



Personal Scope HPS40 Technical Doc



14/02/2003

Packaging



HARD CASE



RS232 LEAD



PROBE60SB

IN THE PACKAGE:

PROBE60SB

RS232 lead

HPS40 unit

User Manual

BAGHPS, carry bag

CASHPS, hard case

OPTIONAL (check with order):

PS905, 9Vdc/500mA adaptor



A division of Velleman Components

SAMPLE FOR APPROVAL

Model type : HPS40

Description : Hand Held Personal Scope

Sample number:

Customer :

Remarks / modifications to previous sample:

None

Includes:

- HPS40 unit
- Manual and documents
- Safety measuring probe (PROBE60S)
- RS232 connector cable
- Power supply adaptor SP905 (optional)
- Carry bag (BagHPS)
- Hard case (CaseHPS)

Prepared by:

Approved by:

Customer acceptance by:

Please return signed copy

DATE :

DATE :

DATE :

Declaration of Conformity



We, Manufacturer



**Velleman Components
Legen Heirweg 33
9890 Gavere
Belgium**

declare that the product


HPS40 Personal Scope

if used according the instructions included with the unit meet the directives
in accordance with 89/336/EEC-EMC Directive
and

- EN 55022 Limits and methods of measurement of radio interference characteristics of information technology equipment (CISPR22 limits)
- EN 50082-1 Electromagnetic Compatibility - Generic immunity standard
- IEC 1010-1 Safety requirements for equipment for measurement, control and laboratory use (*)
(*) if equipment used with safety measurement probe
- FCC Part 15 Part B Unintentional radiators

For the manufacturer

Date: 28/10/2002

Signature:  _____

Name: Stephan Santens
R&D manager

VELLEMAN Instruments

Start frequency: 30MHZ

HPS40 1 CH Personal Scope

End frequency: 1GHz

EN55022 Field strenght

30dB Probe correction attenuation



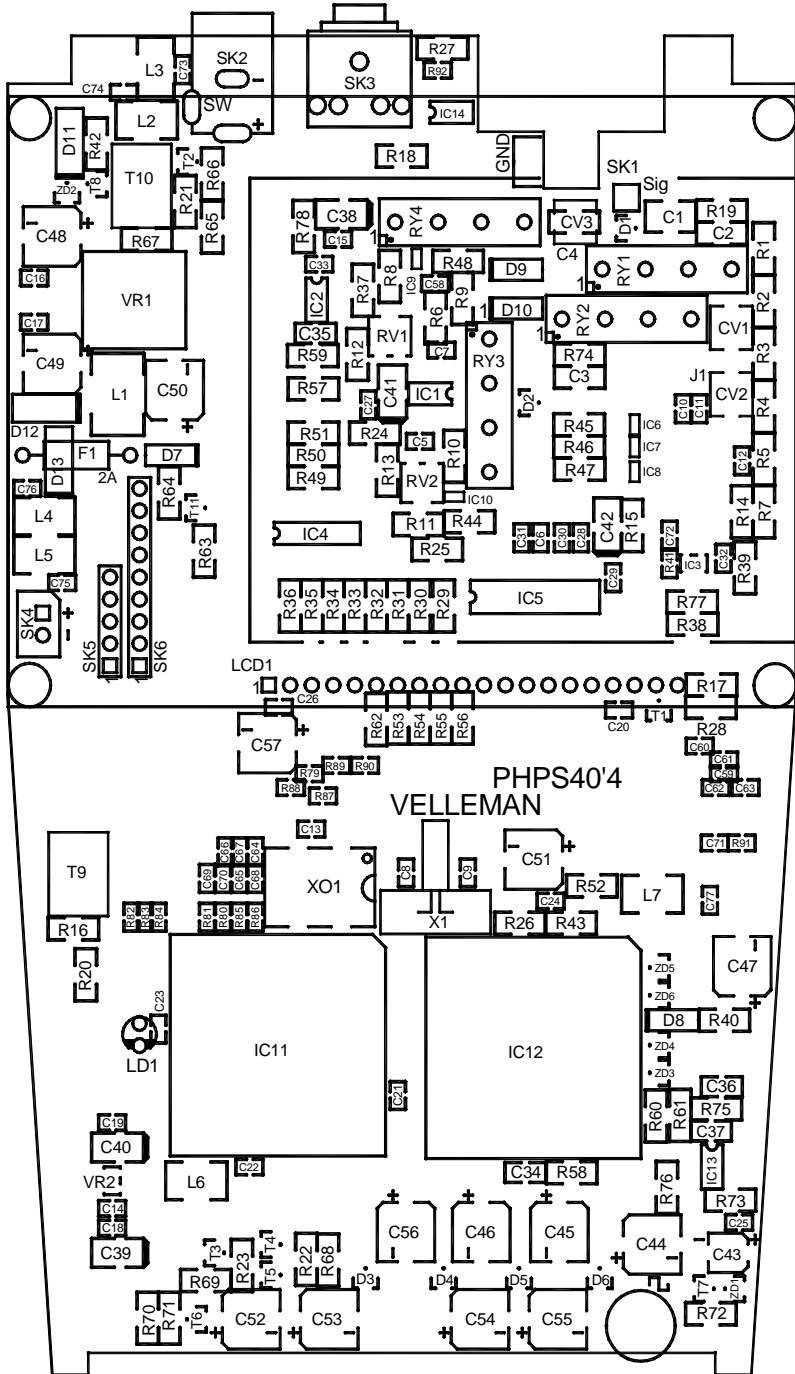


DATE	REVISION OVERVIEW
07-01-2003	Value R92 changed from 33K to 22K for improved RS232 com.
27-01-2003	IL211AT replaced by IL213AT improved RS232 communication
27-01-2003	R26 changed from 270 to 470, improved oscillator stability for oversampling

Name	Descr	Designator
HPS40	PERSONAL SCOPE BOM 19-06-2002	
ASSEMBLY HPS40	Assembly components for HPS40	
BATCLIP+	Battery clip + pole	
BATCLIP+-	Battery clip + - pole	
BATCLIP-	Battery clip - pole	
BATCLIP+	Battery clip + - pole	
CASEHPS40	Enclosure for HPS40 + window + foil + screws	
KBHPS40	Grey keyboard for HPS40	
PANHEADSCREW	Screw for PCB fixation	
SCREENHPS40BK	Screen foil HPS40 back side	
SCREENHPS40KB	screenfoil for HPS40 keyboard side	
SERIALNR	production serial nr (YY-MM- 00000)	
STICK HPS40	Back side info sticker HPS40	
CKSHPS40C	Metal screen on component side HPS40	
CKSHPS40S	Metal screen on solder side HPS40	
CAP HPS40	Capacitors for HPS40	
_10μ/50V	smd electrolytic capacitor 50V	C44
_100μ/16V	smd electrolytic capacitor 16V	C47...C57
_100N	smd capacitor	C15...C33, C72
_100P	smd capacitor	C58, C71
_10N	smd capacitor	C13, C14
_15P	smd capacitor	C6
_1N	smd capacitor	C73...C77
_20P/TRIM	smd ceramic capacitor trimmer	CV1, CV3
_22μ/35V	smd electrolytic capacitor 35V	C45
_2N2	smd capacitor	C12
_2N2/200V	smd capacitor 200V	C2, C3
_33μ/25V	smd electrolytic capacitor 25V	C46
_33P	smd capacitor	C8, C9
_39P	smd capacitor	C11
_4μ7	smd tantalum capacitor	C38...C42
_4μ7/25V	smd electrolytic capacitor 25V	C43
_470N	smd capacitor	C34...C37
_470P	smd capacitor	C59...C70
_47N/200V	smd capacitor 200V	C1
_47P	smd capacitor	C10
_50P/TRIM	smd ceramic capacitor trimmer	CV2
CHOKE_HPS40	Chokes for HPS40	
_0.68μH	smd RF choke	L2...L7
_150μH	smd RF choke	L1
CON_HPS40	Connectors for HPS40	
_HDR1X20	pin header 20-pole	LCD1
_ST-222	3.5mm stereo jack female pcb with switch	SK3
BATCON	battery connector	SK4
CBNC05	BNC FEMALE BULKHEAD	SK1
DJ-005	DC JACK 2.1mm / 5.5mm SOLDER CONNECTIONS	SK2

DIODE_HPS40	Diodes for HPS40	
_BAS45AL	smd low-leakage diode	D9, D10
_BAS85	smd Schottky barrier diode	D7, D8
_BAT54S	smd Schottky barrier double diode	D3...D6
_BAV70	smd high speed double diode	D1, D2
_PRL4001	smd rectifier diode	D11...D13
LED3GL	LED 3mm GREEN 4.0mcd TD UNIVERSAL	LD1
DISPLAY_HPS40	Display assembly for HPS40	
BOLTM2,5X3MM	M2,5mm x 3mm pan head bolt	
HDR20FEM	Female header 20 pole connector	
_SPACER5MM_M2,5	5MM M2,5 spacer	
LCD192112	Graphic LCD 192x112 no negative supply on board	LCD1
FUSE_HPS40	Fuse for HPS40	
PFU2	PICO FUSE FAST 2A QUICK ACTING	F1
IC_HPS40	IC's for HPS40	
_74AHC1G66	smd CMOS bilateral switch	IC6...IC10
_74HC4051	smd 8-channel analog multiplexer/demultiplexer	IC4
_IL211AT	smd optocoupler	IC14
_LMV7239M5	smd 45ns, 2.7V to 5V comparator with push-pull output	IC3
_LMV922M	smd low power dual operational amplifier with Rail-To-Rail i/o	IC2
_UA741CD	smd general purpose operational amplifier	IC13
44PLCC	LEADLESS CHIP CARRIER 44P NON STAGGERED	IC11, IC12
OPA2353UA	smd dual high-speed, single supply, Rail-to-Rail operational amplifier	IC1
TLC5510AINSR	smd 8-bit high-speed A/D Converter	IC5
VKHPS40-IC11	Programmed cpld for HPS40 - ic11	IC11
VKHPS40-IC12	Programmed μ controller for HPS40 - ic12	IC12
PACKING_HPS40	Packing and accesories	
_HHPS40'1	User manual for HPS40 and HPS10	
_MULTIPACKHPS40	Multi pack box for HPS40	
_PROBE60SB	Probe 60S in bulk for hand held scopes (only probe + clamp)	
_RS232LEAD	Custom lead RS232 to 3,5mm jack (moulded)	
_SLEEVE_HPS40	Sleeve for blowcase HPS40	
BAGHPS	CARRYING BAG FOR HPS-SERIES	
CASEHPS	Blow case for Personal scopes	
PCB_HPS40	Printed circuit board for HPS40	
_PHPS40'4	Gold plated two layer PCB for handheld scope HPS40	
QUARTZ_HPS40	Crystal, oscillator for HPS40	
_32.768KHZ	smd watch crystal	X1
_XO-40MHZ	smd crystal clock oscillator	XO1
REG_HPS40	Voltage regulators for HPS40	
_LM2940S-5.0	smd 5V/1A low dropout voltage regulator	VR1
_TPS76433DBV	smd low-power 3.3V/150mA low-dropout positive voltage regulator	VR2

RELAY HPS40	Relays for HPS40	
VR05R051AS	Reed relais 5VDC / 0.5A / 50mW SIL 1 FORM A	RY1...RY4
RES HPS40	Resistors for HPS40	
_100 (0603)	smd resistor	R91
100/1% (1206)	smd resistor 1%	R5
100/TRIM	smd resistor trimmer	RV1
100K (1206)	smd resistor	R74
_10K (1206)	smd resistor	R37...R56
_15 (1206)	smd resistor	R16, R17
150 (1206)	smd resistor	R18, R19
150K (1206)	smd resistor	R75
1K (1206)	smd resistor	R22, R23
_1M (1206)	smd resistor	R77
1R5 (1206)	smd resistor	R14
22K (1206)	smd resistor	R72
270 (1206)	smd resistor	R26
2K2 (1206)	smd resistor	R28
_2K4/1% (1206)	smd resistor 1%	R7, R8
2K5/TRIM	smd resistor trimmer	RV2
330 (1206)	smd resistor	R20, R21
330K (1206)	smd resistor	R76
22K (0603)	smd resistor	R92
_39K/1% (1206)	smd resistor 1%	R1
3K/1% (1206)	smd resistor 1%	R13
3K3 (1206)	smd resistor	R27
3R3 (1206)	smd resistor	R25
_430/1% (1206)	smd resistor 1%	R9
_47 (0603)	smd resistor	R79...R90
47 (1206)	smd resistor	R29...R36, R78
47/1% (1206)	smd resistor 1%	R6
47K (1206)	smd resistor	R57...R71
_47K/1% (1206)	smd resistor 1%	R4
4K7 (1206)	smd resistor	R24
4R7 (1206)	smd resistor	R15
510/1% (1206)	smd resistor 1%	R3
68K (1206)	smd resistor	R12
_750/1% (1206)	smd resistor 1%	R10, R11
82K (1206)	smd resistor	R73
910K/1% (1206)	smd resistor 1%	R2
TRANS HPS40	Transistors for HPS40	
BDP31	smd npn medium power transistor	T9
BDP32	smd pnp medium power transistor	T10
PMBT2222A	smd npn switching transistor	T1...T5
_PMBT2907A	smd pnp switching transistor	T6, T7, T11
_PMBTA14	smd npn darlington transistor	T8
ZENER HPS40	Zener diodes for HPS40	
_PLVA2656A	smd double zener diode 5V6/180mW	ZD2...ZD6
PMBZ5248B	smd zener diode 18V/250mW	ZD1



Test and calibration

Enter the hidden service menu to check the calibration

Enter Setup by long pressing Setup key

SETUP			
MODE	Aut. OFF	Dyn. DPL	SEND
Scope	✓15 min	✓Off	✓ASCII
Demo	1 hour	On	Binary
Y-cal.	Never		
✓About			

RS232C Communication settings

Baudrate: 57600	Data bits: 8
Parity: none	Stop bits: 1
Flow control: none	

Select "About" with arrow keys and short press setup key, then leave setup by long pressing setup key.



You should see the About screen,

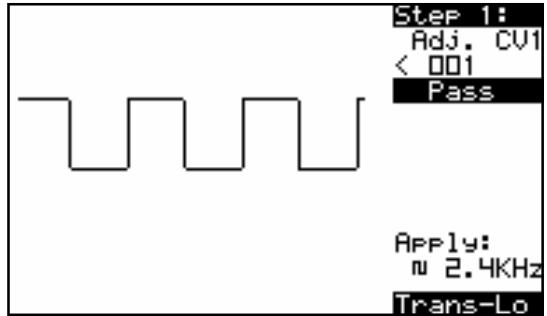
Now press ALL the keys one after the other starting with the power key.

STEP 1, Low level transient

Connect the (x1) probe to the scope probe test output,

If necessary adjust CV1 until pass is displayed

See trimmer location



TRIMMER LOCATION,
If difficult to reach, gently re-
move the metal shielding.



TIP: Pressing Right or Left arrow key, scrolls through the calibration screens

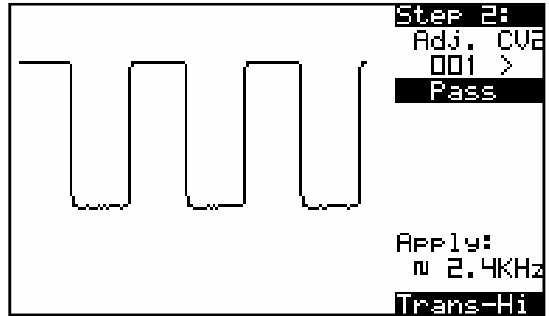
Press **RIGHT ARROW KEY**,

STEP 2, High level transient

Connect the (x1) probe to the scope probe test output,

If necessary adjust CV2 until pass is displayed

See trimmer location

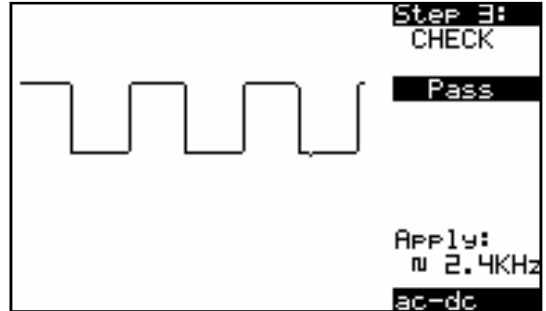


Press **RIGHT ARROW KEY**,

STEP 3, AD/DC Test

Signal should jump up and down.

No adjustment, if fail, check circuit around relay RY1

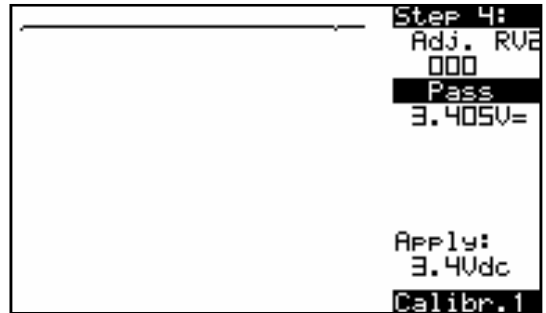


Press **RIGHT ARROW KEY**,

STEP 4, 1V/div calibration

Connect the (x1) probe with a 3.4Vdc supply

If necessary adjust RV2 until pass is displayed



Press **RIGHT ARROW KEY**,

STEP 5, 0.2V/div calibration

Connect the (x1) probe with a 0.7Vdc supply

If necessary adjust RV1 until pass is displayed

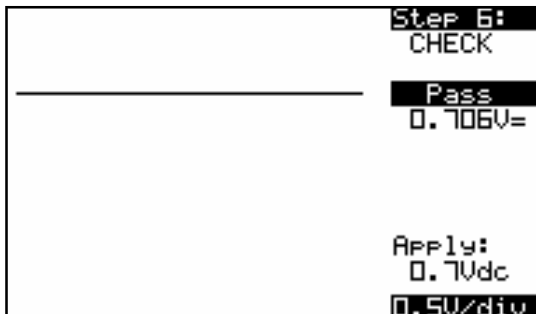


Press **RIGHT ARROW KEY**,

STEP 6, 0.5V/div test

Connect the (x1) probe with a 0.7Vdc supply

No adjustment, if fail, check circuit round IC1, IC9, IC10



Press **RIGHT ARROW KEY**,

STEP 7, 0.1V/div test

Connect the (x1) probe with a 0.17Vdc (170mV) supply

No adjustment, if fail, check circuit round IC1, IC9, IC10

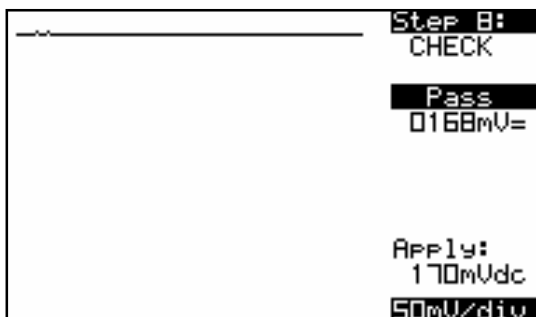


Press **RIGHT ARROW KEY**,

STEP 8, 50mV/div test

Connect the (x1) probe with a 0.17Vdc (170mV) supply

No adjustment, if fail, check circuit round IC1, IC9, IC10

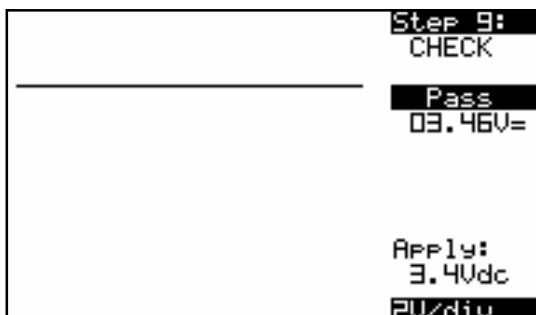


Press **RIGHT ARROW KEY**,

STEP 9, 2V/div test

Connect the (x1) probe with a 3.4Vdc supply

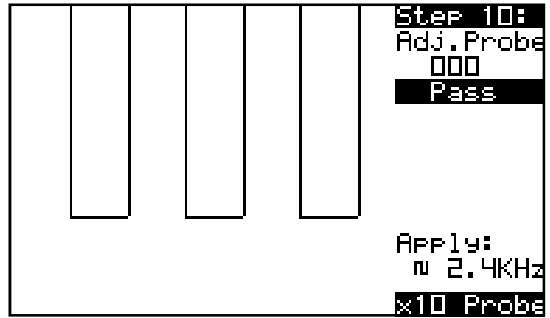
No adjustment, if fail, check circuit round IC1, IC9, IC10



Press **RIGHT ARROW KEY**,

STEP 10, Input transient Probe section

Connect the (**x10**) probe at scope probe test output.



Adjust the probe calibration until pass is indicated.

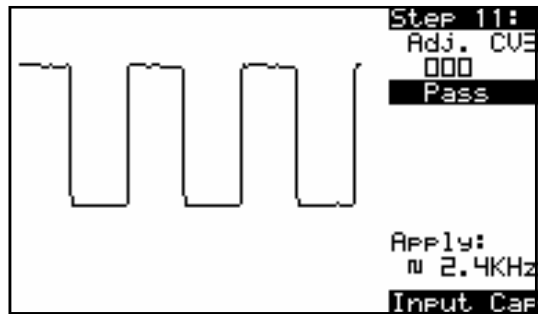


Press **RIGHT ARROW KEY**,

STEP 11, Input transient Scope section

Connect the (**x10**) probe at scope probe test output

Adjust CV3 until pass is indicated



Press **RIGHT ARROW KEY**,

STEP 12, Calibration END

If all steps were correct "Pass" should be indicated, but due to possible manipulation Fail, could be indicated even if all tests were OK. **PRESS POWER OFF TO END THE CALIBRATION**



SPECIFICATIONS

Maximum sample rate	40MS/s for repetitive signals (10MS/s for single shot events)
Input amplifier bandwidth (-3dB)	From 5MHz at 5mV/div to 12MHz at 50mV, 1V & 20V /div
Input impedance	1Mohm // 20pF (standard oscilloscope probe)
Maximum input voltage	100Vpeak (AC + DC), 200Vpeak-peak (AC only)
Input coupling	DC, AC and GND (GND for auto zero reference)
Vertical resolution	8 bit \pm 1bit linearity
Trigger modes	Run, Normal, Once, Roll mode for 1s/div and slower timebase
Trigger level	Adjustable in 8 steps
LCD Graphics	112 x 192 pixels with LED backlight
Signal storage	256 samples with 2 memories, max. 179 samples visible (256 using X shift)
dBm measurement (0dBm= 0.775V in 600ohm)	From -73dB tot +40dB (up to 60dB with X10 probe) \pm 0.5dB accuracy
dBV measurements (0dBV= 1V)	From -75dB tot +38dB (up to 58dB with X10 probe) \pm 0.5dB accuracy
True-rms measurement	From 0.1mV to 80V (up to 400Vrms with X10 probe) 2.5% accuracy
Peak to peak AC sensitivity (sinewave ref.)	0.1mV to 160V (1mV to 1000V with x10 probe) 2% accuracy
Timebase range in 32 steps	50ns to 1hour / division
Input sensitivity range in 12 steps	5mV to 20V/division at X1- 50mV to 200V/div at X10
Probe calibration output	Approx. 2KHz / 4.5Vpp
Supply voltage	9VDC/ min 300mA adapter (unregulated) 12VDC if regulated
Batteries (option)	Alkaline type AA or Ni Cd / NiMH rechargeable (5 pcs required)
Charge current for rechargeable batteries	90mA
Battery current (average)	On: 170mA, with backlight: 240mA, standby current: < 600 μ A
Operating temperature	0 to 50°C (32 to 122°F)
Fysical characteristics	Dim: 105x220x35mm (4.13x7.95x1.38") Weight 450g (16oz.) ex. Batteries



A division of Velleman® Components

**Legen Heirweg 33
9890 Gavere
BELGIUM Europe**

www.vellemaninstruments.com

HPS40TD1.1