

One of the disadvantages of the circuit illustrated in Figure 9, is the use of P Channel power FETS. P Channel power FETS are at a disadvantage when compared to N Channel power FETS. P Channel FETS have a much higher on-resistance, are harder to get and more expensive than N Channel FETS. High on-resistances reduce switching speed and absorb power which lowers efficiency and reliability. A more efficient power FET circuit utilizes identical N Channel power FETS in a push-pull configuration. In order to achieve this, an external supply must be developed for driving the gate of the upper N Channel power FET above the motor power supply voltage. A complete working circuit utilizing Siemens BUZ73 power FETS operating a 150 Volt 3 phase brushless DC motor is depicted in Figures 10 and 11. Figure 10 illustrates the power supply used for generating the upper N Channel gate drive. The 555 oscillator provides a square wave which is AC coupled to a diode network that is referenced to 150 Volts by the upper IN4004.

The lower 1N4004 rectifies the 12 Volt peak-to-peak square wave producing approximately 162 Volts DC at point G. This becomes the gate drive of the upper N Channel power transistor. Figure 11 illustrates the driver circuit. A high output on Pin 2 turns on Q1 and Q2 driving the gate of the upper N Channel FET to 162 Volts.

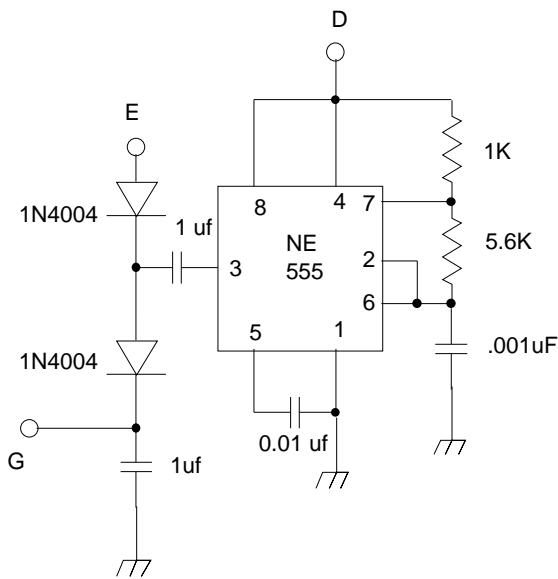
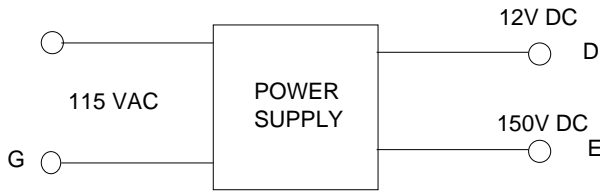


FIGURE 10
VOLTAGE ADDER CIRCUIT FOR ALL
N-CHANNEL POWER STAGE MOTOR DRIVER

The source of this FET will then rise to the motor supply of 150 Volts. The 16 Volt Zener Diode protects the gate to source junction during the rise time. When the output at Pin 2 returns to zero, Q1 and Q2 will turn off causing the gate to source capacitance of the upper N Channel FET to be discharged rapidly through Q3. A high output on Pin 6 is buffered by two parallel inverters of a CD4050 for charging the gate capacitance of the lower BUZ73 N Channel power FET. A low output on Pin 6 causes the gate capacitance to discharge rapidly. This circuit is extremely efficient since significant current only flows during the switching times.

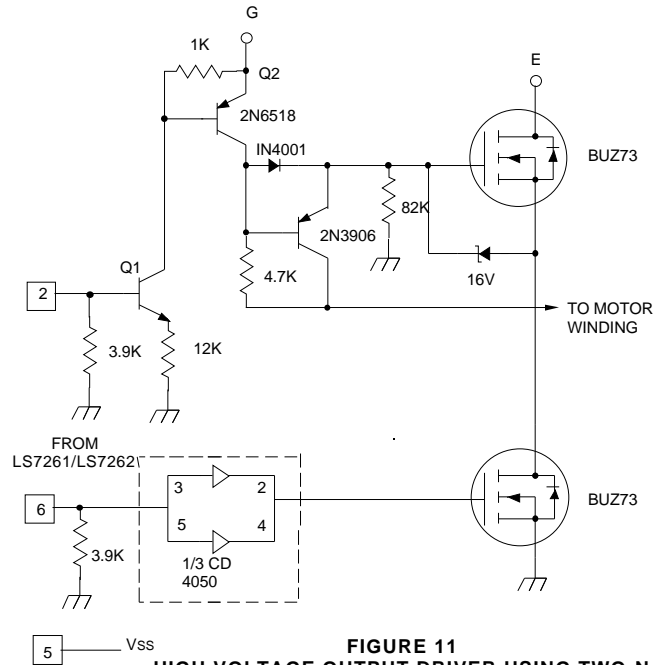


FIGURE 11
HIGH VOLTAGE OUTPUT DRIVER USING TWO-N
CHANNEL POWER FETS

EMULATOR

LSI COMPUTER SYSTEMS, INC. has developed an LS7263/LS7264 emulator for optimizing the circuit programmability for any 3 or 4 phase brushless DC motor. If none of the four different types of 3 phase speed controllers or the one type of four phase speed controller available from LSI COMPUTER SYSTEMS, INC. will exactly match specific motor requirements, then a new circuit can be programmed accordingly. The emulator has 15 thumbwheel switches for adjusting the output power transfer curve and switches for selection of sensor separation, 4 or 8 pole motors and tachometer division. The emulator provides all the interfacing circuitry found in the integrated circuit and is readily available.

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