RCM PRODUCT REPORT:

DEE BEE QUADRUPLEX CL5

LAST October RCM reviewed the Quadruplex 21, now DeeBee is in production of a new generation of Quadruplex, the all new CL5. We had anticipated that the new CL5 might be a rework or modification of the earlier Model 21 system which had proven consistent in both performance and reliability. Obviously this would be the easiest route for any manufacturer to take. It is possible to add feedback servos to the 21, in fact a feedback adaption to the 21 is available. The new CL5 system, as received, is a completely new system, resembling its predecessors in outward appearance, although considerably smaller and more refined. Inside there is no resemblance to the earlier systems except for the high quality workmanship.

General Description

The DeeBee Quadruplex CL5 is a quadruple simultaneous fully proportional feedback radio control system. The total airborne weight is approximately 25 ounces including the superhet receiver, servos and nickel cadmium power supply. As with the 21, the CL5 is completely prewired. Three independent servos are mounted on an epoxy glass mounting board which also contains the aileron servo plug, battery connector, on-off switch, and a jack for auxiliary function. This auxiliary control is even more ideally suited for electric brakes with no other servo required. The receiver is connected to the servo board by means of a connector allowing for easier installation. The board mounting of servos makes installation extremely easy, the board simply being screwed directly to the servo rails. The receiver is foam packed ahead of the servo board. The pre-wiring and cabling provides installation flexibility and eliminates installation error. All plugs are polarized and each is of a different type, making errors in connection virtually impossible.

The Quadruplex CL5 provides independent proportional control of rudder, aileron, elevator and throttle plus an auxiliary control for brakes, flaps, etc., and a pre-program control for extra up-elevator for use in spins. The receiver and transmitter are housed in an attractive maroon anodized case.

Transmitter

Four simultaneously transmitted tones are employed in the CL5. There is no pulse or commutation of the tone, eliminating the need for filter or memory networks in the receiver. The transmitter consists of three general sections – RF, modulator and the four tone generators. Since there is no need to pulse or commutate the tones, the number of components used in the transmitter has been greatly reduced. In fact, only eight transistors are used in the transmitter. The transmitter power supply consists of ten 1.2A. nickel cadmium cells, giving a total on-time of ten hours from full charge.

The quadruplex CL5 transmitter is a completely transistorized, single stick model with the throttle on the top rear corner of the case. All controls are trimmable, with rudder and aileron on the front of the transmitter and elevator on the top where it may be controlled with the left hand during flight. A dual purpose meter is located on the front of the transmitter for a constant check of RF output and a push button test of battery condition. The charge jack is located on the front of the transmitter. The overall transmitter size is 8⅝" x 7" x 3¼". The familiar long screw-on antenna used on previous DeeBee systems has again been used on the CL5 transmitter. In our opinion, this antenna is a little awkward, due to its extreme collapsed length, however, this could easily be replaced. The convenient handle which has always been a part of Quadruplex transmitters has somehow been omitted on the CL5.

Receiver

The superheterodyne receiver utilized in the airborne system is a two deck completely transistorized unit with no relays. The upper printed circuit board is the superhet front end. The lower deck contains four Schwab detectors, designed by Carl Schwab of Huntington Station, New York. It is these four Schwab detectors that separate the four simultaneous tones as received from the transmitter and direct them to the proper servos. Monitoring of the tones from the transmitter and an oscilloscope trace of the transmitter output leaves us somewhat amazed at how these Schwab detectors operate. Each Schwab detector creates a tone in the receiver thereby creating four tones in the receiver, one for each function. These tones, as generated, are servo neutral. The neutral tones from the transmitter are matched to these receiver tones. The receiver locks on to the transmitter tone, and any slight variation from the transmitter will cause the receiver to follow. The receiver and transmitter act very much like magnets in that the receiver almost attracts the transmitter tones. With any

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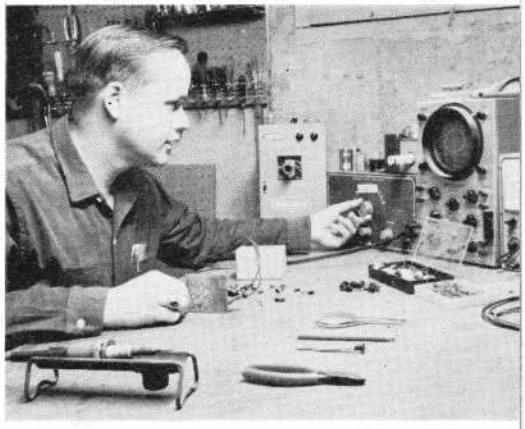

Above: Several young ladies hard at work at the Dee Bee assembly line.

Above right: Dee Bee's design engineer, Carl Schwab. Carl is also the designer of the Schwab Audio Detector used in the new Quadruplex CL5.

Right: The ever-popular Dee Bee 21 Systems awaiting tune-up prior to shipment.

Below: Don Brown supervises a Dee Bee technician.

Below right: Don Brown at his bench.

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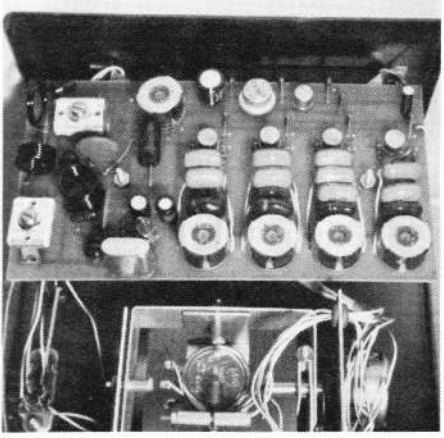

incoming signal from the transmitter, the signal output to the servo is constant with no degrading of control with extreme distance. With any loss of transmitter the receiver will return to its own neutral.

Power Supply

The power supply consists of four 1.2A. nickel cadmium cells with a total idle time of 10 hours, and at least 6 hours safe flying time.

Servos

The servos employed in the CL5 system are manufactured by Accutronics Engineering for DeeBee. These are the same servos reviewed in the January RCM with minor changes in the amplifier circuitry. These servos are relatively compact, each measuring only 1 1/16" x 1¼" x 2⅞" including mounting flanges. The output of the servo is of the wheel type which is quite easy to adapt for different mounting positions or direction of throw. The servos are housed in a rugged metal case and are designed for ease of servicing. The rudder, elevator and throttle servos are mounted on an epoxy glass board measuring 2¾" x 6", and mounting on the same center lines as the 21 board. This board also contains all needed connectors. It is our feeling that this arrangement is quite flexible. In rare cases where extreme compactness or other configuration is needed, the servos could be removed from the board and wired together using a printed circuit board or similar junction.

Price and Availability

The DeeBee Quadruplex CL5 system retails for $579.00 including charger and is available through R/C dealers and distributors.

RCM Findings

Bench tests showed the CL5 to be exceptionally interference free. Transmitters, both proportional and reed, on identical frequencies had no effect on

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the CL5. Full control was maintained under all conditions. This is due primarily to the receiver design and its ability to separate independent tones and recognize only those four with which it is concerned, rejecting all others. Servo resolution is extremely good with no deadband. Servo response is immediate and positive, with plenty of power. Response time is extremely fast. Range checks were consistently over 1500 feet with the transmitter antenna collapsed, giving an antenna extended flying range well beyond visibility.

The system employs temperature tracking. This means that the receiver and transmitter will track each other with any change in temperature, so long as both are at reasonably equal temperatures, thereby eliminating any neutral shift with temperature variation. This is accomplished by using identical LC components in both the receiver and the transmitter. The receiver and transmitter are completely stable over the entire flying temperature range. Tests show that a difference of temperature between receiver and transmitter in excess of 30 degrees F will cause a very slight control shift.

Flight tests of the CL5 showed the system to be quite responsive with very positive neutrals. At no time was loss of control or a fail safe condition noticed. During one flight the transmitter antenna was collapsed and the ship flown beyond a normal flying area. Again no loss of control or reduction in control was noticed! Following bench test operations, other transmitters were turned on during flying on the same frequency, at no time was interference in evidence. During flight the transmitter was purposely turned off. The ship responded instantaneously by proceeding to neutral control and low throttle.

Something new on the CL5 is the addition of a new machined control stick. This stick, replacing the older knob, makes single stick control much more positive, as it allows the flyer to rest his hand on the transmitter case holding the stick as he would a pencil, giving very precise fingertip control.

The design of the transmitter allows the elevator trim and motor control knobs to be interchanged making the transmitter comfortable even for a left handed flyer.

At all times the CL5 performed as well or better than the manufacturer had indicated. It is our general feeling that the new CL5 system may well prove even more reliable than its '21' predecessor, inasmuch as there are no relays, no tubes, and generally fewer components than these earlier models.