



**RCFS 64**  
**RADIO CONTROLLED**  
**FLIGHT SIMULATOR**

By John Kallend

FOR COMMODORE 64

**DAVE BROWN PRODUCTS**  
4560 LAYHIGH - HAMILTON, OHIO 45013





## THE DUAL JOYSTICK "TRANSMITTER"

FROM DAVE BROWN PRODUCTS

Welcome to the wonderful world of R/C Model aircraft. Your purchase of the Dual Joystick "transmitter" will enhance your "flying" enjoyment with the RCFS 64 Flight Simulator, as well as future programs which will surely make use of it's ability to access 4 analog inputs and 3 pushbutton inputs on your Commodore 64 computer. All our Dual Joysticks are tested before they leave our factory, so when you open the box, you are ready to install the plugs and start having fun. Before plugging in your Dual Joystick, refer to your Commodore 64 instruction manual for the location of the 2 control ports. Insert the plugs marked #1 and #2 from the dual joystick box into the appropriately numbered control ports, being careful to ensure that they are right-side up.

This instruction sheet includes a short Basic program with which you may test your Dual Joystick, and step by step instructions for using the knobs which defeat the self-centering springs. Plug in your joystick, type in the test program, and run the program. The numbers on the screen indicate the position of the joystick knobs. They should vary from "0" to "255" as the sticks are moved. Each number corresponds to one axis of travel on one stick. The neutral, or spring centered, position of each axis should be approximately "126" to "129" for most symmetrical control input. If they are not, then adjust the neutrals with each appropriate trim lever. On axis without spring centering, it is sufficient to ensure that the travel will go from "0" to "255". For use with the Dave Brown Products R/C Flight Simulators, the vertical axis (up and down axis), of the left stick, should have the centering-spring disabled for use as the throttle. All other axis should be spring-centered. The next step is to test the pushbuttons. Depress each pushbutton and the message "1>ON", "2>ON", or "3>ON" will appear. For most programs, only pushbuttons 1 and 2 are used, but this unit has the third one installed for any possible future use.



## DEFEAT OF SELF-CENTERING

These joysticks have the feature of being able to defeat the self-centering springs on either axis. Of course, you may also restate the self-centering by simply turning the knob again. If you need to change the self-centering feature, simply follow the following instructions.

First, you must remove the back of the Dual Joystick Unit by removing the four screws on the sides of the unit. On the back of each joystick, you will see 2 knobs. Now look into the front of the joystick, move the stick, and look into the front of the joystick. Move the stick and see the springs which control each axis. Now turn the knobs on the back, which defeat the self-centering. They turn the "D" shaped pieces inside the stick, near the springs. When the curved part catches the arm that the spring is attached to, the self-centering is disabled. This is most easily done by holding the control stick into any corner and rotating the knobs on the back 180 degrees. Note that, if desired, all axis could have the self-centering disabled.

Once you have the desired combination of self-centering and non self-centering, replace the back of the joystick box, and reinstall the screws.

## JOYSTICK TEST PROGRAM

Note: This test program cannot be used to test a 'normal' Commodore joystick, as the normal joysticks are digital (on/off) rather than analog (proportional).

```
10 C=12*4096:REM SET PADDLE ROUTINE START
11 REM POKE IN THE PADDLE READING ROUTINE
15 FOR I=0 TO 63:READ A:POKE C+I,A:NEXT
20 SYS C:REM CALL THE PADDLE ROUTINE
30 P1=PEEK(C+257):REM SET PADDLE 1 VALUE
40 P2=PEEK(C+258):REM " " 2 "
50 P3=PEEK(C+259):REM " " 3 "
60 P4=PEEK(C+260):REM " " 4 "
65 JV=PEEK(56320)
67 PV=PEEK(56321)
70 PRINT P2;TAB(6);P4;TAB(12);P1;TAB(18);P3;TAB(25);
72 IF JV=126 THEN PRINT "1 ON ";
74 IF JV=111 THEN PRINT "2 ON ";
76 IF JV=110 THEN PRINT "1 ON 2 ON ";
78 IF PV<255 THEN PRINT "3 ON";
79 PRINT
90 GOTO 20
95 REM DATA FOR MACHINE CODE ROUTINE
100 DATA 162,1,120,173,2,220,141,0,193,169,192,141,2,220,169
110 DATA 128,141,0,220,160,128,234,136,16,252,173,25,212,157
120 DATA 1,193,173,26,212,157,3,193,173,0,220,9,128,141,5,193
130 DATA 169,64,202,16,222,173,0,193,141,2,220,173,1,220,141
140 DATA 6,193,88,96
```

READY.

# RCFS 64

## R/C MODEL FLIGHT SIMULATOR

### INTRODUCTION

The RCFS 64 Radio Control Flight Simulator is designed to provide an accurate, realistic simulation of flying a radio-controlled model airplane using a Commodore 64 microcomputer. The user is presented with a realistic, animated view of the model as it "flies", as if taken by a TV camera located on the ground at the pilots feet. The view presented accurately portrays the orientation of the model with full compensation for the direction of viewing (That is, for example, when the model is flying level and is high overhead, you see the underside of the model). Takeoffs, Aerobatics, and Landings can all be attempted, and the characteristics of the airplane can be adjusted within wide limits to closely simulate a large variety of model types.

This program is very complex, solving the differential equations of flight, and then generating the 3-D graphics in real time. Some simplification had to be made, in order to enable the program to run at reasonable speed on a microcomputer. Virtually all maneuvers are possible, including snap-rolls and spins, when the airplane is configured properly. The program does, however, have some features not apparant in casual use, such as dual-rate aileron and elevator control which allows you to change the sensitivity

of the control sticks at the press of a button. To get the most out of this program, you are strongly urged to read this instruction manual thoroughly.

## DISCLAIMER

This program attempts to give an accurate simulation of the control of a radio controlled model airplane. While we expect it to be of significant value in learning to fly an R/C model airplane, IT IS NOT INTENDED TO TAKE THE PLACE OF PROPER FLIGHT AND SAFETY TRAINING WITH A SUITABLE MODEL UNDER THE GUIDANCE OF AN EXPERIENCED R/C PILOT-INSTRUCTOR.

DAVE BROWN PRODUCTS and JSK Associates accept no responsibility for any damages caused by failure to heed this warning, or for other consequential damages.

## WARRANTY

If this product fails to run within 90 days of purchase, it will be replaced free if returned, with proof of purchase, to Dave Brown Products. Thereafter, a nominal charge of \$5.00 will be made to cover the cost of packing and shipping. The ORIGINAL DISK must be returned with any request for disk replacement. No other warranty service is provided. The warranty is void if the disk has been tampered with.

## UPDATES

If you wish to receive nominal cost updates of this software, please register

your purchase with Dave Brown Products within 30 days of purchase. Be sure to include your program serial number, and proof of purchase. You will be notified by mail of any update. UPDATE SERVICE WILL NOT APPLY IF YOUR PROGRAM IS KNOWN TO HAVE BEEN ILLEGALLY DUPLICATED OR DISTRIBUTED.

## COPYRIGHT

This program and these instructions are protected by Federal Copyright Laws. This means that it is ILLEGAL to make copies for your friends, club etc. We expect that you will respect the rights of the authors. The program is copy protected, and ANY ATTEMPT TO COPY THIS PROGRAM MAY LEAD TO THE DESTRUCTION OF THE ORIGINAL.

## HARDWARE

In order to use this program, you will need a Commodore 64 computer , at least 1 disk drive, a video monitor or TV, and the Dual Joystick "Transmitter" from Dave Brown Products.

NOTE: The Commodore 64 version of RCFS WILL NOT WORK WITH STD COMMODORE STICKS.

## INSTRUCTIONS

The Dual Joystick "Transmitter " box is attached to your Commodore 64 computer by inserting the connectors marked #1 and #2 into control ports 1 and 2 on the right side of the computer.

Turn on the computer and disk drive, Insert the diskette into the disk drive, and close the disk drive door. At the keyboard type

LOAD "\*",8

and press the <return> key. The disk drive light will come on while the program loads. When the program has loaded, type

RUN

If none of the above means anything to you, you should read the manuals from Commodore which come with the computer.

## THE MAIN MENU

After the program has loaded, you will be presented with a menu of three items. To select one of these, just type the appropriate number. The items available are:

1. Run the Simulator (current set up). This selection will run the simulator using the last configuration which was saved, or the last configuration entered after using selection 2 below.
2. Configure the plane. This selection will lead to a secondary menu enabling you to change the parameters describing the performance of the airplane. The current values of these parameters will be displayed, and the current value may be accepted by



simply pressing the "return" key on the keyboard. Do not worry if you make a mistake, as you can return to this menu later to correct it. Except for Stall Speed, which is in feet/second, and the Thrust/Weight ratio, the parameters are in arbitrary units. In the case of the longitudinal and latitudinal stability parameters, the higher the number, the more stable the airplane is and therefore, the easier to fly. In the case of the aileron and elevator sensitivity, the higher the number, the more sensitive the controls are. Setting the control sensitivity numbers lower will make the airplane easier for most beginners. Experiment with the values until you like the results. We will include some typical configurations below.

#### TYPICAL CONFIGURATIONS

	Trainer	Intermediate	Advanced
Stall speed	8	10	15
Lateral stab	8	5	3
Long stab	8	7	5
Aileron sens	3	4	5
Elevator sens	3	4	5
Drag param	7	5	3
Thrust/Weight	0.8	1.0	1.2

The above examples will result in a simulation of an average airplane of the type indicated, but you may want to experiment with the values until you like the results. After completion of this section, you will be returned to the menu.

3. QUIT. This selection returns you to the BASIC programming language.

## RUNNING THE SIMULATOR

When you have configured the airplane and the controls, you can run the simulator by selecting item 1 from the main menu. At this time, you are asked if you wish to save your configuration to the disk so that the next time you run the program, you will not have to reconfigure the plane and controls. Answer by pressing "Y" for yes or "N" for no. The main part of the program will then be loaded.

You are now asked to center the joystick and press the "return" key to allow the computer to find out where the neutral settings are. When the program starts, you will be presented with a view corresponding to the picture from an imaginary TV camera pointing at the plane. The plane will be about 40 feet ahead, on the ground, and facing straight away from you. In the upper right hand corner is a block containing a map of the airfield, with the runway indicated by the horizontal line in the middle. Once you leave the airfield proper, the "map" expands to show an aerial view of approximately 1 mi. square, and the runway becomes a much shorter line. At the bottom of the display is a read-out giving the distance, in feet, from you to the airplane, it's velocity, the throttle setting (in %), and the altitude of the airplane in feet.

The Dave Brown Products Dual Joystick "transmitter" is set up so that the throttle is operated by the fore and aft movement of the left stick, the rudder (yaw) is operated by the left and right movement of the left stick, the elevator (pitch) is controlled by the fore and aft movement of the right stick (you pull back for up elevator), and the ailerons (roll) are controlled by the left and right movement of the right stick. This is the most common "stick mode" used in flying R/C model airplanes, and is illustrated in figure 1-A below.

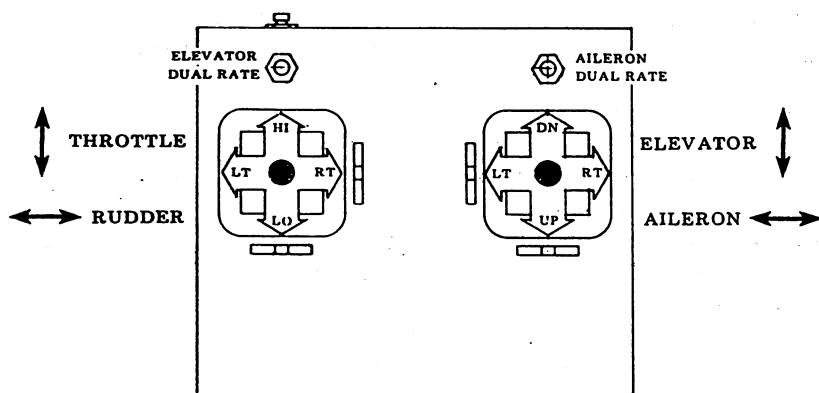


FIG. 1-A

At this point, you may wish to open the throttle about 20% and practice taxiing on the ground using the left joystick to steer the airplane. On the other hand, I expect that you have already opened the throttle fully, so let the airplane gather speed and take the model off using a small amount of backpressure on the elevator stick (you're in for a wild time if you have no previous experience). Control the airplane as you

would a real model, using the ailerons and elevator. In making turns, you should bank the airplane using the ailerons, and then neutralize the aileron stick and hold a little back pressure on the elevator stick to keep the nose up in a turn. You will find that the controls are quite sensitive resulting in the most common of mistakes - overcontrolling. For normal flying, you need to move the stick only 1/4 or so to make nice gentle turns. Don't start using full stick travel or you will get in trouble real quick. As you climb away, you will notice that the "camera" will follow the airplane, so the ground will drop away. The airplane will get smaller as it goes away, just like the real thing.

## ORIENTATION

Two of the most difficult aspects of model flying are: 1) Judging the orientation of the model, especially when it is far away, and 2) Getting used to the apparent reversal of controls when the model is coming toward you. Both of these difficulties are present in the simulation! In fact, the orientation problem is more severe because the ground is out of sight when the model is high, and the program accurately presents the view that the "camera" will see. Some of the consequences of this are: 1. As the airplane flies past you on a constant heading, you will see it apparently turn away from you as it passes. This is due to the fact that the "camera" is turning to track the airplane, and you start to look at the tail of the airplane more and more as it gets further away. 2. As the airplane flies higher, you will be



presented more and more with a view of it's underside (assuming it's flying level) as the "camera" points up at it. This is particularly confusing at first.

The program presents several aids to judging orientation, First, the altitude and distance values will tell you if the airplane is coming or going.

Secondly, the top side of the wing is plain, and the underside is striped. This information gets harder to see as the airplane gets farther away (just like the real thing).

Thirdly, the rate at which the apparent size of the airplane gets smaller as the airplane gets farther away is less than it would be in real life. This makes it easier to see at large distances.

Fourth, The rate of "camera" movement, as it tracks the airplane, is shown by the moving scale marks on the left side and the bottom of the frame.

Fifth, There is a white marker at the right of the screen, which climbs from the bottom of the frame when the "camera" points straight ahead at the horizon, to the top of the frame when the "camera" is pointing straight up.

Sixth, In the upper right hand corner of the frame is a map of the flying field, showing the runway as a line in the middle. This map shows the position of the airplane as a flashing dot on the map. The map expands to a larger scale when you fly outside the immediate airfield you are

flying from.

Taken together, these clues make it fairly easy to judge the orientation of the airplane, except at extreme distances. When you are at extreme distances, a technique which works well is to push the stick a little to the left, and see what the airplane does. If the airplane turns left, then it is going away from you. If it turns right, it's coming toward you. After you get it coming toward you, try a little up elevator, if it climbs, it's right side up, if it dives, it's inverted and you need to roll it to upright.

## MISCELLANEOUS

It is a safety hazard to fly over or taxi through the pit area at a model flying field. Your colleagues will (rightly) chastise you for this. If you try this with the simulator, the program will object with a flash on the screen and a beep, and will move your airplane instantly to the other side of the pit area while maintaining its heading, and the "camera" will have swung around 180 degrees to see the airplane going away.

The following functions are available by pressing the appropriate "function" key.

F1 - Freeze the action. A second press will resume the action.

F3 - Restart on the runway

F5 - Return to the menu to reconfigure the airplane.

## F7 - Turn engine sound off/on.

The program has a feature called "Dual Rate", found commonly on radio control model transmitters. This feature enables the user to reduce the control sensitivity while flying, and still be able to have full throw at the press of a button. If you press the button above the right stick, the aileron axis of the joystick will become less sensitive, pressing the button above the left stick will have the same effect on the elevator sensitivity. This "Low Rate" is indicated on the screen by a letter "A" and/or "E" in the lower right corner of the screen. Simply pressing the appropriate key again will return the control sensitivity back to normal.

## FLYING HINTS

Do not allow the airplane to get too far away. Very many crashes of real models result from loss of orientation when the model is a long way away.

Do not fly directly over your head, the program doesn't mind, but it is very easy to lose orientation when doing this.

When given a stable configuration, the airplane will almost land itself if given low throttle. Many training models do the same. Don't fight it!

If you have no model flying experience, find an experienced R/C modeler to assist you if you have problems.

The Academy of Model Aeronautics is the national organization for model airplane enthusiasts, and is ready and willing to help you to locate, or start, a club in your area. This organization of 90,000 members (and still growing) is a must for those who want to try R/C model airplanes for real.

The Academy of Model Aeronautics  
1810 Samuel Morse drive  
Reston, Va 22090

## ACKNOWLEDGEMENTS

The use of the following is hereby acknowledged.

Bill Budes 3-D Graphics System  
from California Pacific Computer Co.

Many useful comments from the following are gratefully acknowledged.

Suburban Aero Club of Chicago

## PROGRAM

COPYRIGHT (C) 1984 JSK ASSOCIATES  
10 W 33rd St.  
Chicago, IL 60616

## INSTRUCTIONS

COPYRIGHT (C) 1984 DAVE BROWN PRODUCTS  
4560 Layhigh Rd  
Hamilton, Oh 45013

This program marketed by Dave Brown Products through agreement with JSK Associates.



# Warranty Registration

SERIAL NO. 3854 Date Of Purchase \_\_\_\_\_

DEALER'S NAME: \_\_\_\_\_

DEALER'S ADDRESS: \_\_\_\_\_

PURCHASER'S NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

**DAVE BROWN PRODUCTS**

4560 LAYHIGH · HAMILTON, OHIO 45013

**FROM**

PLACE  
STAMP  
HERE

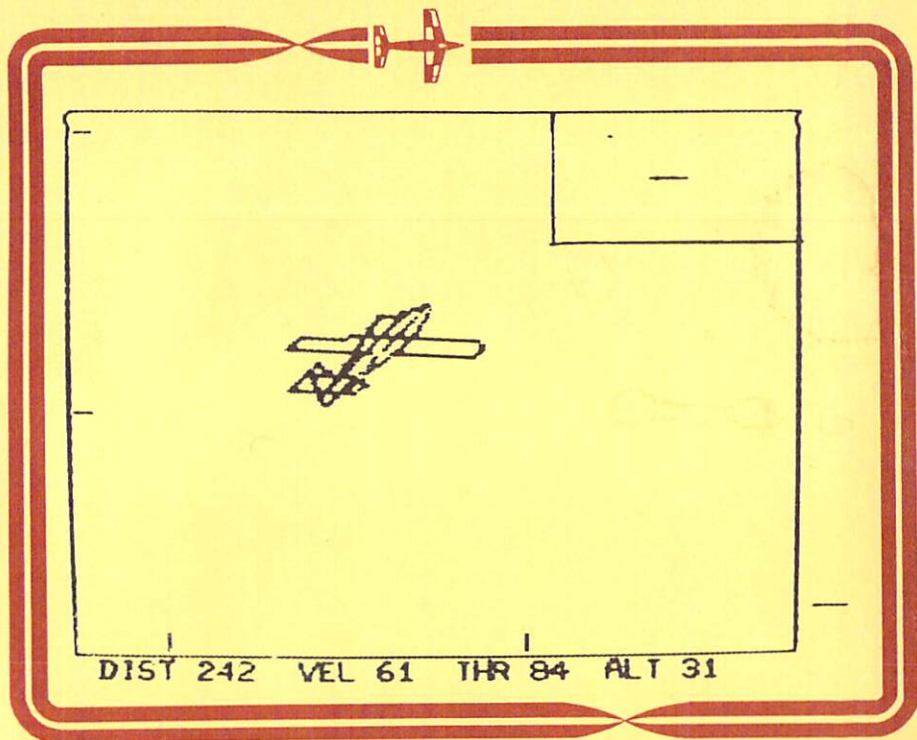
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**DAVE BROWN PRODUCTS**

**4560 LAYHIGH**

**HAMILTON, OHIO 45013**





ACTUAL VIEW OF SCREEN

- GREAT AS A TRAINING AID FOR BEGINNER OR EXPERT
- FULLY AEROBATIC INCLUDING SPINS AND SNAP ROLLS
- CONFIGURE FOR A LARGE VARIETY OF MODEL TYPES FROM TRAINERS TO HOT AEROBATIC MODELS.
- USE WITH DAVE BROWN PRODUCTS DUAL JOYSTICK "TRANSMITTER" FOR AN ACCURATE SIMULATION OF R/C FLYING.
- IT EVEN HAS "DUAL RATE" CONTROL SENSITIVITY

NOTE: Requires Commodore 64 with 1 disk drive and Dave Brown Products Dual Joystick "Transmitter"

Instruction Booklet written by DAVE BROWN, 5 time U.S. R/C Aerobatic Champion and 5 time World Championship Medalist