably caused by outside interference. See "Interference Causes and Remedies" Troubleshooting Section 19.
		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.
4.	SPEED READOUT TOO FAST OR TOO SLOW	a)	Recheck "WHEEL" calibration is measured correctly and entered in metres. eg. 2.445 metres.

PROBLEM		POSSIBLE CAUSE / REMEDY
5.	SPEED READOUT JUMPY	<p>a) Make sure magnet is facing sensor correctly as shown in "Wheel Sensor Installation" section 2.4. Use of an alternative magnet may cause problems due to wrong orientation of magnet.</p> <p>b) Check that wheel magnet is present and the magnet is 15 - 20 mm away from wheel sensor as they pass. Magnet too close 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 20 " 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 wheel magnet and wheel sensor is 15-20 mm. Check for the correct sensor, it should be black.</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 & white wires).</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 & 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 & 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 (black) and signal (white) 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.	WHEEL SENSOR TEST PROCEDURE		<p>USE A MULTIMETER ONLY TO TEST THE WHEEL SENSOR.</p> <p>a) Disconnect wheel sensor from cable.</p> <p>b) Switch Multimeter "ON: and select "OHMS" scale.</p> <p>c) Touch test probes together and meter needle should read zero "0 Ω" resistance.</p> <p>d) Connect test probes to wheel sensor pins. If meter goes immediately to zero without magnet, then sensor is short circuit (faulty). If meter stays to left of scale, hold wheel magnet in front of sensor, meter should go straight to zero. If meter fails to change, then sensor is open circuit (faulty).</p>
8.	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> .
		c)	If boom section controls used, must be connected to boom control input at rear of controller see section 2.7.
9.	TOTAL AND TRIP AREA WON'T RECORD	a)	Check that "SPEED" readout is working. If not see Troubleshooting Section 6.
		b)	At least one boom solenoid must be switched on. (if used)
		c)	Flow sensor must be working OK.
		d)	With liquid flowing, press "SPEED" key and check if L/min readout is working. If not see flow sensor test procedure.
10.	RATE READOUT FLUCTUATES MORE THAN +/- 0.5 L/Ha.	a)	Big fluctuations may be normal for 2-5 seconds only when changing speed or rates.
		b)	Check "SPEED" readout is stable at a constant driving speed. If not, follow Troubleshooting Section 6.
		c)	Check all calibrations are set correctly.
		d)	Check if pump feedback is giving a stable pulse rate as follows: Press "TEST" key and select "TEST FLOW", slow the pump down and listen to the pulse rate. The beeps should be rhythmic and steady.

PROBLEM		POSSIBLE CAUSE / REMEDY	
10.	RATE READOUT FLUCTUATES MORE THAN +/- 0.5 L/Ha continued...	e)	Check the nozzle manufacturers spray chart to see if the rate selected is compatible with the nozzles and driving speed. If nozzles are too large for the intended rate and speed, then the FLOW CONTROL VALVE valve will hunt for the right setting. Increase rates or get the right nozzles for the job.
		f)	Fluctuation could be caused by a faulty pressure relief valve that dumps pressure prematurely, this will cause a continuous self defeating response from the spray controller as it tries to compensate.
		g)	Electrical interference could be causing the flow sensor to pulse erratically - this would result in the controller trying to compensate. See Interference Causes and Remedies. Troubleshooting Section 19.
11.	RATE READOUT STAYS AT ZERO	a)	Check "SPEED" readout. If no speed follow Troubleshooting Section 7.
		b)	Disconnect pump feedback plug from loom and use a short length of wire or long nose pliers to short out between the pins corresponding to the white and green wires of the flow sensor connector plug feeding back into servo valve grey box
		c)	A continuous beep should be heard from the spray controller. Now wriggle all wiring and connections from flow sensor plug to rear of spray controller and listen if the beep can be made to drop out.
		d)	If no beep heard, then repeat test by shorting out progressively across pins 9 & 4 at all points back to controller until faulty cable section is isolated.
		e)	Remove green 12 way plug at rear of controller and repeat Test directly across pins 9 & 4 of controller.
		f)	If no audible response directly into controller then return controller to your nearest dealer for service.
12.	RATE LOW "SLOWER" ALARM OR CAN'T REACH MAXIMUM SPEED.	a)	Indicates target rate selected is not achievable.
		b)	Check manufacturers spray chart to see what rates should be achievable at maximum pressure.
		c)	Check inline filters and nozzle filters which may be blocked causing restriction to available flow rate.
		d)	Check flow sensor inlet for debris causing restriction
		e)	Check difference between actual pressure at boom using a mechanical gauge, and pressure at servo accordingly to spray controller. Then refer to manufacturers spray chart to see rate and speed possible given pressure at boom - line losses are normal.

PROBLEM		POSSIBLE CAUSE / REMEDY	
13.	FLOW CONTROL VALVE VALVE WON'T OPEN AUTOMATICALLY	a)	1. Check "WIDTH" calibration factor is correctly entered. 2. Check "FLOW" cal factor is set. 3. Check "WHEEL" cal factor is set. 4. Check rates are set.
		b)	Check green 12-way plug at rear of spray controller is inserted properly with clips upwards and check implement breakaway connection making sure pins on male side are contacting properly.
		c)	Check ground speed readout is working correctly.
		d)	If no pressure, make sure pump is working correctly.
14.	FLOW CONTROL VALVE KEEPS OPENING WHILE SPRAYING	a)	Check speed readout is working accurately. Refer Troubleshooting Sections 5 – 7.
		b)	Follow Troubleshooting 11 (c) to isolate flow sensor as cause.
		c)	Read nozzle manufacturers spray chart and make sure the intended rate can be delivered at the speed required within the minimum recommended operating pressure.
15.	FLOW CONTROL VALVE RESPONSE TOO SLOW TO START SPRAYING	a)	If switching "OFF" regularly at headlands you must use the master valve option to instantly Start / Stop spray.
		b)	If using solenoid shutdown at headlands you must switch 'OFF' master solenoid whilst still travelling at working speeds . If you shut 'OFF' too late the flow control valve will have opened to bypass.
		c)	If centrifugal pump, when shutdown, pump must be able to cycle some material back to tank, otherwise cavitation may cause loss of pressure.
		d)	If ground wheel is large ie greater than 2 metres travel then additional magnets may be required to improve response at slow working speeds.
16.	RATE HI ALARM ACTIVATES FOR MORE THAN 2-3 SECONDS	a)	Check flow control valve operation.
		b)	Press "CAL" key until slow hold function is displayed and check setting.
17.	PRESSURE READING INCORRECT	a)	It is normal to read up to 10 kPa residual reading when there is no pressure. This does not affect the working range.
		b)	If there are restrictions downline from the flow control valve ie from hoses, solenoids or blocked filters, it will be normal to read a higher pressure in the cab than the true pressure being achieved at the nozzles.
			NOTE: The pressure sensor reading has no effect on the correct functioning of the controller. The pressure reading is only an indication for your information.

PROBLEM		POSSIBLE CAUSE / REMEDY	
18.	PRESSURE TOO LOW	a)	Check all calibration factors are correctly entered.
		b)	With boom spraying make sure sufficient pressure is available.
		c)	Run boom and check hoses for split after servo control valve.
		d)	Make certain nozzles are correct for the job.

19. INTERFERENCE CAUSES AND REMEDIES

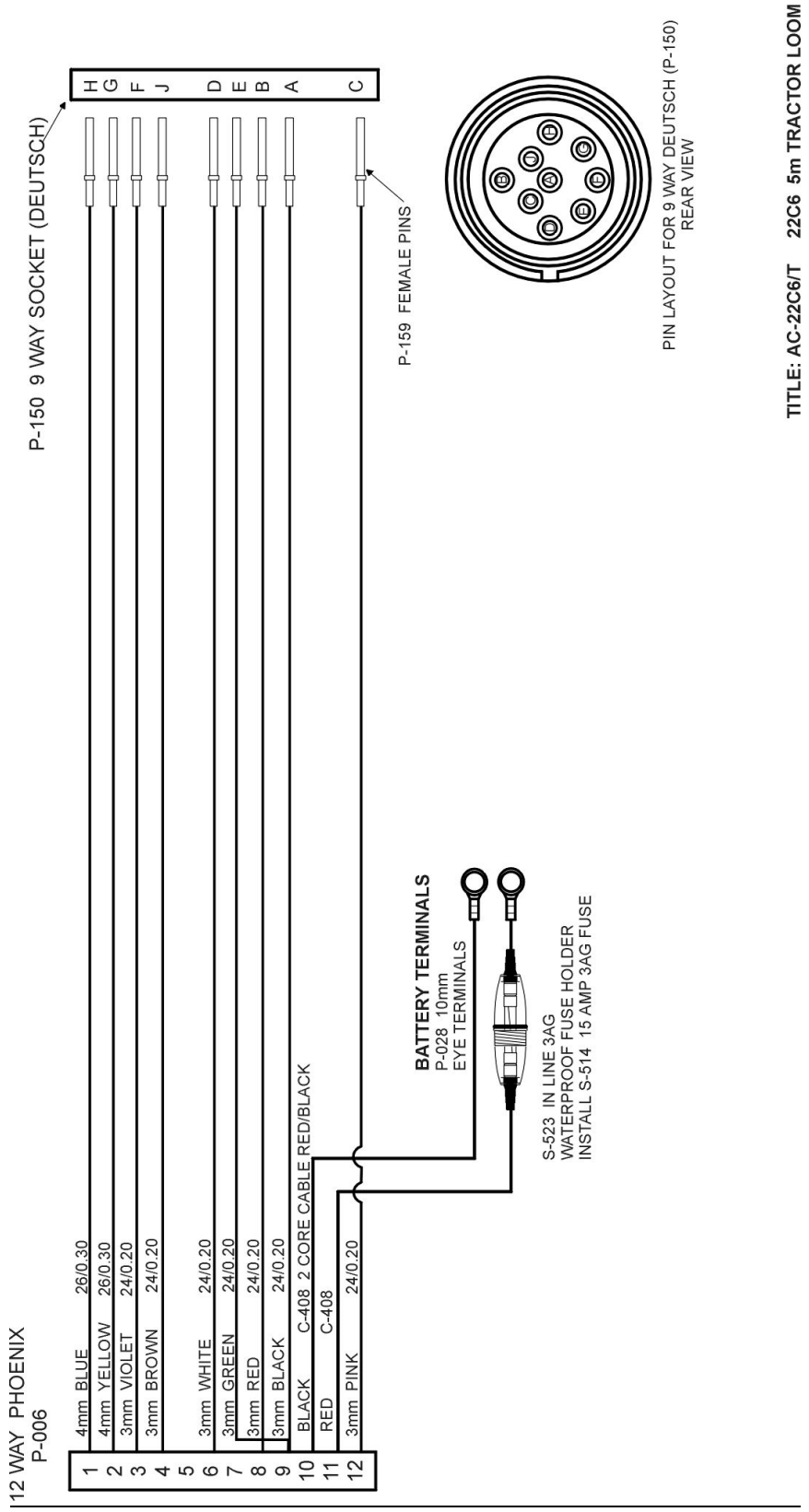
CAUSES	REMEDY
Noisy wire ignition leads on petrol engine or pump motor	Replace with carbon leads. Fit suppressors to coil and distributor.
Faulty alternator	Have alternator serviced
Other electrical equipment running off spray controller power cable.	Run separate power cable direct to 12 V battery for spray controller.
Calibrations get corrupted when solenoids switched off.	Run separate power cable to boom control centre. Fit diode across solenoid coil to clamp spike. Run cable for boom control away from spray controller cable. Separate spare cables from spray controller and boom controller if coiled together.
Kill switch on pump motor upsets Controller	Run kill switch cable away from spray controller cables.

6.1 Summary of Alarms

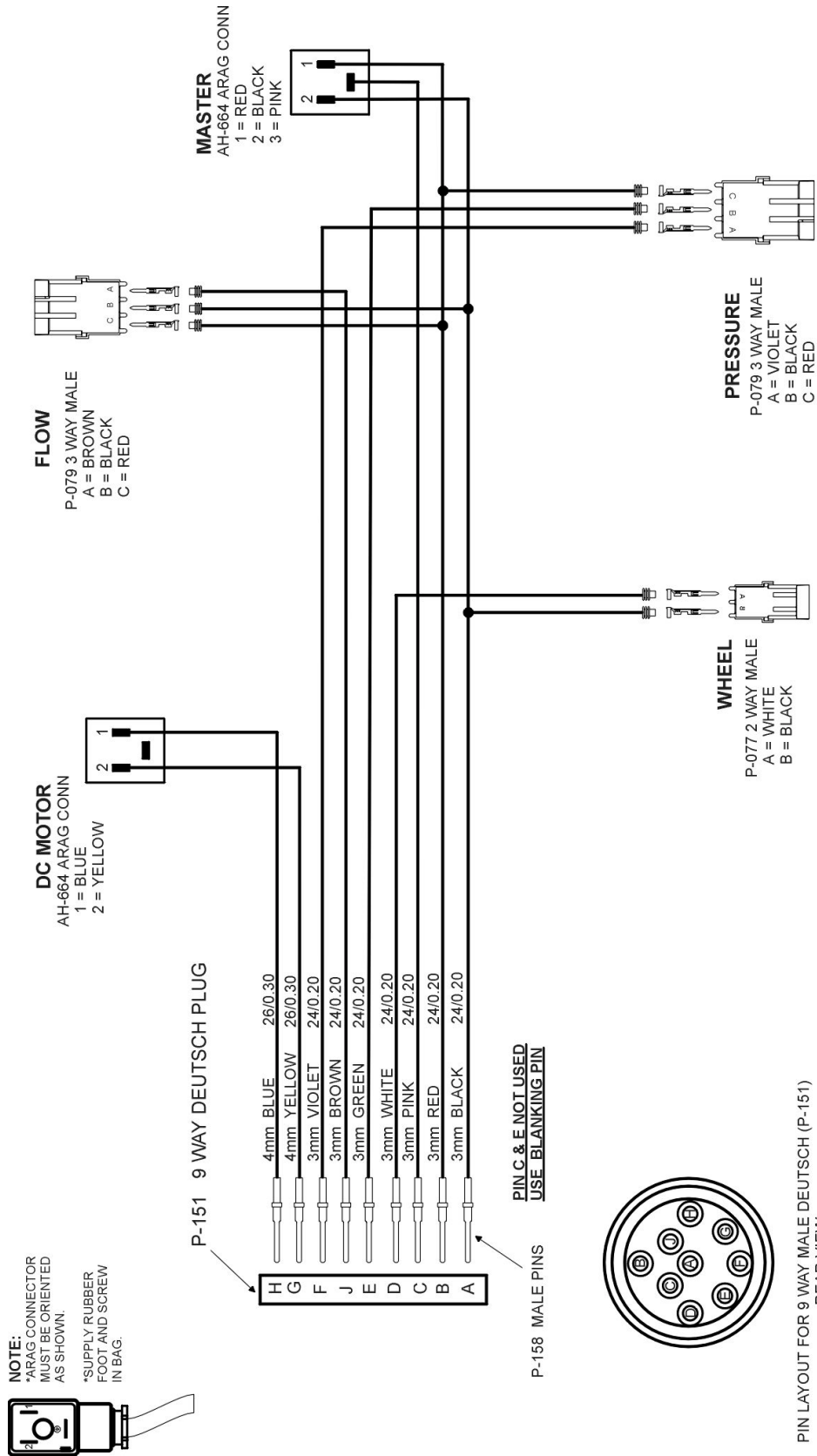
Alarm Type	Description
TANK LEVEL LOW	Level of tank dropped below level sensor in tank
RATE TOO HIGH	Speed too slow to control to rate set
RATE TOO LOW	Speed too fast to control to rate set
PRESSURE HIGH	System pressure has exceeded the high pressure alarm point
PRESSURE LOW	System pressure has gone below the low pressure alarm point.
UNIT ON HOLD	Monitor stopped accumulating data and product is returned to back to the tank
UNIT OFF HOLD	Monitor is returned to the normal spray mode.

7.0 Appendix

7.1 Tractor Loom Diagram

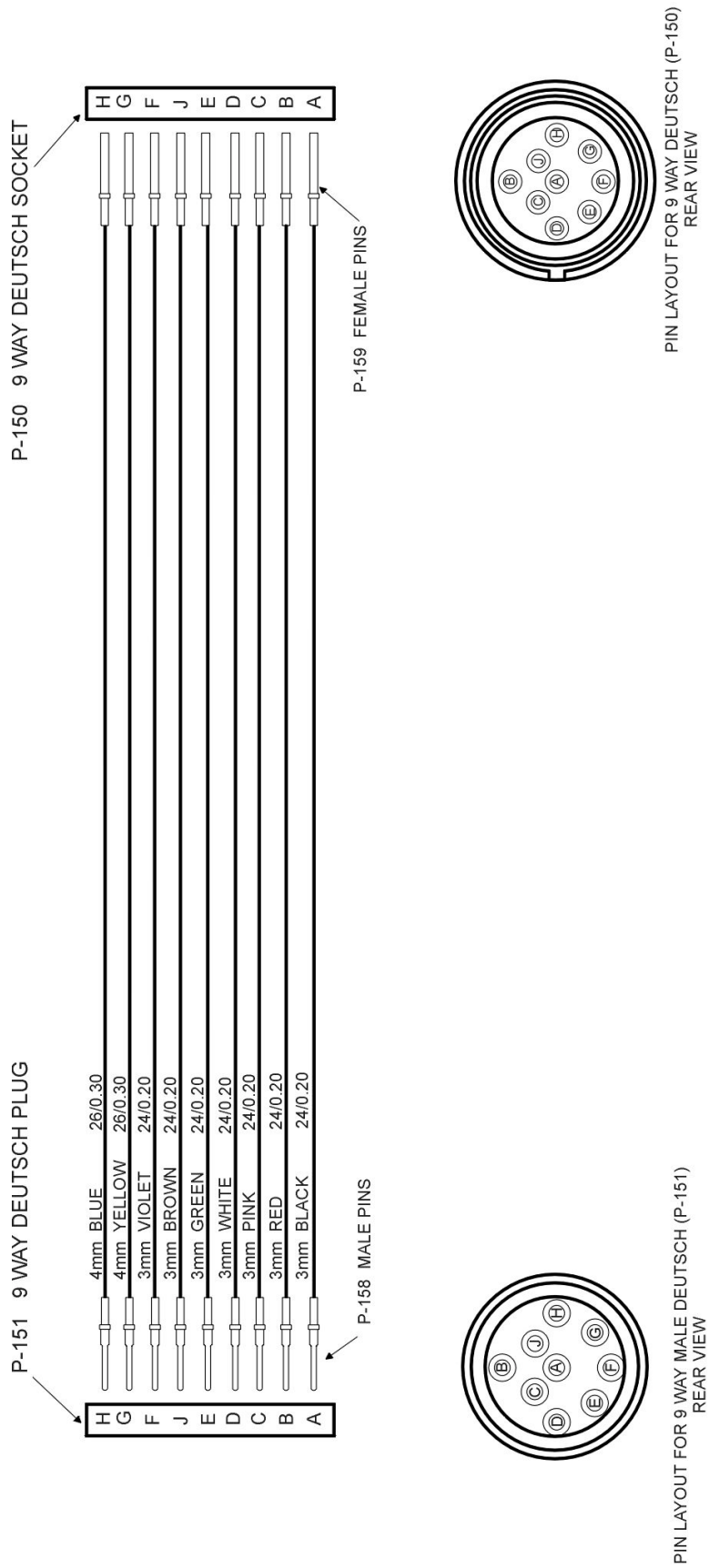


7.2 Implement Loom Diagram



TITLE: AC-22C6I 22C6 LIQUID FERT MACHINE LOOM

7.3 Extension Loom Diagram (optional)



TITLE: AC-22C6E EXTENSION LOOM FOR 22C6