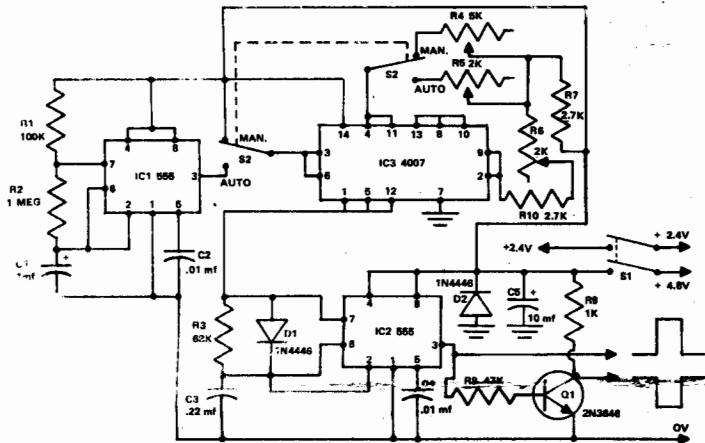


ACE R/C, Inc.

SERVO CYCLE

ASSEMBLY INSTRUCTIONS



**FIGURE ONE
SERVO CYCLE SCHEMATIC**

CIRCUIT DESCRIPTION

A nominal pulse width of 1.5 ms is generated by IC-2, a 555 timer; a rate of 17 ms is determined by R3 and C3. The width can be varied from under 1 ms to over 2 ms by the control pot, R4. D1 limits the duty cycle to less than 50%.

In the auto mode, IC-1 (555) drives IC-3 (4007, an analog switch) to switch between the pulse width extremes determined by R5/7 and R6/10. R5 sets the lesser width (approx. 1 ms) and R6 sets the greater width (approx. 2 ms). The cycle rate is determined by R1, R2, and C1.

Q1, R8, and R9 is a pulse inverter to provide a negative going pulse output.

D2 prevents damage to the circuit if reverse polarity is applied. If reverse polarity is applied for any length of time, D2 will short and need to be replaced.

C2 and C4 are bypass capacitors required for the 555's. C5 is a power supply filter.

PARTS LIST

() Thoroughly read the "Kit Builder's Hints" section and go through the parts list, checking off the components. If there is a shortage, write to Ace R/C, Inc., Box 511, Higginsville, Mo., 64037, for free replacement.

SEMICONDUCTORS

- | | |
|---------------|-----------------------------------|
| () 2 555 IC | () 1 100K (brown, black, yellow) |
| () 1 4007 IC | () 1 1 Meg (brown, black, green) |
| () 1 2N3646 | () 2 2K Trim Pots |
| () 2 1N4446 | () 1 5K Miniature Pot w/hardware |

RESISTORS

All resistors a 1/4 W

- | | |
|------------------------------------|----------------------|
| () 1 1K (brown, black, red) | () 2 .01 Disc |
| () 2 2.7K (red, violet, red) | () 1 .22 mf Bluecap |
| () 1 47K (yellow, violet, orange) | () 1 1 mf Tantalum |
| () 1 68K (blue, grey, orange) | () 1 10 mf Tantalum |

HARDWARE

- () 1 PC Board

- () 1 Metal Front Plate

- () Dakaware Case

- () 2 C/W DPDT Switches

- () 1 Control Knob

- () 4 2-56 X 1/4" Bolts

- () 4 4-40 X 1/4" Bolts

- () 4 2-56 Nuts

- () 6" Double Sided Foam Tape

HOOKUP WIRE

- 30" Red, Black, White

- 13" Blue, Orange

- 4" Brown

- 30" Solder

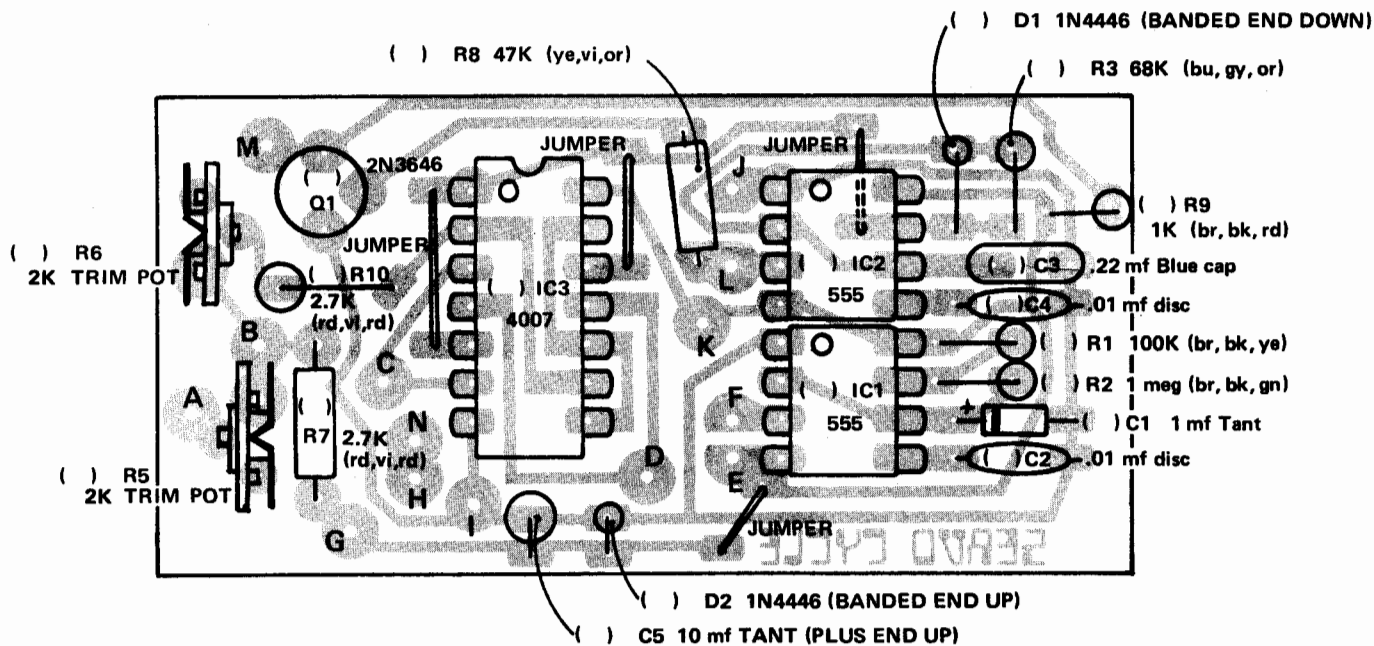


FIGURE TWO
OVERLAY DRAWING

PC BOARD WIRING

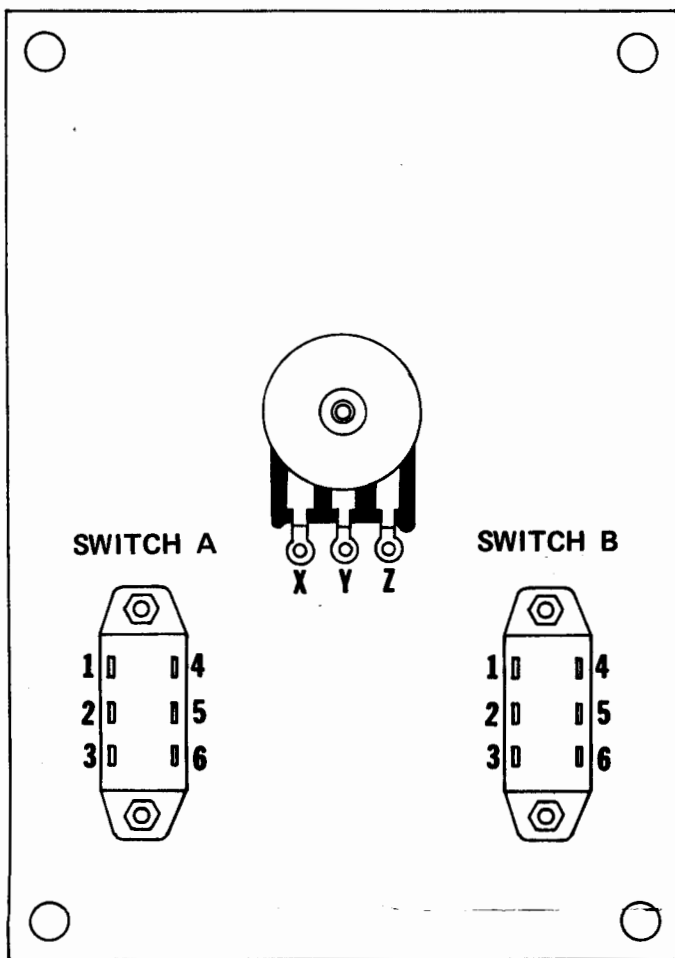
() Gently clean the foil side of the PC board with steel wool.

() Solder the components onto the PC board as shown in the overlay drawing, Figure 2. Install the jumper wires first (use excess resistor leads); then the IC's next, making sure the dot and/or the notch is in the position indicated; then the remainder of the components from right to left. When installing Q1, make sure the triangular relationship of the transistor leads matches the triangular relationship of the holes in the PC board. IC 3, 4007 is a CMOS device; observe the precautions spelled out in the "Kit Builder's Hints".

Check that the tantalum capacitors are installed with the positive leads as indicated and diodes are put in with the banded ends (cathodes) as shown.

WIRING HOOKUP

PC BOARD HOLE	SWITCH A (AUTO/MAN)	PC BOARD HOLE	SWITCH B (ON/OFF)	PC BOARD HOLE	OUTPUT TO SERVO
A	1	G	4	J	-4.8V (BLACK)
B	Y (POT LUG)	H	1	K	+4.8V (RED)
C	5	I	-4.8V	L	POSITIVE PULSE (BLUE)
D	2		+4.8V	M	NEGATIVE PULSE (ORANGE)
E	6		+2.4V	N	+2.4V (WHITE)
F	4				
Z (POT LUG)	3				



**FIGURE THREE
MECHANICAL LAYOUT**

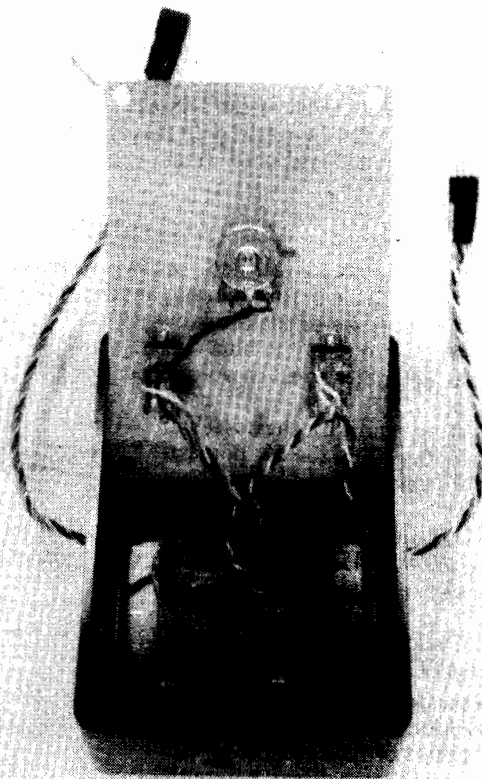
MOUNTING THE HARDWARE

- () Secure the two DPDT switches in the aluminum face plate with 2-56 X 1/4" nuts and bolts.
- () Run a pot nut all the way down on the 5K pot. Insert the pot into the face plate and secure it in position with another nut. Tighten securely.

INTERWIRING

- () Cut a 4" piece of red, blue, white, orange, and brown and a 6" piece of black hookup wire. Tin one end (see "Kit Builder's Hints").
- () Solder the 4" red into hole A in the PC board.
- () Solder the 6" black into hole B in the PC board.
- () Solder the 4" blue into hole C in the PC board.
- () Solder the 4" white into hole D in the PC board.
- () Solder the 4" orange into hole E in the PC board.
- () Solder the 4" brown into hole F in the PC board.
- () Twist these six wires together and cut the red, white, blue, orange and brown wires all the same length; leave the black wire long. Tin the ends of all six wires.
- () Solder the red wire to lug 1 of switch A.
- () Solder the black wire to lug Z of the 5K pot.
- () Solder the blue wire to lug 5 of switch A.
- () Solder the white wire to lug 2 of switch A.
- () Solder the orange wire to lug 6 of switch A.
- () Solder the brown wire to lug 4 of switch A.

- () Cut a 2" piece of black wire, tin both ends and solder one end to lug 3 of switch A and the other end to lug Y of the 5K pot.
- () Cut a 4" piece of red and white wire and a 12" piece of black wire; tin one end of each wire.
- () Solder the 4" red into hole G in the PC board.
- () Solder the 4" white into hole H in the PC board.
- () Solder the 12" black into hole I in the PC board.
- () Twist these three wires together, leaving the black one long. Tin the ends of the red and white wires.
- () Solder the red wire to lug 4 of switch B.
- () Solder the white wire to lug 1 of switch B.
- () Cut a 9" piece of red and white wire and tin one end of each.
- () Solder the 9" red wire to lug 5 of switch B.
- () Solder the 9" white wire to lug 2 of switch B.
- () Twist the 9" red, 9" white, and the black wire coming from hole I on the PC board together. This is the power input cable.
- () Cut a 9" piece of black, red, blue, orange, and white wire and tin one end of each wire.
- () Solder the 9" black into hole J.
- () Solder the 9" red into hole K.
- () Solder the 9" blue into hole L.
- () Solder the 9" orange into hole M.
- () Solder the 9" white into hole N.
- () Twist these 5 wires together. This is the output to the servo.
- () Clip all leads on the bottom of the board to no more than 1/16". Clean the solder rosin off the board with an old toothbrush and denatured alcohol.
- () Carefully inspect the board for possible solder bridges or poor joints.



CONNECTOR WIRING

() Tie an overhand knot in the three wire cable about 1½ - 2" from the switch and run the cable through one of the holes in the side of the case from the inside out--the knot provides strain relief. Do the same for the five wire cable with the knot about 2" from the PC board and pass the cable through the other hole.

() The three wire cable is to be hooked up to a 4.8 battery pack. Black is OV (negative), red is +4.8V (positive), and white is to be hooked up to +2.4V (center tap) if four or five wire servos are to be used. Wire in the appropriate male connector to match your battery pack accordingly.

() The five wire cable is the output to the servo. Obtain the proper female connector to match the servos you'll be using and wire up as follows.

() First determine whether the servos being used are three, four, or five wire servos and whether they require a positive or a negative pulse.

POSITIVE PULSE SYSTEMS:

Ace Digital Commander
Blue Max
EK, ('73 and Later--red/black polarized connectors)
Heath
Kraft
Micro Avionics
MRC
Orbit
Royal
W. E. Midget

NEGATIVE PULSE SYSTEMS:

Controilaire
EK (Super Pro to '73--white/black non-polarized plugs)
EK Logictrol II
EK MM3 servos
F & M
M.A.N.
O.S.
Pro-Line

() Hook the black to OV (negative); usually black from the servo.

() Hook the red to +4.8V (positive); usually red from the servo.

() If the servo is a four or five wire unit, hook white to +2.4V (center tap); usually white from the servo.

() If the servo you're using requires a positive pulse, hook the blue wire to signal input to the servo; usually a third or fourth color different from black, red, or white.

() If the servo you're using requires a negative pulse, hook the orange wire to signal input to the servo; usually a third or fourth wire different from black, red, or white.

() If you're using a MRC five wire servo, the fifth wire (green) from the servo needs to be hooked to +4.8V (red). Place a jumper wire in the female connector accordingly.

() You will have either one or two wires hanging loose, unconnected. Make sure these wires can't short to anything and leave them there . . . in the future you may want to use different kinds of servos that will need them.

ALIGNMENT

() If you have access to a voltmeter and wish to check the operation of the Servo Cycle before plugging in a servo, hook the negative voltmeter probe to the black output wire (OV) and the positive voltmeter probe to the blue output wire (positive pulse output). Set the meter to a low voltage range (1.5V).

Plug in the battery and turn the switch on with the function switch in MAN mode. When the 5K pot shaft is rotated, the voltmeter should swing between approximately .3 and .7 volts.

When switched to the AUTO mode, the voltmeter should oscillate between about .45 and .55 volts, depending on how the limit pots R5 and R6 are set.

If the Servo Cycle does not do this, recheck all your wiring, solder joints, and PC board component placement.

() Turn the power switch off and the function switch to the "MAN" position. Rotate the 5K pot shaft until it is approximately in the center of its travel.

() With a small screwdriver, rotate the trim pots on the PC board all the way clockwise as you face the end of the board with the trim pots in it.

() Plug in the battery pack and a servo that is known to have accurate centering.

() Turn the power on and rotate the 5K pot shaft until the servo centers. Put the knob on the shaft with the pointer on the center hash mark on the face plate. Tighten the set screw. You should be able to rotate the servo through its travel by turning the knob. If opposite rotation is desired, switch the black wire going to lug Z on the 5K pot to lug X and recenter the pot.

() Switch the function switch to "AUTO". The servo should be ticking back and forth. With a small screwdriver, rotate trim pot R5 counterclockwise until the desired amount of travel is reached in the direction which is affected by R5. Don't let the servo go to the end of its travel and hit the locks. Repeat for trim pot R6. The Servo Cycle should now automatically be running your servo back and forth throughout the desired amount of travel.

() Turn off the switch and secure the PC board in the bottom of the case with the double sided tape furnished.

() Mount the face plate into position with 4 4-40 X1/4" bolts.

This completes construction of your Ace R/C Servo Cycle. If you have any comments, write Ace R/C, Box 511, Higginsville, Mo., 64037.

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