

# Instruction manual

# *SHIFTRONIC*

Programmable Automatic Shift System



**JR**systems

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# INTRODUCTION

## Legend

SHIFTRONIC version 2.00 (part number 880900) consist of the following:

ECU	Electronic Control Unit – 880903, 880904 and 880905
CDU	Cab Display Unit - 880170
DCK	Display Cable Kit - 880-180 2m, -181 3m, -182 4m, -183 5m
SSK	Speed Sensor Kit - 880116

Other components involved in a SHIFTRONIC application;

PPU	Portable Programming Unit - 880920
PCK	Programmer Conversion Kit - 880915
CCU	Cab control Unit(Shifter) - 875000-, 2-3-400000-series.
Printer	880145 (220 V) 880146 (110 V)
Printer cable	880144

## Features

SHIFTRONIC is a programable electronic device mainly developed for automatic shifting and for protection of powershift-transmission but can also be adapted for special applications.

- # Analogue input for sensing the throttle position, to activate various functions.
- # Simple to programme before and during operation.
- # Stabilized and accurate R.P.M monitoring.
- # Various types of shift controls (CCU) can be accomodated.
- # Both transmission/vehicle- and-engine speed can be monitored.
- # Vehicle- and/or accessories malfunction can be detected and displayed.
- # Two diffrent ranges (High/Low) with 9 forward and 9 reverse gears.



# SPECIFICATIONS

Power supply: 12 / 24VDC (10--30VDC).

Environmental temperature: -40°C--72°C (-40°F--162°F)

Shiftpositions: 9 forward and 9 reverse + high/low range.

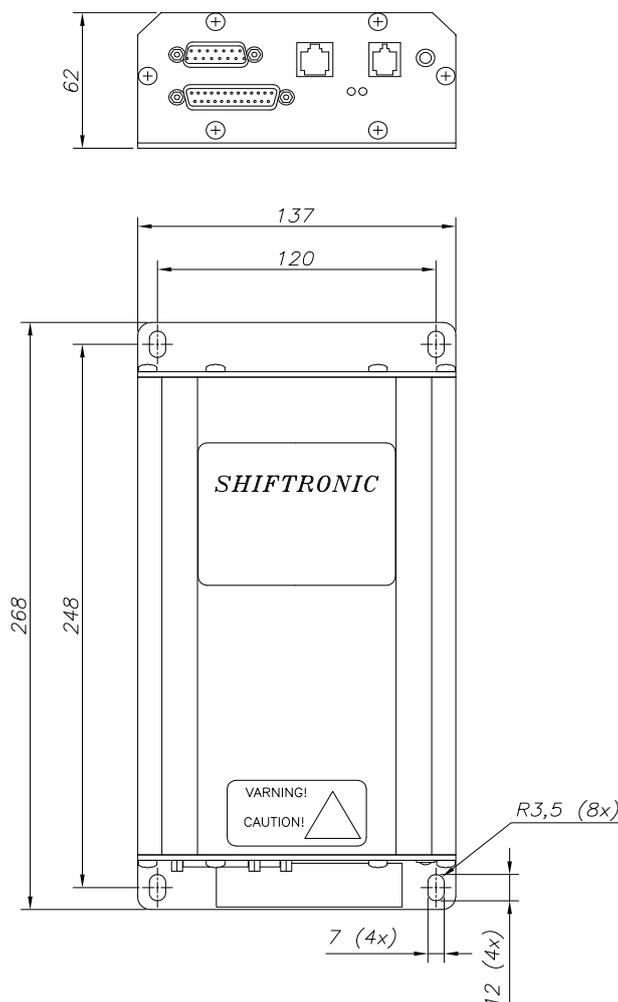
Outputs: All inputs/outputs are protected against short-circuit. Max load 1A per outlet, total max load 5A.  
9 outlets for gear selection. One outlet for engine control.  
Lock-up. Indication of malfunction.

Inputs: 6 inlets for the cab control unit (CCU).  
One inlet for monitoring vehicle (transmission) speed.  
One inlet for manual shift mode.  
One inlet for sensing the position of the throttle pedal.  
Lock-up. Inching, Kick-down.  
2 inlets for indication of malfunction (AUX1; AUX2).  
One inlet (AUX1) can be used for engine speed monitoring.

Material: Extruded aluminum.

Weight: 880903 - 1.7kg (4.55lbs),  
880904 and 880905 – 1.7kg (4.55lbs).

Size:



# FUNCTION

## **Automatic shift**

SHIFTRONIC constantly monitor the revolution of the propeller- and engine-shaft (if the optional mode is selected) and will select appropriate gear according to programmed data. In order to prevent continued up- and down-shifting at equal revolutions of the propeller shaft and of programmed data a hysteresis is programmable.

When the inlet for kick down is activated all speed limit values are increased by a common percentage.

SHIFTRONIC will not upshift beyond selected gear once chosen by the cab control unit (CCU). If a gear is selected by the CCU at a moment when the vehicle speed is higher than programmed value, no shifting will take place until vehicle speed is decreased.

## **Manual shift**

If the manual mode is selected SHIFTRONIC will follow selected gears from the CCU regardless of programmed data, except at direction changes.

## **Security functions**

The following functions are always active in both manual and automatic mode:

### Interlock protection:

SHIFTRONIC will prevent direction changes or shifting from neutral into gear if speed of the vehicle exceeds programmed data. The display shows REV.

### Malfunction:

The malfunction inlets (AUX 1; AUX 2) can be programmed in various ways. Always detected or only when a gear is engaged. They can optionally activate the engine control and/or the malfunction outlets. The display shows a programmable text, e.g. ERROR.

### Engine R.P.M.:

If engine revolutions are to be monitored one of the malfunction inlets (AUX 1) is used. Two different R.P.M. limits are compared. The maximum permitted R.P.M. of the engine is always monitored by SHIFTRONIC. When the programmed limit is exceeded the transmission will automatically shift into neutral and both engine control- and malfunction-outlet will be activated according to selected programmed functions. The display shows RPM.

The maximum permitted start engine R.P.M. is only monitored when a gear is engaged after being in neutral. Resulting effect is as described above. The display shows RPM.

### Speed sensor:

When the propeller shaft R.P.M exceeds a preset limit the pulses are monitored by the ECU to ensure that they are regular. If the pulses for any reason, should be irregular or non existant the ECU will interpret it as a sensor failure. The transmission will automatically shift into neutral and the malfunction outlet will be activated. The display shows SENS.

### Short circuit:

The ECU is protected against short circuits at all outlets. If a short circuit should occur or if each outlet is loaded with more than 1A (totally 4A), all outlets will be deactivated to prevent false gearshifting etc. The display shows AMP.

## **Other functions**

### Malfunction mode:

If any of above security functions have been activated and a normal circuit activation is subsequently switched on, the ECU should either be shifted into neutral or could remain in previous position depending on programmed function before starting again. (ERROR KEEP GEAR)

### Rev. prot. mode:

It is possible to select the following mode: If the CCU is shifted from an engaged gear into neutral when the vehicle is in progress, it can be possible to return to previous gear but only if the vehicle is in the permitted speed range according to programmed value. (REENTER IF REV)

### Lock-up:

The inlet signal for lock-up corresponds directly to the lock-up outlet, except immediately before and after the lockup is engaged. The time delay is programmable.

### Inching:

When the inching input is activated, Shiftronic selects neutral-position. When deactivated Shiftronic activates the engine start rpm, to prevent any gear to be engaged at too high engine speed. The inching circuit can be normally closed or Open.

### Engine control:

The engine control outlet is activated immediately before and after a gear is engaged to provide smooth gear shifting. The time delay is programmable. It is possible to have a common or a separate value for each gear shift. It is also possible to program the engine control not to be activated when down-shifting, and/or down-shifting when the kick down inlet is activated. Furthermore it is possible to have the engine control activated when different malfunctions occur. Although the different time intervals described above are not necessary to control gear shifting and lock-up engagement, the time is monitored anyway. Consequently there has to be a minimum time before gear- and lock-up-engagement can take place.

### Special application:

To control various other vehicle functions as 4-wheel drive etc., which should not be activated before the transmission is in it's neutral position and/or before the vehicle has come to a complete stop, it is possible to receive a signal from the ECU when the transmission is in neutral and when the propeller shaft R.P.M is below programmed value of the interlock protection (REV PROT).

### Tachometer:

To simplify programming of the different speed values the ECU is prepared to display the present R.P.M of the transmission- and engine-shafts. This function is activated by pressing one of the reset buttons situated on the ECU's front panel or on the CDU front cover. The display will initially show TRANS for a moment, and then automatically follow with the present R.P.M of the transmission shaft. By pressing one of the reset buttons a second time the display will return to it's default mode. To receive information of the engine shaft R.P.M, one of the reset buttons has to be pressed a third time. The display will show MOTOR for a moment before the engine R.P.M is displayed.

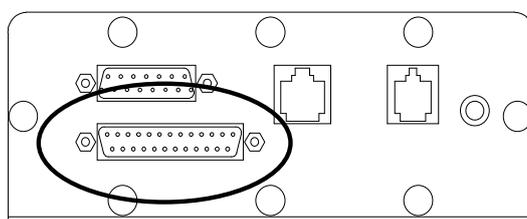
## CONNECTIONS / ADJUSTEMENTS

### Connector - P1

P1 is a 25-pin female d-sub connector. Corresponding male d-sub connector is supplied together with the ECU.

Function and programming values are as described below:

Pin	In/Out	Description	Value
01	Output	Voltage supply for the speed sensor.	-
02	-	Ground supply, for speed sensor.	-
03	Output	Signal G0 for gear engaging/solenoids etc.	001
04	Output	Signal G1 for gear engaging/solenoids etc.	002
05	Output	Signal G2 for gear engaging/solenoids etc.	004
06	Output	Signal G3 for gear engaging/solenoids etc.	010
07	Output	Signal G4 for gear engaging/solenoids etc.	020
08	Output	Signal G5 for gear engaging/solenoids etc.	040
09	Output	Signal G6 for gear engaging/solenoids etc.	100
10	Output	Signal G7 for gear engaging/solenoids etc.	200
11	Output	Signal G8 for gear engaging/solenoids etc. or outlet signal when transmission is in neutral and transmission R.P.M is below REV PROT (ID No 004 and 010).	400
12	Output	Signal for lock-up or inching.	-
13	Output	Signal for engine control.	-
14	Input	Signal from PNP speed-sensor, monitoring R.P.M of propeller shaft.	-
15	Input	AUX1. Either malfunction input or signal from PNP speed-sensor monitoring rpm of engine shaft.	-
16	Input	AUX2. Pure malfunction input.	-
17	Input	Transmission speed-pickup input.	-
18	Input	Transmission speed-pickup input, if a non-grounded pickup is used.	-
19	Input	Engine speed-pickup input.	-
20	Input	Engine speed-pickup input, if a non-grounded pickup is used.	-
21	Input	Optional input for programming unit, "5vdc".	-
22	Input	Optional input for programming unit, "26vdc".	-
23	Input	Optional input for programming unit, "TDAT".	-
24	Input	Optional input for programming unit, "PROG MOD".	-
25	Input	Optional input for programming unit, "RDAT".	-

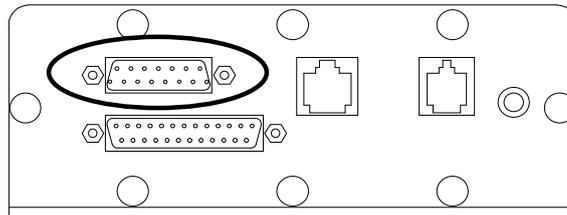


## Connector - P2

P2 is a 15-pin male d-sub connector. Corresponding female d-sub connector is supplied together with the ECU.

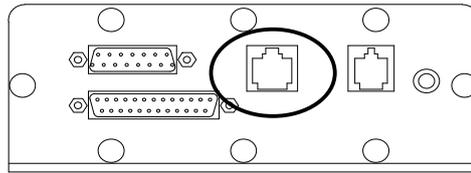
Function and programming values are described below.

Pin	In/Out	Description	Value
01	Input	Voltage supply for the ECU, 12/24vdc.	-
02	-	Ground supply for the ECU.	-
03	Input	Signal UG0 from the CCU, shifter.	01
04	Input	Signal UG1 from the CCU, shifter.	02
05	Input	Signal UG2 from the CCU, shifter.	04
06	Input	Signal UG3 from the CCU, shifter.	10
07	Input	Signal UG4 from the CCU, shifter. Activates the lowregister if pin 3 on dipswitch 1 is on.	20
08	Input	Signal UG5 from the CCU, shifter. Activates the quick first function, if programmed. Activates the lowregister if pin 2 on dipswitch 1 is on.	40
09	Input	Lock-up or inching signal in from switch or pedal.	-
10	Input	Kick down signal in from pedal or switch.	-
11	Input	Manual shift mode signal in from switch.	-
12	Output	Malfunction outlet. Signal for external devices such as buzzers etc. Signal will be provided if inlet signal is achieved at P1/15 (if used as malfunction inlet)and/or P1/16. Signal is also provided when a sensor failure is registered.	-
13	Output	Voltage supply to potentiometer in throttle pedal.	-
14	Input	Signal in from potentiometer in throttle pedal.	-
15	Output	Ground supply to potentiometer in throttle pedal.	-

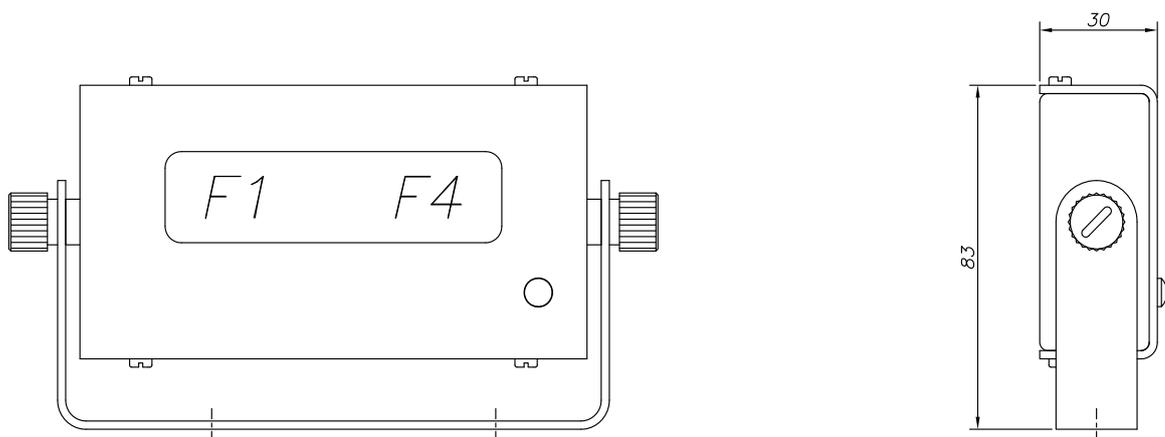
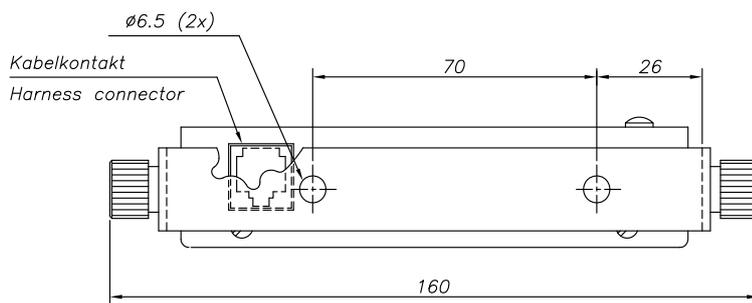


## Connector - P3

The P3-connector is an eight pin modular connector. The connector is used to connect the cab display unit, part number 880170. The display unit is delivered without a connecting cable. The connecting cables for the CDU are available in four different lengths; 2m - 880180, 3m - 880181, 4m - 880182, 5m - 880183.

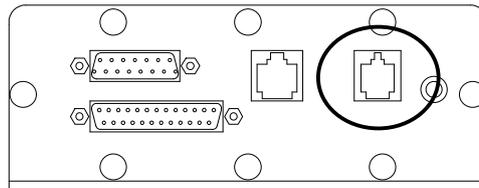


## 880170 Cab Display Unit, size;



## Connector - P4

The P4-connector is a six pin modular connector. The connector is used to connect the portable programming unit, part number 880920. For customers who have both version of Shiftronic (V1.xx, V2.xx) and only one type of programmer, a conversion kit is sold. The conversion kit enables the user to connect any type programming unit to both versions of Shiftronic. The Programmer Conversion Kit - PCK is sold under part number 880915.

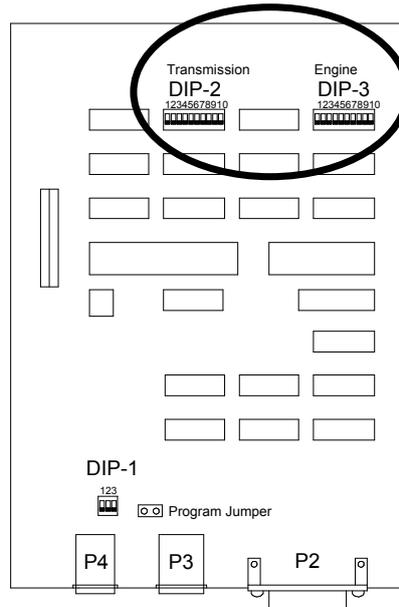


880920 Portable programming unit:



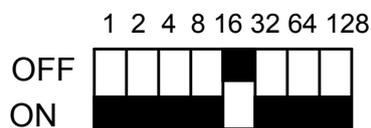
## Adjusting the interface

When the Shiftronic is used together with magnetic pickups to monitor engine or transmission speed, the interface needs to be adjusted in order to get correct rpm values into Shiftronic. To locate the two dip switches, the Shiftronic must be taken apart. Once this has been done the two dip switches (dip-2 & dip-3) are found on the P2-, P3-, P4-circuit board. See the picture below;



The switch marked DIP-2 adjusts the transmission input, and DIP-3 the engine input. To adjust the switches a small instrument of some kind is needed, a pencil is usually Adequate.

A switch is active when it is put in it's off-position. The switches add up to a desired value, if you want to divide with 16 you simply put switch 16 in it's off position. See the example below;



## Attenuation of the signal from a magnetic pickup

The signal from the magnetic-pickup could be disturbed, when the pickup is used to monitor transmission or engine speed. If that is the case, Shiftronic has a attenuation feature that could take care of the problem. The general idea is when you damp the signal coming in, you also damp the disturbances coming in. The attenuation is separate between the transmission and engine.

To activate follow the function you have to disassemble the Shiftronic box, when this is done you find a dip switch on the P1 circuit board. The switch has two channels,  
1=Engine

2=Transmission. To activate the attenuation function you simply slide the switch from it's off position to on.

The factory preset is both channels- attenuation off.

## Using the throttle-position feature

The Shiftronic V2.40 is equipped with an analogue input for sensing the position of the throttle pedal. The input is used to activate the Shiftronics lowregister for engine braking, and/or kickdown feature.

Shiftronic constantly monitors the input, and activates the lowregister/kickdown at the adjusted positions. To adjust the activating position there are two trim-potentiometers, one for lowregister- & one for kickdown-position. The function is selected with a dip switch. To activate and adjust the function, follow the instruction below;

To activate the function the Shiftronic box has to be disassembled. Once this has been done, a switch can be found on the P2-, P3- & P4-circuit board.

The dip switch adjusts the function of the analogue input. The switch has three channels.

1=Activate the kickdown function with the analogue input.

2=Activate the lowregister (P2/8) with the analogue input.

3=Activate the lowregister (P2/7) with the analogue input.

The two trim potentiometers adjusts the throttle-position where the function is to be activated. The potentiometers are marked P1 & P2, and are found on the P1 circuit board.

P1 adjusts the kickdown feature. If the potentiometer is turned clockwise, the activation point is moved towards the end of the throttle-pedals travel.

P2 adjusts the lowregister feature. If the potentiometer is turned anti-clockwise, the activation point is moved towards the beginning of the throttle pedals travel.

## **PROGRAMMING.**

Handling the portable programming unit PPU.

Connect the programmer to connector P4 on Shiftronic.

By connecting a printer to the PPU is possible to get a print out, of current parameters in the Shiftronic.

The ECU should be switched off before the PPU is connected. When supply is switched on again after connecting the PPU, the display will show SHIFTRONIC V1.XX, XX represents the version of the program that is in the Shiftronic.

Note! If the version number of your Shiftronic is different from the one at the top of every page in the manual, your manual may be old. Contact your dealer to receive a new copy.

### **Examine and adjusting parameters.**

By pressing the following push buttons on PPU the following functions will be achieved:

+

The parameters will appear on the display of the PPU in sequence until the end (END) of the programme is reached. By pressing the button again the program will restart from the beginning.

-

As above but the parameters will appear in reverse order.

R

Each parameters has its own identification number, which will be shown on the display of the PPU as soon as the R is pressed.

RXXR

By pressing the buttons in this sequence it is possible to jump directly to required parameter. XX = Parameter identification number.

S

After finding required parameter to be modified and after the new value is entered the push button S has to be pressed, to Save the new value.

CE

If an incorrect value is entered, simply press the CE button and the previous value will reappear on the display of the PPU.

Text

the text parameters are entered by special number sequences as the legend is showing on the PPU. The text TEMP is entered by the number sequence : 64, 45, 55, 60.

## Printer

The printer which can be connected to the PPU consists of the following:

Printer.

Paper roll (thermal).

Cable with connectors.

AC/DC Battery charger.

Operating manual.



## Print

Printing is started by pressing the following sequence on the push buttons on the PPU;

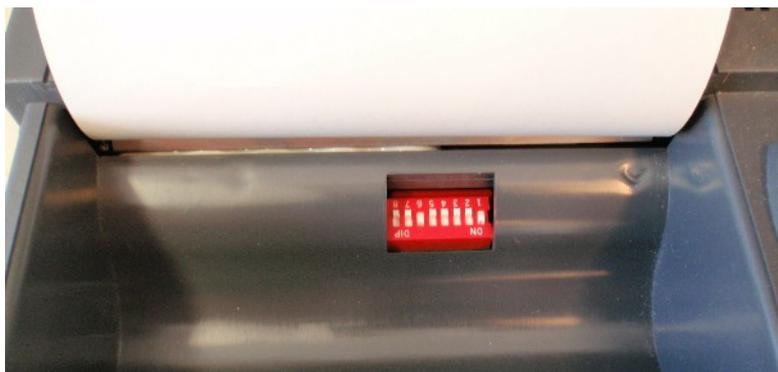
"R . 1", (R dot one).

## Printer technical data.

Interface connector: All signals according to V24. Pin 2  
TD - Data outlet to printer, 1200 baud. Pin 5  
CTS - "Ready" signal from printer.  
Pin 7 SG - Ground signal.

## Dip switches.

Dip switches are situated inside the printer under the paper roll.  
Check that only sw 1 and 6, are in ON position.



# Parameters

Programmable parameters.

**001 PULSES/REV** (Pulses per revolution). Specifies the number of lugs mounted on the transmission and engine outputshafts. The same value is valid for both transmission and engine shaft.

**002 SPEED FILTER.** Specifies how rapidly Shiftronic should adapt to changes in revolution. 64 and 65 are the two recommended values.

**003 SENS CHK** (Sensor check value). Specifies from which minimum trans. rpm value, the pulses should be checked for sensor error. If the rpm value is higher than the programmed value, Shiftronic will not allow the pulses to disappear rapidly. This is to prevent unwanted downshifts. If the pulses should disappear the display will read SENS and the transmission will go to neutral.

**004 REV PROT** (FWD--REV protection value). Specifies the maximum allowed rpm value of the transmission outputshaft, when a gear is selected from neutral.

**005 SHIFT DOWN TYPE.** Specifies how the Shiftronic engine control should work during downshifting. 0 = Engine control is activated with all types of downshifting. 1 = Engine control is not activated with kickdown. 2 = Engine control is not activated with any downshifting. 3 = Give throttle with downshifting, activates G7(P1/10) according to the pre and post values of parameter No 117--132 and 151--166

**006 NO NEUT ACK** (No neutral acknowledgement). Specifies if the shifter (CCU) has to be shifted into neutral position to confirm an error message. 0 = Confirmation required. 1 = Confirmation not required.

**007 REENTER IF REV.** Specifies if it should be possible to return to the previously selected gear when the REV PROT rpm has been exceeded, or if the shifter has to remain in neutral position until the vehicle speed has been decreased under the REV PROT-value. 0 = It is not possible to return to previous gear. 1 = It is possible to return to previous gear as long as the vehicle is in appropriate speed, according to the programmed value.

**008 DIRECT REVERSE** (preselection) Gives the possibility to go directly from forward to reverse without passing neutral. Shiftronic only permits this to happen if you are below the REVPROT-value. 0 = No direct reverse. 1 = Direct reverse is activated, it is also possible to go to neutral with a unique neutral-signal. 2 = Direct reverse is activated, the only way to engage neutral is by putting the shifter in neutral under the REVPROT-value.

**009 REVPROT OUTPUT** (Revprotection output). Specifies if G8(P1/11) is used as an ordinary outlet signal for gear engaging, or if mentioned outlet is used to provide a signal whenever the transmission rpm is below the value of the REV PROT parameter. This signal could be used to activate warning lamps when the vehicle is driving slow and working. 0 = Output is used as an outlet for gear engaging. 1 = Output is activated whenever the transmission rpm is below the REV PROT value.

**010 SELECTIVE MTCL** (Selective engine control). Specifies if separate time delays are used for engine control at each gear shift. 0 = Standard PRE and POST values (ID No 015 and 017) are used for engine control. 1 = Separate PRE and POST values are used (activates ID No 099--116 and 133--150).

**011 NO AUTO FIRST** (Non automatic activation of first gear). Specifies if Shiftronic should exclude first gear. Whenever it engages gear from neutral it selects second gear. 0 = First gear remains. 1 = Exclude first gear.

**012 QUICK FIRST** (Quick selection of first gear) Specifies if it should be possible to activate first gear with a button, preferable placed in the top of the shifter. Whenever the button is pressed first gear will be preselected and activated when the proper rpm value is reached. The button should be momentary and connected to UG5(P2/8). Shiftronic will be locked in first gear. To deactivate first gear you have to bring the shifter to neutral, or twist the twistgrip of the shifter. 0 = UG5(P2/8) is used as a normal inlet. 1 = UG5(P2/8) will activate first gear as described above.

**013 ERROR KEEP GEAR.** Specifies if Shiftronic should stay in the presently activated gear when an error occurs. 0 = Activate neutral when error occurs. 1 = Stay in gear when error occurs.

**014 DUMMY RANGE** Gives the possibility to switch between the hi- and lo-register without stopping in neutral, this could be used to get the engine to "brake" the vehicle. 0 = No dummy range. 1 = Dummy range is activated.

**015 SPEED PICKUP** Specifies if the pickup used for monitoring the transmission rpm, is a pnp- or a magnetic-pickup. 0 = PNP-transmitter. 1 = Magnetic pickup.

**016 MOTOR PICKUP** Specifies if the pickup used for monitoring the engine rpm, is a PNP- or a magnetic-pickup. 0 = PNP-transmitter. 1 = Magnetic pickup.

**017 INCHING INPUT** Specifies the signal from the inching-pedal to Shiftronic. 0 = No inching function. 1 = Inching activated when power to P2/9. 2 = Inching activated when no power to P2/9.

**018 PRE LCKUP** (Pre lockup value). Specifies, in seconds, how long before each gear shift Shiftronic should release the lockup signal, P1/12. Possible interval 0.03--8s.

**019 PRE MOTOR** (Pre engine control value). Specifies, in seconds, how long before each gear shift Shiftronic should activate the engine control signal, P1/13. Possible interval 0.03--8 s.

**020 POST LCKUP** (Post lockup value). Specifies, in seconds, how long after each gear shift Shiftronic should activate the lockup signal, P1/12. Possible interval 0.03--8s.

**021 POST MOTOR** (Post engine control value). Specifies, in seconds, how long after each gear shift Shiftronic should activate the engine control signal, P1/13. Possible interval 0.03--8 s.

**022 KICK DOWN** Specifies with how many percent the speed values (ID No 067--088) should be increased when the kick down inlet is activated (P2/10).

**023 AUX1 MODE** (Auxillary inlet 1 mode) Specifies how the AUX1 inlet (P1/15) is used; If the inlet is NOT used for monitoring the engine rpm, but is used as a pure malfunction inlet, the function will be a sum of the following values; 1 = Activate malfunction outlet (P2/12) when inlet is activated. 2 = Activate engine control outlet (P2/13) when inlet is activated. 4 = check the inlet only when a gear is activated from neutral.

If the inlet is used for monitoring the engine rpm the function will be a sum of the following values; 01 = Activate the malfunction outlet (P2/12) when the engine rpm exceeds the A1 MAX RPM value (ID No 020). 02 = Activate the engine control outlet (P2/13) when the engine rpm exceeds the A1 MAX RPM value (ID No 020). 04 = Activate the malfunction outlet (P2/12) when the engine rpm exceeds the A1 START RPM (ID No 021). 10 = Activate the engine control outlet (P2/13) when the engine rpm exceeds the A1 START RPM value (ID No 021) 20 = Specifies that the AUX1 inlet is used for engine rpm monitoring. E.g. If it is required to monitor the engine rpm and if the engine control should be activated only when the A1 MAX RPM is exceeded, the value 20 + 2 = 22 should be entered.

**024 A1 MAX RPM** (Auxillary inlet 1 maximum rpm value). Specifies the maximum accepted rpm of the engine outputshaft. This parameter only exist if the AUX1 inlet is used for engine rpm monitoring according to parameter ID No 019.

**025 A1 START RPM** (Auxillary inlet 1 start rpm value). Specifies the maximum accepted rpm of the engine outputshaft in the start procedure (every time a gear is engaged from neutral). This parameter only exist if the AUX1 inlet is used for engine rpm monitoring according to parameter ID No 019.

**026 AUX1 TEXT** (Auxillary inlet 1 display text). Specifies the text to be shown on the cab display unit when the inlet is activated (P1/15). The text is programmed as described under paragraph 5.2. This parameter only exist when the AUX1 inlet is not used for engine rpm monitoring according to parameter ID No 019.

**027 AUX 2 MODE** (Auxillary inlet 2 mode). Specifies how the AUX2 inlet (P1/16) is used. The function will be a sum of the following values; 1 = Activate malfunction outlet (P2/12) when the inlet is activated. 2 = Activate engine control outlet (P2/13) when the inlet is activated. 4 = Check the inlet only when a gear is activated from neutral.

**028 AUX2 TEXT** (Auxillary inlet 2 display text). Specifies the text to be shown on the cab display unit when the inlet is activated (P1/16). The text is programmed as described under paragraph 5.2.

**029 STEP CONTROL**. Specifies if a step control shifter is used. 0 = No, an ordinary multi-signal shifter is used. (Most common) 1 = Step control shifter is used.

**030 MASK N** (Coding the neutral signal). Specifies wich of the pins P2/3--8 that are used for forward and reverse signals. This is to help Shiftronic to define neutral.

**031 GEARS FH** (Number of gears in forward high register). Specifies the number of gears in forward high register direction.

**032 GEARS RH** (Number of gears in reverse high register). Specifies the number of gears in reverse high register direction.

**033 IN NH** (Inlet signals in neutral high register). Specifies which of the pins P2/3--8 should be activated in neutral (if a neutral signal is required). The function will be a sum of the following values; 01 = UG0 (P2/3) 02 = UG1 (P2/4) 04 = UG2 (P2/5) 10 = UG3 (P2/6) 20 = UG4 (P2/7) 40 = UG5 (P2/8). E.g. If pins Nos 3 and 4 of the P2 connector should be activated in neutral, the value  $1 + 2 = 3$  should be entered.

**034 IN FH1** (Activated inlets of gear 1 in forward high register). Specifies which of the pins P2/3--8 should be activated in forward and first gear of high register. The function will be a sum of the values described in ID No 029.

**035--042 IN FH2--FH9** See ID No 034

**043--051 IN RH1--RH9** Same as ID No 030--038 but specifies the reverse mode instead.

**052 OUT NH** (Output signals in neutral high register). Specifies which of the pins P1/3-11 should be activated in neutral. (If a neutral signal is required) The function will be a sum of the following values; 001 = G0 (P1/3) 002 = G1 (P1/4) 004 = G2 (P1/5) 010 = G3 (P1/6) 020 = G4 (P1/7) 040 = G5 (P1/8) 100 = G6 (P1/9) 200 = G7 (P1/10) 400 = G8 (P1/11)

**053--061 OUT FH1--FH9.** Specifies which of the output signals should be activated in forward high register gears 1--9. The function will be a sum of the values described in ID No 048.

**062--070 OUT RH--RH9.** Same as ID No 049--057 but specifies the reverse mode instead.

**ODD PARAMETERS 071--085 SP FH1--FH9** (Speed forward high register first to ninth gear). Specifies, for each gear forward, at which rpm of the transmission output shaft the shifting should occur.

**EVEN PARAMETERS 072--086 HY FH1--FH9** (Hystereses forward high register first to ninth gear). Specifies the hystereses for the previous parameters. E.g. If the speed for FH1--FH2 is set to 600 rpm and the hystereses for FH1--FH2 to 100 rpm, upshifting will occur at 650 rpm and downshifting at 550 rpm.

**087--102 SP RH1--RH9 AND HY RH1--RH9.** Same as ID No 067--082 but specifies the reverse mode instead.

**103--120 PRE AND POST FH1--FH9.** Specifies the engine control time described in ID No 015 and 017 separately for each gear. This parameter is only activated if ID No 010 is set to the value 1.

**121--134 PRE AND POST FH9--FH1.** Specifies the pre and post values for giving throttle with downshifting. This parameter is only activated if ID No 005 is set to the value 3.

**137--154 PRE AND POST RH1--RH9.** Same as ID No 099--116 only specifies the reverse mode instead.

**155-170 PRE AND POST RH9--RH1.** Same as ID No 117--132 only specifies the reverse mode instead.

**171 GEARS FL** (Number of gears in forward low register). Specifies the number of gears in the forward low register.

**172 GEARS RL** (Number of gears in reverse low register). Specifies the number of gears in the reverse low register.

IF THE THE HIGH/LOW REGISTER IS NOT WANTED, ID No 171 AND 172 SHOULD BE SET TO 0! IF THE ID No 171 AND 172 ARE PROGRAMMED TO ANYTHING BUT 0, THE SAME PARAMETERS THAT OCCURED AFTER ID No 031 AND 032 WILL APPEAR.

So we will have;

**173 IN NL**

**174--182 IN FL1--FL9**

**183--191 IN RL1--RL9**

**192 OUT NL**

**193-201 OUT FL1--FL9**

**202--210 OUT RL1--RL9**

**ODD211--225 SP FL1--FL9**

**227--243 SP RL1--RL9**

**EVEN212--226 HY FL1--FL9**

**228--244 HY RL1--RL9**

If ID No 010 is set to 1, the pre and post values will appear in parameter No 245-310

**311 END**

# INSTALLATION

## Installation of speed sensor kit-SSK.

The speed sensor kit consists of the following:

Speed sensor - 1 pc  
Sensor lugs - 8 pcs

Brackets as shown on drawing 880116.

It is important that the brackets and the sensor lugs are firmly attached at an appropriate place. The enclosed drawing shows a suggested installation and how many sensor lugs are needed depending on flange diameter. The same drawing also shows the critical measurements which have to be observed.

There are two different types of sensors which can be incorporated in a Shiftronic application where the PNP type (3-wires) is supplied as standard.

The connections for both types are as follows:

### PNP-transmitter.

Brown Supply voltage, connect to P1, pin 1 (P1/1)

Blue Ground supply, connect to P1, pin 2 (P1/2)

Black Signal from sensor, connect to P1, pin 14 ((P1/14)(transmission shaft sensor)) and/or P1, pin 15 ((P1/15)(engine shaft sensor)).

### Magnetic engine pickup

Connection is made to the P1 connector of the Shiftronic.

P1/17 Transmission speed input.

P1/18 Transmission speed input, if a non-grounded pickup is used.

P1/19 Engine speed input.

P1/20 Engine speed input, if a non-grounded pickup is used.

## Installation of electronic control unit-ECU.

### Mechanical installation:

The box of the ECU should be installed inside a cab providing an acceptable environment for the electronic circuitry. If the ECU has to operate in a humid environment the 880905 waterproof series should be used.

The ECU panel should be mounted vertically with the cables downwards. If it is mounted in a high position, the heavy cables should be supported by cable clamps etc.

### Electrical installation:

It is recommended that the ECU is protected with a 8A fuse. Supply connection P2/pin 1.

The ECU and all other electrical components which are integrated in a Shiftronic system should have a common ground. Ground connection P1/pin 2 and P2/pin 2.

The sensor of PNP type should source its voltage supply from the ECU as described in chapter 4.

# TROUBLE SHOOTING

Malfunctions indicated by the CDU.

Display	Description	Remedy
REV	The driver has tried to change direction of the vehicle in a nonpermitted speed range according to programmed value. The transmission will automatically shift into neutral.	Decrease the speed of the the vehicle. Depending of programme the driver has to shift into neutral, remain in present position or select another direction. ID No 006. The ECU will not allow gear engaging until permitted speed of the vehicle is reached.
RPM	Only exist if engine monitoring mode is selected. ID No 019.1)The driver has tried to shift into a gear at a nonpermitted engine speed.2)The engine speed has exceeded the maximum permitted rpm.	Decrease the engine speed. If engine control is selected this will be made automatically.ID No 019.
AMP	The ECU is either shortcircuited or the load of one of the outlet pins is exceeding 1A. All outlets will be disconnected automatically at described error indication.	1)Check if the connections are made correctly and not causing a shortcircuit in the system. 2)Check the load of the consumer which should not exceed 24W for 24V DC system or 12W for 12V system per outlet. If the load exceeds these specified values, relays have to be installed which will reduce the load. If this is necessary please install diodes over the relays. This to avoid transients disturbing Shiftronic. The described condition is reset by the reset button on the ECU or the CDU.
SENS	The ECU has failed, partially or totally, to receive signals from the sensor kit monitoring speed on the propeller shaft.	1)Check if the sensor bracket is firmly fastened. 2)Check the lugs providing the sensor with inductive signals. 3)Check the sensor itself by placing a piece of metal in front of the sensor. The sensors red led should light.. See enclosed drawing. The described condition is reset by the reset button on the ECU or on the CDU.
No automatic shift occurs	-	1)Check by pressing the reset button if revolutions are shown on the display. 2) Check the sensor itself according to SENS, above.

# SHIFTRONIC V3 880900

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SHIFTER/VXL-DON			P2			P1			SOLENOID VALVE/VENTIL				
POS	COLOUR FÄRG	FUNCTION	IN OUT	COLOUR FÄRG	FUNCTION	VALUE VÄRDE	IN OUT	COLOUR FÄRG	FUNCTION	VALUE VÄRDE			
1			IN		SUPPLY		OUT		+SUPPLY PNP				
2			IN		GND		OUT		GND PNP				
3			IN			1	OUT			1			
4			IN			2	OUT			2			
5			IN			4	OUT			4			
6			IN			10	OUT			10			
7			IN			20	OUT			20			
8			IN			40	OUT			40			
9			IN		LOCK UP/INCHING		OUT			100			
10			IN		KICK DOWN		OUT			200			
11			IN		MANUAL SHIFT		OUT			400			
12			OUT		ERROR		OUT		LOCK UP/INCHING				
13			OUT		POT. + SUPPLY		OUT		ENGINE CONTROL				
14			IN		POT. SIGNAL		IN		TRANSM. PNP				
15			OUT		POT. GND		IN		AUX1/ENG. PNP				
							IN		AUX2				
							IN		TRANSM. PICK UP				
							IN		TRANSM. PICK UP $\frac{1}{2}$				
							IN		ENGINE PICK UP				
							IN		ENGINE PICK UP $\frac{1}{2}$				
							OUT		PROGRAM 5VDC				
							OUT		PROGRAM 26VDC				
							IN		PROGRAM TDAT				
							IN		PROGRAM PROG MOD				
							IN		PROGRAM RDAT				

SHIFTER/VXL-DON			P2			P1			SOLENOID VALVE/VENTIL				
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2			IN		GND		OUT		GND PNP				
3			IN			1	OUT			1			
4			IN			2	OUT			2			
5			IN			4	OUT			4			
6			IN			10	OUT			10			
7			IN			20	OUT			20			
8			IN			40	OUT			40			
9			IN		LOCK UP/INCHING		OUT			100			
10			IN		KICK DOWN		OUT			200			
11			IN		MANUAL SHIFT		OUT			400			
12			OUT		ERROR		OUT		LOCK UP/INCHING				
13			OUT		POT. + SUPPLY		OUT		ENGINE CONTROL				
14			IN		POT. SIGNAL		IN		TRANSM. PNP				
15			OUT		POT. GND		IN		AUX1/ENG. PNP				
							IN		AUX2				
							IN		TRANSM. PICK UP				
							IN		TRANSM. PICK UP $\frac{1}{2}$				
							IN		ENGINE PICK UP				
							IN		ENGINE PICK UP $\frac{1}{2}$				
							OUT		PROGRAM 5VDC				
							OUT		PROGRAM 26VDC				
							IN		PROGRAM TDAT				
							IN		PROGRAM PROG MOD				
							IN		PROGRAM RDAT				

SHIFTER/VXL-DON			P2			P1			SOLENOID VALVE/VENTIL				
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3			IN			1	OUT			1			
4			IN			2	OUT			2			
5			IN			4	OUT			4			
6			IN			10	OUT			10			
7			IN			20	OUT			20			
8			IN			40	OUT			40			
9			IN		LOCK UP/INCHING		OUT			100			
10			IN		KICK DOWN		OUT			200			
11			IN		MANUAL SHIFT		OUT			400			
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SHIFTER/VXL-DON			P2			P1			SOLENOID VALVE/VENTIL				
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4			IN			2	OUT			2			
5			IN			4	OUT			4			
6			IN			10	OUT			10			
7			IN			20	OUT			20			
8			IN			40	OUT			40			
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10			IN		KICK DOWN		OUT			200			
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SHIFTER/VXL-DON			P2			P1			SOLENOID VALVE/VENTIL				
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5			IN			4	OUT			4			
6			IN			10	OUT			10			
7			IN			20	OUT			20			
8			IN			40	OUT			40			
9			IN		LOCK UP/INCHING		OUT			100			
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							OUT		PROGRAM 26VDC				
							IN		PROGRAM TDAT				
							IN		PROGRAM PROG MOD				
							IN		PROGRAM RDAT				



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## Important information, control/ecu units

- Check that the contents of the package are according to order confirmation and that the items are in good condition. Put in claim for incorrectness to supplier as soon as possible.
- Ensure a stable voltage source for optimal function. This is true about electric forklift trucks in particular. Supply voltage is 12V or 24V and should be secured with a fuse.
- Wiring harness between the control/ecu unit and the actuator should not be drawn together with the vehicle's power cables or next to power connections on electric engines, radio transmitters, etc. Do not draw the control unit harness in a closed circle, or through circles of other cables.
- Relays , coils, motors and other devices that can cause interference should be shielded with protective diodes or transient protection to prevent interference.
- Remove the vehicle voltage feed and ground connection from the vehicle if welding is necessary.
- Make sure that you protect the vehicle against static electricity whenever you work with it. Connect the chair armrest to the vehicle chassis in order to lead away static electricity caused by friction between the driver and the chair. Outgoing negative voltage from any DC/DC converter preferably be connected to the vehicle chassis.
- Do not open the control/ecu unit. Contact the service organisation if error occurs. If the control unit is opened or modifies the JRsystems AB guarantee will expire. If the control unit modifies without JRsystems AB permission we disclaim our responsibility for the product.
- Do not expose the control/ecu unit to impacts. If someone drop the control unit or similar it should be sent to supplier for control.
- Clean the control unit regularly with a damp rag with mild soap solution. The control unit cannot be soaked in water, washed with high-pressure wash or have any other direct contact with water.
- The control unit is to be placed on an armrest to give the best ergonomic benefits. Choose an armrest with switch in the joint of the chair. Supply voltage shall be disconnected when the armrest is raised.
- Turn off the control/ecu unit if error indication occurs and search for and correct the reason. If the problem is in the control unit it should be sent to supplier for repair. Do never use a vehicle with a control unit with error indication.
- Use shielded wires to sensors and connect the shield to the grounded box. Shielded wires should only have one ground connection point.
- Use sealed connectors and gold plated pins/sockets for analogue signals.
- Include the control unit in the daily inspection of the vehicle before every start-up. Check that the control unit is in good condition especially the bellow, the lever and the buttons. If possible check the harness and the connector. Contact the vehicle manufacturer for advice or service if you have any hesitations.
- Recommended wire areas: 1,5mm<sup>2</sup> for supply voltage and ground. Other wires 0,6mm<sup>2</sup>. *For EMMI:* For use of 5A (Dig out 1 and Dig out 2) 1,5mm<sup>2</sup> is recommended.
- *Only valid for EMMI:* To secure the specified EMC requirements even in extreme circumstances, we recommend a ferrite placed on the harness as closed to the control unit as possible. Requirements of the ferrite: Impedance 168 at 25Mh, 250 at 100 MHz, 300 at 300 MHz and 205 at 500Mhz. JRsystems AB part number 848782 or 848783.