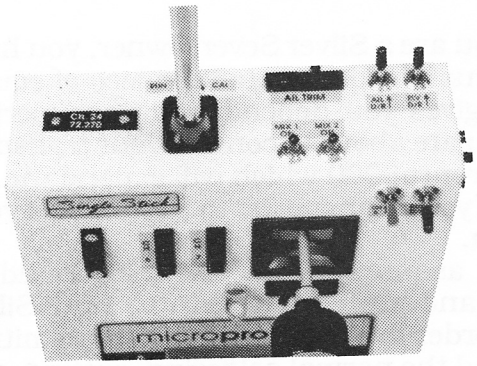
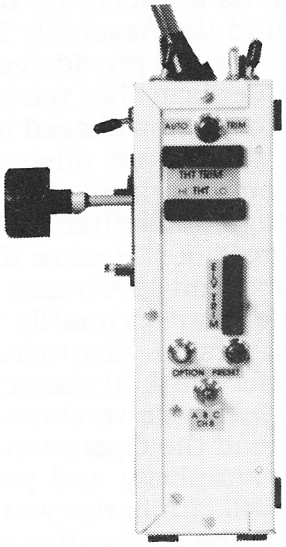
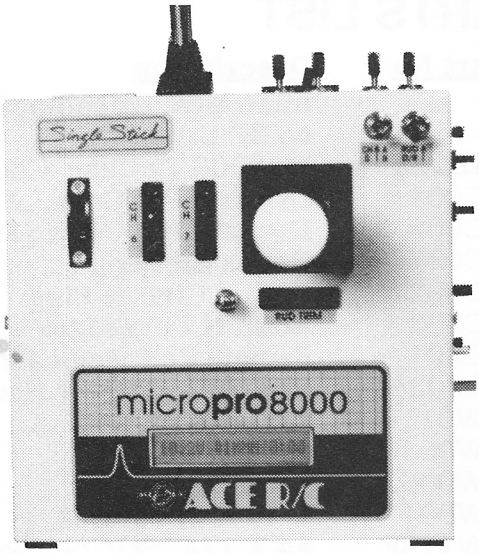
micropro8000
Retrofit Assembly

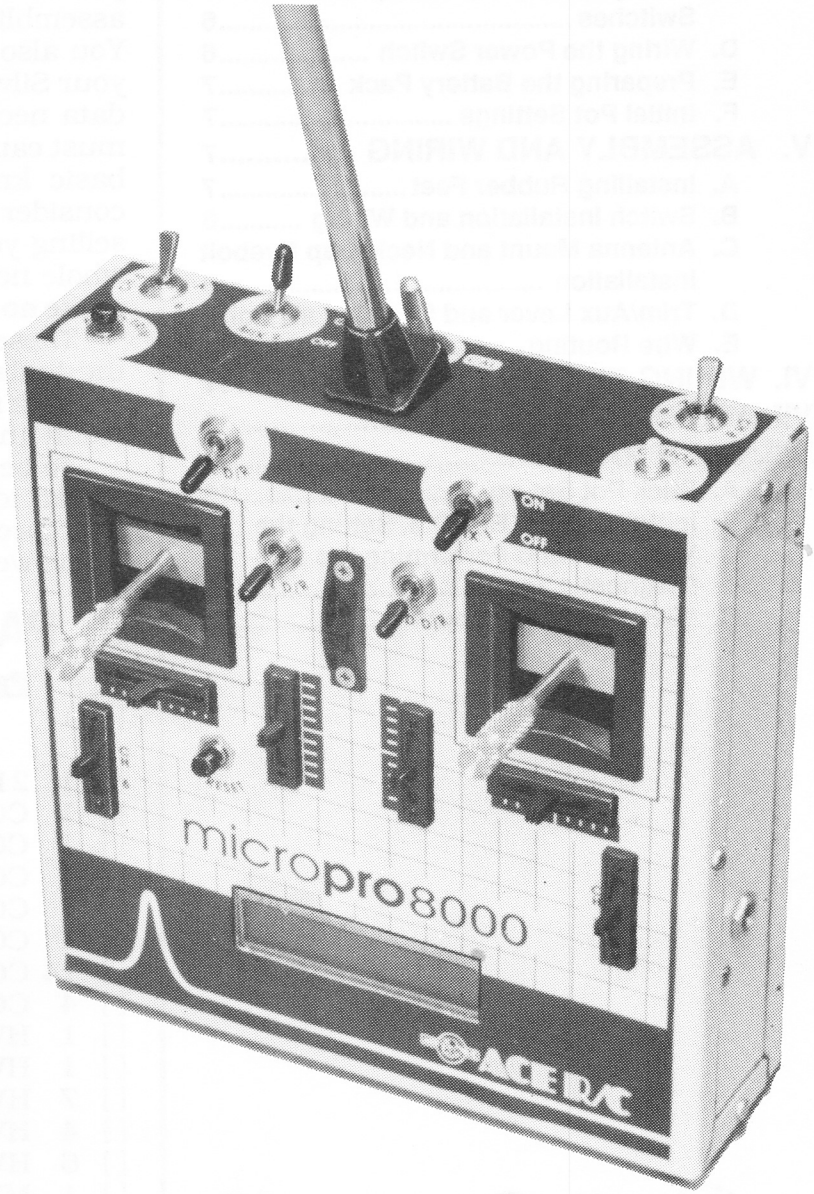
ACE R/C

TECHNICAL SUPPORT: 816.584.6303









micropro8000

So advanced, it's simple

Contents

I. INTRODUCTION 2
II. PARTS LIST 2
III. MECHANICAL DISASSEMBLY 3
IV. INITIAL WIRING OF THE micropro8000 3
- A. Case Preparation and New Parts 3
- B. Trim, Auxiliary, and Stick Wire Preparation 5
- C. Wiring the CH. 5 (retract) andCH.8 Switches 6
- D. Wiring the Power Switch 6
- E. Preparing the Battery Pack 7
- F. Initial Pot Settings 7

V. ASSEMBLY AND WIRING 7
- A. Installing Rubber Feet 7
- B. Switch Installation and Wiring 8
- C. Antenna Mount and Neckstrap Eyebolt Installation 9
- D. Trim/Aux Lever and Stick Installation 9
- E. Wire Routing 10

VI. WIRING THE ENCODER BOARD ..11
VII. ASSEMBLY 12
VIII. CALIBRATION 13
- A. Stick Pot Set-up 13
- B. Initializing the EPROM, Setting the Voltmeter and Performing the Self-Diagnostic Test 13
- C. "Set Joysticks" Routine 15

ACE R/C

116 W. 19th St., P.O.Box 511, Higginsville, MO 64037
Business Office: 816.584.7121 Order Desk: 800.322.7121
24 Hr. FAX: 816.584.7766 Technical Support: 816.584.6303
(Electronics & Aircraft)

I. INTRODUCTION

Since you are a Silver Seven owner, you have become accustomed to a quality piece of equipment that gives you dependability and performance. You are about to convert your transmitter to a micro**pro**8000 which will expand the capabilities of your transmitter to the limits of your imagination.

We are assuming you have kit building experience and are closely akin to your Silver Seven. In order to set up your new transmitter, you will need the normal soldering, cutting, and assembling tools plus an accurate multimeter. You also need to find the Assembly Manual for your Silver Seven. We will provide you with the data necessary to perform this retrofit, but we must caution you that you will need to have this basic knowledge; if not, we advise that you consider having a factory retrofit or even perhaps selling your existing transmitter and buying a whole new micro**pro**8000. Realize that we can **make no refunds** once you have begun the retrofit.

These instructions are primarily written for the dual metal stick version. Also included will be the data necessary for the dual plastic, the single metal and the single plastic versions.

To begin with, read the Operation Manual to get an idea of the simplicity and power of the micro**pro**. Plus, it will familiarize you with some terms we will use in the Calibration procedure.

II. PARTS LIST

Qty	Part No	Description
[ ] 1		micropro Encoder Board w/"L" Brkts.
[ ] 1	21E28	mp8000 Tx Case, Complete
[ ] 1	CC001	Deans 3 Pin Conn., Female
[ ] 1	CC002	Deans 3 Pin Conn., Male
[ ] 4	CC026	Deans Sleeving
[ ] 1	CC082	Round Charge Plug
[ ] 1	CC083	Round Charge Jack w/Hdw.
[ ] 14	CC301	Female Connector Pins
[ ] 4	CC303B	Plastic Connector Housing
[ ] 1	HW011I	# 6 Lockwasher
[ ] 1	HW003F	6-32 Nut
[ ] 7	HW006	Dress Nut
[ ] 4	HW081	4-40 X 3/16" Bolt
[ ] 6	HW113E	#4 X 1/4" Self Tap Screw
[ ] 1	MP230	Neckstrap Eyebolt
[ ] 12	PLA022	Sm. Nylon Wrap 'N Ties
[ ] 4	R4-102	1K Resistor (brn/blk/red)
[ ] 1	R4-202	2K Resistor (red/blk/red)
[ ] 1	R4-432	4.3K Resistor (yel/orn/red)
[ ] 8	RP025	Rubber Feet
[ ] 1	SW005	SPDT Toggle Switch
[ ] 1	SW005A	SPDT Toggle Switch w/Lift to Lock

[ ]	1	SW005F	SPDT Toggle Switch w/ Flat Bat
[ ]	1	SW005G	3 Position Toggle Switch
[ ]	1	SW033	SPDT Push Button w/"Click"
[ ]	2	SW010D	SPST Push Switch w/o "Click"
[ ]	8	TB026	3/32" Heat Shrink Tubing

WIRE LISTING

[ ]	18"	Solder
[ ]	30"	Black Wire
[ ]	10"	Blk/Wht Wire
[ ]	6.5"	Blu/Wht Wire
[ ]	8"	Brn/Wht Wire
[ ]	10"	Grey Wire
[ ]	3"	Grn/Wht Wire
[ ]	8.5"	Orn/Wht Wire
[ ]	8"	Red/Wht Wire
[ ]	9.5"	Vio/Wht Wire
[ ]	10.5"	Yel/Wht Wire
[ ]	8.5"	Blk/Red/Wht Wire Cable
[ ]	23"	Blk/Red Wire Cable
[ ]	4"	Gry/Gry Wire Cable
[ ]	9.5"	Blk/Red/Blu Wire Cable
[ ]	8.5"	Blk/Red/Brn Wire Cable
[ ]	9"	Blk/Red/Grn Wire Cable
[ ]	5"	Blk/Red/Gry Wire Cable
[ ]	8"	Blk/Red/Orn Wire Cable
[ ]	6"	Blk/Red/Vio Wire Cable
[ ]	8"	Blk/Red/Wht Wire Cable
[ ]	7.5"	Blk/Red/Yel Wire Cable
[ ]	8"	Blk/Red/Brn and Wht Wire Cable
[ ]	7.5"	Blk/Red/Orn and Wht Wire Cable
[ ]	5.5"	Blk/Red/Yel and Wht Wire Cable
[ ]	8.5"	Blk/Red/Grn and Wht Wire Cable
[ ]	8"	Velcro Hook
[ ]	8"	Velcro Loop

III. MECHANICAL DISASSEMBLY

[ ] Remove the back from the Silver Seven.
[ ] Remove the two bolts that hold the encoder board to the bottom of the case.
[ ] Clip all the nylon ties that hold the wiring bundles together. Since you will re-use some of the wire, be careful not to cut into the wire.
[ ] Starting with the two wires from the battery pack and making sure they don't short out, clip or unsolder all the wires going to the power switch. Undo them at the switch. Leave the capacitors on the switch. The wires you remove will include the battery pack wires, the wires to the charge jack, the wires to the meter, and the wires to the RF deck.
[ ] Unsolder or clip all the wires that are going to the back side of the encoder board, keeping them as long as possible, because you will reuse some of them later.
[ ] Pull the wires out of the square hole in the board and set the encoder board aside. You will not need it again.
[ ] Remove all the sticks, trims, auxiliary levers, switches, plus the RF deck, batteries, and antenna mount. You can leave the meter and any other items still left in the old case; they won't be needed. Note: use a 7/16" open end wrench to loosen the dress nuts on the switches.

IV. INITIAL WIRING OF THE micro**pro**8000

A. Case Preparation and New Parts

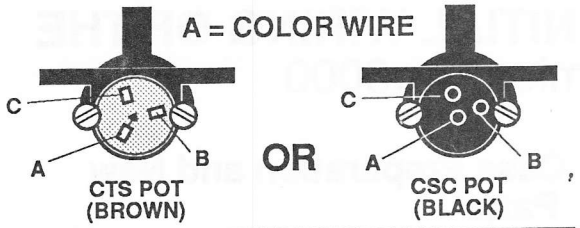
You may find some modifications necessary to the case, or you may need to obtain additional parts to complete your retrofit. We will cover that now:

[ ] Check to see if the plastic outer bezels for the sticks fit into the punched openings. Older bezels were taller than current models; the opening in the case will need to be **heightened** by 3/32" with a file or nibbling tool.
[ ] If you have a Noble 4PDT power switch as opposed to a Noble DPDT switch, you will need to use a 1/8" drill to elongate the top power switch hole. The 4PDT switch will now fit the existing cut outs.
[ ] If you have an old, straight antenna mount that goes into a round hole, you will need a new, offset mount (Ace P/N **PLA390**). Call us, tell us you have a micro**pro** retrofit and need that part and we'll send you one at no charge (1.800.322.7121).
[ ] If your RF deck is not already set up with Deans connectors, it will need to be with a pair of two pin (P/N **19K53**) and three pin (P/N **19K54**) connectors. Here again, call us, and we'll send them at no charge. Refer to your Silver Seven instructions, pg. 20, to install the male halves in the RF deck. The female halves will be wired in later.
[ ] It occurs to us that you may want to upgrade your micro**pro** with new, ratcheted trim and/or auxiliary levers. If so, order P/N **15G44A**. We will have to charge you for these plus a handling fee on the order, but you can use our toll free order desk number: 1.800.322.7121.

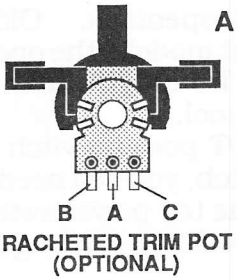
VARIOUS POT CONFIGURATIONS CTS, CSC, AND RATCHETED TRIM POT

FIGURE 1(A)

METAL GIMBAL DUAL STICK TRIM & AUX POTS

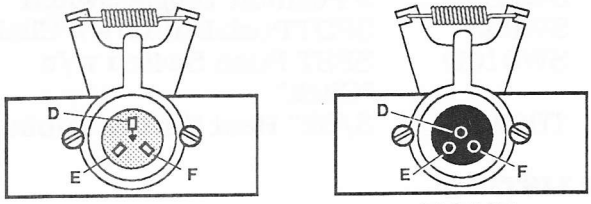


B = RED C = BLACK	FOR:	THT TRIM (GRN/WHT) AUX 1 (VIOLET)
B = BLACK C = RED	FOR:	ELV TRIM (BRN/WHT) AIL TRIM (ORN/WHT) RUD TRIM (YEL/WHT) AUX 2 (GREY)



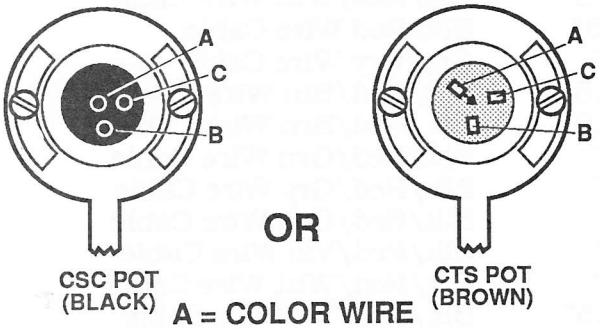
B = BLACK C = RED	FOR:	AIL TRIM (ORG/WHT) RUD TRIM (YEL/WHT) THT TRIM (GRN/WHT) AUX 2 (GREY)
B = RED C = BLACK	FOR:	ELV TRIM (BRN/WHT) AUX 1 (VIOLET)

PLASTIC GIMBAL CONTROL POTS (SINGLE & DUAL)



E = BLACK F = RED	FOR:	CH 1, ELV (BRN) CH 4, THT (GRN)
F = BLACK E = RED	FOR:	CH 2, AIL (ORG) CH 3, RUD (YEL)

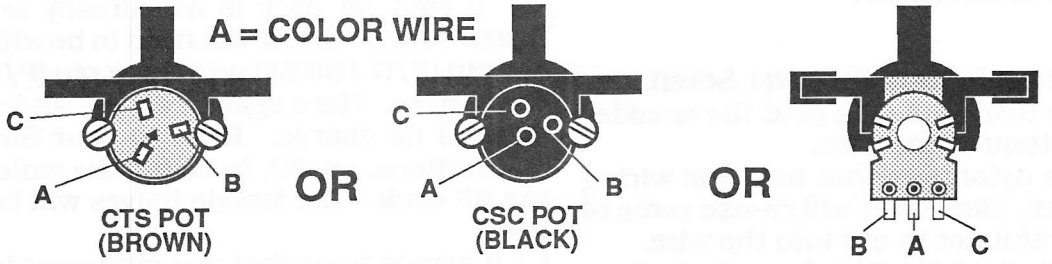
PLASTIC GIMBAL DUAL STICK TRIM & AUX POTS



A = COLOR WIRE

B = RED C = BLACK	FOR:	AIL TRIM (ORN/WHT) RUD TRIM (YEL/WHT) THT TRIM (GRN/WHT CH 6 (VIOLET)
B = BLACK C = RED	FOR:	ELV TRIM (BRN/WHT) CH 7 (GRAY)

SINGLE STICK TRIM & AUX POTS (PLASTIC & METAL)



B = BLACK C = RED	FOR:	AIL TRIM RUD TRIM
B = RED C = BLACK	FOR:	THT (CH 4) THT TRIM ELV TRIM AUX 1 AUX 2

A = COLOR WIRE

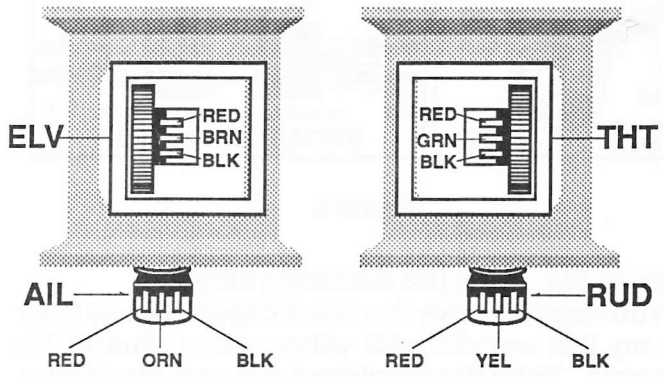
B. Trim, Auxiliary, and Stick Wire Preparation

[ ] As with the Silver Seven, we will use a color code to identify the three wire cables on each of the control, trim, and aux pots. The following chart shows the color code plus the wire lengths for the various versions.

WIRING CHART

CHANNEL	COLOR	2M	2P	1M	1P
1. Elevator	Brown	6"	6"	8.5"	8.5"
Elev. Trim	Brn/Wht	4.5"	7.5"	8"	8"
2. Aileron	Orange	3.5"	8"	5"	5"
Ail. Trim	Orn/Wht	5"	5"	7.5"	7.5"
3. Rudder	Yellow	5"	7.5"	6"*	6"*
Rud. Trim	Yel/Wht	3.75"	4"	5.5"	5.5"
4. Throttle	Green	8"	5.5"	9"	9"
Tht. Trim	Grn/Wht	3"	5.5"	8.5"	8.5"
5. Retract	Blue	9.5"	8.5"	8.5"	8.5"
6. Aux. 1	Violet	6"	5.5"	5"	5"
7. Aux. 2	Grey	5"	5"	4.5"	4.5"
8. Aux. 3	White	8"	8"	7.5"	7.5"

2M = Dual Metal Gimbal, **2P** = Dual Plastic Gimbal,
1M = Single Metal, **1P** = Single Plastic
*Splice to existing rudder pot wires.



METAL GIMBAL CONTROL POTS (SINGLE & DUAL STICK)

Figure 1(B)

[ ] Locate your four trim levers. Of course, if you have plastic gimbals, the trims are part of the sticks.
[ ] Check the length of the wire between the pot and the end of the wire and compare it to the length shown in the Wire Length Chart. If it is too long, shorten it; if it is too short, replace it with the furnished wire cable.
[ ] Check that the pots are wired according to Fig. 1. The red and black wires may need to be reversed in order to correspond. Make sure all the solder joints are secure by wiggling the wire at each joint. Note: the pots in your trims and aux levers may be one of two types; CTS (light brown in color) or CSC (black in color).

[ ] You are now going to install connectors on the end of each of the trim pot cables. Cut the three wire cable for each of the four trim levers to the length indicated on the wiring chart. The distance is measured between the pot and the end of the cable.
[ ] Strip 1/8" insulation off the ends of all of the wires you just cut, twist, and tin each of them.

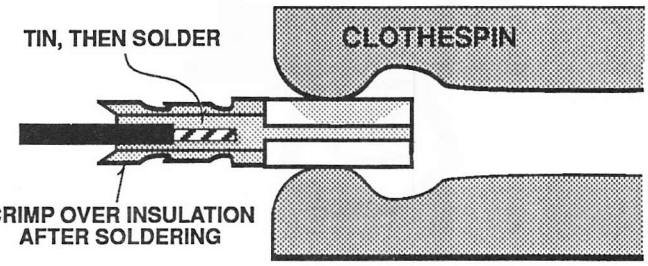


Figure 2

[ ] Refer to Fig. 2. Tin and solder a female pin to each of the 12 wires you have just prepared. Be careful not to use too much solder or you'll inhibit the proper operation of the pin. A clothespin is a handy holding fixture while soldering. Wait until the joint cools and then crimp the tabs over the insulation with a needle nosed pliers.

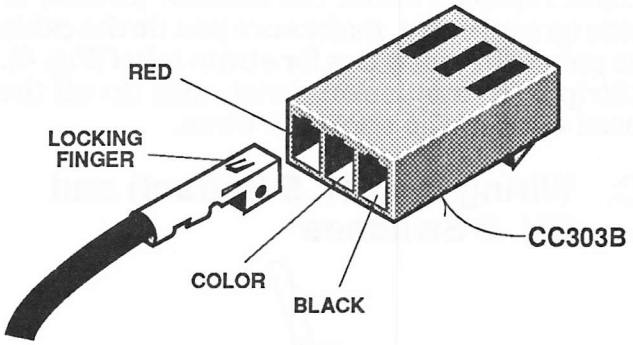


Figure 3

[ ] Refer to Fig. 3. Now, making sure you are doing so properly, insert the three female pins into a plastic connector body until they click into place. Repeat for each of the four trim pot cables. If, for some reason, you need to remove a pin, take a small screwdriver or similar probe, and push down on the locking finger while pulling on the wire. It will slide out.
[ ] Locate the grey and violet three wire cables furnished. Strip 1/8" insulation, twist, and tin both ends of all six wires.
[ ] Locate the two auxiliary levers that you removed from your Silver Seven. Unsolder the wires going to the pots and discard the wires.
[ ] Solder the violet three wire cable to the aux pot

for Ch. 6 and the grey cable to the aux pot for Ch. 7, referring to Fig. 1.

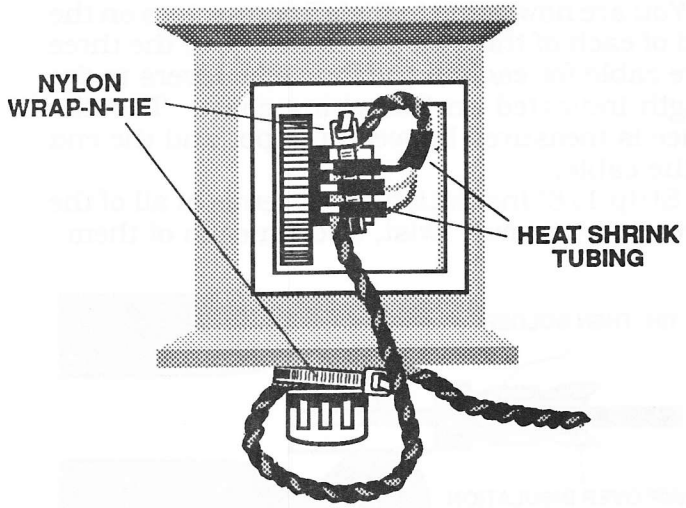


Figure 4

[ ] According to the Wiring Chart, check the length of each stick control pot cable, measuring from the pot. Shorten if too long or replace with one of the furnished cables if too short. Check to make sure they are all wired properly according to Fig. 1. Reverse the red and black wires if needed. New heat shrink tubing is furnished. If you have replaced either the elevator (brown) or throttle (green) cable, make sure you tie the cable to the pots with nylon ties for strain relief (Fig. 4).
[ ] Strip 1/8" insulation, twist, and tin all the exposed ends of the stick pot wires.

C. Wiring the CH. 5 (retract) and CH. 8 Switches

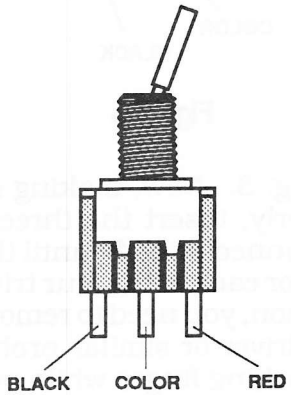
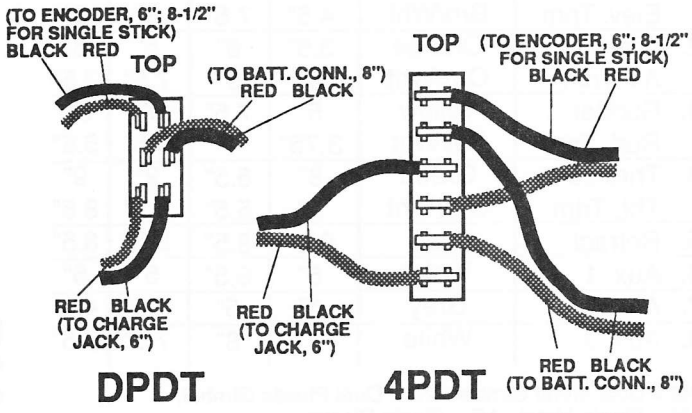


Figure 5

[ ] Locate the two new switches that have the flat bat handle. Note that one switch has two positions and the other has three. The two position switch is for CH 5 (Retract; blue wire) and the three position is for CH 8 (Aux. 3; white wire).
[ ] Locate the blue cable and the white cable, strip 1/8" insulation, twist, and tin both ends of each cable. Referring to Fig. 5, solder one end of the blue cable to the two position 'flat bat' switch (tin the switch terminals first) and solder one end of the white cable to the three position 'flat bat' switch. Note: at the factory, we usually don't cover the switch joints with tubing; if you chose to do it this way, make sure you don't have any uninsulated wire beyond the terminal in order to eliminate potential shorts later.

D. Wiring the Power Switch



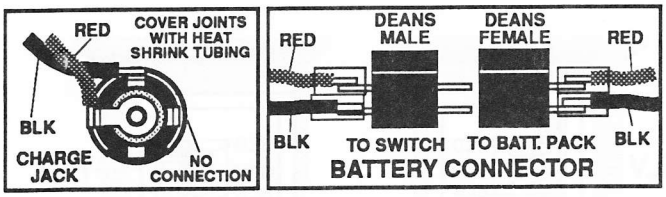


Figure 6

Refer to Fig. 6 for the following steps:
[ ] You need to leave the three capacitors as they are on the switch. All other wires should be removed. Take the furnished red and black wire cable and cut into three pieces: two 6" lengths and one 8". (Note: if you are doing a single stick transmitter, cut wires to these lengths: 6", 8", and 8-1/2".) Strip and tin both ends of all three cables.
[ ] Take the 8" cable and solder a Deans male three pin connector on one end (cover joints with sleeving).
[ ] Take one 6" cable and solder the furnished charge jack to one end (cover joints with heat shrink tubing).
[ ] Now solder all three of the cables to the power switch as shown. Make sure the capacitors stay hooked up to the switch.

E. Preparing the Battery Pack

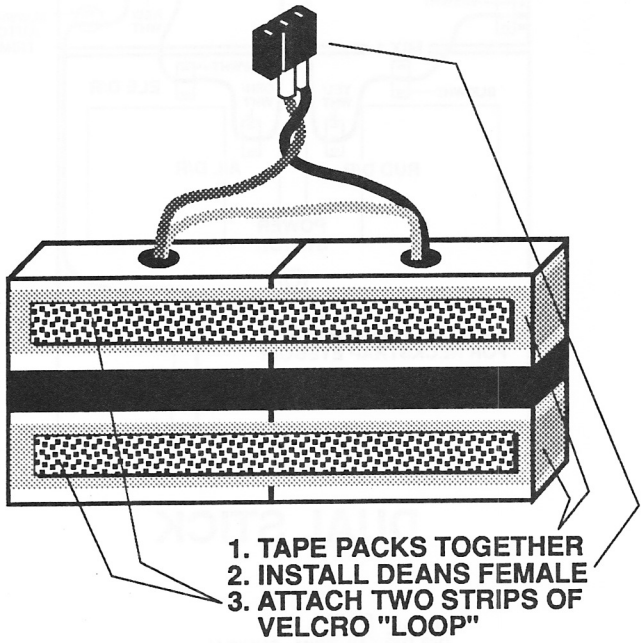


Figure 7

[ ] Using electrical or strapping tape, tape your two battery packs together end to end.
[ ] Being careful not to allow them to short together, refer to Fig. 6 and solder a Deans female three pin connector onto the red and black wires from your battery pack.
[ ] Note that you have been supplied an 8" length of Velcro "hook" and "loop" material. Cut the "loop" (the "fuzzy" stuff) in half, remove the protective backing and stick one on the side of the battery pack towards the top and the other towards the bottom. Set the pack aside for now.

F. Initial Pot Settings

[ ] Set your multimeter to measure resistance and have it on the lowest setting that includes 3000 (3K) ohms.
[ ] Referring to your Silver Seven instructions (pg. 13 and 22), adjust all trim and auxiliary pots so there is approximately 2400 ohms resistance between the black wire and the colored wire when the lever is in its neutral or center position. If desired, use straight pins as test probes in the trim pots female connectors. Leave the control pots alone for now.

V. ASSEMBLY AND WIRING

A. Installing Rubber Feet

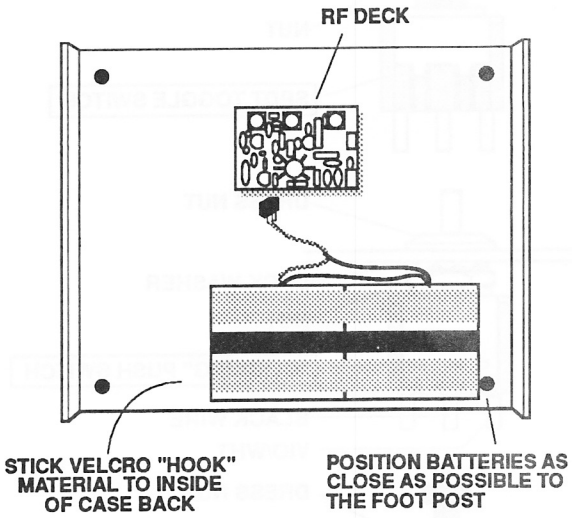


Figure 8

[ ] There are eight rubber feet to install in the bottom and the back of the transmitter case; note the 3/16" holes that are punched for these. Poke the small end of each foot through the hole and grab it from the inside with a needle nose pliers. Gently pull and wiggle until the foot is engaged in the hole.
[ ] While you have the back of the case handy, apply two 4" strips of Velcro "loop" material on the inside of the back to hold the battery pack in place. Note: the two holes in the back for the RF deck; they are toward the top of the back.

The easiest way to apply the Velcro to the back is to first mate it with the Velcro that you have already put on the battery pack, peel off the backing paper and then put the batteries into position on the back: they need to go in the lower right hand corner of the back so that they are about 1/4" up from the bottom and as close as they can go to the part of the rubber foot that protrudes through the back. The "loop" material will then be stuck to the back in the proper location.
[ ] Also install your RF deck onto the back of the case using the two 2-56 screws and the appropriate frequency plate. Make sure the screws are securely tightened.

B. Switch Installation and Wiring

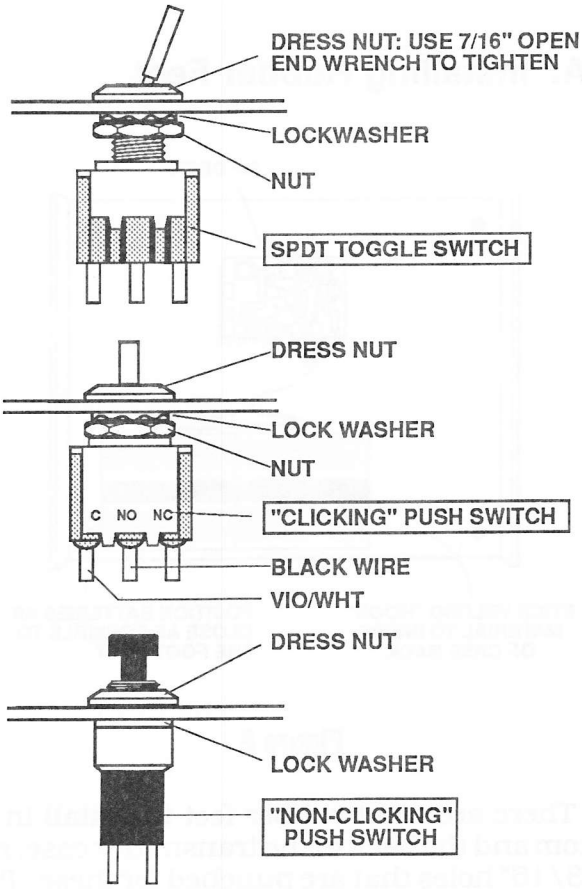


Figure 9

[ ] Locate the four SPDT toggle switches you removed from your Silver Seven and unsolder all the wires. If there are any capacitors soldered to the switches, they can be removed. Also locate the new SPDT toggle switch supplied with the retrofit.

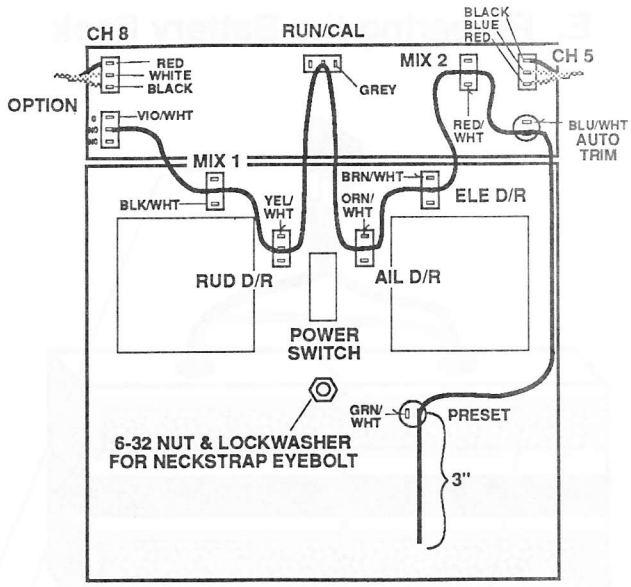
[ ] Using the hardware as per Fig. 9, install these five switches in the holes indicated for ELE D/R, AIL D/R, RUD D/R, MIX 1, and MIX 2. The bodies of the switches run vertically. Use a 7/16" open end wrench to tighten the dress nut.

[ ] Locate the two black push button switches that are furnished with your retrofit that are the same and don't "click" when pushed. Install them in the holes indicated for PRESET and AUTO TRIM.

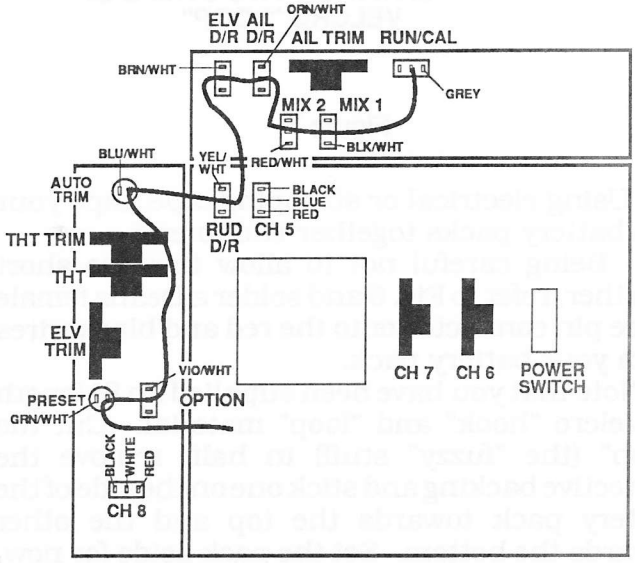
[ ] Locate the push button switch that is furnished with your retrofit (the one that "clicks") and install it where indicated for OPTION.

[ ] Locate the lift-to-lock SPDT toggle switch and install it where indicated for RUN/CAL.

[ ] Leave the CH 5 and CH 8 switches and the power switch alone for now.



DUAL STICK



SINGLE STICK

"DAISY–CHAIN" WIRING DIAGRAM

Figure 10

[ ] All of the switches you have just installed get wired in a "daisy chain" arrangement. That means there is a common wire for each switch and this common wire runs from switch to switch to switch. We have furnished 30" of black wire for this purpose. The technique is simple. We start by soldering one end of the wire to the center terminal of the OPTION button. Make sure you tin both the wire and the switch terminal before

terminal of the MIX 1 switch; leave some slack and note the length. Use your wire strippers and break the insulation at this point; don't cut the wire, just the insulation.
[ ] Tin the exposed wire and the terminal and make the joint.
[ ] Next, run the wire to the center terminal of the RUD D/R switch and repeat.
[ ] Then go the RUN/CAL switch,
[ ] the AIL D/R switch,
[ ] the ELE D/R switch,
[ ] and the MIX 2 switch.
[ ] Next go to the AUTO TRIM button; the black wire can hook to either switch terminal. Now route the wire down the right side of the transmitter and
[ ] solder to either terminal of the PRESET button.
[ ] Leave 3" of wire and clip off; strip 1/8" insulation off the end, twist, and tin.

Note: the order for single stick transmitters is: RUN/CAL, MIX 1, MIX 2, AIL D/R, ELV D/R, RUD D/R, AUTO TRIM, OPTION, and PRESET.

[ ] Figure 10 indicates which switch terminal the second wire for each switch goes (there are only two wires on each of these switches). Following is a chart that provides the colors and length of these wires. Locate the appropriate wire, then strip, tin, and solder to the proper switch. Make sure both the wire and the terminal are tinned before making the joint. After you have soldered to the switch, strip 1/8" insulation off the other end, twist, and tin.

SWITCH	COLOR	LENGTH
( ) OPTION	Vio/Wht	9.5"
( ) MIX 1	Blk/Wht	10"
( ) RUD D/R	Yel/Wht	10.5"'
( ) RUN/CAL	Grey	10"
( ) AIL D/R	Orn/Wht	8.5"
( ) ELV D/R	Brn/Wht	8"
( ) MIX 2	Red/Wht	8"
( ) AUTO TRIM	Blu/Wht	6.5"
( ) PRESET	Grn/Wht	3"

[ ] Install the CH 5 (two position) and the CH 8 (three position) switches as you did the others; refer to Fig. 10 for the proper orientation of the switches. You have already wired these switches.
[ ] Install the power switch. It should go into the micro**pro** just like it came out of the Silver Seven. Make sure you orient it properly.

C. Antenna Mount and Neckstrap Eyebolt Installation

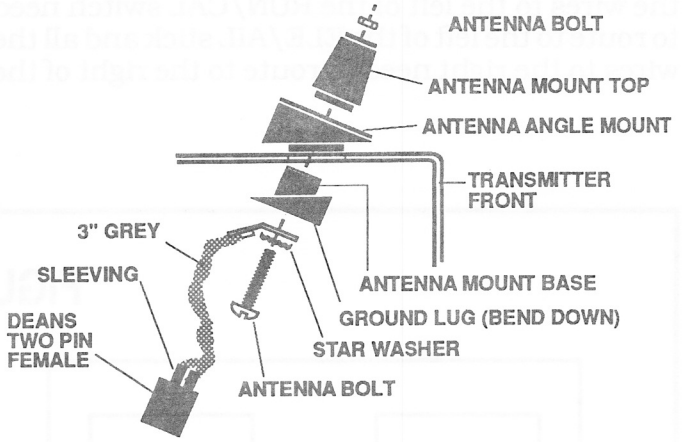


Figure 11

[ ] Using the existing screw, nut, solder lug, and lock washer, install the antenna mount as shown in Fig. 11. Hint: before tightening the screw, install the antenna half way down the bolt to insure proper alignment. Now tighten up the bolt. Unsolder your existing wire to the solder lug.
[ ] Locate the 4" long two wire grey cable and install a two pin female connector on the one end and solder the other end of both wires to the solder lug.

[ ] Next, it is necessary to give the solder lug and grey cable joint some strain relief. To do so, use a nylon wrap 'n tie to secure the grey cable to the body of the RUN/CAL switch. Make sure the cable contacts the plastic portion of the switch, not the metal.

[ ] Secure the neckstrap eyebolt into place with the furnished No. 6 lock washer and 6-32 nut.

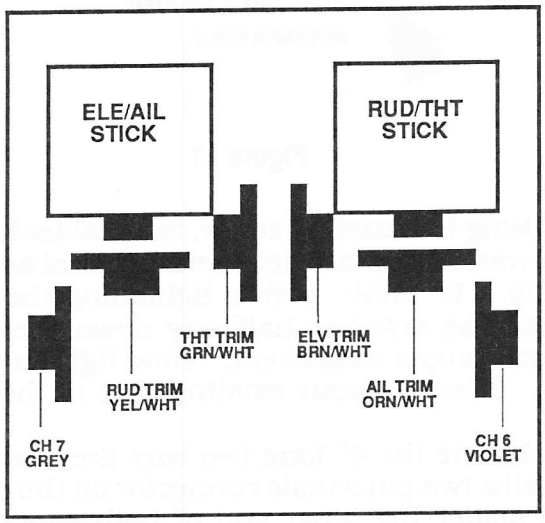
D. Trim/Aux Lever and Stick Installation

[ ] Refer to Fig. 12 and install the four trim levers and the two auxiliary levers with No. 2 self tap screws. NOTE: The layout indicates full crossed trims. Go ahead and wire it up according to Fig. 12. Modifications to this can be accomplished later if desired; it is covered in the Operation Manual.
[ ] Temporarily install the stick assemblies in place, using only a couple screws....you may need to remove them later.

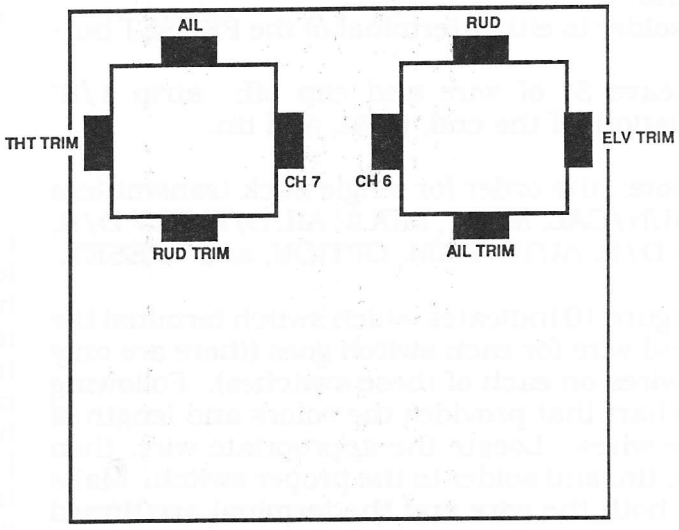
E. Wire Routing

[ ] You now have a "rat's nest" of wiring to deal with. Begin by "combing" the wires into place. All the wires to the left of the RUN/CAL switch need to route to the left of the ELE/AIL stick and all the wires to the right need to route to the right of the RUD/THT stick, including the grey wire from the RUN/CAL switch. The power switch wires route down the center. "Comb" the wires into a temporary position; we will permanently tie them into place later.

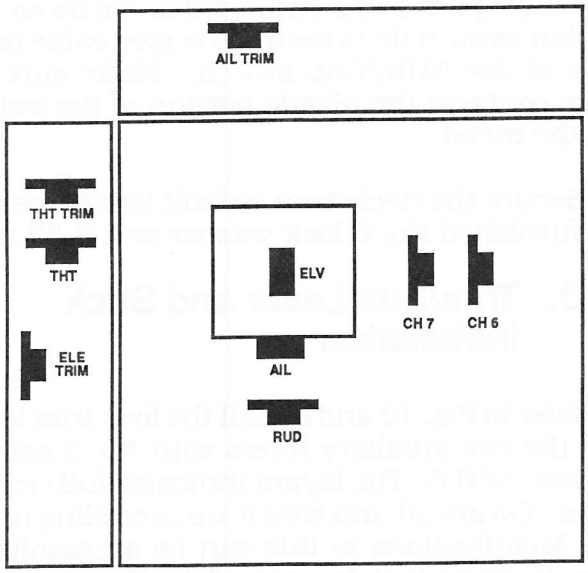
FIGURE 12



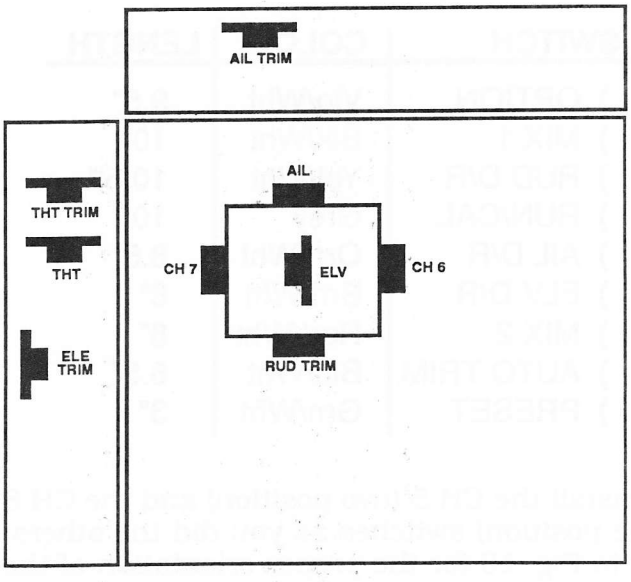
DUAL METAL STICK



DUAL PLASTIC STICK



METAL SINGLE STICK



PLASTIC SINGLE STICK

TRIM/AUX LEVER AND STICK INSTALLATION

VI. WIRING THE ENCODER BOARD

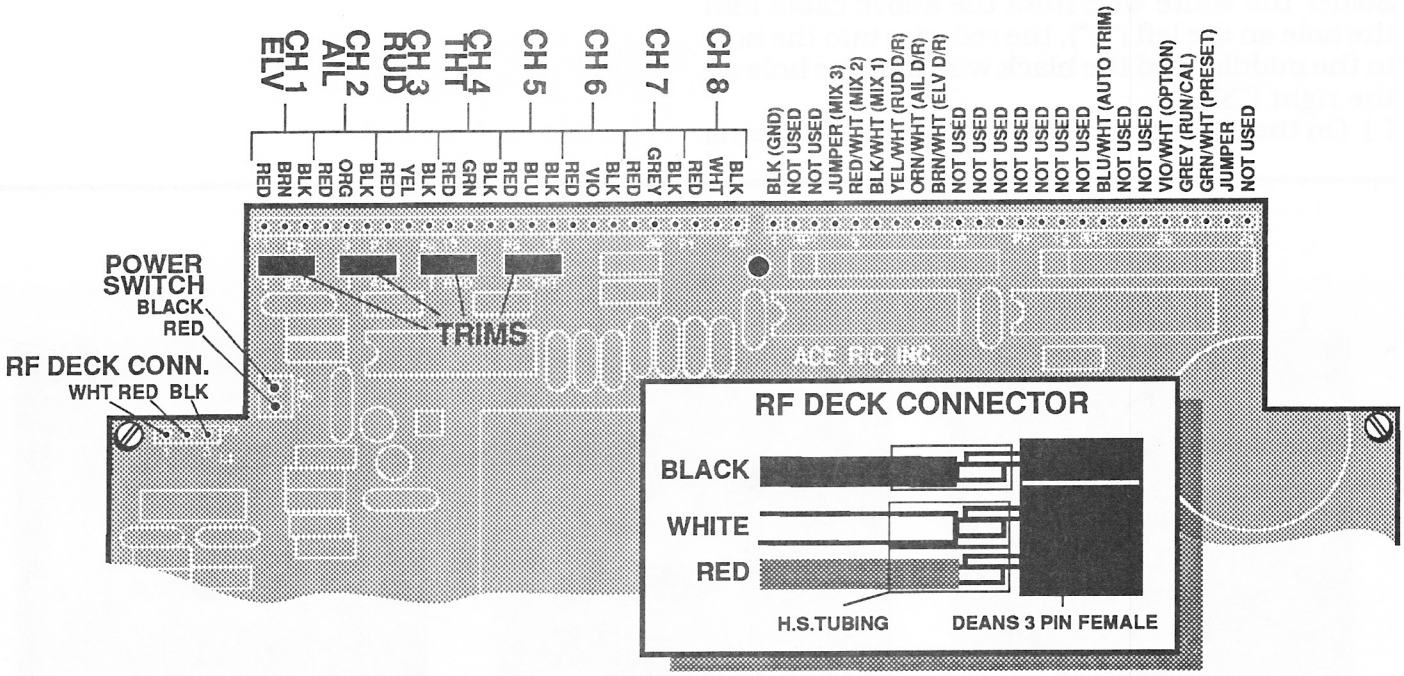


Figure 13

[ ] The following steps are critical, but not difficult. You will now be wiring everything into the encoder board. Keep the wiring neat and orderly; if it looks good, it will work good. Study your encoder board and Fig. 13; note the row of holes across the top. There are two groups of 24 and the holes are labeled at 1, 5, 10, 15, 20, and 24. We will reference the holes as being in either the left or right group as you face the component side of the board. As you solder a wire or cable in place, neatly route it to its location. We will start in the middle of the left group and work our way out to the end. As you proceed, make sure there are absolutely no frayed wires and each wire is inserted fully into the hole.

[ ] Solder the three wire cable that has the white wire in it and is coming from the CH 8 switch with the black wire in hole 24, the white wire in hole 23 and the red wire in hole 22. These holes are in the left group. Notice, that as you proceed, each three wire cable will have the black on the right, the color in the middle, and the red on the left.

[ ] Next solder the cable that has the grey wire in it (CH 7): black in hole 21, grey in hole 20, and red in hole 19.

[ ] Next do the violet cable: black in hole 18, violet in hole 17, and red in hole 16.

[ ] Repeat for blu (CH 5), holes 15, 14, and 13.

[ ] Repeat for grn (CH 4, THT), holes 12, 11, and 10.

[ ] Repeat for yel (CH 3, RUD), holes 9, 8, and 7.

[ ] Repeat for orn (CH 2, AIL), holes 6, 5, and 4.

[ ] Repeat for brn (CH1, ELV), holes 3, 2, and 1.

[ ] Now we will do the right group in a similar fashion, starting at the middle. The short black wire coming from the PRESET button goes in hole 1. This is the end of your "daisy chain" that hooks most of the switches together.

[ ] Holes 2 and 3 are not used.

[ ] There is a jumper between hole 4 and hole 23. This is the MIX 3 switch which is always "ON". If you want to install a MIX 3 switch, this would be where you do it. At this stage, just leave the jumper as is.

[ ] The red/wht wire (MIX 2) goes in hole 5.

[ ] The blk/wht wire (MIX 1) goes in hole 6.

[ ] The yel/wht wire (RUD D/R) goes in hole 7.

[ ] The orn/wht wire (AIL D/R) goes in hole 8.

[ ] The brn/wht wire (ELV D/R) goes in hole 9.

[ ] Holes 10 through 16 are left open.

[ ] The blu/wht wire (AUTO TRIM) goes in hole 17.

[ ] Holes 18 and 19 are left open.

[ ] The violet/wht wire (OPTION) goes in hole 20.

[ ] The grey wire (RUN/CAL) goes in hole 21.

[ ] The grn/wht wire (PRESET) goes in hole 22.

[ ] There is a jumper wire in hole 23.

[ ] Hole 24 is not used.

[ ] That completes the wiring of the two groups of 24 holes in the top of the board. You are almost done!

[ ] Look over on the left of the board and locate the two holes labeled P6.

The black wire from the power switch goes in the upper hole ("2") and the red wire goes into the lower hole ("1").

[ ] Locate a three wire cable with a white wire in it 8-1/2" long. Strip, twist, and tin both ends.
[ ] Locate the three holes in the board labeled P7. Solder the white wire from the above cable into the hole on the left ("1"), the red wire into the hole in the middle, and the black wire into the hole on the right ("3").
[ ] On the other end of this cable, solder a Deans 3 pin female connector as shown. Make sure these joints are secure and cover them with sleeving.

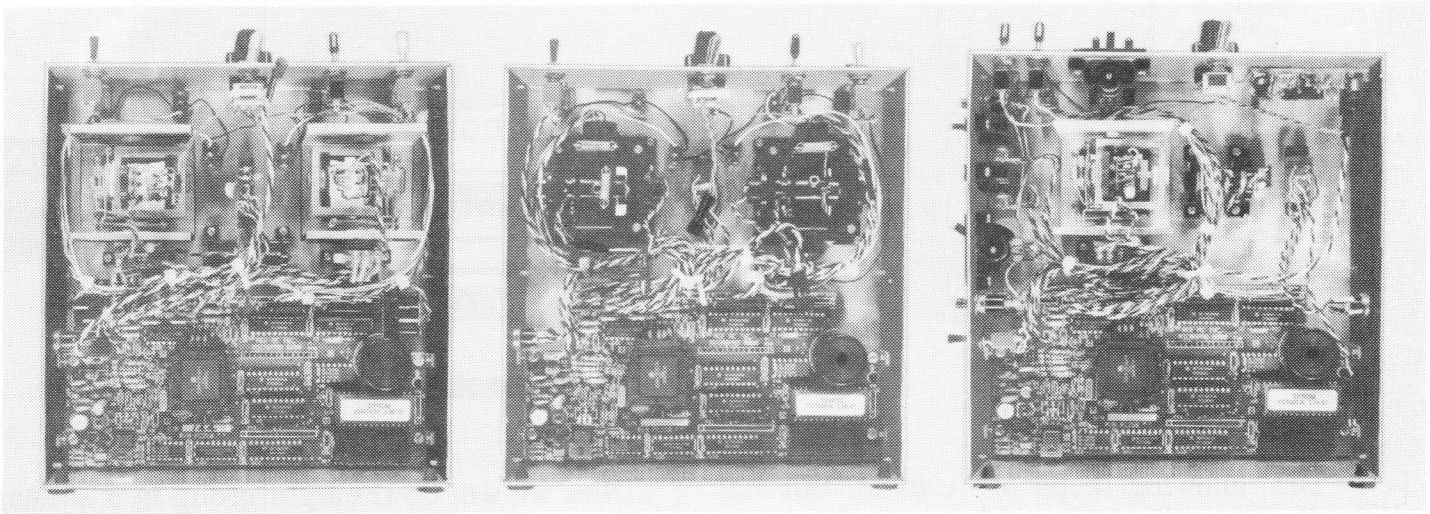


Figure 14

VII. ASSEMBLY

[ ] Locate the two side plates for your case. Note that one of them has an extra hole in it. It goes on the left side of the case as you face the rear and the other goes on the right. Secure each side plate to the front of the case with three No. 4 x 1/4" Self Tap screws. Be careful not to pinch any wires in the process.
[ ] After the side panels are secured, install the charge jack into the left side panel using the hardware furnished.
[ ] Blow or brush any clippings or residue from the inside of the case. Remove the protective cover that is over the clear window on the inside of the case. Also remove the protective film that is on the LCD display on the back side of the encoder board.
[ ] Secure the encoder board into place using four 4-40 x 3/16" bolts from the sides into the "L" brackets that are already installed on the board. Make sure there are no wires trapped between the encoder board and the case.

[ ] Look at the end of each of trim pot connector and note a little "1" imprinted. This "1" corresponds with the red wire and when you plug the connector in, it should be to the left and the black wire to the right. Now, plug each of the four trim pot connectors into the PC board as follows: Brn/Wht trim plugs into the male connector on the board labeled "ELV"; Orn/Wht to "AIL"; Yel/Wht to "RUD"; and, Grn/Wht to "THT". The little "1" or red wire should correspond to the vertical white mark on the board.

[ ] Now use the small nylon wrap 'n ties to neatly bundle the wires and cables. Make sure there is no strain on any of the wires and that none of them interfere with the workings of the sticks, trims, or aux levers. All the wires except the power switch wires should be routed on the outside of each stick assembly.

You should have three connectors available to plug into the components on the back of the case: the two for the RF deck and the one for the battery pack.

Double check all your wiring because in the next step we will apply power to your transmitter.

VIII. CALIBRATION

A. Stick Pot Set-up

[ ] Plug in your battery pack, but leave the RF deck unplugged while you are calibrating so you don't consume unnecessary power. Leave the back unsnapped for now and just lay it down on your work surface so you can get to the insides.
[ ] While doing the calibration, a mirror or a second pair of eyes and hands are needed so you can read the LCD display while adjusting the pots. Reread the sections in your Silver Seven manual that tell you how to adjust both the stick and the trim pots (pg. 13 and 22).
[ ] First, check that the system powers up OK by turning on the transmitter with the RUN/CAL switch is in the RUN position. Observe the LCD display. It should look normal, just as described in your Operation Manual. If it doesn't, recheck your wiring to make sure power is getting to the encoder.
[ ] Now, set your voltmeter on DC volts at the lowest setting that includes 12 volts. Attach the negative probe to metal tab which is on the power transistor that is in the lower left hand corner of the encoder board. This tab is an easy place to access the ground (negative) of the transmitter circuit. Read the voltage at the aileron pot terminal to which the red wire is going. It should be around 9 to 10 volts. **Multiply** this reading times **0.315** and write it down. For example, the voltage measured at the pot terminal with the red wire is 9.38 volts. 9.38 x 0.315 = 2.95 (rounded off to two decimals).
[ ] Attach the positive probe to the aileron pot's middle terminal (the one with colored wire going to it). Adjust the pot so that when the stick is in neutral, the voltage reads the same as your calculated voltage. Get it as close as you can. When done, be sure to retighten the set screw.
[ ] Repeat this same procedure for the other three stick pots. When you do the throttle pot, you will have to physically hold it in the center of its travel. This procedure should get you real close to the proper setting. We will fine tune them next.

B. Initializing the EPROM, Setting the Voltmeter and Performing the Self-Diagnostic Test

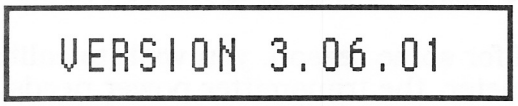
In order to "teach" the computer about its current surroundings, it is necessary to initialize it. Programmed in the computer is a procedure to accomplish this.

This routine also allows you to re-calibrate the digital voltmeter, if desired. Under normal circumstances, you should **never** have to perform this procedure because it is done at the factory. If you do want to calibrate the voltmeter, you will need a variable power supply capable of producing at least 13 volts and an accurate voltmeter.

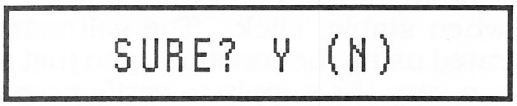
It is in this routine that we will so a self-diagnostic test to verify the proper operation of the sticks, switches, and levers by allowing you to view the input to the A/D (analog to digital) converters.

[ ] To access this routine, you have to perform the following procedure:

1. With the transmitter OFF and with the RUN/CAL switch in the RUN position, press and hold the PRESET button. Then:
2. Turn the transmitter ON. The display will read (the number may be differ ent):



3. Still keeping the PRESET button depressed, push the AUTO TRIM button and hold.
4. Then, release the PRESET button.
5. Then, release the AUTO TRIM button. The display should read:



If the display does not agree with this, try again. It may take a couple of times to get the procedure down pat. When the display reads the above statement, move the aileron stick left and right; the parenthesis should change back and forth from "Y" to "N".

NOTE: If it doesn't, your aileron stick pot is not set-up right. Turn the transmitter off and go through the set-up procedure for the aileron stick again. Then try the procedure again. If you still can't get proper operation, call our technical support number (816.584.6303) and we will talk you through a procedure to fix it. Have your transmitter available with charged batteries when you call!
[ ] When the YOU SURE? is displayed, use the aileron stick to position the parenthesis to "Y" and click the OPTION button. Observe the display. For a few moments, all 16 of the display's characters will be occupied with a letter or a number to verify proper operation. Then:

```
INITIALIZE Y (N)
```

[ ] You will need to use the aileron stick to answer (Y) Yes and click the OPTION button. The display will momentarily show:

```
EPROM INIT'D
```

And then go to:

```
VOLTMETER Y (N)
```

CAUTION: DO NOT ANSWER "YES" UNLESS YOU HAVE READ THE NEXT PARAGRAPH:

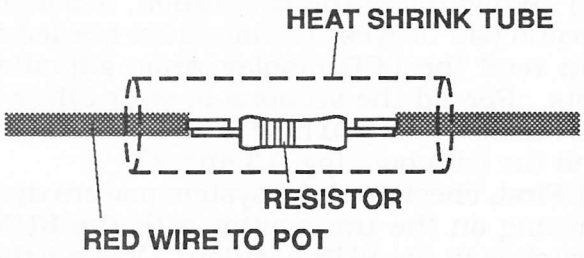
If for some reason, you wish to calibrate the voltmeter, the transmitter power needs be supplied with a variable power supply monitored by a good, accurate voltmeter. Power up the transmitter with the supply set at about 10V. Answer (Y) Yes to the VOLTMETER question and click; once you do, you are committed to perform this procedure to completion. The display will prompt you to set the power supply to 12.5V. Do so, and when stable, click the OPTION button. Now you will be prompted to set the supply at 9.5V. Do so, and when stable, click. The voltmeter is now calibrated using the constants you just supplied; you can vary the supply to verify proper operation. Click once more and you can now continue with the reading of the A/D converters.

[ ] If you have either calibrated the Voltmeter or used the aileron stick to answered (N) No to the Voltmeter question and clicked, the display will read:

```
ELV A/D = XXX
```

This is the raw A/D data for each channel's input to the computer (except CH 8). This routine is used for checking all pots to make sure they don't have "dead" spots and are adjusted properly.

[ ] The number displayed should be as follows: when in neutral, the number should be approximately 128. When you move the ELV stick upward, the number should continue to increase until you reach the end of travel. It should not reach 255 and quit while you still have stick movement left; if it does, there will be a "dead spot" at that portion of the travel. By the same token, when you move the stick downward, the numbers should continue to decrease until you reach the end of travel. It should not reach 0 while there is still stick movement left. Adjust the pot setting as necessary to achieve these conditions.



"PAD" RESISTOR INSTALLATION

Figure 15

You may find that you can't adjust the pots properly so these conditions are achieved; i.e., you reach 0 and 255 before you reach the end of stick or lever travel. This is most likely to happen with the plastic gimbal control pots and/or the throttle lever and rudder knob pot on the single stick version of the transmitter. If so, it will be necessary to install a "pad" resistor in line with the positive lead to the pot (red wire). Following are the suggested values: Plastic gimbal control pots; 1K (brn, blk, red). Single stick throttle pot; 2K (red, blk, red). Single stick rudder knob pot; 4.3K (yel, orn, red).

To do this, turn the transmitter off and simply cut the red wire a couple inches away from the pot; unravel a bit of the wire and cut off approximately 1/2" of the red wire. Strip and tin about 1/8" of the insulation off the exposed wires. Cut both leads of the appropriate resistor to about 3/16" long and tin. Slip a 3/4" length of 3/32" heat shrink tubing over one of the red wire ends then solder the appropriate resistor in place. Don't shrink the heat shrink tubing down until you are sure the resistor does the job.

Now read the A/D converters again; readjust the pots as needed; you should get the proper readings.

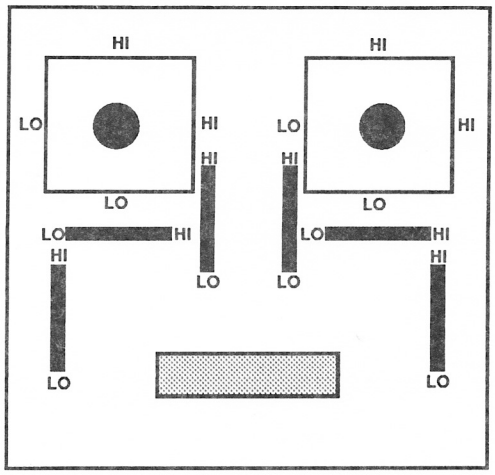


Figure 16

Note: Figure 16 shows where the stick or lever should be when you get the high numerical reading and where is should be when you get the low numerical reading; check to make sure it correlates with your transmitter as you go along. Note that the HI reading is always when the stick or lever is in the upward or right position. If different than that, you will have to reverse the red and black wires to that given pot and recenter the pot.

[ ] When you have the elevator pot adjusted properly, click the OPTION button and the following will be displayed.

```
AIL A/D = XXX
```

Repeat the check as you did for the elevator pot and adjust if needed. When satisfied, click the OPTION button and repeat for all the pots including the CH 5 switch (0 will be displayed when the switch is in the B position and 255 will be displayed in the A position). Following is the order they will occur:

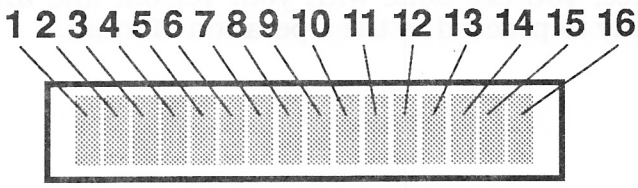
[ ] ELV (elevator pot)
[ ] AIL (aileron pot)
[ ] RUD (rudder pot)
[ ] THT (throttle pot)
[ ] CH 5 (retract switch)
[ ] CH 6 (channel 6)
[ ] CH 7 (channel 7)
[ ] ETM (elevator trim)
[ ] ATM (aileron trim)
[ ] RTM (rudder trim)
[ ] TTM (throttle trim)

NOTE: the trims are "crossed"; if you want to modify that, you can do that later....it is covered in the Operation Manual.

You can only move in one direction in this procedure; if you need to go back to a previous channel, you will need to turn the transmitter off and start over at the beginning of the "Initializing" procedure.

[ ] After reading all the A/D converters for all the channels and trims, the next display will automatically read a series of 0's and 1's. This displays the status of each of your micro**pro** switches and buttons including CH 8. Verify proper operation by actuating the switch and observing the display.

Following is a chart that provides you a guide to this feature.



LCD DISPLAY

DISPLAY POSITION	SWITCH	"0" INDICATES
1	AUTO TRIM	Pushed
2	OPTION	Pushed*
3	CH8	"A"
4	CH8	"C"
5	RUNCAL	"CAL"
6	N/A	.....
7	N/A	.....
8	N/A	.....
9	N/A	.....
10	PRESET	Pushed
11	MIX 3	"ON"**
12	MIX 2	"ON"
13	MIX 1	"ON"
14	RUD D/R	Down
15	AIL D/R	Down
16	ELV D/R	Down

*Buzzer also sounds
**If Installed

C. "Set Joysticks" Routine

[ ] The **Set Joysticks** routine must be performed. The reason for this procedure is to teach the computer the new parameters for all the pots and the CH 5 switch.

With the transmitter off, the **RUN/CAL** switch in the **RUN** mode, and the sticks at neutral, push the AUTO TRIM button and then turn the transmitter on. The display will read:

```
SET JOYSTICKS
```

[ ] While this is displayed, move both sticks to full up, full down, full right, and full left. Also, move all the trim levers to both extremes, the CH 6 and CH 7 levers to both extremes, and the CH 5 switch.

[ ] To exit this procedure, push the AUTO TRIM button once again, and the display will display the normal **RUN** mode information. The routine is complete, but **don't forget to exit properly** by pushing the AUTO TRIM button.

[ ] Check out is now complete. To exit this procedure, simply turn the transmitter off. Once you plug in the RF deck and snap the back into place, you are done with your retrofit and are ready to proceed to the Operation Manual.

ACE R/C

116 W. 19th St., P.O.Box 511, Higginsville, MO 64037
Business Office: 816.584.7121 Order Desk: 800.322.7121
24 Hr. FAX: 816.584.7766 Technical Support: 816.584.6303 (Electronics & Aircraft)