BONNER TRANSMITE SERVO SCHEMATIC

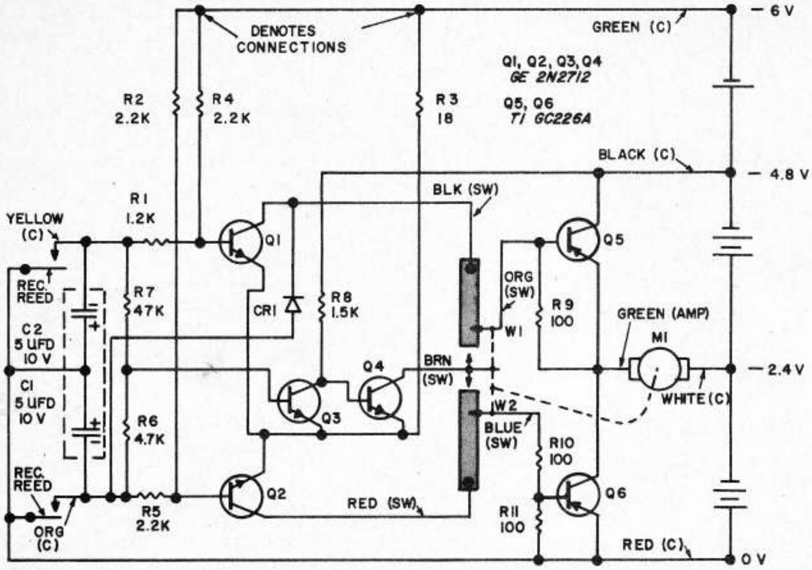


FIGURE I. ***SCHEMATIC***

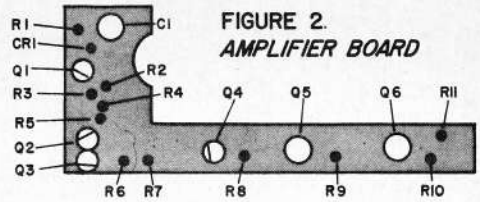


FIGURE 2. ***AMPLIFIER BOARD***

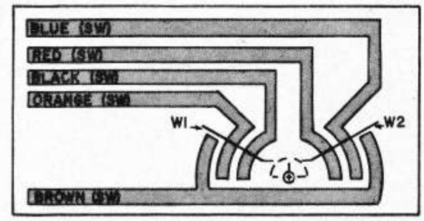


FIGURE 3. ***SWITCHING BOARD***

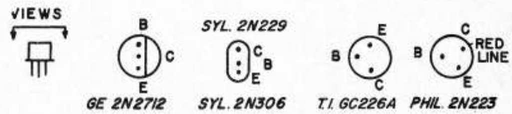


FIGURE 4. ***TRANSISTOR IDENTITY***

The Bonner Transmite — the inside story of this popular servo.

it this tip has a 1″ slit in the silk which scooped water and must have shipped a gallon!!

Another aggravation which had its effect was a badly-warped-down-elevator-effect in the stab. However, though we didn't make a successful R.O.W., we both learned a bit more about sea planes that day. It was generally agreed that if the Gypsy had a slightly larger engine and a kick-up elevator we would have been able to taxi nose high until the model could have become aerodynamically "bouyant" enough to escape its watery runway.

One thing I wasn't aware of until this soggy affair ended was that "trusted" aide Dale was actually using my poor old water-soaked sailplane as a training ground for the weekend when he'd have his finally-finished-Jenny-On-Floats ready for its own watery amphi-session! So who needs enemies?!!

For those interested, his Jenny is full-house with a .56 for thrust and the large sized (28″) GeeBee floats for bouyancy. When he returns from the sea with his ship I'll try to get some photos of what's left and record them here.

The July issue of "Carrier Wave", the excellent club clarion of the McDonnell R/C Model Airplane Club doings (St. Louis, Mo.) contained an extremely well detailed x-ray look at what makes a Bonner Transmite servo "tick."

In view of the vast number of these servos in operation, we felt that passing along the observations of Bill Campbell is not only timely, but should be the type of material you'll feel compelled to refer back to, from time to time, regardless of whether you're just moving into the advanced art of Multi or are there now and are beginning to ask yourself questions.

. . . So, with thanks to Bill, we present his account verbatim. Accompanying drawings of the circuitry and mechanics will help to clarify each step as you follow along. Those who find electronic jargon somewhat like Venusian Sandscrit may get some relief by biting on a length of old zinc pipe! Anyway —

"An important link in the resonant reed bank multi system in use is the servo amplifier. The amplifier receives an average of 3 ma of pulsed DC current from a reed and must amplify this signal to over 1 ampere as required by a starting, or stalled, servo motor. The amplifier is necessary because the resonant reed cannot handle the required 1 ampere motor current for any length of time before it would become pitted or even welded inoperative.

Prior to 1961, the most commonly used amplifier was a SPDT (single pole-double throw) relay. In 1961 Bonner introduced his Transmite servo amplifier which replaced the relay type amplifier with solid state circuitry which has proven to be much more reliable, vibration resistant, and trouble free. A slight cost increase, less space required, and nearly the same overall weight of the control system is also noted.

Figure 1, schematic, shows the electronic interconnections of the components which make up the Transmite amplifier. Electrical connections are shown by conspicuous dots. Wires are color coded as they appear in the Transmite servo. A (C) by the color code means the wire is found in the cable exiting through the grommet at the motor end of the servo. An (SW) means the wire is attached to the switcher board located inside the cover of the servo. An (AMP) means the wire ties to the "L" shaped amplifier board from the component shown.

Figure 2, amplifier board, shows the approximate component location as viewed from the component side of the amplifier board.

(Continued on page 42)

FROM THE GROUND UP

(Continued from page 37)

Figure 3, switching board, shows the arrangement of the printed circuit switches and the spring finger wipers (W1 & W2) which comprise the travel limit switches and neutral return switches required by the amplifier. The wipers are mechanically tied together, but are electrically isolated. See the quadrant output gear in the Transmite for details.

Figure 4, transistor identity, shows the lead location of various transistors which have been used in the Transmite amplifiers since their introduction. All transistors are viewed as though you are looking at the top of the transistor case with the leads extending down and away from you.

Figures 1, 2 & 3 were developed from a 1963 manufactured Transmite and uses the transistors called out in figure 1.

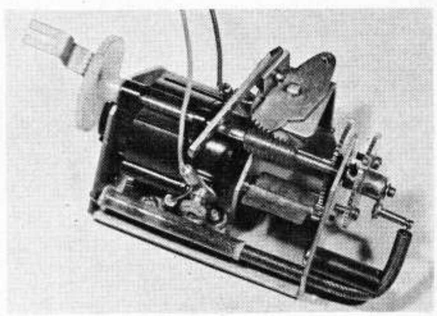
Earlier Transmites used either the Sylvania 2N306 or 2N229 in place of the 2N2712 and used the Philco 2N223 in place of the TIGC226A. They did not contain CR1, this 'prevents damage in case both input reeds are closed at the same time diode, or R10. R3 was 47 ohms and a 2.2K resistor was tied between 0 volts and the junction of the emitters of Q1, Q2, Q3 & &4. R1 was 2.2K and C1 and C2 were two separate capacitors housed individually instead of being in a common case.

TRANSMITE AMPLIFIER CIRCUIT OPERATION

DC pulses, when received on the yellow signal wire from a resonant reed, are filtered by C2 & R1 for Q1; and by C2 and R7 for Q3. DC pulses, when received on the orange signal wire, are filtered by C1 & R5 for Q2 and by C1 & R6 for Q3. Q3 conducts when either the yellow or orange wire is carrying a signal and cuts off neutralizing transistor Q4. Q4 is normally turned on (no signal) and supplies base current (approx. 50 ma) to either Q5 or Q6 to neutralize the servo when no signal is coming in on the yellow or orange signal wires. Q1 amplifies the filtered 3 ma signals which arrive on the yellow signal wire and supplies approximately 50 ma to the base of motor power transistor Q5 which in turn supplies up to 1 ampere to the motor. Q2 amplifies the filtered 3ma signals which arrive on the orange signal wire and supplies approximately 50 ma to the base of motor power transistor Q6 which in turn supplies up to 1 ampere to the motor. Of course the direction of motor rotation depends upon whether Q5 or Q6 is conducting. R2 and R4 bias Q1 and Q2 off when no signals are incoming on the yellow or orange signal wires. R3 limits the current which Q1, Q2, Q3 & Q4 carry and also helps R1, R2, R4, R5, R6 & R7 to keep Q1, Q2 & Q3 cut off at higher temperatures, since any leakage current passing through R3 increases the reverse bias on Q1, Q2 & Q3. R8 is the load resistor for Q3. R9 & R11 bias Q5 & Q6 off during neutral conditions and are especially helpful at higher temperatures. R10 limits Q6 base current. "So observes Bill Campbell of the "hows" and 'whys" a Bonner Transmite servo does what it does when you command.

. . . sorry — you can let off on the pipe now!

Our thanks to Walt Watkins of Eatontown, N.J. for not only letting us in on his pulse servo experimentations, but also sending the unit so we could see it first hand. I tried to shoot it in the best manner to give you a good look-see, too.



Walt is a relative newcomer to Galloping Ghost, but is having much success in this area of control. His actuator is novel in that the rudder-elevator torque arm swings 180 degrees before it begins to engage any spring tension. Walt seems to feel that this cuts down the possibility of an unwanted complete cycle when effecting up elevator (slow pulse rate). True, there is a possibility of full-cycle servos, such as the Go-Ac, going completely through a revolution if your pulse box slow rate (for UP) is set too low. Walt's arrangement doesn't prevent this — but does initiate a

(Continued on page 54)