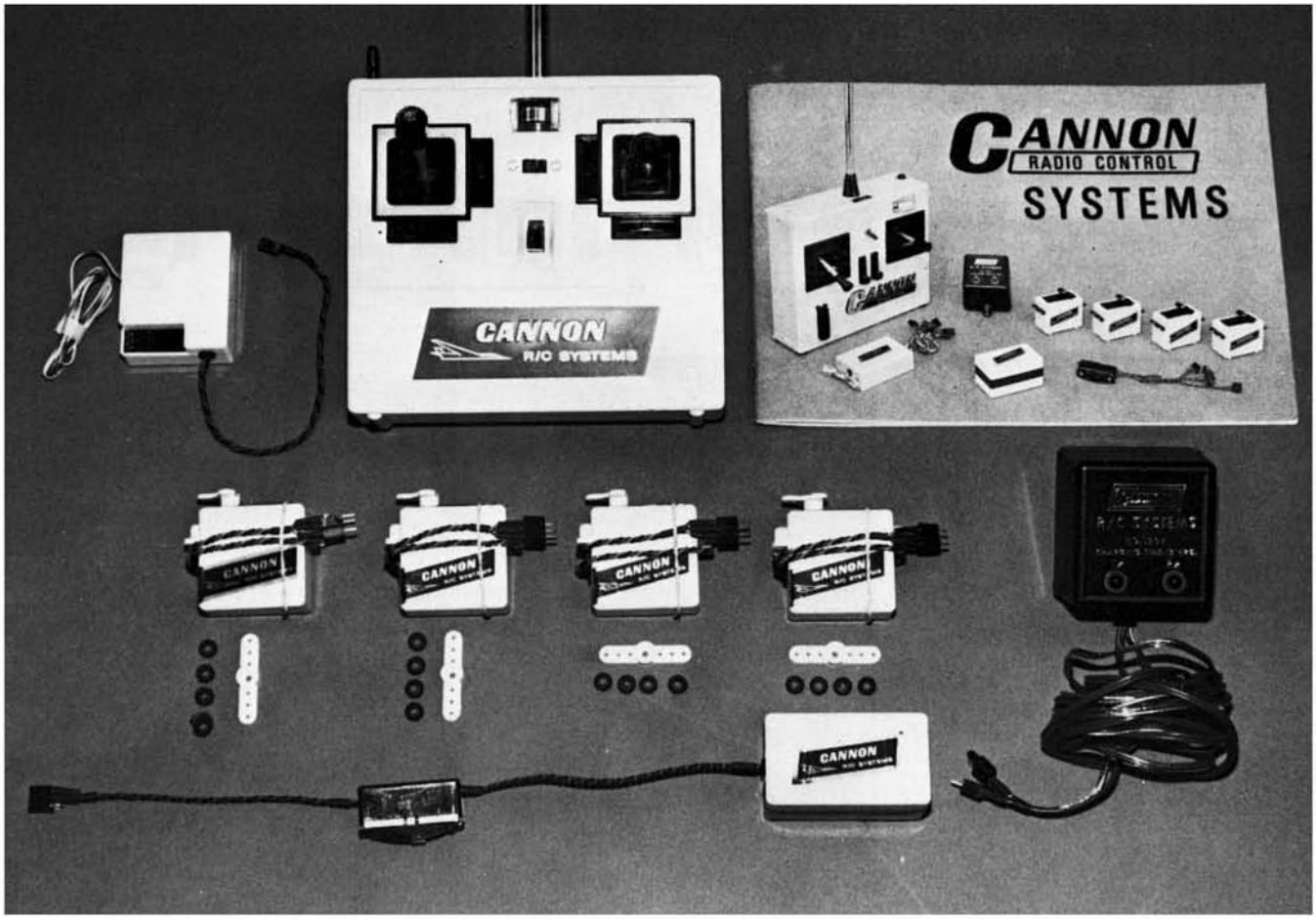


PHOTOGRAPHY: BOB ABERLE

An FM Product Review:

Cannon Electronic's Mini-Sport R/C System

Cannon's interesting new "economy" system still offers many options. Dry batteries or rechargeable, sub-miniature servos and 100 mah battery packs. It can be upgraded later from two channels to five. It's also offered in kit form/**Bob Aberle**

The name Cannon Electronics has been associated in recent years with very small, compact radio equipment. Back in 1976 Bill Cannon introduced his Super-Mini system with an airborne weight of only 5.0 ounces (with four servos). That particular system was reviewed in the January 1977 issue of FLYING MODELS. I'm sure Bill would like the R/C flyer to know that he also offers a complete line of equipment including his full size custom built Grand-Prix series. series.

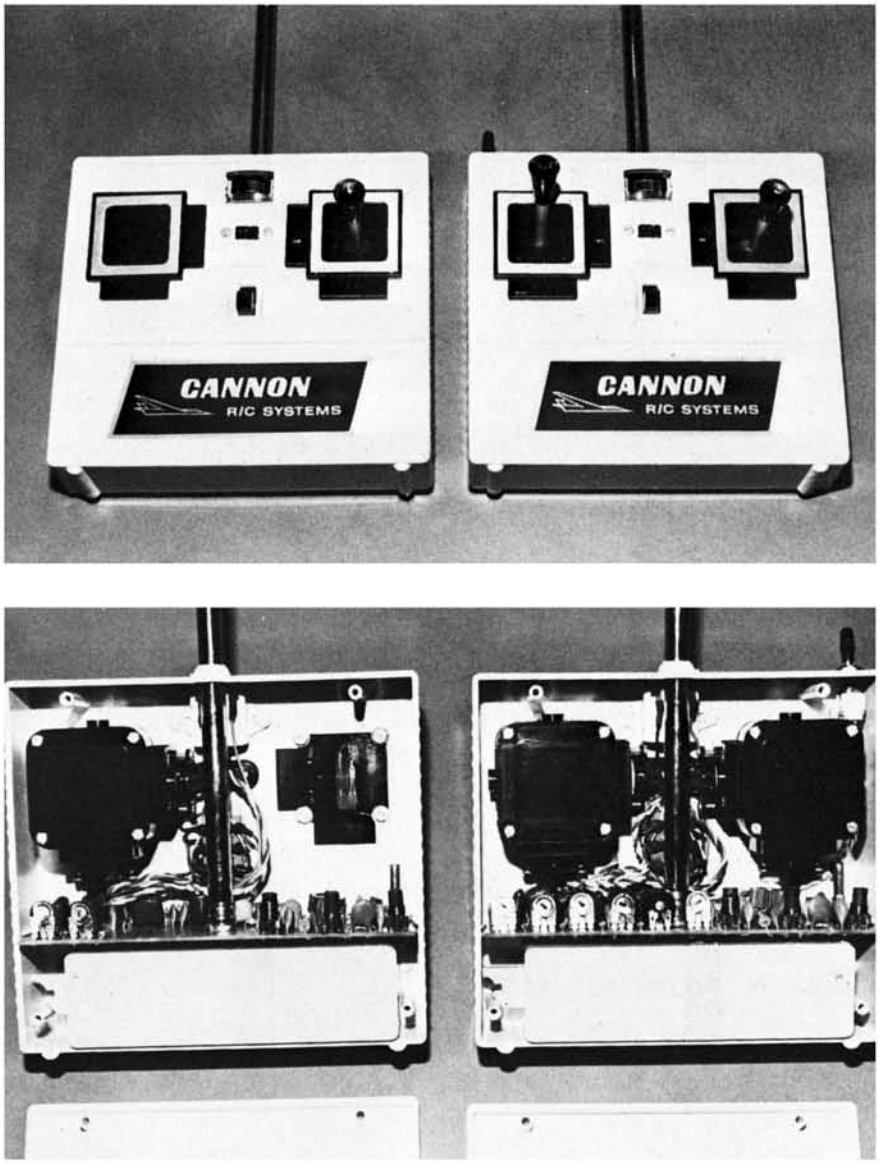
This past year Cannon Electronics, like so many other R/C manufacturers entered into the so called "Economy Class" equipment line. The usual marketing theory here is to limit the systems options, offering a single radio package at an attractive price. The new Cannon Model 810 Mini-Sport is economy priced, but still offers some interesting options which I will discuss later in this review.

My particular evaluation radio was designated as a Mini-Sport deluxe system (Model 810D-54A) which has a list price of $259.95. This system specifically includes: a full five channel transmitter with nickel-cadmium rechargeable batteries, a five channel receiver, four type CE-4 servos, a nickel-cadmium airborne battery pack, dual output charger, an assortment of servo hardware, servo trays and an instruction manual. Although my system came with a dual stick transmitter you could obtain a single stick (3-axis) transmitter on the four or five channel model for an additional $15.00. As is the case with all Cannon systems the basic price includes frequencies on either the 27 or 72 mhz bands. For an additional $10.00 fee

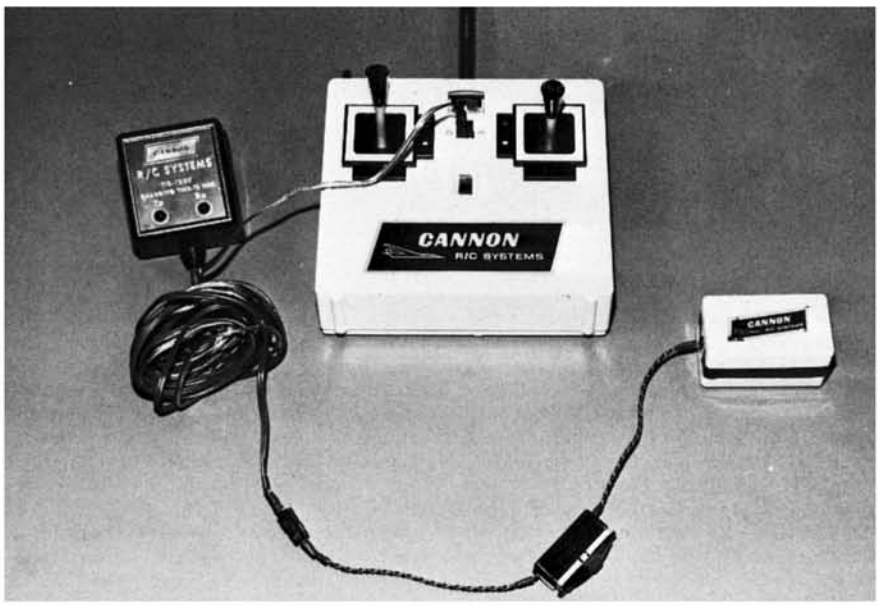
Cannon will also make available frequencies in the 29, 35, 40, 53 and 60 mhz bands. Some of these frequencies, of course, are only legally permitted in foreign countries.

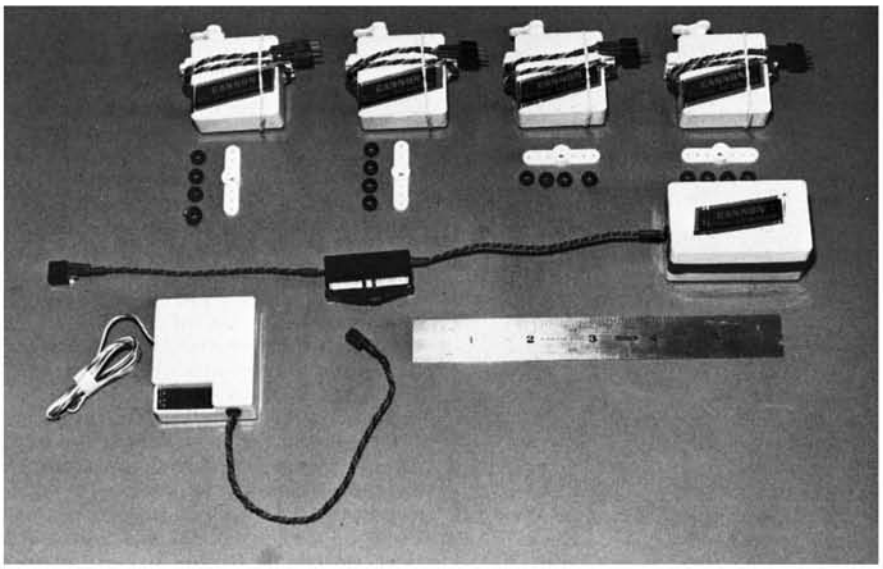
The Cannon Mini-Sport transmitter is housed in a white ABS plastic case measuring 5⅜" wide x 5" high x 1¾" thick (less the control stick projections. Sketch out those dimensions on a piece of paper and you will realize just how compact this transmitter really is. The molded plastic case idea was Bill Cannon's using the expert facilities of Bob Dunham's organization in Lake Havasu City, Arizona. The resulting two piece custom case is attractive, simple and most important, inexpensive. A nine section telescoping whip antenna extends to 48" and collapses down to 4". It can also be completely removed, if desired. The dual axis Dunham semi-open gimbal sticks need no introduction to the R/C modeler. You can adjust the stick length to a maximum of 1¾" if that is your preference. Once you get the correct length just apply some Hot-Stuff to hold the stick tip in place. These stick assemblies employ the CTS type 5K ohm ceramic element pots. Each of the four prime channels has a trim lever. These levers each provide a generous 22 degrees (+/- 11 degrees) of vernier control (trim). A meter on the front panel monitors R-F output. The output is quite high, by the way. I measured it at 700 mw, which is very close to the legal limit of 750 mw (on the 72 mhz R/C frequencies). Inside the transmitter case all the circuitry is located on a single P/C board. The R-F output stage transistor is fitted with a heavy extruded aluminum heat sink to help dissipate some of the heat generated by this high powered transmitter. On my five channel transmitter a retract switch was located on the top left corner of the case. This is strictly an on/off type control and is not proportional. Although the dual stick four and five channel units are supplied in the Mode II configuration you can order Mode I from the factory at the time of your purchase. Since I had a deluxe system, my transmitter came with a set of eight (9.6 volt nominal), 500 mah capacity, nickel-cadmium rechargeable batteries. These batteries are of the A-A pen cell size and are manufactured by G.E. They are located in a battery case directly below the P/C board. A charging jack (Deans three pin with key) is located on the front panel directly above the power switch.

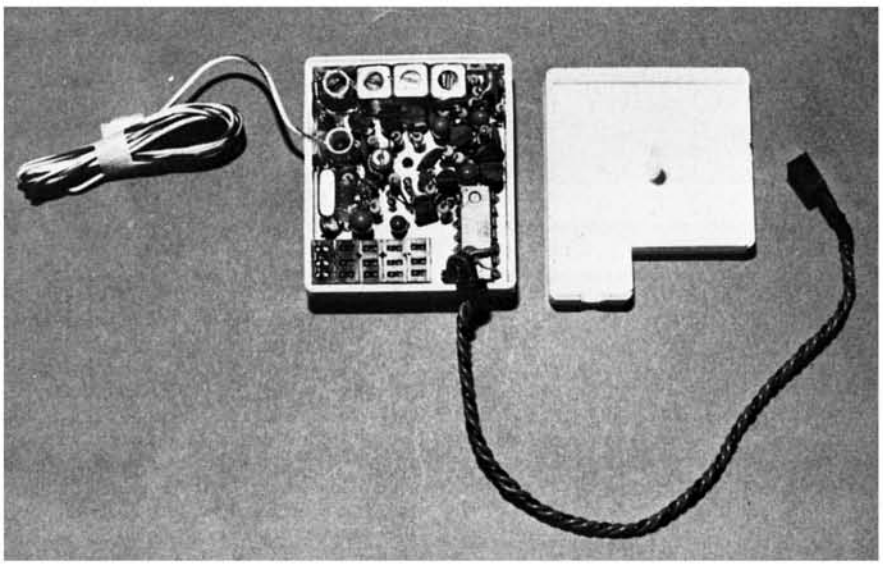
Next item is the Mini-Sport receiver model 520R. It is housed in a white molded nylon case measuring 1⁹/₁₆" wide x 1⅞" long x ¾" thick. My five channel version weighed approximately 1.3 ounces (the two channel version weighs only 1.15 ounces). Deans three pin (gold plated) connectors are used throughout. I like this type connector since you can do your own soldering when it becomes necessary. Five connectors are attached directly to the P/C board in a block type configuration. Servo cables plug directly into the receiver case. The power connector is a male type. All the servo (channel) connectors are female type. A single cable (6" long) exits from the receiver case. Surprisingly this is the fifth channel connector, not the aileron connector as you might expect. My receiver idled at 10 ma which is a low idle and is mainly attributed to the use of a C.M.O.S. 8 bit shift register I.C. (type MM74C164N) in the decoder. Eight channel capability is available in this receiver, but not the transmitter. The speci-



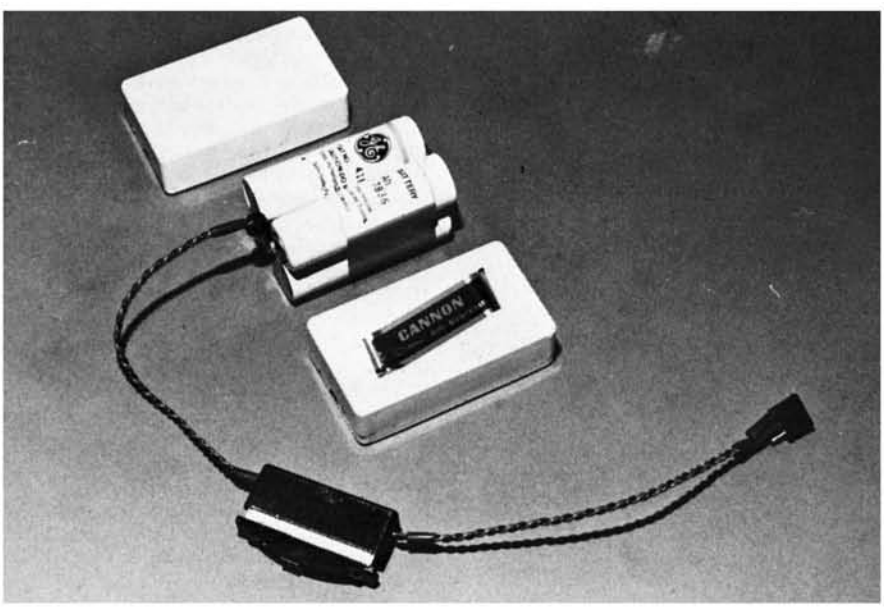
Inside two typical Cannon 810 transmitters. Additional stick and retract switch can be added (right) to give five channels. **At top:** Front exteriors of two channel (left) and five channel transmitters. Molded ABS plastic case reduces system cost. **Beneath:** Dual battery charger (with separate L.E.D.'s) supplied with deluxe system. The switch is built into the battery harness so it must be turned on for charging.







The neat receiver layout makes assembly and tuning easy, reducing price of system. An assembly kit is available too, through Charlie's R/C Goodies. **Top:** Mini-Sport airborne components, 10.6 ounces. Smaller servos and battery pack available as option to reduce weight and volume. **At bottom:** G.E. 500 mah A-A pencell nickel-cads supplied are in airborne pack. Light 100 mah and fast charge options.

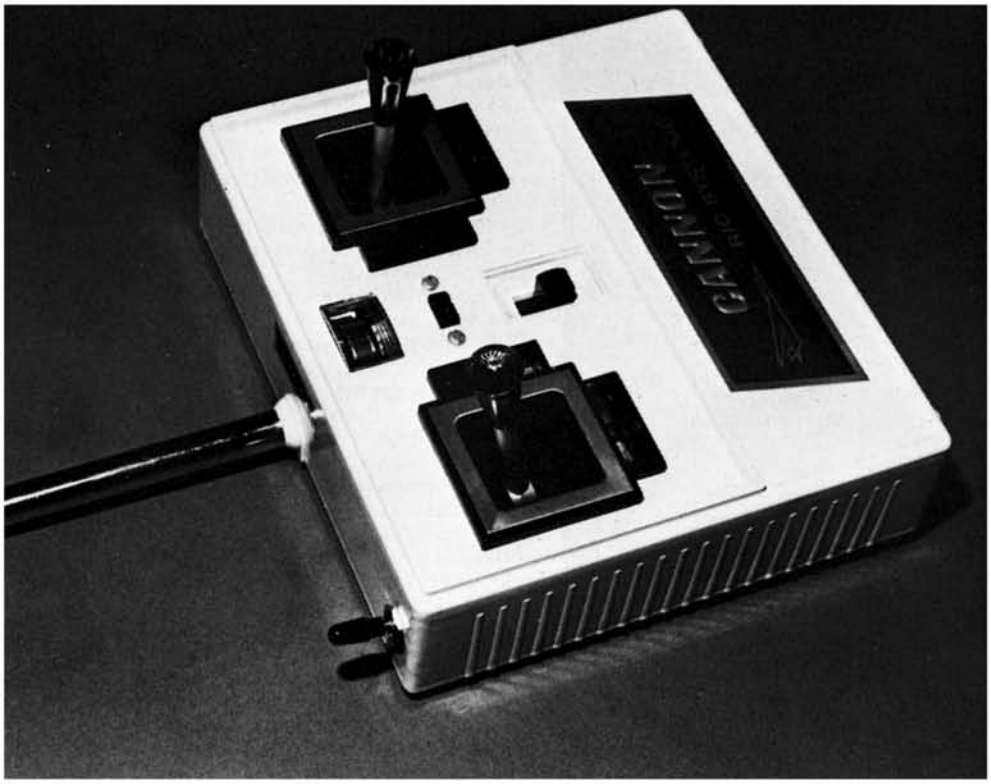


fications indicate a double tuned front end with an F.E.T. R-F amplifier and mixer. Sensitivity is said to be 4 to 6 microvolts nominal, Selectivity is +/- 4 khz at 6 db and the image rejection is -3 db. All of the components are assembled on a single P/C board. The molded case is held together with a single screw located in the center. Maintenance should be a breeze with this layout. Receiver antenna is color coded to the operating frequency (in this case white/red for 72.240 mhz).

The standard servo supplied with the Mini-Sport system is the popular Cannon CE-4 variety. This particular servo is designed around the Dunham D-1 mechanics, which, to a degree, resembles the D&R Bantam units. Each servo measures, 1½" long x 1½" high x ¾" thick (less mounting flanges and output arm) and weighs 1.25 ounces. An extra long 7½" three wire cable is provided on each servo, terminating in a Deans three pin connector. Cannon servo wiring has the signal lead by the alignment mark of the Deans connector. Power negative (black) is in the center. Power positive (red) is on the opposite end. Inside the servo is the usual 16 mm diameter motor (8 ohms resistance), a 5K ceramic element pot and a single P/C board containing the amplifier. Cannon still uses the popular T.I. 28604 I.C. chip with good success. Specifications continue to use the older power rating of 4 pounds of thrust. Using the newer technology (which is becoming more accepted) this servo should give approximately 20 oz. in. of torque which is sufficient for even a .60 powered model. Servo idle drain is 8 ma. My servos traveled approximately 80 degrees (roughly +/- 40 degrees). Resolution was good with minimum overshoot on return to neutral from full excursion. Additional, assembled servos of this type can be purchased for $28.95. Individual servo parts are available should you like to do your own maintenance.

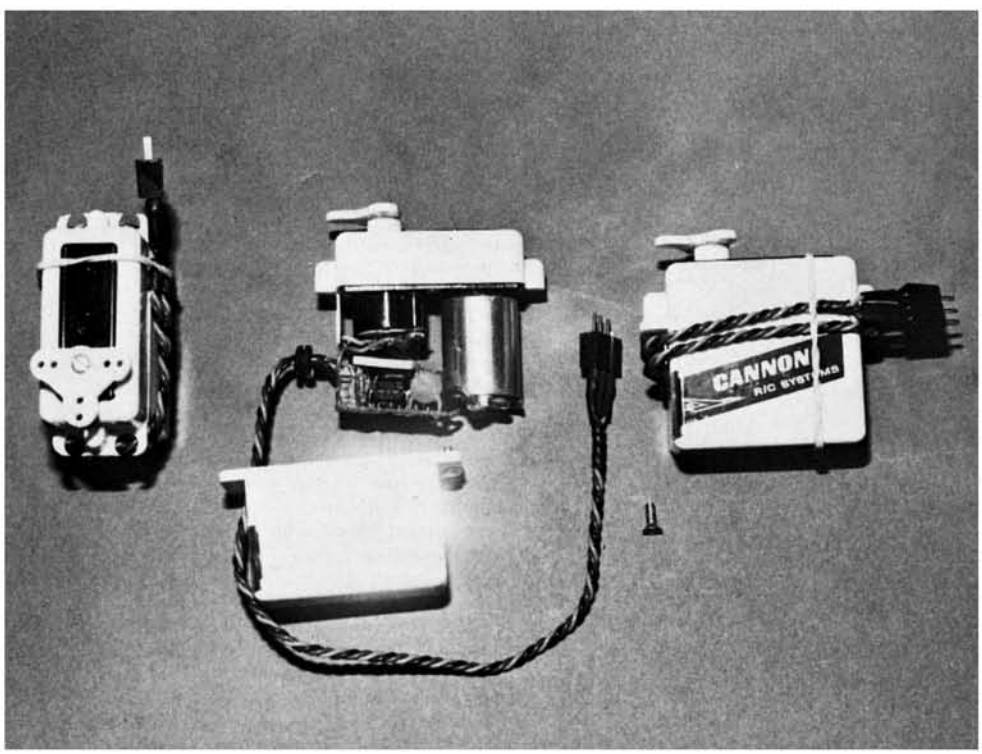
The standard airborne battery pack supplied with the Mini-Sport system is a 500 mah variety measuring 1¼" square x 2¼" long. Cannon employs the G.E. cells of the A-A pen cell size (similar to those used in the transmitter). As with other Cannon radios this pack includes the main power switch as part of the battery wiring harness. This saves the weight of an extra connector. But you must remember to *always turn on* this switch when charging. The battery pack with the switch and cable weighs 4.3 ounces. A red L.E.D. indicates the proper charging (one for the transmitter and one for the receiver). When initiating a charge cycle it's always a good idea to check that the L.E.D.'s are glowing. I measured the charge rate as 42 ma going to the transmitter and 41 ma going to the airborne battery pack. This is roughly the C/10 rate which requires a 14 to 16 hour period to obtain a full charge. Although the transmitter charge connector has a keyed slot I found it possible to connect the receiver output charge connector to the transmitter. This produced only a 10 ma charge current which is far too low. So just a word of caution and use some common sense when charging the transmitter by itself (which admittedly isn't done too often).

Total four channel airborne weight of this system as just described is only 10.6 ounces. That is very low considering four full size servos and a 500 mah battery pack. I might add that the volume is quite small for a "full size" system. This would make it ideal for



A close-up of the Cannon five channel Mini-Sport transmitter. Dunham semi-open gimbal control sticks, R-F output meter, charging jack beneath. Retract switch, top left corner (not a proportional channel). **Below:** Cannon CE-4 servos with standard Dunham D-1 mechanics from above, case removed.

the small R/C compartment found in most Q-500 and quarter midget pylon racers. Cannon offers a considerable number of options as to servo type and battery configuration which can further reduce this airborne weight. The subminiature CE-8 servos, which weigh only 0.7 ounces each, can be obtained with this basic system at a $7.50/ per unit surcharge. Using four of these servos, instead of the CE-4's, would reduce the airborne system weight to only 8.4 ounces. You can also substitute 450 mah and 100 mah battery packs for the normal system battery. But recognize that your flight time, between charges, will be reduced accordingly. In general I found that four CE-4 servos and the 500 mah battery pack were capable of close to three full hours of operating time on a full charge. This time can, of course, vary with the use of the controls, but it is a good average.



You may have noticed in several of my photographs a two channel Mini-Sport transmitter. As mentioned earlier Cannon Electronics offers a considerable array of options with this particular system. A basic two channel system with dry batteries (both transmitter and receiver) lists for $119.95. This could be used as a starting point for a beginner. After that the modeler could have his system converted all the way up to the full five channels and could even have rechargeable batteries added. The overall design of this system permits this easy build up. To further enhance this marketing concept Cannon has established a conversion (or upgrading) pricing schedule which follows closely the full system prices. In other words if you bought the basic two or three channel system and later converted it to the full five channel system as described in this review, your total cost would be roughly the same as if you had bought the full system in the first place. The details of all these conversion options are covered completely in the new Cannon Electronics catalog. I suggest you write them for one (address is 13400-26 Saticoy Street, No. Hollywood, California 91605).

For those interested the Mini-Sport system is warranteed for a 180 day period (from the date of purchase). The instruction manual, which I made criticism of in the past, has been greatly expanded. It is complete including licensing requirements and a discussion on the use of frequency flags (flags are not included). If you are technically inclined Cannon will sell you a full set of system schematic diagrams for $3.50 plus $1.00 shipping and handling.

I would normally conclude my review at this point. The Mini-Sport performed well, without exception. Having flown two separate Cannon systems for the past three years I can attest to it's overall reliability. But there is still one more feature to be discussed. Earlier this year a separate company directly affiliated with Cannon Electronics started offering a kit version of this same Mini-Sport system. Charlie's R/C Goodies (same mailing address as Cannon Electronics) has a complete series of kits based on this system just described. Although I didn't have the time to tackle the construction of a system I did receive a complete set of assembly instructions for my review. The information provided was excellent. I counted a total of 41 pages including component identification sheets, parts check lists, step by step assembly instructions (with photographs), system tune up, check out and trouble shooting procedures. It is certainly thorough. If R/C kit building is your pleasure you could purchase an equivalent kit of the mini-Sport five channel system for $199.95. And if I read the brochure properly you can even purchase conversion kits that will enable the modeler to upgrade his Mini-Sport system from two up to five channels without returning the system to the Cannon Electronics factory. All in all this neat little system works well and certainly has a host of options available.