US ID STCLK+4
US O200
US XDISPL+12
US WANDX+6
US CLKINT
US OPTION+2

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// SPACE WAR. V3
// D.E. WREGE

// CONDITIONAL ASSEMBLY PARAMETERS
// FOR AX08 TYPE DISPLAY DEFINE AX08=1
   IFNEF AX08 (AX08=0)
// FOR TYPE 30G DISPLAY DEFINE T30G=1
   IFNEF T30G (T30G=0)
// FOR PDP-8/E VC8E DISPLAY VC8E=1
   IFNEF VC8E (VC8E=0)
// PDP-12 - VR12 IS DEFAULT
   IFZERO VC8E+T30G+AX08 (PDP12=1)

// CONDITIONAL ASSEMBLIES FOR CLOCK
// FOR DK8-EA (60 CYCLE) DK8EA=1
   IFNEF DK8EA (DK8EA=0)
// FOR DK8-EP PROGRAMABLE DK8EP=1
   IFNEF DK8EP (DK8EP=0)
// FOR FRED DYER'S FUNNY CLOCK F_CLOCK=1
   IFNEF F_CLOCK (F_CLOCK=0)
// DEFAULT IS PDP-12 KW12-A
   IFNZRO PDP12 <
   IFZERO DK8EA+AX08+DK8EP+F_CLOCK <
   IFNEF KW12 (KW12=1)>

// DEFS
   IFNZRO PDP12 <
  0140 DIS= 140 /DISPLAY A POINT LINC MODE
  6141 LINC= 6141 /GO TO LINC MODE
  0082 PDP= 0082 /GO TO 8-MODE>

  7405 MUI= 7405 /EAE MULTIPLY
  7407 DIV= 7407 /EAE DIVIDE
  7411 NMI= 7411 /EAE NORMALIZE
  7413 SHL= 7413 /EAE SHIFT LEFT
  7415 ASR= 7415 /ARITHMETIC SHIFT RIGHT
  7417 LSR= 7417 /LOGICAL SHIFT RIGHT
  7421 MQL= 7421 /LOAD MQ; CLEAR AC
  7423 SCL= 7423 /STEP COUNTER LOAD FROM MEMORY
  7441 SCA= 7441 /STEP COUNTER TO ACCUMULATOR
  7501 MQA= 7501 /READ MQ

  0010 D= 10 /DISPLAY BUFFER FIELD
  4000 DISBUF=4000 /ADDRESS OF DISPLAY BUFFER
PAGE ZERO CONSTANTS AND VARIABLES

0001 5777 \ JMP INTRPT

0006 *6 /FOR PDP-12
0007 0000 QA, 0 /ALPHA REG USED FOR DISPLAY
0008 0000 QALPHA, 0 /RESERVED XR'S
0009 0000 QR1, 0 /FOR DISPLAY ROUTINE ONLY
000A 0000 QR2, 0 /MUST BE USED WITH IOF
000B 0000 QR3, 0

0020 *20 /VARIABLES RESERVED

0020 0000 QR, 0 /SHIP POSITION RADIAL
0021 0000 ALIVE, 0 /=0 WHEN SHIP BLOWN UP
0022 0000 QXPOS, 0 /NON-ZERO OTHERWISE
0023 0000 QYPOS, 0 /X COORD.
0024 0000 QY, 0 /Y COORD.
0025 0000 QVX, 0 /X COMPONENT VELOCITY
0026 0000 QVY, 0 /Y COMPONENT VELOCITY
0027 0000 QPH, 0 /SHIP ANGLE (NOT POSITION DEPENDENT)
0028 0000 QPDBOT, 0 /SHIP ANGULAR VELOCITY
0029 0000 QPHR, 0 /PRECISION QPH
002A 0000 SHIELD, 0 /NON-ZERO WHEN SHIELDS ARE UP.
002B 0000 HYPERS, 0 /WHEN SHIELDS ARE UP NO MISSELS
002C 0000 MISCHT, 1 /AND NO ACCELERATION ALLOWED.
002D 0000 ARMED, 0 /NON-ZERO WHEN IN HYPERSPACE
002E 0000 QSHIP, 0 /-# MISSELS LEFT
002F 0000 QSHIPH, 0 /INCREMENTS TO 0 BEFORE SHIP
0030 0000 QSINP, 0 /CAN FIRE
0031 0000 QSHIPN, 0 /POINT TO SHIP PICTURE
0032 0000 QSHIPPH, 0 /# POINTS TO BE DISPLAYED IN SHIP
0033 0000 QSINPH, 0 /SIN(QPH)
0034 0000 QCOSPH, 0 /COS(QPH)
0035 0000 SHIPSZ=.QR /#ENTRIES/SHIP

0041 3777 QTIME, 3777 /TIME SCALING FACTOR

/TEMPS AND VARIABLES

0042 0000 QSINPH, 0 /SIN(QTH)
0043 0000 QCOSPH, 0 /COS(QTH)
0044 0000 BREAKU, 0 /NON-ZERO WHEN SHIP BREAKING UP.
0045 0000 DBUFF, 0 /POINTS TO NEXT POS IN DISP BUFF.
0046 0000 QTHR, 0 /NON-ZERO WHEN MAIN ROCKETS ON
0047 0000 QTHA, 0 /NON-ZERO WHEN ANGULAR THRUST ON
0048 0000 CONSER, 0 /NON-ZERO IF CONSERVING ANGULAR
0049 0000 NUMMIS, 0 /MOMENTUM
004A 0000 NHUMMII, 0 /# MISSELS IN MISTBL
004B 0000 NHUMMII, 0 /TEMPORARY FOR UPDATING MISSLES
00053 0001 MAXMIS, -7777
00054 0000 QTM1, 0
00055 0000 QTM2, 0
00056 0000 QCHT1, 0
00057 0000 QCHT2, 0
00058 0000 QCHT3, 0

/NUMBER OF ALLOWABLE MISSELS
/GENERAL TEMPORARIES

/MUST BE USED WITH IOF

/CONSTANTS
00061 0010 QTHRUS, 10
00062 1000 QGRAY, 1000
00063 0004 QRET, 4
00064 1000 QTHROC, 1000

/THRUST
/GRAVITY
/THRUST ANGULAR RETRO'S
/MUSSEL VELOCITY OF ROCKETS

/THE FOLLOWING ARE POINTERS & FLAGS
00065 2200 PSAUCP, SAUC
00066 4000 MISPN1, MISTBL

/POINTER TO SAUCER SHIP GENERATOR
/POINTS TO WHERE NEXT MISSEL SHOULD
/GO IN MISSEL TABLE

00067 1003 BOUNC1, NULL
00070 1003 BOUNCY, NULL

/NEW INSTRUCTIONS
4471 MULT=JMS I.
00071 0202 XMULT
4472 DIVIDE=JMS I.
00072 0234 XDIVID
4473 DISPLAY=JMS I.
00073 0260 XDISP1
4474 COS=JMS I.
00074 0325 XCOSIN
4475 SIN=JMS I.
00075 0306 XSINE
4476 GGRAY=JMS I.
00076 3050 XGGRAY
4477 RANDOM=JMS I.
00077 0331 XRANDOM
4500 ONDECK=JMS I.
02100 1600 XONDECK
4501 OFDECK=JMS I.
00101 1616 XOFDECK
4502 DRAW=JMS I.
00102 2000 CALPNT
4503 NXTPOS=JMS I.
00103 2600 NEWPDS
4504 NXTANG=JMS I.
00104 2662 ANGLES
4505 FLAME=JMS I.
00105 3342 DFLAME
4506 DSTARS=JMS I.
00106 3400 SUN
4507 DSUN=JMS I.
POLARS
FIRE=JMS I
FIRONE
/THESE DEFS ARE ONLY FOR INTERMEDIATE STAGES OF DEVELOPMENT.

IFDEF XXXXXX < /OR IFPASS2
IFDEF XONDECK <XONDECK=NULL1>
IFDEF XOFDECK <XOFDECK=NULL1>
IFDEF CALPNT <CALPNT=NULL1>
IFDEF NEWPOM <NEWPOM=NULL1>
IFDEF ANGLES <ANGLES=NULL1>
IFDEF DFLAME <DFLAME=NULL1>
IFDEF SUN <SUN=NULL1>
IFDEF FIRONE <FIRONE=NULL1>
IFDEF SAUC <SAUC=NULL1>
IFDEF XGGRAY <XGGRAY=NULL1>
IFDEF BOUNX <BOUNX=NULL1>
IFDEF BOUNY <BOUNY=NULL1>
IFDEF MISTBL <MISTBL=.
IFDEF SPCWAR <SPCWAR=.

0111
00111 7402
0200

XXXYXX=.

HLT

PAGE
SO WE HAVE START AT 200

JMP I+.+1

SPCWAR

//SIGNED MULTIPLY ROUTINE.
//THIS ROUTINE DOES A INTEGER MULTIPLY OF
//TWO SIGNED NUMBERS (11 BITS OF SIGNIF).
//RESULT IS A SINGLE 12-BIT SIGNED NUMBER.
//CALL: TAD <MLTCAHND
//JMS MULT
//MLTPLR

XMULT, 0

CALL
//MULTIPICAND POSITIVE?

SPA
//NO: MAKE POS. REMEMBER SIGN IN LINK

CMA CML IAC
//LOAD MULTIPLICAND INTO MQ

MQL
//PICK UP MULTIPLIER

TAD I XMULT
//POINT TO RETURN

ISZ XMULT
//POSITIVE??

SPA
//NO. MAKE POS AND REMEMBER SIGN

CMA CML IAC
//FOR THE MULTIPLY

DCA XMULT1
//AC=-1 IF NEG; -2 IF POS.

CMA RAL
//SAVE IT FOR LATER

DCA XMULTS
//EAE MULTIPLY

MUY
//MULTIPLYER GOES HERE

XMULT1, 0
//WANT CORRECT NORMALIZATION

SHL
//ONE SHIFT ONLY

0
//REMEMBER HIGH ORDER

DCA XMULT1
//READ LOW ORDER

MQA
//SKIP IF NO ROUND UP

SPA CLA
//ROUND UP ONE

IAC
//MAKE ROUNDED RESULT

TAD XMULT1
//WILL SKIP IF NEG SIGN

ISZ XMULTS
//DONE: AC=RESULT

JMP I XMULT
//NEGATE

CIA
//AND RETURN

XMULTS, 0
//SAVES SIGN OF RESULT

DIVIDION OF SIGNED DIVIDEND BY UNSIGNED DIVISOR.
EXIT WITH 12-BIT SIGNED RESULT.
DIVIDE OVERFLOW ONLY OCCURS WHEN DIVISOR=0
CALL: TAD <DIVIDEND
DIVIDE
DIVISOR
ERROR
//DIVISION BY 0
NORMAL RET.
//AC=SIGNED RESULT

XDIVID, 0

CALL
//FOR SIGN

SPA
//IS IT POSITIVE?

CIA CML
//NO: MAKE POS.
00240  7421  MQI
00241  7044  CMA RAL
00242  3233  DCA XMULTS
00243  1634  TAD I XDIVID
00244  2234  ISZ XDIVID
00245  7450  SNA
00246  5634  JMP I XDIVID
00247  2234  ISZ XDIVID
00250  3252  DCA +2
00251  7407  DVI
00252  0000
00253  7701  MQA CLA
00254  2233  ISZ XMULTS
00255  5634  JMP I XDIVID
00256  7041  CIA
00257  5634  JMP I XDIVID

/PUT IN LOW ORDER
/AC=-1 IF NEG.
SAVE SIGN
GET DIVISOR
POINT TO ERROR EXIT
SKIP IF NOT ZERO
TAKE DIV BY 0 RETURN
POINT TO NORMAL RETURN
STORE DIVISOR
DO THE DIVISION
HOLDS THE DIVISOR
GET RESULT
SKIP IF NEG
POS=RETURN
NEG=NEGATE
AND RETURN
/SPCWAR BY D.E. WREGE

/PAL8-V10A NO/DA/TE PAGE 6

/DISPLAY ROUTINE. REFRESHER OUT OF BUFFER IN FIELD D.
/TIS FOR PDP-12 DISPLAY. USES QALPHA FOR REGISTER.
/CALL: TAD <ADDR-1> /ADDR=ADDRESS OF BUFFER IN FIELD D
/DISPLA /OF X,Y PAIRS.
/-# POINTS

00260 0000 XDISPL, 0
00261 3012 DCA QDISXR /ADDRESS INTO XR
00262 1660 TAD I XDISPL /PICK UP # X,Y PAIRS
00263 2260 ISZ XDISPL /POINT TO RETURN
00264 7450 SHA /IF ZERO POINTS THEN EXIT
00266 6600 JMP I XDISPL
00267 6680 STL RAR /2 FOR POINT PAIRS
00267 3056 DCA QCNT1 /STASH FOR COUNT
00268 5660 CDF D /TO DISPLAY BUFFER FIELD
00269 6602 IOF /FOR LINK MODE
00272 1412 IFNZRO PDP12 <
00273 1412 XDISL, TAD <QDISXR /GET THE X
00274 1377 TAD <400 /0 IS CENTER OF SCREEN
00275 3007 DCA QALPHA /STICK IN ALPHA REGISTER
00276 1412 TAD <QDISXR /GET Y-POSITION
00277 6141 LINC
00277 0147 DIS QALPHA /DISPLAY THE POINT
00280 8802 PDP /BACK TO 0-MODE
00281 7300 CLA CLL /GET RID OF THE Y
>
IFNZRO T30G <
TAD <3 /MAX INTENSITY
6074 6574 /SET MAX INTENSITY
CLA CLL
XDISL, TAD <QDISXR /GET X
CLA CLL
CLL RAL /512 RESOLUTION
TAD <1000 /TO CENTER OF SCREEN
6053 6553 /CLEAR AND LOAD X
CLA CLL
TAD <QDISXR /GET Y
CLL RAL /512 RESOLUTION
TAD <1000 /TO CENTER OF SCREEN
6067 6567 /CLEAR AND LOAD Y;DISPLAY
CLA CLL
6161 65161 /WAIT TILL DONE
JMP .-1>

IFNZRO VC8E <
6059 6509 /CLEAR ALL FLAGS
XDISL, TAD <QDISXR /GET X
CLA CLL
6053 6553 /CLEAR AND LOAD X
CLA CLL
TAD <QDISXR /GET Y
CLL RAL /512 RESOLUTION
6054 6554 /CLEAR AND LOAD Y
CLA CLL
6055 6555 /INTENSIFY
6052 65052 /WAIT TILL DONE
JMP -1
IFNZRO AX08 <
XDLSL, TAD I QDISXR
TAD < 400
6303 LOAD X
CLA CLL
TAD I QDISXR GET Y
6317 LOAD Y AND INTENS.
CLA CLL
>
00302 2056 ISZ QCNT1 SKIP WHEN DONE
00303 5272 JMP XDLSL LOOP
00304 6201 CDF 0 BACK TO THIS FIELD
00305 5660 JMP I XDISPL AND RETURN

SINE LOOKUP ROUTINE. ANGLES ARE IN
FRACTIONS OF A CIRCLE. I.E. IN 256THS OF A CIRCLE.
THUS PI RADIANS = 200<8>
THE RESULT IS A SIGNED NUMBER -2048<19<2048.
NOTE THE NORMALIZATION.
CALL: TAD < ANGLE
SINE

00306 0000 XSINE, 0
00307 3054 DCA QTM1 REMEMBER ANGLE
00310 1954 TAD QTM1 GET BACK
00311 0375 AND <177 INDEX INTO TABLE
00312 1377 TAD < SINTAB BY ADDING OFFSET
00313 3055 DCA QTM2 FOR INDIRECT
00314 1954 TAD QTM1 NOW TO FIGURE OUT SIGN
00315 0375 AND <200 BIT 4 INDICATES HEMISPHERE
00316 7100 CLL FOR HEMISPHERE INDICATOR
00317 7640 SZA CLA SKIP IF POS RESULT
00320 7120 STL NEG RESULT: INDICATE IN LINK
00321 1456 TAD I QTM2 PICK UP VALUE
00322 7430 SZL SKIP IF POS
00323 6041 CIA NEGATIVE SIGN
00324 5706 JMP I XSINE

DO THE SAME FOR COSINES

00325 0000 XCOSIN, 0
00326 1374 TAD < 100 OFFSET SO WE CAN USE SINE ROUTINE
00327 4306 JMS XSINE
00330 5725 JMP I XCOSIN AND RETURN

RANDOM NUMBER GENERATOR.
USES RC(N+1) = (2<11+3)R(N-1) MODULO 24.
COULD BE LESS INTELEGENT FOR SPEED.
RESULT IS 12 BIT RANDOM NUMBER IN AC.

00331 0000 XRANDO, 0
00332 1355 TAD RANUML GET LOW ORDER
00333 7421 MQL
00334 7405 MU Y
00335 4003 4003
00336 3353 DCA RANUMT
00337 7501 MQA
00340 3355 DCA RANUML
00341 1354 TAD RANUMH
00342 7421 MQL
00343 7405 MU Y
00344 4003 4003
00345 7200 CLA
00346 7501 MQA
00347 1353 TAD RANUMT
00350 3354 DCA RANUMH
00351 1354 TAD RANUMH
00352 5731 JMP I XRANDOM
00353 0000 RANUMT, 0
00354 0000 RANUMH, 0
00355 0001 RANUML, 1
00374 0100
00375 0200
00376 0177
00377 0400
0400 PAGE
00400 0000  SINTAB, 0;50;101;151;201;251;301;350;400;449
00401 0062
00402 0145
00403 0227
00404 0311
00405 0375
00406 0454
00407 0536
00410 0620
00411 0701
00412 0762  498;546;595;643;690;737;784;830;876;921
00413 1042
00414 1123
00415 1203
00416 1262
00417 1341
00420 1420
00421 1476
00422 1554
00423 1631
00424 1706  0966;1010;1053;1096;1138;1179;1220;1260;1299;1338
00425 1762
00426 2035
00427 2110
00430 2162
00431 2233
00432 2304
00433 2354
00434 2423
00435 2472
00436 2537  1375;1412;1448;1483;1518;1551;1583;1615;1645;1675
00437 2604
00440 2650
00441 2713
00442 2756
00443 3017
00444 3057
00445 3117
00446 3155
00447 3213
00450 3247  1703;1730;1757;1782;1806;1829;1851;1872;1892;1911
00451 3302
00452 3335
00453 3366
00454 3416
00455 3445
00456 3473
00457 3520
00460 3544
00461 3567
00462 3610  1928;1945;1960;1974;1987;1998;2009;2018;2026;2033
00463 3631
00464 3650
00465 3666
00466 3703
00467 3716
00470 3731
00471 3742
00472 3752
00473 3761
00474 3766 2038;2043;2046;2047;2047;2047;2046;2043;2038;2033
00475 3773
00476 3776
00477 3777
00500 3777
00501 3777
00502 3776
00503 3773
00504 3766
00505 3761
00506 3752 2026;2018;2009;1998;1987;1974;1960;1945;1928;1911
00507 3742
00510 3731
00511 3716
00512 3703
00513 3666
00514 3650
00515 3631
00516 3610
00517 3567
00520 3544 1892;1872;1851;1829;1806;1782;1757;1730;1703;1675
00521 3520
00522 3473
00523 3445
00524 3416
00525 3366
00526 3335
00527 3302
00530 3247
00531 3213
00532 3155 1645;1615;1583;1551;1518;1483;1448;1412;1375;1338
00533 3117
00534 3057
00535 3017
00536 2756
00537 2713
00540 2650
00541 2604
00542 2537
00543 2472
00544 2423 1299;1260;1220;1179;1138;1096;1053;1010;0966;0921
00545 2354
00546 2304
00547 2233
00550 2162
00551 2110
00552 2035
00553 1762
00554 1706
OCTAL

00555 1631
00556 1554 0876;0830;0784;0737;0690;0643;0595;0546;0498;0449
00557 1476
00560 1420
00561 1341
00562 1262
00563 1203
00564 1123
00565 1042
00566 0762
00567 0701
00570 0620 0400;0350;0301;0251;0201;0151;0101;0050
00571 0536
00572 0455
00573 0373
00574 0311
00575 0227
00576 0145
00577 0062

RESERVED FOR GRAVITY TABLE

A LITTLE DO NOTHING SUBROUTINE

01000 0000 NULL1, 0
01001 7300 CLA CLL
01002 5603 JMP I NULL

WE NEED TWO OF THEM?????

01003 0000 NULL, 0
01004 5603 JMP I NULL
ROCKET FLAME TABLE
DECIMAL

\( FLAME_X, \)

\( 01205 \quad 7766 \quad -10;0; -12;0; -14;0; -16;0; -20;0; -18;0; -20;0; -22;0 \)

\( 01206 \quad 0000 \)
\( 01207 \quad 7764 \)
\( 01208 \quad 0000 \)
\( 01209 \quad 7762 \)
\( 01210 \quad 0000 \)
\( 01211 \quad 7760 \)
\( 01212 \quad 0000 \)
\( 01213 \quad 7758 \)
\( 01214 \quad 0000 \)
\( 01215 \quad 7756 \)
\( 01216 \quad 0000 \)
\( 01217 \quad 7754 \)
\( 01218 \quad 0000 \)
\( 01219 \quad 7752 \)
\( 01220 \quad 0000 \)
\( 01221 \quad 7750 \)
\( 01222 \quad 0000 \)
\( 01223 \quad 7748 \)
\( 01224 \quad 0000 \)

SHIP OUTLINES

SHIP 1  KLINGON BATTLE CRUISER (STAR TREK)

\( SHIP1C, \)

\( 01225 \quad 0001 \quad 1;0; 3;0; 5;0; 7;0; 9;0; 10;1; 12;1; 13;1; 14;0 \)
\( 01226 \quad 0000 \)
\( 01227 \quad 0003 \)
\( 01228 \quad 0000 \)
\( 01229 \quad 0005 \)
\( 01230 \quad 0000 \)
\( 01231 \quad 0000 \)
\( 01232 \quad 0000 \)
\( 01233 \quad 0000 \)
\( 01234 \quad 0000 \)
\( 01235 \quad 0011 \)
\( 01236 \quad 0000 \)
\( 01237 \quad 0012 \)
\( 01238 \quad 0001 \)
\( 01239 \quad 0014 \)
\( 01240 \quad 0001 \)
\( 01241 \quad 0015 \)
\( 01242 \quad 0001 \)
\( 01243 \quad 0016 \)
\( 01244 \quad 0000 \)
\( 01245 \quad 0000 \)
\( 01246 \quad 0000 \)
\( 01247 \quad 0000 \)
\( 01248 \quad 0000 \)
\( 01249 \quad 0000 \)
\( 01250 \quad 0000 \)
\( 01251 \quad 0000 \)
\( 01252 \quad 0001 \)
\( 01253 \quad 7776 \)
\( 01254 \quad 0001 \)
\( 01255 \quad 7775 \)
\( 01256 \quad 0002 \)
\( 01257 \quad 7774 \)
\( 01258 \quad 0003 \)
\( 01259 \quad 7773 \)
\( 01260 \quad 0004 \)
\( 01261 \quad 7772 \)
\( 01262 \quad 0005 \)
\( 01263 \quad 7771 \)
01065 7771
01066 0006
01067 7767 -9;6; -11;6; -12;6; -11;5; -9;3; -7;1; -8;1
01070 0006
01071 7765
01072 0006
01073 7764
01074 0006
01075 7765
01076 0005
01077 7767
01100 0003
01101 7771
01102 0001
01103 7770
01104 0001
1105 1105
01105 0015 13; -1
01106 7777
01107 0014 12; -1; 10; -1; -8; -1; -7; -1; -9; -3; -11; -5; -12; -6; -11; -6
01110 7777
01111 0012
01112 7777
01113 7770
01114 7777
01115 7771
01116 7777
01117 7767
01120 7775
01121 7765
01122 7773
01123 7764
01124 7772
01125 7765
01126 7772
01127 7767 -9; -6; -7; -6; -6; -5; -5; -4; -4; -3; -3; -2; -2; -1; 0; -1
01130 7772
01131 7771
01132 7772
01133 7772
01134 7773
01135 7773
01136 7774
01137 7774
01140 7775
01141 7775
01142 7776
01143 7776
01144 7777
01145 0000
01146 7777
01147 0001 1; 0; 3; 0; 5; 0; 7; 0; 9; 0; 0; 0
01150 0000
01151 0003
01152 0000
/SPCWBR BY D.E. WREGE

01153 0005
01154 0000
01155 0007
01156 0000
01157 0011
01160 0000
01161 0000
01162 0000

/SHIP1E=

01163 0011 SAUC1, 9;0;10;0;11;0;3;0;-3;0;0;3;0;-3
01164 0000
01165 0012
01166 0000
01167 0013
01170 0000
01171 0003
01172 0000
01173 7775
01174 0000
01175 0000
01176 0003
01177 0000
01200 7775

/SHIP2E=

/SHIP 2 FLASH GORDON

01201 0016 SHIP2C,
01202 0000
01203 0014
01204 0001
01205 0012
01206 0002
01207 0010
01208 0002
01211 0006
01212 0002
01213 0004
01214 0002
01215 0002
01216 0002
01217 0000
01220 0002
01221 7776
01222 0002
01223 7774
01224 0002
01225 7772
01226 0002
01227 7770
01230 0002
01231 7770
01232 0000
01233 0004 4;4;2;6;0;0;3;0;-3;0;-2;7;0;5;0;3
SHIP2E =

01251 0014 12; -1; 10; -2; 8; -2; 6; -2; 4; -2; 2; -2; 0; -2; -2; -2; -4; -2; -6; -2; -
01252 7777
01253 0012
01254 7776
01255 0018
01256 7776
01257 0006
01258 7776
01259 0004
012510 7776
012511 0002
012512 7776
012513 0000
012514 7776
012515 7776
012516 7776
012517 7776
012518 7776
012519 7776
01251A 7776
01251B 7776
01251C 7776
01251D 7776
01251E 7776
01251F 7776
012520 4; -4; 2; -6; 0; -8; -3; -8; -2; -7; 0; -5; 0; -3
01300 7774
01301 0002
01302 7772
01303 0000
01304 7770
01305 7775
01306 7770
01307 7776
01308 7771
01309 0000
0130A 7773
0130B 0000
0130C 0000
0130D 7775

/SHIP2E =.

/SAUCER CANNON
01315 0011 SAUC2, 9; 0; 10; 0; 11; 0
01316 0000
```
01317 0012
01320 0000
01321 0013
01322 0000
    1323    SAUC2E=

/SAUCERS COMMON OUTLINE

/SHIP,
01323 0000 0;112; 1;110; 2;106; 3;100; 4;91; 5;79
01324 0160
01325 0001
01326 0156
01327 0002
01330 0152
01331 0003
01332 0144
01333 0004
01334 0133
01335 0005
01336 0117
01337 0005 6;66; 6;51; 7;35; 7;10; 7;0
01340 0102
01341 0006
01342 0063
01343 0007
01344 0043
01345 0007
01346 0022
01347 0007
01350 0000
  1351    BSHIPE=

OCTAL

/SHIP DEPENDENT STUFF FOR PAGE ZERO LOAD

01351 0000  SHIP1, ZBLOCK QSHIP-QR
01366 1315    SAUC2
01367 0005    SAUC2E-SAUC2
    0017    XXX=-SHIP1
01370 0000    ZBLOCK SHIPSZ-XXX

1353    SHIP1X=SHIP1+QXPOS-QR
1354    SHIP1Y=SHIP1+QYPOS-QR

01372 0000  SHIP2, ZBLOCK QSHIP-QR
01407 1315    SAUC2
01410 0006    SAUC2E-SAUC2
    0017    XXX=-SHIP2
01411 0000    ZBLOCK SHIPSZ-XXX

1374    SHIP2X=SHIP2+QXPOS-QR
1375    SHIP2Y=SHIP2+QYPOS-QR
```
/SPCWAR BY D.E. WREGE  

/ONDECK ROUTINE.
/THIS ROUTINE PUTS SHIP DEPENDENT STUFF
/IN PAGE ZERO FOR COMMON CALCULATIONAL
/Routines. Enter with table add-1 in ac.
/Copies "SHIPSZ" locations.

/CALL: TAD (SHIPSZ-1
/ ONDECK
/ RETURN

01600 0000 XONDEC, 0
01601 3011 DCA QXR2  /ADDRESS OF SHIP STUFF
01602 1377 TAD (QR-1  /START OF PAGE ZERO LOC.
01603 3010 DCA QXR1  /STICK IN OTHER XR
01604 4206 JMS SWITC
01605 5600 JMP I XONDECK

/TAKE STUFF FROM XR2 AND PUT IN XR1

01606 0000 SWITCH, 0
01607 1376 TAD <-SHIPSZ  /NUMBER OF ENTRIES
01610 3056 DCA QCNT1
01611 1411 TAD I QXR2  /SOURCE
01612 3410 DCA I QXR1  /DESTINATION
01613 2056 ISZ QCNT1  /DONE?
01614 5211 JMP .-3  /NOT YET
01615 5606 JMP I SWITCH

/OFDECK ROUTINE.
/COPY STUFF OUT. (INVERSE OF ONDECK)
/CALL: TAD (SHIPSZ-1
/ OFDECK
/ RETURN

01616 0000 XOFDEC, 0
01617 3010 DCA QXR1  /DESTINATION XR
01620 1377 TAD (QR-1  /START OF PAGE ZERO STUFF
01621 3011 DCA QXR2  /SOURCE XR
01622 4206 JMS SWITC
01623 5616 JMP I XOFDEC  /AND RETURN
ROUTE TO CALCULATE THE SHIP OUTLINE FROM CENTRAL COORDINATES AND OUTLINE. REQUIRES THE FOLLOWING PAGE 0'S BE PREVIOUSLY SET UP:

QXPOS X-CORD CENTER OF SHIP
QYPOS Y-CORD CENTER OF SHIP
QSNPH SINE OF SHIP ANGLE FROM X AXIS
QCOSPH COS OF SHIP ANGLE FROM X AXIS
QSHIP POINTS TO START OF SHIP OUTLINE TABLE
QSHIPN NUMBER OF POINTS IN SHIP OUTLINE
QTIME OUTLINE SCALE FACTOR

IF SHIP IS NOT ALIVE OR IN HYPERSPACE THEN FAST EXIT.
COSINES AND SIGNS MUST ALREADY BE AVAILABLE.
ALGORITHM:
X=QXPOS + XS*COS(PH) - YS*SIN(PH)
Y=QYPOS + XS*SIN(PH) + YS*COS(PH)
WHERE XS AND YS ARE POINTS ON SHIP OUTLINE FROM QSHIP TABLE.
THIS ROUTINE MAKES USE OF SYMMETRY.

02000 0000 CALPNT, 0
02001 1032 TAD HYPERS /GET HYPERSPACE FLAG
02002 7648 SZA CLA /SKIP IF VISIBLE
02003 5600 JMP I CALPNT /CAN'T SEE HIM
02004 1021 TAD ALIVE /NOW SEE IF ALIVE
02005 7650 SNA CLA /SKIP IF ALIVE AND WELL
02006 5600 JMP I CALPNT /HAS BIT THE DUST
02007 1036 TAD QSHIPN /NUMBER OF POINTS IN SHIP
02010 7161 CIA STL /NEGATE
02011 7010 RAR /POINT PAIRS
02012 3056 DCA QCNT1 /~# POINT PAIRS.
02013 7240 STA /SINCE USING XR
02014 1035 TAD QSHIP /WANT START-1
02015 3010 DCA QXR1 /STASH IN XR
02016 1041 TAD QTME /GET THE TIME SCALER
02017 3222 DCA T1 /SET IT UP FOR A MULT
02020 1040 TAD QCOSPH /GET COS
02021 4471 MULT /SCALE IT
02022 0000 T1, 0
02023 3271 DCA CALPX1 /SET IT UP FOR OUTLINE CALC
02024 1041 TAD QTME /DO THE SAME FOR -SIN
02025 3231 DCA T2
02026 1037 TAD QSNPH
02027 7041 CIA
02030 4471 MULT
02031 0000 T2, 0
02032 3275 DCA CALPY1
02033 1037 TAD QSNPH
02034 7510 SPA
02035 7041 CIA
02036 3322 DCA CALPY3
02037 1022 TAD QXPOS /MUST SCALE X RIGHT
02040 7415 ASR /TWO TO THE RIGHT
02041 0002    2
02042 3356    DCA CALPTX /STORE FOR LATER
02043 1023    TAD QYPOS /AND THE SAME FOR Y
02044 7415    ASR
02045 0002    2
02046 3357    DCA CALPTY
02047 1041    TAD QTIME /SCALE SINE AND COS FOR THE
02050 3253    DCA T3 /Y COMPONENT OF SHIP OUTLINE
02051 1037    TAD QSINPH
02052 4471    MULT
02053 0000    T3, 0
02054 3310    DCA CALPX2
02055 1041    TAD QTIME
02056 3261    DCA T4
02057 1040    TAD QCOSPH
02060 4471    MULT
02061 0000    T4, 0
02062 3314    DCA CALPY2
02063 1410    CALPL, TAD I QXR1 /GET X POINT
02064 3353    DCA CALPX /AND STASH
02065 1410    TAD I QXR1 /GET Y POINT
02066 3354    DCA CALPY /AND STASH
02067 1353    TAD CALPX /GET X
02070 4471    MULT /MULTIPLY
02071 0000    CALPX1, 0
02072 3355    DCA CALPT /STORE TILL LATER
02073 1354    TAD CALPY /GET Y
02074 4471    MULT
02075 0000    CALPY1, 0 /-XY*SIN(PH)
02076 3361    DCA CALPY4 /SAVE IT FOR SYM CALC
02077 1361    TAD CALPY4 /AND GET IT BACK
02080 1355    TAD CALPT /XS*COS(PH)-YS*SIN(PH)
02081 1356    TAD CALPTX /AND IN CENTER OF SHIP
02082 6211    CDF D /TO DISPLAY FIELD
02083 3445    DCA I DBUFP /INTO DISPLAY BUFFER
02084 2045    ISZ DBUFP
02085 6201    CDF 0
02086 1353    TAD CALPX
02087 4471    MULT
02090 0000    CALPX2, 0 /XS*SIN(PH)
02091 3369    DCA CALPT2 /STASH
02092 1354    TAD CALPY /GET Y VALUE
02093 4471    MULT
02094 0000    CALPY2, 0 /YS*COS(PH)
02095 3362    DCA CALPY5 /SAVE IT FOR SYM CALC
02096 1362    TAD CALPY5 /AND GET IT BACK
02097 1360    TAD CALPT2 /XS*SIN(PH)+YS*COS(PH)
02100 7000    PSAUC2, HOP /OR JMP .+3 FOR SHIPS
02101 4471    MULT
02102 0000    CALPY3, 0
02103 1357    TAD CALPTY /YPOS+XS*SIN(PH)+YS*COS(PH)
02104 1357    TAD CALPTY /YPOS
02105 6211    DCF D /TO DISPLAY FIELD
02106 3445    DCA I DBUFP /STICK IN BUFFER
02107 2045    ISZ DBUFP /NEXT POSITION
02108 6201    CDF 0 /BACK TO THIS FIELD
SPCWAR BY D. E. WREGE

02130 1361  TAD CALPY4  /GET -Y*SIN(PH)
02131 7041  CIA       /NEGATE IT
02132 1355  TAD CALPT  /ADD XS*COS(PH)
02133 1356  TAD CALPTX /ADD CENTER OF SHIP
02134 6211  CDF D      /CHANGE TO DISPLAY FIELD
02135 3445  DCA I DBUFP /AND DEPOSIT IT
02136 2045  ISZ DBUFP
02137 6201  CDF 0      /RESTORE DATA FIELD
02140 1362  TAD CALPY5 /GET YS*COS(PH)
02141 7041  CIA       /AND NEGATE IT
02142 1360  TAD CALPT2 /ADD TO IT XS*SIN(PH)
02143 1357  TAD CALPTY /ADD ON SHIP CENTER
02144 6211  CDF D      /CHANGE TO DISPLAY FIELD
02145 3445  DCA I DBUFP /AND DEPOSIT IT
02146 2045  ISZ DBUFP
02147 6201  CDF 0      /CHECK FOR COMPLETION
02150 2056  ISZ QCNT1
02151 5263  JMP CALPL  /LOOP
02152 5600  JMP I CALPNT

02153 0000  CALPX, 0
02154 0000  CALPY, 0
02155 0000  CALPT, 0
02156 0000  CALPTX, 0
02157 0000  CALPTY, 0
02160 0000  CALPT2, 0
02161 0000  CALPY4, 0
02162 0000  CALPY5, 0

2200  PAGE
THIS IS FOR SHIPS BEING SAUCERS
REPLACES CALPNT WHEN USING SAUCERS.

02200  0000 SAUC,  0
02201  1032 TAD HYPERS
02202    7640 SZA CLA
02203    5600 JMP I SAUC
02204  1377 TAD <BSHIP-1
02205  3010 DCA QXR1
02206  1041 TAD QTIME
02207  3212 DCA .+3
02208  1037 TAD QSINPH
02209    4471 MULT
02210    8000  0
02211  3237 DCA SALPN1
02212  1376 TAD <BSHIP-BSHIP /LENGTH
02213  7130 STL RAR
02214  3056 DCA QCNT1
02215  1022 TAD QXPDS
02216  7415 ASR;2
02217  8002 DCA SALPTX
02218  1023 TAD QYPOS
02219    415 TAD QYPOS
02220    4471 ASR;2
02221    0002 DCA SALPTX
02222  3315 TAD QYPOS
02223  1041 TAD QTIME
02224    3233 DCA SALPN2
02225  1410 SALPN1, TAD I QXR1
02226  4471 MULT
02227  0000 SALPN2,  0
02228  3315 DCA SALPX
02229  1410 TAD I QXR1
02230  4471 MULT
02231  0000 SALPN1,  0
02232  7415 ASR;3
02233  0003 DCA SALPY
02234  6211 CDF D
02235  1316 TAD SALPX
02236  1314 TAD SALPTX
02237  3445 DCA I DBUFP
02238  2045 ISZ DBUFP
02239  1317 TAD SALPY
02240  1315 TAD SALPY
02241  3445 DCA I DBUFP
02242  2045 ISZ DBUFP
02243  1316 TAD SALPX
02244  1314 TAD SALPTX
02245  3445 DCA I DBUFP
02246  2045 ISZ DBUFP
02247  1317 TAD SALPY
02248  1315 TAD SALPY
02249  3445 DCA I DBUFP
02264 2045 ISZ DBUFP
02265 1316 TAD SALPX
02266 7041 CIA
02267 1314 TAD SALPTX
02270 3445 DCA I DBUFP
02271 2045 ISZ DBUFP
02272 1317 TAD SALPY
02273 1315 TAD SALPTY
02274 3445 DCA I DBUFP
02275 2045 ISZ DBUFP
02276 1316 TAD SALPX
02277 7041 CIA
02300 1314 TAD SALPTX
02301 3445 DCA I DBUFP
02302 2045 ISZ DBUFP
02303 1317 TAD SALPY
02304 7041 CIA
02305 1315 TAD SALPTY
02306 3445 DCA I DBUFP
02307 2045 ISZ DBUFP
02310 6201 CDF 0
02311 2056 ISZ QCNT1
02312 5231 JMP SALPNL
02313 5600 JMP I SAUC
02314 0000 SALPTX, 0
02315 0000 SALPTY, 0
02316 0000 SALPX, 0
02317 0000 SALPY, 0
/SPCWAR BY D.E. WREGE

/ROUTINE TO ADD TWO NUMBERS (REALLY!!!)
/CHECKING FOR SCOPE WRAP AROUND.
/TAKES TWO RETURNS DEPENDING ON WHETHER WRAP OCCURS
/FROM 3777 TO 4000 AND 4000 TO 3777.
/ALGORITHM:
/ 1. ONLY HAVE TROUBLE IF ADDING NUMBERS OF SAME SIGN
/ 2. IF SAME SIGN ARE OK IF LINK OVERFLOW MATCHES
/   SIGN BIT.

/CALL:  TAD NUMB1
/       JMS I <XADD
/       NUMB2
/       RET1
/       RET2
/       NO WRAP.
/   BOTH RETURNS ARE WITH AC=NUMB1+NUMB2

02320 0000 XADD, 0
02321 3345 DCA XADD1
02322 1345 TAD XADD1
02323 7004 RAL
02324 7200 CLA
02325 1720 TAD I XADD
02326 7510 SPA
02327 7020 CML
02330 7430 SZL
02331 5341 JMP XADD2
02332 1345 TAD XADD1
02333 7510 SPA
02334 7020 CML
02335 7420 SHL
02336 2320 ISZ XADD
02337 2320 ISZ XADD
02340 5720 JMP I XADD
02341 1345 XADD2, TAD XADD1
02342 2320 ISZ XADD
02343 2320 ISZ XADD
02344 5720 JMP I XADD
02345 0000 XADD1, 0

/ROUTINE TO BOUNCE X

02346 0000 BOUNX, 0
02347 7300 CLA CLL
02350 1024 TAD QYX
02351 7041 CIA
02352 3024 DCA QYX
02353 2346 ISZ BOUNX
02354 5746 JMP I BOUNX

/AND Y

02355 0000 BOUNY, 0
<table>
<thead>
<tr>
<th>Time</th>
<th>Action</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>02356</td>
<td>7300</td>
<td>CLA CLL</td>
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<tr>
<td>02357</td>
<td>1025</td>
<td>TAD QYY</td>
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<td>7041</td>
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<td>2355</td>
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<td>02363</td>
<td>5755</td>
<td>JMP I BOUNY</td>
</tr>
<tr>
<td>02376</td>
<td>7752</td>
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<tr>
<td>2400</td>
<td></td>
<td>PAGE</td>
</tr>
</tbody>
</table>

GET RID OF THE BAD QYPOS

PAST DCA QYPOS
TIME SCALE FACTOR LOOKUP ROUTINE

02400 0000  LOOKUP, 0
02401 7510  SPA
02402 7041  CIA
02403 7417  LSR
02404 6004  4
02405 1377  TAB (TABLE
02406 3211  DCA OFFSET
02407 1611  TAB I OFFSET
02410 5600  JMP I LOOKUP
02411 8000  OFFSET, 0

CURVED SPACE TABLE, 64 POINTS (HALF SCREEN)

02412 3777  TABLE, 2047;2047;2047;2047
02413 3777
02414 3777
02415 3777
02416 3777  2047;2047;2047;2047
02417 3777
02420 3777
02421 3777
02422 3777  2047;2047;2047;2047 FLAT IN THE
02423 3777
02424 3777
02425 3777
02426 3777  2047;2047;2047;2047 CENTER
02427 3777
02430 3777
02431 3777
02432 3777  2044;2040;2025;2010
02433 3777
02434 3751
02435 3732
02436 3720  2000;1990;1970;1950;
02437 3706
02440 3662
02441 3636
02442 3605  1925;1900;1875;1850;
02443 3554
02444 3523
02445 3472
02446 3434  1820;1790;1750;1719
02447 3376
02450 3326
02451 3256
02452 3174  1660;1610;1550;1500
02453 3112
02454 3016
02455 2734
02456 2553  1387;1325;1212;1100
02457 2455
02460 2274
02461 2114
02462 1750
02463 1604
02464 1440
02465 1274
02466 1161
02467 1046
02468 0864
02470 0764
02471 0702
02472 0620
02473 0536
02474 0437
02475 0341
02476 0271
02477 0226
02500 0175
02501 0144
02502 0113
02503 0062
02504 0057
02505 0056
02506 0055
02507 0055
02510 0055
02511 0055
02512 0055
02513 0055
02514 0055
02515 0055
02577 2412
2600
THE ROUTINE IS TO CALCULATE THE NEW POSITIONS AND VELOCITIES OF A POINT ON SCREEN UNDER THE INFLUENCE OF A THRUST AND GRAVITY. THE ALGORITHM IS WEIRD, MAINLY BECAUSE I PROBABLY HAVE NOT FIGURED OUT THE GOOD WAY TO DO IT BUT, HERE IS HOW THE CALCULATION PROCEEDS:

1. ACCELERATION DUE TO GRAVITY IS CALCULATED VIA THE ROUTINE GGRAY. THIS ROUTINE SETS UP
   OSINTH = SIN(TH) / R
   OCOSTH = COS(TH) / R
   AC_ = GGRAY / R FROM LOOKUP TABLE WHERE TH = ANGLE WITH SUN AND R = SQRT(X^2 + Y^2)

2. NEW VALUES FOR THE COMPONENTS OF VELOCITY IS COMPUTED FROM QVX = QVX + OTHR * COS(PH) - GGRAY * SIN(TH)
   QVY = QVY + OTHR * SIN(PH) - GGRAY * COS(TH)

3. NEW VALUES OF X, Y ARE COMPUTED
   QXPOS = QXPOS + QVX * (SCALE FACTOR)
   QYPOS = QYPOS + QVY * (SCALE FACTOR)

ALSO DOES WRAP-AROUND CHECKS AND BOUNCE IF ON.

02600 0000 NEWPOS, 0
02601 4476 GGRAY
02602 3207 DCA NEWPO1
02603 1207 TAD NEWPO1
02604 3225 DCA NEWPO2
02605 1043 TAD QCOSTH
02606 4471 MULT / WE ARE DOING 1 / R GRAVITY
02607 0000 NEWPO1, 0
02610 3207 DCA NEWPO1
02611 1046 TAD QTHR /THRUST ON
02612 7458 SHA /SKIP IF ON
02613 5228 JMP NEWPO3+1 /NO; DON'T CALCULATE
02614 3217 DCA NEWPO3
02615 1049 TAD QCOSPH
02616 4471 MULT
02617 0000 NEWPO3, 0 /T*COS(PH)
02620 1207 TAD NEWPO1 /T*COS(PH) + GGRAY
02621 1024 TAD QVX /+OLD VELOCITY COMP.
02622 3024 DCA QVX
02623 1042 NEWPO6, TAD QSINTH
02624 4471 MULT
02625 0000 NEWPO2, 0
02626 3225 DCA NEWPO2
02627 1046 TAD QTHR /GET ROCKET THRUST
02630 7458 SHA /SKIP IF ON
02631 5236 JMP NEWPO4+1 /NOT ON: SAVE TIME
02632 3235 DCA NEWPO4
02633 1037 TAD QSINPH
02634 4471 MULT /T*SIN(PH)
02635 0000 NEWPO4, 0 /T*SIN(PH) + GGRAY
02636 1225 TAD NEWPO2 /+OLD VELOCITY COMPONENT
02637 1025 TAD QVY /SAVE.
02640 3025 DCA QVY /HOW TO CALCULATE NEW X, Y
4315 SC=JMS SCALE /OPTIONAL FLAT OR CURVED
4777' SC1=JMS SCALE1
4776' SC2=JMS SCALE2
02641 1024 NEUPO5, TAD QXY
02642 4315 JMS SCALE /SCALE IF REQUIRED
02643 3246 DCA .+3 /FOR WRAP CHECK
02644 1022 TAD QXPOS /ADD OLD POSITION
02645 4775 JMS I <XADDD /ADD THEM
02646 0000 0
02647 4467 JMS I BOUNCX /BOUNCE X IF IMPLEMENTED
02650 3022 DCA QXPOS /UPDATE TO NEW POSITION
02651 1025 TAD QYY /GET Y VELOCITY
02652 4315 JMS SCALE /SCALE IF REQUIRED
02653 3256 DCA .+3
02654 1023 TAD QYPOS /ADD OLD POSITION
02655 4775 JMS I <XADDD
02656 0000 0
02657 4470 JMS I BOUNCY /BOUNCE IF IMPLEMENTED
02660 3023 DCA QYPOS /UPDATE POSITION.
02661 5600 JMP I NEUPO5 /RETURN

/AND NEW ANGLE PHI

02662 0000 ANGLES, 0
02663 1050 TAD CONSER /CHECK IF CONSERVING ANGULAR MOMENTUM
02664 7650 SHA CLA /SKIP IF YES
02665 5271 JMP NEUPO5 /NO:
02666 1047 TAD QTHA
02667 1027 TAD QPHDOT
02670 5275 JMP NEUPO8
02671 7621 NEUPO5, CLA MQL /CLEAR MQL
02672 1047 TAD QTHA
02673 7413 SHL
02674 0003 3
02675 3027 NEUPO8, DCA QPHDOT
02676 1027 TAD QPHDOT
02677 1030 TAD QPHR
02678 3030 DCA QPHR
02701 1030 TAD QPHR
02702 7415 ASR
02703 0003 3
02704 0374 AND <377 /ALL THAT MATTERS
02705 3026 DCA QPH /TO NEW VALUE
02706 1026 TAD QPH /MAKE SINE AND COS
02707 4475 SIN
02710 3037 DCA ONSINPH /SAVE SINE
02711 1026 TAD QPH
02712 4474 COS
02713 3040 DCA QOSINPH /AND COS
02714 5662 JMP I ANGLES /AND RETURN

/ROUTINE TO SCALE VELOCITY
02715 0000 SCALE, 0
02716 4472 DIVIDE
02717 0016 16
02720 7000 NOP
02721 5715 JMP 1 SCALE

02774 0377
02775 2320
02776 3035
02777 3000

3000 PAGE
/ CURVED VELOCITY SCALER ROUTINES
/ THE TIME SCALE FACTOR IS LOOKED UP AS
/ A FUNCTION OF THE LARGER COMPONENT OF
/ DISTANCE TO THE CENTER OF THE SHIP FROM
/ MID-SCREEN. X AND Y VELOCITY COMPONENTS
/ ARE THEN SCALED BY HIS FACTOR.

03000 0000 SCALE1, 0
03001 7300 CLA CLL
03002 1022 TAD QXPOS / GET THE CENTER OF THE SHIP
03003 7510 SPA / IF NEGATIVE, MAKE IT POSITIVE
03004 7041 CIA
03005 3234 DCA COMPAR / SAVE IT
03006 1023 TAD QYPOS / GET THE Y COMPONENT
03007 7500 SMA / MAKE SURE IT'S NEGATIVE
03010 7041 CIA
03011 1234 TAD COMPAR / COMPARE IT WITH THE X COMP
03012 7620 SNL CLA
03013 5217 JMP .+4
03014 7200 CLA / IF QXPOS IS THE LARGER COMP
03015 1022 TAD QXPOS / THEN PUT IT IN THE AC
03016 5221 JMP .+3 / AND JMP TO LOOKUP
03017 7200 CLA / OTHERWISE, PUT QYPOS IN AC
03020 1023 TAD QYPOS
03021 4777 JMS LOOKUP / AND JMP TO LOOKUP
03022 3041 DCA QTIME / SAVE THE TIME SCALE FACTOR
03023 1041 TAD QTIME
03024 3227 DCA TX / SET IT UP FOR A MULT
03025 1024 TAD QVX
03026 4471 MULT / MULTIPLY VELOCITY BY QTIME
03027 0000 TX, 0
03028 4472 DIVIDE / SCALE IT DOWN
03031 0016 16
03032 7800 NOP
03033 5600 JMP 1 SCALE1
03034 0000 COMPAR, 0

03035 0000 SCALE2, 0
03036 7200 CLA
03037 1041 TAD QTIME / GET THE SCALE FACTOR
03040 3243 DCA TY
03041 1025 TAD QVY / GET THE Y VELOCITY
SPCWAR BY D.E. WREG

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03042 4471 MULT /MULTIPLY IT BY QTIME
03043 2000 TY, 0
03044 4472 DIVIDE /SCALE IT DOWN
03045 8816 16
03046 7008 NOP
03047 5635 JMP I SCALE2

/Routine to get gravity constant for current X,Y position.
/Is table lookup on X^2+Y^2 in GRYTBL.

03050 2000 XGGRAY, 0
03051 4776 JMS NEWPOL /GET SIN(TH)/R ETC.
03052 1020 TAD QR /GET R^2
03053 7417 LSR /SCALE DOWN A LITTLE
03054 8002 2
03055 1375 TAD GRYTBL /INDEX INTO TABLE
03056 3261 DCA XSQUAR /STORE FOR INDIRECT
03057 1661 TAD I XSQUAR /GET VALUE
03058 5658 JMP I XGGRAY /AND RETURN

03061 2000 XSQUAR, 0

/This routine is to calculate the gravity table.
/To be used by XGGRAY. The lookup is via (X^2+Y^2)
/To index into the table. Therefore the table
/is stored by R^2 value (128 positions BIG)

03062 2000 SETGRY, 0
03063 1374 TAD GRYTBL-1 /SET XR TO GRAVITY TABLE
03064 3013 DCA OXR3 /FOR STORING
03065 3306 DCA SETGR1 /IS R-SQUARE
03066 1373 TAD (-177) /THIS MANY POINTS
03067 3058 DCA QCNT3
03068 3413 DCA I OXR3 /AS FIRST IS 0
03069 2306 SETGR1, ISZ SETGR1 /NEXT R-SQUARE
03070 1306 TAD SETGR1
03071 4772 JMS ROOT /TAKE SQUARE ROOT
03072 3277 DCA SETGRX /FOR DIVIDE
03073 1862 TAD QGRAY /GET GRAVITY CONSTANT
03074 4472 DIVIDE
03075 0000 SETGRX, 0
03108 7000 NOP /CAN'T GET DIVIDE BY 0
03109 7041 CIA /STORE NEGATIVE VALUES
03102 3413 DCA I OXR3 /STASH IN TABLE
03103 2060 ISZ QCNT3 /DONE?
03104 5271 JMP SETGR1 /NO? CONTINUE
03105 5652 JMP I SETGRY

03106 2000 SETGR1, 0

03172 3307
03173 7601
03174 0577
03175 0600
03176 3200
THIS ROUTINE LOADS UP QSINTH AND QCOSTH
WITH NUMBERS PROPORTIONAL TO SIN(TH)/R
AND COS(TH)/R. COUPLED WITH "GRAY"
WHICH LOOKS UP A VALUE PROPORTIONAL TO
GRAY/R RESULTS IN THE GRAVITY COMPONENTS
THE CALCULATION USES EXTENDED PRECISION

03200 0000 NEWPOL, 0
03201 1022 TAB QXPOS
03202 7510 SPA
03203 7041 CIA  /ABS VALUE OF X
03204 3210 DCA NEWPL1
03205 1210 TAD NEWPL1 /CALC X^2
03206 7421 MQL  /LOAD MULTIPICAND
03207 7405 MUY  /USE EAE DIRECTLY
03210 0000 NEWPL1, 0
03211 3304 DCA NEWPLH /STASH HIGH ORDER X^2
03212 7501 MQA  /GET LOW ORDER
03213 3305 DCA NEWPLL /SAVE FOR NOW
03214 1023 TAD QYPOS /GET Y
03215 7510 SPA
03216 7041 CIA  /TAKE ABS. VALUE
03217 3223 DCA NEWPL6 /TO CALCULATE
03220 1223 TAD NEWPL6 /Y^2
03221 7421 MQL  /LOAD MULTIPICAND
03222 7405 MUY  /DO IT.
03223 0000 NEWPL6, 0
03224 1304 TAD NEWPLH /HAYE R^2 HIGH ORDER
03225 3304 DCA NEWPLH
03226 7100 CLL  /FOR CARRY
03227 7501 MQA  /GET LOW ORDER
03230 1305 TAD NEWPLL /ADD LOW ORDER X^2
03231 7421 MQL  /LOAD MQ FOR NORMALIZE
03232 7204 RAL CLA  /CARRY BIT OVER
03233 1304 TAD NEWPLH /HIGH ORDER O.K.
03234 3020 DCA QR  /SAVE FOR GGRAY
03235 1020 TAD QR
03236 7411 MNI  /NORMALIZE
03237 3246 DCA NEWPL2 /STASH DIVISOR
03240 7441 SCA  /GET STEP COUNTER
03241 1306 TAD NEWPL5 /PLUS SCALE FACTOR
03242 3251 DCA NEWPL4 /STASH FOR ASR
03243 7421 MQL  /CLEAR MQ
03244 1210 TAD NEWPL1 /NOW CALC SIN/R
03245 7407 DVI
03246 0000 NEWPL2, 0
03247 7200 CLA  /GET RID OF THE REMAINDER
03250 7413 SHL  /SCALE DOWN
03251 0000 NEWPL4, 0
03252 3043 DCA QCOSTH /STASH SIN(TH)/R
03253 1022 TAD QXPOS /HOW ABOUT SIGN
03254 7700 SHA CLA  /SKIP IF NEED TO NEGATE
03255 5261 JMP .+4 /HOPE
03256 1043 TAD QCOSTH /YES; NEGATE
03257 7041 CIA
/SPCWAR BY D.E. WREGE

/TAKE SQUARE ROOT OF AC.
/MUST BE POSITIVE AND LESS THAN 200(8)
/INTEGER NEWTON'S METHOD

03307 6000 ROOT, 0
03310 7104 CLL RAL, RCL RAL /SCALE FOR MORE PRECISION
03311 7104
03312 3337 DCA ROOTN2 /SAVE SQUARE
03313 1377 TAD <4 /FOUR PASSES
03314 3341 DCA ROOTT /WILL HOME IN
03315 7001 IAC /START WITH A 1
03316 3323 DCA ROOTL1 /FOR INITIAL GUESS
03317 1323 ROOTL, TAD ROOTL1 /COPY ITERATION FOR COMPARE
03318 3340 DCA ROOT1 /IS LAST TRY
03319 1337 TAD ROOTN2 /NOW TO CALCULATE
03320 4472 DIVIDE /X^2/XI
03321 6000 ROOTL1, 0
03322 7000 NOP /DIV BY ZERO
03323 1323 TAD ROOTL1 /XI+X^2/XI
03324 7110 CLL RAR /1/2(XI+X^2/XI)
03325 3323 DCA ROOTL1 /IS NEW VALUE
03326 2341 ISZ ROOTT /DO IT 4 TIMES
03327 5317 JMP ROOTL
03328 1323 TAD ROOTL1 /LATEST GUESS
03329 7110 CLL RAR /SCALE BACK DOWN
03330 7450 SHA
03331 7001 IAC /NO ZERO'S
03332 5707 JMP I ROOT
03333 6000 ROOTN2, 0
03334 8000 ROOT1, 0
03335 8000 ROOTT, 0

/ROUTINE TO PUT IN FLAME
/FOR NOW DISPLAY GENERATOR DOES NOT
/IF IN HYPERSONE OR DEAD.

03336 8888 DFLAME, 0
03337 1046 TAD QTHR /TO SEE IF ON
03338 7650 SHA CLA /SKIP IF ON
03339 5742 JMP I DFLAME
03340 1376 TAD <FLAMEX
03341 3035 DCA QSHIP /FOR CALPNT
03342 4477 RANDOM /RANDOM LENGTH FLAME
03343 6375 AND (16
03344 7001 IAC; IAC /ALWAYS DISP ONE
03345 7001
03346 3036 DCA QSHIPN /LENGTH
03347 4502 DRAW /PUT IN BUFFER
03348 5742 JMP I DFLAME
03349 8016
03350 1005
03351 7774
03352 3400 PAGE
ROUTINE TO DISPLAY THE SUN

03400 0000 SUN, 0
03401 2251 ISZ SUNCT /COUNTER FOR WHERE WE ARE
03402 7800 NOP /IN THE DISPLAY
03403 7621 CLA HQL /CLEAR MQ
03404 1251 TAD SUNCT
03405 7413 SHL
03406 0004 4 /MAX=32
03407 7415 ASR /PRESERVE SIGN
03410 0004 4
03411 3251 DCA SUNCT /PRESERVE FOR NEXT TIME
03412 1251 TAD SUNCT /PICK UP
03413 0377 AND <7770
03414 3252 DCA SUTMP
03415 4477 RANDOM
03416 0376 AND <7
03417 1252 TAD SUTMP
03420 7500 SNA /NEED NEGATIVE NUMBER
03421 7041 CIA /MAKE NEGATIVE
03422 7104 RAL CLL /PAIRS
03423 3226 DCA .+3 /STORE -#PNTS
03424 1375 TAD <SUNPT1-1 /ADDRESS OF PAIRS
03425 4473 DISPLAY
03426 0000 0 /#POINTS
03427 1226 TAD .-1 /NOW FOR ALONG X AXIS
03430 1374 TAD <220 /COUNTER LENGTH
03431 7041 CIA /MAKE NEGATIVE
03432 3237 DCA SUNL2 /SET UP OTHER HALV
03433 7344 STA CLL RAL /-2
03434 3253 DCA SUNHLF /HALVES
03435 1373 SUND2, TAD <SUNPT2-1 /START FOR OTHER AXIS
03436 4473 DISPLAY
03437 0000 SUNL2, 0
03440 5600 JMP I SUN
03441 7300 SUNL1, CLA CLL
03442 1375 TAD <SUNPT1-1 /DISPLAY ALL
03443 4473 DISPLAY
03444 7600 -200
03445 1373 TAD <SUNPT2-1
03446 4473 DISPLAY
03447 7600 -200
03450 5600 JMP I SUN
03451 0000 SUNCT, 0
03452 0000 SUTMP, 0
03453 7777 SUNHLF, -1
03454 0000 POLARS, 0 /DISPLAY ONLY POLARIS
03455 7200 CLA
03456 4477 RANDOM /GET RANDOM NUMBER
03457 0372 AND <37 /31 POINTS
03460 1371 TAD <7740 /MAKE NEG
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/SPCWAR BY D.E. WREGE

/FIRE A MISSIL
/BY PUTTING ANOTHER ONE IN MISTBL<POINTED TO BY MISPNT.
/ALSO RESETS ARMED.

03600 0000  FIRONE, 0
03601 1032  TAD HYPERS
03602  7640  SZA CLA
03603  5600  JMP I FIRONE  /NOT IF IN HYPERSPACE
03604  1021  TAD ALIVE
03605  7650  SHA CLA
03606  5600  JMP I FIRONE  /OR IF DEAD
03607  1270  TAD ARMEDLY  /DELAY FOR FIRING
03610  3034  DCA ARMED  /RESET FOR PROPER DELAY
03611  1033  TAD MISPNT  /CHECK MISSLE COUNT THIS SHIP
03612  7650  SHA CLA  /SKIP IF ANY LEFT
03613  5600  JMP I FIRONE  /NO MISSELS LEFT
03614  2033  ISZ MISPNT  /UPDATE NUMBER
03615  7000  NOP  /MIGHT SKIP
03616  7421  MUL  /CLEAR MQ
03617  1270  TAD ARMEDLY  /WILL ALLOW MAX OF 8 MISSELS
03620  7413  SHL  /PER SHIP
03621  0002  2  /BY *10(8)
03622  3466  DCA I MISPNT  /ALIVE FOR NEXT MISSLE
03623  2066  ISZ MISPNT
03624  1026  TAD QPH
03625  4475  SIN  /GET SIN(PHI)
03626  3242  DCA FSINPH
03627  1026  TAD QPH
03630  4474  COS  /AND COS(PHI)
03631  3234  DCA FCOSPH
03632  1377  TAD <300  /TO START IT
03633  4471  MULT
03634  0000  FCOSPH, 0  /AT X POSITION
03635  1022  TAD QXPOS  /START
03636  3465  DCA I MISPNT  /STASH
03637  2066  ISZ MISPNT
03640  1377  TAD <300
03641  4471  MULT  /MULTIPLY
03642  0000  FSINPH, 0  /SIN(PHI)=Y COORD
03643  1023  TAD QYPOS
03644  3466  DCA I MISPNT  /STASH
03645  2066  ISZ MISPNT  /POINT TO VELOCITIES
03646  1064  TAD QTHROC  /GET MUSSEL VELOCITY
03647  3252  DCA .+3  /FOR MULTIPLY
03650  1234  TAD FCOSPH
03651  4471  MULT
03652  1000  1000
03653  1024  TAD QVX  /AND CALC STARTING Y VEL
03654  3466  DCA I MISPNT  /STASH QVX
03655  2066  ISZ MISPNT
03656  1064  TAD QTHROC
03657  3262  DCA .+3
03658  1242  TAD FSINPH
03661  4471  MULT
/SPGWAR BY D.E. WREG

03662 1000 1000
03663 1025 TAD QVY
03664 3466 DCA I MISPNT
03665 2066 ISZ MISPNT
03666 2051 ISZ NUMMIS
03667 5600 JMP I FIRONE
03670 7760 ARMED, -20 /TIME DELAY BETWEEN FIREINGS

/GO INTO HYPERSPACE
03671 0000 HYPER, 0
03672 7240 STA
03673 3032 DCA HYPERS
03674 4477 RANDOM
03675 3022 DCA QXPOS
03676 4477 RANDOM
03677 3023 DCA QYPOS
03700 5671 JMP I HYPER
03777 0300
03800 4000 PAGE

/STASH Y VEL
/COUNT THE NUMBER OF LIVE MISS.
04000   0000  MISTBL,  ZBLOCK 22°5

/ORDER OF DATA IS

/ALIVE
/XPOS
/YPOS       5 ENTRIES PER MIS.
/VX
/VY

/THERE ARE NUMMIS OF THEM

4200   PAGE
SUBROUTINE TO UPDATE MISSELS

04200 0000 MISSELS, 0
04201 1051 TAD NUMMIS / GET NUMBER
04202 7450 SNA / SKIP IF THERE ARE ANY
04203 5600 JMP I MISSLS / NONE
04204 7041 CIA / NEGATE FOR COUTING
04205 3233 DCA MISSCH / -# TO DO
04206 1377 TAD (-100)
04207 3776' DCA STOVER / STILL SOME STUFF
04210 3052 DCA HNMMIS / START WITH 0 LEFT (UPDATED BY PUTHIS)
04211 3046 DCA QTHR / MEANINGLESS
04212 3047 DCA QTHA / MEANINGLESS
04213 1375 TAD <MISTBL
04214 3234 DCA MISSIN / POINTER INTO TABLE
04215 1234 TAD MISSIN
04216 3066 DCA MISPN1 / AND POINTER OUT
04217 4274 MISS1, JMS GETMIS / GET A MISSLE
04219 4503 HXTP0S / CALC NEW POSITION

CHECK FOR HIT

04221 4774' JMS COLID1 / COLLISION SHIP1
04222 4773' JMS BANG / EXPLOSION
04223 4772' JMS COLID2 / COLLISION SHIP2
04224 4773' JMS BANG / EXPLOSION
04225 4237 JMS MISSUB / LOAD THE DISPLAY BUFFER
04226 2233 ISZ MISSCHNT / MORE?
04227 5217 JMP MISSMS / YEP
04229 1052 TAD NUMMIS
04231 3051 DCA NUMMIS
04232 5600 JMP I MISSLS / NO: DONE

04233 0000 MISSCHN, 0
04234 0000 MISSIN, 0
04235 0000 MISST1, 0
04236 0000 MISST2, 0

SUBROUTINE TO LOAD UP DISPLAY BUFFER

04237 0000 MISSUB, 0
04240 1022 TAD QXPOS / LOAD UP DISPLAY BUFFER
04241 7415 ASR / SHIFT FOR GOOD POS
04242 0002 2
04243 6211 CDF D
04244 3235 DCA MISST1 / SO CAN MAKE 2 COPYs
04245 1235 TAD MISST1
04246 3449 DCA I DBUFP / LOAD X
04247 2045 ISZ DBUFP
04248 1023 TAD QYPOS
04251 7415 ASR
04252 0002 2
04253 3236 DCA MISST2 / SO CAN MAKE 2 COPYs
04254 1236 TAD MISST2
04255 3445 DCA I DBUFP / LOAD Y
SPCWAR BY D.E. WREGA

04256  2045  ISZ DBUFF
04257  1235  TAD MISST1 /ANOTHER COPY
04260  3445  DCA I DBUFF
04261  2845  ISZ DBUFF
04262  1236  TAD MISST2
04263  3445  DCA I DBUFF
04264  2045  ISZ DBUFF
04265  6201  CDF 0 /BACK TO THIS FIELD
04266  1021  TAD ALIVE
04267  7650  SNA CLA
04270  5273  JMP .+3
04271  2021  ISZ ALIVE /CHECK IF TIME HAS RUN OUT
04272  4307  JMS PUTMIS /NO-Still ALIVE
04273  5637  JMP I MISSUB

GET SOME MISSEL DATA

04274  0000  GETMIS, 0
04275  1371  TAD (ALIVE-1
04276  3010  DCA OXR1
04277  1370  TAD <-5
04300  3056  DCA QCNT1
04301  1634  TAD I MISSIN
04302  3410  DCA I OXR1
04303  2234  ISZ MISSIN
04304  2056  ISZ QCNT1
04305  5301  JMP -.4
04306  5674  JMP I GETMIS

ROUTINE TO COPY MISSEL DATA BACK.

04307  0000  PUTMIS, 0
04310  2052  ISZ NNUMMIS /COUNT THE MISSEL
04311  1371  TAD (ALIVE-1
04312  3010  DCA OXR1
04313  1370  TAD <-5
04314  3056  DCA QCNT1
04315  1410  TAD I OXR1
04316  3466  DCA I MISPNT
04317  2066  ISZ MISPNT
04320  2056  ISZ QCNT1
04321  5315  JMP -.4
04322  5707  JMP I PUTMIS

SUBROUTINE TO CALC NEXT POSSITION IN SHIP BREAKUP

04323  0000  SCATTE, 0
04324  1044  TAD BREAKU /MAKE SURE SOME LEFT
04325  7450  SNA /SKIP IF DONE
04326  5723  JMP I SCATTE /NONE LEFT
04327  3233  DCA MISSCH /COUNT THEM
04330  3052  DCA NNUMMIS /CLEAR # LEFT
04331  3046  DCA QTHR /THRUST IS OFF
04332  3047  DCA QTHA /NO ANGLES OF COURSE
04333 1367   TAD <SCATBL   /TABLE OF PIECES
04334 3234   DCA MISSIN   /STORE IN POINTER
04335 1066   TAD MISPNT   /SAVE MISSLE POINTER
04336 3354   DCA SCATTMP
04337 1367   TAD <SCATBL   /INIT OUT POINTER
04340 3066   DCA MISPNT   /TO POINT TO PIECES
04341 4274   JMS GETMIS   /PUT ONE IN PAGE ZERO
04342 4503   NXTPOS   /UPDATE POSITION
04343 4237   JMS MISSUB   /DO DISPLAY BUFFER STUFF
04344 2233   ISZ MISSCHT   /DONE?
04345 5341   JMP .-4   /NOT YET
04346 1354   TAD SCATTMP   /YEP. RESTORE MISPNT
04347 3066   DCA MISPNT
04350 1052   TAD HNUMMIS   /NUMBER OF PIECES LEFT
04351 7041   CIA   /STORE NEGATIVE
04352 3044   DCA BREAKUP   /IN FLAG WORD
04353 5723   JMP I SCATTER

04354 0000   SCATM, 0   /SAVE MISPNT

04367 4720
04370 7773
04371 0020
04372 4454
04373 4505
04374 4423
04375 4000
04376 5507
04377 7700

4400   PAGE
/SPCWAR BY D.E. WREGE

ROUTINES TO CHECK FOR COLLISIONS.
/COLIDE - CHECKS FOR COLLISION WITH SUN.
/COLID1 - CHECKS FOR SHIP1
/COLID2 - CHECKS FOR SHIP2
/NOTE THAT COLID1 AND COLID2 ALSO CHECK FOR COLLISION
/WITH SUN, BUT DO NOT TAKE EXPLODE EXIT.
/THIS IS SO MISSILES MAY BE REMOVED WITHOUT EXPLOSION.
/THE ROUTINES DEADIFY THE APPROPRIATE JOBY.
/CALL: JMS COLIDE
/HIT SOMETHING
/NORMAL EXIT

04400 0000 COLIDE, 0
04401 1822 TAD QXPOS /CHECK X
04402 4214 JMS COLIDS /FOR <128
04403 7410 SKP /A POSSIBILITY
04404 5210 JMP COLLD4 /O.K.
04405 1023 TAD QYPOS
04406 4214 JMS COLIDS
04407 5212 JMP COLID1
04410 2200 COLLD4, ISZ COLIDE
04411 5600 JMP I COLIDE /ALL OK
04412 3021 COLLD1, DCA ALIVE /KILL IT
04413 5600 JMP I COLIDE /AND TAKE FIRST EXIT

/ROUTINEM TO CHECK ABSOLUTE VALUE
/OF AC<128

04414 0000 COLIDS, 0
04415 7510 SPA
04416 7041 CIA
04417 0377 AND <7600
04420 7640 SZA CLA
04421 2214 ISZ COLIDS
04422 5614 JMP I COLIDS

/CHECK FOR COLLISION WITH SHIP1 AND SUN

04423 0000 COLID1, 0
04424 4200 JMS COLIDE /CHECK SUN FIRST
04425 5623 JMP I COLID1
04426 1776 TAD I <SHIP1+ALIVE-QR
04427 7650 SNA CLA /SKIP IF ALIVE
04430 5247 JMP COLLD5 /NO
04431 1775 TAD I <SHIP1+HYPERS-QR
04432 7640 SZA CLA /SKIP IF NOT IN HYPERSPACE
04433 5247 JMP COLLD5 /IS IN HYPER.
04434 1022 TAD QXPOS
04435 7041 CIA
04436 1774 TAD I <SHIP1X
04437 4214 JMS COLIDS
04440 7410 SKP
04441 5247 JMP COLLD5
04442 1023 TAD QYPOS
/SPCWAR BY D.E. WREGE

04443 7841 CIA
04444 1773 TAD I (SHIP1Y
04445 4214 JMS COLIDS
04446 5251 JMP COLLD2
04447 2223 COLLD5, ISZ COLID2 /NO COLLISION
04450 5623 JMP I COLID2
04451 3821 COLLD2, DCA ALIVE /KILL CURRENT MISSLE ETC.
04452 3776 DCA I (SHIP1+ALIVE-QR /AND SHIP1
04453 5623 JMP I COLID1

/COLLISION WITH SHIP2

04454 8000 COLID2, 0
04455 4200 JMS COLIDE /CHECK SUN
04456 5654 JMP I COLID2
04457 1772 TAD I (SHIP2+ALIVE-QR
04460 7650 SMA CLA /SKIP IF ALIVE
04461 5300 JMP COLLD6
04462 1771 TAD I (SHIP2+HYPERS-QR
04463 7640 SZA CLA /SKIP IF NOT IN HYPERSPACE
04464 5300 JMP COLLD6 /IS SO IGNORE
04465 1022 TAD QXPOS
04466 7841 CIA
04467 1770 TAD I (SHIP2X
04470 4214 JMS COLIDS
04471 7410 SKP
04472 5300 JMP COLLD6
04473 1023 TAD QYPOS
04474 7841 CIA
04475 1767 TAD I (SHIP2Y
04476 4214 JMS COLIDS
04477 5302 JMP COLLD3
04500 2254 COLLD6, ISZ COLID2
04501 5654 JMP I COLID2
04502 3021 COLLD3, DCA ALIVE
04503 3772 DCA I (SHIP2+ALIVE-QR
04504 5654 JMP I COLID2

/ROUTINE TO SET UP PIECES OF SHIP AFTER /A COLLISION.

04505 8000 BANG, 0
04506 1366 TAD <BRKTB1-1 /POINT TO PIECES TABLE
04507 3019 DCA QXR1 /AND DESTINATION TABLE
04508 1365 TAD <SCATBL-1 /AND DESTINATION TABLE
04511 5301 DCA QXR2 /FOR INITIAL CONDITIONS
04512 1364 TAD <-20 /8 PIECES FOR NOW
04513 3056 DCA QCN1 /TO PUT IN
04514 1418 BANG1, TAD I QXR1 /PICK UP LIFETIME
04515 3411 DCA I QXR2 /PUT IN TABLE
04516 1410 TAD I QXR1 /X-POSITION
04517 1020 TAD QXPOS /MOVE TO WHERE SHIP IS
04518 3411 DCA I QXR2 /PUT AWAY
04519 1410 TAD I QXR1 /AND Y-POSITION
04520 1020 TAD QYPOS /MOVE TO WHERE IT SHOULD BE
04523 3411 DCA I QXR2 /STASH
04524 1410 TAD I QXR1 /PICK UP A VELOCITY COMP
04525 1024 TAD QVX /AND ADD INITIAL VELOCITY
04526 3411 DCA I QXR2 /STASH
04527 1410 TAD I QXR1 /AND Y VELOCITY
04530 1025 TAD QVY
04531 3411 DCA I QXR2 /STASH
04532 2056 ISZ QCNT1 /DONE?
04533 5314 JMP BANGL1 /NOT YET
04534 1364 TAD <-20 /INITIALIZE BREAKUP
04535 3044 DCA BREAKUP /ALSO IS # ENTRIES
04536 5705 JMP I BANG /AND RETURN

04564 7760
04565 4717
04566 4577
04567 1375
04570 1374
04571 1404
04572 1373
04573 1354
04574 1353
04575 1363
04576 1352
04577 7600

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04667 7754  -24;0;0;20;0
04670 0000
04671 0000
04672 7760
04673 0000
04674 7760  -20;20;0;10;10
04675 0020
04676 0000
04677 0010
04700 0010
04701 7760  -20;0;20;10;-10
04702 0000
04703 0020
04704 0010
04705 7770
04706 7760  -20;20;0;-10;10
04707 7760
04710 0000
04711 7770
04712 0010
04713 7760  -20;0;-20;-10;-10
04714 0000
04715 7760
04716 7770
04717 7770

04720 0000  SCATBL, ZBLOCK 21^5

5200  PAGE
SPCWAR: I0F

05200 6002 SPCWAR: IOF
05201 1377 TAD <SHIP1-1
05202 4500 ONDECK
05203 1377 JMS STARTU
05204 4223 TAD <SHIP1-1
05205 4501 OFDECK
05206 1376 TAD <SHIP2-1
05207 4500 ONDECK
05208 4223 JMS STARTU
05209 -2500 TAD <-2500
05210 3822 DCA QXPOS
05211 1375 TAD <-2500
05212 3822 DCA QXPOS
05213 1376 TAD <SHIP2-1
05214 4501 OFDECK
05215 1374 TAD <MISTBL
05216 3066 DCA MISPNT
05217 3051 DCA NUMMIS
05218 4773' (JMS STCLK)
05219 6001 ION
05220 5772' JMP WAR-2

RE-INITIALIZE ALL
GET SHIP1 DATA
COPY OUT
GET SHIP2 INFO
INITIALIZE
START #2 ON OTHER SIDE
COPY OUT
INITIALIZE MISSELS
NONE TO START
START CLOCK UP

/INITIALIZE PARAMETERS

05223 0000 STARTU, 0
05224 3024 DCA QVX
05225 3025 DCA QVY
05226 1371 TAD <2500
05227 3022 DCA QXPOS
05228 4477 RANDOM
05229 3023 DCA QYPOS
05230 3027 DCA QPHDOT
05231 4477 RANDOM
05232 0370 AND <277
05233 3026 DCA QPH
05234 7001 IAC
05235 3021 DCA ALIVE
05236 3031 DCA SHIELD
05237 3032 DCA HYPERS
05238 3044 DCA BREAKU
05239 1053 TAD MAXMIS
05240 3033 DCA MISCHT
05241 3034 DCA ARMED
05242 4767' JMS SETGRV
05243 5623 JMP I STARTUP
05244 3062
05245 0277
05246 2500
05247 5400
05248 6042
05249 4000
05250 5300
05251 1371
05252 1350

START WITH NO VELOCITY
IN EITHER DIRECTION
AT THIS X
ABOUT 2/3 OUT
AND RANDOM Y
Y POSITION RANDOM
NO ROTATION
AND RANDOM ANGLE
MASK FOR GOOD ANGLE
MAKE IT ALIVE
SHIELDS NOT ON
NOT IN HYPERSPACE.
NOT BREAKING UP
# MISSELS/SHIP
ALLOWED
START OUT ARMED
CALC GRAVITY TABLE
/SPCWAR BY D.E. WREGE

/THIS IS THE MAJOR CONTROL

05480  7240  STA
05481  3777'  DCA SUNHLF  /LET'S NOT HAVE TROUBLE WITH THIS
05482  1376  WAR,  TAD < DISBUF+2  /FOR NOW INITIALIZE
05483  3045  DCA DBUFFP  /DISPLAY BUFFER POINTER
05484  6211  CDF 0
05485  3775  DCA I < DISBUF
05486  3774  DCA I < DISBUF+1
05487  6201  CDF 0
05488  1373  TAD < SHIP1-1
05411  4500  ONSDECK  /START OUT WITH SHIP1
05412  1021  TAD ALIVE  /NOW TO SEE IF HE EXISTS
05413  7650  SNA CLA  /SKIP IF ALIVE
05414  5231  JMP WARS2  /NOPE: GO TO SHIP2
05415  1372  TAD < -100
05416  3307  DCA STOVER  /SOMEONE STILL ALIVE
05417  7604  LAS  /GET SWITCHES
05420  4771'  JMS WARSUB  /DO THE CALCULATIONS
05421  1032  TAD HYPERS
05422  7640  SZA CLA  /SKIP IF NOT IN HYPERSPACE
05423  5226  JMP WARIE  /IGNORE CHECKING
05424  4778'  JMS COLIDE  /CHECK FOR COLLISION WITH SUN
05425  4767'  JMS BANG  /START EXPLOSION
05426  1373  WARIE,  TAD < SHIP1-1
05427  4501  OFDECK
05430  4505  FLAME  /DISPLAY FLAME

/HOW FOR SHIP2

05431  1366  WARS2,  TAD < SHIP2-1  /HOW DO SHIP 2
05432  4500  ONSDECK
05433  1021  TAD ALIVE  /NOW TO SEE IF HE EXISTS
05434  7650  SNA CLA  /SKIP IF ALIVE
05435  5256  JMP WARS3  /NOPE: GO TO SHIP2
05436  1372  TAD < -100
05437  3307  DCA STOVER  /SOMEONE STILL ALIVE
05440  7604  LAS  /GET SWITCHES
05441  7417  LSR,7  /OVER FOR WARSUB
05442  0007  
05443  4771'  JMS WARSUB  /DO THE CALCULATIONS
05444  1032  TAD HYPERS
05445  7640  SZA CLA  /SKIP IF NOT IN HYPERSPACE
05446  5253  JMP WAR2E  /NO MORE CHECKING
05447  4770'  JMS COLIDE  /COLLISION WITH SUN FIRST
05450  7410  SKP
05451  4765'  JMS COLIDE1  /CHECK COLLISIONS
05452  4767'  JMS BANG  /START THE EXPLOSION
05453  1366  WAR2E,  TAD < SHIP2-1
05454  4501  OFDECK
05455  4505  FLAME
/SPCWAR BY D.E. WREGE

/NOW FOR THE MISSLES

05456  6002  WARS3,  IOF
05457  4764'  JMS MISSLS  /INTERRUPTS CAN BOMB HERE
05460  6001  ION

/AND ANY BREAKUP

05461  1044  TAD BREAKUP
05462  7640  SZA CLA  /SKIP IF ANY
05463  4763'  JMS SCATTER  /DO IT

/NOW TO DISPLAY IT

05464  1045  WARDIS,  TAD DBUF
05465  7041  CIA
05466  1375  TAD <DISBUF
05467  6002  IOF  /NO INTS IN LINC MODE
05470  3273  DCA WARDX  /FOR DISPLAY ROUTINE
05471  1362  TAD <DISBUF-1
05472  4473  DISPLAY
05473  0000  WARDX,  0
05474   4507  D1=DSUN
05475   4506  D2=DSUN
05476  4507  DSUN  /DISPLAY THE UNIVERSE OR SUN
05477  6001  ION
05478  2307  ISZ STOVER  /DELAY FOR AUTO RESTART
05479  7410  SKP
05500  5761'  JMP SPCWAR  /START OVER
05501  1306  IFNZRO FCLOCK+KW12+AX08+DK8EA+DK8EP <
05502  7650  TAD WAIT
05503  5301  SNA CLA
05504  5302  JMP -2
05505  3306  DCA WAIT>
05506  5202  JMP WARM
05506  0000  WAIT,  0  /-1 WHEN READY
05507  0000  STOVER,  0  /SET BY INTERRUPT ROUTINE
      /DELAY FOR AUTO RESTART
/SPCWAR BY D.E. WREGE

/SUBROUTINE TO DO ALL OF THE SHIP CALCULATIONS.
/ENTER WITH BITS SET ACCORDING TO OPTIONS

05600  0000  WARSUB, 0
05601  3777'  DCA SWITCHES
05602  1777'  TAD SWITCHES
05603  7010  RAR  /ROCKET BIT TO LINK
05604  7630  SZA CLA  /SKIP IF NOT ON
05605  1061  TAD QTHRST  /COPY THRUST INTO QTHR
05606  3046  DCA QTHR  /IF ROCKETS ON
05607  3032  DCA HYPER  /TAKE OUT OF HYPERSONCE
05610  1777'  TAD SWITCHES
05611  0376  AND <6  /MASK ROT BITS
05612  7450  SNA  /SKIP IF ANY ON
05613  5232  JMP WARI
05614  3054  DCA QTMI
05615  1054  TAD QTMI
05616  1375  TAD <6  /TO SEE IF HYPERSONCE
05617  7650  SZA CLA  /SKIP IF NOT HYPERSONCE
05620  4774'  JMS HYPER  /GO INTO HYPERSONCE
05621  1032  TAD HYPER  /IF IN HYPERSONCE DON'T DO
05622  7640  SZA CLA  /THE CALCULATIONS
05623  5600  JMP I WARSUB
05624  1054  TAD QTMI
05625  7012  RTR  /GET CLOCKWISE INTO LINK
05626  7200  CLA  /GET RID OF OTHER BIT
05627  1063  TAD QRET  /RETRO CONSTANT
05630  7420  SHL  /SKIP IF CC
05631  7041  CIA
05632  3047  WARI,  DCA QTHA  /SET RETRO THRUST
05633  1034  TAD ARMED  /TO SEE IF ALREADY ARMED
05634  7650  SNA CLA  /SKIP IF NOT YET
05635  5240  JMP .+3  /ALREADY ARMED
05636  2034  ISZ ARMED  /UPDATE TIME DELAY
05637  5244  JMP WAR2  /NOT ARMED.
05640  1777'  TAD SWITCHES  /IS ARMED SO CHECK
05641  0373  AND <10  /FIRE BIT.
05642  7640  SZA CLA  /SKIP IF NOT FIRING
05643  4510  FIRE  /FIRE A MISSLE.
05644  4503  WARI,  NXTPOS  /CALC NEW POSITION
05645  4504  NXTANG  /AND SHIP ANGLE
05646  4502  DRAW  /SET DISPLAY BUFFER
05647  4772'  PSAUC1,  JMS SAUC  /OR NHP FOR SHIPS
05650  5600  JMP I WARSUB

05772  2200
05773  0010
05774  3671
05775  7772
05776  0066
05777  1686
05780  6000  PAGE

/ROCKET
/ROTATE BITS
/FIRE
COME HERE FROM INTERRUPT

06000 0000 SAVAC, 0
06001 0000 SAVLK, 0

06002 3200 INTRPT, DCA SAVAC /SAVE ACCUMULATOR
06003 7010 RAR
06004 3201 DCA SAVLK /AND LINK
06005 6031 KSF /KEYBOARD?
06006 5212 JMP .+4
06007 6036 KRB /READ THE CHAR
06010 3220 DCA ICHAR /STORE
06011 5640 JMP I OPTIONS
06012 6041 TSF /TELEPRINTER
06013 5222 JMP CLKINT /NO CHECK CLOCK
06014 6042 TCF /CLEAR THAT FLAG
06015 3217 DCA TELSW /SET NOT IN PROGRESS SWITCH
06016 5640 JMP I OPTIONS

06017 0000 TELSW, 0
06020 0000 ICHAR, 0
06021 0000 DELAY1, 0

CLKINT

06022 6131 IFNZRO KW12+DK8EP <
06023 5227 CLSK /SKIP IF CLOCK
06024 6135 JMP INTEXT /QUIT <UNDEFINED INT?>
06025 6041 CLSA /CLEAR THE FLAGS

IFNZRO FCLOCK <
06026 6131 /SKIP IF NOT FLAG
06027 SKP
06028 6132 JMP INTEXT /HOPE
06029 /RECONNECT TO INT

IFNZRO DK8EA <
0602A 6137 /SKIP ON CLOCK
0602B 6130 JMP INTEXT /HOPE
0602C 6136 ISZ DELAY1 /MAKE SURE INT STILL ENABLED
0602D JMP INTEXT /HOPE: NEXT TIME
0602E GLL STA RTL /-3
0602F DCA DELAY1 /RESET DELAY1

IFNZRO AX08 <
06030 6321 /SKIP IF CLOCK
06031 JMP INTEXT /WHO???
06032 6352 /CLEAR CLOCK
06033 ISZ DELAY1 /NOT YET
06034 JMP INTEXT /RESET INTRPS
06035 DCA DELAY1 /DELAY INTERVAL

06036 7240 STA /AND SET WAITING
DCA WAIT

IFNZRO T30 <6161,HOP>
CLA CLL
TAD SAVLK /GET LINK
RAL CLL
TAD SAVAC /AND AC.
RMF /RESTORE FIELDS
ION /AND RESTOR INTERRUPTS
JMP I 0 /RETURN TO PROGRAM

GO BACK TO SPCWAR

OPTION, KBOARD
JMP INTEXT

IFNZRO KW12+DK8EP <
/SUBROUTINE TO START UP CLOCK
/MAY BE HARDWARE DEPENDENT
/THIS IS FOR KW12A CLOCK - PDP12
/OR PROGRAMABLE PDP8E CLOCK DK8EP

6131   CLSK=6131 /SKIP IF CLOCK
6132   CLLR=6132 /LOAD CONTROL
6133   CLAB=6133 /AC TO BUFFER PRESET
6134   CLEN=6134 /LOAD ENABLE
6135   CLSA=6135 /BIT RESET FLAGS

0090   STCLK, 0
CLA CLL /JUST IN CASE
IFNZRO PDP12 <CLLR /STOP CLOCK
CLEN /CLEAR INTERRUPTS
>
TAD <-40 /ABOUT 30CPS
CLAB /LOAD PRSET
CLA CLL
IFNZRO PDP12 <
TAD < 0100 /1KC - PRESET TIME
CLLR /LOAD CONTROL
CLSA /CLEAR STATUS AND POSSIBLE OVERFLOW
CLA CLL
TAD < 300 /INTERRUPT ON OVERFLOW
CLEN
CLA CLL
TAD < 4100 /AND START UP CLOCK
>
IFNZRO BK8EP <
TAD < 5300 /INTR ON CLOCK - 1KC
>
CLA CLL
JMP I STCLK>

IFNZRO FCLOCK <
DYER'S FUNNY CLOCK

STCLK, 0
6132
JMP I STCLK>

IFNZRO DK8EA <
/DK8EA <LINE CLOCK>

STCLK, 0
6134
JMP I STCLK>

IFNZRO AX08 <

STCLK, 0
CLA CLL
TAD (400
6346 /START CRYSTAL CLOCK
TAD CLKLIM /INITIALIZE CLOCK
DCA DELAY1
JMP I STCLK

CLKLIM, 7400>

STCLK, 0
IFZERO KW12+AX08+FCLOCK+DK8EA+DK8EP <

STCLK, 0
JMP I STCLK>

06173 4100
06174 0300
06175 0100
06176 7740
06177 5506
6200 PAGE
06200  4324  KBOARD, JMS GETC /GET THE CHAR
06201  4246  JMS DISPCH /DISPATCH ON CHAR
06202  7460  -*P;OPLAT
06203  7007  -"C;OCCURV
06204  7475  -"F;OSTARS /FIELD OF STARS
06205  7022  -"Z;OSUN /POLARIS ONLY
06206  7472  -"B;OBOUNCE /BOUNCE_MODE
06207  7033  -"W;OWRAP /WRAP AROUND
06210  7446  -"A;OANGUL /ANGULAR MOMENT CONSERVE
06211  7042  -"M;ONORM /NO ANG MOM CONS.
06212  7476  -"G;OMAGR /RESET GRAVITY
06213  6347  -"M;OMICL /RESET NUMB MISSLES
06214  7451  -"R;ORETRO /RESET RETRO CONSTANT
06215  6400  -"T;OHTHR /RESET THRUST CONSTANT
06216  7477  -"S;OSHIPS /DISPLAY SHIPS
06217  6410  -"M;OMISSL /DISPLAY UFOS
06218  6416  -"O;OUFO /LIST OPTIONS
06219  6416  -"G;OMAGR /MATCH
06220  7462  -"N;ONORM /NOT IN LIST
06221  6416  -"T;OHTHR /SKIP IF NO MATCH
06222  7471  -"S;OSHIPS /TO NEXT CHAR
06223  6461  -"B;OBOUNCE /CONTINUE
06224  7463  -"W;OWRAP /FOUND IT
06225  6502  -"A;OANGUL /END OF LIST
06226  7456  -"M;OMICL /START OVER
06227  6520  -"R;ORETRO
06228  7454  -"T;OHTHR
06229  6511  -"S;OSHIPS
06230  7455  -"M;OMICL
06231  6650  -"R;ORETRO
06232  7452  -"T;OHTHR
06233  7575  -"S;OSHIPS
06234  7451  -"M;OMICL
06235  7000  -"R;ORETRO
06236  7453  -"T;OHTHR
06237  6626  -"S;OSHIPS
06238  7461  -"M;OMICL
06239  6600  -"R;ORETRO
06240  7461  -"T;OHTHR
06241  6600  -"S;OSHIPS
06242  7575  -"M;OMICL
06243  7600  -"R;ORETRO
06244  8000  0 /END OF LIST
06245  5777  JMP SPCWAR /START OVER

/DISPATCH ON ACCUMULATOR

06246  8000  DISPCH, 0
06247  3264  DCRA OTMN /TEMP STASH
06248  1646  TAB I DISPCH /GET COMPARISON
06249  2246  ISZ DISPCH /B MEANS DONE
06250  2246  SNA
06251  7450  JMP I DISPCH /NOT IN LIST
06252  5646  TAD OTMN /CHECK AGAINST CAHR
06253  1264  SNA CLA /SKIP IF NO MATCH
06254  7658  JMP .+3 /MATCH
06255  5261  ISZ DISPCH /TO NEXT CHAR
06256  2246  JMP DISPCH+2 /CONTINUE
06257  5258  TAB I DISPCH /FOUND IT
06262 3246  DCA DISPCH  /DO DOUBLE INDIRECT
06263 5646  JMP I DISPCH
06264 0000  OTM1, 0

/PRINT A MESSAGE

06265 0000 PRMSG, 0
06266 1655 TAD I PRMSG  /GET ADD OF MESSAGE
06267 3264 DCA OTM1  /STORE POINTER
06270 2265 ISZ PRMSG  /NORMAL EXIT
06271 1664 PRST1, TAD I OTM1
06272 7012 RTR;RTR;RTR  /OVER FOR PRINT
06273 7012
06274 7012
06275 4302 JMS PRCHR  /PRINT LEFT HALF
06276 1664 TAD I OTM1
06277 4302 JMS PRCHR  /PRINT RIGHT HALF
06300 2264 ISZ OTM1  /NEXT WORD
06301 5271 JMP PRST1  /LOOP
06302 0000 PRCHR, 0
06303 0376 AND <77
06304 7450 SHA
06305 5665 JMP I PRMSG  /IF ZERO QUIT
06306 1375 TAD <40  /FOR EXTEND
06307 7510 SPA  /SKIP IF HEUMERIC
06310 1374 TAD <100  /IS ALPHA
06311 1373 TAD <240  /BACK TO CORRECT
06312 4314 JMS PCH /PRINT ROUTINE
06313 5702 JMP I PRCHR

/PRINT A CHARACTER ROUTINE

06314 0000 PCH, 0
06315 6046 TLS  /OUTPUT IT
06316 3772 TDC TELSW  /SET TTY INPROGRESS
06317 4771 JMS OPTIONS  /AND WAIT TILL FINISHED
06320 1772 TAD TELSW  /KEYBOARD INTERRUPT
06321 7440 SZA
06322 5317 JMP .-3  /NOT YET
06323 5714 JMP I PCH  /DONE.

/GET AN INPUT CHARACTER

06324 0000 GETC, 0
06325 1770 TAD ICHAR  /FROM INTERRUPT SERVICE
06326 7440 SZA
06327 5332 JMP .+3  /YES
06330 4771 JMS OPTIONS  /WAIT SOME MORE
06331 5325 JMP GETC+1
06332 3336 DCA CHAR
06333 3770 DCA ICHAR
06334  1336  TAD CHAR
06335  5724  JMP I GETC  /AND RETURN WITH CHAR
06336  0000  CHAR,  0
06337  0000  CRLF,  0
06340  1367  TAD <215
06341  4314  JMS PCH
06342  1366  TAD <212
06343  4314  JMS PCH
06344  5737  JMP I CRLF
06345  4771' REINITIALIZE,  JMS OPTIONS
06346  5200  JMP KBOARD
/SPCWAR BY D.E. WREGE

//TURN ON BOUNCE

06347 1365 OBOUNC, TAD (BOUNX
06350 3067 DCA BOUNCX
06351 1364 TAD (BOUNY
06352 3070 DCA BOUNCY
06353 4265 JMS PRMSG
06354 7437 MBOUNC
06355 4337 JMS CRLF
06356 5345 JMP REINIT

06364 2355
06365 2346
06366 0212
06367 0215
06370 6020
06371 6040
06372 6017
06373 8240
06374 0100
06375 7740
06376 8077
06377 5200

//ROUTE TO DISABLE BOUNCE

06400 1377 OWRAP, TAD <NULL
06401 3067 DCA BOUNCX
06402 1377 TAD <NULL
06403 3070 DCA BOUNCY
06404 4776 JMS PRMSG
06405 7444 MWRAP
06406 4775 JMS CRLF
06407 5774 JMP REINIT

//PAGE
/SPCWAR BY D.E. WREGE

/ROUTINE TO CONSERVE ANGULAR MOM

06410 7201 DANGUL, Cla IAC
06411 3050 DCA CONSER
06412 4776 JMS PRMSG
06413 7454 MAGCON
06414 4775 JMS CRLF
06415 5774 JMP REINIT
06416 7332 ONORM, DCA CONSER
06417 4776 JMS PRMSG
06420 7465 MNORMAL
06421 4775 JMS CRLF
06422 5774 JMP REINIT

/ROUTINE TO INPUT AN OCTAL NUMBER FROM THE KEYBOARD.
/CALL: JMS OCTAL
/     RETI /NO INPUT
/     RET2 /AC=OCTAL NUMBER

06423 0000 OCTALK, O
06424 3257 DCA NUMB
06425 3260 DCA INPUT
06426 4773 OCTALL, JMS GETC
06427 4772 JMS PCH
06430 1771 TAD CHAR
06431 1370 TAD "0"
06432 7500 SMA
06433 5250 JMP NUMBEX
06434 1367 TAD "0" "0"
06435 7510 SPA
06436 5250 JMP NUMBEX
06437 3260 DCA INPUT
06440 1257 TAD NUMB
06441 7104 CLL RAL; CLL RAL; CLL RAL
06442 7104
06443 7104
06444 1260 TAD INPUT
06445 3257 DCA NUMB
06446 2260 ISZ INPUT
06447 5226 JMP OCTALL
06450 7300 NUMBEX, Cla CLL
06451 1260 TAD INPUT
06452 7640 SZA CLA
06453 2223 ISZ OCTALK
06454 4775 JMS CRLF
06455 1257 TAD NUMB
06456 5623 JMP OCTALK
06457 0000 NUMB, O
06460 0000 INPUT, O

06461 4776 DGRAY, JMS PRMSG
06462 7500 MGRAY

/TELL HIM WHAT OPTION IS
06463  4223  JMS OCTALX  \ GET NEW VALUE
06464  5774'  JMP REINIT  \ NO INPUT
06465  3062  DCA OGRAY  \ SET VALUE
06466  1366  TAD CKBOARD  \ REINITIALIZE
06467  3765'  DCA OPTIONS
06470  4764'  JMS SETGRY  \ SET UP TABLE
06471  1062  TAD OGRAY  \ HOW TO SEE IF ANTI-GRAY.
06472  7700  SMH CLA  \ SKIP IF YES
06473  5763'  JMP WAR-2
06474  4776'  JMS PRMSG
06475  7516  MAGRAY  \ ANTI GRAVITY
06476  4775'  JMS CRLF
06477  1366  TAD CKBOARD
06500  3765'  DCA OPTIONS
06501  5763'  JMP WAR-2
06502  4776'  DMISSL  JMS PRMSG
06503  7525  MMISSLS
06504  4223  JMS OCTALX  \ GET A NUMBER
06505  5774'  JMP REINIT
06506  7041  CIA  \ SET MISSEL CONSTANT
06507  3053  DCA MAXHIS  \ SET CONSTANT
06510  5774'  JMP REINIT  \ DONE

\ ROUTINE TO READJUST THRUST
06511  4776'  OTHRUS  JMS PRMSG
06512  7537  MTHRUS
06513  4223  JMS OCTALX
06514  5774'  JMP REINIT
06515  7106  CLL RTL
06516  3061  DCA OTHRUS
06517  5774'  JMP REINIT

\ ROUTINE TO SET RETRO CONSTANT
06520  4776'  ORETRO  JMS PRMSG
06521  7552  MRETRO
06522  4223  JMS OCTALX
06523  5774'  JMP REINIT
06524  3063  DCA ORET
06525  5774'  JMP REINIT

\ ROUTINE TO PRINT LOTS OF MESSAGES
06526  0030  MMESSG,  0
06527  4775'  JMS CRLF  \ NEW LINE
06530  1726  TAD I MMESSG  \ GET START OF MESSAGE
06531  7450  SHA  \ SKIP IF MORE TO COME
06532  5726  JMP I MMESSG
06533  3335  DCA . +2
06534  4776'  JMS PRMSG  \ PRINT IT
06535  0000  \ NEXT LINE
06536  2326  ISZ MMESSG  \ MORE
06537  5327  JMP MMESSG+1
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**JMP REINIT**
/DISPLAY SAUCERS (UFO'S)

06626 4775' OUFO, JMS PRMSG
06627  7374' MUFO
06630 4774' JMS CRLF
06631 1373' TAD (JMS I PSAUCP
06632 3772' DCA PSAUC1
06633 1371' TAD (NOP
06634 3770' DCA PSAUC2
06635 1367' TAD (SAUC1
06636 3766' DCA I (SHIP1+OSHIP-QR
06637 1365' TAD (SAUC1-E-SAUC1
06640 3764' DCA I (SHIP1+OSHIPN-QR
06641 1363' TAD (SAUC2
06642 3762' DCA I (SHIP2+OSHIP-QR
06643 1361' TAD (SAUC2-E-SAUC2
06644 3760' DCA I (SHIP2+OSHIPN-QR
06645 1357' OUFOR, TAD (KBOARD
06646 3756' DCA OPTIONS
06647 5755' JMP WAR-2

/DISPLAY SHIPS

06650 4775' OSHIPS, JMS PRMSG
06651  7403' NSHIPS
06652 4774' JMS CRLF
06653 1270' TAD OSHIPJ
06654 3770' DCA PSAUC2
06655 1371' TAD (NOP
06656 3772' DCA PSAUC1
06657 1354' TAD (SHIP1C
06660 3766' DCA I (SHIP1+OSHIP-QR
06661 1353' TAD (SHIP1-E-SH1PC
06662 3764' DCA I (SHIP1+OSHIPN-QR
06663 1352' TAD (SHIP2C
06664 3762' DCA I (SHIP2+OSHIP-QR
06665 1351' TAD (SHIP2-E-SHIP2C
06666 3760' DCA I (SHIP2+OSHIPN-QR
06667 5245' JMP OUFOR

06670 5323 OSHIPJ, PSAUC2+3&177+5200

06710 5050
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06753 5060
06754 1025
06755 5400
06756 6040
06757 6200
06758 1410
06761 8006
06762 1407
06763 1315
/SPCWAR BY D.E. WREGE

PAGE

/RESET MUSSEL VELOCITY OF ROCKETS

07800 4777' OVELOC, JMS PRMSG
07801 7200 NYELOX
07802 4776 JMS I (OCTALK
07803 5775' JMP REINIT
07804 7110 CLL RAR
07805 3864 DCA QTHROC /RESET MUSSEL VELOCITY
07806 5775' JMP REINIT

/SELECT FLAT OR CURVED SPACE

07807 4777' OPHLAT, JMS PRMSG
07810 7421 MPHLAT
07811 4774' JMS CRLF
07812 7200 CLA
07813 1373 TAB <3777
07814 3041 DCA QTIME /NO TIME CURVE ON OUTLINE
07815 1372 TAB <SC
07816 3771' DCA NEWP07+1
07817 1372 TAB <SC
07820 3770' DCA NEWP07+11
07821 5775' JMP REINIT

07822 4777' OCURVE, JMS PRMSG
07823 7412 MCURVE
07824 4774' JMS CRLF
07825 7200 CLA
07826 1367 TAB <SC1
07827 3771' DCA NEWP07+1
07830 1366 TAB <SC2
07831 3770' DCA NEWP07+11
07832 5775' JMP REINIT

/DISPLAY OPTIONAL SUN OR UNIVERSE

07833 4777' OSTARS, JMS PRMSG
07834 7427 MSTARS
07835 4774' JMS CRLF
07836 7200 CLA
07837 1365 TAB <B2
07840 3764' DCA WARDX+1
JMP REINIT

JMS PRMSG
MSUN
JMS CRLF
CLA
TAD KD1
DCA WRDX+1
JMP REINIT

PAGE
07200 2605 \text{VELOCITY INITIAL OF MISSILES (2000)}: \\
07201 1417 \\
07202 0311 \\
07203 2431 \\
07204 4011 \\
07205 1611 \\
07206 2411 \\
07207 0114 \\
07208 4017 \\
07209 0640 \\
07210 1511 \\
07211 2323 \\
07212 1405 \\
07213 2350 \\
07214 6260 \\
07215 6060 \\
07216 5172 \\
07217 8000 \\
07218 1720 \text{OPTIONS ARE DESIGNATED BY FIRST CHARACTER:} \\
07219 2411 \\
07220 1716 \\
07221 2340 \\
07222 0122 \\
07223 0540 \\
07224 0405 \\
07225 2311 \\
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07234 0310 \\
07235 0122 \\
07236 0302 \\
07237 2405 \\
07238 2200 \\
07239 2118 \text{THE NUMBER IN PARENS ARE "NORMAL" VALUES:} \\
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MOPTBA, TEXT \INPUT NUMBERS ARE OCTAL\n
MOPTC, TEXT \AVAILABLE OPTIONS ARE:\n
MOPTD, TEXT \U DISPLAY UFO'S\n
MOPTC, TEXT \S DISPLAY SHIPS\n
MSUN, TEXT 'Z POLARIS ONLY'

MOPTF, TEXT \G RESET GRAVITY CONSTANT(1000)\n
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MPHAT, TEXT "PHLAT SPACE"
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