Logic DM101 Electronic
Reverse engineered "to fix mine" by;
Kelvin Unsworth
21st October 2006

Note: Some component values may be wrong due to colour fade.

This is how I think the circuit works. There are NO guarantees. Part numbers/values and circuit connections could be wrong. Use at your own risk.

240 VAC enters via a 100ma anti surge fuse (not shown on scematic) then passes through a 100 ohm resistor. There is then an anti surge varistor to prevent mains spikes. The 240 VAC is then recified and filtered with two 22uF electrolytic capacitors giving approx' +150 and -150 VDC with a 0V in between.
On the -150VDC side the -ve voltage is supplied to the -ve out put transistors Q5 and Q6. It also supplies a 15k wire wound resistor that feeds on to two 7.5v zenner diodes. These make the -15v supply rail.
On the +150VDC side the +ve voltage is supplied to the +ve out put transistors Q3 and Q4. It also supplies a 15k wire wound resistor that feeds the LED circuitry. Current will flow through either Q1 or LED1 depending on the state of the two flip flops in IC2. If the 45RPM button has been pressed then out puts QA (IC2a) and QB(IC2b) will be on (at +15v) and D1 and D2 will not conduct and Q1 will turn off. The current will then flow through LED1 lighting it. I either QA or QB are off then Q1 will be turned on and there will not be enough voltage across LED1 to light it. The current flow will continue through to Q2.
Current will flow through either Q2 or LED2 depending on the state of the two flip flops in IC2. If the 33RPM button has been pressed then out puts NOTQA (IC2a) and QB(IC2b) will be on (at +15v) and D3 and D4 will not conduct and Q2 will turn off. The current will then flow through LED2 lighting it. I either NOTQA or QB are off then Q2 will be turned on and there will not be enough voltage across LED2 to light it.

QB = turn motor on
QA = 45RPM
NOTQA = 33RPM

Pressing SW3 (45RPM button) puts 15v onto the set input of flip flop a and b latching QA and QB on via D9 and D8.
Pressing SW1 (33RPM button) puts 15v onto the set input of flip flop b via D7 and reset flipflop b latching NOTQA and QB on.
Pressing SW2 resets flipflop b turning QB off.

The current flowing via Q1/LED1 Q2/LED2 feeds through to two 7.5 v zenner diodes making the +15v supply.

The flipflip a out put QA is used to operate three solid state switches in DG308ACJ these short out R29,R30,R26 and R25 in the oscilator circuit changing it's frequency from 50 Hz (33RPM) to 67.5 Hz (45RPM)
Flipflop b out put QB is used to switch the oscilator out put from IC3b into the drive opamp IC1.

The DG308ACJ ic is only shown as the four solid state switches on the scematic.

IC3a/b is an LF353N my CAD program did not have this IC so it is shown as an LM348N.

The LF353N is the 50/67.5 Hz oscilator which to me looks like it gives out a clipped sawtooth wave form. ZD9 and ZD10 appear to limit the output to + - 6v.

Q9 seems to pull the solid state switches off when the 45RPM button is pressed ?!!

The output from the oscilator is feed to the 741 opamp which will amplify the signal and feed it into a 1k resistor R16. This signal does not go any further. The only way I can see that this circuit works is via the supplies to the 741. Q7 and Q8 form two regulator circuits for the 741 supply. Looking at Q7, +150v is fed to Q4 and Q3 this is tapped off via D5 and R12 to bias the base. This base signal is also fed via ZD7 a 75V zenner to Q7. Q7s base is at +15 v thus giving 15v from its emmitter supplying the 741 +ve rail. When the 741s out put swings high it draws current form the +ve rail this takes current from Q7 and all the way back to the biasing resistor thus drawing current from the base and reducing the out put from Q3/Q4. Q5/Q6 and Q8 will work the same but on the negative side. Thus Q3/Q4 give the +ve half of the output and Q5/Q6 give the -ve.

R8,R9,R10 and R11 appear to limit the current through Q3-Q6. Why the out put transistors are doubled up I don't know.

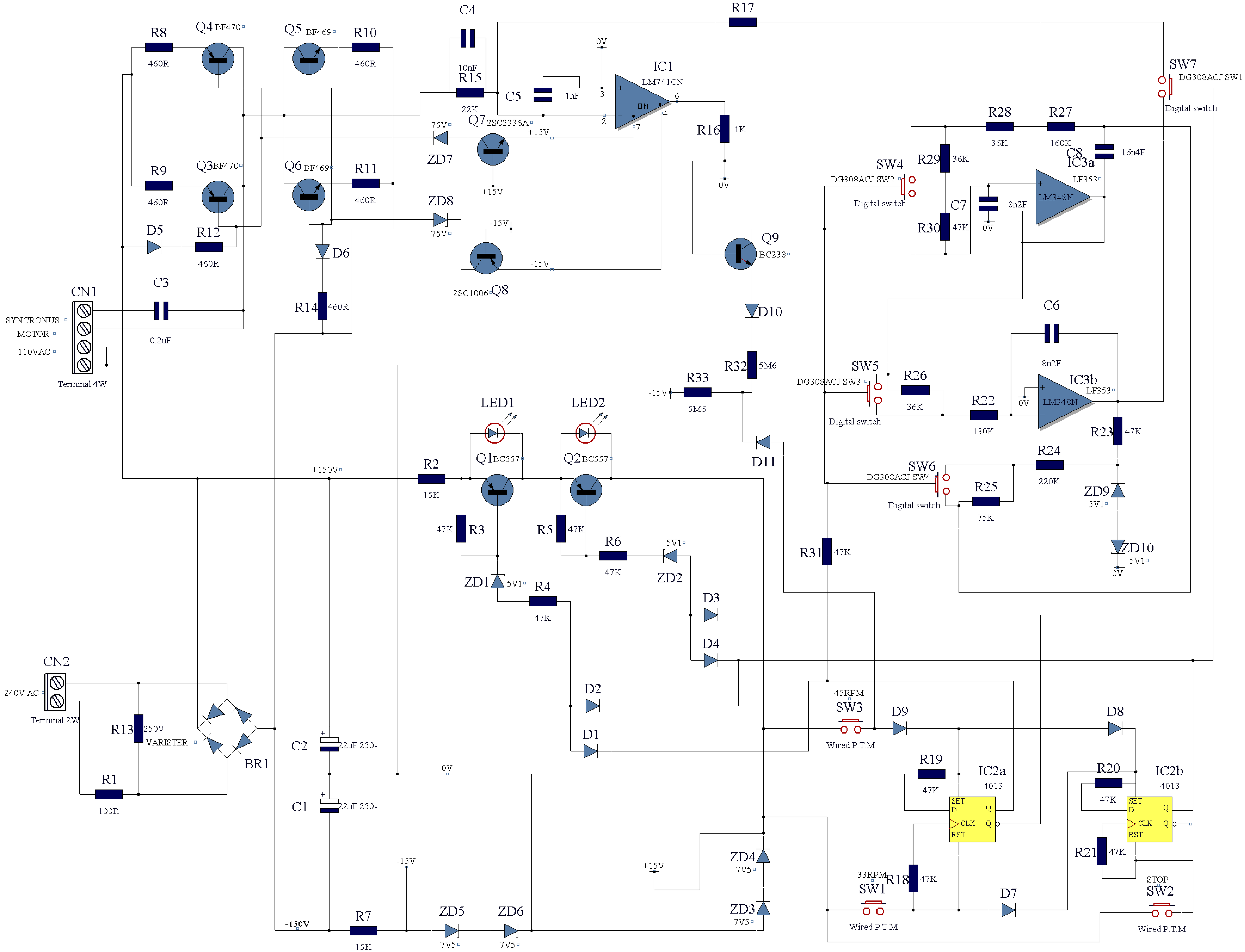
The part numbers for Q5,Q6 and Q8 are calculated. The parts are not marked. Q9 is marked ~238 I assume BC238.

C3 is to alter the phase of the out put to one of the motor coils to ensure it goes the right way.

C4 and R15 form a feed back loop to the 741. I do not know the value of R17 but I guess some where between 10k and 50k.

The motor looks very similar to Radio Spares (rswww.com) stock no 441-0423. 110vac-50Hz C 0.22uF 250RPM 117vac-60Hz C 0.18uF 300RPM 1.8W 18mA 24 pole.

http://www.mclennan.co.uk/datasheets/european/synchronousdata/990411131813.pdf


R17
C4
R8
Q4 BF470
Q5 BF469
R10
460R
460R
10nF
R15
22K
C5
1nF
0V
IC1
LM741CN
ON
R16
1K
0V
SW7
DG308ACJ SW1
Digital switch
R28
R27
36K
160K
C8
16n4F
IC3a
LF353
LM348N
SW4
DG308ACJ SW2
Digital switch
R29
36K
C7
8n2F
R30
47K
0V
Q7 2SC2336A
75V
+15V
ZD7
+15V
R9
Q3 BF470
Q6 BF469
R11
460R
460R
D5
R12
460R
ZD8
75V
-15V
-15V
Q8 2SC1006
D6
Q9
BC238
D10
CN1
C3
SYNCRONUS
MOTOR
110VAC
0.2uF
Terminal 4W
R14
460R
C6
8n2F
R32
5M6
R33
-15V
5M6
SW5
DG308ACJ SW3
Digital switch
R26
36K
R22
130K
IC3b
LF353
LM348N
0V
R23
47K
LED1
LED2
Q1 BC557
Q2 BC557
D11
+150V
R2
15K
R24
220K
SW6
DG308ACJ SW4
Digital switch
R25
75K
ZD9
5V1
47K
R3
R5
47K
R6
47K
5V1
ZD2
R31
47K
ZD10
5V1
0V
ZD1
5V1
R4
47K
D3
D4
CN2
240V AC
Terminal 2W
R13
250V
VARISTER
BR1
D2
D1
45RPM
SW3
Wired P.T.M
D9
D8
C2
22uF 250v
R19
47K
IC2a
4013
SET
D
CLK
RST
Q
R20
47K
IC2b
4013
SET
D
CLK
RST
Q
R1
100R
0V
C1
22uF 250v
-15V
+15V
ZD4
7V5
R21
47K
33RPM
SW1
R18
47K
Wired P.T.M
D7
STOP
SW2
Wired P.T.M
-150V
R7
15K
ZD5
7V5
ZD6
7V5
ZD3
7V5