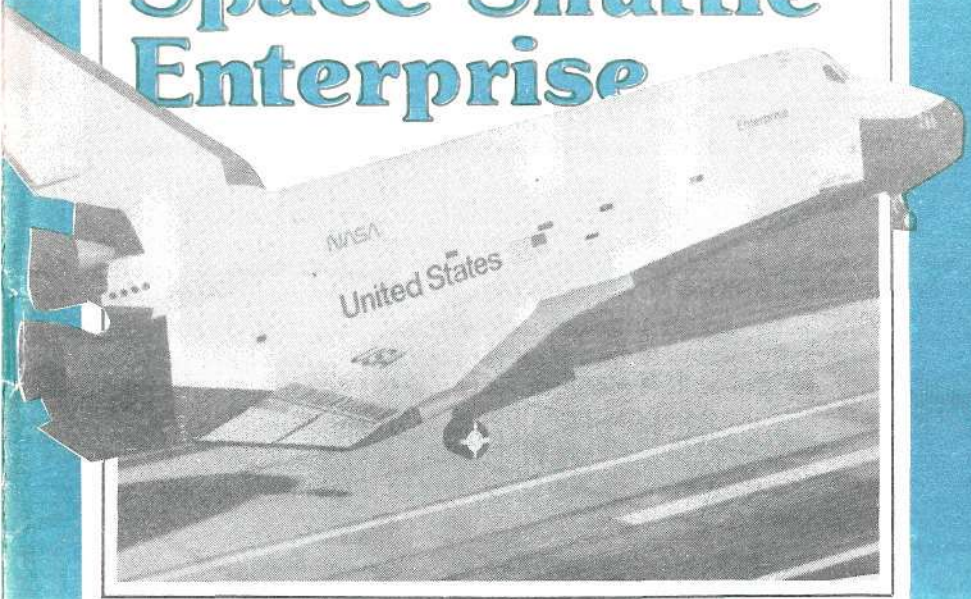
SoftSide™

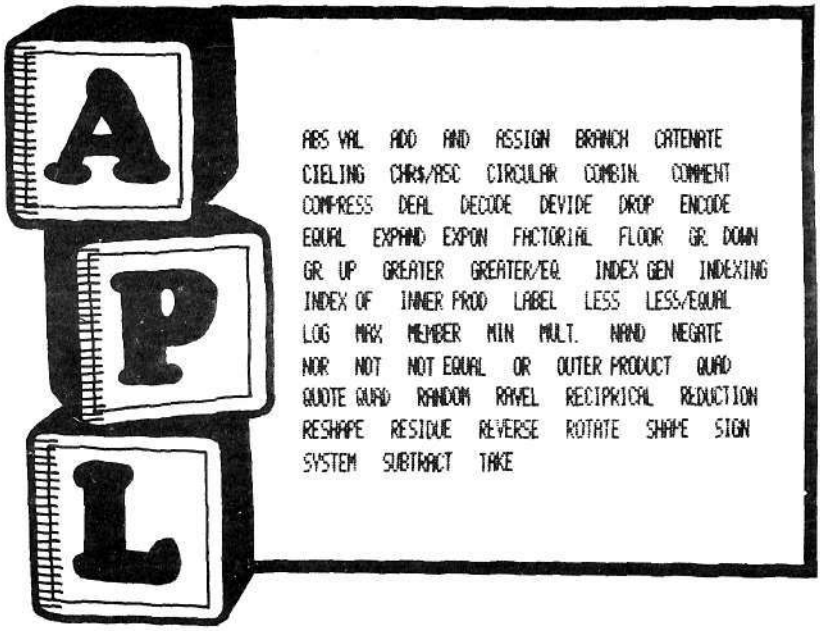
S-80* EDITION

YOUR BASIC SOFTWARE MAGAZINE

FEBRUARY 1980 $2.00

Land the Space Shuttle Enterprise





APL is a powerful and elegant computer language, yet it is easy to learn. It is ideal for the engineer, scientist, mathematician, circuit designer, or for the person who just wants to learn a new language.

Due to the absence of the special character set for APL on the TRS-80*, APL 80 uses shifted letters, which are identified on the screen with a lighted graphics block before the letter. If you have a modified TRS-80 (Electric Pencil Modification), a lower case driver is included to display the shifted letters on the screen.

Special features of APL 80 include the ability to save and load workspace on disk, return to DOS for directory or commands without losing your workspace or variables, and send output to a line printer. Four workspaces are included with lessons on the use of APL operators, commands, and functions, with many examples.

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YOUR BASIC SOFTWARE MAGAZINE VOL. II, NO. 5

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Less than 80 years from man's first powered flight in 1903--a flight which took him 120 feet--a new era nears, one in which space crews will use the same craft again and again for routine flights into space.

The Space Shuttle is composed of the Enterprise, (shown on this month's cover) an external fuel tank, and two solid rocket boosters. The Enterprise and boosters are reusable; the external tank is expended on each launch.

Some of the tasks that will be performed by The Enterprise are: retrieving satellites from Earth orbit, servicing orbiting satellites, conducting experiments in space that cannot be duplicated on Earth, and studying the Earth and deep space from a unique vantage point high above the atmosphere.

During reentry, portions of the Enterprise exterior will reach temperatures up to 2,300 degrees Fahrenheit. The craft will level into horizontal flight at low altitude for an unpowered aircraft-type approach and landing is simulated by our featured program, DEADSTICK by Al Ragsdale.

Ragsdale works on the Space Shuttle project and has over 1000 hours of flight time in the Lunar Module and Space Shuttle simulators.

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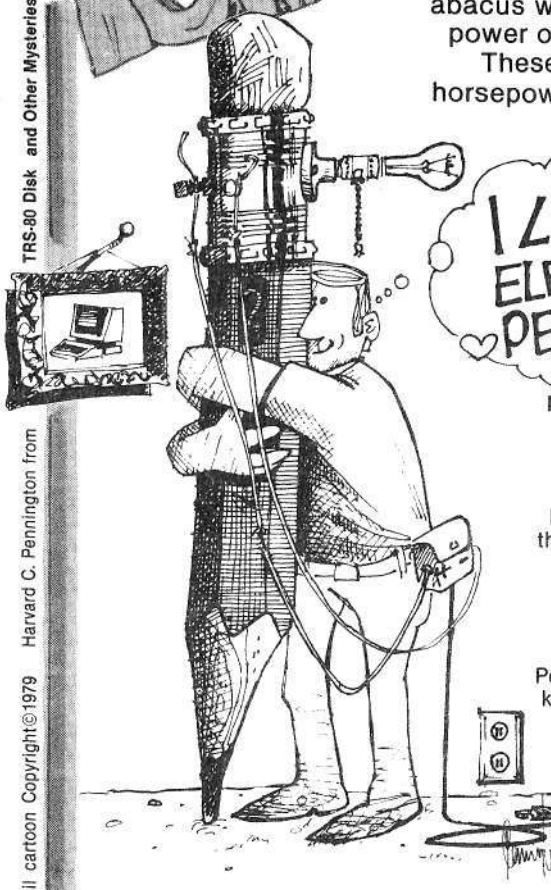

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SoftSide Magazine is continually seeking original articles and software for publication. Imagination and variety in concept and content are our primary criteria for acceptance. Payment varies with length, suitability, ease of editing and quality.

Our policies with respect to software purchase are highly individualized, and offer the programmer several options, including one-time publication rights, outright purchase, and royalties on sale of prerecorded cassettes. Program submissions should use Radio Shack Level II Basic, should run in Level II **and** Disk BASIC, and may **not** employ coding techniques that cannot be accurately presented in a line listing, such as SYSTEM modules and "super graphics" or other hybrid methods. For more information, please write: **SoftSide,** PO Box 68, Milford, NH 03055.

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OUTGOING MAIL

I have had a lot of fun lately learning a new language. APL 80 is a version of APL for the TRS-80 that was submitted by Phelps Gates, and he even included programming lessons in APL on the disk version. For me, the real fascination has been how much you could do with a very short program. In lesson 4, he includes a Black Jack program in 13 short lines! Since I am easily amused by a complex new toy, I asked the thirteen-year-old girl who babysits for us occasionally to try APL. She had no trouble following the lessons even without programming experience, and loved APL, but then she has been raised on 'new math'!

SoftSide will be displaying another new trick next month. SONIC TORPEDOES by Phillip Case is a short shoot-'em-up program controlled by voice entry from the cassette recorder microphone. You simply say 'FIRE' to dispatch a torpedo at a space ship.

I'd like to express my appreciation to the folks at the Johnson and Marshall Space Centers of the National Aeronautics and Space Administration for the pictures and technical information in this issue. They provided, without cost and on short notice, exactly the kind of pictures that we needed to illustrate DEADSTICK. Since microelectronics is a direct outgrowth of the space effort, you could call NASA one of the parents of the microcomputer. We had a Christmas party in our neighborhood and discovered that every one there owed their jobs to microelectronic technology. So much for the short-sighted souls who called placing a man on the moon a waste of money!

If you look closely at our cover, you will discover that our magazine has a new name. It is now SoftSide: S-80 Edition. We were contacted by the lawyers from Apple Computer Company and politely asked to change the name of AppleSeed. Now we love a good fight, but they did ask nicely, so we decided to call the Apple magazine SoftSide: Apple Edition. It followed that the original should become SoftSide: S-80.

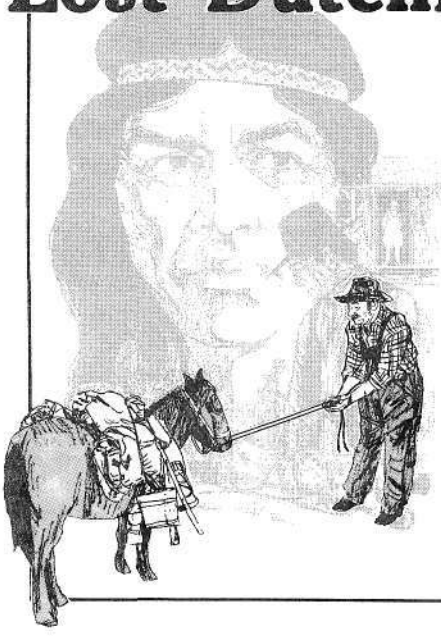
We are not alone in changing our name at the request of a computer manufacturer's lawyer. The TRS-80 Bulletin is now the S-80 Bulletin, and I applaud the reasoning. While Radio Shack still has a large piece of the market they pioneered, many other suppliers are selling products to the same people, and there is now even another brand of computer that will load and run cassettes produced for the TRS-80. Just as there was a switch from the 'Altair bus' to the 'S-100 is a good choice. Besides, I get tired of writing 'TRS-80 and Radio Shack are trademarks of Tandy Corporation'. Words to that effect appeared at least 16 times in our first edition of The Eighty.

Speaking of the S-80 bulletin, we do appreciate the good review they gave PROG/80 and SoftSide in the November-December issue. However, we are concerned that they reprinted Robert Johnson's review of People's Pascal from PROG/80. SoftSide Publications usually buys only one-time publication rights for our articles. We have no objections to reprinting, but ask that permission be received from both Softside Publications and the author, and the author should receive compensation. For example, my article on writing good computer games was reprinted in the Judge's Guild Journal and scheduled for reprinting by Practical Computing. In both cases SoftSide gave permission freely, and I received compensation.

Now that we have three publications for the S-80 bus, we need lots of articles. SoftSide will continue to emphasize games and personal applications, PROG/80 will continue to offer help in programming, reviews, hardware construction features, and utilities, and The Eighty will seek general articles, business applications and almost anything else that is good and is not on target for the other magazines. Please note that we cannot accept programs in line listing form. Cassettes or diskettes only, except for brief programming hints and short programming examples in articles. If you would like to know more about submitting programs and articles, you can send a self-addressed stamped envelope and ask for a copy fo our author's guide to Freida Day, who handles our submissions.

Lost Dutchman's Gold

by Teri Li



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Requires TRS-80 with 16K memory, two disk drives, and line printer.

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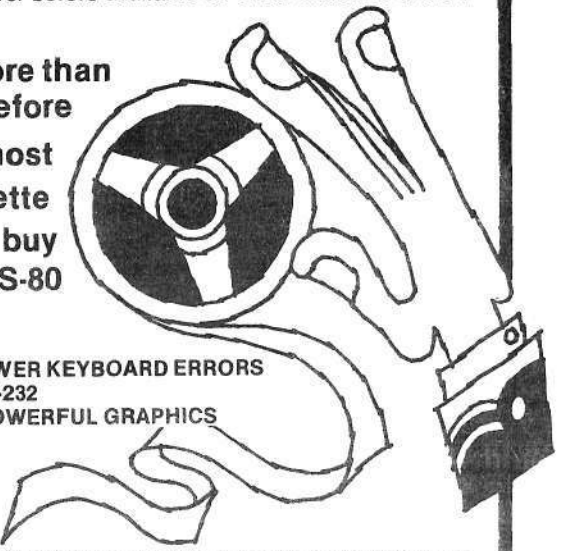

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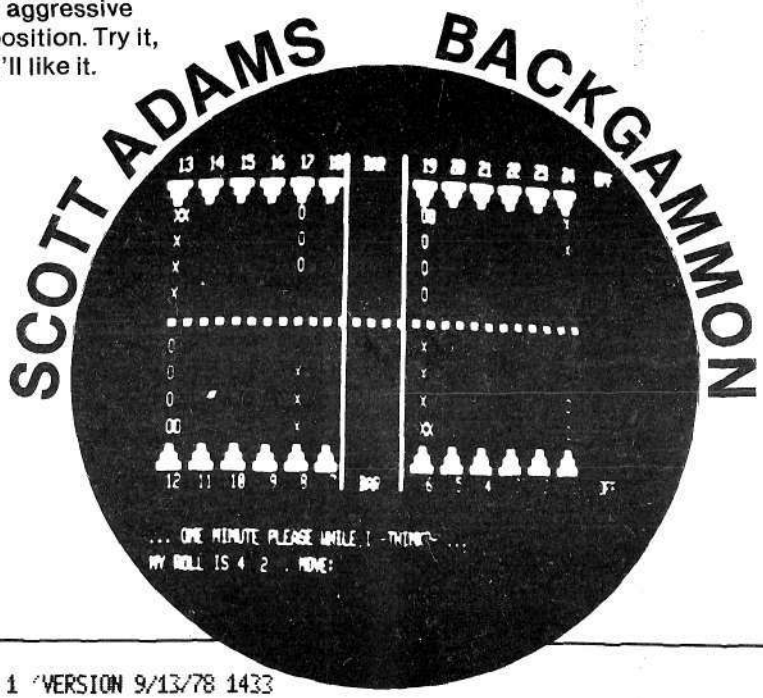
From the irrepressible keyboard of Scott Adams comes Backgammon at its best. With a combination of a fine graphics display and high intelligence, this program can be challenging, informative and just plain fun. So put on your Backgammon shoes and get ready for competitive and aggressive opposition. Try it, you'll like it.




```
1 'VERSION 9/13/78 1433
2 'COPYRIGHT 1978 S ADAMS ALL RIGHTS RESERVED.
3 'PHONE 1-305-862-6917.
10 ' BACKGAMMON BY SCOTT ADAMS 8/25/78
11 CLEAR 100
12 DEFINT A-Z
13 ' 241 CANTERCLUB TRL LONGWOOD FL 32750 1-305-862-6917
20 DB=0'DEBUG 1=YES, 0=NO
25 DIM B(35) :L=0 :M=0 :V=0 :I=0 :J=0 :J1=0 :K=0 :J2=0 :J3=0
30 DIM HD(27),DI(4),MV(2,4),BS(2,4),Q7(2,16),DH(4)
32 CLS :PRINT :PRINTTAB(4)"WELCOME TO  ** ADAMS-COMPUTER-BACKGAM
MON **" :PRINT
33 PRINT"SPECIAL NOTES FOR *-ADAMS BACKGAMMON-*":
   PRINT"  1) IF YOU HAVE A BAR MOVE, ENTER IT FIRST.":
   PRINT"  2) IF YOU SHOULD BE TRAPPED WITH NO LEGAL MOVE, HIT E
```

```
NTER." :PRINT" 3) YOU'LL NOT BE WARNED IF YOU FORGET TO BEAR OF
F.":PRINT
35 VH=11 :VT=5 :VP=-7 :VM=5 :VL=-2 :VF=10 :VA=-1 :VO=-2
36 PRINT"I TAKE 40 SECONDS OR LESS FOR A MOVE." :PRINT"BUT ONCE
IN AWHILE I'LL TAKE UP TO 5 MINUTES. YOU":PRINT"MAY TAKE AS LONG
 AS YOU LIKE!" :PRINT :PRINT :INPUT"HAVE YOU PLAYED WITH ME BEFO
RE";A$ :IF LEFT$(A$,1)="N" GOSUB20000
40 DATA 2,66,130,194,3,67,131,195,1,65,129,193,0,64,128,192:DATA
194,130,66,2,195,131,67,3,193,129,65,1,192,128,64,0
50 FORL=1TO2:FORM=1TO16:READQ7(L,M):NEXTM,L
60 FOR L=0TO27 :B(L)=0 :NEXT :B(24)=-2 :B(1)=2 :B(19)=5 :B(6)=-5
   :B(12)=5 : B(13)=-5  :B(17)=3 :B(8)=-3 :LV=1 'START VERSION 1
  LOGIC FOR SPEED.
80 GOSUB10000
90 GOSUB11111:IF DI(1)=DI(2) THEN 90 ELSE PRINT@896,"MY ROLL IS"
  ;DI(1);" YOUR ROLL IS";DI(2);" ";
100 IF DI(1)<DI(2) THEN PRINT" YOU"; ELSE PRINT" I";
110 PRINT" GO FIRST."; :FOR L=1TO2000 :NEXT
   :IF DI(1)>DI(2) THEN 135 ELSE 120
115 GOSUB11111
120 GOSUB1000 :PRINT@896,TAB(63);:PRINT :GOSUB2000
130 GOSUB11111 :PRINT@960,TAB(63);
135 PRINT@896,TAB(63);
   :PRINT@896,"... ONE MINUTE PLEASE WHILE I COGITATE ..."
140 PRINT@960,"MY ROLL IS";DI(1);DI(2);" ";
150 GOSUB5400 :GOSUB2000
160 GOTO115
1000 'HUMAN MOVE
1010 IF NOT POINT(4,19) GOSUB 10000 'BOARD GONE?
1020 PRINT@832,TAB(63);
    :PRINT@832," YOUR ROLL IS";DI(1);DI(2);". MOVE ('X')";
1025 IF B(26)<>0 AND B(25-DI(1))>1 AND B(25-DI(2))>1
    PRINT" YOU CAN'T  MOVE THOUGH!!!!!";:
    FOR L=1TO2000 :NEXT :RETURN
1030 A$="" :INPUT A$ :IF LEFT$(A$,1)<>"B" THEN 1040
    ELSE GOSUB10000  :GOTO1020
1040 GOSUB3000 :IF Q<>0 THEN 1095
1060 FOR L=1TO M5 :FOR M=1TO2 'REPLC 0 WITH HOME OR OFF
1070 IF MV(M,L)=0 THEN MV(M,L)=25+M
```

```
1080 NEXTM,L
1090 GOSUB4000
1095 IF Q=0 THEN 1110
1097 PRINT@896,"* ERROR - ";
1100 IF Q=2 PRINT"MOVE MAN ON BAR";
1101 IF Q=1 PRINT"TRY AGAIN";
1102 IF Q=3 PRINT"TOO FEW MOVES";
1103 IF Q=4PRINT"CHECK YOUR DICE!";
1104 IF Q=5 PRINT"TOO MANY MOVES";
1109 PRINT" *  YOUR MOVE WAS: ";A$; :PRINT@832,TAB(63);
   :GOTO1020
1110 IF MS<1 THEN RETURN ELSE FOR I=1TO MS' DO MOVE
1120 IF B(MV(2,I))=1 THEN QF=MV(2,I) :QT=0 :GOSUB9000
1130 QF=MV(1,I) :QT=MV(2,I) :GOSUB9000
1140 NEXTI :RETURN
1245 .455
2000 'SEE IF ANY WINNERS
2010 IF B(25)=15 THEN LO=LO+1 :A$="I" :GOTO2030
2020 IF B(27)<>-15 THEN RETURN ELSE WI=WI+1 :A$="YOU"
2030 PRINT@896,TAB(63); :PRINT@896,A$;" WIN!! YOU HAVE WON";WI
    ;"AND LOST";LO;"GAMES. ";
2040 INPUT"ANOTHER GAME";C$ :IF LEFT$(C$,1)="Y" THEN 60 ELSE
    IF LEFT$(C$,1)="N" THEN CLS :RUN"MENU":ELSE 2030
3000 'CONVERT MOVES IN A$ TO MV ARRAY
3010 'LEGAL FORMAT 1-2-3/3-4 ETC.
3020 IF A$="" THEN MS=0 :Q=0 :RETURN
3030 L=0 : M=0 'L=CHAR CNTR, M=MV INDX
3035 IF M>3 THEN Q=1 :RETURN
3040 L=L+1 :M=M+1 :GOSUB 3300 :MV(1,M)=Q :L=L+1
3050 GOSUB 3300 :MV(2,M)=Q
3055 IF L>LEN(A$) THEN 3100
3060 IF MID$(A$,L,1)<>"-" THEN 3090
3070 L=L+1 :GOSUB 3300 :IF M+Q-1>DN THEN
    Q=5 :RETURN 'ERROR TOO MANY MOVES
3080 N=M :FOR M=N+1 TO N+Q-1 :MV(1,M)=MV(1,N) :MV(2,M)=MV(2,N)
     :NEXT :M=N+Q-1
3090 IF L<LEN(A$) THEN IF MID$(A$,L,1)="," THEN 3035 ELSE
     Q=1 :RETURN 'ERROR REDO MOVE
3100 Q=0 :MS=M :RETURN
```

```
3300 'REMOVE NEXT # FROM A$
3310 B$=MID$(A$,L,1) :C$=MID$(A$,L+1,1)
3320 IF C$>="0" AND C$<="9" THEN L=L+1 :B$=B$+C$
3330 Q=VAL(B$) :L=L+1 :RETURN 'L IS NEXT CHAR POINTER
4000 'CHECK HUMAN MOVE. Q=0 NO ERROR
4010 FOR L=0TO27 :HD(L)=B(L) :NEXT :Q=1 'COPY BOARD
4015 IF M5=0 THEN 4110 'NO MOVE?
4020 FOR L=1TO M5 :FOR M=1TO2 : N=MV(M,L)
4030 IF N<1 OR N>27 OR N=25 THEN 4200
4040 NEXT M,L
4050 FOR L=1TO M5 :QT=MV(2,L) :QF=MV(1,L)
4060 IF B(QT)>1 OR B(QF)<-1 THEN 4200
4062 IF B(26)<>0 AND (QF<>26 OR QT<19) THEN Q=2 :GOTO 4200
4070 B(QF)=B(QF)+1 :B(QT)=B(QT)-1 :IF B(QT)=0 THEN B(QT)=-1
4090 IF QT=27 THEN N=B(26) :FOR M=7TO24 :N=N+(B(M)<0) :NEXT
:IF N<>0 THEN 4200
4100 NEXT L
4110 GOSUB 6500 'ALL MOVES USED UP?
4120 FOR L=0TO27 :B(L)=HD(L) :NEXT :RETURN
4200 GOTO4120
5000 'INPUT J,J1,D1,D2 DO DUMMY MOVE. EVALUATE BOARD. IF NO
     MOVE FOR  A DIE THEN RANK MOVE -100
5010 FOR L=0TO27 :HD(L)=B(L) :NEXT L:ZZ=Z
5020 V=0 :FOR L=1TO DN :ON L GOTO 5025,5030,5035,5040
5025 M=J :M1=J+D :GOTO5041
5030 M=J1 :M1=J1+D1 :GOTO5041
5035 M=J2 :M1=J2+D :GOTO5041
5040 M=J3 :M1=J3+D
5041 '
5044 IF Z=1 AND M1>25 AND M1<999
     FOR M9=18 TO M-1 :IF B(M9)<1 THEN NEXT M9:M1=25
    'IF BEARING OFF USE HIGHEST AVAILABLE MAN
5045 IF M1>24+Z IF M1<999 THEN V=-10000 :GOTO5070 'DON'T
   TRY TO BEAR OFF IF STUCK AND NOT IN END GAME!
5046 IF M>24 OR M1>24+Z THEN V=V-100 :GOTO5060
5048 B(M)=B(M)-1
5050 IF B(M)>-1 THEN B(M1)=B(M1)+1 :IF B(M1)=0 THEN B(M1)=1
   :V=V+VT :B(26)=B(26)-1 :IF M1<11 THEN V=V+VT'WE HIT EM
5055 IF B(M)<0 IF B(25)>14 THEN V=10000 :GOTO5070 :ELSE
```

```
    V=-10000 :GOTO5070'ERROR NO MEN LEFT TO MOVE
5057 IF Z=1 AND M1=25 THEN V=V+VF 'END GAME BORNE OFF
5058 IF Z=0 FOR LL=0 TO 18 :IF B(LL)<1 NEXT LL :Z=1 'END GAME?
5060 NEXT L :GOSUB8000
5070 FOR L=0TO27 : B(L)=HD(L) :NEXTL :Z=ZZ :RETURN
5200 ' MOVE FROM BAR
5201 IF DB=1 PRINT@832,"BAR MOVE";
5210 IF B(0)=0 OR DN<1 THEN RETURN
5220 FOR I=1TODN : J=DI(I) :IF B(J)<>-1 THEN 5240 ELSE
    QF=J :QT=26 :GOSUB9000:
    QF=0 :QT=J :GOSUB9000 'HIT EM
5230 DI(I)=DI(DN) :DN=DN-1 :GOTO5210 'COMPACT DICE
5240 NEXT I :FOR I=1TODN : J=DI(I) :IF B(J)=1 THEN
    QF=0 :QT=J :GOSUB9000 :GOTO5230 'HELP SINGLE POINT
5250 NEXT I :FOR I=1TODN :J=DI(I) :IF B(J)>-1 THEN
     QF=0 :QT=J :GOSUB9000 :GOTO5230 'MOVE ANYWHERE
5260 NEXT I :PRINT@CR," I CAN'T  MOVE!"; :RETURN
5400 ' DO COMPY MOVE
5410 PRINT". MOVE: "; :CR=960+POS(0) :Z=0 'END GAME FLAG
5411 IF DB=1 PRINT@832,TAB(63);
5420 L=0 :FOR I=0TO18 :L=L+(B(I)>0) :NEXT I'END MOVE?
5430 IF L=0 THEN Z=1 :LV=2 'END DO LVL 2 LOGIC
5440 GOSUB5200 'BAR MOVE
5450 IF DN=0 OR B(0)<>0 THEN 5470 'NO MORE MOVE!
5452 IF Z=0 THEN 5460
5455 IF B(26)=0 FOR L=1 TO DN:
    FOR M=25-DI(L) TO 24 :IF B(M)>-1 NEXT M:
    IF B(25-DI(L))<1 THEN NEXT L ELSE
    QF=25-DI(L) :QT=25 :GOSUB9000 :DI(L)=0 :NEXT L
  'REMOVE MEN FROM POINT IF IT'S SAFE!
5456 M=0 :FOR L=1TO DN :IF DI(L)<>0 THEN M=M+1 :DH(M)=DI(L)
5457 NEXT L :IF DN<>M :FOR L=1 TO DN :DI(L)=DH(L) :NEXT L :DN=M
5458 IF DN<1 THEN 5450
5459 'THE PRECEDING MOVES REMOVED ANY MEN DURING AN END GAME
    AS LONG AS THERE WERE NO HUMAN MEN IN FRONT.  IT THEN
    COMPACTED THE DICE ARRAY.
5460 IF DN<3 THEN GOSUB7000 ELSE GOSUB6000
5470 PRINT@896,TAB(63); :RETURN
5700 'FLAG WE STILL HERE
```

```
5705 IF DB=1 RETURN
5710 IF FG=0 THEN FG=1
5720 FG=-FG :PT=896+30
5730 IF FG<0 THEN PRINT@PT,"COGITATE"; ELSE PRINT@PT,"-THINK?-";
5740 RETURN
6000 'COMPY HAD DOUBLES
6001 IF DB=1 PRINT@832,"DOUBLES MOVE";
6010 MX=-9999 : D=DI(1) :D1=D :E=24 :NM=0
    :J=999 :J1=999 :J2=999 :J3=999
    'END AT POINT 24 IF END GAME ELSE 25-DICE
6012 BG=2*VL :IF LV=2 THEN 6019 'SEE IF ANY 1 HUMAN CAN BE HIT
     BY A SAFE DOUBLE.
     IF SO STOP WHEN MX>=VT ELSE IF MX>=2*VL. IF END GAME LV=2
6014 FOR L=1TO24 :IF B(L)<>-1 THEN NEXT L ELSE: K=L:
      FOR M=1TO DN/2 :K=K-D :IF K<1 THEN NEXT L ELSE
       IF B(K)<-1 THEN NEXT L ELSE
       IF B(K)>1 THEN BG=1  ELSE NEXT M,L
6019 IF Z=1 THEN BG=VF*DN/2+VM
6020 FOR J=1TOE :K=B(J) '1ST MOVE
6030 IF K>0 THEN K=B(J+D) :IF K>-2 THEN 6050
6035 IF Z=1 IF J+D>25 THEN 6050
6040 NEXT J :J=999 :IF MX>-50 THEN 6150 ELSE 6140
6050 FOR J1=J TO E :K=B(J1) :IF J1=J+D THEN K=1
    '2ND MOVE
6055 IF J1=J IF K<2 THEN K=0 'TOO MANY SAME SPOT
6060 IF K>0 THEN K=B(J1+D) :IF K>-2 THEN 6080 'OK TRY IT
6065 IF Z=1 IF J1+D1>25 THEN 6080
6070 NEXT J1: J1=999 :IF MX>-50 THEN 6040 ELSE 6140 'GOT 1 MOVE
     AT LEAST WHICH USES ALL DICE. SO DON'T BOTHER WITH MOVES
     THAT DONT'T EVEN MOVE
6080 GOSUB5700 :FOR J2=J1 TO E :K=B(J2)
    :IF J2=J1+D OR J2=J+D THEN K=1 '3RD MOVE
6085 IF J2=J1 IF J1=J IF K<3 THEN K=0 'TOO MANY FROM SAME SPOT
6090 IF K>0 THEN K=B(J2+D) :IF K>-2 THEN 6110
6095 IF Z=1 IF J2+D>25 THEN 6110
6100 NEXT J2 :J2=999 :IF MX>-50 THEN 6070 ELSE 6140
6110 GOSUB5700:IF DN<4 THEN 6140 ELSE FOR J3=J2 TO E :K=B(J3)
    IF J3=J1+D OR J3=J2+D OR J3=J+D THEN K=1'FINAL MOVE
```

```
6120 IF K<>0 THEN K=B(J3+D) :IF K<-2 THEN 6140
6125 IF Z=1 IF J3+D>25 THEN 6140
6130 NEXT J3 :J3=999 :IF MX<-50 THEN 6100
6140 GOSUB 5000 :IF V>MX THEN MX=V: NM=1
    :BS(1,1)=J :BS(2,1)=J+D :BS(1,2)=J1 :BS(2,2)=J1+D
    :BS(1,3)=J2 : BS(2,3)=J2+D : BS(1,4)=J3 :BS(2,4)=J3+D
    :IF DB=1THEN PRINT"*";V;J;J1;J2;J3;
6141 IF MX>=BG THEN 6160
6145 IF J3<>999 THEN6130 ELSE IF J2<>999 THEN 6100 ELSE IF
    J1<>999 THEN 6070 ELSE IF J<>999 THEN 6040
6150 'DO BEST MOVE
6160 GOTO7120
6500 'HAS HUMAN USED ALL MOVES?
6510 FOR L=1TO4 :DH(L)=DI(L) :NEXT L'COPY DICE
6515 IF MS=0 THEN 6570 'NO MOVE?
6520 FOR L=1TO MS 'SEE WHICH ROLLS USED UP
6530 QF=MV(1,L) :IF QF=26 LET QF=25 'BAR
6540 QT=MV(2,L) :IF QT=27 LET QT=0 'HOME
6550 FOR M=1 TO DN :IF QF-QT=DH(M) THEN DH(M)=0 :ELSE NEXT M
    'FLAG IT USED
6560 NEXT L
6570 FOR L=1 TO DN 'SEE IF ANY DICE UNUSED
6580 IF DH(L)=0 THEN 6700 'NO
6590 'CAN HE MOVE THE MISSING ROLL?
6600 D=DH(L) :IF B(26)<0 IF B(25-D)>0 THEN 6700
    ELSE Q=2 :GOTO6710 'MAN LEFT ON BAR!
6605 Q=3 :IF MS=DN THEN Q=4 'NO TOO FEW BU BAD COUNT
6610 FOR M=1 TO 24 'SEE IF ANY REGULAR MOVES AVAILABLE
6620 IF B(M)>-1 THEN 6650 'NO MAN HERE
6630 N=M-D :IF N<1 THEN 6650
6640 IF B(N)<1 THEN 6710 'HE HAS A MOVE!
6650 NEXT M
6700 NEXT L :Q=0 'NO ERROR, ALL ROLLS USED
6710 RETURN
7000 'DO ALL POSSIBLE REGULAR MOVES, FIND BEST
7001 IF DB=1 PRINT@832,"REGULAR";
7010 MX=-9999 : NM=0
7020 FOR I=1TO DN :D=DI(I) :D1=DI(3-I) :J1=999
7030 FOR J=1TO 25-D+Z*(D-1) :K=B(J) 'FIRST MOVE
```

```
7040 IF K>0 THEN K=B(J+D) :IF K>-2 THEN 7060
7045 IF Z=1 IF J+D>25 THEN 7060
7050 NEXT J :J=999 :IF MX>-50 THEN 7110 ELSE 7100
7060 IF DN=1 THEN 7100 '1 MOVE ONLY
7065 K=J :IF K<24 IF I=2 OR B(K)<2 LET K=K+1
7070 GOSUB5700 :FOR J1=K TO 24 :K=B(J1)
    :IF J1=J+D THEN K=1'SECOND MOVE
7080 IF K>0 THEN K=B(J1+D1) :IF K>-2 THEN 7100
7085 IF Z=1 IF J1+D1>25 THEN 7100
7090 NEXT J1 :J1=999 :IF MX>-50 THEN 7050 'UNMOVABLE BUT GOT 1.
7100 GOSUB 5000 :IF V>MX THEN MX=V: NM=1
    :BS(1,1)=J :BS(2,1)=J+D
    :BS(1,2)=J1 :BS(2,2)=J1+D1
    :IF DB=1 PRINT"*";MX;J;J+D;J1;J1+D1;
7105 IF J1<>999 THEN 7090 ELSE IF J<>999 THEN 7050
7110 NEXT I
7120 IF NM=0 PRINT@CR,"I CANNOT MOVE"; :RETURN 'DO BEST-MOVE
7130 NM=0 :FOR L=1 TO DN :FOR M=1 TO2
7133 IF BS(M,L)>25 AND BS(M,L)<>999 THEN BS(M,L)=25
7135 IF BS(M,L)<0 OR BS(M,L)>=999 THEN 7160 ELSE NEXT M
7140 IF B(BS(2,L))=-1 THEN OF=BS(2,L) :OT=26 :GOSUB9000
7150 OF=BS(1,L) :OT=BS(2,L) :GOSUB9000 :NM=1
7160 NEXT L :IF NM=0 THEN 7120 ELSE RETURN
8000 'EVALUATE MOVE V=MEN HIT ALREADY AND MEN BORNE OFF
8010 IF Z=1 THEN 8040 'END GAME
8020 FOR L=0TO18 :IF B(L)>0 THEN 8030 ELSE NEXT L:V=V+VM
    'ALL MEN HOME?
8030 FOR L=1TO6 :IF B(L)>0 THEN V=V+B(L)*VL 'MEN IN HUMAN HOME
8035 NEXT L
8040 M=26 :IF B(26)<>0 THEN 8070 'NOT PAST HUMANS YET
8050 M=0 :FOR L=24 TO 0 STEP-1 :IF M=0 IF B(L)<0 LET M=L
    'M=FIRST HUMAN
8060 IF M=0 OR B(L)<=0 THEN NEXT :V=V+VH :GOTO8100 'PAST HUMANS
8065 'LOOK FOR SINGLES ONLY IF WE AREN'T PAST ALL HUMANS
8070 FOR L=1TO24 'LOOK FOR SINGLES, WORST IS SINGLE WHERE HUMAN
    CAN HIT THEM, NEXT IS SINGLE IN HUMAN HOME, NEXT IS SINGLE
    PAST ALL HUMANS
8075 IF B(L)<>1 THEN 8090
8080 IF L<7 THEN V=V+VP-VL :GOTO8090 'SINGLE IN HUMAN HOME
```

```
8085 IF L>M THEN V=V+VA ELSE V=V+VP
8087 IF L>18 THEN V=V-VO*B(26) 'MEN OPEN IN HOME CAN BE HIT
8090 NEXT L
8095 IF B(26)=0 THEN 8100 ELSE M=0 :FOR L=19 TO 24
   :IF B(L)=1 THEN M=0
  ELSE IF B(L)>1 THEN M=M+1 :NEXT L :ELSE NEXT L
8096 IF M<>6 THEN V=V+(M*3-1)/2 ELSE V=V+35 'SHUT HIM OUT!
8100 RETURN
9000 'MOVE QT TO QF
9010 S=SGN(B(QF)) :IF S=0 RETURN
9020 Q4$="O" :IF S=-1 THEN Q4$="X"
9030 Q=ABS(B(QF)) :B(QF)=B(QF)-S :Q2=QF
9040 GOSUB9100 :PRINT@Q1," "; 'REMOVE FROM
9050 B(QT)=B(QT)+S :Q=ABS(B(QT)) :Q2=QT
9060 GOSUB9100 :PRINT@Q1,Q4$;
9065 B$=MID$("##",1,2+(QF(10))
    :C$=MID$("##",1,2+((QT(10)OR(QT=25)))
9070 IF S=1 PRINT@CR,""; :PRINTUSING B$;QF; :PRINT"-";
    :PRINTUSING C$;-QT*(QT<25); :PRINT". "; :CR=960+POS(0)
9080 RETURN
9100 'COMPUTE SCREEN POSITION Q=CHIP#, Q2=POINT#
9110 Q3=1 :IF Q2>0 AND Q2<25 THEN Q3=CINT(Q2/13)+1 'TOP/BOTTOM
9120 IF Q2>25 THEN Q3=2
9125 Q3=3-Q3
9130 IF Q2=0 OR Q2=26 THEN Q4=155+320*(3-Q3-1) ELSE
     IF Q2=25 OR Q2=27 THEN Q4=187+320*(3-Q3-1) ELSE
     IF Q2>18 THEN Q4=128+33+(Q2-19)*4 ELSE
     IF Q2>12 THEN Q4=128+(Q2-13)*4 ELSE
     IF Q2>6 THEN Q4=448+(12-Q2)*4 ELSE
     Q4=448+33+(6-Q2)*4EK*$0
9140 Q1=Q7(Q3,Q)+Q4 :RETURN
10000 'DRAW BOARD
10010 CLS :PRINT@768,; :FOR L=12TO1 STEP-1 :PRINTUSING"  ##";L;
     :IF L=7 THEN PRINT"   BAR   "; ELSE
     IF L=1 PRINT"   OFF";
10020 NEXT :PRINT@0,; :FOR L=13TO24 :PRINT USING"  ##";L;
     :IF L=18 THEN PRINT"   BAR   "; ELSE
     IF L=24 PRINT"   OFF";
10025 NEXT
```

```
10030 PRINT@384,; :FOR L=0TO56 STEP2 :PRINT CHR$(140);CHR$(032);
 :NEXT :PRINT@384," ";
10040 FOR L=65TO118 STEP4 :FOR M=L TO L+640 STEP 640
10042 IF L>86 AND L<97 THEN 10049
10043 N=M :IF L>90 LET N=N+1
10045 K=184 :K1=180 :IF M=L THEN K=139 :K1=135
10048 PRINT@N,CHR$(K);CHR$(191);CHR$(K1);
10049 NEXTM,L
10050 FOR L=49TO65 STEP16 :FOR M=0TO37 :SET(L,M) :NEXT M,L
10060 'PUT MEN ON BOARD
10070 FOR Q2=0TO27 :IF B(Q2)=0 THEN 10110
10080 FOR Q=1TO ABS(B(Q2)) :GOSUB9100
10090 IF B(Q2)<0 THEN PRINT@Q1,"X"; ELSE PRINT@Q1,"O";
10100 NEXT
10110 NEXT
10120 RETURN
11111 FOR RR=1 TO RND(100) :DI(1)=RND(6) :NEXT :RANDOM
11121 FOR RR=1 TO RND(100) :DI(2)=RND(6) :NEXT :RANDOM
11130 IF DI(1)=DI(2) THEN DN=4 :DI(3)=DI(1) :DI(4)=DI(1).RETURN
11140 DN=2 :RETURN
20000 'INSTRUCTIONS
20010 CLS :PRINT"RULES ARE THE SAME AS IN BACKGAMMON  TO ENTER A
 MOVE"
20020 PRINT"INPUT FROM-TO-TIMES  SEPERATE EACH MOVE BY A PERIOD(
 )!"
20030 PRINT  PRINT"EXAMPLE TO MOVE FROM POINT 2 TO POINT 3 TWIC
E:"
20040 PRINT"    2-3-2"
20050 PRINT  PRINT"EXAMPLE  TO MOVE FROM POINT 1 TO POINT 2 AND
FROM POINT 3 TO 4"
20060 PRINT"     1-2.3-4
20070 PRINT  PRINT"EXAMPLE  TO MOVE FROM POINT 1 TO POINT 2 AND
FROM POINT 3 TO 4" :PRINT"  AND FROM POINT 8 TO HOME TWICE..."
20080 PRINT"      1-2.3-4.8-0-2"
20090 PRINT  PRINT"NOTE THAT BOTH HOME AND BAR ARE SIGNIFIED BY
A 0."
20100 PRINT"INPUT 'BOARD' TO REDRAW BOARD AS NEEDED."
20400 INPUT"HIT ENTER TO START";A$ :RETURN
```

SPECIAL SPACE GAME SECTION

pages 20-26

ALIEN INVASION

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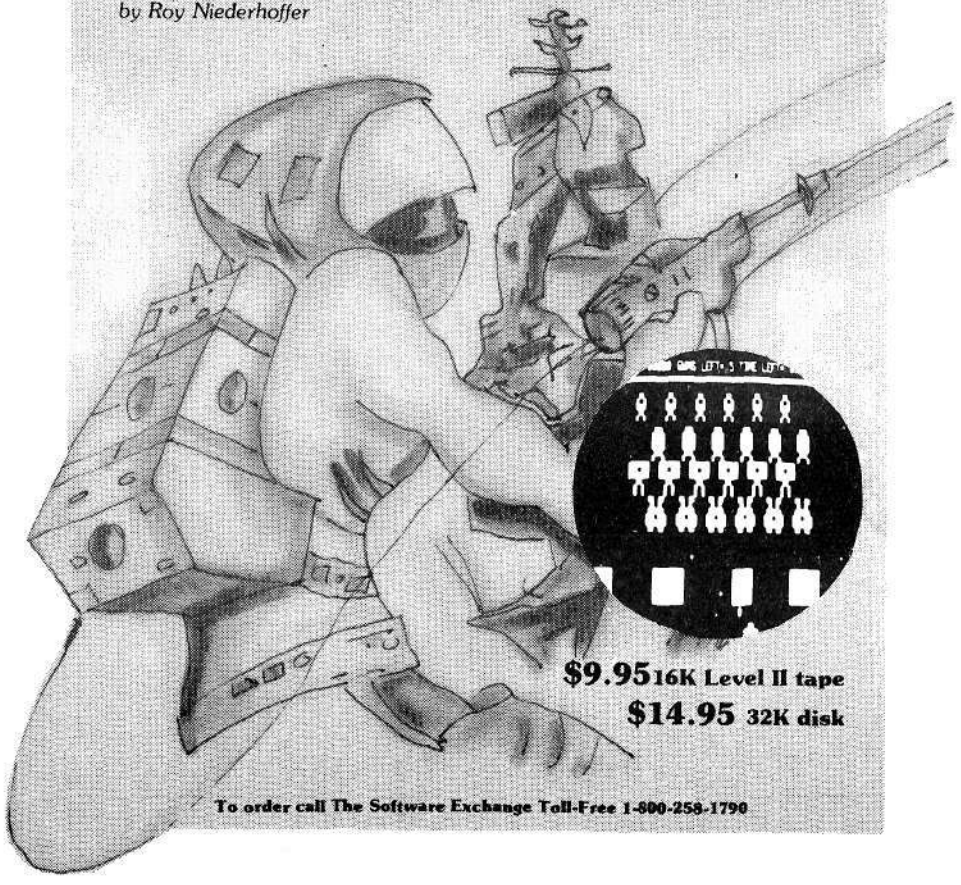
by Roy Niederhoffer



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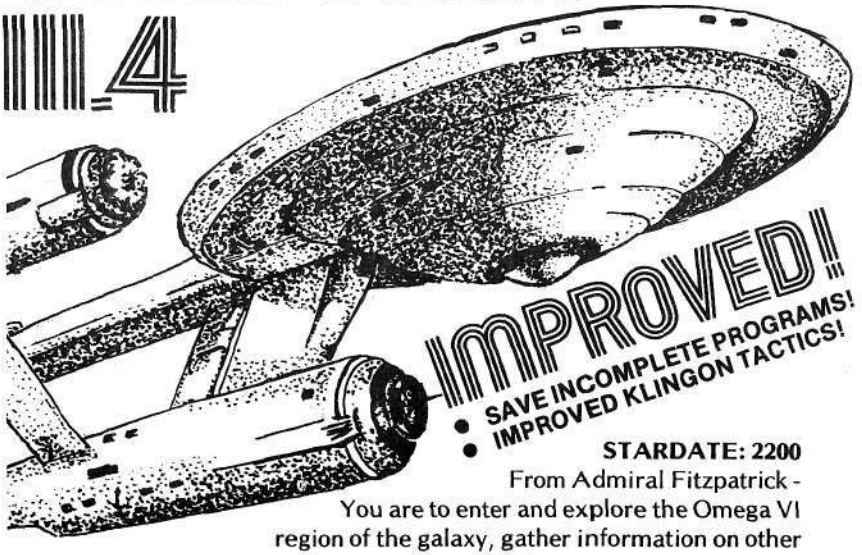
STAR TREK III.4



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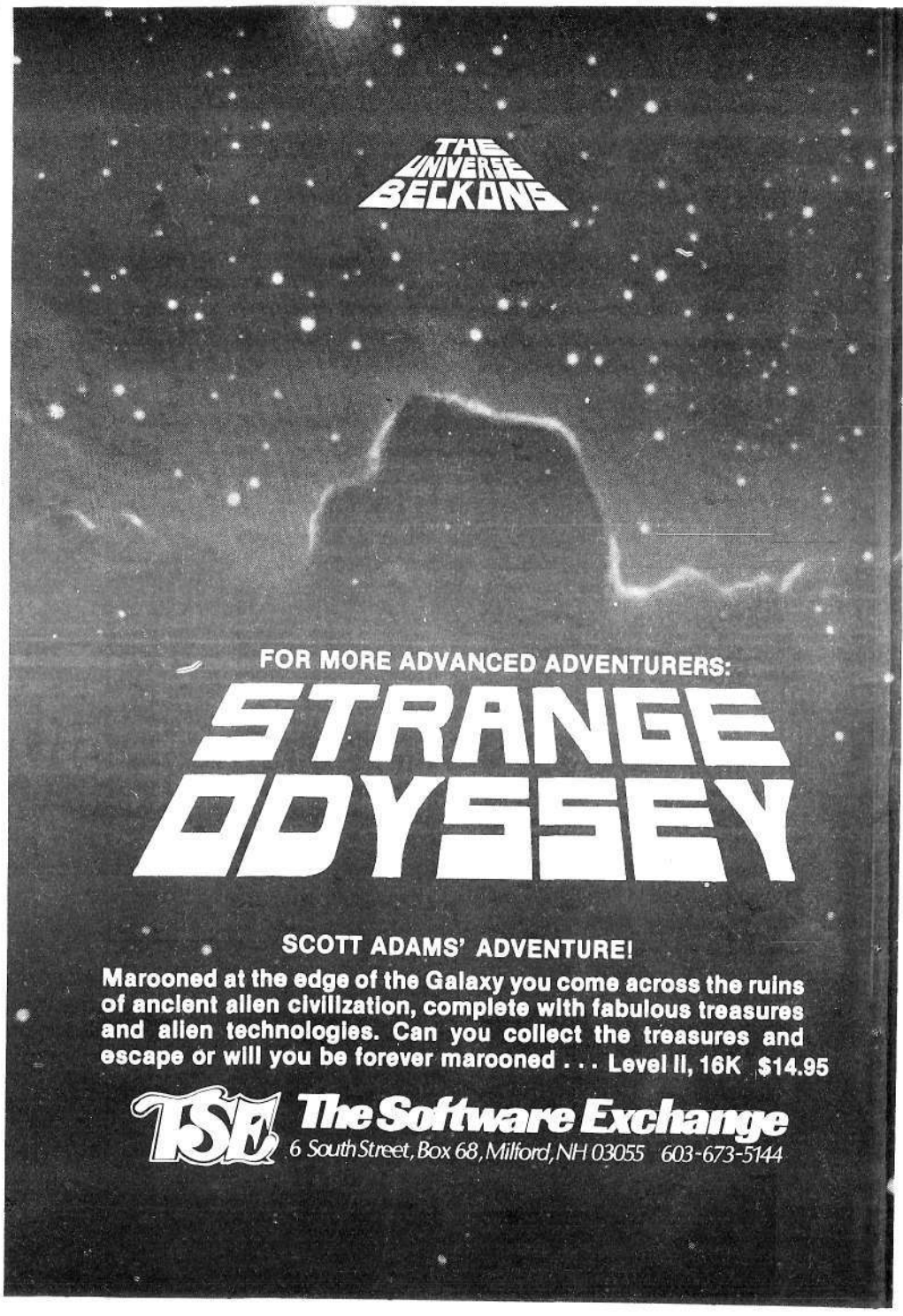
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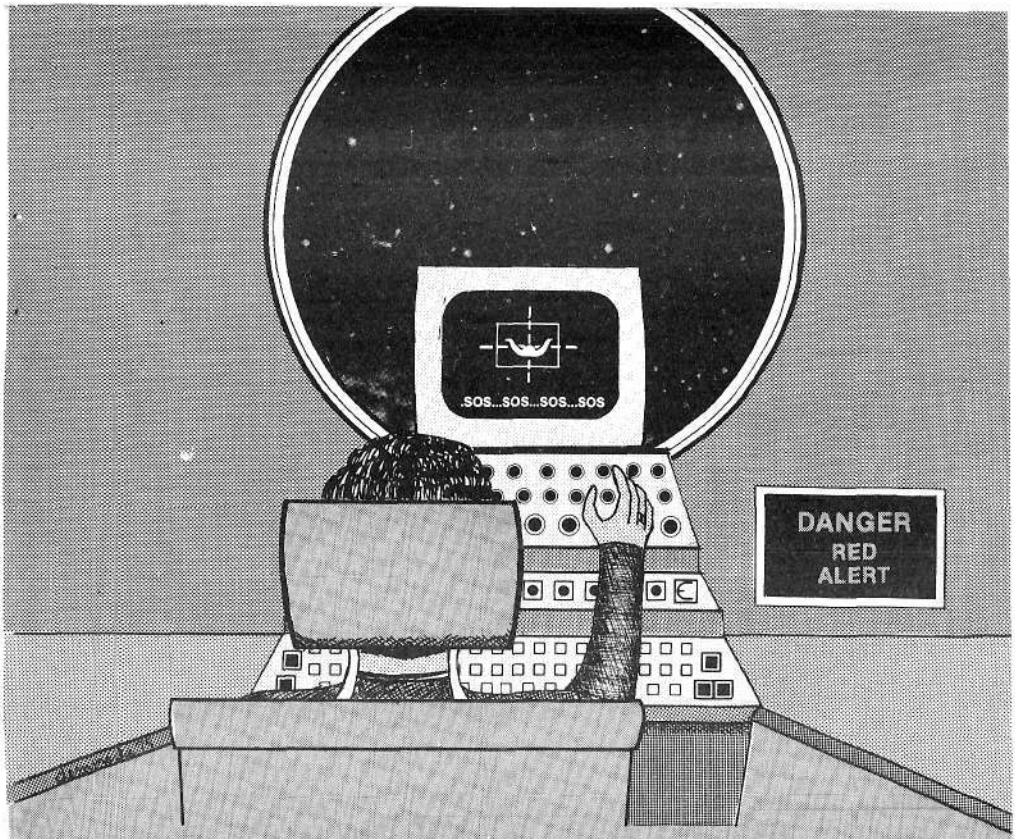

TIME TREK Joshua Lavinsky

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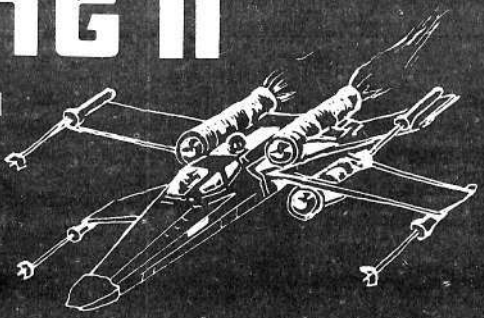
X-WING II

by Chris Freund



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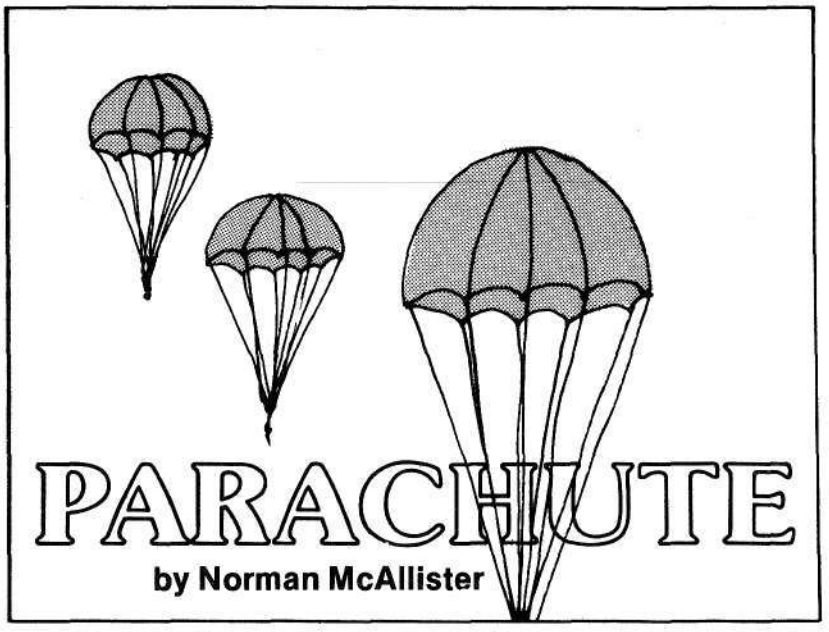
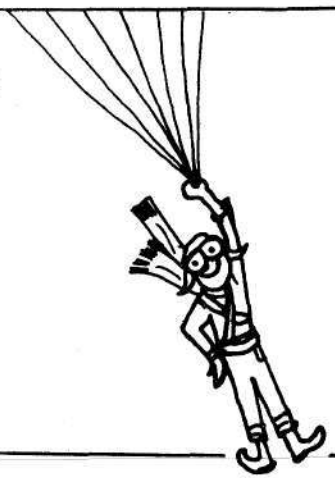


PARACHUTE

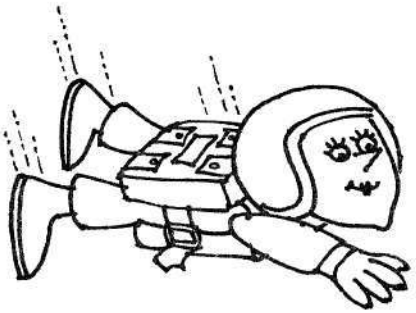
by Norman McAllister

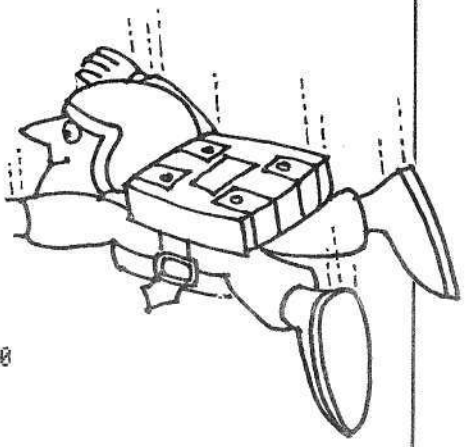
The hum of the engines have almost lulled you to sleep, despite the excitement of the moment. Suddenly, the alarm bell rings. The Jumpmaster motions for you to get into position. The wind roars past the open door. A tap on the shoulder and out you go. There is the illusion of floating even though you are falling at better than ninety miles an hour. Ripcord! You are snatched back into reality as the chute deploys. You steer towards the target area and land with a roll and twist. Ten feet from the center. Not a bad jump.

```
1 'PARACHUTE - TARGET JUMPING
2 '1979. N. MCALLISTER.
5 CLS
10 RESTORE
15 CLEAR200
16 'SET UP STRING VARIABLES
20 Y=0
25 JP=-1
30 READA
40 IFA=0THEN115
50 Y=Y+1
```



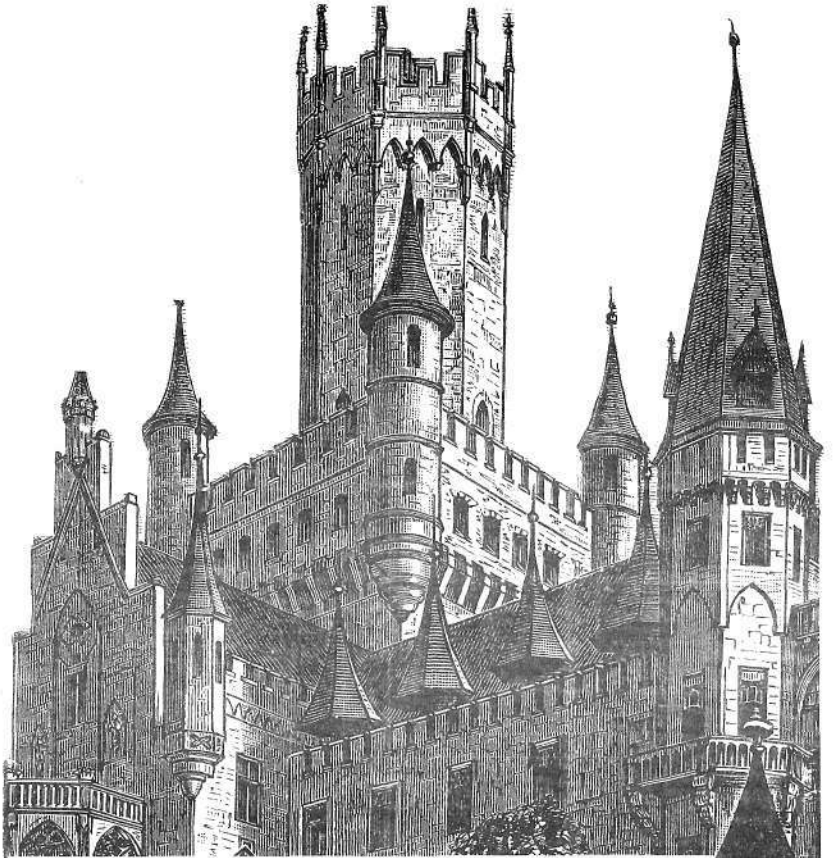
```
60 A$(Y)=""
70 FORX=1TOA
80 READB
90 A$(Y)=A$(Y)+CHR$(B)
100 NEXTX
110 GOTO30
115 'START
116 GOSUB6000:GOSUB5000
120 X=-1
130 X=X+1
140 IFX>55THEN1000
145 'PRINT PLANE
150 PRINT@X,A$(1);
155 IFJS=1THEN400
160 IFBS=1THEN200
165 IFX>47THEN300
166 IFX<5THEN300
170 B$=INKEY$
180 IFB$="J"THENBS=1:J=X-5:W=3:GOTO200
190 GOTO300
200 W=W+1
202 IFW<2THEN300
204 W=0
206 J=J+65
208 IFJ>895THEN2000
209 'PRINT FREE FALL CHUTIST
210 PRINT@J,A$(2);
300 IFJS=1THEN400
305 IFJ>512THEN130
310 B$=INKEY$
320 IFB$="P"THENJS=1:V=5:GOTO400
330 GOTO500
400 V=V+1
402 IFV<4THEN500
403 V=0
404 J=J+64+WD
406 IFJ>767THEN3000
408 'PRINT PARACHUTE WITH CHUTIST
410 PRINT@J,A$(3);
```





```
500 GOTO130
999 'START PLANE BACK AT LEFT OF SCREEN
1000 PRINT@55,"          ";
1010 PRINT@124,"  ";
1020 IFBS=0ANDJS=0THEN120
1100 GOTO155
1999 'JUMP FAILURE ROUTINE
2000 PRINT@J,A$(4);
2010 PRINT@J,A$(5);
2020 PT=0:JP=-1
2030 PRINT@0,CHR$(30);CHR$(10);CHR$(30);CHR$(29)
2040 PRINT"YOU WAITED TOO LONG TOO PULL THE RIPCORD!"
2050 PRINT:PRINT"   DID YOU THINK YOU WERE A BIRD?"
2060 PRINT:INPUT"DO YOU WANT TO TRY AGAIN";A$
2070 IFLEFT$(A$,1)="Y"THEN2980
2080 END
2980 GOSUB5000
2990 GOTO120
3000 PRINT@0,CHR$(30);CHR$(10);CHR$(30);CHR$(29)
3010 T=T+3
3020 J=J+194
3030 K=J+1
3040 IFT=JORT=KTHEN3200
3050 IFT<JTHEN3300
3060 IFK<T-4THEN3400
3070 PT=PT+10
3080 GOTO3980
3200 PT=PT+25
3210 GOTO3980
3300 IFJ>T+4THEN3400
3310 PT=PT+10
3320 GOTO3980
3400 PT=PT+1
3980 GOSUB5000
3990 GOTO120
4999 'SET UP DISPLAY
5000 CLS
5005 JP=JP+1
5010 JS=0:BS=0:WD=RND(3)-2
```

```
5020 T=RND(30)+975
5026 IFWD=-1PRINT@T-63,CHR$(168);CHR$(188);CHR$(188);
5027 IFWD=0PRINT@T-61,CHR$(168);
5028 IFWD=1PRINT@T-61,CHR$(168);CHR$(188);CHR$(188);
5030 FORX=TTOT+7
5040 PRINT@X,CHR$(176);
5050 NEXTX
5060 PRINT@T+3,CHR$(186);
5070 PRINT@896,"JUMPS";JP;
5080 PRINT@960,"POINTS";PT;
5990 RETURN
5999 'PRINT INSTRUCTIONS
6000 PRINTCHR$(23)
6010 PRINT"  P A R A C H U T E"
6020 PRINT:PRINT"THE SPORT OF TARGET JUMPING":PRINT
6030 INPUT"DO YOU NEED INSTRUCTIONS";X$
6040 IFLEFT$(X$,1)="N"THEN6990
6050 CLS
6060 PRINT"YOU ARE A CONTESTANT IN A TARGET JUMPING EVENT."
6070 PRINT:PRINT"THE OBJECT OF THE SPORT IS TO LAND SAFELY AS CL
OSE TO THE TARGETFLAG AS POSSIBLE.  YOU RECEIVE 25 POINTS FOR HIT
TING THE FLAG, 10POINTS FOR HITTING THE TARGET, AND 1 POINT FOR
LANDING SAFELY."
6110 PRINT:PRINT"AS IN REAL LIFE, THE GAME ENDS WHEN YOU FAIL TO
 PULL THE RIPCORDIN TIME."
6120 PRINT:PRINT"PUSH THE 'J' KEY TO JUMP FROM THE AIRPLANE AND
BEGIN YOUR FREE  FALL.  PUSH THE 'P' KEY TO PULL THE RIPCORD."
6130 PRINT:INPUT"HIT ENTER WHEN READY TO BEGIN";X$
6990 RETURN
10000 DATA16,32,189,176,176,184,188,188,176,26,24,24,24,24,32,13
0,129
10010 DATA32,32,32,32,32,32,32,26,24,24,24,24,24,24,32,137,184,1
52,129,32,26,24,24,24,24,24,24,32,152,131,137,144,32
10020 DATA53,32,32,32,32,32,32,26,24,24,24,24,24,24,32,32,184,18
8,144,32,26,24,24,24,24,24,24,32,138,147,131,155,32,26,24,24,24,
24,24,32,166,182,132,32,26,24,24,24,24,24,32,170,171,32
10030 DATA14,32,138,184,154,32,26,24,24,24,24,176,143,165,144
10040 DATA14,32,32,32,32,32,26,24,24,24,24,179,190,182,145
19900 DATA0
```



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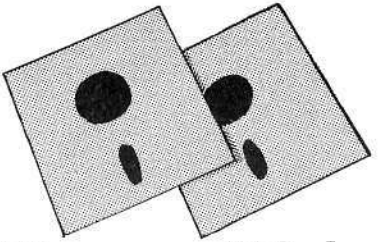

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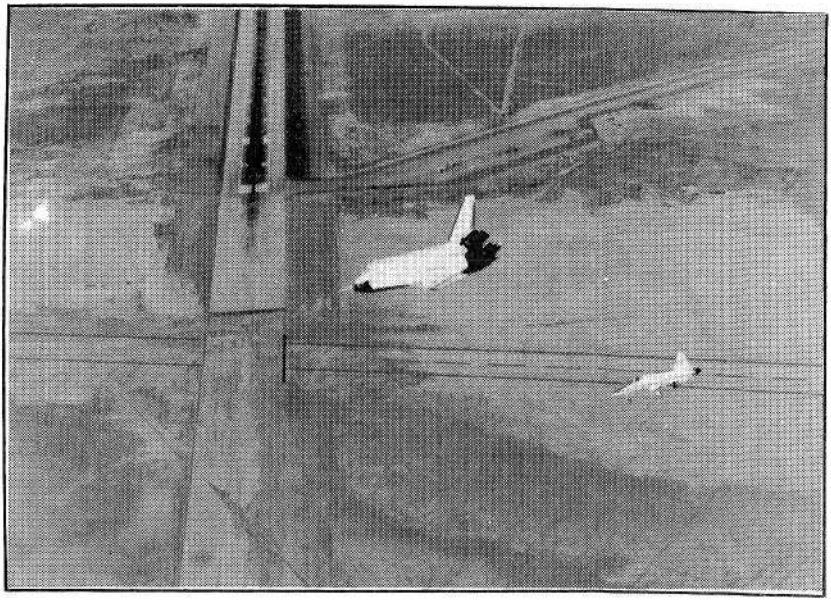


(Photos courtesy National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Texas)

DEADSTICK

Land the Space Shuttle

by Al Ragsdale

The Space Shuttle Orbiter is really the world's fastest glider. Boosted into orbit by rocket engine, it must return to earth in an unpowered glide, know to pilots as a "deadstick landing."

For most of the reentry glide, the Orbiter is out of communication with the ground. This reentry "blackout" results from the intense heat caused by air friction. At about Mach 10 (ten times the speed of sound) the blackout is over. The pilow then has sufficient communications and navigation data to locate and glide to the landing site. He may be assisted by ground controllers including a Guidance Officer (GUIDO) and a Flight Dynamics Officer (FIDO).

This program is designed to give the feel of flying a Space Shuttle Orbiter to a deadstick landing. The data displays are simplified versions of those a real Orbiter pilot has available. The aerodynamics and guidance

equations were developed by the author as part of a Master's Thesis in Avionics Instrumentation.

DISPLAY

Figure 1 is a typical DEADSTICK display. The displayed quantities are described below.

IAS—Indicated Airspeed (in Knots)

This is determined by the pressure of the air flowing around the Orbiter. At sea level the IAS is approximately the same as true airspeed. But at higher altitudes the air is less dense and less pressure is generated at the same speed. Most of a reentry is flown at an IAS of around 200, increasing to about 300 before landing. If the IAS gets too high there is danger of damaging the controls or structure. If the IAS gets too low the vehicle will "stall" because it cannot generate enough lift to keep flying.

MACH—Mach Number

This is the ratio of the speed of the Orbiter to the speed of sound. This gives an estimate of true airspeed independent of altitude. Mach 1 is approximately 1000 feet per second or 700 miles per hour. The Mach Number is the major factor which determines the flight characteristics of the Orbiter. The Orbiter begins reentry at Mach 25 and slows down to about Mach 0.5 before landing. (This program begins at Mach 10 due to the reentry blackout, and to save time.)

ALFA—Angle of Attack (in degrees)

This is the angle between the direction the Orbiter is pointing (pitch) and the direction it is moving (flight path angle). See Figure 2. The angle of attack determines the lift and drag forces. Because of the thin air at high altitudes a high angle of attack is required to generate enough lift. The Orbiter begins a reentry at an angle of attack as high as 40 degrees, and slowly pitches down to below 5 degrees before landing.

ALT—Altitude (in 1000's of feet)

This is the altitude above the runway. For example, 41.5 means the Orbiter is at 41,500 feet. Below 10,000 feet the actual altitude is shown.

RATE—Altitude Rate (in feet per second)

This is the rate at which the altitude is changing each second. Plus means the altitude is increasing; minus means it is decreasing. Descent rates of 200 feet per second are typical for the Orbiter.

DME—Distance Measuring Equipment (in nautical miles)

This is the range from the Orbiter to the beginning of the runway.

BNG—Relative Bearing (in degrees)

This is the direction to the runway relative to the present heading (direction the Orbiter is traveling). Zero means the runway is straight ahead; a positive BNG means it is to the right, negative to the left.

ATTITUDE DISPLAY

The display at the top center of the screen is called a "roll bug" or "sky pointer". When it is in the center, as in Figure 3, the Orbiter

is in a wings—level attitude. Otherwise it points in the direction of the sky, opposite the bank angle. A reference marker is provided at 30 degrees left and right bank. For example, in Figure 1 the Orbiter is in a 45 degree right bank. To roll back to wings level always roll **toward the roll bug.**

The horizon indicator consists of a fixed airplane symbol and a moving horizon. The horizon is tilted left or right according to the roll attitude (bank) and moved up or down by the pitch attitude. Note the horizon moves opposite the wings of the Orbiter. For example in Figure 1 the Orbiter is making a nose—high right turn. In figure 3 it is making a wings—level dive. Do not confuse pitch (shown on the horizon indicator) with ALFA. It is possible for pitch to be down 15 degrees and ALFA to be 6 degrees at the same time (it is during the landing approach!). This means the Orbiter is moving down along a 21 degree flight path angle. Usually pitching up increases the angle of attack and also causes a decrease in IAS, but does not necessarily result in a climb.

NAVIGATION DISPLAY

The arrow at the bottom center of the screen indicates the present position of the Orbiter (at the tail of the arrow). The indicators near the arrow are position predictors, which predict where the Orbiter will be in 30 and 60 seconds at its present speed and bank angle. In Figure 3 the Orbiter is flying straight ahead. In Figure 1 it is turning to the right.

The location of the airport (runway) relative to the Orbiter is indicated by a pair of pixels on the lower half of the screen. If the airport is behind the Orbiter, the airport symbol will only indicate whether the airport is to the left or right. The Navigation Display scale factor changes proportional to range until the landing site is 20 miles away.

FLIGHT CONTROLS

The pilot flies the Orbiter to a deadstick (powerless) landing by controlling its pitch (up and down) and roll (left and right). An autopilot is available which can fly any or all of the landing manuevers.

Deadstick simulates these controls as follows:

In CHIMP mode the vehicle is flown by the autopilot. The roll and pitch follow the commands of GUIDE and FIDO exactly.

In ROOKIE mode the pilot has the following controls:

- ↑ pitches up 2 degrees (1 degree below ALFA=9)*
- ↓ pitches down 2 degrees (1 degree below ALFA=6)*
- ↕ pitches to the autopilot pitch command (only once)
- → rolls right 15 degrees*
- ← rolls left 15 degrees*
- ⟩ rolls to 45 degrees right bank
- ⟨ rolls to 45 degrees left bank
- @ rolls to wings-level attitude
- = rolls to the autopilot roll command (once only)
- A turns the autopilot on or off

If the pilot's commands are out of limits GUIDO and FIDO will make suggestions to bring the Orbiter back on course. If the pilot is making a more drastic error which might be dangerous, a warning message will advise the pilot to correct the situation.

In ASTROPILOT mode the pilot has the same controls and will be assisted by GUIDO and FIDO. However random malfunctions or turbulence may occur and the pilot must make corrections. One of the malfunctions in loss of communications with GUIDO and FIDO for several seconds.

In ACE mode the pilot cannot use the A, !, or = commands (the autopilot has failed!) and GUIDO and FIDO will not advise him (communications have failed too!) He will also encounter turbulence and control failures.

FLIGHT TECHNIQUES

There are three main flight phases in DEADSTICK: Entry (above Mach 3), Energy Management (below Mach 3), and Final Approach (when the Orbiter is nearly lined up with the runway below Mach 1).

During Entry, the Orbiter follows a slow pitch down profile with ALFA decreasing 3 degrees for each Mach number, beginning with ALFA=30 at Mach 8 and above. For example, at Mach 7 ALFA is 27, at Mach 6 ALFA is 24, etc. The roll attitude is typically either wings—level, or rolled 45 degrees left to right. GUIDO directs the pilot to turn away from the airport to a BNG of -30 if the Orbiter is approaching the airport too fast, i.e. if the DME is less than the nominal value of 4*MACH**2. Otherwise GUIDO will direct the pilot to fly to a BNG of zero (the airport straight ahead).

During the Energy Management phase ('traffic pattern') FIDO directs the pilot to achieve an altitude of at least double the DME—for example if DME is 20, ALT should be 40 or more. The ALFA commands are limited between 9 and 15 degrees. The roll attitude is usually either 45 degrees left or right or wings—level. The pilot is directed to fly to a BNG of -90 if the ALT is more than 10,000 feet above the Glideslope altitude (double the DME). Otherwise he is directed to turn straight toward the airport, and maintain the Glidescope with ALT = 2 * DME.

As the Orbiter slows down Mach 1 there is a large pitch down command, because the aerodynamics change below the speed of sound. Below Mach 1 ALFA commands are limited between 3 and 10 degrees until the final flare.

When the Orbiter is approximately lined up with the runway (BNG = 0) and is below the speed of sound, the Final Approach begins. ALFA will decrease to a value of approximately 4 degrees, and the airspeed (IAS) will increase to about 300. The Glidescope altitude of double the DME should be maintained.

At 2000 feet altitude the final flare begins. The pilot should roll to wings—level and pitch up (sometimes down) to maintain a sink rate (RATE) of approximately 10% of the altitude. For example, at 200 feet ALT, RATE should be about -20. The sink rate must be less than 10 at touchdown for a safe landing. During the final flare the flight controls are designed to maintain a constant sink rate until new commands are entered. Flaring too much can result in stalling by slowing the Orbiter down too soon so it runs out of airspeed before touchdown, and falls to the runway.

GUIDO and FIDO will assist the pilot through all these manuevers (except in ACE mode). If the pilot loses control he can turn on the autopilot to help (except in ACE mode) and then take over again as soon as things are back to normal. Warning— the autopilot cannot recover from all possible situations!**

SCORING

At touchdown an evaluation of the flight is made. For the landing to be successful the touchdown must occur:

1. On the runway (which is assumed to be a mile wide and 5 miles long)
2. At a sink rate less than 10 ft/sec (landing gear limit)
3. With the wings approximately level (to prevent breaking wings)
4. At an airspeed less than 220 knots (to avoid tire damage)

If any of the above criteria are violated a crash message is printed.

The pilot's score is calculated by starting with 100 points and adding or subtracting the following;

+10	points if flown in ROOKIE mode
+20	points if flown in ASTROPILOT mode
+30	points if flown in ACE mode
-20	points if a Final Approach is flown
-10	points if a Traffic Pattern is flown
-0	points if a ReEntry is flown
-50	points if the Crash criteria are violated
-1	point for every call from GUIDO
-1	point for every call from FIDO
-1	point for every time the Autopilot is used

In ACE mode the score is calculated in the same way, but the pilot does not see GUIDO or FIDO's messages.

If you ignore FIDO and GUIDO and fly directly over the runway at high altitude, the program will crash with an overflow error, (dividing altitude by distance). Since you cannot land properly anyway when this happens consider yourself a prisoner in Siberia.

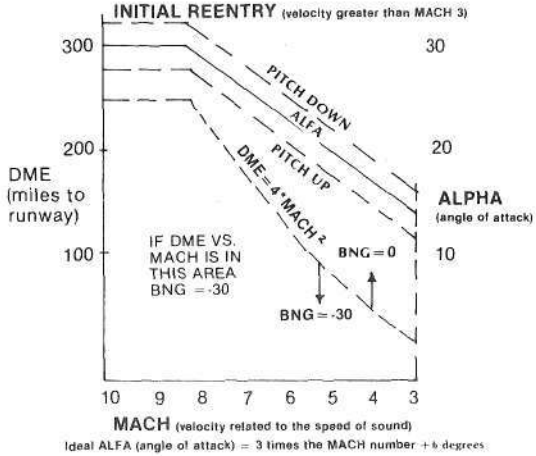
If you let your indicated airspeed get too high you will come in too fast and burn up. The screen will display "BAILOUT".

HAPPY LANDINGS!

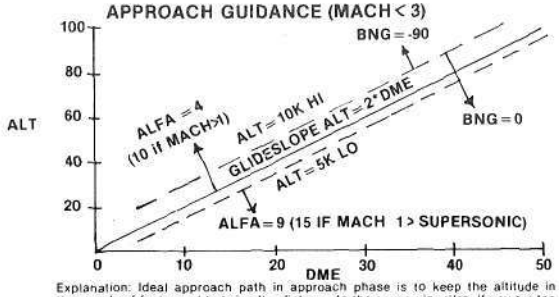
*If the arrow keys are held down the command will be repeated on the next program cycle. Pitch and roll commands may be entered simulaneously.

FIG. 4

INITIAL REENTRY PHASE



APPROACH PHASE



Explanation: Ideal approach path in approach phase is to keep the altitude in thousands of feet equal to twice the distance to the runway in miles. If you are too high, reduce your angle of attack. If you are too low, increase angle (ALFA). Notice that you need a greater ALFA at supersonic speeds.

Abbreviations:

I.A.S.	Indicated air speed (air pressure, not velocity)
MACH	Velocity (MACH 1 is the speed of sound)
ALFA	Angle between direction shuttle is really traveling and the direction it is pointed
ALT	Altitude in thousands of feet
RATE	Change in altitude in feet per second
DME	Distance measuring equipment (miles to runway)
BNG	Bearing to runway (-left + right of shuttle)
FIDO	Flight dynamics officer
GUIDO	Guidance officer

United States Space Shuttle Enterprise

FIG. 1

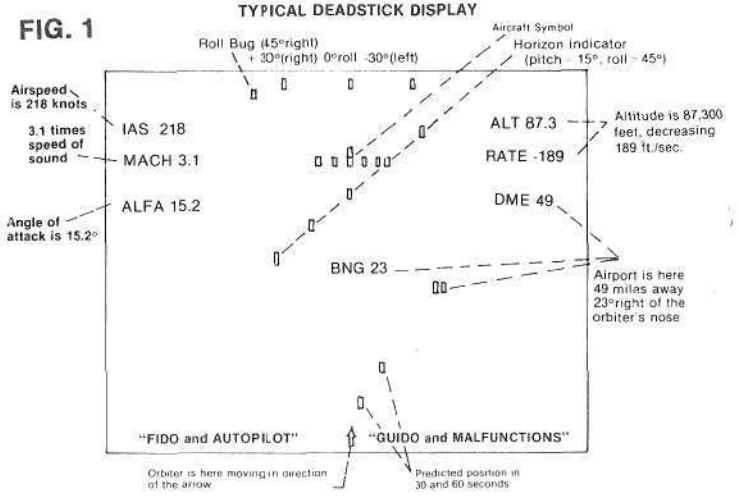


FIG. 2

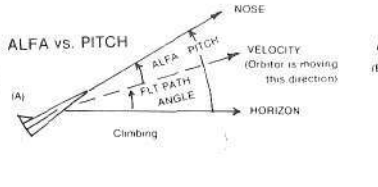
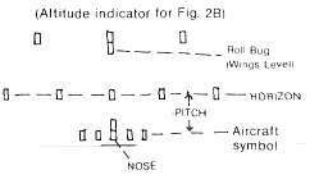


FIG. 3



PILOT'S CHECKLIST

MACH	ALFA	DME (x) BNG = 0
>8	30	>256
7	27	196
6	24	144
5	21	100
4	18	64

EXCEPT IF DME<x, BNG = -30

3 to 1 15 to 9 IF ALT>2DME + 10 BNG = -90

<1 9 to 3 ALT = 2 DME 200<1 AS<300

FLARE: RATE = 10%ALT TD RATE<10

```
1 CLS:PRINT "D E A D S T I C K"
2 PRINT "BY AL RAGSDALE---VERSION 120979.1"
4 GOTO 1000
5 SET(J,I):ON ERROR GOTO 6:RETURN
6 IF J>JM THEN LET J=JM:RESUME
7 IF J<0 THEN LET J=0:RESUME
8 IF I>IM THEN LET I=IM:RESUME
9 IF I<0 THEN LET I=0:RESUME
10 RESET(J,I):ON ERROR GOTO 11:RETURN
11 IF J>JM THEN LET J=JM:RESUME
12 IF J<0 THEN LET J=0:RESUME
13 IF I>IM THEN LET I=IM:RESUME
14 IF I<0 THEN LET I=0:RESUME
150          'CONSTANTS
151 IC=23.5:IM=47:IJ=2:IW=10.5
152 JC=63.5:JM=127:JC%=63.IW%=10
153 KA=.001:KB=.000001:KC=1843.4:KD=57.2958
154 KG=32.174:KK=295:KM=5000:KN=.0001646
155 KP=23500:KQ=.0012:KR=.0174533:KS=2690:KW=160870
158 K0=.05:K1=.0555:K2=.2222:K3=.02:K4=.0889:K5=.868
160 M1=0.8:M2=1.2:M3=2.5:A1=1200:A2=3.5:S1=12.5:S2=0.2
161 H1=-0.1:H2=-0.08:H3=-0.05:V1=100:V2=150:V3=300:V4=350
162 D1=240000:D2=450:D3=3000:D4=0.027:D5=0.5
163 R1%=48:R2%=63:R3%=78:R4%=57:R5%=69:RX=15:RM=45:RN=-45
164 UP%=8:UL%=40:UR%=72:DN%=16:DL%=48:DR%=80:LT%=32:RT%=64
190 RR=KR*R:CR=COS(RR):SR=SIN(RR):G=KD*HD/V:DM=DR:Q=KQ*V*V*EXP(-
H/KP):HK=KA*H:CLS
199 CF=0:BC=0:GI=0:F1=0:AP=0:AT=1
200          'DYNAMICS
201 LET DT=5:IF HK<3 THEN LET DT=2+HK
202 LET M=KA*V:LET P=G+A*CR
203 IF M>M1 THEN 210      'AERODYNAMICS
204 LET CL=K0*A:LET CD=K1+K2*CL*CL:GOTO 218
210 IF M<M2 THEN 214
211 LET CL=K3*A:LET CD=K4+K5*CL*CL:GOTO 218
214 LET W1=M3*(M2-M):LET W2=M3*(M-M1)
215 LET CL=(W1*K0+W2*K3)*A:LET CD=W1*(K1+K2*CL*CL)+W2*(K4+K5*CL* CL)
218 IF CL>1 THEN LET CL=1
220 LET Q=KQ*V*V*EXP(-H/KP):LET VI=SQR(Q*HK)
221 LET L=Q*KS*CL:LET D=Q*KS*CD
224 IF VI>V3 THEN LET D=D+D3*(VI-V3)
225 IF D>D1 THEN LET D=D1
```

```
226 LET HA=KG*(L*CR/KW-1):LET HD=HD+DT*HA:LET H=H+DT*HD:LET HK=K
A*H
229 LET GR=HD/(V+DT*VD):LET G=KD*GR
231 LET VD=-KG*GR-D/KM:LET V=V+DT*VD:IF V<V1 THEN LET V=V1
232 IF VI>400THENCLS:PRINTCHR$(23):PRINT@400,"B A I L  O U T !":
GOTO999
236 LET BD=KN*V*SB/DR-L*SR/(KM*V):LET BR=BR+DT*BD:IF ABS(BR)>10
THEN LET BR=0
237 LET CB=COS(BR):LET SB=SIN(BR)
238 LET DD=KN*V*CB:LET DR=DR-DT*DD:LET X=DR*CB:LET Y=DR*SB
242 LET DM=SQR(DR*DR+D4*HK*HK):LET BI=KD*BR+D5
300 'NUMERICAL READOUTS
305 LET V$="###.#"
310 PRINT @ 64,"IAS  ";INT(VI);
311 IF HK>10 THEN PRINT @ 118,"ALT ";:PRINT USING V$;(KA*H);
312 IF HK<10 THEN PRINT @ 118,"ALT ";INT(H);
313 PRINT @ 192,"MACH";:PRINT USING V$;M;
314 PRINT @ 246,"RATE";INT(HD);
315 PRINT @ 320,"ALFA";:PRINT USING V$;A;
316 IF DM>10 THEN PRINT @ 374,"DME ";INT(DM);:GOTO 318
317 PRINT @ 374,"DME";:PRINT USING V$;DM
318 IF HK>2 THEN PRINT @ 541,"BNG";INT(BI):GOTO 321
319 IF(X<0)*(X>-5)*(ABS(Y)<1) THEN PRINT @ 538,"=-RUNWAY-=:":GO
TO 321
320 PRINT @ 538,"[--FLARE--[ "
321 PRINT @ 469,"                              ";
322 IF(M<1)*((V)<150)+(A>15)) PRINT @ 469,"* * STALL WARNING * *
";
323 IF VI>350 THEN PRINT @ 469,"* * SPEED TOO HIGH * *";
324 IF ABS(R)>60 THEN PRINT @ 469,"* * BANK TOO STEEP * *";
325 IF (HK<50)*(HD<-10) THEN PRINT @ 469,"* * SINK RATE HIGH * *"
;
399 REM
400 'DISPLAYS
401 PRINT @ 991,"[";
405 LET SX=20/DR:IF DR<20 THEN LET SX=1
406 LET SY=2*SX
413 LET J=JA+1:LET I=IA:GOSUB 10
414 LET J=JA-1:LET I=IA:GOSUB 10
415 LET JA=JC+SY*Y:LET IA=IM-SX*X
```

```
416 LET J=JA+1:LET I=IA:GOSUB 5
417 LET J=JA-1:LET I=IA:GOSUB 5
418 LET J=J3:LET I=I3:GOSUB 10
419 LET J=J6:LET I=I6:GOSUB 10
420 LET X3=30*V*KN:LET X6=2*X3
421 LET Y3=D2*KN*L*SR/KM:LET Y6=4*Y3
422 LET J3=JC+SY*Y3:LET I3=IM-SX*X3
423 LET I=I3:LET J=J3:GOSUB 5
424 LET J6=JC+SY*Y6:LET I6=IM-SX*X6
425 LET I=I6:LET J=J6:GOSUB 5
429 IF (SK>0)*(AT=0)*(HK>2) THEN 499
430 LET J=JB:LET I=1:GOSUB 10     'ROLL BUG
431 LET JB=JC-D5*R:LET J=JB:GOSUB 5
432 SET(R1%,0):SET(R2%,0):SET(R3%,0)
435 LET I=IL:LET J=JL     'ATTITUDE INDICATOR
436 FOR K%=1 TO 5
437 LET I=I+DI:LET J=J+DJ:GOSUB 10
438 NEXT
439 LET IL=IW+S1*SR+S2*P:LET DI=-5*SR
440 LET JL=JC-30*CR:LET DJ=10*CR
441 LET I=IL:LET J=JL
442 FOR K%=1 TO 5
443 LET I=I+DI:LET J=J+DJ:GOSUB 5
444 NEXT
445 SET(JC%,IW%-1):LET AT=0
446 FOR J%=R4% TO R5% STEP 4:SET(J%,IW%):NEXT
499 REM
500          'COMMANDS
501 LET C%=PEEK(15168):IF (SK>0)*(HK<2) THEN 530
502 IF C%=0 THEN 510 ELSE LET AT=1:IF (SK=0) THEN LET SK=1
503 IF(C%=DN%)+(C%=DL%)+(C%=DR%)THEN LET A=A-1:IF A>6 THEN A=A-1
:GOTO 505
504 IF(C%=UP%)+(C%=UL%)+(C%=UR%)THEN LET A=A+1:IF A>9 THEN LET A
=A+1
505 IF(C%=RT%)+(C%=UR%)+(C%=DR%)THEN LET R=R+RX:GOTO 510
506 IF(C%=LT%)+(C%=UL%)+(C%=DL%)THEN LET R=R-RX
510 LET C$=INKEY$:IF C$="" THEN 599 ELSE LET AT=1
511 IF (C$="A")*(SK>0)*(SK<3) THEN SK=0:GOTO 599
512 IF (SK=0) THEN LET SK=1
515 IF C$="." THEN LET R=RM.GOTO 599
```

```
516 IF C$="," THEN LET R=RN:GOTO 599
517 IF C$="@" THEN LET R=0:GOTO 599
518 IF SK=3 THEN 599
521 IF C$="1" THEN LET A=AC:LET AP=AP+1
522 IF C$="-" THEN LET R=RC:LET AP=AP+1
523 GOTO 599
530 LET AT=1:IF HC=0 THEN LET HC=HD    'FLARE COMMAND
531 IF(C%=UP%)+(C%=UR%)+(C%=UL%)THEN LET HC=H2*H+5
532 IF(C%=DN%)+(C%=DR%)+(C%=DL%)THEN LET HC=H1*H
534 LET A=(A1+(30/DT)*(HC-HD))/Q:IF A<4 THEN LET A=4
535 IF A>16 THEN LET A=16
536 GOTO 505
599 REM
600 'GUIDANCE EQUATIONS
605 IF M<3 THEN 615
606 LET AC=6+3*M:IF M>8 THEN LET AC=30:LET BC=0:GOTO 630
607 IF M1-INT(M)=0 THEN 630
608 LET M1=INT(M):IF DN<4*M*M THEN LET BC=-30:GOTO 630
609 LET BC=0:GOTO 630
615 IF HK<2 THEN 625
616 LET BC=0:HN=2*DN:LET AC=4+HN-HK
617 IF AC>9 THEN LET AC=9
618 IF AC<3.5 THEN LET AC=3.5
619 IF M>1 THEN LET AC=AC+6
620 LET AC=AC/CR:IF AC>15 THEN LET AC=15
621 IF (HK>20)*(HK>HN+10) THEN LET BC=-90
622 GOTO 630
625 LET HM=H1*H:LET AC=(A1+(45/DT)*(HM-HD))/Q
626 IF AC>16 THEN LET AC=16
627 IF AC<5 THEN LET AC=5
630 LET RC=2*M*(BI-BC):IF HK<4 THEN LET RC=0
631 IF ABS(RC)>RM THEN LET RC=RM*SGN(RC)
633 PRINT @ 960,"                                [";
634 PRINT @ 992,"                                ";
635 LET G$="":LET F$=""
636 IF SK>0 THEN 640
637 LET A=AC:LET R=RC:LET AP=AP+1:PRINT @ 960,"AUTOPILOT ON";:GO
TO 700
640 LET RE=20:LET AE=2:IF M<1 THEN LET RE=10:LET AE=1
641 IF HK<10 THEN LET AE=05
```

```
643 IF ((A-AC)>AE)+(MK(1)*((VI(150)+(A)15)) THEN LET F$="PITCH DO
WN"
644 IF ((AC-A)>AE)+(VI)350) THEN LET F$="PITCH UP  "
645 IF MK>2 THEN 650
646 IF HD)-.05*H THEN LET F$="PITCH DOWN"
647 IF (H)50)*(HD<-.2*H) THEN LET F$="PITCH UP  "
648 IF (H<50)*(HD<-10) THEN LET F$="PITCH UP  "
650 IF F$="" THEN 660 ELSE FI=FI+1
651 IF (MN=1)+(MN=4)+(SK=3) THEN 660
652 PRINT @ 960,"FIDO SUGGESTS YOU ";F$;:FI=FI+1
660 IF (R-RC)>RE THEN LET G$="ROLL LEFT "
661 IF (RC-R)>RE THEN LET G$="ROLL RIGHT"
662 IF (ABS(BI-BC)<2)*(ABS(R))10) THEN LET G$="ROLL LEVEL"
663 IF G$="" THEN 700 ELSE GI=GI+1
664 IF (MN)1)*(MN<5)+(SK=3) THEN 700
665 PRINT @ 994,"GUIDO SUGGESTS YOU ";G$;
700  'MALFUNCTIONS
701 IF SK<2 THEN 799
711 IF TM=0 THEN LET MN=RND(100)
712 IF MN>4 THEN 800
713 LET TM=TM+1
714 IF TM>5+RND(5) THEN TM=0
715 ON MN GOTO 720,730,740,750
720 PRINT @ 960,"PITCH CONTROL MALFUNCTION   ";
721 LET A=A+.5-RND(0):LET AT=1:GOTO 799
730 PRINT @ 994,"ROLL CONTROL MALFUNCTION     ";
731 LET R=R+10-RND(20):LET AT=1:GOTO 799
740 PRINT @ 994,"ENCOUNTERING TURBULENCE      ";
741 LET A=A+.5-RND(0):LET R=R+10-RND(20):AT=1:GOTO 799
750 PRINT @ 960,"COMMUNICATIONS MALFUNCTION  ";
751 IF(F$<>"")+(G$<>"")THEN PRINT @ 994,"!#$%&0(*=@+</) >[# *&%#
/ $&?!";
799 REM
800 LET RR=R*R:LET SR=SIN(RR):LET CR=COS(RR)
900 IF HD-2*HD THEN 200
910 CLS
911 IF HD<-20 THEN PRINT "YOU CRASHED AT ";INT(-HD);"FT/SEC":LET
 CF=1
912 IF HD<-10 THEN PRINT "YOU BROKE THE LANDING GEAR":LET CF=1
913 IF VI)220 THEN PRINT "YOU DESTROYED YOUR TIRES":LET CF=1
```

```
914 IF ABS(R)>10 THEN PRINT "YOU BROKE A WING OFF":LET CF=1
915 IF (X>0)+(X<-5)+(ABS(Y)>1) THEN PRINT "YOU MISSED THE RUNWAY
":LET CF=1
916 IF CF=1 THEN 921
920 PRINT "CONGRATULATIONS!  YOU MADE A SAFE LANDING."
921 PRINT:PRINT "YOUR TOUCHDOWN CONDITIONS WERE:"
922 PRINT "SINK RATE  ";INT(-HD);:PRINT TAB(17) "FT/SEC" TAB(32)
;
923 PRINT "AIRSPEED   ";INT(VI);:PRINT TAB(49) "KNOTS"
924 PRINT "DOWNRANGE ";:PRINT USING V$;-X;:PRINT TAB(17) "MILES"
TAB(32);
925 PRINT "CROSSRANGE ";INT(6076*Y);:PRINT TAB(49)"FEET"
926 PRINT "BANK ANGLE ";INT(R);:PRINT TAB(17)"DEGREES" TAB(32);
927 PRINT "ALFA ANGLE ";INT(A);:PRINT TAB(49)"DEGREES":PRINT:IF
SK<>0 THEN 930
928 IF CF<>1 PRINT "AUTOMATIC LANDING--NOT BAD FOR A CHIMP!":GOT
O 999
929 PRINT "YOU SHOULD HAVE TURNED ON THE AUTOPILOT SOONER!":GOTO
 999
930 PRINT "FIDO CALLED YOU ";FI;" TIMES    ";
931 PRINT "GUIDO CALLED YOU ";GI;" TIMES"
932 PRINT "YOU USED THE AUTOPILOT ";AP;" TIMES       ";
933 LET SC=100-GI-AP-FI-10*IN+10*SK
934 IF(CF=1)THEN SC=SC-50
935 PRINT "YOUR SCORE IS ";SC
940 IF SC>89 THEN R$="A TICKER TAPE PARADE IN YOUR HONOR"
941 IF SC<90 THEN R$="YOU BE PROMOTED TO *** ACE ***"
942 IF SC<75 THEN R$="YOU BE HIRED AS AN ASTROPILOT"
943 IF SC<50 THEN R$="YOU NEED MORE TRAINING"
944 IF SC<0 THEN R$="SENDING A CHIMP NEXT TIME"
950 PRINT "NASA HEADQUARTERS RECOMMENDS ";R$
999 PRINT:INPUT "HIT (ENTER) TO TRY AGAIN";ZZ:IN=0:SK=0:GOTO1
1000 PRINT:RANDOM
1002 PRINT "WHAT IS YOUR SKILL LEVEL?"
1003 INPUT "0=CHIMP 1=ROOKIE 2=ASTROPILOT 3=ACE",SK:PRINT
1004 PRINT "FOR RE-ENTRY PRACTICE HIT (ENTER)"
1005 PRINT "FOR APPROACH PRACTICE HIT (1) (ENTER)"
1006 PRINT "FOR LANDING PRACTICE HIT (2) (ENTER)"
1007 INPUT "TO TYPE IN INITIAL CONDITIONS HIT (3) (ENTER)";IN
1008 CLS:PRINT:PRINT "COLUMBIA--THIS IS HOUSTON."
```

```
1009 ON (IN+1) GOTO 1010,1020,1030,1040
1010 DR=340+RND(70):BR=.1*(RND(5)-3+RND(0)):R=45*SGN(BR)
1011 H=150000+RND(30000):HD=-1*RND(200):V=10000:M=10:A=30
1012 PRINT "YOU ARE OUT OF YOUR RE-ENTRY BLACKOUT."
1013 GOTO 1100
1020 DR=40+RND(20):BR=-.5*RND(0):M=2.5+RND(0):V=1000*M:A=6+3*M
1021 H=80000+RND(20000):HD=-100-RND(200):R=45*SGN(BR)
1022 PRINT "YOU ARE IN THE TRAFFIC PATTERN FOR A DEADSTICK LANDI
NG."
1023 GOTO 1100
1030 DR=6+4*RND(0):BR=.1-.2*RND(0):M=.5+.3*RND(0):V=1000*M
1031 H=12000+RND(8000):HD=-100-RND(200):R=15-RND(30):A=3+3*RND(0
)
1032 PRINT "YOU ARE ON FINAL APPROACH FOR A DEADSTICK LANDING."
1033 GOTO 1100
1040 PRINT @ 0,"PLEASE ENTER DESIRED VALUES"
1041 INPUT "MACH NUMBER";M:V=1000*M
1042 INPUT "ALTITUDE IN 1000'S OF FEET";H:H=1000*H
1043 INPUT "ALTITUDE RATE IN FT/SEC";HD
1044 INPUT "DOWNRANGE IN NAUTICAL MILES";DR
1045 INPUT "RELATIVE BEARING IN DEGREES";BI:BR=.0175*BI
1046 INPUT "ANGLE OF ATTACK IN DEGREES";A
1047 INPUT "ROLL ATTITUDE IN DEGREES";R
1100 PRINT:ON (SK+1) GOTO 1110,1200,1300,1400
1110 PRINT "SINCE THIS IS A TEST FLIGHT, THERE IS NO NEED FOR YO
U TO DO"
1111 PRINT "ANYTHING.  THE ORBITER WILL BE FLOWN BY THE AUTOPILO
T."
1112 PRINT "JUST SIT BACK AND RELAX...AND ENJOY YOUR BANANA!":GO
TO 2000
1200 PRINT "YOU MUST FLY THE MISSION YOURSELF."
1201 PRINT "YOU WILL BE ASSISTED BY FIDO--YOUR FLIGHT DYNAMICS O
FFICER"
1202 PRINT "    AND GUIDO--YOUR GUIDANCE OFFICER."
1203 PRINT "THE FOLLOWING KEYBOARD COMMANDS ARE AVAILABLE--NO SH
IFTS REQ'D"
1204 PRINT CHR$(91);" TO PITCH UP      ";CHR$(92);" TO PITCH DOW
N     ! FOR AUTO PITCH"
1205 PRINT CHR$(93);" TO ROLL LEFT     ";CHR$(94);" TO ROLL RIGH
```

```
T     = FOR AUTO ROLL"
1206 PRINT "@ FOR WINGS LEVEL  < FOR 45 LEFT ROLL  > FOR 45 RIGH
T ROLL"
1207 PRINT "          A  TO TURN THE AUTOPILOT ON OR OFF"
1208 PRINT "HOUSTON, OVER AND OUT.":GOTO 2000
1300 PRINT "YOU MUST FLY THE MISSION MANUALLY.  FIDO AND GUIDO W
ILL ASSIST"
1301 PRINT "YOU IF NECESSARY.  TELEMETRY INDICATES YOU HAVE POSS
IBLE"
1302 PRINT "CONTROL MALFUNCTIONS.  WEATHER RADAR INDICATES POSSI
BLE"
1303 PRINT "THUNDERSTORMS AND TURBULENCE IN THE LANDING ZONE:"
1304 PRINT "GOOD LUCK!  HOUSTON, OVER AND OUT.":GOTO 2000
1400 PRINT "YOU MUST FLY...MISSION.....THUNDERSTORMS....."
1401 PRINT "....MALFUNC.....POOR COMMUNICA....FIDO AND GUIDO.
...."
1402 PRINT "...REPEAT, UNABLE TO ASSIST YOU.....AND OUT":GOTO 2
000
2000 PRINT:INPUT "HIT (ENTER) TO CONTINUE";ZZ:GOTO 150
```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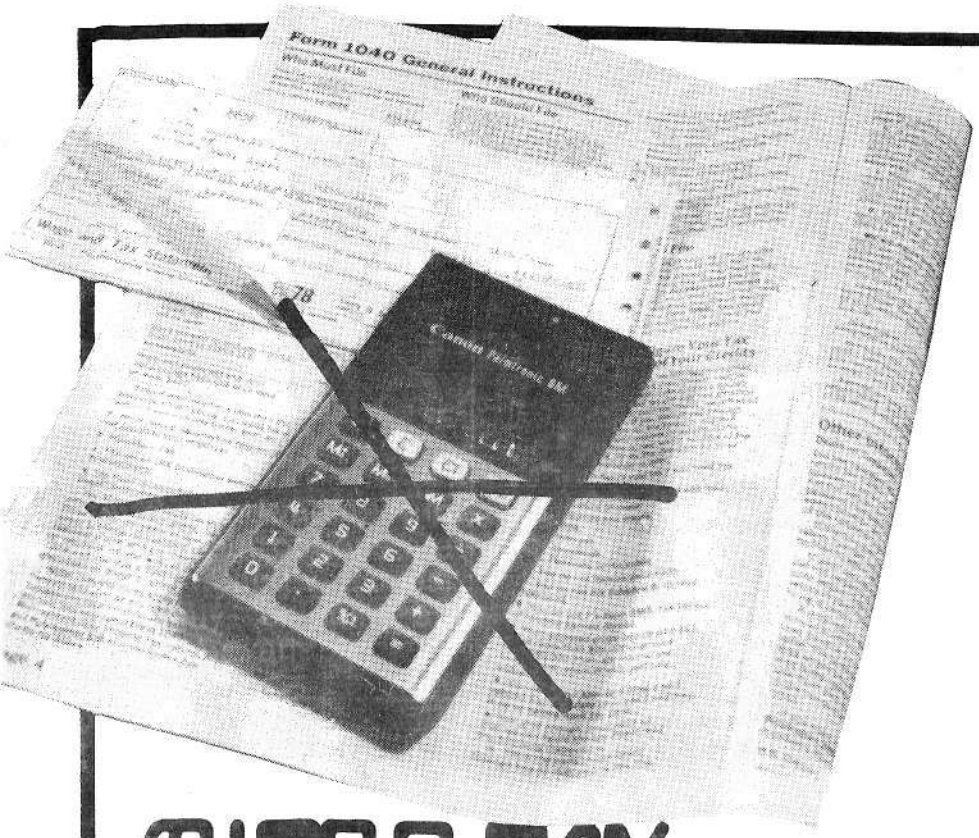

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by George Blank

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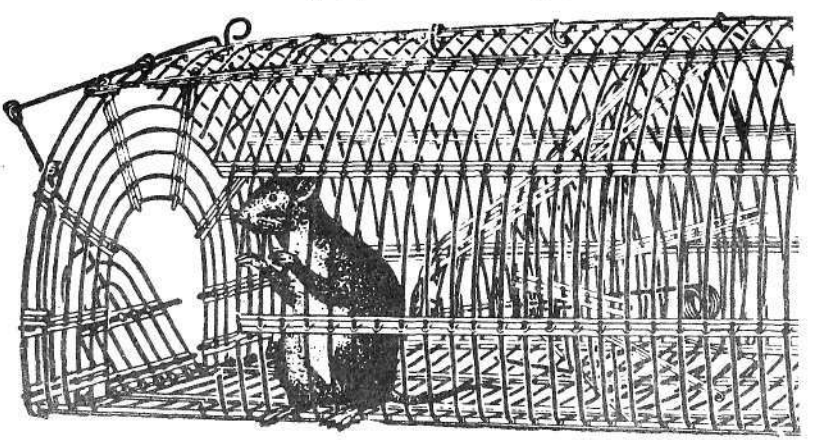

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PLAY IT AGAIN, SAM

by Alan Zett

The computer plays a note, then two and three; soon it's a little tune, and you're trying to remember exactly how it goes, by the tones and the letters with them, so you can duplicate it. Did it go H, Y, Y, G, B? or was it H, G, Y, Y...

The string of letter/tones goes on for 8 to 32 notes, depending on the level of difficulty you selected. Since the tones are chosen at random, it's a pleasant surprise when they seem to follow a familiar melody. But once in a while you'll hear a sequence of notes that might inspire you to write a new song --who knows, it could be in the Top 40!

By now, most of you will recognize the sound routine that is poked into line 2000. It will give you a strange listing after you run the program, so it is best to save it on tape or disk before running, or else retype line 2000 before saving the program.

```
0 CLS:PRINT"
NOTE: BECAUSE OF MY SOUND ROUTINE, WHEN YOU LIST THE PROGRAM,
PART OF IT WILL SCROLL FUNNY AND LOOK GARBLED. TO GET A BETTER
IDEA WHAT CAUSES THIS, EDIT 2000 AND STEP THROUGH IT 1 SPACE
AT A TIME.
1 PRINT"
FOLLOWING THIS LINE IS A ROUTINE WHICH POKES A MACHINE LANGUAGE
ROUTINE INTO A STRING VARIABLE SPACE. THIS ALLOWS YOU TO POWER
UP AND PRESS ENTER IN RESPONSE TO MEMORY SIZE.
2 PRINT"
THANKS TO SOFTSIDE FOR THE STRING ROUTINE.
SOUND ROUTINE AND PROGRAM BY ALAN J. ZETT.
TO START PROGRAM HIT ANY KEY
```

```
3 IFINKEY$=""THEN3:REM DELETE 0 TO 5 IF NOT NEEDED
5 REM - 255 , 228 , 206 , 190 - USR NOTE NUMBERS (LOW TO HIGH)
10     REM                    REM     10
       * * * * * * * * * * * * * *
       * *  PLAY IT AGAIN, SAM * *
       * *   BY: ALAN J ZETT   * *
       * * * * * * * * * * * * * *
10     REM                    REM     10
20 CLS:GOTO1000
30 N=VAL(W$):N=(N*8)-1:FORX=0TON:S(X)=RND(4):NEXT
40 FORX=0TON
50 IFS(X)=1THENS(X)=255
60 IFS(X)=2THENS(X)=228
70 IFS(X)=3THENS(X)=206
80 IFS(X)=4THENS(X)=190
90 NEXT
100 CLS:PRINT@24,Y$:PRINT@324,G$:PRINT@364,H$:PRINT@664,B$:PRINT
@472, "PLAY IT AGAIN, SAM";
105 PRINT@960,"PRESS ENTER TO BEGIN";:PRINT@0,;
110 A$=INKEY$:IFA$=CHR$(13)THEN120ELSEIFA$="P"THENC=0:GOTO3000EL
SE110
120 PRINT@960,"                    ";:PRINT@0,;
200 A=0
210 IFS(A)=190THENO$=Y$:P=24
220 IFS(A)=206THENO$=H$:P=364
230 IFS(A)=228THENO$=B$:P=664
240 IFS(A)=255THENO$=G$:P=324
250 GOSUB400:A=A+1:IFA>CTHEN500ELSE210
400 PRINT@P,T$;:Z=USR(S(A)):PRINT@P,O$;:RETURN
500 PRINT@960,"YOUR TURN";:PRINT@0,;:A=0
505 A$=INKEY$:IFA$=""THEN505
507 IFA$="R"GOTO200
508 IFA$="P"THENC=0:GOTO3000
509 IFA$=CHR$(13)THEN505
510 IFS(A)=190ANDA$="Y"THENO$=Y$:P=24:GOSUB400:GOTO580
520 IFS(A)=206ANDA$="H"THENO$=H$:P=364:GOSUB400:GOTO580
530 IFS(A)=228ANDA$="B"THENO$=B$:P=664:GOSUB400:GOTO580
540 IFS(A)=255ANDA$="G"THENO$=G$:P=324:GOSUB400:GOTO580
550 PRINT@471,STRING$(20,32);:PRINT@477,"W R O N G";:C=0
```

```
560 FORX=1TO5:FORY=130TO160STEP30.2=USR(Y):NEXTY:NEXTX:FORX=1TO1
000:NEXT:GOTO3000
580 A=A+1:IFD>CTHENC=C+1ELSE505
590 IFC>NTHEN600ELSE105
600 FORX=1TO5:FORY=20TO1STEP-1.2=USR(Y):NEXTY:FORY=1TO20:Z=USR(Y
):NEXTY:NEXTX
610 PRINT@476,"* YOU WIN *";:C=0
620 FORX=1TO1000:NEXT:GOTO3000
1000 CLEAR1500:DIMS(32):C=0
1010 S$=CHR$(26)+STRING$(19,8)
1020 H$=STRING$(19,191)+S$+STRING$(6,191)+"  "+STRING$(3,191)+"
 "+STRING$(6,191)+S$+STRING$(6,191)+"  "+STRING$(3,176)+"  "+STR
ING$(6,191)+S$+STRING$(6,191)+STRING$(2,176)+STRING$(3,191)+STRI
NG$(2,176)+STRING$(6,191)+S$+STRING$(19,143)
1030 G$=STRING$(19,191)+S$+STRING$(6,191)+"  "+STRING$(5,176)+ST
RING$(6,191)+S$+STRING$(6,191)+"  "+STRING$(2,191)+CHR$(179)+STR
ING$(2,131)+STRING$(6,191)+S$+STRING$(6,191)+STRING$(7,176)+STRI
NG$(6,191)+S$+STRING$(19,143)
1040 B$=STRING$(19,191)+S$+STRING$(6,191)+"  "+STRING$(3,176)+"
"+CHR$(131)+STRING$(6,191)+S$+STRING$(6,191)+"  "+STRING$(2,176)
+CHR$(176)+" "+CHR$(138)+STRING$(6,191)+S$+STRING$(6,191)+STRING
$(6,176)+CHR$(188)+STRING$(6,191)+S$+STRING$(19,143)
1050 V$=STRING$(19,191)+S$+STRING$(6,191)+CHR$(180)+" "+CHR$(139
)+CHR$(191)+CHR$(135)+" "+CHR$(184)+STRING$(6,191)+S$+STRING$(7,
191)+CHR$(189)+CHR$(144)+" "+CHR$(160)+CHR$(190)+STRING$(7,191)+
S$+STRING$(8,191)+CHR$(181)+CHR$(176)+CHR$(186)+STRING$(8,191)+S
$
1051 V$=V$+STRING$(19,143)
1060 T$=CHR$(191)+STRING$(17,131)+CHR$(191)+S$+CHR$(191)+STRING$
(17,32)+CHR$(191)+S$+CHR$(191)+STRING$(17,32)+CHR$(191)+S$+CHR$(
191)+STRING$(17,22)+CHR$(191)+S$+CHR$(143)+STRING$(17,140)+CHR$(
143)
2000 SOUND$="////////////////////////"
2010 X=VARPTR(SOUND$):Y=PEEK(X+1)+256*PEEK(X+2)
2020 FORZ=YTOY+22:READD:POKEZ,D:NEXT
2030 IFPEEK(16396)=201POKE16526,PEEK(X+1):POKE16527,PEEK(X+2)ELS
ECMD"T":DEFUSR0=PEEK(X+1)+256*PEEK(X+2):POKE14308,0
2050 DATA205,127,10,14,140,69,62,1,211,255,16,254,69,62,2,211,25
5,16,254,13,32,239,201
```

```
3000 PRINTTAB(15); "P L A Y  I T  A G A I N,  S A M"
3005 PRINT"THIS IS THE GAME OF PLAY IT AGAIN, SAM. THE
COMPUTER WILL SELECT 1 OF 4 RANDOM SQUARES AND ITS
CORRESPONDING TONE. YOU MUST FOLLOW WITH THE SAME KEY
AND TONE, ELSE THE COMPUTER WILL TELL YOU YOU'RE
WRONG AND YOU MUST START OVER.
3010 PRINT"
IF YOU GET THE FIRST KEY/TONE RIGHT THE COMPUTER WILL ADD
ANOTHER KEY/TONE AND YOU WILL CONTINUE PLAYING BACK THE
SEQUENCE UNTIL  A MAXIMUM OF 8,16,24 OR 32 TONES ARE
COMPLETED. (DEPENDING ON THE LEVEL OF DIFFICULTY YOU
CHOSE - 1,2,3 OR 4)
3020 PRINT"PRESS 'ENTER' TO CONTINUE.";
3030 IFINKEY$=""THEN3030
3040 CLS:PRINT"
THE KEYS USED ARE:
              Y
          G       H
              B
FOR SOUND, CONNECT THE AUX LEAD TO AN AMPLIFIER OR
PUT A BLANK TAPE IN THE RECORDER, PRESS 'PLAY' AND
'RECORD' BUTTONS, REMOVE THE EAR LEAD AND PLUG IN
3050 PRINT"AN EARPHONE OR A SET OF HEADPHONES.

( ----NOTE:---- DON'T PUT ON THE HEAD PHONES OR
 PUT THE EARPHONE IN YOUR EAR. IT IS SO LOUD IT
 CAN BE HEARD BY SETTING IT NEXT TO THE COMPUTER!)
3060 PRINT"
PRESS ENTER TO CONTINUE.";
3070 IFINKEY$=""THEN3070
3080 CLS:PRINT"
WHEN PLAYING, PLEASE WAIT A MOMENT BEFORE
PRESSING THE NEXT KEY IN THE SEQUENCE.
HINT:
IF YOU HAVE TROUBLE REMEMBERING THE SEQUENCE,
TYPE 'R' FOR REPEAT OR
TYPE 'P' FOR NEW GAME.
3090 PRINT"WHAT LEVEL OF DIFFICULTY (1 TO 4)
3100 W$=INKEY$:IFW$=""ORVAL(W$)<1ORVAL(W$)>4THENZ=USR(RND(50)):G
OTO3100ELSEGOTO30
```

AIR RAID

by Small System Software

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KAMIKAZE

by Russell Starkey

You command the anti-aircraft guns as suicide planes dive toward your ship in this exciting game of skill!

A live-action game with machine language graphics (plane and ship) for fast-paced fun. Three levels of play: Beginner, Amateur, and Professional.

For Level II, 16K Price, $7.95

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RPN CALCULATOR

Have you ever needed a calculator to check some figures and at the same time needed to retain some "key" numbers while thinking the problem through?

Here's just the program to do the job: **RPN Calculator** is based on **R**everse **P**olish **N**otation (not familiar with the system . . . instructions are built right in) It makes your TRS-80 function like a programmable calculator. Expanded scientific functions now include logarithmic and trigonometric functions in addition to previous features such as: add, subtract, multiply, divide, raise to power, square root, register arithmetic, Pi, ...lo-, and mili-. Stores memories and stack to tape for later playback. Now includes line printer routine to print stack and all 100 memories. Comes complete with many fail-safe features to guard against user-error.

Level II, 16K tape, Price, $9.95. **by Russell Starkey**

9 Games for Pre-School Children

by George Blank

Until they go to school, children think that learning is fun, not work. Is this the reason that they learn so much faster in the early years? And learning is great play. With these games children teach each other the alphabet, addition and subtraction, recognition of letters and words, even art as they play with patterns on the screen. The games are written for ages four to six. The author has a degree in education, with graduate study in child development and counseling, plus a wide variety of teaching experience in industry, the military, public and private schools, and churches. If you have children, and you also have a TRS-80, then you should have **Nine Games for Pre-School Children.** All nine games and the menu are in the computer at one time, and the children will quickly learn to select the one they want. **Level II, 16K $9.95**

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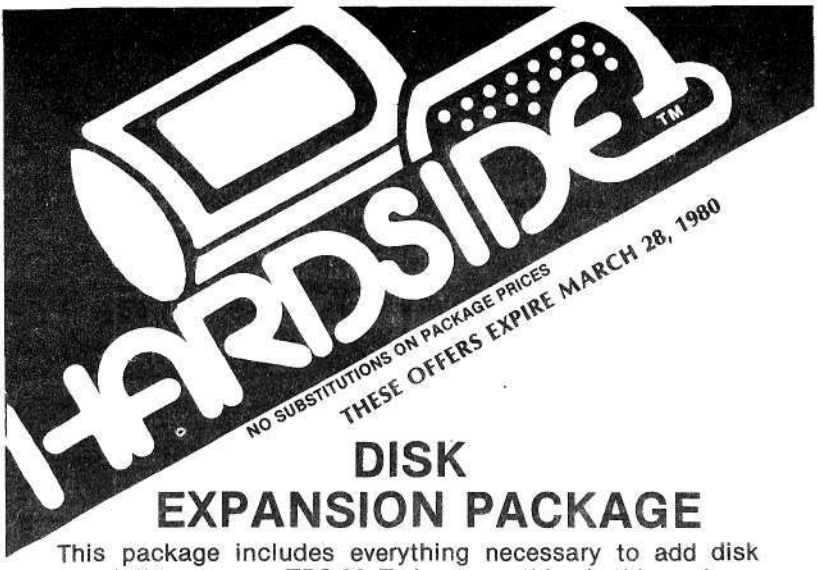

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This package includes everything necessary to add disk capabilities to your TRS-80. To buy everything in this package at the local Radio Shack store would cost $1100.00.

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Level-I 4K	$499	$449
Level-II 4K	$619	$559
Level-II 16K		$669
Level-II 16K, w/keypad	$849	$769
EXPANSION INTERFACE:		
.... OK	$299	$269
.... 16K	$448	379/403
.... 32K	$597	479/537
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Percom, TFD-100, 40-track		$399
Percom, dual TFD-100		$795
Percom, TFD-200, 77-track		$675
2-drive cable		$29
4-drive cable		$39
Radio Shack, -0	$499	$469
Radio Shack, -1, 2, 3	$499	$459
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Line Printer III	$1999	$1849
Centronics 779-2	$1598	$1095
Line Printer II	$999	
Centronics 730	$999	$899
Centronics P1†	$499	$419
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The MAGIC of Leo Christopherson

Android Nim

The newest version of TRS-80's first animated graphics game - Android NIM - now with more animation and **sound**!

Level II, 16K - **$14.95**

Snake Eggs

Here is a computerized reptilian version of **21** complete with arrogant snakes and appropriate **sound**.

Level II, 16K **$14.95**

Life Two

Two in one: Game of Life, at an astounding 100 generations a minute, plus Battle of Life with animated creatures and **sound**.

Level II, 16K **$14.95**

BEE WARY

This fast paced real time action game is a contest between a Bee operated by the player and a Spider operated by the computer. The Bee tries to sting the Spider in a vulnerable spot while the Spider tries to jump up and swallow the Bee. Fast paced animation, sound, and real time action. Machine language subroutines, but loads as Level II for easy operation.

$14.95

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PROGRAMMING TIPS

Using the OUT command with port 255 can create some interesting effects. Try these one-liners out and watch what happens.

```
FOR R = 1 TO 500: OUT 255,4: OUT 255,0: NEXT R
```

This causes the internal beeper to Buzz(?) Hum(?).

```
FOR R =1TO 500: OUT 255,4: OUT 255,255: NEXT R
```

The video display quivers and vibrates in a "wavey water" effect.

```
FOR R = 1 TO 500: OUT 255,4: OUT 255,25: NEXT R
```

Now the two effects are combined for a "Hum-buzz-wavey water" display that could be a useful subroutine.

```
FOR R = 1 TO 500: OUT 255, INP (255): NEXT R
```

This flips the display into the 32 character mode and holds it there for a few seconds.

Thanks to
JEFF METZNER
Londonville, NY

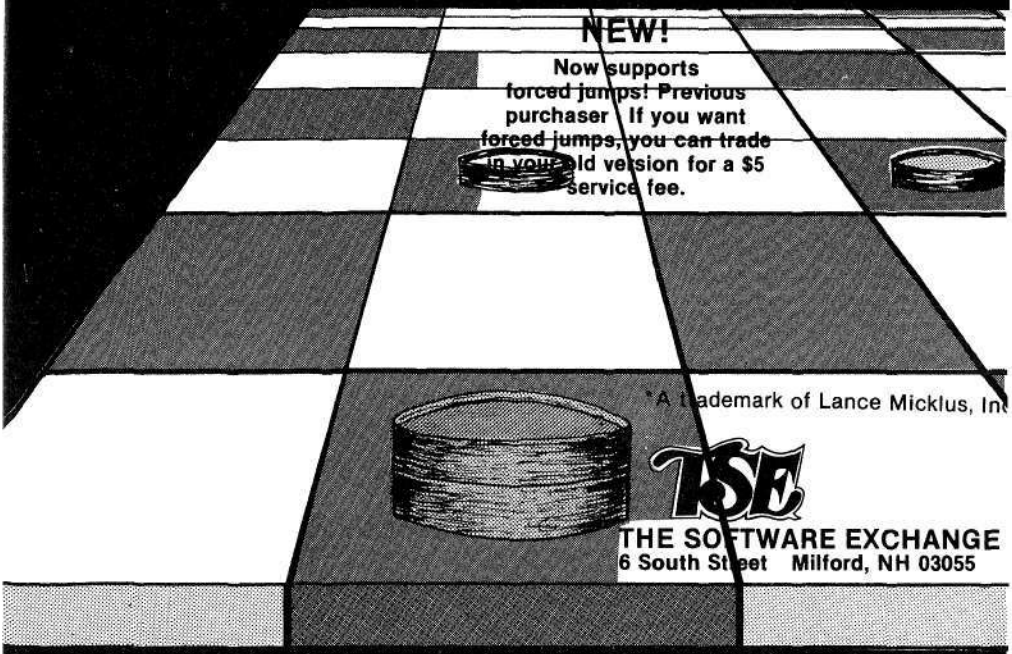
Bug Report

```
ISOLATE     NOVEMBER, PAGE 19    LINES 100, 110

PROBLEM: PRINTING DROPOUT - JANUARY CORRECTION INCORRECT

100 T=0:FORX=-1TO1:FORY=-1TO1:P=L+Y*7+X*128:S=X*3+Y+5:Z(S)=0:IFP
EEK(V+P+1)=191PRINT@P+67,S;:Z(S)=1:T=T+1
110 NEXT:NEXT:Z(5)=1:M=L.PRINT@896,D;.IFTPRINT"TO WHICH SQUARE D
O YOU WISH TO MOVE (";:GOSUB850:PRINTCHR$(24)" )?"ELSEB=C:GOTO99
9
```

```
OIL BARON    DECEMBER, 1979  PAGES 8 - 26

PROBLEM. USES TOO MUCH MEMORY FOR LEVEL II 16K

THERE ARE TWO ALTERNATIVES.
1) TRIM PROGRAM CAREFULLY

2) DELETE BAR GRAPH ROUTINE AS FOLLOWS:
  DELETE 8800-9290
  INSERT 8800 CLS:RETURN
```

THE MEAN CHECKERS MACHINE

by Lance Micklus



*A trademark of Lance Micklus, Int

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Our resident wizard has done it again! Designed in FORTRAN, run as machine language, this program turns your TRS-80 into an unbelievably wicked checker player! Four levels of play; at the most difficult, the machine may take ten minutes per move, as it attempts to assess all possibilities. MEAN CHECKERS MACHINE is to checkers what SARGON is to chess. (Level 4 is an exercise in humility!)

Level II, 16K	$19.95
Disk	$24.95

ADVENTURE

Get the granddaddy of the Adventure Games!

From MicroSoft, the people who wrote BASIC for all the personal computers, comes a version of the original Adventure. NOW, you no longer need a PDP-10 for all the power of the original game!

This game fills an entire diskette. Endless variety and challenge as you seek to rise to the level of Grand Master (until you gain skill, there are whole areas of the cave that you cannot enter.)

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Many computer business applications can be done with this Data Management System. You can structure it to keep your financial records, inventory, customer lists, sales records, or manage almost any application that requires storage, reordering, and arithmetic manipulation of information. A sophisticated inventory control application is included with the system as an example, and another example describes a complete mailing list application.

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- Print mailing labels.
- Print records selectively, for example, only customers with New York addresses.
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- Printer alignment pattern for labels.
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INPUT

A COLUMN OF YOUR LETTERS

Dear Sir:

One year ago I received a complimentary copy of SoftSide Magazine. After a quick perusal of this then-new computer magazine, I ordered and received all the back issues! Things haven't been the same for me since.

I also find Prog/80 very helpful; the editorials and articles by both George Blank and Lance Micklus are very informative - in both SoftSide and Prog/80.

Recent programs such as **Isolate, Engineer, Melt Down, and Picture Puzzles** have been a lot of fun plus instructive for me, in seeing just how they were designed.

On **Devices,** (by Lance Micklus) - I really got a lot from this excellent article. How about a follow-up on say, Peek and Poke functions?

And then, perhaps, a follow-up article from George Blank on **NEWDOS+** and/or **VTOS 3.0** - he likes these Disk Operating Systems better than **TRSDOS** (better than **TRSDOS 2.3**?). I cannot get either **NEWDOS+** or **VTOS** to work as advertised or to do anything at all like **TRSDOS 2.3** will for me. I have not experienced any problems of consequence such as I've read others having had with their **TRSDOS**.

I hope that the New Year will be a good one for all of you at SoftSide and by the same token, just as rewarding for all of us subscribers from your publication.

George A. Seipp
Gretna, LA

Dear Sir;

I recently sent back to you a "defective" program tape — **Pentominoes**. Before I even got a chance to miss it, WHIZZZ! another arrived at my door!

My compliments to your expeditious service.

That night, however, I loaded the program several times, only to get "Syntax Error in 2".

It happened every time!

After poking around the program for an hour, I discovered that my machine was only reading the first item in the DATA statement.

Radio Shack supplied the cure in one newsletter, as you did in SoftSide Magazine. The cure is of course:

```
5 POKE16533,255
```

From that point on, the program ran flawlessly.

I thought I'd drop this hint so you may pass it on to your customers with loading problems.

Many thanx - you're terrific!

Kevin Burke
Orillia, Ont. Canada

This Could Be The Handiest Program You Own! By Ken Knecht

Dynamic Data Base

A data base manager is a general purpose file management program that can be set up for different uses. This could be the handiest program you own!

You specify the number of items in the file, whether they are numerical or alphanumeric and how long each item is, and the program creates the file, receives your data, sorts it, searches for information, stores and retrieves from disk, and will even perform arithmetic with data items.

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PENCIL/PAL

by Microcomputer Specialists

Form letter generator for use with the Electric Pencil by Michael Schrayer. You can use a mailing list maintained as a PENCIL file, print letters selectively using selection codes, use custom greetings for each account, and print labels. Requires 32K 1 Disk System, Electric Pencil, and lower case modification kit. (Program 121 lines 5600 Bytes) **$35.**

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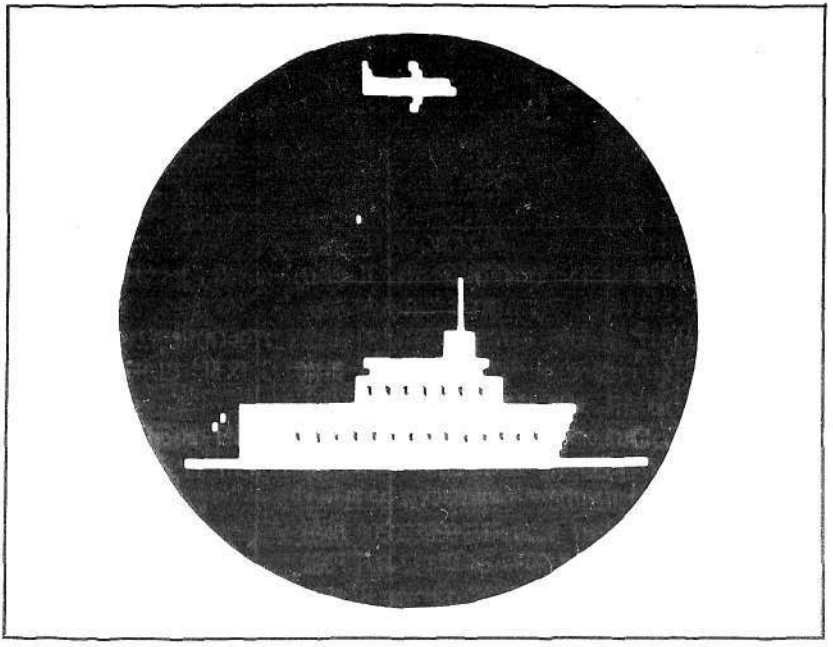
DEEP SIX

Chris Freund

A ship is sailing serenely along on the high seas, when the crew spots a bomber plane on the attack and headed straight for them. As the plane zeroes in, someone spreads the alarm, and the crew starts jumping overboard in panic. Then the bomb hits and the ship blows to smithereens right before your eyes!

This short program is a clever little graphics display rather than a game. Here is what your screen will show:



```
0 'WRITTEN BY CHRIS FREUND
1 DEFINTO,X:CLEAR700:D$=STRING$(8,176):C$=STRING$(8,188):CLS
8 Y=30:Z=4:GOSUB9:O$=P$:GOSUB9:Q$=P$:GOSUB9:GOTO10
9 P$="":FORX=1TO63:IFRND(ABS(36-X))=1P$=P$+CHR$(RND(63)+128):NEX
TX:RETURNELSEP$=P$+" ":NEXTX:RETURN
10 A$=CHR$(189)+STRING$(5,176)+CHR$(178)+CHR$(189)+STRING$(4,176
)+CHR$(26)+STRING$(12,24)+STRING$(6,131)+CHR$(163)+CHR$(159)+STR
ING$(5,131)
11 CLS:PRINT@960,STRING$(63,131);:FORX=839TO903STEP64:PRINT@X,ST
RING$(43,191);:NEXT
12 PRINT@790,STRING$(20,191);:PRINT@727,CHR$(140);STRING$(10,188
);STRING$(4,191);CHR$(188);CHR$(140);:PRINT@674,STRING$(4,188);:
FORX=25TO30:SET(72,X):NEXT
13 PRINT@881,STRING$(2,191);CHR$(159);CHR$(129);:PRINT@945,CHR$(
191);CHR$(135);
14 FORX=28TO93STEP5:RESET(X,42):NEXT
15 FORX=47TO77STEP5:RESET(X,37):NEXT
16 X=42
20 FORO=1TO50STEP.3:PRINT@O-1," ";:PRINT@O+63," ";:PRINT@O,A$;
21 IFO>10ANDZ<33GOTO50
22 IFZ>33THEN100
24 X=X-2:IFX<14THEN26ELSESET(X,38):RESET(X+2,38)
25 GOTO29
26 RESET(14,38):READT:READTT:SET(T,TT):RESET(R,RR):R=T:RR=TT:IFR
R=44RESET(6,44):RESTORE:X=42
29 NEXT
30 PRINT@X-1,CHR$(30);:PRINTCHR$(30)
41 DATA11,39,9,40,7,41,6,42,6,43,6,44
42 GOTO100
50 IFZ=34GOTO25ELSERESET(Y,Z):Y=Y+.3:Z=Z+.3
55 SET(Y,Z)
60 GOTO24
100 GOTO105:FORX=1TO61STEP20:PRINT@480-X/2,STRING$(X,191);:PRINT
@544-X/2,STRING$(X,191);:PRINT@608-X/2,STRING$(X,191);:PRINT@672
-X/2,STRING$(X,191);:PRINT@736-X/2,STRING$(X,191);:PRINT@800-X/2
,STRING$(X,191);:PRINT@864-X/2,STRING$(X,191);
104 PRINT@928-X/2,STRING$(X,191);:NEXT
105 PRINTCHR$(23);:PRINT@544,"BOOM!":PRINT:PRINTP$:PRINTO$:PRINT
Q$:PRINTP$
110 FORX=1TO2000:NEXTX:RUN
```

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Been searching for an easy way to get into machine language?

SIMPLE SIMON, published in the March 1979 issue of PROG/80, comes to your rescue. Features included are:

- Program entry
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SIMPLE SIMON

by Rev. George Blank

Find out what's going on in your Level II ROM, examine and modify the DCB's, create machine language subroutines, and more! written in BASIC so it's easy to understand and customize.

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The computer has 1000 five letter words in memory. The player's task is to guess the one the computer selects. The player picks a word; the computer tells the player how many of the letters in the chosen word are in the computer's word; the player picks another word; and so on until the player guesses right. An absorbing one or two player word game that is also a great vocabulary and spelling tool.

80 SOFTWARE CRITIQUE recently recommended it highly, calling it 'much more fun and more of a challenge than Hangman and similar word games.'

Level II, 16K

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Unless you are very lucky, when you buy a packaged program, you will either have to modify your procedures or modify the program to your requirements. Modification is much simpler than writing a program from scratch, and often as satisfactory.

What do you need to know to buy a package? First, write down the information you need to store and the reports you need. Then obtain a copy of the output reports for the package you are considering. Often you can just rename a category and store your information directly. Compare the number of accounts you have with the capacity of the system you are considering. (Remember that you might use separate diskettes if you cannot fit all your customers or accounts on one.) Ask if we have a data sheet available for the program you are considering.

We strongly recommend that people purchasing our business software purchase the manual first. Most of our manuals are available for 10% of the purchase price plus $1.00 shipping. (There is a minimum fee of $5 for a manual.) If you later purchase the same program, we will credit you with the price of the manual. Even if you do not buy the program, you will find information in the manual that will help you evaluate other programs or design your own, and you will therefore not have wasted your money.

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