COMPUTERIZED POWER SUPPLY COMPONENT SELECTION

*Let your computer choose
your power-supply components.*

Jack Cunkelman

■As critical as a power supply may be, it seems to be the last thing to be considered. Only after a project is working, using the bench supply, do we think about the power supply and how we are going to fit it into the enclosure. This is where this program comes into play. It will make component selection faster and easier.

A power supply can consist of a battery or a transformer/rectifier assembly to power it from 120 volt AC sources. The linear type of power supply seems to be the most popular transformer/rectifier combination and that is what we will deal with here.

There are only a few ways to obtain DC power from AC sources using linear power supplys. One of the following three circuits are used by most experimenters: full wave bridge, full wave-center tapped, and full wave bridge -center tapped. We will limit ourselves to these three circuits.

Once the program is running there are two options available, output to the screen or output to a printer. The printer output will generate a list of component rating values for various power supply voltages and configurations.

The screen option treats the transformer as the variable element. Plugging in the values from those transformers in your "junk box" will enable you to quickly determine if they can be used or not. The screen display also deals with current ratings. A 0 entry, when a question is asked will return you to the menu. A 0 entry on the menu will stop the program.

All ratings are conservative for cool running, reliable operation. If you cannot find components with the exact rating, always step up to the next highest rated component available.

FULL WAVE BRIDGE CAPACITOR INPUT FILTER			
TRANSFORMER VOLTAGE (RMS)	DC VOLTS	DIODE PIV	CAPACITOR VOLTAGE
5	6	12	7
6	8	16	10
7	9	18	11
8	10	20	13
9	12	24	15
10	13	26	16
11	14	28	18
12	16	32	20
13	17	34	22
14	18	36	23
15	20	40	26
16	21	42	27
17	22	44	28
18	24	48	31
19	25	50	32
20	26	52	33
21	28	56	36
22	29	58	37
23	30	60	39
24	32	64	41
25	33	66	42
26	34	68	44
27	36	72	46
28	37	74	48
29	38	76	49
30	40	80	52
31	41	82	53
32	43	86	55
33	44	88	57
34	45	90	58
35	47	94	61
36	48	96	62
37	49	98	63
38	51	102	66
39	52	104	67
40	53	106	68
41	55	110	71
42	56	112	72
43	57	114	74
44	59	118	76
45	60	120	78
46	61	122	79
47	63	126	81
48	64	128	83
49	65	130	84
50	67	134	87
51	68	136	88
52	69	138	89
53	71	142	92
54	72	144	93
55	73	146	94

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10 CLS
20 REM POWER SUPPLY SPECIFICATION PR
OGRAM
30 REM BY JACK CUNKELMAN
40 REM JUNE 1985
50 INPUT "DO YOU WANT SCREEN DISPLAY
 (S) OR PRINTER OUTPUT (P)";D$
60 IF D$="S" THEN 80
70 IF D$="P" THEN 500
75 PRINT "INPUT ERROR" : GOTO 50
80 CLS
85 PRINT"POWER SUPPLY TYPE"
90 PRINT"    FULL WAVE BRIDGE (1)"
100 PRINT"    FULL WAVE CENTER TAP (
2)"
110 PRINT"    FULL WAVE BRIDGE CENTE
R TAP (3)"
120 PRINT" ALL USING CAPACITOR INPUT
 FILTERING"
130 INPUT" SELECT TYPE 1 , 2 , 3 OR
0 TO QUIT";T
135 IF T=0 THEN END
140 ON T GOTO 1000,2000,3000
150 GOTO 80
500 CLS
510 PRINT "THE PRINTER OPTION PRINTS
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      A TABLE OF VALUES FOR VARIOUS
             TRANSFORMERS"
520 PRINT "TYPE OF CIRCUIT:"
530 PRINT"     FULL WAVE BRIDGE (1)"
540 PRINT"     FULL WAVE CENTER TAP (
2)"
550 PRINT"     FULL WAVE BRIDGE CENTE
R TAP (3)"
560 PRINT" ALL USING CAPACITOR INPUT
 FILTERING"
570 INPUT" SELECT TYPE 1 , 2 , 3  OR
 0 TO QUIT";T
580 IF T=0 THEN END
590 ON T GOTO 1500,2500,3500
1000 CLS
1010 PRINT"FULL WAVE BRIDGE , CAPACI
TOR INPUT FILTER"
1020 INPUT"TRANSFORMER RMS VOLTAGE";
V
1025 IF V=0 THEN 80
1030 INPUT"TRANSFORMER CURRENT RATIN
G (AMPS)";C
1040 RV=INT((V*.95*1.414)+.04)
1050 DV=INT(2*RV)
1060 CV=INT(1.3*RV)
1070 OC = INT(C/1.8*10)
1080 GOSUB 5000

1090 PRINT V;TAB(21)RV;TAB(31)DV;TAB
(41)CV;TAB(52)OC/10
1100 GOTO 1010
1500 CLS
1510 INPUT"MINIMUM TRANSFORMER VOLTA
GE";M
1522 T$="FULL WAVE BRIDGE"
1524 GOSUB 6000
1530 FOR V = M TO M+50
1540 RV=INT((V*.95*1.414)+.04)
1550 DV=INT(2*RV)
1560 CV=INT(1.3*RV)
1580 LPRINT TAB(8)V;TAB(20)RV;TAB(31
)DV;TAB(41)CV
1590 NEXT V
1600 GOTO 500
2000 CLS
2010 PRINT"FULL WAVE CENTER TAPPED ,
 CAPACITOR INPUT FILTER"
2020 INPUT"TRANSFORMER RMS VOLTAGE (
ENTIRE SECONDARY)";V
2025 IF V=0 THEN 80
2030 INPUT"TRANSFORMER CURRENT RATIN
G (AMPS)";C
2040 RV=INT((V*.95*1.414)+.04)/2
2050 DV=INT(4*RV)
2060 CV=INT(1.3*RV)
2070 DV=INT(4*RV)
2075 OC=INT(C/1.2*10)
2080 GOSUB 5000
2090 PRINT V;TAB(21)RV;TAB(31)DV;TAB
(41)CV;TAB(52)OC/10
2110 GOTO 2010
2500 CLS
2510 INPUT"MINIMUN TRANSFORMER VOLTA
GE (ENTIRE SECONDARY)";M
2520 T$="FULL WAVE CENTER TAP"
2524 GOSUB 6000
2530 FOR V = M TO M+50
2540 RV=INT((V*.95*1.414)+.04)/2
2550 DV=INT(4*RV)
2560 CV=INT(1.3*RV)
2580 LPRINT TAB(8)V;TAB(20)RV;TAB(31
)DV;TAB(41)CV
2590 NEXT V
2600 GOTO 500
3000 CLS
3010 PRINT "FULL WAVE BRIDGE CENTER
TAP,CAPACITOR INPUT FILTER"
3020 INPUT"TRANSFORMER RMS VOLTAGE (
ENTIRE SECONDARY)";V
3025 IF V=0 THEN 80
3030 INPUT "TRANSFORMER CURRENT RATI
NG (AMPS)";C
3040 RV =INT((V*.95*1.414)+.04)/2
3050 DV = INT(4*RV)
3060 CV =INT(1.3*RV)
3070 OC =INT((C/1.8)/2*10)
3080 GOSUB 5000
3090 PRINTV;TAB(18)"+/-"RV;TAB(31)DV
;TAB(41)CV;TAB(49)"+/-"OC/10
3100 GOTO 3010
3500 CLS
3510 INPUT"MINIMUM TRANSFORMER VOLTA
GE (ENTIRE SECONDARY)";M
3520 T$="FULL WAVE BRIDGE CENTER TAP
"
3525 GOSUB 6000
3530 FOR V = M TO M+50
3540 RV = INT((V*.95*1.414)+.04)/2
3550 DV = INT(4*RV)
3560 CV = INT(1.3*RV)
3580 LPRINT TAB(8)V;TAB(19)"+/-"RV;T
AB(31)DV;TAB(41)CV
3590 NEXT V
3600 GOTO 500
5000 PRINT"TRANSFORMER";TAB(20)" DC
";TAB(30)"DIODE";TAB(40)"CAPACITOR";
TAB(52)  " DC  "
5010 PRINT"VOLTAGE(RMS)";TAB(20)"VOL
TS";TAB(30)" PIV ";TAB(40)"VOLTAGE";
TAB(51)   "CURRENT(AMPS)"
5020 RETURN
6000 LPRINT:LPRINT:LPRINT
6005 LPRINT TAB(20) T$
6010   LPRINT TAB(20)"CAPACITOR INPUT
   FILTER"
6015 LPRINT
6020   LPRINTTAB(5)"TRANSFORMER";TAB(
20)" DC ";TAB(30)"DIODE"TAB(40)"CAPA
CITOR"
6030   LPRINTTAB(5)"VOLTAGE(RMS)";TAB
(20)"VOLTS";TAB(30)" PIV ";TAB(40)"V
OLTAGE"
6035 LPRINT
6040 RETURN
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The biggest variable seems to be the transformer and how it is rated. I have always been within 10% of the desired output value using the transformer's published ratings.◄◎►