

02/08/2007 EPROM program E61 and later. KW950-E option selection. Page 1.

HEX	SW1 1234 5678	SK3 DATA INPUT	SK3 DATA OUTPUT	SK3 BAUD	SK3 OUTPUT RATE	SK4 OUTPUT	SK5 INPUT	(or) SK2 Gyro INPUT display is heading
00	0000 0000	All NMEA 0183 Heading sentences Cetrek & Yokogawa #0	NMEA 0183 \$HEHDT,x.x,T*hh	4800	When heading changes and 1 per second	Alarm Pulse	GP HE HC HDT HDM HCC 4800	Stepper, synchro, contactless 90X 400Hz.
01	0000 0001	"	"	9600	"	"	"	"
02	0000 0010	"	"	19200	"	"	"	"
03	0000 0011	"	"	2400	"	"	"	"
04	0000 0100	"	"	4800	"	Furuno 25 mS	"	"
05	0000 0101	"	"	4800	"	Furuno 50 mS	"	"
06	0000 0110	"	" #06	4800	"	Reversed HEHDT 4800	----	"
07	0000 0111	"	"	4800	"	Yokogawa 2400	----	"
08	0000 1000	"	"	4800	"	HEHDT 10/sec 4800	----	"
09	0000 1001	"	"	4800	10 per second	"	----	"
0A	0000 1010	"	"	38400	50 per second	"	----	"
0B	0000 1011	"	HEHDT & TIROT #B	4800	At change & 1 per sec	"	----	"
0C	0000 1100	Data to be passed	HEHDT + filter-through #C	4800	1 sec & filter-through	"	As top cell	"
0D	0000 1101	Data to be passed	HEHDT + filter-through #D	9600	1 sec & filter-through	"	As top cell	"
0E	0000 1110	As in top cell	HEHDG	4800	10 per sec	"	----	"
0F	0000 1111	"	HCHCC	4800	10 per sec	"	----	"
10	0001 0000	"	HCHDM	4800	10 per sec	"	----	"
11	0001 0001	"	YOKOGAWA	4800	5 per sec	"	----	"
12	0001 0010	"	S.G.B 1/6 deg	4800	10 per sec	"	----	"
13	0001 0011	Select normal or reverse heading Apply volts to SK3 1&2. #13	HEHDT & TIROT	4800	HEHDT 10 per sec ROT 1 per sec	----	As top cell	"
14	0001 0100	----	<i>ANSCHUTZ COURSEBUS - CAUTION!</i>	9600		"	----	"
15	0001 0101	----	TOKIMEC ROBERTSON ES160	9600	At change & 1 per sec	----	As top cell	"
16	0001 0110	----	SKR80	9600		HEHDT	----	"
17	0001 0111	As in top cell	CETREK	4800	6 per sec	"	----	"
18	0001 1000	ROBERTSON SKR82 "RS232" Not current loop but inverse of it.	HEHDT	9600	At change & 1 per sec	"	----	----
19	0001 1001	<i>ANSCHUTZ COURSEBUS CAUTION!</i>	HEHDT	9600	"	"	----	----
1A	0001 1010	Mag hdg HCC HDM (not true hdg)	HEHDT	4800	"	"	As top cell	M-type step & 180:1 synchro
1B	0001 1011	NMEA 0183	HEHDT	4800	10 per sec	Furuno 50 ms ##	----	M-type step & 180:1 synchro
1C	0001 1100	---	ROBERTSON SKR80 #1C	9600		----	As top cell	----
1D	0001 1101	---	HEHDT	9600	10 per sec	----	"	----
1E	0001 1110	---	HEHDT	38400	50 per sec	----	"	----
1F	0001 1111	---	<i>ANSCHUTZ COURSEBUS CAUTION!</i>	9600		----	"	----

NOTES. Switch 0 = off. Only one input can be active or there will be confusion. The setting only takes effect at switch-on. More options will be added on request.

#00. Talkers HE, HC, and GP are accepted. If HEHDT is detected it takes priority, and other heading inputs are ignored. Thus the KW950 becomes a data filter for HEHDT.

#06. Display is normal heading. Normal and reversed heading data output is available from SK3 and SK4.

#0B. Rate of Turn header TI is used. HEROT was not accepted by some AIS, or caused it a problem when using both HE & TI .

#0C #0D. The filter-through function passes selected sentences of the NMEA input out of SK3, interleaving the heading data. Data passed through is \$GP GGA, VTG and ZDA. The filter may be set to pass all data by changing a preset EPROM location.

#13. SK3 input is used to select normal or reversed heading, display & data output. Apply 5 to 12 volts to SK3, 1-2, for reversed heading. Take 5volts from SK4, via a switch.

#14, 19, 1F. The Anschutz output was created specifically for Raytheon Anschutz, Kiel, to solve some of their interfacing requirements. The Anschutz Coursebus output was tested by Raytheon Anschutz, Kiel, and they declared it to be correct. A Coursebus reader program for PC is available to check it. Unfortunately some repeaters or radars have proved not able to read this signal, although others read it fine. The reasons are not all known. Therefore, the options for Anschutz Coursebus should be treated with caution. It is not guaranteed but if it works it's a bonus.

#1C. Robertson SKR 82 "current loop" equivalent output is from SK3 pins 6 and 5. (inverted data "B" and 0 volts.) It is not a 20 mA current loop drive but has been used successfully. Treat with caution. This function was created for Points North Ltd.

## KW950 option selection. Page 2.

HEX	SW1 1234 5678	SK3 DATA INPUT	SK3 DATA OUTPUT	SK3 BAUD	SK3 OUTPUT RATE	SK4 OUTPUT	SK5 INPUT	(or) SK2 Gyro INPUT	DISPLAY
20	0010 0000	All NMEA 0183 Heading sentences Cetrek & Yokogawa	NMEA 0183 \$HEHDT,x.x,T*hh	4800	When heading changes & 1 per second	Alarm Pulse	GP HE HC HDT HDM HCC HRC 4800	Stepper, synchro, contactless 90X 400Hz.	Heading
21	0010 0001	"	HEHDT	"	2 per second	"	"	"	"
22	0010 0010	"	Scan LR40 data	"	10 per sec	"	"	"	"
23	0010 0011	Data to pass through	HEHDT + pass through	"	10/sec + passthrough	"	"	"	"
24	0010 0100	Select normal or reverse hdg. Apply volts to SK3 1&2. #24	HEHDT & TIROT	4800	1 per sec	----	As top cell	"	"
25	0010 0101	----	HEHDT	"	At change & 1 per sec.	"	#25 Robertson current loop	"	"
26	0010 0110	----	Robertson SKR80	9600	Continuous		#25 Robertson current loop	----	"
27	0010 0111	As top cell 9600	Microtechnica \$N3N2N1N0	9600	12ms		HEHDT 4800	"	"
28	0010 1000	As top cell 4800	HCHDT	4800	125 mS	HEHDT 4800 100ms	HEHDT 4800	----	"
29	0010 1001	"	Cetrek	4800	175 mS	Furuno 50 mS #29		"	"
2A	0010 1010	Data to pass through	VMVBW + pass thru	4800	1 second	----	Yokogawa speed \$VMVSD 2400	"	"
2B	0010 1011	Data to pass through	HEHDT & TIROT + pass thru	4800	1 second	----	Yokogawa Heading \$HEHDC 2400	"	"
2C	0010 1100	200 pulse per mile	HEHDT TIROT VMVBW	4800	1 second	---	As top cell	"	"
2D	0010 1101	Ormtech tide data under development	Proprietary tide data	1200	1 second	Proprietary 4800	---	---	Tide height
2E	0010 1110		Watchkeeper's alarm Power on with autopilot #2E	4800	1 second	D1 = local alm D2 = Off-bridge alarm		Reset pulse input	Minutes Count down
2F	0010 1111		SDDBT & SDDPT Depth metres	4800	Each sentence at 1 second interval	#2F	TX pulse. J1 can invert pulse	S1 = RX pulse S3 set active high/low	Depth Metres

#24. SK3 input is used to select normal or reversed heading, display & data output. (NOT for data input) Apply 5 to 12 volts to SK3, 1-2, for reversed heading. Take 5volts from SK4, via a switch.

#25. Hardware mod required for Robertson current loop input. Input opto is replaced by CNY17 and input resistor shorted out. Set jumper J1 to invert the SKR80 current loop data. More in manual.

#2B. The rate of turn data from the Yokogawa sentence is not used. The KW950 calculates its own from the heading change.

#2E. The countdown time can be changed by holding AL and using inc/dec." If a battery backed RAM (example M48Z58Y) is fitted as IC7 the countdown value is retained. Otherwise, it is set to 15 minutes at power-on.

#29. Furuno output has been tested on a Furuno radar. The serial data out on SK3 pauses when the Furuno data is sent.

#2F. Hold "AL" and use the inc/dec buttons to add a correction to the depth output from SK3. This is used to make the data output register as below-surface for survey purposes.

Depth is based on 1500 m/s. Maximum 3,276 M. Resolution to 0.1 metre. See latest handbook for pulse input setting up. (J1 normal or INV transmit pulse.) (S3 = 0v = RX active HI. S3 = +volts = RX active low)

**KW950 option selection. Page 3. Display shown in right hand column**

HEX	SW1 1234 5678	SK3 DATA INPUT	SK3 DATA OUTPUT	SK3 BAUD	SK3 OUTPUT RATE	SK4 OUTPUT	SK5 INPUT Or R1-R2	(or) SK2 Gyro INPUT	DISPLAY
30	0011 0000	NMEA 0183 Heading sentences, Cetrek & Yokogawa + Speed sentences	NMEA 0183 Heading HEHDT HEROT Speed VMVBW	4800	1 per second.		200 pulses per mile Water speed #30	Stepper gyro S1,S2,S3	Water Speed
31	0011 0001	"	HEHDT & VDVBW	4800	"	----	"	"	"
32	0011 0010	"	IIVHW & VDVBW	4800	1 second	----	"	"	"
33	0011 0011	"	VMVBW	4800	1 second	----	"	----	"
34	0011 0100	"	VDVBW	4800	1 second	----	"	----	"
35	0011 0101	"	VDVBW	4800	1 second	----	"	----	"
36	0011 0110	Data to be passed	VDVBW + Pass-through	4800	1 plus pass-through	----	"	----	"
37	0011 0111	As top cell	VDVBW	4800	1 second	----	400 pulses per mile	----	"
38	0011 1000	Data to be passed	VDVBW + Pass-through	4800	1 plus pass-through	----	"	----	"
39	0011 1001	As in top cell	VDVBW	4800	1 second	----	200 pulses per mile Ground speed	----	Ground Speed
3A	0011 1010	"	HEHDT + VDVBW	4800	3/sec + 1/sec	---	200 ppm water spd	Stepper gyro	Heading
3B	0011 1011	"	"	4800	10/sec + 1/sec	---	200 ppm water spd	Stepper gyro	Heading
3C	0011 1100	JLN202/203 log data	VDVBW	4800	1 second	----	JLN202/203 clock #3C	----	Water speed
3D	0011 1101	As in top cell	VDVBW	4800	1 second	----	100 pulses per mile	----	Water speed
3E	0011 1110	VD VM GP II VTG, VBW, VHW	GPVTG VDVBW	4800	1 second	200 pulses/mile		----	Speed
3F	0011 1111	---	AGRSA	4800	1 per sec & on change	---	#3F	S1=port S2=stbd S3=clutch	Rudder
40	0100 0000	----	\$ERRPM,S,0,x.x.,A*HH	4800	1 per second	---	10 pulses per rev	Apply volts to S1 for astern	RPM
41	0100 0001	----	\$ERRPM,S,1,x.x.,A*HH	4800	1 per second	---	10 pulses per rev	Apply volts to S1 for astern	RPM
42	0100 0010	----	\$ERRPM,S,2,x.x.,A*HH	4800	1 per second	---	10 pulses per rev	Apply volts to S1 for astern	RPM
43	1100 0011	----	\$IITXT,01,mm,01,text	4800	In time with input	----	Serial data 4800	----	950T, data
44	1100 0100	----	\$IITXT,01,mm,01,text	4800	In time with input	----	Serial data 9600	----	950T, data
45	0100 0101	----	SDDBT & SDDPT	4800	1 second	----	Marconi Seachart data #45	---	Metres
46	0100 0110	Data to be passed	\$ERRSA + pass-through	4800	1 second	---		Steps 6 steps per degree	Degrees
47									
48	0100 1000	----	\$ERRPM,S,0,x.x.,A*HH	4800	1 per second	---	150 pulses per rev 5000 Hz = 2000 RPM	Apply volts to S1 for astern	RPM
49	0100 1001	----	\$ERRPM,S,1,x.x.,A*HH	4800	1 per second	---	150 pulses per rev	Apply volts to S1 for astern	RPM
4A	0100 1010	----	\$ERRPM,S,2,x.x.,A*HH	4800	1 per second	---	150 pulses per rev	Apply volts to S1 for astern	RPM
4B	0100 1011	----	Simulated data output	4800	continuous				Head
4C	0100 1100	As in top cell	\$HEHDT	9600	20 per second	----	\$HEHDT at 38400 baud		Head
4D	0100 1101	---							

SW1 position 1 = 0 = KW950 E. Position 1 = KW950-T. The switch must be set to suit the instrument. The KW950-T can only display certain data such as gyro heading input as a bonus. Its main purpose is as a VDR display. Conversely, the KW950 E can not display KW950-T text, but can input and output serial data.

#30. IMO resolution says pulses per mile are in forward direction only. Pulse input to SK5 or SK2, R1 R2.

If NMEA 0183 speed is input the pulse input is ignored. NMEA 0183 output resolution 0.1 knots.

The KW950 can not know the difference between water or ground speed when interfacing pulses per mile input. Longitudinal speed is assumed.

#3C JLN 202/203 is the JRC doppler log serial data and clock output. It does not define water or ground speed, so the VBW bow water speed field is used.

#3E Only one speed input must be applied, not both GPS and log. Headers accepted GP, VD, VM, VW, II.

#3F receives voltages from autopilot and moves the desired rudder angle command, and display. Rudder angle is +/- 30 degrees. Rate of change 10 deg/sec.

#40, centre line shaft revolutions. #41, starboard side shaft revolutions. #42, port side shaft revolutions. Max revs per minute 999. The KW950E measures RPM in 6 second blocks. Locations 5B and 5C define the word (LS and MS) in binary milliseconds for the counting interval. For 10 pulses/rev use 6000 = 1770H

#43, #44. Input serial data such as radar proprietary data. Output NMEA 0183 text sentence. Reserved characters such as "\$" are filtered out of the input data. Normally used for KW950-T text display for AMI's VDR.

#45. Marconi Seachart serial data as intended for its remote display. Set J1 to "invert."

#46 Connect step transmission as for stepper gyro. Rudder sensor angle is output. Align like gyro

#48, centre line. #49, starboard. #4A, port side. Maximum value is about 6000 RPM

The KW950E counts pulses over a period (default 400 mS) and uses it as RPM. The count is based on sampling at 79.75 microseconds, and the period defined by the multiplication of two values in locations 5D and 5E. Default values 79.75 x 59 (3BH) x 85 (55H) = 400 mS. The character "S" for shaft can be changed to "E" or any ascii character at location 5F.

#4B, This option puts the KW950 into a simulator mode, where it outputs many sentences every second including, DBT, GGA, VTG, VBW, RPM, RSA, VDM.

IN	OUT	OPTION		IN	OUT	OPTION
Anschutz coursebus	HEHDT	19		LOG 100, 200, 400 PPM	VMVBW	30 to 3c, 2C
Echo sounder start & stop pulses	SDDPT SDDBT	2F		LOG JLN202/203	VDVBW	
Echo sounder Marconi Seachart	SDDBT SDDPT	45		ROBERTSON SKR82	HEHDT	18, 25, 26
				RPM pulses	ERRPM	40 to 44. 48 to 4A
GPS	GPS + head	0C, 0D, 23 etc		Stepper & synchro gyro	HEHDT +	00 and more
Gyro step or synchro	HEHDT HEHCC etc	00 and more				
	Reverse	13,		Yokogawa Heading	HEHDT	03, 2B
H*HCC, H*HDM	HEHDT	1A & more		Yokogawa speed	VMVBW	2A