

Electro-Magnetic Compatibility (EMC)

This product complies with Council Directive 89/336/EEC when installed and used in accordance with the relevant instructions.



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User Guide

"Shaft Speed 600/660" Speed/Area/Shaft Speed Meter

Calibration and Operation
Software Reference WZ307-000 rev.8

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Overview

The *RDS Shaft Speed 600 / Shaft Speed 660* is a versatile, easy-to-use instrument. The instrument has an illuminated 4-digit display with 6 display functions as follows,

SHAFT SPEED 600

The Shaft Speed 600 monitors,

- Forward Speed
- Partial and Total Area worked
- RPM - Shafts 1, 2, 3 and 4 each with programmable underspeed or overspeed alarm.

The Forward Speed and Area functions can be displayed in either Metric or Imperial units.

There are two memory registers to record area worked. The area is accumulated to whichever total is selected on the display – total 1 or total 2. Area totals and all calibration data are automatically stored in memory when the instrument is powered off.

SHAFT SPEED 660

The *Shaft Speed 660* is the same as the model 600 with the following exceptions:-

- (i) An hour meter is substituted for the “Shaft 4 RPM” function.
- (ii) You can also monitor a particular machinery component, which in the event of a malfunction or an operating parameter being exceeded, will automatically trigger an audible / visual alarm on the instrument to STOP operation. An alarm output (O/P 2) is also triggered, which can be utilised to physically inhibit further operation, or otherwise compensate for the alarm condition. The alarm function requires an appropriate sensor or switch kit connected via input 4.

Calibration

The instrument must be initially calibrated to suit the implement being monitored. Two programme modes allow the default settings to be altered as required. Most of these settings do not need to be accessed in normal use.

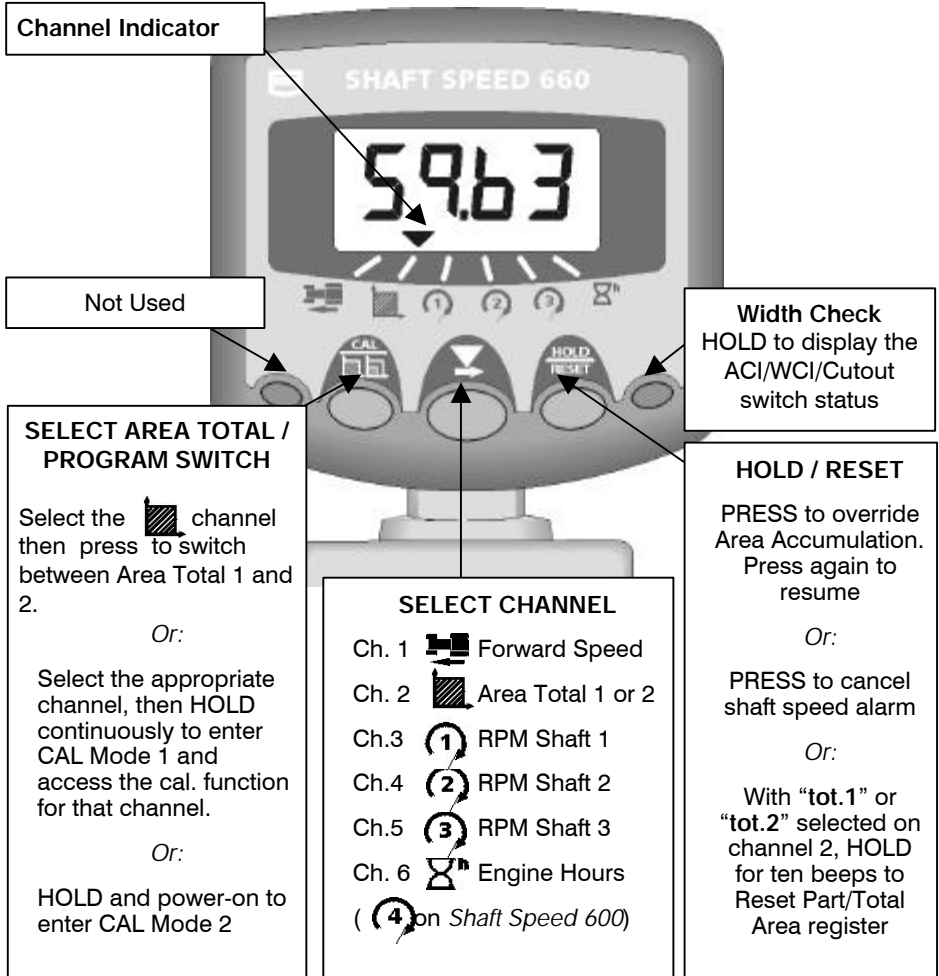
The system comprises :

- Head unit
- Forward Speed Sensor Kit
- An automatic cut-out switch to prevent area accumulation when turning on headlands etc.
- A junction box and power supply kit.
- Individual Shaft Speed Sensor kits as required.

The instrument can also be used in conjunction with the RDS Area Compensation Interface (ACI) to ensure accurate area monitoring when using partial implement width.

The Control Switches

The front panel has five buttons. Only the middle three are normally used.



Work Status Indicator


The ▼ indicator is used to indicate the channel to which the information on the display relates. It also shows the working status of the implement.

The cursor flashes when the implement is out of work (e.g. lifting implement on the headland) and the area accumulation stops.

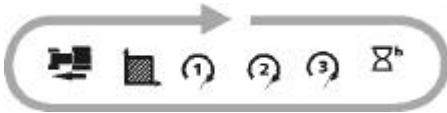
The cursor is on continuously when the implement is in work and area accumulation takes place.

Units

The forward speed and area display can be set for either metric (km/hr, ha) or imperial units (miles/hr, acres).

To check which is selected, select any channel and then HOLD the  button for 3 seconds. The display will briefly show "Met" or "IMP". Release the button to return to the normal display mode.

Channel Selection



Simply press the ▼ button to cycle through the channels.

Forward Speed



The forward speed is displayed either in miles/hr or km/hr according to the units selected in CAL Mode 2. In order to display the correct speed and accumulate area correctly, the instrument must be programmed with the correct Speed Sensor Factor (SSF). This is the distance travelled between two pulses received from the sensor.

Default = 2.000m (78.78 inches)

The S.S.F. can be calculated theoretically and then manually programmed, or the instrument can automatically calculate it via the “Autocal” function. Carry out this test whenever soil conditions or wheel sizes change.

NOTE: An ‘Autocal’ simpler to perform and is more accurate in field conditions

Manual Speed Calibration

Calculate as follows;

- (i) **If a conventional wheel sensor with two magnets is installed, the Speed Sensor Factor is half the effective rolling circumference of the wheel. Drive the vehicle forward in field conditions with the implement attached, for exactly 5 revolutions of the sensed wheel. Measure the distance travelled (metres) and divide by ten to find the Speed Sensor Factor.**
- (ii) **If a prop shaft sensor with a single magnet is installed, the distance travelled for each turn of the prop shaft must be determined. To determine this distance, drive the vehicle forwards for exactly 10 revolutions of the prop shaft. Measure this distance (metres) and divide by ten, to find the Speed Sensor Factor.**
- (iii) **If a Radar sensor is installed, the Speed Sensor Factor is 0.008 (0.312”).**






1. Select the  channel.
2. HOLD  to enter programme mode 1 (Fig. 2).
The display briefly shows “MET” or “IMP” indicating metric/imperial units, before the calibration factor appears. Continue holding the button and...



Figure 2: Select S.S.F.

3. PRESS  to select the digit or decimal point to change.
4. HOLD  to change the selected digit (or move the decimal point).
5. RELEASE  to select the next digit and repeat as above, otherwise simply release both buttons. The instrument will then return to the normal display mode.

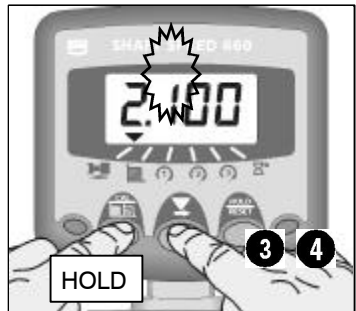


Figure 3: Change S.S.F.

'Autocal'

For maximum accuracy, perform an auto-calibration in field conditions.



1. Set two markers at 100 metres apart (328 feet). Choose a convenient reference point on the tractor/implement and position this point opposite the first marker.
2. Select the  channel.
3. HOLD  until the calibration factor is displayed.



Figure 4: Start 'Autocal'

- Continue holding this button and press **HOLD RESET**.
The display flashes 'Auto' ready for calibration (Fig. 4).

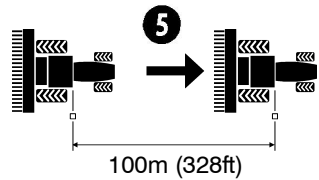


Figure 5: 'Autocal' distance

- Drive the vehicle until the chosen reference point on the tractor/implement is opposite the second marker.
The instrument counts and displays the sensor pulses received over the distance travelled.

- Press the **HOLD RESET** button to complete the Autocal routine (Fig. 6).
The calibration factor is automatically calculated and stored in memory.



Figure 6: Stop 'Autocal'



Area Totals / Implement Width



The area is derived from the forward speed and the programmed implement width and is accumulated to whichever total is selected on the display – Total 1 or Total 2.

The two separate area totals can be independently reset to zero.

Display Area Total

1. Select the  channel.
2. Press  to cycle between the two area totals.

The display will then show 'tot.1' or 'tot.2' before displaying the area accumulated since that total was last reset.

Area Override

If an automatic override switch is installed, the area will automatically stop accumulating when the implement is put out of work. The channel indicator will flash when area accumulation is overridden and will be on permanently when area is being recorded.

Area accumulation can also be overridden at any time by pressing the **HOLD** button.

The display will flash 'heLd'

Press **HOLD** button a second time to continue area accumulation.



Figure 7 : Select Area Total



Figure 8 : Area Override

Reset Area Totals




1. Select the  channel.
2. Press  to cycle between the two area totals.
3. Hold  for 5 seconds to zero that total.



Figure 9 : Reset Total 1 / Total 2

Check Working Width

If you have an ACI or WCI fitted, you can see the part width selected (with a WCI), or the number of nozzles switched on (with an ACI).

With any display channel selected, press and hold the right hand button (Fig.10). After a 3-second delay, the display will show one of the following,

- (i) **If a standard on-off override switch is fitted**, the display will show 'n01' (full width) when the machine is in work (fig. 10) and 'n00' when the machine is out of work.
- (ii) **If a Width Compensation Interface (WCI - Fig. 5) is fitted** the display will show 1, 0.75 (¾ width), 0.5 (½ width), or 0.25 (¼ width) corresponding to the switch position on the WCI.



Figure 10 : Check Working Width

NOTE: Connecting an RDS "Width Compensation Interface" is not possible where the head unit lead has a Framatome type connector

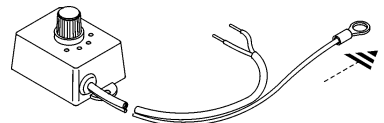


Figure 11 : Width Compensation Interface

- (iii) **If an Area Compensation Interface (ACI) is fitted** (e.g. on a sprayer),

E.g. An ACI is fitted on a 24 metre sprayer with 5 boom sections. The nozzle spacing is 0.5 metres and there are 10, 10, 8, 10, and 10 nozzles respectively on each section, giving 48 nozzles in total.

The instrument should be programmed with an implement width of 0.5 metres. When all boom sections are on, the ACI will signal the instrument that there are 48 nozzles in use, e.g. the display will show 'n48', (48 x 0.5 m = 24 metre full width).

Set Implement Width

In order for the instrument to accumulate area correctly, the full working width of the implement must be programmed. The units are either in inches if the instrument is set for imperial units, or in metres if it is set for metric units (default = 24metres).






1. Select the  channel.
2. HOLD  to enter programme mode 1. The display briefly shows "tot.1" or "tot.2", then "MET" or "IMP" indicating metric/imperial units, before the calibration factor appears. Continue holding the button and...
3. PRESS  to select the digit or decimal point to change.
4. HOLD  to change the selected digit (or move the decimal point).
5. RELEASE  to select the next digit and repeat as above, otherwise simply release both buttons. The instrument will then return to the normal display mode.



Figure 12: View Implement Width

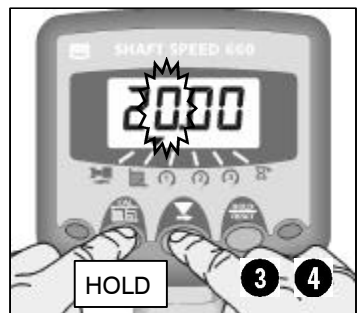


Figure 13: Set Implement Width

RPM Channels



There are three RPM channels (4 channels on the *Shaft Speed 600*).

RPM Alarm

Each RPM channel has a programmable alarm threshold – either as an underspeed alarm or as an overspeed alarm.

An alarm condition causes the instrument to default to that RPM channel. The instrument beeps continually and flashes the actual RPM. Cancel the alarm by restoring the RPM within the programmed limits.

Alternatively, press the **HOLD**
RESET button to silence the audible alarm. The RPM display continues to flash until the RPM is restored within the programmed limit, or the instrument is switched off and back on again.




Calibration

In order for RPM to be displayed correctly, The RPM Sensor Factor must be programmed correctly.


The factor is the number of pulses received by the instrument per revolution of the sensed shaft, e.g. for measuring Engine RPM, PTO Speed, Shaft Speed, Fan Speed etc, depending on the particular installation.




Please refer to section CAL Mode 2 to determine and programme the correct factor

Select Low/High Alarm threshold / Programme Alarm Speed

1. Select the appropriate RPM channel.
2. HOLD  to enter programme mode 1.
The display flashes "Lo" or "Hi" for 3 seconds, indicating which speed threshold is currently set.
3. To change the setting, continue holding the  button and press the  button within the 3-second period to toggle between "Lo" and "Hi" settings (Fig.14).
After 3 seconds, the display shows the current alarm speed.set (Fig. 15).

NOTE: The default alarm speed is zero, i.e. the alarm is disabled.

To programme the alarm speed, continue holding the  button and...

4. PRESS  to select the digit or decimal point to change.
5. HOLD  to change the selected digit (or move the decimal point).
6. RELEASE  to select the next digit and repeat as above, otherwise simply release both buttons. The instrument will then return to the normal display mode.

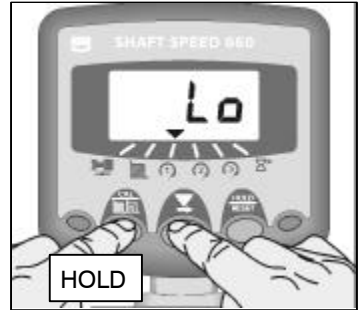


Figure 14: Select Low/High Alarm

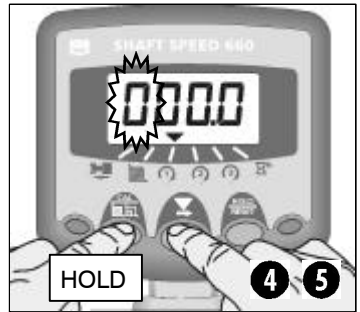


Figure 15: Set Alarm Speed

Hour Meter (Shaft Speed 660)







NOTE: This channel instead indicates shaft speed (4) on the Shaft Speed 600 instrument

The Hour Meter function can be set (via Cal Mode 1) to accumulate either when the instrument is powered (“IGN”), when either shafts 1,2, or 3 are running (“CH.1”, “CH.2”, “CH.3”), or it can be disabled (“OFF”).

If disabled, the instrument displays “OFF” when this channel is selected in the normal operating mode.

The hour meter total can be set or zeroed via Cal Mode 2.

Select Hours accumulation option

1. Select the  channel.
2. HOLD  to enter programme mode 1. The display indicates the option currently set.
3. To change the setting, continue holding the  button and press the  button to toggle to the desired option. Release both buttons. The instrument will then return to the normal display mode.

“STOP” Alarm (Shaft Speed 660 only)

When the alarm input (I/P4) is configured, you can for example, monitor a particular machinery component, which in the event of a malfunction or an operating parameter being exceeded, will automatically trigger an audible / visual alarm on the instrument. The alarm function requires an appropriate sensor or switch kit connected via input 4.

NOTE: This alarm works independently from the work cutout input.

An alarm condition causes the instrument to flash “STOP” and to beep continually. The alarm will cancel once the operating parameter in question returns to a normal condition.

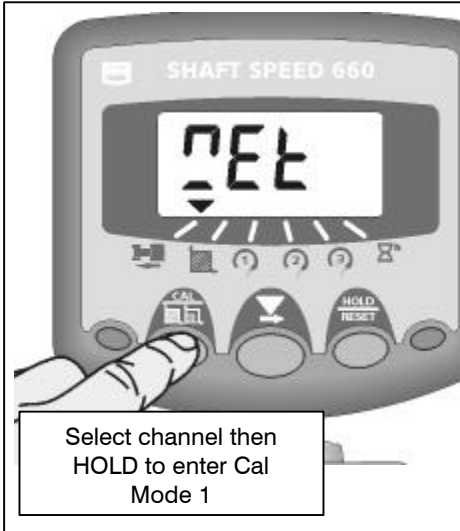
Alternatively, press the **HOLD**
RESET button to silence the audible alarm, and the flashing display can be overridden by selecting any other channel. The alarm function is reset when the operating parameter in question returns to a normal condition, or the instrument is switched off and back on again.

Alarm Output

An alarm output (O/P 2) is also triggered. This can be used for example, to physically inhibit further operation, or otherwise compensate for the alarm condition. The actual setup will depend on the particular installation.

For example, the output could be connected via a relay, to operate a solenoid/motor-actuated switch or valve.

CAL Mode 1 Summary




CH.	FUNCTION
1	Fwd Speed Cal Factor
2	Implement/Nozzle Width
3	RPM1 – Alarm Speed, Hi/Lo
4	RPM2 – Alarm Speed, Hi/Lo
5	RPM3 – Alarm Speed, Hi/Lo
6	Hours Accumulation option <i>(Shaft Speed 660)</i> RPM4 – Alarm Speed, Hi/Lo <i>(Shaft Speed 600)</i>

Figure 16 : CAL Mode 1 Summary

CAL mode 2

Enter CAL Mode 2

Press the  button and power-on the instrument (Fig.24).The display will show “CAL.2”,

Press and release  to select the appropriate channel.

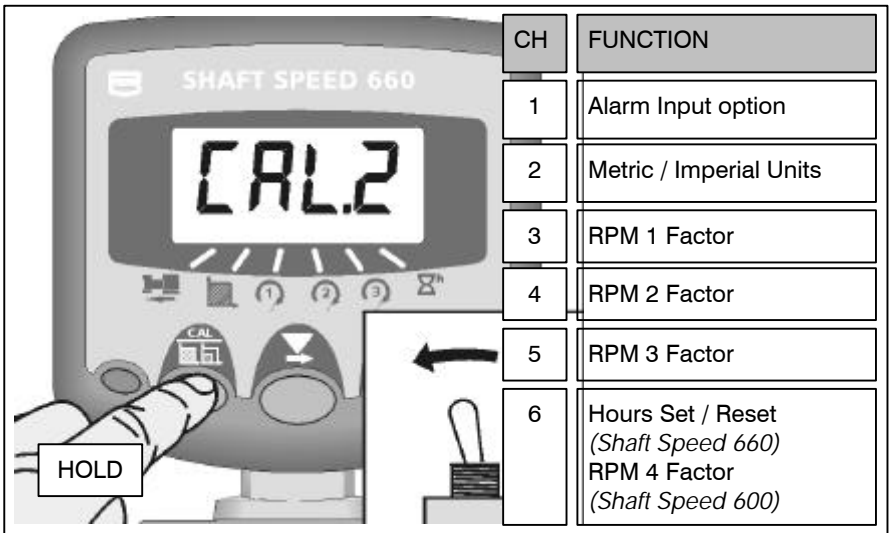


Figure 17 : Enter CAL Mode 2

Channel 1 - Alarm Input option (Shaft Speed 660 only)

You can configure the instrument to trigger an alarm output (O/P 2) as a result of the voltage input on I/P 4. Configure the input as follows:-



Press the  button to toggle the option

If the alarm is to be triggered by the input going to 0V, then select “CLoS”.

If the alarm is to be triggered by the input going to +V, then select “OPEn”.

Select “OFF” to disable the input (default setting).

Metric/Imperial Units Selection (Channel 2)

Press  to select channel 2, then press  to select “MET” or “IMP”

	Metric	Imperial
Forward Speed	Km/hr	Mile/hr
Area	hectares	acres


Set Shaft Speed Sensor Cal Factor

The default setting is 1 pulse per rev (p.p.r), which is OK in the case of a magnetic sensor with a single magnet on the sensed shaft.

In other cases, perform the following calibration procedure.


1. Run the sensed component at a known speed. If necessary measure this speed using a hand-held tachometer.
2. At the same time have someone note the RPM displayed on the instrument.
3. Calculate the new calibration factor


$$\text{New Factor} = \text{Initial Factor} \times \frac{\text{Displayed Speed}}{\text{Actual Speed}}$$

Press  to select channel 3, 4, or 5 (or channel 6 on the *Shaft Speed 600* instrument), corresponding to RPM1,2,3 or 4 in the normal operating mode.


The existing factor is displayed (default = 1.000) and the first digit flashes.

PRESS  to select the digit or decimal point to change.

HOLD  to change the selected digit (or move the decimal point).

Press  to store the setting and select another channel.


Adjust (or Zero) Hours Total (Shaft Speed 660 only)

Press  to select channel 6.

The existing hours total is displayed and the first digit flashes.

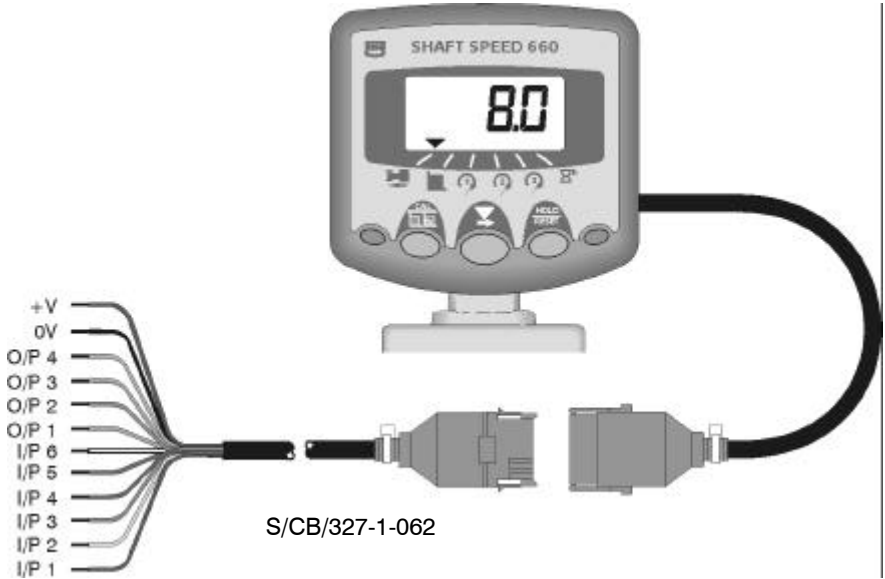
To adjust the total, (or to set zero),

PRESS  to select the digit or decimal point to change.

HOLD  to change the selected digit (or move the decimal point).

Wiring Connections – GyraX SASS 100 (SASS 660)

A 12-way Qikmate to bare ends extension cable Pt No. S/CB/327-1-062 is supplied to connect to the sensors, power supply etc.



Refer to the “Work measurement Installation” manual S/DC/500-10-261 for details on fitting sensors / cutout switches etc.

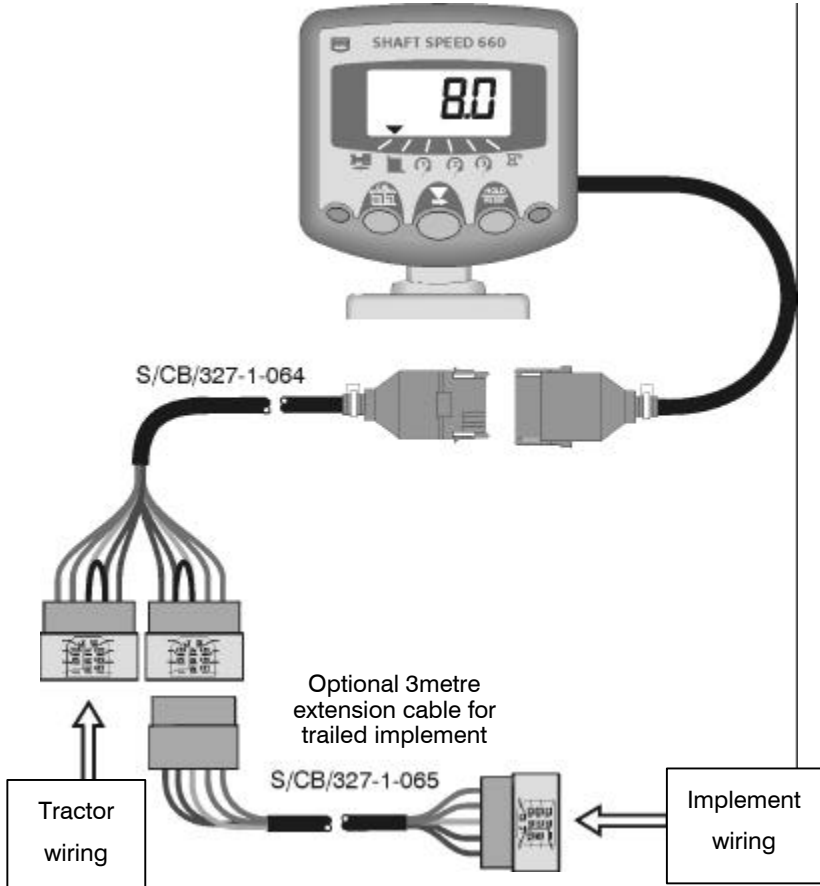
Connections for Cable S/CB/327-1-062

KEY	COLOUR	FUNCTION	
		SHAFT SPEED 600	SHAFT SPEED 660
+V	RED	+V IN	
0V	BLACK	0V IN (CONNECT TOGETHER 0V IN AND SENSOR 0V" USING A SUITABLE TERMINAL BLOCK)	
OP4	PINK	NOT USED	NOT USED
OP3	GREY	NOT USED	"STOP" ALARM OUTPUT
OP2	ORANGE	NOT USED	NOT USED
OP1	TURQUOISE	AUDIBLE ALARM +V	
IP8	-----	WCI ¾ WIDTH [1]	
IP7	-----	WCI ½ WIDTH [1]	
IP6	WHITE	FWD SPEED +V	
IP5	BLUE	AREA CUTOUT +V	
IP4	BROWN	RPM 4 SIGNAL	"STOP" ALARM INPUT
IP3	PURPLE	RPM 3 +V	
IP2	YELLOW	RPM 2 +V	
IP1	GREEN	RPM 1 +V	

[1] *There is no provision for WCI connection on cable S/CB/327-1-062*

Wiring Connections – RDS Retrofit SASS 600/660

A 12-way Qikmate to 2 x 11-way AMP extension cable Pt No. S/CB/327-1-064 is supplied to connect to the sensors, power supply etc.



Refer to the "Work measurement Installation" manual S/DC/500-10-261 for details on fitting sensors / cutout switches etc.

Connections for Cable S/CB/327-1-064

CONNECTOR – RED (357R, 358R)				
TERMINAL	KEY	COLOUR	FUNCTION	
			SHAFT SPEED 600	SHAFT SPEED 660
11	+V	RED	+V IN	
10 2,5,8	0V	BLACK	0V IN (+ 3 x COMMON 0V FOR SENSORS)	
9	Vss	RED	RADAR SENSOR +V	
6	IP6	WHITE	FWD SPEED +V	
7	OP3	GREY	NOT USED	“STOP” ALARM OUTPUT
4	OP2	ORANGE	NOT USED	NOT USED
1	OP1	TURQUOISE	AUDIBLE ALARM +V	

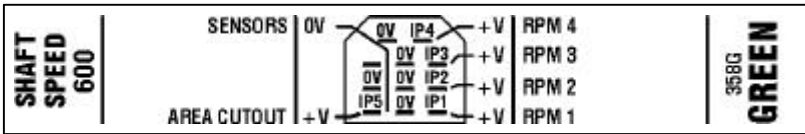
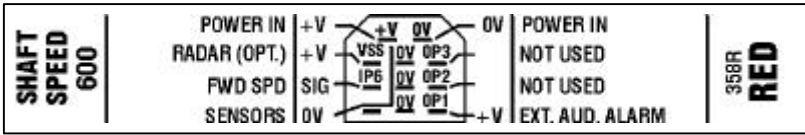
CONNECTOR – GREEN (357G, 358G)				
TERMINAL	KEY	COLOUR	FUNCTION	
			SHAFT SPEED 600	SHAFT SPEED 660
2,5,6,8,11	0V	PINK/BLACK	5 x COMMON 0V FOR SENSORS	
3	IP5	BLUE	AREA CUTOUT +V	
10	IP4	BROWN	RPM 4 SIGNAL	“STOP” ALARM INPUT
7	IP3	PURPLE	RPM 3 +V	
4	IP2	YELLOW	RPM 2 +V	
1	IP1	GREEN	RPM 1 +V	

NOTE: There is no provision for WCI connection on cable S/CB/327-1-064

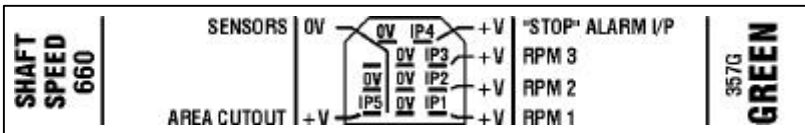
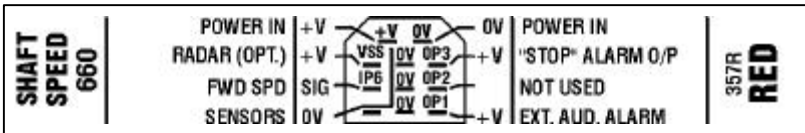
In some cases for installations on trailed implements, in order to make all the necessary connections between the tractor and implement using the extension cable S/CB/327-1-065, you may need to switch one or more terminal blades between the two connectors.

Carefully insert a suitable thin-bladed screwdriver into the appropriate blade housing and lever the locking tab slightly inwards. The blade can then be withdrawn from the rear of the connector housing. The tabs will probably need to be levered back out so that the blade will lock properly when re-inserted.

SASS 600 Connector Labels Ref: S/DC/500-10-358(Red+ Green)



SASS 660 Connector Labels Ref: S/DC/500-10-357(Red+ Green)



Issue 1:	19/6/02	Original Issue
Issue 2:	1/7/02	Wiring changes for S/CB/327-1-062
Issue 3:	12/7/02	Wiring changes for S/CB/327-1-064/65
Issue 3b:	24/7/02	Correction p.19 – Input options