Several people have asked me just how our servo's work, servo torque, and of course which brand/type is the best to buy. I guess I could explain how a servo works but doubt if anyone would understand my drivel so when I found the following article in the Spring 2003 issue of High Flight magazine I thought this might be the explanation you are looking for. CB

SERVOS…

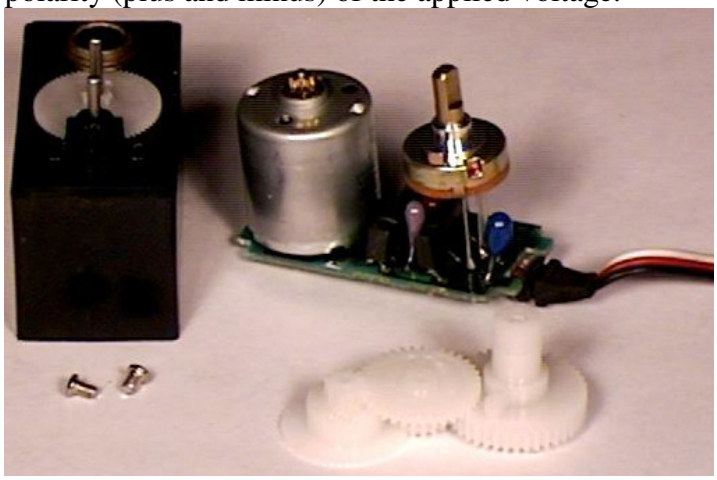
MINIATURE MARVELS OF POWER AND PRECISION

By Eloy Marez

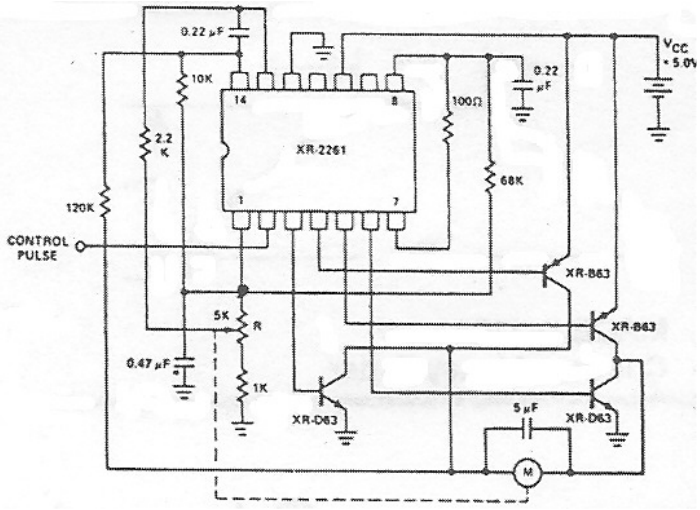
SERVOS! - not a new subject, not for me or for a lot of other R/C media writers. Yet, servos are the second most asked about or discussed subject in my mail and phone calls. The number one? Right, it is batteries! Anyway, while not a new subject to most of us, they are to the newcomers, which thankfully are with us every week. And too, I find that many more experienced R/C'ers who have previously accepted their R/C equipment only as a necessary evil sometimes develop more of an interest in knowing more about what makes it tick! Or fly, in this case.

Anyway, let us clear up some of the mystery of these most useful R/C devices. In the process, we will also hit on some of the new developments you've read and are probably wondering about.

The working part of the servo is the motor itself, a DC (Direct Current) motor. The basics of a DC motor are that they are rated for maximum voltage, the applied voltage will determine their operating speed and thus the torque they will produce, and that the direction of rotation can be reversed by reversing the polarity (plus and minus) of the applied voltage.



In other words, if you connect a battery to a DC motor, it is going to run. How fast it will run will depend on the number of cells in the battery; its direction of rotation will depend on how you connect the red and black wires! (Wires on the "motor" not the red/black/white wire going into the electronics of the servo.)



Simple! Basic! All the magic of the R/C servo is incorporated in the amplifier, (electronics) probably the most sophisticated and complex part of the entire R/C system. But first, one more point about that DC motor. Since the early days of the type of equipment in use today, we have used four NiCad cells (4.8 volts) for the airborne receiver and servo power. In the last few years, since the popularity of large airplanes came along, many have taken to using five cells (6.0 volts) for airborne system power. The receiver doesn't seem to care, it is operating on "internally" regulated (3.2 to 3.5 volts) anyway. However, the servos will be noticeably faster, and by the only method we have of estimating their torque, that of holding the output while it is operated, they seem to develop more power

Speed and power in a servo is good, and the maker's estimate for such is a twenty percent increase in going from 4.8 to 6.0 volt batteries. However, there is a down side to that - in electronics more than in most other things, it is definite that one doesn't get something for nothing. First, there is a twenty percent increase in the current drain of a servo, with a similar reduction in flying time available from a given battery capacity. Secondly, and there are no figures for this, a higher applied voltage and increased speed will most definitely reduce a motor's life. What we do not know, no data being available - at least to me - is if this is a significant amount, or if it merely lowers the expected life from a million hours down to 800,000 hours. Hopefully, in time we will get enough feedback from those who use or have used the same servo with both voltages and will have some idea of the expected results.

In reading the servo ads, you will run across reference to three-and five-pole, and to coreless motors. Say what? Well, first of all, there are many - dozens or maybe even hundreds, of types of motors in the world.