ROBIN
Robin Electronics Limited

Issue Date: 5 September 00

CALIBRATION INSTRUCTION

MODEL	**HVT5020**
DESCRIPTION	**High Voltage Insulation Tester**

Equipment Required	1. Wavetek: 9100: Multifunction Calibrator 2. Robin: 7028B: High Voltage Probe 3. Robin KTE**: HVT5020 Test Box 4. Robin: IR120: Infrared Adaptor 5. PC running Hyper Terminal
References	1. On screen guide

NOTES:

a) Hazardous voltages are present during calibration. Ensure that all correct precautions are taken.
b) Ensure that the HVT5020 battery is fully charged.
c) Adjustments may be made by using the PC keyboard or the tester keys.
d) The HVT5020 Accuracy Specification grid is attached.

PROCEDURE:

1 Connect the IR120 to the HVT5020 port and configure it for satisfactory communication. Run Hyper Terminal on the PC.

2. With the HVT5020 "↑ UP" and "↓ DOWN" keys depressed switch the HVT5020 on. The HVT5020 will enter calibration mode indicated by "Calibrate HVT" on the display.

   A Calibration Menu will appear on the PC screen.

3. Select the mode to be calibrated.

   4.1 <u>HV Output</u>

   a) Connect the 7028B to the HVT5020 + and – terminals.

   b) Press (PC) ↵ and adjust the display to indicate the same voltage as the measured value by pressing the (PC) U or D keys. (Ctrl U and Ctrl D will increase the adjustment increments).

   When the correct value is displayed press (PC) ↵.

   Both the 500V and 5 000V ranges are calibrated in the same way.

4.2 Leakage Current Measurement

a) Link the HVT5020 Guard and – terminals.

b) Set the 9100 output to 2.000 mA dc and connect the +ve to the HVT5020 – terminal and the –ve to the HVT5020 + terminal.

c) Press (PC) ↵.

d) Switch the 9100 output on and press (PC) ↵.

4.3 Charge Current Measurement

Connect the 9100 and calibrate the Charge Current measurement as for Leakage Current.

4.4 Battery Status

a) Connect the 9100 to the HVT5020 +ve to + and –ve to -. Apply 12.00V dc and press (PC) ↵.

VALIDATION:

Calibration adjustments have been satisfactorily completed when the HVT5020 outputs and indications are within the 70% of specification limits indicated on the attached page.

Authorised by: QA/CSS Manager

HVT5020 ACCURACY SPECIFICATION INSPECTION CRITERIA Ser.No:

INSULATION RESISTANCE		Applied Value	Tol +/-	Lo Limit	Hi Limit	Lo 70%	Hi 70%	Indicated Value
VOLTAGE RANGE	RESISTANCE RANGE	*Specification: +/- 5% rdg*						
500 V	200 kΩ	199.81 kΩ	9.99	189.82	9.99	192.82	206.80	
	500 kΩ	501.32 kΩ	25.07	476.25	25.07	483.77	518.87	
	1 GΩ	1.00 GΩ	0.05	0.95	1.05	0.97	1.04	
	100 GΩ	103.7 GΩ	20.74	82.96	124.44	89.18	118.22	
1000 V	1 MΩ	1.001 MΩ	0.05	0.95	1.05	0.97	1.04	
	1 GΩ	1.004 GΩ	0.05	0.95	1.05	0.97	1.04	
	200 GΩ	208.0 GΩ	41.60	166.40	249.60	178.88	237.12	
2500 V	2.5 MΩ	2.499 MΩ	0.12	2.37	2.62	2.41	2.59	
	1 GΩ	1.004 GΩ	0.05	0.95	1.05	0.97	1.04	
	500 GΩ	513.0 GΩ	102.60	410.40	615.60	441.18	584.82	
5000 V	5 MΩ	4.995 MΩ	0.25	4.75	5.24	4.82	5.17	
	1 GΩ	1.004 GΩ	0.05	0.95	1.05	0.97	1.04	
	1 TΩ	0.990 TΩ	0.20	0.79	1.19	0.85	1.13	

INSULATION VOLTAGE		Measured Value	Lo Limit	Hi Limit	Lo 70%	Hi 70%	Indicated Value
Voltage Range	Load Resistance	*Specification: - 0%/+10% rdg at 1mA load current*					
500	500 kΩ	V	500.0	550.0	500.0	535.0	
1000	1.00 MΩ	V	1000.0	1100.0	1000.0	1070.0	
2500	2.50 MΩ	V	2500.0	2750.0	2500.0	2675.0	
5000	5.00 MΩ	V	5000.0	5500.0	5000.0	5350.0	

1kV CAPACITANCE MEASUREMENT	Applied Value uF	Tol +/-	Lo Limit	Hi Limit	Lo 70%	Hi 70%	Indicated Value
Nominal Value	*Specification: +/- (15%+0.03uF) rdg*						
0.1uF	0.098	0.05	0.05	0.14	0.07	0.13	
1uF	1.010	0.15	0.86	1.16	0.91	1.12	

LIVE CIRCUIT WARNING	Applied Value V	Tol +/-	Lo Limit	Hi Limit	Lo 70%	Hi 70%	Indicated Value
Nominal Value	*Specification: +/- (5%+ 2V) rdg*						
30V @ 50Hz / dc	31.0	3.50	27.50	34.50	28.55	33.45	
220V @ 50Hz / 60Hz	220.0	13.00	207.00	233.00	210.90	229.10	
500V @ 50Hz	500.0	27.00	473.00	527.00	481.10	518.90	
1000V @ 50Hz	1000.0	52.00	948.00	1052.00	963.60	1036.40	

Equipment employed:

Authorised: Date:

5.5 Accuracy Test

Serial Number

Voltage	Test Box	HVT5020 Display		Maximum
500V	100 GΩ		86 GΩ	114 GΩ
500V	1 GΩ		0.96 GΩ	1.04 GΩ
500V	500 kΩ		483 kΩ	518 kΩ
500V	200 kΩ		193 kΩ	207 kΩ
1kV	200 GΩ		172 GΩ	228 GΩ
1kV	1 GΩ		0.96 GΩ	1.04 GΩ
1kV	1 MΩ		0.96 MΩ	1.04
2.5kV	500 GΩ		430 GΩ	570 GΩ
2.5kV	1 GΩ		0.96 GΩ	1.04 GΩ
2.5kV	2.5 MΩ		2.41 MΩ	2.59 MΩ
5kV	1 TΩ		0.86 TΩ	1.14 TΩ
5kV	1 GΩ		0.96 GΩ	1.04 GΩ
5kV	5 MΩ		4.82 MΩ	5.18 MΩ
500V	0.1uF		0.07uF	0.13uF
	1uF		0.87uF	1.12uF

5.6 Output Voltage Tests

Voltage	Load	Voltage Probe		
	500 kΩ		507V	543V
	No Load		507V	543V
1kV	1 MΩ		1015V	1085V
1kV	No Load		1015V	1085V
2.5kV	2.5 MΩ		2537V	2713V
			2537V	2713V
			5075V	5425V
			5075V	5425V

5.7 Short Circuit Current Test

5kV	Ammeter		1.20mA	1.8mA

5.8 Voltage Measurement Test

Live Circuit		HVT5020 Display		
-32v			29V	34V
240V ac			230V	250V

ISSUE	A	B	C	D	E	F	G	H	I	J
DATE	12/01/01	17/04/01	03/09/01							
C/NOTE	9087-01	9089-01	9092-01							

Robin HVT5000 Instrument Assembly Parts List

5144-00A 02/06/00 **Instrument Assembly**

REFERENCE	Quantity	DESCRIPTION	SUPPLIER	ORDER CODE
	1	Case Assembly		5145-00A
	1	Instrument Sub Assembly		5143-00A
Feet	4	Rubber feet	Richco	FF001
Screws for Feet	4	M5 x 20mm Button Head Hexagon (Black)		
	1	Lead set	Silvertronic	
	1	Battery Charger Lead		
	1	Mains Charger Lead		
	1	Irda Adaptor + Software + Cable		
	1	Warantee card		
	1	Calibration certificate		
	1	Serial Number Lable		
	1	Carry case		
	1	Handbook		

Robin HVT5000 Instrument Sub Assembly

5143-00A **02/06/00** **Instrument Sub-Assy**

REFERENCE	Quantity	DESCRIPTION	SUPPLIER	ORDER CODE
Push Buttons	7	Machined nylon rod		HVT007
Battery support bracket	1	PC/ABS injection moulding	Hoi Yip	HVT005
Screws for Battery	4	M3 x 12mm Pan Head		
Battery	1	12V 2.8 Ah YUASA Lead Acid	YUASA	NP2.8-12
Spacers	4·	18mm Hex Spacers		
Screws for PCB's	19	M3 x 12mm Pan Head		
Washers Shakeproof	19	M3 Shakeproof washers		
Washers Crinkle	3	M3 Crinkle Washers		
Mains inlet cable				5138-00A
DC charger cable				5139-00A
Invertor cable				5136-00A
Front Panel Assembly		Front Panel Assembly	BHA	5142-00A
PCB 1		Measurement PCB Assembly	BHA	3137-98B
PCB 2		Inverter PCB Assembly	BHA	3138-98B
PCB 2		Display PCB Assembly	BHA	3135-98D

5142-00A **02/06/00** **Front Panel Assy**

REFERENCE	Quantity	DESCRIPTION	SUPPLIER	ORDER CODE
Fascia	1	PC/ABS injection moulding	Hoi Yip	HVT003
Fascia Posts	4	PC/ABS injection moulding	Hoi Yip	HVT011
Terminal barrier	1	PC/ABS injection moulding	Hoi Yip	HVT004
Terminal barrier fixing	2	Custom Turning		
Display Lens + glue	1	Cast acrylic sheet	Instrument Plastics	HVT005
Irda Window + glue	1	Cast acrylic sheet	Instrument Plastics	HVT008
Ball Catch	2	Plug cover catch	Universal Fittings	CA11931
Front Panel Label	1	Reverse printed sheet plastic		
Terminal Label	1	Reverse printed sheet plastic		
IEC Inlet	1	Snap Fit IEC Inlet	Bulgin	PX0575/15/63
Fuse Holder	1	20mm x 5mm Fuse Holder	Bulgin	FX0359
Socket 1	1	4mm Shrouded Socket 24A (RED)	Multi Contact	23.3070-1
Socket 2	1	4mm Shrouded Socket 24A (BLACK)	Multi Contact	23.3070-1

5145-00A 02/06/00 **Case Assy.**

REFERENCE	Quantity	DESCRIPTION	SUPPLIER	ORDER CODE
Enclosure Lid	1	Roto moulded polyethylene	ARM Plastics	HVT001
Enclosure Base	1	Roto moulded polyethylene	ARM Plastics	HVT002
latches	2	Polypropylene injection moulding	Southco	07-11-201-12
latch striker plate	2	Polypropylene injection moulding	Southco	07-12-201-12
Screws for latches	8	M3 x 10mm Csk Head Hexagon (Black)		
Hinges	2	Polypropylene injection moulding	Southco	G6-5-1
Screws for Hinges	8	M4 x 10mm Button Head Hexagon (Black)		
		Packing		
		Case Label		

5098-97E

Name	Quantity	Value	Type / Package	Manufacturer
IC1,2,3,4	4	uPD7225 / G00	QFP-52	
IC5	1	ICM7555IBA	8PIN-SM	
IC6	1	HSDL-7001	SO-16	Hewlet Packard
IC7	1	HSDL-1001-014		Hewlet Packard
C1,2,3,4,7,12, 13,14,15	9	100n	X7R 0805	
C5,8,9,10,11	5	1n	X7R 0805	
C6	1	10n	X7R 0805	
C16,17	2	10u / 10V tantalum		
C18,19	2	15pF	NP0 0805	
R1,2,3,7	4	1K	5% 1/8W 0805	
R4,11	2	Zero Ohm Link	805	
R5	1	4K7	5% 1/8W 0805	
R6	1	10K	5% 1/8W 0805	
R8	1	10R	5% 1/8W 0805	
R9	1	100R	5% 1/8W 0805	
R10	1	10M	5% 1/8W 0805	
PCB	1	3135-98E		
XL1	1	3.6864MHz	HC49/4HSMX	
Display	1	2078-99A	Custom	Densitron
Bezel	1	2079-99A	Custom	Densitron
Elastomers	2	5mm x 110mm	LSO18	Densitron
CON1	1	5137-00A		

Robin 5kV Inverter PCB Parts List

5104-98D **07/06/00**

REFERENCE	Quantity	VALUE	DESCRIPTION	Manufacturer
IC1	1		74HC00N	Any
IC2	1		TLV2252 IP	Texas
IC3	1		UC3845AN	Unitrode
IC4	1		TOP224P	Power Integrations
IC5	1		TLP621	Any
IC6	1		4013BE	Any
IC7	1		TLP504A	Any
IC8	1		HP 2531	Any
FET1	1		IRF540	Any
FET2	1		RFP15P05	Any
FS1	1	3.15A	TR5 Fuse 3.15A (F)	Any - Wickmann 19370K
TR1	1		BC337	Any
T1	1		POL-12017 Transformer	Sequoia
TRANS1	1		Transformer 5 KV	To Drawing 2073-98A
Ferrite Core	2		Ferrite core (supplied)	
Clips	2		Clips (supplied)	
L1	1	3.3uH	3R3M2R9 Inductor	TDK
L2	1	30mH	3030R3 Choke	MURATA
R1,2,3,24,25,26, 27,30,32,35,57	11	33M	VR37	BC
R4	1	680K	1% .25W 50ppm Metal Film	
R5	1	4M7	1% .25W 50ppm Metal Film	
R6,7,8,13,14,18	6	47K	1% .25W 50ppm Metal Film	
R9,19	2	10K	1% .25W 50ppm Metal Film	
R10,21	2	100K	1% .25W 50ppm Metal Film	
R11	1	5K6	1% .25W 50ppm Metal Film	
R12,16	2	220K	1% .25W 50ppm Metal Film	
R15	1	160K	1% .25W 50ppm Metal Film	
R17,42,50,51,52,54	6	10K	1% .25W 50ppm Metal Film	
R20,34,40,41,55,56	6	1K	1% .25W 50ppm Metal Film	
R23,28,31,33,37,58	6	68K	1 W Carbon Film 1000V	
R29	1	10M	VR37	BC
R36	1	22R	1% .25W 50ppm Metal Film	
R38	1	3K3	1% .25W 50ppm Metal Film	
R39	1	220R	2.5 W Wire Wound	eg - BC components AC03
R43	1	0.22R	2.5 W Wire Wound	
R44	1	39R	1% .25W 50ppm Metal Film	
R45	1	150R	1% .25W 50ppm Metal Film	
R46	1	6R8	1% .25W 50ppm Metal Film	
R47	1	2K	1% .25W 50ppm Metal Film	
R48	1	4K7	1% .25W 50ppm Metal Film	
R53	1	3M	1% .25W 50ppm Metal Film	
R59-R72	14	15K	PRO 1 Metal oxide	BC
C1,6,7,8	4	0.22uF	Polyester Minibox	eg - BC 370 series, AVX BF s
C2,3	2	1000uF	25V Electrolytic low ESR	Dia 12.5mm, pitch 5mm
C4,25,32,35,39,41	6	0.1uF	Polyester Minibox	eg - BC 370 series, AVX BF s
C5	1	47nF	Polyester Minibox	eg - BC 370 series, AVX BF s
C9,22	2	10uF	Electrolytic 25V min.	Dia 5mm, 2mm pitch

Robin 5kV Inverter PCB Parts List

C10,11,20,33,36,40	6	10nF	Polyester Minibox	eg - BC 370 series, AVX BF s
C12,13,14,16,17, 18,19,21	8	47nF	1KV Polypropylene	Evox Rifa PHE428
C15	1	1nF	1KV Ceramic	7.5mm pitch
C23	1	1nF	Polyester Minibox	eg - BC 370 series, AVX BF s
C24A C24B	2	1uF	Polyester Minibox	eg - BC 370 series, AVX BF s
C26	1	0.1uF	250V AC Class X2	15mm pitch
C27	1	68uF	400V Electrolytic low ESR	Dia 22mm pitch 10mm
C28	1	1nF	250V AC Class Y	12.5mm pitch
C29	1	47uF	16V Electrolytic	Dia 5mm, 2mm pitch
C30	1	220uF	35V Electrolytic	Dia 10mm, pitch 5mm
C31,42	1	680uF	35V Electrolytic low ESR	Dia 12mm, pitch 5mm
C34	1	0.47uF	Polyester Minibox	eg - BC 370 series, AVX BF s
C37	1	22nF	Polyester Minibox	eg - BC 370 series, AVX BF s
C38	1	100pF	50V Ceramic	eg - BC components 683
D1,3,18	3		1N4148	
D2	1		11DQ04	
D4,5,6,7,8,9,10,11	8		BY8404	
D12,12A	2		1N5361	
D13,15	2		BA157	
D14,22	2		1N4002	
D16	1		BYT43J	
D17	1		1N5388	
D19	1		BZX55C13	
D20,21	2		31DQ04	
BR1	1		KBP205	
CONN1			Dubox 10W SIL	Berg 76384-410
CONN2	1		Maxi KK 3Way 0.2"	Molex 10-08-5031
RLY1,2,3,4,5	5		RTB14012	Schrack
Battery Cable	1		To Drawing	5140-00
HV output cable	1	130mm	HV silicone cable	
Earth Strap Cable	1		16 strand 0.2mm PVC	
PCB	1		3138-98D	
Total	**163**			

5105-98F

02/06/00

REFERENCE	Quantity	VALUE	DESCRIPTION	Manufacturer
IC1,14	2		MC78L05ACP	Any
IC2	1		LM339N	Any
IC3,7	2		LTC1050CN8	Linear Technology
IC4	1		MC79L05ACP	Any
IC5,6	2		LMC6082AIN	National
IC8	1		MC33181P	Motorola
IC9	1		AD820AN	Analogue Devices
IC10	1		74HC4052N	Any
IC11	1		MCP601 IP	Microchip
IC12	1		ULN2003A	Any
IC13	1		AD7705BN	Analogue Devices
IC15,18	2	*****	93C86 (IC18 Programmed)	Any Industrial Temp
	1	*****	8 Way IC socket for IC18	
IC16	1	****	PIC16C77-04 IP (Programmed)	Microchip
	1	****	40 Way IC socket for IC16	
IC17	1		ZREF25Z	Zetex
IC19	1		ICL7662CPA	Harris
IC20	1		MC33163P	Motorola
FET1,2	2		BUZ71A	Any
FET3	1		ZVN1306A	Any
TR1,2	2		BC547C	
R1,3,7,8	4	2M2	VR37	
R2,4,6,20,22, 23,24,26,32,34, 43,44,49,51,60	15	10K	1% .25W 50ppm Metal Film	
R5,61	2	1K	1% .25W 50ppm Metal Film	
R5A	1	43K	1% .25W 50ppm Metal Film	
R9,28	1	30K	1% .25W 50ppm Metal Film	
R9A	1	1K2	1% .25W 50ppm Metal Film	
R10,12	2	680R	1% .25W 50ppm Metal Film	
R11,17,36,	3	1M	1% .25W 50ppm Metal Film	
R13,45	2	100R	2.5W Wire Wound	BC components AC03
R14,15	2	100R	1% .25W 50ppm Metal Film	
R16,21	2	470R	1% .25W 50ppm Metal Film	
R18	1	10K var	11mm cermet trimmer	Bourns 3386X / Spectrol 63X
R19	1	4R7	1% .25W 50ppm Metal Film	
R25	1	33M	1% .25W 50ppm Metal Film	
R27	1	5K6	1% .25W 50ppm Metal Film	
R29,30	2	220K	1% .25W 50ppm Metal Film	
R31,41	2	39K	1% .25W 50ppm Metal Film	
R33,40	2	240K	1% .25W 50ppm Metal Film	
R35,46,47,50, 54,55,62,64,65	9	100K	1% .25W 50ppm Metal Film	
R37,38	2	360K	1% .25W 50ppm Metal Film	
R39	1	91K	1% .25W 50ppm Metal Film	
R42	1	13K	1% .25W 50ppm Metal Film	
R48	1	22K	1% .25W 50ppm Metal Film	
R57,58	2	47R	1% .25W 50ppm Metal Film	

Robin 5kV Measurement Board Parts List

R59	1	0R22	2.5W Wire Wound	
R63	1	0R	LINK	
C1,2,8,9,32,35 37	7	10u / 35V	Electrolytic	Dia 5mm, pitch 2mm
C3,4,5,10,11,12, 15,33,36,39,40	11	100n	Polyester Minibox	5mm pitch
C6	1	220p	Ceramic	5mm pitch
C7	1	2u2	Polypropylene 250V	BC 378 42225
C13,16,17,19, 20,21	6	470n	Polyester Minibox	5mm pitch
C14	1	1u	Polyester Minibox	5mm pitch
C18,23	2	220n	Polyester Minibox	5mm pitch
C22,30,31	3	100p	Ceramic	5mm pitch
C24,25,28,29 44,45,46,47	8	10n	Polyester Minibox	5mm pitch
C26,27	2	47p	Ceramic	5mm pitch
C38	1	470p	Ceramic	5mm pitch
C41,42	2	1000u / 25V	Electrolytic low ESR	Dia 12mm, pitch 5mm
D1,6,7,11	4		1N5400	Any
D2	1		1N4001	Any
D4,5,8,9	4		1N4148	Any
D10	1		BZX85C15	Any
D12	1		31DQ04	Any
	1	5V	Buzzer	Kingstate KPE-272A
XL1	1	3.6864MHz	XTAL	HC-18U
XL2	1	500KHz	CERAMIC RESONATOR	5mm pitch
CON1	1		16 Way DUAL IN LINE PINS	2 X 8 Gold Plated
CON2	1		Dubox 2W SIL	Berg 76384-402
CON3	1		Dubox 10W SIL	Berg 76384-410
SW2-8	7		SKHCAC	Alps
RLY1,2,3	3		G6E 134P	Omron
	3		Terminal Posts	Silvertronic 103165
CHOKE1	1	100uH	Inductor 2.6A	Pulse PE92102
Fuse	1	500mA	32mm 1000V fuse	SIBA
Fuse Clips	2		Fuse clip	pitch 7.5mm
Guard cable	2		200mm	
Guard crimps	2		3/16" spade	
Guard covers	2		3/16" spade	
PCB				

Robin 5kV Measurement Board Parts List

R57,58	2	47R	1% .25W 50ppm Metal Film	
R59	1	0R22	2.5W Wire Wound	
R63	1	0R	LINK	
C1,2,8,9,32,35 37	7	10u / 35V	Electrolytic	Dia 5mm, pitch 2mm
C3,4,5,10,11,12, 15,33,36,39,40	11	100n	Polyester Minibox	5mm pitch
C6	1	220p	Ceramic	5mm pitch
C7	1	2u2	Polypropylene 250V	BC 378 42225
C13,16,17,19, 20,21	6	470n	Polyester Minibox	5mm pitch
C14	1	1u	Polyester Minibox	5mm pitch
C18,23	2	220n	Polyester Minibox	5mm pitch
C22,30,31	3	100p	Ceramic	5mm pitch
C24,25,28,29 44,45,46,47	8	10n	Polyester Minibox	5mm pitch
C26,27	2	47p	Ceramic	5mm pitch
C38	1	470p	Ceramic	5mm pitch
C41,42	2	1000u / 25V	Electrolytic low ESR	Dia 12mm, pitch 5mm
D1,6,7,11	4		1N5400	Any
D2	1		1N4001	Any
D4,5,8,9	4		1N4148	Any
D10	1		BZX85C15	Any
D12	1		31DQ04	Any
	1	5V	Buzzer	Kingstate KPE-272A
XL1	1	3.6864MHz	XTAL	HC-18U
XL2	1	500KHz	CERAMIC RESONATOR	5mm pitch
CON1	1		16 Way DUAL IN LINE PINS	2 X 8 Gold Plated
CON2	1		Dubox 2W SIL	Berg 76384-402
CON3	1		Dubox 10W SIL	Berg 76384-410
SW2-8	7		SKHCAC	Alps
RLY1,2,3	3		G6E 134P	Omron
	3		Terminal Posts	Silvertronic 103165
CHOKE1	1	100uH	Inductor 2.6A	Pulse PE92102
Fuse	1	500mA	32mm 1000V fuse	SIBA
Fuse Clips	2		Fuse clip	pitch 7.5mm
Guard cable	2		200mm	
Guard crimps	2		3/16" spade	
Guard covers	2		3/16" spade	
PCB				