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Operating Instructions

for the

MODEL 520

TINI-BLOCK and CINDER-BLOCK

Proportional Control Systems

SYSTEM DESCRIPTION

All Cannon Proportional Control Systems are of proven Digital design, providing full digital proportional control of all channels. Flite packs are compatible with all past and present Cannon transmitters, as well as with most standard transmitters from other manufacturers.

Each "Block" System consists of a transmitter, receiver-servo block, separate servos for extra channels, rechargeable nickel-cadmium receiver battery and switch harness, and an external transformer-type charger. As supplied, all transmitter and receiver channels are operational and require only that units be plugged together to operate.

The Tini-Block is our smallest unit, consisting of a receiver and one servo in a very compact package. Thus, it may be operated as a single channel device or, with added servos, as a multiple channel system.

The Cinder-Block is slightly larger, but includes two servos cased with the receiver. Mounting a single unit thereby provides a full two-channel installation. External servos may be plugged in for extra channels.

An inexpensive 9-volt carbon battery, Eveready No. 276, is required for transmitter operation. This battery will normally provide many hours of satisfactory operation. Replace transmitter battery when terminal voltage (with transmitter ON) drops to approximately 6 volts. If battery voltage is allowed to drop too low, a loss of range together with slight servo centering shift may occur.

A 9.6 V nicad battery pack is available with the transmitter if desired. A charging jack is provided for use with an external charger. Initial cost differential is \$25.00 extra.

Either a 225 mah or 500 mah nickel-cadmium pack is available for these systems at no cost difference. The smaller battery offers lighter weight, whereas the 500 mah pack gives longer flight time. Do not under any circumstances attempt to operate these receivers or servos with standard dry batteries.

The charger supplied for the standard 225 mah Gould cube pack provides a charge rate of 20-22 ma; the high-charge rate 225 mah pack and the 500 mah pack require a charger with a 40-50 ma charge rate.

If your transmitter is equipped with nicads, plug the round plug on charger into charging jack on transmitter and the other plug into connector on end of Rx battery switch harness. If Tx uses dry batteries, charger connects directly to connector on switch harness. In all cases transmitter switch should be OFF and receiver switch ON when charging. Note: Rx battery switch is ON when switch slide handle is positioned toward the battery.

MODELS

Both "Block" systems are available in two, three or four channels. Self-centering sticks are used on the transmitters for rudder (or aileron) and elevator control. On three-channel models a separate positionable control lever operates a third servo for motor or auxiliary control. The four-channel transmitter employs two separate two-axis sticks with standard control functions.

Two transmitter sizes are supplied because of physical dimensions required to mount two full stick assemblies. On the small two-channel transmitter the vertical stick may be modified easily to provide positionable settings for functions such as engine control.

Either model may be purchased with the quantity of servos desired. Standard servo with the Tini-Block is the rotary C-E3; with the Cinder-Block it is the Model C-E1. Any standard Cannon 3-wire servo with proper plugs is compatible with these units.

SPECIFICATIONS

Transmitter

Operating Voltage	9 volts
Battery Type	Eveready 276 (Dry)
Power Output	600 milliwatts (27 MHz) 300 milliwatts (72 MHz)
Frequencies Available	All standard 27 and 72 MHz frequencies
Frequency Tolerance	.005%
Operating Temperature Range	+10° to +130° F
Dimensions:	
2 and 3 Channel	2 x 4-1/2 x 6-1/2 inches
4 Channel	2 x 6-1/4 x 6-1/2 inches
Antenna	54" collapsible whip
Total Weight (with battery)	2 pounds

Receiver-Servo Block

Receiver Type	FET Superhet, single tuned
Sensitivity	4 microvolts
Bandwidth	4 DB at 4 KHz
Intermediate Frequency	455 KHz
Available Frequencies	Same as transmitter
Operating Voltage	4.8 volts
Current Drain (Idle):	
Receiver	22 ma
Servo (each)	6 ma

AGC 2 stages
 Operating Temperature Range +10° to +130° F
 Dimensions:
 Tini-Block 1-5/16 x 1-7/16 x 1-9/16 inches
 Cinder-Block ... 1-7/16 x 1-11/16 x 2-3/4 inches
 Above dimensions less mounting flanges
 Weight (including plugs):
 Tini-Block 2 ounces
 Cinder-Block 3.9 ounces
 Plug Type 3-pin Deans
 No. of Channels 2, 3 or 4

Models C-E1 and C-E3 Servos

Output Rotary
 Rotation ±45 degrees
 Resolution ±1%
 Thrust 3 to 3-1/4 pounds
 Dimensions:
 C-E1 23/32 x 1-3/8 x 1-25/32 inches
 C-E3 23/32 x 1-3/8 x 1-1/2 inches
 Weight:
 C-E1 1.4 ounces
 C-E3 1.2 ounces
 Current Drain:
 Neutral 6 ma
 Running 150 ma
 Full Stall 450 ma

Receiver Battery

Type Nickel-Cadmium
 Cells 4
 Voltage 4.8 volts, no center tap
 Capacity:
 Small battery 225 mah
 Large battery 500 mah
 Recommended Charge Rate:
 225 mah pack 20-22 ma
 500 mah pack 40-50 ma
 Size:
 225 mah pack 7/8 x 1-13/32 x 1-13/32 inches
 500 mah pack 1-1/4 x 1-1/4 x 2-3/16 inches
 Shape:
 225 mah pack flat cube
 500 mah pack square
 Weight:
 225 mah pack 1.9 ounces
 500 mah pack 4.1 ounces
 Operating Life:
 225 mah pack 1 to 1-1/2 hours
 500 mah pack 3 to 4 hours

PREPARATION FOR USE

1. Check all units, wires and plugs carefully for possible damage due to shipment or handling.
2. To avoid possible loss of antenna tip, hold upper antenna rod with pliers and tighten tip securely with other pliers.
3. Charge receiver and transmitter batteries (if nicad) for 24 hours before initial use.
4. For dry cell transmitters, install 9 volt battery (Eveready 276).
5. After charge, plug receiver battery into mating male plug on receiver.
6. Connect external servo(s) to receiver cable(s). Be certain to match plug keyways or equipment may be damaged or burned out.

Channel	Function	Servo Cable Wire Color
1	Rudder, aileron or steering	orange
2	Elevator (or motor)	yellow
3	Motor (or auxiliary)	green
4	Rudder	blue

7. Install transmitter antenna - do not extend.
8. Turn transmitter ON. Turn receiver ON. All servos should move to neutral except motor servo, which will move to the position determined by control lever setting on Tx.
9. Operate each transmitter control in both directions to check servo response. Note direction of servo travel. If necessary reverse direction of servo travel to obtain correct control surface movement. Center servos, if required.
10. Before installation we recommend cycling the equipment through at least one complete battery charge to make sure all components continue to operate properly.
11. Turn receiver OFF, then transmitter. Proceed with equipment installation.

SERVO INSTALLATION

Servos mount in conventional manner in airplane, boat or vehicle, using rubber grommets and standard hardware (not supplied). Use of mounting trays is recommended. Be sure and provide clearance for wires extending through end of servos.

All neutral adjustments of control surfaces must be made through linkage adjustments, not by servo or transmitter centering adjustments.

Always use an override device on motor and auxiliary channel servos to prevent possibility of motor burn-out in case of incorrect linkage adjustment.

RECEIVER INSTALLATION

Locate the receiver in the aircraft (or vehicle) where it is least subject to crash damage and is still accessible for tuning. "Blocks" are usually fastened to mounting strips in fuselage, using grommets and standard mounting hardware (not supplied).

Always position receiver above and/or behind batteries to reduce possible crash damage.

Total recommended antenna length is 36 inches. A horizontal insulated antenna wire is satisfactory for aircraft use. This may either be externally mounted or installed in the fuselage during construction. In the latter case, do not use metallic paints when finishing the aircraft, or radio range will be drastically reduced. A short vertical section of music wire will be adequate for boats or cars. Naturally, sensitivity will be greater with longer antenna lengths, and if extreme distance is anticipated, the full length antenna should be utilized.

CAUTION

Antenna must not be close to other wires in

the equipment installation, or the resulting noise pick-up may cause erratic operation.

WIRING

Install all wiring as neatly as possible, making sure it does not interfere with or become entangled in the servos or control linkages. Check wiring occasionally, particularly at plugs, for signs of breakage or poor connections.

BATTERY INSTALLATION

Where possible, mount receiver battery forward of receiver and servos. Install adequate foam padding for protection against crash damage.

BATTERY CHARACTERISTICS

Batteries are the source of most equipment troubles and should receive the most attention. In case of malfunction, always suspect and check batteries first.

Charge batteries fully before each flying session. If charging current does not exceed 25 ma (for a 225 mah battery) or 50 ma (for a 500 mah battery), unit may be left on charge for extended periods without harm. After an initial charge, 8 to 12 hours of charge will bring the battery to full strength.

Receiver battery voltage after charge may "top out" as high as 5.5 volts under load. With a few minutes use this will drop to 4.8 - 5 volts, where it remains virtually constant until charge is depleted. Upon depletion, nickel cadmium battery voltages drop very rapidly, practically to zero. Under no condition should the battery be used after depletion; overdischarge may permanently damage cells.

NOTE

It is not unusual for receiver and servos to "jitter" slightly on a full charge. This will disappear when voltage drops to normal.

If battery voltage after charge is below 4.8 volts, unit is either defective or worn out, charger may be defective, battery may have been reverse-charged, or a short may exist in the equipment. A wiring or equipment short will usually be indicated by overheating of wires to battery pack.

Other than voltage measurements taken at each individual cell under load, no positive means is available to determine when either a fully charged or discharged state exists. For this reason, batteries must be charged at recommended rate for sufficient time to insure full charge.

Under normal use, approximately 3 to 4 hours of flight operation may be expected from a fully charged 500 mah nickel cadmium pack; 1 to 1-1/2 hours from a 225 mah pack.

RECEIVER TUNING

Factory-tuned receivers are sealed, and tuning is not recommended unless an out-of-tune condition is suspected.

If tuning is required, perform this operation with servos plugged into the first two receiver channels.

To adjust receiver tuning, remove antenna from transmitter and have one person slowly move away from airplane while operating Channel 1 control on transmitter. Using the spade end (like a small screwdriver) of a plastic tuning wand, carefully peak the front coil until maximum operating range is obtained. This will vary from 8 - 40 feet or more. Once tuned, use a small amount of candle wax to lock tuning slugs in position. Caution: Do not touch the I. F. transformer tuning.

Antenna-off range may vary widely with different units, and should be used as a guide only in operation of your equipment. Factors which cause variations in range include transmitter tuning, length of antenna, antenna orientation, position in which transmitter is held, height of transmitter and receiver above ground, equipment installation, surface over which test is made, etc. Do not attempt to increase receiver sensitivity just to increase antenna-off range. Once a standard is determined for antenna-off range, this can be used as a quick-check reference of equipment operation. Serious range tests should be made with transmitter antenna installed. The real test is ground-to-air range.

Average range, antenna down, should be approximately 300 - 500 feet. Antenna-up ground range should be 2000 feet or more. Air range should be 3 to 5 times your ground range.

CENTERING SERVOS

When centering servos, be sure all transmitter controls, including trim, are in neutral.

To center TINI-BLOCK, C-E1 and C-E3 servos, first remove output arm and attaching screw. Insert a small jewelers screwdriver into hole in output gear until it bottoms. Turn screwdriver gently in direction opposite desired direction of centering change. Output shaft will rotate to the new center position. This adjustment is quick and touchy, so may require a few tries before correct centering is obtained. Note: The 180° S-4 servo requires a 1/16" Allen wrench for this centering adjustment.

To center servos in Cinder-Block, remove case, loosen two screws holding pot element, then rotate element slightly until servo centers. Tighten screws.

REVERSING SERVO DIRECTION

To reverse operating direction of servos, reverse connections of both motor wires, and reverse the brown and green wires to feedback pot. Do not change position of yellow wire to pot. It is not necessary to change position of ground wire when reversing motor wires. Re-center servos as necessary after reversing direction.

STICK CONVERSION

If positionable throttle control is desired on a stick instead of spring-loaded neutral, open transmitter case and remove centering spring on vertical axis.

On Ace/Rand stick, take out the two retaining screws

and washers holding the plastic spring stop against stick body. Remove spring stop, rotate it 180° and insert the right-angle end into small rectangular opening in the side of stick body. Reinstall and tighten screws while holding right angle end against yoke. Amount of pressure applied by spring stop against yoke ratchet determines stick tension.

Trim lever tension may be adjusted by tightening or loosening pivot screw holding trim lever to stick body.

Light centering action of stick can be stiffened by removing one more turn from centering springs.

TRANSMITTER NICAD INSTALLATION

If desired, a 9.6 volt nicad may be installed in place of the dry battery. An external plug should be added to enable battery charging without opening the case. This can be done at the factory for \$30.00, plus shipping.

For nicad use, a 270 ohm resistor must be installed on the 72 MHz transmitter board in place of the wire jumper.

ADDING CHANNELS

Both the two channel receiver and transmitter can be factory converted to three channels at very nominal cost. Transmitter is limited to three channels, but the receiver is capable of building to four channels with installation of the proper I. C. and correct cabling.

SHIFTING CHANNELS

On 2 and 3 channel Tini-Blocks, Channel 1 servo is in receiver block. On 4-channel model, Channel 2 servo is in the block.

On 2 and 3-channel Cinder-Blocks, Channels 1 and 2 servos are in receiver block. On 4-channel model, Channels 2 and 3 servos are in the block.

If another control arrangement is desired, this may

be accomplished by exchanging positions of the servo signal wires (orange, yellow, green and blue) where they attach to the receiver-decoder. Be extremely careful when moving wires that no solder shorts remain, or I.C. chips may be damaged.

MAINTENANCE

Electrical plugs should be checked occasionally for cleanliness and proper contact. To clean, use electronic tuner cleaner on both male and female contacts, with fine sandpaper as required. Use pointed end of an Xacto knife to close up the female contacts and restore spring tension.

If servo gears become noisy, disassemble servo and inspect each gear carefully under high power magnification to locate burrs and broken or bent gear teeth which impair operation.

Should servo gear lubrication be required, use fine powdered graphite or "Dry Lube". Never use grease or liquid lubricant of any type.

Servo feedback pots have elements made of hard-fired ceramic. These may require occasional cleaning, usually evidenced by jumpy or erratic servo operation. Use tuner contact cleaner and soft tissue for cleaning. Lubricate pot element with a thin coating of silicone grease, then wipe it clean with soft tissue. Allow no silicone grease to remain, since it is non-conducting and would be detrimental to servo operation.

Check bronze wipers to make sure that positive contact is made against pot element without excessive pressure. Too much pressure will cause brass from wiper to impregnate surface of pot element, making servo run erratically. Be sure wipers are not bent. Both wiper contacts should touch the element with equal pressure.

SCHEMATICS

Schematics for the Cinder-Block or Tini-Block Systems are available for \$3.00 and applicable sales taxes, plus 50¢ shipping cost.

WARRANTY

Factory-built equipment is warranted by Cannon Electronics to be free of defects in material and workmanship for a period of ninety days. However, this warranty is void should the manufacturer judge that defect to be caused by abuse, crashes, over-voltage, incorrect battery polarity or other misuse by the customer.

Please fill in the enclosed warranty cards within 10 days and return them to the factory as a record of your equipment purchase. Warranty service will be performed only on equipment so covered.

ABOVE WARRANTY NOT APPLICABLE TO KITS. KITS ARE WARRANTED ONLY FOR COMPLETENESS OF PARTS.

Cannon Electronics assumes no liability or responsibility for loss or damage incurred or inflicted during operation of R/C equipment.

NOTICE

A Class "C" Operator's License issued by the Federal Communications Commission is required before this transmitter can be operated on 27 or 72 MHz. A technician class (or higher) Amateur License is required to operate on the 53 MHz band. License application forms can be obtained from your local FCC office.