PeakTech®

HEINZ-GÜNTER LAU GMBH

Elektronik und Messtechnik

Kornkamp 32

DE-22926 Ahrensburg

Tel: +49-(0) 41 02 / 4 23 43 /44

Fax: +49-(0) 41 02 / 4 34 16

info@peaktech.de

www.peaktech.de

Heinz-Günter Lau GmbH · P. O. Box 1428 · DE-22904 Ahrensburg/Germany

Service-Anleitung

Modell: *PeakTech*® 4000

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Innovative Messtechnik
PeakTech®
Spitzentechnologie, die überzeugt

1. Examination of the duty of protective circuit
   Turn on the meter and press down the button for resistance, input 5V DC voltage at the voltage terminals, monitor the voltage at Q1, Q3, the emitters, gradually switch input voltage to 25V to see if the voltage at Q1, Q3 were clamped under 9V; switch the input voltage back to 5V and exchange the polarities of the input voltage, gradually switch the input voltage again to 25V to see if the voltage at Q1, Q3 were clamped under 9V. Should the voltage at Q1, Q3 becomes more than 9V, do not increase the voltage further and examine relative protective circuit.

2. Examination of the basic duties of the meter
   Having turned on the meter and set the meter at the tap position of AC voltage, press each of the buttons, and all the keys should make response or make sounds, with the sound of the buzzers being mellow and sonorous, and there should be correct displays on VFD for each of the testing tap positions, which are shown in the following table:

Table 1 Correct Displays on VFD for Each Testing Tap Position(Note: The minuses in the brackets are not necessarily shown)

Tap Positions	Display on VFD	Tap position	Display on VFD
AC Voltage	AC、AUTO、V、 VOLT	Capacitance⊣⊢	AUTO,nF, ⊣⊢
DC Voltage	DC、AUTO、V、VOLT、 (—)	Microampere μA	DC,AUTO, μA, AMP，(—)
Millivoltage	DC、AUTO、mV、VOLT、 (—)	Milliampere mA	DC,AUTO,mA, AMP，(—)
Logic frequency	AUTO、Hz、FREQ	Ampere A	DC,AUTO, A, AMP，(—)
Diode	V、⊣⊢		
Resistor	AUTO、MΩ、 OHM		

3. Put the meter under the status for adjustment

   Hold down the button for adjustment at the bottom of the meter and release it immediately after the meter is turned on so the meter can go into the status for adjustment. You can tell whether the meter is in the status for adjustment or not by seeing whether the meter goes into manual range (with MANUAL displayed on VFD) or auto range (with AUTO displayed on VFD). After the setup is completed, warm the meter up for ten minutes before adjusting it.

4. Modulations of Zeros
   Press～Hz button and the modulations of zeros will progress automatically under the control of the program in the meter. However, make sure to begin modulations of zeros after the display on VFD becomes stable, or the zero might drift after modulation. Modulations of zeros must be done for each range of each tap position. Short circuit or open circuit is needed at the input ends, depending on different tap positions. Although it might take longer time for you to wait for stabilization of the display on VFD for AC voltage or electric current, stabilization of the display is a must before zero modulation; otherwise, inaccurate zero is expected. To reduce the time spent on waiting for stabilization, it is advisable to modulate more than one meter's zero in a modulation. Table 2 shows the status of display you have to wait for , ranges and the connection at the input ends for modulation.

5. Modulations of the ranges of the meter.
   Zero modulation must be done before the modulations of the ranges. It is necessary to input different standard signals or connect standard components (such as resistors or capacitors) for modulations of ranges, depending on different tap positions and ranges. Then, wait for the stabilization of the displays before pressing HOLD button to begin the modulations automatically with the software. In case that OL is shown on the VFD after the standard signal is input, press HOLD button and wait for the stabilization of the display, Press the HOLD button again and display of the meter shall be basically equal to the standard signals (with discrepancy not more than 2 digits). Should big discrepancy occur, press the HOLD button so that the display becomes basically equal to the standard signals. Table 3 shows the status of display you have to wait for , the value of the standard signals and the connection at the input ends for modulation. As high frequency compensation capacitors have influence on the measurement of the capacitance, the modulation of capacitance should be done after the modulation of high frequency. For modulation of range 50MΩ, first connect the standard resistor of 40MΩ to expect E on VFD, replace the resistor of 40MΩ with a 20MΩ one, press HOLD button again.

Table 2: Modulations of Zeros for P 4000

Tap Position	Status（by pressing Select button）	Range (by pressing Range button)	Connection at the Input Ends	Modulation Method
AC Voltage (ACV)	N/A	5V	Establish short circuit between the terminal of V Ω Hz and that of COM	Press~Hz button
		50V		
		500V		
		1000V		
DC Voltage (DCV)	DC	5V	Establish short circuit between the terminal of V Ω Hz and that of COM	Press~Hz button
		50V		
		500V		
		1000V		
	AC	5V		
		50V		
		500V		
		1000V		
Millivolt (mV)	DC	50mV	Establish short circuit between the terminal of V Ω Hz and that of COM	Press~Hz button
		500 mV		
	AC	50 mV		
		500 mV		
Logic Frequency (Hz)				
Diode ( )	N/A	N/A	Establish short circuit between the terminal of V Ω Hz and that of COM	Press~Hz button
Resistance(Ω)	N/A	500 Ω	Establish short circuit between the terminal of V Ω Hz and that of COM	Press~Hz button
		5K Ω		
		50K Ω		
		500K Ω		
		5M Ω		
		50M Ω		
Capacitance( )	N/A	50nF	Switch of f all the input ends	Press~Hz button
		500nF		
		5 μ F		
		50 μ F		
		500 μ F		
		5000 μ F		
Microampere(μ A)	DC	500 μ A	Establish short circuit between the terminal of μ A/mA and that of COM	Press~Hz button
		5000 μ A		
	AC	500 μ A		
		5000 μ A		
Milliampere (mA)	DC	50mA	Establish short circuit between the terminal of μ A/mA and that of COM	Press~Hz button
		500mA		
	AC	50mA		
		500mA		
Ampere(A)	DC	5A	Establish short circuit between the terminal of A and that of COM	Press~Hz button
		10A		
	AC	5A		
		10A		

Table 3 Modulations of the Ranges of P 4000

Tap Position	Status（by pressing Select button）	Range (by pressing Range button)	Rated signals or values	Connection at Input Ends	Modulation Methods
AC Voltage (ACV)	N/A	5V	~4V/60Hz	Terminal of V Ω Hz And Terminal of COM	按 HOLD 键
		50V	~40V/60Hz		
		500V	~400V/60Hz		
		1000V	~800V/60Hz		
DC Voltage (DCV)	DC	5V	+4V	With terminal of V Ω Hz connected with positive signal and terminal of COM connected with negative signal	
		50V	+40V		
		500V	+400V		
		1000V	+800V		
	AC	5V	~4V/60Hz		
		50V	~40V/60Hz		
		500V	~400V/60Hz		
		1000V	~800V/60Hz		
Millivolt (mV)	DC	50mV	+40mV		
		500 mV	+400mV		
	AC	50 mV	~40mV/60Hz		
		500 mV	~400mV/60Hz		
Logic Frequency ⎍Hz)					
Diode (→ ⊢	N/A	N/A	+1.5V	With terminal of V Ω Hz connected with positive signal and terminal of COM connected with negative signal	
Resistance(Ω)	N/A	500 Ω	400 Ω	Terminal of V Ω Hz And Terminal of COM	
		5K Ω	4K Ω		
		50K Ω	40K Ω		
		500K Ω	400K Ω		
		5M Ω	4M Ω		
		50M Ω	40M Ω /20M Ω		
Capacitar ⊣⊢)	N/A	50nF	40nF	With terminal of V Ω Hz connected with the positive o capacitor and terminal of COM connected with negative of capacitor.	
		500nF	400nF		
		5 μF	4 μF		
		50 μF	40 μF		
		500 μF	400 μF		
		5000 μF	1000 μF		
Microampere(μA)	DC	500 μA	+400 μA	With uA/mA connected with positive signal and COM connected with negative signal	
		5000 μA	+4000 μA		
	AC	500 μA	~400 μA/60Hz		
		5000 μA	~4000 μA 60Hz		
Milliampere (mA)	DC	50mA	+40mA		
		500mA	+400mA		
	AC	50mA	~40mA/60Hz		
		500mA	~400mA/60Hz		
Ampere(A)	DC	5A	+4A	With Terminal A connected with positive signal and COM connected with negative signal	
		10A	+8A		
	AC	5A	~4A/60Hz		
		10A	~8A/60Hz		

6. High frequency modulations

Modulations of high frequencies shall be done when the meter is working(non modulating status).Only the high frequencies at AC voltage position needs modulating and those at other tap position are ensured by the circuit. Compensatory capacitors for high frequencies- C4,C5,C6,C7- have been built in the circuit and positions for four testing capacitors- C4' ,C5', C6', C7'- have also been preset. The compensatory capacitances corresponding to the ranges at AC voltage position are shown in the following Table 4

Table 4 AC Ranges and Corresponding Compensatory Capacitors

Range	5v	50v	500V	1000V
Compensatory Capacitor	C4,C4'	C5 ,C5'	C6,C6'	C7,C7'

Signals of different frequencies are needed for high frequency modulations and the value of each testing signal for each range at each frequency shall be ten percent of the full range. The testing signals and permissible errors are shown in the following Table 5.

Table 5 High Frequency Performances of the Ranges of AC Voltage

Range	Testing Signals		Errors	Ranges	Testing Signals		Precision
5V	~0.5V ~5V	1KHz	±0.4%	500V	~50V ~500V	1KHz	±0.4%
		10KHz	±0.8%		~50V ~300V	10KHz	±0.8%
		20KHz	±1.2%				
50V	~5V ~50V	1KHz	±0.4%	1000V	~100V ~1000V	1KHz	±0.4%
		10KHz	±0.8%				
		20KHz	±1.2%				

In case that positive errors (the displayed values are bigger than the input signals) occurs when modulating 10KHz or 20KHz and the precisions approximate or reach what is prescribed in the table, increase the value of the testing capacitors corresponding to the range. In case that negative errors (the displayed values are smaller than the input signals) occurs when modulating 10KHz or 20KHz and the precisions approximate or reach what is prescribed in the table, decrease the value of the testing capacitors corresponding to the range. In modulation, signals for 20KHz modulations shall be firstly input, as performance at 10KHz and1KHz will likely be satisfactory if 20KHz has been satisfactory.

7. Modulations of Capacitances

Modulations of capacitances shall be done after the modulations of high frequency compensation. It is necessary to put the meter under modulating status for the capacitance modulation. Refer to Section 5 and Table 3 for modulations of capacitances at different ranges

8. Initialization of the Memory

Under modulating status, press the button **Δ REL** , and in about 2 seconds, MEM will display on VFD, which means 30 sectors have been allotted , that is, the initialization has been completed. Switch off the meter and restart it , then press MEM button and the screen information at the time is supposed to be stored in Memory 1. Press **VIEW ∇** button to return to Memory 1, and what has been stored is supposed to display.

9. Examination of the measurement of logic frequency and duty cycle

Press **⎍Hz** button, input logic square wave with amplitude of 2.5V from **VΩHz** terminal and **COM** terminal, with the COM terminal connected with low potential and the **VΩHz** connected with high one. Switch the frequency of the square wave from5 KHz to 2 KHz. Should the display on VFD be in excessive error, replace the 4MHz crystal beside U1.

Press SELECT button to show the duty cycle on the 2nd display, change the duty cycle of the square signal and the display on the VFD is supposed to change.

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10. Examination of the Measurement of Linear Frequency
    1. Choose ACV tap position, with the range set at 5V, input 500mV/200KHz signal from **VΩHz** terminal and COM terminal, press ～Hz button, and it is supposed that there be correct frequency shown on the 2nd display, with error as ±3(±0.006%±2). Reduce the frequency to 10 Hz (with amplitude unchanged), it is supposed that there be correct frequency shown on the meter (finally cut off the signal output).
    2. Choose mV tap position, input 4mV/200KHz signal from **VΩHz** terminal and COM terminal, press ～Hz button, and it is supposed that there be correct frequency shown on the 2nd display, with error as ±3（±0.006%±2）. Reduce the frequency to 10 Hz (with amplitude unchanged), it is supposed that there be correct value of frequency shown on the meter (finally cut off the signal output).
    3. Choose μA tap position, input 40μA/10KHz signal from **VΩHz** terminal and COM terminal, press ～Hz button, and it is supposed that there be correct frequency shown on the 2nd display, with error as ±3（±0.006%±2）. Reduce the frequency to 10 Hz (with ampere amplitude unchanged), it is supposed that there be correct value of frequency shown on the meter (finally cut off the signal output).
    4.

    Note: Examine such components as R41 and C21 should there is no frequency value shown.

11. Examination of RS232C, the infrared socket.
    Insert the infrared plug on the RS232-C cable into the meter, with another end of the cable connected to the computer. Execute the receiving program on the computer a RS-232C OLD button for 2 seconds and release to allow the meter to send data to the computer, with on VFD appearing. The RS-232C vn on the computer display should be the same as what is shown on VFD of the meter. Press HOLD button for another 2 seconds and release to stop sending signals to the computer, with RS-232C disappearing, the data on the computer will no longer change. Should the connection between the meter and the computer can not be realized, replace the cable and the infrared plug for retry. S RS-232C etry fail, examine components such as R50、R51、Q7、D10 and their connections.

12. Examination of alarm for current tap position
    Insert meter cable into μA/mA socket, and the buzzer will sound if the meter is not set at μA position or mA position. Insert meter cable into A socket, and the buzzer will sound if the meter is not set at A position.

13. Keep record of each step of the modulation for omission and the following Table 6 is for the record.

Table 6 Record of P 4000 Modulation

Number	Protection	Ac V	DcV		mV	Diode	Cap	uA	mA	Amp	高频	频率	
Buttons			-5V	~5V	-50 mV	Zero Modulation	500Ω	50n	-500 μA	-50 mA	-5A	~5V	ACV
							5k	500n					
Buzzer			-50 V	~50 V	-500 mV		50k	5μ	-5000 μA	-500 mA	-10A	~50 V	mV
VFD	Sockets		-500 V	~500 V	~50 mV	Modulations	500k	50μ	~500 μA	~50 mA	~5A	~500 V	mA
							5M	500μ					⊔Hz
	Alarm		-1000 V	~1000 V	~500 mV		50M	5000μ	~5000 μA	~500 mA	~10A	~1000 V	⎍ %

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NJM062M

U12
ULN2803A

U2
HD64738024

U1
FS9704

U6
AD737

U4
REF43

NJM062M
U5

U3

U8
93LC76

U10

U9

U7
NJM062M

U11A

U11 LM293

MAX6120

Note: is Signal Grand, is Data Grand.

V
Hz
Cap
Ohm
Diode
Com
mA/ uA
10A

Title	P 4000 Sheet1		
Size A3	Number 1		Revision v2.0
Date: 2005-12-16		Sheet of	
File:		Drawn By:	

VFD DISPLAY PANEL (BACK VIEW)

U13
uPD16311

-31.5v
C42A
22uF/50V
U13
51Pin
0V
C44
0.1uF
C43
22uF/25V
+5V
CJ2
L2a

U13
51Pin
CJ1
L2b

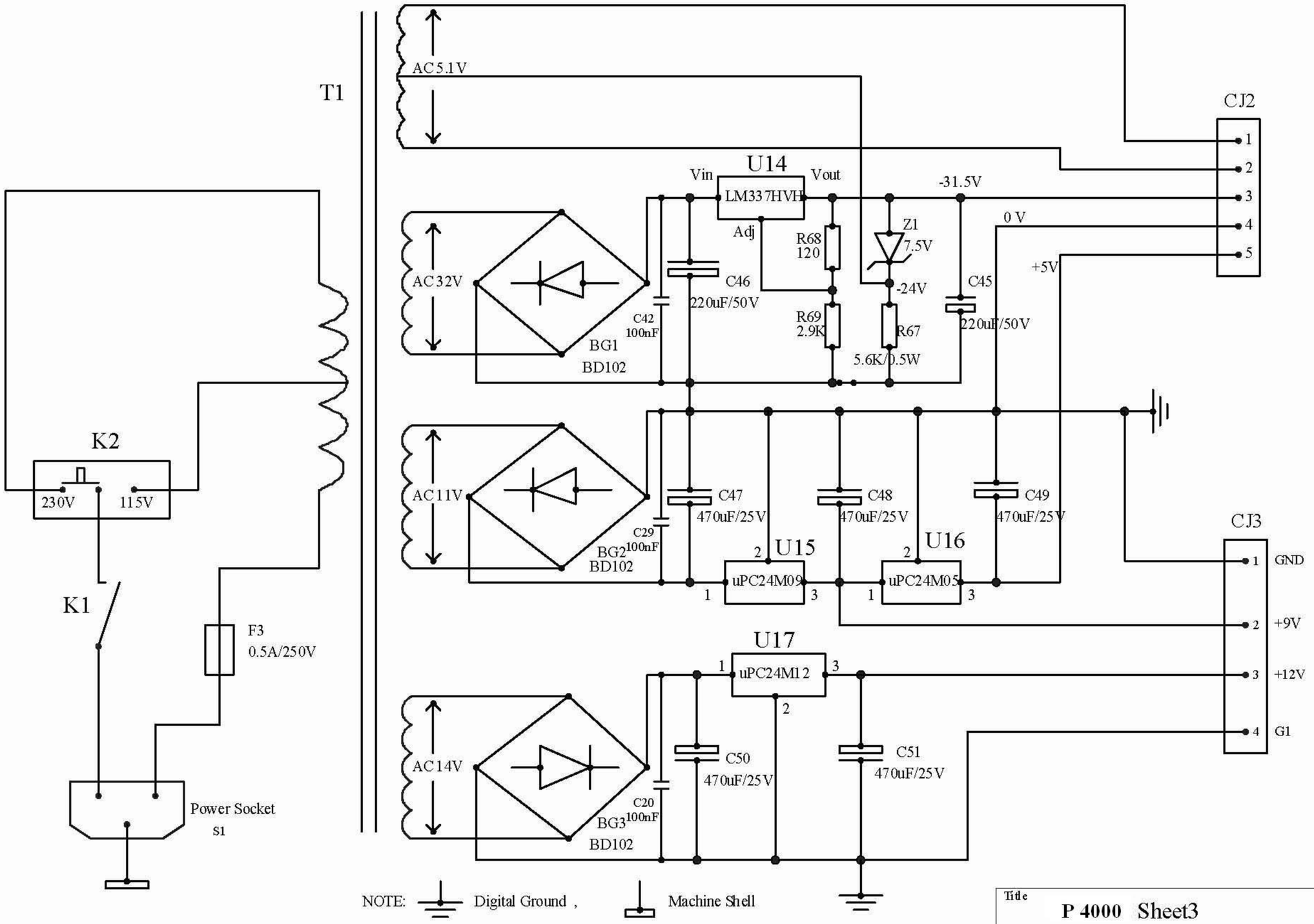
R60 56K
R61 10K
R62 10K

Bot17:ViewUp	Bot18:ViewDon	Bot19:ClrMem	Bot20:Hold
Bot13:Max/Min	Bot14: Rel	Bot15: ~Hz	Bot16:Save
Bot9: mA	Bot10: Amp	Bot11: Range	Bot12:Select
Bot5: Diode	Bot6: Ohm	Bot7: Cap	Bot8:uA
Bot1: ACV	Bot2: DCV	Bot3: mV	Bot4:Pul-Hz

D12 D13 D14 D15 D16
1N4148 * 5

C44A C44B C44C C44D
4700pF 4700pF 4700pF 4700pF
R63 10K R64 10K R65 10K R66 10K

Title: P 4000 Sheet2		
Size: A4	Number: 2	Revision:
Date: 2005-12-16		Sheet of
File:		Drawn By:



Title	P 4000 Sheet3		
Size A4	Number 3		Revision
Date: 2005-12-16		Sheet of	
File:		Drawn By:	