

RAYSTK MODIFIERS.

* NONE *

15 ACTIVE CARD(S). 0 INACTIVE CARD(S). 0 INSERTED CARD(S).

RAYLST MODIFIERS.

* NONE *

18 ACTIVE CARD(S). 0 INACTIVE CARD(S). 0 INSERTED CARD(S).

INSLST MODIFIERS.

* NONE *

20 ACTIVE CARD(S). 0 INACTIVE CARD(S). 0 INSERTED CARD(S).

PRMLST MODIFIERS.

* NONE *

13 ACTIVE CARD(S). 0 INACTIVE CARD(S). 0 INSERTED CARD(S).

SPHLST MODIFIERS.

* NONE *

15 ACTIVE CARD(S). 0 INACTIVE CARD(S). 0 INSERTED CARD(S).

TRILST MODIFIERS.

* NONE *

23 ACTIVE CARD(S). 0 INACTIVE CARD(S). 0 INSERTED CARD(S).

MTRLST MODIFIERS.

* NONE *

20 ACTIVE CARD(S). 0 INACTIVE CARD(S). 0 INSERTED CARD(S).

□ DECK STATUS AND MODIFICATIONS.
DECK - LGTLST

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LGTLST MODIFIERS.

* NONE *

19 ACTIVE CARD(S). 0 INACTIVE CARD(S). 0 INSERTED CARD(S).

SCREEN MODIFIERS.

* NONE *

28 ACTIVE CARD(S). 0 INACTIVE CARD(S). 0 INSERTED CARD(S).
 STATS MODIFIERS.
 * NONE *

12 ACTIVE CARD(S). 0 INACTIVE CARD(S). 0 INSERTED CARD(S).
 ACCEL MODIFIERS.
 * NONE *

40 ACTIVE CARD(S). 0 INACTIVE CARD(S). 0 INSERTED CARD(S).
 GRID MODIFIERS.
 * NONE *

11 ACTIVE CARD(S). 0 INACTIVE CARD(S). 0 INSERTED CARD(S).
 TOTSIZE MODIFIERS.
 * NONE *

18 ACTIVE CARD(S). 0 INACTIVE CARD(S). 0 INSERTED CARD(S).
 TRT2 MODIFIERS.
 * NONE *

*CALL PARAMS	TRT2	87
*CALL SCREEN	TRT2	88
*CALL STATS	TRT2	89
*CALL PRMLST	TRT2	90
*CALL SPHLST	TRT2	91
*CALL TRILST	TRT2	92
*CALL MTRLST	TRT2	93
*CALL LGTLST	TRT2	94
*CALL RAYLST	TRT2	95
*CALL INSLST	TRT2	96

DECK STATUS AND MODIFICATIONS. MODIFY - VER 1.2 05/08/09. 12.28.33. PAGE 4
 DECK - TRT2

*CALL SCREEN	TRT2	232
*CALL SCREEN	TRT2	301
*CALL STATS	TRT2	318
*CALL PARAMS	TRT2	338
*CALL SCREEN	TRT2	339
*CALL RAYLST	TRT2	340
*CALL RAYSTK	TRT2	341
*CALL INSLST	TRT2	342
*CALL STATS	TRT2	343
*CALL PARAMS	TRT2	518
*CALL RAYLST	TRT2	519
*CALL RAYSTK	TRT2	520
*CALL INSLST	TRT2	521
*CALL PRMLST	TRT2	522
*CALL MTRLST	TRT2	523
*CALL SCREEN	TRT2	524

*CALL STATS	TRT2	525
*CALL PARAMS	TRT2	698
*CALL SCREEN	TRT2	699
*CALL PARAMS	TRT2	747
*CALL INSLST	TRT2	748
*CALL SCREEN	TRT2	749
*CALL LGTLST	TRT2	750
*CALL MTRLST	TRT2	751
*CALL PARAMS	TRT2	903
*CALL STATS	TRT2	904
*CALL SCREEN	TRT2	905
*CALL INSLST	TRT2	906
*CALL PRMLST	TRT2	907
*CALL MTRLST	TRT2	908
*CALL PARAMS	TRT2	1043
*CALL RAYSTK	TRT2	1044
*CALL INSLST	TRT2	1045
*CALL RAYLST	TRT2	1046
*CALL PRMLST	TRT2	1047
*CALL PARAMS	TRT2	1105
*CALL RAYSTK	TRT2	1106
*CALL INSLST	TRT2	1107
*CALL RAYLST	TRT2	1108
*CALL PRMLST	TRT2	1109
*CALL ACCEL	TRT2	1110
*CALL GRID	TRT2	1111
*CALL PARAMS	TRT2	1234
*CALL RAYSTK	TRT2	1235
*CALL RAYLST	TRT2	1236
*CALL PRMLST	TRT2	1237
*CALL ACCEL	TRT2	1238
*CALL GRID	TRT2	1239
*CALL INSLST	TRT2	1240
*CALL PARAMS	TRT2	1347
*CALL SPHLST	TRT2	1348
*CALL INSLST	TRT2	1349
*CALL STATS	TRT2	1350
*CALL PARAMS	TRT2	1443
*CALL TRILST	TRT2	1444
*CALL INSLST	TRT2	1445

□ DECK STATUS AND MODIFICATIONS.
DECK - TRT2

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*CALL STATS	TRT2	1446
*CALL INSLST	TRT2	1587
*CALL PRMLST	TRT2	1614
*CALL SPHLST	TRT2	1615
*CALL MTRLST	TRT2	1616
*CALL LGTLST	TRT2	1617
*CALL RAYLST	TRT2	1618
*CALL TRILST	TRT2	1619
*CALL PARAMS	TRT2	1636
*CALL SCREEN	TRT2	1637
*CALL PARAMS	TRT2	1660
*CALL LGTLST	TRT2	1661
*CALL PARAMS	TRT2	1683
*CALL TRILST	TRT2	1684
*CALL PARAMS	TRT2	1954
*CALL SCREEN	TRT2	1955
*CALL MTRLST	TRT2	1956
*CALL LGTLST	TRT2	1957
*CALL PRMLST	TRT2	1958
*CALL SPHLST	TRT2	1959

*CALL TRILST	TRT2	1960
*CALL PARAMS	TRT2	2213
*CALL STATS	TRT2	2214
*CALL PRMLST	TRT2	2215
*CALL ACCEL	TRT2	2216
*CALL PARAMS	TRT2	2416
*CALL ACCEL	TRT2	2417
*CALL SPHLST	TRT2	2465
*CALL TRILST	TRT2	2484
*CALL PARAMS	TRT2	2524
*CALL ACCEL	TRT2	2525
*CALL PARAMS	TRT2	2666
*CALL ACCEL	TRT2	2667
*CALL PARAMS	TRT2	2783

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2797 ACTIVE CARD(S).           0 INACTIVE CARD(S).           0 INSERTED CARD(S).
STATISTICS.                   MODIFY - VER 1.2   05/08/09. 12.28.33.   PAGE 6

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DECKS ON PROGRAM LIBRARY.

* NONE *

COMMON DECKS ON PROGRAM LIBRARY.

* NONE *

DECKS ADDED BY INITIALIZATION DIRECTIVES.

PARAMS	RAYLST	PRMLST	TRILST	LGTLST	STATS	GRID	TRT2
RAYSTK	INSLST	SPHLST	MTRLST	SCREEN	ACCEL	TOTSIZE	

DECKS WRITTEN ON COMPILE FILE.

TRT2

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25700B STORAGE USED.           5201 CARDS WRITTEN ON COMPILE FILE.
PROGRAM TRT2                   73/720 OPT=2                   FTN 5.1+538           05/08/09. 12.28.37   PAGE 1

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1      PROGRAM TRT2(INPUT,OUTPUT,IMAGE,           TRT2           1
2      +          TAPE5=INPUT,TAPE6=OUTPUT,TAPE7=IMAGE) TRT2           2
3      C***** TRT2 TRT2           3
4      C          1          2          3          4          5          6          7 VTRT2 TRT2           4
5      C23456789012345678901234567890123456789012345678901234567890123456789012TRT2 TRT2           5
6      C TRT2 TRT2           6
7      C ***** TRT2 TRT2           7
8      C TOY RAY TRACER MARK 2 TRT2 TRT2           8
9      C TRT2 - FORTRAN-77 IMPLEMENTATION TRT2 TRT2           9
10     C ***** TRT2 TRT2          10
11     C TRT2 TRT2          11
12     C A SIMPLE RAY TRACER RENDERER. TRT2 TRT2          12
13     C THE MAIN "PURPOSE" OF THIS CODE IS TO SERVE AS A NON-TRIVIAL AND TRT2 TRT2          13
14     C ARGUABLY "FUN" APPLICATION TO RUN IN "RETRO-COMPUTING" ENVIRONMENTS. TRT2 TRT2          14
15     C OK - SO IT REALLY DOESN'T HAVE MUCH OF A PURPOSE! TRT2 TRT2          15
16     C TRT2 TRT2          16
17     C A PROTOTYPE WAS ACTUALLY WRITTEN AND DEBUGGED IN C++ (WRITTEN SO IT TRT2 TRT2          17
18     C COULD BE TRANSLATED PRETTY MUCH DIRECTLY TO FORTRAN-77). IT SHOULD TRT2 TRT2          18
19     C BE STRAIGHTFORWARD (IF TIME CONSUMING) TO MOVE IT TO OTHER LANGUAGES TRT2 TRT2          19
20     C - ALTHOUGH THAT WOULDN'T EXACTLY SHOW THE BEST FEATURES OF THOSE TRT2 TRT2          20
21     C LANUGAGES. TRT2 TRT2          21
22     C TRT2 TRT2          22
23     C IT IS ALSO AN EXPERIMENT IN HOW SIMPLE AND SMALL A "USEFUL" TRT2 TRT2          23

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24	C RENDERER CAN BE - IN TERMS OF LINES OF CODE, ANYWAY.	TRT2	24
25	C	TRT2	25
26	C THE GOALS WERE:	TRT2	26
27	C 1) PORTABILITY	TRT2	27
28	C 2) EASE OF RECODING IN DIFFERENT LANGUAGES	TRT2	28
29	C 3) SMALL MEMORY FOOTPRINT	TRT2	29
30	C 4) STILL CAPABLE OF MAKING PRETTY PICTURES	TRT2	30
31	C 5) EASY EXTENSIBILITY:	TRT2	31
32	C A) NEW GEOMETRIC PRIMITIVE TYPES SHOULD BE STRAIGHTFORWARD	TRT2	32
33	C TO ADD	TRT2	33
34	C B) TEXTURE MAPPING, ETC., WOULD BE STRAIGHTFORWARD TO	TRT2	34
35	C ADD ON MACHINES WITH ENOUGH MEMORY TO MAKE IT FEASIBLE.	TRT2	35
36	C	TRT2	36
37	C CURRENT FEATURES:	TRT2	37
38	C 1) SPHERE PRIMITIVES (PROVING AGAIN THAT RAY TRACING IS MOSTLY	TRT2	38
39	C A LOAD OF BALLS).	TRT2	39
40	C 2) TRIANGLE PRIMITIVES WITH OPTIONAL VERTEX NORMALS	TRT2	40
41	C (THESE WILL BE CORRECTLY INTERPOLATED)	TRT2	41
42	C 3) STOCHASTIC ANTI-ALIASING (BASIC DISTRIBUTED RAY TRACING)	TRT2	42
43	C 4) OPTIONAL SHADOWS, OPTIONALLY APPROPRIATELY "SOFT EDGED"	TRT2	43
44	C 5) SPECULARLY REFLECTIVE MATERIALS (CORRECT SPECULAR REFLECTION)	TRT2	44
45	C 6) TRANSPARENT MATERIALS (CORRECT REFRACTION)	TRT2	45
46	C 7) SIMPLE SURFACE ROUGHNESS FACTOR FOR MATERIALS.	TRT2	46
47	C 8) ACCELERATED RAY INTERSECTION TESTS USING A SPACE SUBDIVISION	TRT2	47
48	C (VOXEL) SCHEME	TRT2	48
49	C 9) IMAGES OUTPUT AS TEXT FILES (WELL - IT IS PORTABLE!).	TRT2	49
50	C 10) DIRECTIONAL LIGHTS (RAISED COSINE AND BARN DOOR TYPES)	TRT2	50
51	C	TRT2	51
52	C HAVING SPACE SUBDIVISION ACCELERATION MEANS IT ISN'T ALL	TRT2	52
53	C THAT SIMPLE! HOWEVER, THIS CAN MAKE A REALLY BIG DIFFERENCE	TRT2	53
54	C WITH LOTS OF PRIMITIVES. WELL - ASSUMING THEY CAN BE	TRT2	54
55	C "INDEXED" (SEE CODE). TO SAVE MEMORY, PRIMITIVES THAT	TRT2	55
56	C ARE TOO BIG CANNOT BE "ACCELERATED".	TRT2	56
57	C	TRT2	57
□	PROGRAM TRT2 73/720 OPT=2 FTN 5.1+538 05/08/09. 12.28.37 PAGE 2		
58	C BECAUSE THIS CODE MUST WORK WITH STANDARD FORTRAN-77,	TRT2	58
59	C RECURSION IS EXPLICITLY CODED USING A RAY STACK WITHOUT MAKING	TRT2	59
60	C ANY ACTUAL RECURSIVE CALLS. ALSO, ALL STORAGE MUST BE	TRT2	60
61	C STATICALLY ALLOCATED AT COMPILE TIME.	TRT2	61
62	C	TRT2	62
63	C AS ALWAYS WITH FLOATING POINT BASED CODE, THE PRECISION WITH WHICH	TRT2	63
64	C CALCULATIONS ARE DONE IS IMPORTANT. TESTS FOR APPROXIMATE EQUIVALENCE	TRT2	64
65	C AND "NUDGING" THINGS TO AVOID DEGENERATE CASES IS UNAVOIDABLE. PARTS OF	TRT2	65
66	C THE CODE WHICH MAY SUFFER FROM "PRECISION" ISSUES ARE HIGHLIGHTED WITH	TRT2	66
67	C THE COMMENT: PRECISION! THE PARAMETERS EPS AND MINEPS CAN TUNE SOME OF	TRT2	67
68	C THIS. NOTE THAT 32BIT FLOATING POINT IS *NOT* GOOD ENOUGH FOR THE GRID	TRT2	68
69	C TRAVERSAL CODE. IT WORKS PERFECTLY WITH 64BIT (WELL - PRETTY EXHAUSTIVE	TRT2	69
70	C TESTING HAS FAILED TO MAKE IT GO WRONG) BUT *NOT* WITH 32 BIT. WHAT	TRT2	70
71	C WILL HAPPEN WITH CDC FORMAT 60 BIT? SO FAR, SO GOOD.	TRT2	71
72	C	TRT2	72
73	C THE PRIMARY GOAL OF THE FORTRAN VERSION OF THIS CODE IS TO RUN ON	TRT2	73
74	C EMULATED CDC MAINFRAMES. THE TOTAL SIZE OF THE PROGRAM MUST BE KEPT	TRT2	74
75	C (WELL) BELOW 131000 60 BIT WORDS.	TRT2	75
76	C	TRT2	76
77	C AUTHOR: NICK GLAZZARD	TRT2	77
78	C C++ EXPERIMENTS AND PROTOTYPE: NOVEMBER 2003	TRT2	78
79	C F-77 IMPLEMENTATION: JULY/AUGUST 2005	TRT2	79
80	C TRT (MARK 1): SUMMER 1984 (LOST LONG AGO)	TRT2	80
81	C	TRT2	81
82	C-----	TRT2	82
83	C MAIN	TRT2	83

		TRT2_20050809_130554.lpr		
84	C	-----	TRT2	84
85	C		TRT2	85
86		IMPLICIT CHARACTER*1 (A-Z)	TRT2	86
87	C		PARAMS	1
88	C	-----	PARAMS	2
89	C	-- SUNDRY PARAMETERS --	PARAMS	3
90	C	-----	PARAMS	4
91	C		PARAMS	5
92		REAL GTHUGE, MINEPS, EPS, MINFLT, MAXFLT, TRTPI, DEGRAD	PARAMS	6
93		PARAMETER(GTHUGE=1E7)	PARAMS	7
94		PARAMETER(MINEPS=1E-5)	PARAMS	8
95		PARAMETER(EPS=1E-7)	PARAMS	9
96		PARAMETER(MINFLT=-1E20)	PARAMS	10
97		PARAMETER(MAXFLT=1E20)	PARAMS	11
98		PARAMETER(TRTPI=3.1415926)	PARAMS	12
99		PARAMETER(DEGRAD=TRTPI/180.0)	PARAMS	13
100	C		PARAMS	14
101		INTEGER EYERAY, RFLRAY, TRNRAY	PARAMS	15
102		PARAMETER(EYERAY=1)	PARAMS	16
103		PARAMETER(RFLRAY=2)	PARAMS	17
104		PARAMETER(TRNRAY=3)	PARAMS	18
105	C		PARAMS	19
106		INTEGER ENTER, LEAVE	PARAMS	20
107		PARAMETER(ENTER=1)	PARAMS	21
108		PARAMETER(LEAVE=2)	PARAMS	22
109	C		PARAMS	23
110		INTEGER NOACL, SUBACL	PARAMS	24
111		PARAMETER(NOACL=0)	PARAMS	25
112		PARAMETER(SUBACL=1)	PARAMS	26
113	C		PARAMS	27
114		INTEGER BKCNST, BKVERT, BKHORZ	PARAMS	28
	PROGRAM TRT2	73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
				PAGE 3
115		PARAMETER(BKCNST=0)	PARAMS	29
116		PARAMETER(BKVERT=1)	PARAMS	30
117		PARAMETER(BKHORZ=2)	PARAMS	31
118	C		PARAMS	32
119		INTEGER LGTCON, LGTCOS, LGTBRN	PARAMS	33
120		PARAMETER(LGTCON=0)	PARAMS	34
121		PARAMETER(LGTCOS=1)	PARAMS	35
122		PARAMETER(LGTBRN=2)	PARAMS	36
123	C		PARAMS	37
124		INTEGER SPHPRM, TRIPRM	PARAMS	38
125		PARAMETER(SPHPRM=1)	PARAMS	39
126		PARAMETER(TRIPRM=2)	PARAMS	40
127	C		PARAMS	41
128		INTEGER DAXX, DAXY, DAXZ	PARAMS	42
129		PARAMETER(DAXX=1)	PARAMS	43
130		PARAMETER(DAXY=2)	PARAMS	44
131		PARAMETER(DAXZ=3)	PARAMS	45
132	C		SCREEN	1
133	C	-----	SCREEN	2
134	C	-- SCREEN COMMON BLOCK --	SCREEN	3
135	C	-----	SCREEN	4
136		C SIZE: 3 * DIMPXL + 15 WORDS = 12303	SCREEN	5
137	C		SCREEN	6
138		INTEGER MAXPXL, DIMPXL	SCREEN	7
139		PARAMETER(MAXPXL=4096)	SCREEN	8
140		PARAMETER(DIMPXL=MAXPXL)	SCREEN	9
141	C		SCREEN	10
142		INTEGER SNX, SNY, SMAXD, OS, ACCEL, SHADOW, BKT, CURX, CURY	SCREEN	11
143		COMMON /SCREEI/ SNX, SNY, SMAXD, OS, ACCEL, SHADOW, BKT,	SCREEN	12

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144      +          CURX, CURY          SCREEN      13
145      C          SCREEN              SCREEN      14
146      REAL FPD, APER, FOCAL, FSTOP, MINWGT SCREEN      15
147      REAL COLR, COLG, COLB          SCREEN      16
148      REAL BACKR, BACKG, BACKB       SCREEN      17
149      REAL BKRI, BKRF, BKRD          SCREEN      18
150      REAL BKGI, BKGF, BKGD          SCREEN      19
151      REAL BKBI, BKBF, BKBD          SCREEN      20
152      REAL LINER(DIMPXL), LINEG(DIMPXL), LINEB(DIMPXL) SCREEN      21
153      COMMON /SCREER/ FPD, APER, FOCAL, FSTOP, MINWGT, SCREEN      22
154      +          COLR, COLG, COLB,    SCREEN      23
155      +          BACKR, BACKG, BACKB,  SCREEN      24
156      +          BKRI, BKRF, BKRD,    SCREEN      25
157      +          BKGI, BKGF, BKGD,    SCREEN      26
158      +          BKBI, BKBF, BKBD,    SCREEN      27
159      +          LINER, LINEG, LINEB   SCREEN      28
160      C          STATS                1
161      C----- STATISTICS COMMON BLOCK ----- 2
162      C-- STATISTICS COMMON BLOCK -- 3
163      C----- 4
164      C SIZE: 8 WORDS. 5
165      C          STATS                6
166      INTEGER MAXDPS, MAXRYS, MAXISS, TOTRAY, TOTFEL, NACC, NOACC 7
167      COMMON /STATSI/ MAXDPS, MAXRYS, MAXISS, TOTRAY, TOTFEL, NACC, 8
168      +          NOACC 9
169      C          STATS                10
170      REAL NSECTS 11
171      COMMON /STATSR/ NSECTS 12
PROGRAM TRT2          73/720 OPT=2          FTN 5.1+538          05/08/09. 12.28.37          PAGE 4

172      C          PRMLST              1
173      C----- PRMLST              2
174      C-- PRIMITIVE LIST COMMON BLOCK -- 3
175      C----- PRMLST              4
176      C SIZE: 5 * DIMPRM + 1 WORDS = 5121 5
177      C          PRMLST              6
178      INTEGER MAXPRM, DIMPRM 7
179      PARAMETER( MAXPRM=1024 ) 8
180      PARAMETER( DIMPRM=MAXPRM ) 9
181      C          PRMLST              10
182      INTEGER NPRM, MATTER(DIMPRM), PACCEL(DIMPRM), PRAYID(DIMPRM) 11
183      INTEGER PRMTYP(DIMPRM), PRMIDX(DIMPRM) 12
184      COMMON /PRMLST/ NPRM, MATTER, PACCEL, PRAYID, PRMTYP, PRMIDX 13
185      C          SPHLST              1
186      C----- SPHLST              2
187      C-- SPHERE LIST -- 3
188      C----- SPHLST              4
189      C SIZE: 4 * DIMSPH + 1 WORDS = 4097 5
190      C          SPHLST              6
191      INTEGER MAXSPH, DIMSPH 7
192      PARAMETER( MAXSPH=1024 ) 8
193      PARAMETER( DIMSPH=MAXSPH ) 9
194      C          SPHLST              10
195      INTEGER NSPH 11
196      COMMON /SPHLSI/ NSPH 12
197      C          SPHLST              13
198      REAL SOX(DIMSPH), SOY(DIMSPH), SOZ(DIMSPH), SRAD(DIMSPH) 14
199      COMMON /SPHLSR/ SOX, SOY, SOZ, SRAD 15
200      C          TRILST              1
201      C----- TRILST              2
202      C-- TRIANGLE LIST -- 3
203      C----- TRILST              4

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		TRT2_20050809_130554.lpr		
204	C 23 * DIMTRI + 1 WORDS = 5889		TRILST	5
205	C		TRILST	6
206	INTEGER MAXTRI, DIMTRI		TRILST	7
207	PARAMETER(MAXTRI=256)		TRILST	8
208	PARAMETER(DIMTRI=MAXTRI)		TRILST	9
209	C		TRILST	10
210	INTEGER NTRI, DAX(DIMTRI)		TRILST	11
211	COMMON /TRILSI/ NTRI, DAX		TRILST	12
212	C		TRILST	13
213	REAL TX1(DIMTRI), TY1(DIMTRI), TZ1(DIMTRI)		TRILST	14
214	REAL TX2(DIMTRI), TY2(DIMTRI), TZ2(DIMTRI)		TRILST	15
215	REAL TX3(DIMTRI), TY3(DIMTRI), TZ3(DIMTRI)		TRILST	16
216	REAL TNX(DIMTRI), TNY(DIMTRI), TNZ(DIMTRI), TND(DIMTRI)		TRILST	17
217	REAL NVX1(DIMTRI), NVY1(DIMTRI), NVZ1(DIMTRI)		TRILST	18
218	REAL NVX2(DIMTRI), NVY2(DIMTRI), NVZ2(DIMTRI)		TRILST	19
219	REAL NVX3(DIMTRI), NVY3(DIMTRI), NVZ3(DIMTRI)		TRILST	20
220	COMMON /TRILSR/ TX1, TY1, TZ1, TX2, TY2, TZ2, TX3, TY3, TZ3,		TRILST	21
221	+ TNX, TNY, TNZ, NVX1, NVY1, NVZ1, NVX2, NVY2,		TRILST	22
222	+ NVZ2, NVX3, NVY3, NVZ3, TND		TRILST	23
223	C		MTRLST	1
224	C-----		MTRLST	2
225	C-- MATERIAL LIST COMMON BLOCK --		MTRLST	3
226	C-----		MTRLST	4
227	C SIZE: 14 * DIMMTR + 1 WORDS = 449		MTRLST	5
228	C		MTRLST	6
	PROGRAM TRT2	73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
				PAGE 5
229	INTEGER MAXMTR, DIMMTR		MTRLST	7
230	PARAMETER(MAXMTR=32)		MTRLST	8
231	PARAMETER(DIMMTR=MAXMTR)		MTRLST	9
232	C		MTRLST	10
233	INTEGER NMTR		MTRLST	11
234	COMMON /MTRLSI/ NMTR		MTRLST	12
235	C		MTRLST	13
236	REAL MKR(DIMMTR), MKT(DIMMTR)		MTRLST	14
237	REAL MCAR(DIMMTR), MCAG(DIMMTR), MCAB(DIMMTR)		MTRLST	15
238	REAL MCDR(DIMMTR), MCDG(DIMMTR), MCDDB(DIMMTR)		MTRLST	16
239	REAL MCSR(DIMMTR), MCSG(DIMMTR), MCSB(DIMMTR)		MTRLST	17
240	REAL META(DIMMTR), MGLS(DIMMTR), MRGH(DIMMTR)		MTRLST	18
241	COMMON /MTRLSR/ MKR, MKT, MCAR, MCAG, MCAB, MCDR, MCDG, MCDDB,		MTRLST	19
242	+ MCSR, MCSG, MCSB, META, MGLS, MRGH		MTRLST	20
243	C		LGTLST	1
244	C-----		LGTLST	2
245	C-- LIGHT LIST COMMON BLOCK --		LGTLST	3
246	C-----		LGTLST	4
247	C SIZE: 13 * DIMLGT + 4 WORDS = 420		LGTLST	5
248	C		LGTLST	6
249	INTEGER MAXLGT, DIMLGT		LGTLST	7
250	PARAMETER(MAXLGT=32)		LGTLST	8
251	PARAMETER(DIMLGT=MAXLGT)		LGTLST	9
252	C		LGTLST	10
253	INTEGER NLGT, LDIR(DIMLGT)		LGTLST	11
254	COMMON /LGTLSI/ NLGT, LDIR		LGTLST	12
255	C		LGTLST	13
256	REAL LCAR, LCAG, LCAB, LOX(DIMLGT), LOY(DIMLGT), LOZ(DIMLGT)		LGTLST	14
257	REAL LCLR(DIMLGT), LCLG(DIMLGT), LCLB(DIMLGT)		LGTLST	15
258	REAL LDX(DIMLGT), LDY(DIMLGT), LDZ(DIMLGT)		LGTLST	16
259	REAL LTGT(DIMLGT), LTG2(DIMLGT), LRAD(DIMLGT)		LGTLST	17
260	COMMON /LGTLSR/ LCAR, LCAG, LCAB, LOX, LOY, LOZ, LCLR, LCLG,		LGTLST	18
261	+ LCLB, LDX, LDY, LDZ, LTGT, LTG2, LRAD		LGTLST	19
262	C		RAYLST	1
263	C-----		RAYLST	2

264	C-- RAY LIST COMMON BLOCK --	RAYLST	3
265	C-----	RAYLST	4
266	C SIZE: 13 * DIMRAY + 2 WORDS = 6658	RAYLST	5
267	C	RAYLST	6
268	INTEGER MAXRAY, DIMRAY	RAYLST	7
269	PARAMETER(MAXRAY=512)	RAYLST	8
270	PARAMETER(DIMRAY=MAXRAY)	RAYLST	9
271	C	RAYLST	10
272	INTEGER NLRAY, RAYNUM, RISECT(DIMRAY), RTYPE(DIMRAY)	RAYLST	11
273	INTEGER RDEP(DIMRAY), RRAYID(DIMRAY)	RAYLST	12
274	COMMON /RAYLSI/ NLRAY, RAYNUM, RISECT, RTYPE, RDEP, RRAYID	RAYLST	13
275	C	RAYLST	14
276	REAL ROX(DIMRAY), ROY(DIMRAY), ROZ(DIMRAY)	RAYLST	15
277	REAL RDX(DIMRAY), RDY(DIMRAY), RDZ(DIMRAY)	RAYLST	16
278	REAL RWGTR(DIMRAY), RWGTG(DIMRAY), RWGTB(DIMRAY)	RAYLST	17
279	COMMON /RAYLSR/ ROX, ROY, ROZ, RDX, RDY, RDZ, RWGTR, RWGTG, RWGTB	RAYLST	18
280	C	INSLST	1
281	C-----	INSLST	2
282	C-- INTERSECTION LIST COMMON BLOCK --	INSLST	3
283	C-----	INSLST	4
284	C SIZE: 13 * DIMINS + 1 WORDS = 6683	INSLST	5
285	C	INSLST	6
	PROGRAM TRT2 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
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286	INTEGER MAXINS, DIMINS, NEWINS, SHDINS	INSLST	7
287	PARAMETER(MAXINS=512)	INSLST	8
288	PARAMETER(DIMINS=MAXINS+2)	INSLST	9
289	PARAMETER(NEWINS=MAXINS+1)	INSLST	10
290	PARAMETER(SHDINS=MAXINS+2)	INSLST	11
291	C	INSLST	12
292	INTEGER NINS, IPRIM(DIMINS), IRRAY(DIMINS), ITRAY(DIMINS)	INSLST	13
293	INTEGER ITTYP(DIMINS)	INSLST	14
294	COMMON /INLSI/ NINS, IPRIM, IRRAY, ITRAY, ITTYP	INSLST	15
295	C	INSLST	16
296	REAL IPX(DIMINS), IPY(DIMINS), IPZ(DIMINS)	INSLST	17
297	REAL INX(DIMINS), INY(DIMINS), INZ(DIMINS)	INSLST	18
298	REAL ICOLR(DIMINS), ICOLG(DIMINS), ICOLB(DIMINS)	INSLST	19
299	COMMON /INLSR/ IPX, IPY, IPZ, INX, INY, INZ, ICOLR, ICOLG, ICOLB	INSLST	20
300	INTEGER Y, RDOK	TRT2	97
301	C	TRT2	98
302	WRITE(6,100)	TRT2	99
303	100 FORMAT(1H1, 'TOY RAY TRACER MARK2 V0.1 FORTRAN-77')	TRT2	100
304	WRITE(6,101)	TRT2	101
305	101 FORMAT(1X, '*****')	TRT2	102
306	C	TRT2	103
307	C-- INITIALIZE THE SCENE DATABASE	TRT2	104
308	C	TRT2	105
309	CALL INITDB	TRT2	106
310	C	TRT2	107
311	C-- INITIALIZE STATISTICS	TRT2	108
312	C	TRT2	109
313	CALL INITST	TRT2	110
314	C	TRT2	111
315	C-- READ THE SCENE FROM "INPUT" AND BUILD SCENE DATABASE	TRT2	112
316	C	TRT2	113
317	CALL READDB(RDOK)	TRT2	114
318	IF(RDOK .EQ. 0)THEN	TRT2	115
319	WRITE(6,102)	TRT2	116
320	102 FORMAT(1X, 'ERROR: FAILED TO READ SCENE DATABASE.')	TRT2	117
321	STOP	TRT2	118
322	ENDIF	TRT2	119
323	C	TRT2	120

324	C-- PRINT INFORMATION		TRT2	121
325	C		TRT2	122
326	WRITE(6,103)		TRT2	123
327	103 FORMAT(1X,'SCREEN SPECIFICATION:')		TRT2	124
328	IF(ACCEL .EQ. NOACL)THEN		TRT2	125
329	WRITE(6,104)		TRT2	126
330	104 FORMAT(6X,' ACCEL: NONE')		TRT2	127
331	ELSE		TRT2	128
332	WRITE(6,105)		TRT2	129
333	105 FORMAT(6X,' ACCEL: VOXEL GRID SUBDIVISION')		TRT2	130
334	ENDIF		TRT2	131
335	IF(SHADOW .EQ. 0)THEN		TRT2	132
336	WRITE(6,106)		TRT2	133
337	106 FORMAT(6X,' SHADOWS: NO')		TRT2	134
338	ELSE		TRT2	135
339	WRITE(6,107)SHADOW		TRT2	136
340	107 FORMAT(6X,' SHADOWS: YES,',I5,' FEELERS')		TRT2	137
341	ENDIF		TRT2	138
342	WRITE(6,108)SNX, MAXPXL		TRT2	139
	PROGRAM TRT2 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE 7
343	108 FORMAT(6X,' OUTPUT PIXELS:',I5,' MAX:',I5)		TRT2	140
344	WRITE(6,109)SNY, MAXPXL		TRT2	141
345	109 FORMAT(6X,' OUTPUT LINES:',I5,' MAX:',I5)		TRT2	142
346	WRITE(6,110)OS		TRT2	143
347	110 FORMAT(6X,' OVERSAMPLE:',I3,' (SQUARED)')		TRT2	144
348	WRITE(6,111)APER		TRT2	145
349	111 FORMAT(6X,' APERTURE:',F9.4)		TRT2	146
350	WRITE(6,112)FPD		TRT2	147
351	112 FORMAT(6X,' FOCAL PLANE DIST:',F9.4)		TRT2	148
352	WRITE(6,113)FOCAL		TRT2	149
353	113 FORMAT(6X,'LENS FOCAL LENGTH:',F9.4)		TRT2	150
354	WRITE(6,114)FSTOP		TRT2	151
355	114 FORMAT(6X,' LENS F-STOP:',F9.4)		TRT2	152
356	IF(BKT .EQ. BKCNST)THEN		TRT2	153
357	WRITE(6,115)BKRI, BKGI, BKBI		TRT2	154
358	115 FORMAT(6X,'BACKGROUND: CONSTANT',F9.4,' ',F9.4,' ',F9.4)		TRT2	155
359	ELSE IF(BKT .EQ. BKVERT)THEN		TRT2	156
360	WRITE(6,116)BKRI, BKGI, BKBI, BKRF, BKGF, BKBF		TRT2	157
361	116 FORMAT(6X,'BACKGROUND: VERTGRAD',F9.4,' ',F9.4,' ',F9.4,		TRT2	158
362	+ ' TO ',F9.4,' ',F9.4,' ',F9.4)		TRT2	159
363	ELSE		TRT2	160
364	WRITE(6,117)BKRI, BKGI, BKBI, BKRF, BKGF, BKBF		TRT2	161
365	117 FORMAT(6X,'BACKGROUND: HORZGRAD',F9.4,' ',F9.4,' ',F9.4,		TRT2	162
366	+ ' TO ',F9.4,' ',F9.4,' ',F9.4)		TRT2	163
367	ENDIF		TRT2	164
368	C		TRT2	165
369	WRITE(6,118)		TRT2	166
370	118 FORMAT(1X,'CONSTRAINTS:')		TRT2	167
371	WRITE(6,119)SMAXDP		TRT2	168
372	119 FORMAT(6X,'MAX RAY TREE DEPTH: ',I5)		TRT2	169
373	WRITE(6,120)MINWGT		TRT2	170
374	120 FORMAT(6X,'MIN SIG RAY WEIGHT: ',F9.4)		TRT2	171
375	C		TRT2	172
376	WRITE(6,121)		TRT2	173
377	121 FORMAT(1X,'DATABASE STATISTICS:')		TRT2	174
378	WRITE(6,122)NPRM, MAXPRM		TRT2	175
379	122 FORMAT(6X,'PRIMITIVES:',I5,' MAX:',I5)		TRT2	176
380	WRITE(6,123)NSPH, MAXSPH		TRT2	177
381	123 FORMAT(6X,' SPHERES:',I5,' MAX:',I5)		TRT2	178
382	WRITE(6,124)NTRI, MAXTRI		TRT2	179
383	124 FORMAT(6X,' TRIANGLES:',I5,' MAX:',I5)		TRT2	180

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384          WRITE(6,125)NMTR, MAXMTR          TRT2      181
385          FORMAT(6X,' MATERIALS:',I5,' MAX:',I5)          TRT2      182
386          WRITE(6,126)NLGT, MAXLGT          TRT2      183
387          FORMAT(6X,'   LIGHTS:',I5,' MAX:',I5)          TRT2      184
388          C          TRT2      185
389          C-- IF ACCELERATING, INIT THE ACCEL STRUCTURES          TRT2      186
390          C          TRT2      187
391          IF( ACCEL .EQ. SUBACL )CALL STACEL          TRT2      188
392          C          TRT2      189
393          C-- STEP OVER ALL THE LINES OF THE OUTPUT IMAGE          TRT2      190
394          C-- TRACE ALL RAYS NEEDED TO GENERATE THE LINE          TRT2      191
395          C-- SHADE THE LINE          TRT2      192
396          C-- OUTPUT THE LINE          TRT2      193
397          C          TRT2      194
398          WRITE(7,200)SNX, SNY          TRT2      195
399          200 FORMAT(1X,2(I5))          TRT2      196
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400          DO 1 Y=1,SNY          TRT2      197
401          IF( ( ( Y / 10 ) * 10 ) .EQ. Y )THEN          TRT2      198
402          CALL DISPLA( '... LINE:', Y )          TRT2      199
403          ENDIF          TRT2      200
404          CURY = Y          TRT2      201
405          CALL INITLN          TRT2      202
406          CALL TRCLN( Y )          TRT2      203
407          CALL OUTLN( Y )          TRT2      204
408          1 CONTINUE          TRT2      205
409          C          TRT2      206
410          C-- PRINT STATISTICS          TRT2      207
411          C          TRT2      208
412          WRITE(6,127)          TRT2      209
413          127 FORMAT(1X,'EXECUTION STATISTICS:')          TRT2      210
414          WRITE(6,128)MAXRYS, MAXRAY          TRT2      211
415          128 FORMAT(6X,'MAX RAYS IN TREE:',I5,' MAX:',I5)          TRT2      212
416          WRITE(6,129)MAXISS, MAXINS          TRT2      213
417          129 FORMAT(6X,'MAX INTERSECTS PER RAY:',I5,' MAX:',I5)          TRT2      214
418          WRITE(6,130)NSECTS          TRT2      215
419          130 FORMAT(6X,'TOTAL ISECT TESTS',F11.0)          TRT2      216
420          WRITE(6,131)TOTRAY          TRT2      217
421          131 FORMAT(6X,'TOTAL RAYS TRACED:',I12)          TRT2      218
422          WRITE(6,132)TOTFEL          TRT2      219
423          132 FORMAT(6X,'TOTAL LIGHT FEELERS:',I12)          TRT2      220
424          C          TRT2      221
425          STOP          TRT2      222
426          END          TRT2      223

```

--VARIABLE MAP--(LO=A)

-NAME-	ADDRESS-	BLOCK-	PROPERTIES-----	TYPE-----	SIZE	-NAME-	ADDRESS-	BLOCK-	PROPERTIES-----	TYPE-----	SIZE
ACCEL	4B	/SCREEI/		INTEGER		ICOLG	7016B	/INLSLR/		REAL	514
APER	1B	/SCREER/		REAL		ICOLR	6014B	/INLSLR/		REAL	514
BACKB	12B	/SCREER/		REAL		INX	3006B	/INLSLR/		REAL	514
BACKG	11B	/SCREER/		REAL		INY	4010B	/INLSLR/		REAL	514
BACKR	10B	/SCREER/		REAL		INZ	5012B	/INLSLR/		REAL	514
BKBD	23B	/SCREER/		REAL		IPRIM	1B	/INLSI/		INTEGER	514
BKBF	22B	/SCREER/		REAL		IPX	0B	/INLSLR/		REAL	514
BKBI	21B	/SCREER/		REAL		IPY	1002B	/INLSLR/		REAL	514
BKGD	20B	/SCREER/		REAL		IPZ	2004B	/INLSLR/		REAL	514
BKGF	17B	/SCREER/		REAL		IRRAY	1003B	/INLSI/		INTEGER	514
BKGI	16B	/SCREER/		REAL		ITRAY	2005B	/INLSI/		INTEGER	514
BKRD	15B	/SCREER/		REAL		ITYP	3007B	/INLSI/		INTEGER	514

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NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE	NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE
BKRF	14B	/SCREER/		REAL		LCAB	2B	/LGTLSR/		REAL	
BKRI	13B	/SCREER/		REAL		LCAG	1B	/LGTLSR/		REAL	
BKT	6B	/SCREEI/		INTEGER		LCAR	0B	/LGTLSR/		REAL	
COLB	7B	/SCREER/		REAL		LCLB	243B	/LGTLSR/		REAL	32
COLG	6B	/SCREER/		REAL		LCLG	203B	/LGTLSR/		REAL	32
COLR	5B	/SCREER/		REAL		LCLR	143B	/LGTLSR/		REAL	32
CURX	7B	/SCREEI/		INTEGER		LDIR	1B	/LGTLSI/		INTEGER	32
CURY	10B	/SCREEI/		INTEGER		LDX	303B	/LGTLSR/		REAL	32
DAX	1B	/TRILSI/		INTEGER	256	LDY	343B	/LGTLSR/		REAL	32
FOCAL	2B	/SCREER/		REAL		LDZ	403B	/LGTLSR/		REAL	32
FPD	0B	/SCREER/		REAL		LINEB	20024B	/SCREER/		REAL	4096
FSTOP	3B	/SCREER/		REAL		LINEG	10024B	/SCREER/		REAL	4096
ICOLB	10020B	/INLSR/		REAL	514	LINER	24B	/SCREER/		REAL	4096
PROGRAM TRT2 73/720 OPT=2						FTN 5.1+538 05/08/09. 12.28.37 PAGE 9					
LOX	3B	/LGTLSR/		REAL	32	OS	3B	/SCREEI/		INTEGER	
LOY	43B	/LGTLSR/		REAL	32	PACCEL	2001B	/PRMLST/		INTEGER	1024
LOZ	103B	/LGTLSR/		REAL	32	PRAYID	4001B	/PRMLST/		INTEGER	1024
LRAD	543B	/LGTLSR/		REAL	32	PRMIDX	10001B	/PRMLST/		INTEGER	1024
LTGT	443B	/LGTLSR/		REAL	32	PRMTYP	6001B	/PRMLST/		INTEGER	1024
LTG2	503B	/LGTLSR/		REAL	32	RAYNUM	1B	/RAYLSI/		INTEGER	
MATTER	1B	/PRMLST/		INTEGER	1024	RDEP	2002B	/RAYLSI/		INTEGER	512
MAXDPS	0B	/STATSI/		INTEGER		RDOK	731B			INTEGER	
MAXISS	2B	/STATSI/		INTEGER		RDY	3000B	/RAYLSR/		REAL	512
MAXRYS	1B	/STATSI/		INTEGER		RDZ	4000B	/RAYLSR/		REAL	512
MCAB	200B	/MTRLSR/		REAL	32	RISCT	5000B	/RAYLSR/		REAL	512
MCAG	140B	/MTRLSR/		REAL	32	ROX	2B	/RAYLSI/		INTEGER	512
MCAR	100B	/MTRLSR/		REAL	32	ROY	0B	/RAYLSR/		REAL	512
MCDB	340B	/MTRLSR/		REAL	32	ROZ	1000B	/RAYLSR/		REAL	512
MCDG	300B	/MTRLSR/		REAL	32	ROZ	2000B	/RAYLSR/		REAL	512
MCDR	240B	/MTRLSR/		REAL	32	RRAYID	3002B	/RAYLSI/		INTEGER	512
MCSB	500B	/MTRLSR/		REAL	32	RTYPE	1002B	/RAYLSI/		INTEGER	512
MCSG	440B	/MTRLSR/		REAL	32	RWGTB	10000B	/RAYLSR/		REAL	512
MCSR	400B	/MTRLSR/		REAL	32	RWGTG	7000B	/RAYLSR/		REAL	512
META	540B	/MTRLSR/		REAL	32	RWGTR	6000B	/RAYLSR/		REAL	512
MGLS	600B	/MTRLSR/		REAL	32	SHADOW	5B	/SCREEI/		INTEGER	
MINWGT	4B	/SCREER/		REAL		SMAXDP	2B	/SCREEI/		INTEGER	
MKR	0B	/MTRLSR/		REAL	32	SNX	0B	/SCREEI/		INTEGER	
MKT	40B	/MTRLSR/		REAL	32	SNY	1B	/SCREEI/		INTEGER	
MRGH	640B	/MTRLSR/		REAL	32	SOX	0B	/SPHLR/		REAL	1024
NACC	5B	/STATSI/		INTEGER		SOY	2000B	/SPHLR/		REAL	1024
NINS	0B	/INLSI/		INTEGER		SOZ	4000B	/SPHLR/		REAL	1024
NLGT	0B	/LGTLSI/		INTEGER		SRAD	6000B	/SPHLR/		REAL	1024
NLRAY	0B	/RAYLSI/		INTEGER		TND	12400B	/TRILSR/		REAL	256
NMTR	0B	/MTRLSI/		INTEGER		TNX	4400B	/TRILSR/		REAL	256
NOACC	6B	/STATSI/		INTEGER		TNY	5000B	/TRILSR/		REAL	256
NPRM	0B	/PRMLST/		INTEGER		TNZ	5400B	/TRILSR/		REAL	256
NSECTS	0B	/STATSR/		REAL		TOTFEL	4B	/STATSI/		INTEGER	
NSPH	0B	/SPHLI/		INTEGER		TOTRAY	3B	/STATSI/		INTEGER	
NTRI	0B	/TRILSI/		INTEGER		TX1	0B	/TRILSR/		REAL	256
NVX1	6000B	/TRILSR/		REAL	256	TX2	1400B	/TRILSR/		REAL	256
NVX2	7400B	/TRILSR/		REAL	256	TX3	3000B	/TRILSR/		REAL	256
NVX3	11000B	/TRILSR/		REAL	256	TY1	400B	/TRILSR/		REAL	256
NVY1	6400B	/TRILSR/		REAL	256	TY2	2000B	/TRILSR/		REAL	256
NVY2	10000B	/TRILSR/		REAL	256	TY3	3400B	/TRILSR/		REAL	256
NVY3	11400B	/TRILSR/		REAL	256	TZ1	1000B	/TRILSR/		REAL	256
NVZ1	7000B	/TRILSR/		REAL	256	TZ2	2400B	/TRILSR/		REAL	256
NVZ2	10400B	/TRILSR/		REAL	256	TZ3	4000B	/TRILSR/		REAL	256
NVZ3	12000B	/TRILSR/		REAL	256	Y	730B			INTEGER	

--SYMBOLIC CONSTANTS--(LO=A)

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```

--NAME---TYPE-----VALUE
BKCNST  INTEGER          0
BKHORZ  INTEGER          2
BKVERT  INTEGER          1
DAXX    INTEGER          1
DAXY    INTEGER          2
DAXZ    INTEGER          3
DEGRAD  REAL             0"17124357506472324711"
DIMINS  INTEGER          514

```

PROGRAM TRT2 73/720 OPT=2

```

--NAME---TYPE-----VALUE
EPS      REAL             0"16706553762465362572"
EYERAY  INTEGER          1
GTHUGE  REAL             0"17474611320000000000"
LEAVE   INTEGER          2
LGTBRN  INTEGER          2
LGTCOS  INTEGER          0
LGTCON  INTEGER          1
MAXFLT  REAL             0"20235327435361326142"
MAXINS  INTEGER          512
MAXLGT  INTEGER          32
MAXMTR  INTEGER          32
MAXPRM  INTEGER          1024
MAXPXL  INTEGER          4096
MAXRAY  INTEGER          512

```

```

--NAME---TYPE-----VALUE
DIMLGT  INTEGER          32
DIMMTR  INTEGER          32
DIMPRM  INTEGER          1024
DIMPXL  INTEGER          4096
DIMRAY  INTEGER          512
DIMSPPH INTEGER          1024
DIMTRI  INTEGER          256
ENTER   INTEGER          1

```

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```

--NAME---TYPE-----VALUE
MAXSPH  INTEGER          1024
MAXTRI  INTEGER          256
MINEPS  REAL             0"16775174265421615510"
MINFLT  REAL             0"57542450342416451635"
NEWINS  INTEGER          513
NOACL   INTEGER          0
RFLRAY  INTEGER          2
SHDINS  INTEGER          514
SPHPRM  INTEGER          1
SUBACL  INTEGER          1
TRIPRM  INTEGER          2
TRNRAY  INTEGER          3
TRTPI   REAL             0"17216220773232113302"

```

--PROCEDURES--(LO=A)

```

--NAME---TYPE-----ARGS-----CLASS-----
DISPLA          2      SUBROUTINE
INITDB          0      SUBROUTINE
INITLN          0      SUBROUTINE
INITST          0      SUBROUTINE

```

```

--NAME---TYPE-----ARGS-----CLASS-----
OUTLN           1      SUBROUTINE
READDB          1      SUBROUTINE
STACEL          0      SUBROUTINE
TRCLN           1      SUBROUTINE

```

--STATEMENT LABELS--(LO=A)

```

--LABEL-ADDRESS-----PROPERTIES-----DEF
1  INACTIVE  DO-TERM  408
100 214B    FORMAT   303
101 222B    FORMAT   305
102 230B    FORMAT   320
103 236B    FORMAT   327
104 242B    FORMAT   330
105 247B    FORMAT   333
106 255B    FORMAT   337
107 261B    FORMAT   340
108 267B    FORMAT   343
109 274B    FORMAT   345
110 301B    FORMAT   347

```

```

--LABEL-ADDRESS-----PROPERTIES-----DEF
111 307B    FORMAT   349
112 314B    FORMAT   351
113 321B    FORMAT   353
114 326B    FORMAT   355
115 333B    FORMAT   358
116 342B    FORMAT   361
117 354B    FORMAT   365
118 366B    FORMAT   370
119 371B    FORMAT   372
120 376B    FORMAT   374
121 403B    FORMAT   377
122 407B    FORMAT   379

```

```

--LABEL-ADDRESS-----PROPERTIES-----DEF
123 414B    FORMAT   381
124 421B    FORMAT   383
125 426B    FORMAT   385
126 433B    FORMAT   387
127 442B    FORMAT   413
128 446B    FORMAT   415
129 453B    FORMAT   417
130 461B    FORMAT   419
131 466B    FORMAT   421
132 472B    FORMAT   423
200 440B    FORMAT   399

```

--ENTRY POINTS--(LO=A)

```

--NAME---ADDRESS--ARGS---
TRT2     23B      0

```

--I/O UNITS--(LO=A)

```

--NAME--- PROPERTIES-----

```

TAPE6	FMT/SEQ						
TAPE7	FMT/SEQ						
□	PROGRAM TRT2	73/720	OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE	11

--STATISTICS--

PROGRAM-UNIT LENGTH	733B = 475						
CM LABELLED COMMON LENGTH	121252B = 41642						
CM STORAGE USED	60500B = 24896						
COMPILE TIME	0.548 SECONDS						
□	SUBROUTINE OUTLN	73/720	OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE	1

1	C				TRT2	224
2	C				TRT2	225
3		SUBROUTINE OUTLN(Y)			TRT2	226
4		IMPLICIT CHARACTER*1 (A-Z)			TRT2	227
5		INTEGER Y			TRT2	228
6	C	*****			TRT2	229
7	C	OUTPUT A LINE OF THE IMAGE AS FORMATTED TEXT			TRT2	230
8	C	*****			TRT2	231
9	C				SCREEN	1
10	C	-----			SCREEN	2
11	C	-- SCREEN COMMON BLOCK --			SCREEN	3
12	C	-----			SCREEN	4
13	C	SIZE: 3 * DIMPXL + 15 WORDS = 12303			SCREEN	5
14	C				SCREEN	6
15		INTEGER MAXPXL, DIMPXL			SCREEN	7
16		PARAMETER(MAXPXL=4096)			SCREEN	8
17		PARAMETER(DIMPXL=MAXPXL)			SCREEN	9
18	C				SCREEN	10
19		INTEGER SNX, SNY, SMAXDP, OS, ACCEL, SHADOW, BKT, CURX, CURY			SCREEN	11
20		COMMON /SCREEI/ SNX, SNY, SMAXDP, OS, ACCEL, SHADOW, BKT,			SCREEN	12
21	+	CURX, CURY			SCREEN	13
22	C				SCREEN	14
23		REAL FPD, APER, FOCAL, FSTOP, MINWGT			SCREEN	15
24		REAL COLR, COLG, COLB			SCREEN	16
25		REAL BACKR, BACKG, BACKB			SCREEN	17
26		REAL BKRI, BKRF, BKRD			SCREEN	18
27		REAL BKGI, BKGF, BKGD			SCREEN	19
28		REAL BKBI, BKBF, BKBD			SCREEN	20
29		REAL LINER(DIMPXL), LINEG(DIMPXL), LINEB(DIMPXL)			SCREEN	21
30		COMMON /SCREER/ FPD, APER, FOCAL, FSTOP, MINWGT,			SCREEN	22
31	+	COLR, COLG, COLB,			SCREEN	23
32	+	BACKR, BACKG, BACKB,			SCREEN	24
33	+	BKRI, BKRF, BKRD,			SCREEN	25
34	+	BKGI, BKGF, BKGD,			SCREEN	26
35	+	BKBI, BKBF, BKBD,			SCREEN	27
36	+	LINER, LINEG, LINEB			SCREEN	28
37		INTEGER TREC, TREM, IREC, S, E, I, J, K			TRT2	233
38		INTEGER PIXI(24)			TRT2	234
39	C				TRT2	235
40	C	-- ENFORCE LEGAL COLOUR RANGE NOW.			TRT2	236
41	C				TRT2	237
42		DO 5 I=1,SNX			TRT2	238
43		IF(LINER(I) .LT. 0.0)LINER(I) = 0.0			TRT2	239
44		IF(LINER(I) .GT. 1.0)LINER(I) = 1.0			TRT2	240
45		IF(LINEG(I) .LT. 0.0)LINEG(I) = 0.0			TRT2	241
46		IF(LINEG(I) .GT. 1.0)LINEG(I) = 1.0			TRT2	242
47		IF(LINEB(I) .LT. 0.0)LINEB(I) = 0.0			TRT2	243
48		IF(LINEB(I) .GT. 1.0)LINEB(I) = 1.0			TRT2	244

49	5	CONTINUE			TRT2	245
50	C				TRT2	246
51	C--	OUTPUT 8 RGB VALUES PER FULL TEXT LINE (72 CHARS/LINE)			TRT2	247
52	C--	ORDER RGBRGB...			TRT2	248
53	C				TRT2	249
54		TREC = SNX / 8			TRT2	250
55		TREM = SNX - (TREC * 8)			TRT2	251
56		S = 1			TRT2	252
57		E = 8			TRT2	253
□		SUBROUTINE OUTLN	73/720	OPT=2	FTN 5.1+538	05/08/09. 12.28.37
						PAGE 2
58	C				TRT2	254
59	C--	OUTPUT ANY FULL TEXT LINES			TRT2	255
60	C				TRT2	256
61		DO 1 IREC=1,TREC			TRT2	257
62		K = 1			TRT2	258
63		DO 2 J=S,E			TRT2	259
64		PIXI(K) = INT(LINER(J) * 255.9)			TRT2	260
65		K = K + 1			TRT2	261
66		PIXI(K) = INT(LINEG(J) * 255.9)			TRT2	262
67		K = K + 1			TRT2	263
68		PIXI(K) = INT(LINEB(J) * 255.9)			TRT2	264
69		K = K + 1			TRT2	265
70	2	CONTINUE			TRT2	266
71		WRITE(7,100)(PIXI(I),I=1,24)			TRT2	267
72	100	FORMAT(1X,24(I3))			TRT2	268
73		S = S + 8			TRT2	269
74		E = E + 8			TRT2	270
75	1	CONTINUE			TRT2	271
76	C				TRT2	272
77	C--	OUTPUT ANY PARTIAL TEXT LINE			TRT2	273
78	C				TRT2	274
79		IF(TREM .NE. 0)THEN			TRT2	275
80		E = S + TREM - 1			TRT2	276
81		K = 1			TRT2	277
82		DO 3 J=S,E			TRT2	278
83		PIXI(K) = INT(LINER(J) * 255.9)			TRT2	279
84		K = K + 1			TRT2	280
85		PIXI(K) = INT(LINEG(J) * 255.9)			TRT2	281
86		K = K + 1			TRT2	282
87		PIXI(K) = INT(LINEB(J) * 255.9)			TRT2	283
88		K = K + 1			TRT2	284
89	3	CONTINUE			TRT2	285
90		WRITE(7,100)(PIXI(I),I=1,(3*TREM))			TRT2	286
91		ENDIF			TRT2	287
92	C				TRT2	288
93		RETURN			TRT2	289
94		END			TRT2	290

--VARIABLE MAP--(LO=A)

-NAME	-ADDRESS	-BLOCK	-PROPERTIES	-TYPE	-SIZE	-NAME	-ADDRESS	-BLOCK	-PROPERTIES	-TYPE	-SIZE
ACCEL	4B	/SCREEI/		INTEGER		COLB	7B	/SCREER/		REAL	
APER	1B	/SCREER/		REAL		COLG	6B	/SCREER/		REAL	
BACKB	12B	/SCREER/		REAL		COLR	5B	/SCREER/		REAL	
BACKG	11B	/SCREER/		REAL		CURX	7B	/SCREEI/		INTEGER	
BACKR	10B	/SCREER/		REAL		CURY	10B	/SCREEI/		INTEGER	
BKBD	23B	/SCREER/		REAL		E	150B			INTEGER	
BKBF	22B	/SCREER/		REAL		FOCAL	2B	/SCREER/		REAL	
BKBI	21B	/SCREER/		REAL		FPD	0B	/SCREER/		REAL	
BKGD	20B	/SCREER/		REAL		FSTOP	3B	/SCREER/		REAL	

BKGF	17B	/SCREER/	REAL		I	151B	INTEGER	
BKGI	16B	/SCREER/	REAL		IREC	146B	INTEGER	
BKRD	15B	/SCREER/	REAL		J	152B	INTEGER	
BKRF	14B	/SCREER/	REAL		K	153B	INTEGER	
BKRI	13B	/SCREER/	REAL		LINEB	20024B	REAL 4096	
BKT	6B	/SCREEI/	INTEGER		LINEG	10024B	REAL 4096	
SUBROUTINE OUTLN				73/720	OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE 3
--SYMBOLIC CONSTANTS--(LO=A)								
-NAME-----TYPE-----VALUE								
DIMPXL	INTEGER					4096		
MAXPXL	INTEGER					4096		
--PROCEDURES--(LO=A)								
-NAME-----TYPE-----ARGS-----CLASS-----								
INT	GENERIC		1		INTRINSIC			
--STATEMENT LABELS--(LO=A)								
-LABEL-ADDRESS-----PROPERTIES-----DEF								
1	INACTIVE	DO-TERM		75				
2	INACTIVE	DO-TERM		70				
3	INACTIVE	DO-TERM		89				
5	INACTIVE	DO-TERM		49				
100	132B	FORMAT		72				
--ENTRY POINTS--(LO=A)								
-NAME-----ADDRESS-----ARGS-----								
OUTLN	3B		1					
--I/O UNITS--(LO=A)								
-NAME-----PROPERTIES-----								
TAPE7	FMT/SEQ							
--STATISTICS--								
PROGRAM-UNIT LENGTH				206B =	134			
CM LABELLED COMMON LENGTH				30035B =	12317			
CM STORAGE USED				57200B =	24192			
COMPILE TIME				0.289	SECONDS			
SUBROUTINE INITLN				73/720	OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE 1

1	C	TRT2	291
2	C-----	TRT2	292

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3      C RAY TRACING ROUTINES                                TRT2      293
4      C-----
5      C                                                     TRT2      295
6      SUBROUTINE INITLN                                    TRT2      296
7      IMPLICIT CHARACTER*1 (A-Z)                          TRT2      297
8      C*****
9      C INITIALIZE THE OUTPUT LINE                          TRT2      299
10     C*****
11     C                                                     SCREEN     1
12     C-----
13     C-- SCREEN COMMON BLOCK --                            SCREEN     2
14     C-----
15     C SIZE: 3 * DIMPXL + 15 WORDS = 12303                 SCREEN     5
16     C                                                     SCREEN     6
17     INTEGER MAXPXL, DIMPXL                                SCREEN     7
18     PARAMETER( MAXPXL=4096 )                               SCREEN     8
19     PARAMETER( DIMPXL=MAXPXL)                             SCREEN     9
20     C                                                     SCREEN    10
21     INTEGER SNX, SNY, SMAXDP, OS, ACCEL, SHADOW, BKT, CURX, CURY SCREEN    11
22     COMMON /SCREEI/ SNX, SNY, SMAXDP, OS, ACCEL, SHADOW, BKT, SCREEN    12
23     + CURX, CURY                                          SCREEN    13
24     C                                                     SCREEN    14
25     REAL FPD, APER, FOCAL, FSTOP, MINWGT                  SCREEN    15
26     REAL COLR, COLG, COLB                                 SCREEN    16
27     REAL BACKR, BACKG, BACKB                              SCREEN    17
28     REAL BKRI, BKRF, BKRD                                 SCREEN    18
29     REAL BKGI, BKGF, BKGD                                 SCREEN    19
30     REAL BKBI, BKBF, BKBD                                 SCREEN    20
31     REAL LINER(DIMPXL), LINEG(DIMPXL), LINEB(DIMPXL)     SCREEN    21
32     COMMON /SCREER/ FPD, APER, FOCAL, FSTOP, MINWGT,     SCREEN    22
33     + COLR, COLG, COLB,                                   SCREEN    23
34     + BACKR, BACKG, BACKB,                                SCREEN    24
35     + BKRI, BKRF, BKRD,                                   SCREEN    25
36     + BKGI, BKGF, BKGD,                                   SCREEN    26
37     + BKBI, BKBF, BKBD,                                   SCREEN    27
38     + LINER, LINEG, LINEB                                SCREEN    28
39     C                                                     TRT2     302
40     INTEGER I                                             TRT2     303
41     DO 1 I=1,SNX,1                                       TRT2     304
42     LINEG(I) = 0.0                                        TRT2     305
43     LINEB(I) = 0.0                                        TRT2     306
44     LINEB(I) = 0.0                                        TRT2     307
45     1 CONTINUE                                           TRT2     308
46     RETURN                                               TRT2     309
47     END                                                  TRT2     310

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--VARIABLE MAP--(LO=A)

NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE	NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE
ACCEL	4B	/SCREEI/		INTEGER		BKBD	23B	/SCREER/		REAL	
APER	1B	/SCREER/		REAL		BKBF	22B	/SCREER/		REAL	
BACKB	12B	/SCREER/		REAL		BKBI	21B	/SCREER/		REAL	
BACKG	11B	/SCREER/		REAL		BKGD	20B	/SCREER/		REAL	
BACKR	10B	/SCREER/		REAL		BKGF	17B	/SCREER/		REAL	
SUBROUTINE INITLN 73/720 OPT=2						FTN 5.1+538 05/08/09. 12.28.37 PAGE 2					
NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE	NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE
BKGI	16B	/SCREER/		REAL		FSTOP	3B	/SCREER/		REAL	
BKRD	15B	/SCREER/		REAL		I	15B			INTEGER	
BKRF	14B	/SCREER/		REAL		LINEB	20024B	/SCREER/		REAL	4096
BKRI	13B	/SCREER/		REAL		LINEG	10024B	/SCREER/		REAL	4096
BKT	6B	/SCREEI/		INTEGER		LINER	24B	/SCREER/		REAL	4096

COLB	7B	/SCREER/	REAL	MINWGT	4B	/SCREER/	REAL
COLG	6B	/SCREER/	REAL	OS	3B	/SCREEI/	INTEGER
COLR	5B	/SCREER/	REAL	SHADOW	5B	/SCREEI/	INTEGER
CURX	7B	/SCREEI/	INTEGER	SMAXDP	2B	/SCREEI/	INTEGER
CURY	10B	/SCREEI/	INTEGER	SNX	0B	/SCREEI/	INTEGER
FOCAL	2B	/SCREER/	REAL	SNY	1B	/SCREEI/	INTEGER
FPD	0B	/SCREER/	REAL				

--SYMBOLIC CONSTANTS--(LO=A)

-NAME----	-TYPE-----	-----VALUE
DIMPXL	INTEGER	4096
MAXPXL	INTEGER	4096

--STATEMENT LABELS--(LO=A)

-LABEL-	-ADDRESS-----	-PROPERTIES----	-DEF
1	INACTIVE	DO-TERM	45

--ENTRY POINTS--(LO=A)

-NAME----	-ADDRESS--	-ARGS---
INITLN	3B	0

--STATISTICS--

PROGRAM-UNIT LENGTH	16B = 14
CM LABELLED COMMON LENGTH	30035B = 12317
CM STORAGE USED	57100B = 24128
COMPILE TIME	0.083 SECONDS

□	SUBROUTINE INITST	73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE	1
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1	C		TRT2	311
2	C		TRT2	312
3		SUBROUTINE INITST	TRT2	313
4		IMPLICIT CHARACTER*1 (A-Z)	TRT2	314
5	C	*****	TRT2	315
6	C	INITIALIZE THE STATISTICS	TRT2	316
7	C	*****	TRT2	317
8	C		STATS	1
9	C	-----	STATS	2
10	C	-- STATISTICS COMMON BLOCK --	STATS	3
11	C	-----	STATS	4
12	C	SIZE: 8 WORDS.	STATS	5
13	C		STATS	6
14		INTEGER MAXDPS, MAXRYS, MAXISS, TOTRAY, TOTFEL, NACC, NOACC	STATS	7
15		COMMON /STATSI/ MAXDPS, MAXRYS, MAXISS, TOTRAY, TOTFEL, NACC,	STATS	8
16		+ NOACC	STATS	9
17	C		STATS	10
18		REAL NSECTS	STATS	11
19		COMMON /STATSR/ NSECTS	STATS	12
20	C		TRT2	319
21		MAXDPS = 0	TRT2	320
22		MAXRYS = 0	TRT2	321
23		MAXISS = 0	TRT2	322
24		TOTRAY = 0	TRT2	323
25		TOTFEL = 0	TRT2	324
26		NACC = 0	TRT2	325

27 NOACC = 0
 28 NSECTS = 0.0
 29 RETURN
 30 END

TRT2 326
 TRT2 327
 TRT2 328
 TRT2 329

--VARIABLE MAP--(LO=A)

--NAME---ADDRESS--BLOCK-----PROPERTIES-----TYPE-----SIZE				--NAME---ADDRESS--BLOCK-----PROPERTIES-----TYPE-----SIZE			
MAXDPS	0B	/STATSI/	INTEGER	NOACC	6B	/STATSI/	INTEGER
MAXISS	2B	/STATSI/	INTEGER	NSECTS	0B	/STATSR/	REAL
MAXRYS	1B	/STATSI/	INTEGER	TOTFEL	4B	/STATSI/	INTEGER
NACC	5B	/STATSI/	INTEGER	TOTRAY	3B	/STATSI/	INTEGER

--ENTRY POINTS--(LO=A)

--NAME---ADDRESS--ARGS---		
INITST	3B	0

--STATISTICS--

PROGRAM-UNIT LENGTH 12B = 10
 CM LABELLED COMMON LENGTH 10B = 8
 CM STORAGE USED 56700B = 24000
 COMPILE TIME 0.040 SECONDS
 □ SUBROUTINE TRCLN 73/720 OPT=2

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1	C		TRT2	330
2	C		TRT2	331
3		SUBROUTINE TRCLN(Y)	TRT2	332
4		IMPLICIT CHARACTER*1 (A-Z)	TRT2	333
5		INTEGER Y	TRT2	334
6		C*****	TRT2	335
7		C TRACE ALL RAYS NEEDED TO CREATE LINE Y	TRT2	336
8		C*****	TRT2	337
9		C	PARAMS	1
10		C-----	PARAMS	2
11		C-- SUNDRY PARAMETERS --	PARAMS	3
12		C-----	PARAMS	4
13		C	PARAMS	5
14		REAL GTHUGE, MINEPS, EPS, MINFLT, MAXFLT, TRTPI, DEGRAD	PARAMS	6
15		PARAMETER(GTHUGE=1E7)	PARAMS	7
16		PARAMETER(MINEPS=1E-5)	PARAMS	8
17		PARAMETER(EPS=1E-7)	PARAMS	9
18		PARAMETER(MINFLT=-1E20)	PARAMS	10
19		PARAMETER(MAXFLT=1E20)	PARAMS	11
20		PARAMETER(TRTPI=3.1415926)	PARAMS	12
21		PARAMETER(DEGRAD=TRTPI/180.0)	PARAMS	13
22		C	PARAMS	14
23		INTEGER EYERAY, RFLRAY, TRNRAY	PARAMS	15
24		PARAMETER(EYERAY=1)	PARAMS	16
25		PARAMETER(RFLRAY=2)	PARAMS	17
26		PARAMETER(TRNRAY=3)	PARAMS	18
27		C	PARAMS	19
28		INTEGER ENTER, LEAVE	PARAMS	20
29		PARAMETER(ENTER=1)	PARAMS	21
30		PARAMETER(LEAVE=2)	PARAMS	22
31		C	PARAMS	23
32		INTEGER NOACL, SUBACL	PARAMS	24
33		PARAMETER(NOACL=0)	PARAMS	25

34		PARAMETER(SUBACL=1)		PARAMS	26
35	C			PARAMS	27
36		INTEGER BKCNST, BKVERT, BKHORZ		PARAMS	28
37		PARAMETER(BKCNST=0)		PARAMS	29
38		PARAMETER(BKVERT=1)		PARAMS	30
39		PARAMETER(BKHORZ=2)		PARAMS	31
40	C			PARAMS	32
41		INTEGER LGTCON, LGTCOS, LGTBRN		PARAMS	33
42		PARAMETER(LGTCON=0)		PARAMS	34
43		PARAMETER(LGTCOS=1)		PARAMS	35
44		PARAMETER(LGTBRN=2)		PARAMS	36
45	C			PARAMS	37
46		INTEGER SPHPRM, TRIPRM		PARAMS	38
47		PARAMETER(SPHPRM=1)		PARAMS	39
48		PARAMETER(TRIPRM=2)		PARAMS	40
49	C			PARAMS	41
50		INTEGER DAXX, DAXY, DAXZ		PARAMS	42
51		PARAMETER(DAXX=1)		PARAMS	43
52		PARAMETER(DAXY=2)		PARAMS	44
53		PARAMETER(DAXZ=3)		PARAMS	45
54	C			SCREEN	1
55	C-----			SCREEN	2
56	C-- SCREEN COMMON BLOCK --			SCREEN	3
57	C-----			SCREEN	4
	□	SUBROUTINE TRCLN	73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
					PAGE 2
58	C	SIZE: 3 * DIMPXL + 15 WORDS = 12303		SCREEN	5
59	C			SCREEN	6
60		INTEGER MAXPXL, DIMPXL		SCREEN	7
61		PARAMETER(MAXPXL=4096)		SCREEN	8
62		PARAMETER(DIMPXL=MAXPXL)		SCREEN	9
63	C			SCREEN	10
64		INTEGER SNX, SNY, SMAXD, OS, ACCEL, SHADOW, BKT, CURX, CURY		SCREEN	11
65		COMMON /SCREEI/ SNX, SNY, SMAXD, OS, ACCEL, SHADOW, BKT,		SCREEN	12
66		+ CURX, CURY		SCREEN	13
67	C			SCREEN	14
68		REAL FPD, APER, FOCAL, FSTOP, MINWGT		SCREEN	15
69		REAL COLR, COLG, COLB		SCREEN	16
70		REAL BACKR, BACKG, BACKB		SCREEN	17
71		REAL BKRI, BKRF, BKRD		SCREEN	18
72		REAL BKGI, BKGf, BKGD		SCREEN	19
73		REAL BKBI, BKBF, BKBD		SCREEN	20
74		REAL LINER(DIMPXL), LINEG(DIMPXL), LINEB(DIMPXL)		SCREEN	21
75		COMMON /SCREER/ FPD, APER, FOCAL, FSTOP, MINWGT,		SCREEN	22
76		+ COLR, COLG, COLB,		SCREEN	23
77		+ BACKR, BACKG, BACKB,		SCREEN	24
78		+ BKRI, BKRF, BKRD,		SCREEN	25
79		+ BKGI, BKGf, BKGD,		SCREEN	26
80		+ BKBI, BKBF, BKBD,		SCREEN	27
81		+ LINER, LINEG, LINEB		SCREEN	28
82	C			RAYLST	1
83	C-----			RAYLST	2
84	C-- RAY LIST COMMON BLOCK --			RAYLST	3
85	C-----			RAYLST	4
86	C	SIZE: 13 * DIMRAY + 2 WORDS = 6658		RAYLST	5
87	C			RAYLST	6
88		INTEGER MAXRAY, DIMRAY		RAYLST	7
89		PARAMETER(MAXRAY=512)		RAYLST	8
90		PARAMETER(DIMRAY=MAXRAY)		RAYLST	9
91	C			RAYLST	10
92		INTEGER NLRAY, RAYNUM, RISECT(DIMRAY), RTYPE(DIMRAY)		RAYLST	11
93		INTEGER RDEP(DIMRAY), RRAYID(DIMRAY)		RAYLST	12

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                                TRT2_20050809_130554.lpr
94      COMMON /RAYLSI/ NLRAY, RAYNUM, RISECT, RTYPE, RDEP, RRAYID      RAYLST      13
95      C                                                                RAYLST      14
96      REAL ROX(DIMRAY), ROY(DIMRAY), ROZ(DIMRAY)                    RAYLST      15
97      REAL RDX(DIMRAY), RDY(DIMRAY), RDZ(DIMRAY)                    RAYLST      16
98      REAL RWGTR(DIMRAY), RWGTG(DIMRAY), RWGTB(DIMRAY)              RAYLST      17
99      COMMON /RAYLSR/ ROX, ROY, ROZ, RDX, RDY, RDZ, RWGTR, RWGTG, RWGTB RAYLST      18
100     C                                                                RAYSTK      1
101     C---- IN-MEMORY AND GLOBALLY ACCESSIBLE DATA STRUCTURES      RAYSTK      2
102     C                                                                RAYSTK      3
103     C-----
104     C-- RAY STACK COMMON BLOCK --                                  RAYSTK      4
105     C-----
106     C SIZE: DIMSTK + 2 WORDS = 514                                RAYSTK      7
107     C                                                                RAYSTK      8
108     INTEGER MAXSTK, DIMSTK                                         RAYSTK      9
109     PARAMETER( MAXSTK=512 )                                         RAYSTK     10
110     PARAMETER( DIMSTK=MAXSTK )                                     RAYSTK     11
111     C                                                                RAYSTK     12
112     INTEGER NSRAY, CRAY                                           RAYSTK     13
113     INTEGER RAY(DIMSTK)                                           RAYSTK     14
114     COMMON /RAYSTK/ NSRAY, CRAY, RAY                              RAYSTK     15
115     SUBROUTINE TRCLN      73/720 OPT=2                               FTN 5.1+538 05/08/09. 12.28.37 PAGE 3
116     C                                                                INSLST      1
117     C-----
118     C-- INTERSECTION LIST COMMON BLOCK --                          INSLST      3
119     C-----
120     C SIZE: 13 * DIMINS + 1 WORDS = 6683                          INSLST      5
121     C                                                                INSLST      6
122     INTEGER MAXINS, DIMINS, NEWINS, SHDINS                         INSLST      7
123     PARAMETER( MAXINS=512 )                                       INSLST      8
124     PARAMETER( DIMINS=MAXINS+2 )                                  INSLST      9
125     PARAMETER( NEWINS=MAXINS+1 )                                 INSLST     10
126     PARAMETER( SHDINS=MAXINS+2 )                                 INSLST     11
127     C                                                                INSLST     12
128     INTEGER NINS, IPRIM(DIMINS), IRRAY(DIMINS), ITRAY(DIMINS)    INSLST     13
129     INTEGER ITTYP(DIMINS)                                         INSLST     14
130     COMMON /INLSI/ NINS, IPRIM, IRRAY, ITRAY, ITTYP              INSLST     15
131     C                                                                INSLST     16
132     REAL IPX(DIMINS), IPY(DIMINS), IPZ(DIMINS)                   INSLST     17
133     REAL INX(DIMINS), INY(DIMINS), INZ(DIMINS)                   INSLST     18
134     REAL ICOLR(DIMINS), ICOLG(DIMINS), ICOLB(DIMINS)            INSLST     19
135     COMMON /INLSR/ IPX, IPY, IPZ, INX, INY, INZ, ICOLR, ICOLG, ICOLB INSLST     20
136     C                                                                STATS       1
137     C-----
138     C-- STATISTICS COMMON BLOCK --                                  STATS       3
139     C-----
140     C SIZE: 8 WORDS.                                               STATS       5
141     C                                                                STATS       6
142     INTEGER MAXDPS, MAXRYS, MAXISS, TOTRAY, TOTFEL, NACC, NOACC   STATS       7
143     COMMON /STATSI/ MAXDPS, MAXRYS, MAXISS, TOTRAY, TOTFEL, NACC, +
144     NOACC                                                           STATS       8
145     C                                                                STATS       9
146     REAL NSECTS                                                   STATS      10
147     COMMON /STATSR/ NSECTS                                         STATS      11
148     C                                                                TRT2      344
149     C-- FUNCTION "PROTOTYPES"                                       TRT2      345
150     C                                                                TRT2      346
151     REAL RANHLF                                                    TRT2      347
152     C                                                                TRT2      348
153     C-- LOCAL VARIABLES                                           TRT2      349
154     C                                                                TRT2      350

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TRT2_20050809_130554.lpr
154 REAL LEFT, RIGHT, BOTTOM, TOP, DP, DPX, DPY, RNS, RMAG TRT2 351
155 REAL FY, FX, DS, FYS, FYSJ, FXS, FXSJ, DSX, DSY, LRAD TRT2 352
156 REAL ETHETA, ERAD, EX, EY TRT2 353
157 INTEGER X, SUBX, SUBY, NS, OS2, UOS, IDUM TRT2 354
158 C TRT2 355
159 C-- CALCULATE THE PIXEL CENTER COORDINATES AT THE EDGES OF THE APERTURE TRT2 356
160 C TRT2 357
161 DP = APER / REAL(SNX) TRT2 358
162 LEFT = ( -APER + DP ) * 0.5 TRT2 359
163 RIGHT = ( APER - DP ) * 0.5 TRT2 360
164 BOTTOM = LEFT * REAL(SNY) / REAL(SNX) TRT2 361
165 TOP = RIGHT * REAL(SNY) / REAL(SNX) TRT2 362
166 C TRT2 363
167 C-- CALCULATE THE RECIPROCAL OF THE MAGNIFICATION OF THE LENS TRT2 364
168 C TRT2 365
169 IF( FPD .LT. ( FOCAL + 0.5 ) ) FPD = FOCAL + 0.5 TRT2 366
170 RMAG = ( FPD - FOCAL ) / FOCAL TRT2 367
171 C TRT2 368
SUBROUTINE TRCLN 73/720 OPT=2 FTN 5.1+538 05/08/09. 12.28.37 PAGE 4

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172 C-- SCALE APERTURE EDGE COORDINATES TO FOCAL PLANE EDGE COORDINATES TRT2 369
173 C TRT2 370
174 LEFT = LEFT * RMAG TRT2 371
175 RIGHT = RIGHT * RMAG TRT2 372
176 BOTTOM = BOTTOM * RMAG TRT2 373
177 TOP = TOP * RMAG TRT2 374
178 C TRT2 375
179 C-- CALCULATE THE EFFECTIVE LENS RADIUS TRT2 376
180 C TRT2 377
181 LRAD = 0.5 * FOCAL / FSTOP TRT2 378
182 C TRT2 379
183 C-- CALCULATE CONSTANTS FOR SUBSAMPLING TRT2 380
184 C TRT2 381
185 IF( OS .EQ. 0 ) THEN TRT2 382
186 DS = 0.0 TRT2 383
187 NS = 1 TRT2 384
188 RNS = 1.0 TRT2 385
189 OS2 = 0 TRT2 386
190 UOS = 1 TRT2 387
191 ELSE TRT2 388
192 DS = 1.0 / OS TRT2 389
193 NS = OS * OS TRT2 390
194 RNS = 1.0 / NS TRT2 391
195 OS2 = OS / 2 TRT2 392
196 UOS = OS TRT2 393
197 ENDIF TRT2 394
198 C TRT2 395
199 C-- CALCULATE THE X AND Y STEPS ON THE FOCAL PLANE BETWEEN PIXEL CENTERS TRT2 396
200 C TRT2 397
201 DPX = ( RIGHT - LEFT ) / REAL( SNX - 1 ) TRT2 398
202 DPY = ( TOP - BOTTOM ) / REAL( SNY - 1 ) TRT2 399
203 DSX = DS * DPX TRT2 400
204 DSY = DS * DPY TRT2 401
205 C TRT2 402
206 C-- CALCULATE Y COORDINATE OF CURRENT LINE CENTER TRT2 403
207 C TRT2 404
208 FY = BOTTOM + ( Y - 1 ) * DPY TRT2 405
209 C TRT2 406
210 C-- STEP OVER THE PIXELS IN THE LINE. TRT2 407
211 C TRT2 408
212 DO 1 X=1,SNX TRT2 409
213 CURX = X TRT2 410

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                                TRT2_20050809_130554.lpr
214          FX = LEFT + ( X - 1 ) * DPX          TRT2      411
215          C                                  TRT2      412
216          C-- STEP OVER Y SUBSAMPLES - AND JITTER THEM          TRT2      413
217          C                                  TRT2      414
218          DO 2 SUBY=1,UOS                      TRT2      415
219          FYS = ( SUBY - OS2 - 1 ) * DSY + FY          TRT2      416
220          FYSJ = FYS + RANHFLF(IDUM) * DSY          TRT2      417
221          C                                  TRT2      418
222          C                                  TRT2      419
223          C-- STEP OVER X SUBSAMPLES - AND JITTER THEM.          TRT2      420
224          C                                  TRT2      421
225          DO 3 SUBX=1,UOS                      TRT2      422
226          FXS = ( SUBX - OS2 - 1 ) * DSX + FX          TRT2      423
227          FXSJ = FXS + RANHFLF(IDUM) * DSX          TRT2      424
228          C                                  TRT2      425
0 SUBROUTINE TRCLN          73/720 OPT=2          FTN 5.1+538          05/08/09. 12.28.37          PAGE          5

229          C-- BEGIN TRACING RAYS. THERE ARE INITIALLY NO RAYS. AND NO INTERSECTION          TRT2      426
230          C                                  TRT2      427
231          NLRAY = 0                              TRT2      428
232          NSRAY = 0                              TRT2      429
233          NINS = 0                              TRT2      430
234          COLR = 0.0                            TRT2      431
235          COLG = 0.0                            TRT2      432
236          COLB = 0.0                            TRT2      433
237          C                                  TRT2      434
238          C-- GENERATE A SCREEN RAY FROM A RANDOMLY CHOSEN POINT ON THE LENS (EX,ET          TRT2      435
239          C-- THROUGH THE FOCAL PLANE POSITION (FX,FY,SCREEN.FPD)          TRT2      436
240          C                                  TRT2      437
241          NLRAY = NLRAY + 1                      TRT2      438
242          RAYNUM = RAYNUM + 1                   TRT2      439
243          ETHETA = RANHFLF(IDUM) * TRTPI          TRT2      440
244          ERAD = ( RANHFLF(IDUM) + 0.5 ) * LRAD          TRT2      441
245          EX = ERAD * COS( ETHETA )             TRT2      442
246          EY = ERAD * SIN( ETHETA )             TRT2      443
247          RRAYID(NLRAY) = RAYNUM                TRT2      444
248          RTYPE(NLRAY) = EYERAY                TRT2      445
249          RISECT(NLRAY) = 0                    TRT2      446
250          RWGTR(NLRAY) = 1.0                   TRT2      447
251          RWGTG(NLRAY) = 1.0                   TRT2      448
252          RWGTB(NLRAY) = 1.0                   TRT2      449
253          RDEP(NLRAY) = 1                      TRT2      450
254          ROX(NLRAY) = EX                      TRT2      451
255          ROY(NLRAY) = EY                      TRT2      452
256          ROZ(NLRAY) = 0.0                    TRT2      453
257          RDX(NLRAY) = FXSJ - EX               TRT2      454
258          RDY(NLRAY) = FYSJ - EY               TRT2      455
259          RDZ(NLRAY) = FPD                     TRT2      456
260          CALL NRMVEC( RDX(NLRAY), RDY(NLRAY), RDZ(NLRAY) )          TRT2      457
261          TOTRAY = TOTRAY + 1                  TRT2      458
262          C                                  TRT2      459
263          C-- PUSH THE RAY ONTO THE RAY STACK.          TRT2      460
264          C                                  TRT2      461
265          NSRAY = NSRAY + 1                    TRT2      462
266          RAY(NSRAY) = NLRAY                   TRT2      463
267          IF( NLRAY .GT. MAXRYS )MAXRYS = NLRAY          TRT2      464
268          C                                  TRT2      465
269          C-- WHILE THERE ARE RAYS ON THE RAY STACK, POP A RAY OFF          TRT2      466
270          C                                  TRT2      467
271          4          CONTINUE                    TRT2      468
272          IF( NSRAY .EQ. 0 )GOTO 5              TRT2      469
273          CRAY = RAY(NSRAY)                    TRT2      470

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274          NSRAY = NSRAY - 1
275          C
276          C-- FIND INTERSECTIONS OF THIS CURRENT RAY WITH PRIMITIVES.
277          C-- WHEN THERE IS AN INTERSECTION, CALCULATE A SHADE AT THE INTERSECTION
278          C-- AND ADD THIS CONTRIBUTION TO THE PIXEL COLOUR.
279          C-- ADD NEW REFLECTED AND TRANSMITTED RAYS TO THE RAY STACK IF APPROPRIATE
280          C
281          CALL TRACE
282          GOTO 4
283          5          CONTINUE
284          C
285          C--- ADD IN THE NEW SAMPLE COLOUR TO THE PIXEL

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```

TRT2      471
TRT2      472
TRT2      473
TRT2      474
TRT2      475
TRT2      476
TRT2      477
TRT2      478
TRT2      479
TRT2      480
TRT2      481
TRT2      482

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□ SUBROUTINE TRCLN 73/720 OPT=2 FTN 5.1+538 05/08/09. 12.28.37 PAGE 6

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286          C
287          LINER(X) = LINER(X) + COLR
288          LINEG(X) = LINEG(X) + COLG
289          LINEB(X) = LINEB(X) + COLB
290          C
291          C-- END LOOP OVER SUBSAMPLES IN X
292          C
293          3          CONTINUE
294          C
295          C-- END LOOP OVER SUBSAMPLES IN Y
296          C
297          2          CONTINUE
298          C
299          C-- NORMALIZE THE RESULT COLOUR FOR THE OUTPUT PIXEL
300          C
301          LINER(X) = LINER(X) * RNS
302          LINEG(X) = LINEG(X) * RNS
303          LINEB(X) = LINEB(X) * RNS
304          C
305          C-- END LOOP OVER PIXELS OF OUTPUT LINE
306          C
307          1          CONTINUE
308          RETURN
309          END

```

```

TRT2      483
TRT2      484
TRT2      485
TRT2      486
TRT2      487
TRT2      488
TRT2      489
TRT2      490
TRT2      491
TRT2      492
TRT2      493
TRT2      494
TRT2      495
TRT2      496
TRT2      497
TRT2      498
TRT2      499
TRT2      500
TRT2      501
TRT2      502
TRT2      503
TRT2      504
TRT2      505
TRT2      506

```

--VARIABLE MAP--(LO=A)

--VARIABLE MAP--(LO=A)				--VARIABLE MAP--(LO=A)							
NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE	NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE
ACCEL	4B	/SCREEI/		INTEGER		ERAD	265B			REAL	
APER	1B	/SCREER/		REAL		ETHETA	264B			REAL	
BACKB	12B	/SCREER/		REAL		EX	266B			REAL	
BACKG	11B	/SCREER/		REAL		EY	267B			REAL	
BACKR	10B	/SCREER/		REAL		FOCAL	2B	/SCREER/		REAL	
BKBD	23B	/SCREER/		REAL		FPD	0B	/SCREER/		REAL	
BKBF	22B	/SCREER/		REAL		FSTOP	3B	/SCREER/		REAL	
BKBI	21B	/SCREER/		REAL		FX	253B			REAL	
BKGD	20B	/SCREER/		REAL		FXS	257B			REAL	
BKGF	17B	/SCREER/		REAL		FXSJ	260B			REAL	
BKGI	16B	/SCREER/		REAL		FY	252B			REAL	
BKRD	15B	/SCREER/		REAL		FYS	255B			REAL	
BKRF	14B	/SCREER/		REAL		FYSJ	256B			REAL	
BKRI	13B	/SCREER/		REAL		ICOLB	10020B	/INLSR/		REAL	514
BKT	6B	/SCREEI/		INTEGER		ICOLG	7016B	/INLSR/		REAL	514
BOTTOM	246B			REAL		ICOLR	6014B	/INLSR/		REAL	514
COLB	7B	/SCREER/		REAL		IDUM	275B			INTEGER	
COLG	6B	/SCREER/		REAL		INX	3006B	/INLSR/		REAL	514
COLR	5B	/SCREER/		REAL		INY	4010B	/INLSR/		REAL	514

CRAY	1B	/RAYSTK/	INTEGER		INZ	5012B	/INSLSR/	REAL	514
CURX	7B	/SCREEI/	INTEGER		IPRIM	1B	/INLSI/	INTEGER	514
CURY	10B	/SCREEI/	INTEGER		IPX	0B	/INSLSR/	REAL	514
DP	NONE		REAL		IPY	1002B	/INSLSR/	REAL	514
DPX	250B		REAL		IPZ	2004B	/INSLSR/	REAL	514
DPY	NONE		REAL		IRRAY	1003B	/INLSI/	INTEGER	514
DS	254B		REAL		ITRAY	2005B	/INLSI/	INTEGER	514
DSX	261B		REAL		ITTPY	3007B	/INLSI/	INTEGER	514
DSY	262B		REAL		LEFT	244B		REAL	

□	SUBROUTINE	TRCLN	73/720	OPT=2	FTN	5.1+538	05/08/09.	12.28.37	PAGE	7	
-NAME	-ADDRESS	-BLOCK	-PROPERTIES	-TYPE	-SIZE	-NAME	-ADDRESS	-BLOCK	-PROPERTIES	-TYPE	-SIZE

LINEB	20024B	/SCREER/	REAL	4096	RISECT	2B	/RAYLSI/	INTEGER	512
LINEG	10024B	/SCREER/	REAL	4096	RMAG	NONE		REAL	
LINER	24B	/SCREER/	REAL	4096	RNS	251B		REAL	
LRAD	263B		REAL		ROX	0B	/RAYLSR/	REAL	512
MAXDPS	0B	/STATSI/	INTEGER		ROY	1000B	/RAYLSR/	REAL	512
MAXISS	2B	/STATSI/	INTEGER		ROZ	2000B	/RAYLSR/	REAL	512
MAXRYS	1B	/STATSI/	INTEGER		RRAYID	3002B	/RAYLSI/	INTEGER	512
MINWGT	4B	/SCREER/	REAL		RTYPE	1002B	/RAYLSI/	INTEGER	512
NACC	5B	/STATSI/	INTEGER		RWGTB	10000B	/RAYLSR/	REAL	512
NINS	0B	/INLSI/	INTEGER		RWGTG	7000B	/RAYLSR/	REAL	512
NLRAY	0B	/RAYLSI/	INTEGER		RWGTR	6000B	/RAYLSR/	REAL	512
NOACC	6B	/STATSI/	INTEGER		SHADOW	5B	/SCREEI/	INTEGER	
NS	NONE		INTEGER		SMAXDP	2B	/SCREEI/	INTEGER	
NSECTS	0B	/STATSR/	REAL		SNX	0B	/SCREEI/	INTEGER	
NSRAY	0B	/RAYSTK/	INTEGER		SNY	1B	/SCREEI/	INTEGER	
OS	3B	/SCREEI/	INTEGER		SUBX	271B		INTEGER	
OS2	273B		INTEGER		SUBY	272B		INTEGER	
RAY	2B	/RAYSTK/	INTEGER	512	TOP	247B		REAL	
RAYNUM	1B	/RAYLSI/	INTEGER		TOTFEL	4B	/STATSI/	INTEGER	
RDEP	2002B	/RAYLSI/	INTEGER	512	TOTRAY	3B	/STATSI/	INTEGER	
RDX	3000B	/RAYLSR/	REAL	512	UOS	274B		INTEGER	
RDY	4000B	/RAYLSR/	REAL	512	X	270B		INTEGER	
RDZ	5000B	/RAYLSR/	REAL	512	Y	1	DUMMY-ARG	INTEGER	
RIGHT	245B		REAL						

--SYMBOLIC CONSTANTS--(LO=A)

-NAME	-TYPE	-VALUE	-NAME	-TYPE	-VALUE
BKCNST	INTEGER	0	LGTCOS	INTEGER	1
BKHORZ	INTEGER	2	MAXFLT	REAL	0"20235327435361326142"
BKVERT	INTEGER	1	MAXINS	INTEGER	512
DAXX	INTEGER	1	MAXPXL	INTEGER	4096
DAXY	INTEGER	2	MAXRAY	INTEGER	512
DAXZ	INTEGER	3	MAXSTK	INTEGER	512
DEGRAD	REAL	0"17124357506472324711"	MINEPS	REAL	0"16775174265421615510"
DIMINS	INTEGER	514	MINFLT	REAL	0"57542450342416451635"
DIMPXL	INTEGER	4096	NEWINS	INTEGER	513
DIMRAY	INTEGER	512	NOACL	INTEGER	0
DIMSTK	INTEGER	512	RFLRAY	INTEGER	2
ENTER	INTEGER	1	SHDINS	INTEGER	514
EPS	REAL	0"16706553762465362572"	SPHPRM	INTEGER	1
EYERAY	INTEGER	1	SUBACL	INTEGER	1
GTHUGE	REAL	0"17474611320000000000"	TRIPRM	INTEGER	2
LEAVE	INTEGER	2	TRNRAY	INTEGER	3
LGTBRN	INTEGER	2	TRTPI	REAL	0"17216220773232113302"
LGTCON	INTEGER	0			

--PROCEDURES--(LO=A)

-NAME	-TYPE	-ARGS	-CLASS	-NAME	-TYPE	-ARGS	-CLASS
-------	-------	-------	--------	-------	-------	-------	--------

COS	GENERIC	1	INTRINSIC	REAL	GENERIC	1	INTRINSIC		
NRMVEC		3	SUBROUTINE	SIN	GENERIC	1	INTRINSIC		
RANHLF	REAL	1	FUNCTION	TRACE		0	SUBROUTINE		
□	SUBROUTINE TRCLN		73/720 OPT=2			FTN 5.1+538	05/08/09. 12.28.37	PAGE	8

--STATEMENT LABELS--(LO=A)
 -LABEL-ADDRESS-----PROPERTIES-----DEF

1	INACTIVE	DO-TERM	307
2	INACTIVE	DO-TERM	297
3	INACTIVE	DO-TERM	293
4	172B		271
5	200B		283

--ENTRY POINTS--(LO=A)
 -NAME---ADDRESS---ARGS---

TRCLN	3B	1
-------	----	---

--STATISTICS--

PROGRAM-UNIT LENGTH	301B = 193			
CM LABELLED COMMON LENGTH	63104B = 26180			
CM STORAGE USED	57700B = 24512			
COMPILE TIME	0.542 SECONDS			
□	SUBROUTINE TRACE	73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37 PAGE 1

1	C		TRT2	507
2	C		TRT2	508
3		SUBROUTINE TRACE	TRT2	509
4		IMPLICIT CHARACTER*1 (A-Z)	TRT2	510
5	C	*****	TRT2	511
6	C	INTERSECT THE "CURRENT RAY" (RAYSTK.CRAY) WITH ALL THE PRIMITIVES IN TTRT2	TRT2	512
7	C	IF THERE IS AN INTERSECTION RECORD THE INTERSECTION IN THE INTERSECTIOTRT2	TRT2	513
8	C	SET THE CURRENT RAY INTERSECTION INDEX TO THE NEW INTERSECTION.	TRT2	514
9	C	FIND A SHADE AT THE INTERSECTION AND ADD THAT CONTRIBUTION TO THE SAMPTRT2	TRT2	515
10	C	SPAWN NEW REFLECTED AND TRANSMITTED RAYS IF APPROPRIATE. PUSH THEM ON	TRT2	516
11	C	*****	TRT2	517
12	C		PARAMS	1
13	C	-----	PARAMS	2
14	C	-- SUNDRY PARAMETERS --	PARAMS	3
15	C	-----	PARAMS	4
16	C		PARAMS	5
17		REAL GTHUGE, MINEPS, EPS, MINFLT, MAXFLT, TRTPI, DEGRAD	PARAMS	6
18		PARAMETER(GTHUGE=1E7)	PARAMS	7
19		PARAMETER(MINEPS=1E-5)	PARAMS	8
20		PARAMETER(EPS=1E-7)	PARAMS	9
21		PARAMETER(MINFLT=-1E20)	PARAMS	10
22		PARAMETER(MAXFLT=1E20)	PARAMS	11
23		PARAMETER(TRTPI=3.1415926)	PARAMS	12
24		PARAMETER(DEGRAD=TRTPI/180.0)	PARAMS	13
25	C		PARAMS	14
26		INTEGER EYERAY, RFLRAY, TRNRAY	PARAMS	15
27		PARAMETER(EYERAY=1)	PARAMS	16
28		PARAMETER(RFLRAY=2)	PARAMS	17
29		PARAMETER(TRNRAY=3)	PARAMS	18
30	C		PARAMS	19
31		INTEGER ENTER, LEAVE	PARAMS	20

32	PARAMETER(ENTER=1)	PARAMS	21
33	PARAMETER(LEAVE=2)	PARAMS	22
34	C	PARAMS	23
35	INTEGER NOACL, SUBACL	PARAMS	24
36	PARAMETER(NOACL=0)	PARAMS	25
37	PARAMETER(SUBACL=1)	PARAMS	26
38	C	PARAMS	27
39	INTEGER BKNST, BKVERT, BKHORZ	PARAMS	28
40	PARAMETER(BKNST=0)	PARAMS	29
41	PARAMETER(BKVERT=1)	PARAMS	30
42	PARAMETER(BKHORZ=2)	PARAMS	31
43	C	PARAMS	32
44	INTEGER LGTCOS, LGTCOS, LGTBRN	PARAMS	33
45	PARAMETER(LGTCOS=0)	PARAMS	34
46	PARAMETER(LGTCOS=1)	PARAMS	35
47	PARAMETER(LGTBRN=2)	PARAMS	36
48	C	PARAMS	37
49	INTEGER SPHPRM, TRIPRM	PARAMS	38
50	PARAMETER(SPHPRM=1)	PARAMS	39
51	PARAMETER(TRIPRM=2)	PARAMS	40
52	C	PARAMS	41
53	INTEGER DAXX, DAXY, DAXZ	PARAMS	42
54	PARAMETER(DAXX=1)	PARAMS	43
55	PARAMETER(DAXY=2)	PARAMS	44
56	PARAMETER(DAXZ=3)	PARAMS	45
57	C	RAYLST	1
□	SUBROUTINE TRACE 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37 PAGE 2

58	C-----	RAYLST	2
59	C-- RAY LIST COMMON BLOCK --	RAYLST	3
60	C-----	RAYLST	4
61	C SIZE: 13 * DIMRAY + 2 WORDS = 6658	RAYLST	5
62	C	RAYLST	6
63	INTEGER MAXRAY, DIMRAY	RAYLST	7
64	PARAMETER(MAXRAY=512)	RAYLST	8
65	PARAMETER(DIMRAY=MAXRAY)	RAYLST	9
66	C	RAYLST	10
67	INTEGER NLRAY, RAYNUM, RISECT(DIMRAY), RTYPE(DIMRAY)	RAYLST	11
68	INTEGER RDEP(DIMRAY), RRAYID(DIMRAY)	RAYLST	12
69	COMMON /RAYLSI/ NLRAY, RAYNUM, RISECT, RTYPE, RDEP, RRAYID	RAYLST	13
70	C	RAYLST	14
71	REAL ROX(DIMRAY), ROY(DIMRAY), ROZ(DIMRAY)	RAYLST	15
72	REAL RDX(DIMRAY), RDY(DIMRAY), RDZ(DIMRAY)	RAYLST	16
73	REAL RWGTR(DIMRAY), RWGTG(DIMRAY), RWGTB(DIMRAY)	RAYLST	17
74	COMMON /RAYLSR/ ROX, ROY, ROZ, RDX, RDY, RDZ, RWGTR, RWGTG, RWGTB	RAYLST	18
75	C	RAYSTK	1
76	C---- IN-MEMORY AND GLOBALLY ACCESSIBLE DATA STRUCTURES	RAYSTK	2
77	C	RAYSTK	3
78	C-----	RAYSTK	4
79	C-- RAY STACK COMMON BLOCK --	RAYSTK	5
80	C-----	RAYSTK	6
81	C SIZE: DIMSTK + 2 WORDS = 514	RAYSTK	7
82	C	RAYSTK	8
83	INTEGER MAXSTK, DIMSTK	RAYSTK	9
84	PARAMETER(MAXSTK=512)	RAYSTK	10
85	PARAMETER(DIMSTK=MAXSTK)	RAYSTK	11
86	C	RAYSTK	12
87	INTEGER NSRAY, CRAY	RAYSTK	13
88	INTEGER RAY(DIMSTK)	RAYSTK	14
89	COMMON /RAYSTK/ NSRAY, CRAY, RAY	RAYSTK	15
90	C	INSLST	1
91	C-----	INSLST	2

		TRT2_20050809_130554.lpr			
92	C-- INTERSECTION LIST COMMON BLOCK --		INSLST	3	
93	C-----		INSLST	4	
94	C SIZE: 13 * DIMINS + 1 WORDS = 6683		INSLST	5	
95	C		INSLST	6	
96	INTEGER MAXINS, DIMINS, NEWINS, SHDINS		INSLST	7	
97	PARAMETER(MAXINS=512)		INSLST	8	
98	PARAMETER(DIMINS=MAXINS+2)		INSLST	9	
99	PARAMETER(NEWINS=MAXINS+1)		INSLST	10	
100	PARAMETER(SHDINS=MAXINS+2)		INSLST	11	
101	C		INSLST	12	
102	INTEGER NINS, IPRIM(DIMINS), IRRAY(DIMINS), ITRAY(DIMINS)		INSLST	13	
103	INTEGER ITTYP(DIMINS)		INSLST	14	
104	COMMON /INLSI/ NINS, IPRIM, IRRAY, ITRAY, ITTYP		INSLST	15	
105	C		INSLST	16	
106	REAL IPX(DIMINS), IPY(DIMINS), IPZ(DIMINS)		INSLST	17	
107	REAL INX(DIMINS), INY(DIMINS), INZ(DIMINS)		INSLST	18	
108	REAL ICOLR(DIMINS), ICOLG(DIMINS), ICOLB(DIMINS)		INSLST	19	
109	COMMON /INLSR/ IPX, IPY, IPZ, INX, INY, INZ, ICOLR, ICOLG, ICOLB		INSLST	20	
110	C		PRMLST	1	
111	C-----		PRMLST	2	
112	C-- PRIMITIVE LIST COMMON BLOCK --		PRMLST	3	
113	C-----		PRMLST	4	
114	C SIZE: 5 * DIMPRM + 1 WORDS = 5121		PRMLST	5	
114	SUBROUTINE TRACE 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE	3
115	C		PRMLST	6	
116	INTEGER MAXPRM, DIMPRM		PRMLST	7	
117	PARAMETER(MAXPRM=1024)		PRMLST	8	
118	PARAMETER(DIMPRM=MAXPRM)		PRMLST	9	
119	C		PRMLST	10	
120	INTEGER NPRM, MATTER(DIMPRM), PACCEL(DIMPRM), PRAYID(DIMPRM)		PRMLST	11	
121	INTEGER PRMTYP(DIMPRM), PRMIDX(DIMPRM)		PRMLST	12	
122	COMMON /PRMLST/ NPRM, MATTER, PACCEL, PRAYID, PRMTYP, PRMIDX		PRMLST	13	
123	C		MTRLST	1	
124	C-----		MTRLST	2	
125	C-- MATERIAL LIST COMMON BLOCK --		MTRLST	3	
126	C-----		MTRLST	4	
127	C SIZE: 14 * DIMMTR + 1 WORDS = 449		MTRLST	5	
128	C		MTRLST	6	
129	INTEGER MAXMTR, DIMMTR		MTRLST	7	
130	PARAMETER(MAXMTR=32)		MTRLST	8	
131	PARAMETER(DIMMTR=MAXMTR)		MTRLST	9	
132	C		MTRLST	10	
133	INTEGER NMTR		MTRLST	11	
134	COMMON /MTRLSI/ NMTR		MTRLST	12	
135	C		MTRLST	13	
136	REAL MKR(DIMMTR), MKT(DIMMTR)		MTRLST	14	
137	REAL MCDR(DIMMTR), MCDG(DIMMTR), MCAB(DIMMTR)		MTRLST	15	
138	REAL MCSR(DIMMTR), MCDG(DIMMTR), MCDG(DIMMTR)		MTRLST	16	
139	REAL MCSR(DIMMTR), MCSG(DIMMTR), MCSB(DIMMTR)		MTRLST	17	
140	REAL META(DIMMTR), MGLS(DIMMTR), MRGH(DIMMTR)		MTRLST	18	
141	COMMON /MTRLSR/ MKR, MKT, MCDR, MCDG, MCDG, MCDG, MCDG, MCDG, MCDG,		MTRLST	19	
142	+ MCSR, MCSG, MCSB, META, MGLS, MRGH		MTRLST	20	
143	C		SCREEN	1	
144	C-----		SCREEN	2	
145	C-- SCREEN COMMON BLOCK --		SCREEN	3	
146	C-----		SCREEN	4	
147	C SIZE: 3 * DIMPXL + 15 WORDS = 12303		SCREEN	5	
148	C		SCREEN	6	
149	INTEGER MAXPXL, DIMPXL		SCREEN	7	
150	PARAMETER(MAXPXL=4096)		SCREEN	8	
151	PARAMETER(DIMPXL=MAXPXL)		SCREEN	9	

152	C				SCREEN	10
153		INTEGER SNX, SNY, SMAXDP, OS, ACCEL, SHADOW, BKT, CURX, CURY			SCREEN	11
154		COMMON /SCREEI/ SNX, SNY, SMAXDP, OS, ACCEL, SHADOW, BKT,			SCREEN	12
155	+	CURX, CURY			SCREEN	13
156	C				SCREEN	14
157		REAL FPD, APER, FOCAL, FSTOP, MINWGT			SCREEN	15
158		REAL COLR, COLG, COLB			SCREEN	16
159		REAL BACKR, BACKG, BACKB			SCREEN	17
160		REAL BKRI, BKRF, BKRD			SCREEN	18
161		REAL BKGI, BKGF, BKGD			SCREEN	19
162		REAL BKBI, BKBF, BKBD			SCREEN	20
163		REAL LINER(DIMPXL), LINEG(DIMPXL), LINEB(DIMPXL)			SCREEN	21
164		COMMON /SCREER/ FPD, APER, FOCAL, FSTOP, MINWGT,			SCREEN	22
165	+	COLR, COLG, COLB,			SCREEN	23
166	+	BACKR, BACKG, BACKB,			SCREEN	24
167	+	BKRI, BKRF, BKRD,			SCREEN	25
168	+	BKGI, BKGF, BKGD,			SCREEN	26
169	+	BKBI, BKBF, BKBD,			SCREEN	27
170	+	LINER, LINEG, LINEB			SCREEN	28
171	C				STATS	1
	□ SUBROUTINE TRACE	73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE	4
172	C	-----			STATS	2
173	C--	STATISTICS COMMON BLOCK --			STATS	3
174	C	-----			STATS	4
175	C	SIZE: 8 WORDS.			STATS	5
176	C				STATS	6
177		INTEGER MAXDPS, MAXRYS, MAXISS, TOTRAY, TOTFEL, NACC, NOACC			STATS	7
178		COMMON /STATSI/ MAXDPS, MAXRYS, MAXISS, TOTRAY, TOTFEL, NACC,			STATS	8
179	+	NOACC			STATS	9
180	C				STATS	10
181		REAL NSECTS			STATS	11
182		COMMON /STATSR/ NSECTS			STATS	12
183	C				TRT2	526
184	C--	LOCAL VARIABLES			TRT2	527
185	C				TRT2	528
186		REAL OX, OY, OZ			TRT2	529
187		REAL DX, DY, DZ			TRT2	530
188		REAL NDOTI, ETA, RETA, COS1, COS22, K2, SWGT, TVAL			TRT2	531
189		REAL RWGT, LRWGTR, LRWGTG, LRWGTB			TRT2	532
190		REAL TWGT, TWGTR, TWGTG, TWGTB			TRT2	533
191		REAL CWGTR, CWGTG, CWGTB			TRT2	534
192		INTEGER NINST, PRIM, MATL, ASECT, DEP, TTYP, IDUM			TRT2	535
193	C				TRT2	536
194	C--	GET USEFUL THINGS ABOUT THE CURRENT RAY.			TRT2	537
195	C				TRT2	538
196		OX = ROX(CRAY)			TRT2	539
197		OY = ROY(CRAY)			TRT2	540
198		OZ = ROZ(CRAY)			TRT2	541
199		DX = RDX(CRAY)			TRT2	542
200		DY = RDY(CRAY)			TRT2	543
201		DZ = RDZ(CRAY)			TRT2	544
202		CWGTR = RWGTR(CRAY)			TRT2	545
203		CWGTG = RWGTG(CRAY)			TRT2	546
204		CWGTB = RWGTB(CRAY)			TRT2	547
205		DEP = RDEP(CRAY)			TRT2	548
206		IF(DEP .GT. MAXDPS)MAXDPS = DEP			TRT2	549
207	C				TRT2	550
208	C--	TEST FOR INTERSECTIONS. IF THERE ARE ANY, WE NEED THE NEAREST.			TRT2	551
209	C--	IF THERE WAS AN INTERSECTION, ITS POSITION AND SURFACE NORMAL WILL	BTRT2		552	
210	C--	INSLST.XXX(INSLST.NINS+1) AFTER THIS.	TRT2		553	
211	C		TRT2		554	

212	NINST = NINS + 1	TRT2	555
213	IF(ACCEL .EQ. NOACL)THEN	TRT2	556
214	CALL GENST(OX, OY, OZ, DX, DY, DZ, NINST, ASECT, TVAL, 1)	TRT2	557
215	ELSE	TRT2	558
216	CALL CELSCT(OX, OY, OZ, DX, DY, DZ, NINST, ASECT, TVAL, 1)	TRT2	559
217	ENDIF	TRT2	560
218	C	TRT2	561
219	C-- IF THERE ACTUALLY WAS AN INTERSECTION, UPDATE THE INTERSECTION COUNT	TRT2	562
220	C-- CREATE NEW REFLECTED AND TRANSMITTED RAYS IF APPROPRIATE.	TRT2	563
221	C	TRT2	564
222	IF(ASECT .NE. 0)THEN	TRT2	565
223	NINS = NINST	TRT2	566
224	IF(NINST .GT. MAXISS)MAXISS = NINST	TRT2	567
225	PRIM = IPRIM(NINST)	TRT2	568
226	MATL = MATTER(PRIM)	TRT2	569
227	LRWGTR = MKR(MATL) * MCDR(MATL) * CWGTR	TRT2	570
228	LRWGTG = MKR(MATL) * MCDG(MATL) * CWGTG	TRT2	571
□	SUBROUTINE TRACE 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
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229	LRWGTB = MKR(MATL) * MCDB(MATL) * CWGTB	TRT2	572
230	TWGTR = MKT(MATL) * MCDR(MATL) * CWGTR	TRT2	573
231	TWGTG = MKT(MATL) * MCDG(MATL) * CWGTG	TRT2	574
232	TWGTB = MKT(MATL) * MCDB(MATL) * CWGTB	TRT2	575
233	TTYTYP = ITTYP(NINST)	TRT2	576
234	ETA = META(MATL)	TRT2	577
235	C	TRT2	578
236	C-- USE MAXIMUM OF COLOUR COMPONENT WEIGHTS TO DECIDE IF TO TERMINATE	TRT2	579
237	C	TRT2	580
238	RWGT = LRWGTR	TRT2	581
239	IF(LRWGTG .GT. RWGT)RWGT = LRWGTG	TRT2	582
240	IF(LRWGTB .GT. RWGT)RWGT = LRWGTB	TRT2	583
241	TWGT = TWGTR	TRT2	584
242	IF(TWGTG .GT. TWGT)TWGT = TWGTG	TRT2	585
243	IF(TWGTB .GT. TWGT)TWGT = TWGTB	TRT2	586
244	C	TRT2	587
245	C-- FLIP THE NORMAL?	TRT2	588
246	C	TRT2	589
247	IF((DX * INX(NINST) + DY * INY(NINST) + DZ * INZ(NINST))	TRT2	590
248	+ .GT. 0.0)THEN	TRT2	591
249	INX(NINST) = -INX(NINST)	TRT2	592
250	INY(NINST) = -INY(NINST)	TRT2	593
251	INZ(NINST) = -INZ(NINST)	TRT2	594
252	ENDIF	TRT2	595
253	C	TRT2	596
254	C-- CALCULATE THE COLOUR AT THE INTERSECTION.	TRT2	597
255	C	TRT2	598
256	CALL SHADE(NINST, MATL)	TRT2	599
257	SWGT = 1.0 - MKR(MATL) - MKT(MATL)	TRT2	600
258	IF(SWGT .LT. 0.0)SWGT = 0.0	TRT2	601
259	COLR = COLR + (ICOLR(NINST) * SWGT * CWGTR)	TRT2	602
260	COLG = COLG + (ICOLG(NINST) * SWGT * CWGTG)	TRT2	603
261	COLB = COLB + (ICOLB(NINST) * SWGT * CWGTB)	TRT2	604
262	C	TRT2	605
263	C-- SPAWN NEW RAYS (RECURSE, EFFECTIVELY) IF WE ARE NOT TOO DEEP.	TRT2	606
264	C	TRT2	607
265	IF(DEP .LT. SMAXDP)THEN	TRT2	608
266	DEP = DEP + 1	TRT2	609
267	C	TRT2	610
268	C-- NEW REFLECTED RAY	TRT2	611
269	C	TRT2	612
270	IF(RWGT .GT. MINWGT)THEN	TRT2	613
271	NDOTI = 2 * (INX(NINST) * DX + INY(NINST) * DY +	TRT2	614

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272 + INZ(NINST) * DZ ) TRT2 615
273 NLRAY = NLRAY + 1 TRT2 616
274 RAYNUM = RAYNUM + 1 TRT2 617
275 RRAYID(NLRAY) = RAYNUM TRT2 618
276 RTYPE(NLRAY) = RFLRAY TRT2 619
277 RISECT(NLRAY) = 0 TRT2 620
278 RWGTR(NLRAY) = LRWGTR TRT2 621
279 RWGTG(NLRAY) = LRWGTG TRT2 622
280 RWGTB(NLRAY) = LRWGTB TRT2 623
281 RDEP(NLRAY) = DEP TRT2 624
282 ROX(NLRAY) = IPX(NINST) TRT2 625
283 ROY(NLRAY) = IPY(NINST) TRT2 626
284 ROZ(NLRAY) = IPZ(NINST) TRT2 627
285 RDX(NLRAY) = DX - NDOTI * INX(NINST) TRT2 628
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286 RDY(NLRAY) = DY - NDOTI * INY(NINST) TRT2 629
287 RDZ(NLRAY) = DZ - NDOTI * INZ(NINST) TRT2 630
288 CALL NRMVEC( RDX(NLRAY), RDY(NLRAY), RDZ(NLRAY) ) TRT2 631
289 IRRAY(NINST) = NLRAY TRT2 632
290 NSRAY = NSRAY + 1 TRT2 633
291 RAY(NSRAY) = NLRAY TRT2 634
292 TOTRAY = TOTRAY + 1 TRT2 635
293 IF( NLRAY .GT. MAXRYS )MAXRYS = NLRAY TRT2 636
294 ENDIF TRT2 637
295 C TRT2 638
296 C-- NEW TRANSMITTED RAY TRT2 639
297 C TRT2 640
298 IF( TWGT .GT. MINWGT )THEN TRT2 641
299 IF( TTYP .EQ. ENTER )THEN TRT2 642
300 RETA = ETA TRT2 643
301 ELSE TRT2 644
302 RETA = 1.0 / ETA TRT2 645
303 ENDIF TRT2 646
304 COS1 = -( INX(NINST) * DX + INY(NINST) * DY + TRT2 647
305 + INZ(NINST) * DZ ) TRT2 648
306 COS22 = 1.0 - RETA * RETA * ( 1.0 - COS1 * COS1 ) TRT2 649
307 IF( COS22 .GT. 0.0 )THEN TRT2 650
308 K2 = RETA * COS1 - SQRT( COS22 ) TRT2 651
309 NLRAY = NLRAY + 1 TRT2 652
310 RAYNUM = RAYNUM + 1 TRT2 653
311 RRAYID(NLRAY) = RAYNUM TRT2 654
312 RTYPE(NLRAY) = TRNRAY TRT2 655
313 RISECT(NLRAY) = 0 TRT2 656
314 RWGTR(NLRAY) = TWGTR TRT2 657
315 RWGTG(NLRAY) = TWGTG TRT2 658
316 RWGTB(NLRAY) = TWGTB TRT2 659
317 RDEP(NLRAY) = DEP TRT2 660
318 ROX(NLRAY) = IPX(NINST) TRT2 661
319 ROY(NLRAY) = IPY(NINST) TRT2 662
320 ROZ(NLRAY) = IPZ(NINST) TRT2 663
321 RDX(NLRAY) = RETA * DX + K2 * INX(NINST) TRT2 664
322 RDY(NLRAY) = RETA * DY + K2 * INY(NINST) TRT2 665
323 RDZ(NLRAY) = RETA * DZ + K2 * INZ(NINST) TRT2 666
324 CALL NRMVEC( RDX(NLRAY), RDY(NLRAY), RDZ(NLRAY) ) TRT2 667
325 ITRAY(NINST) = NLRAY TRT2 668
326 NSRAY = NSRAY + 1 TRT2 669
327 RAY(NSRAY) = NLRAY TRT2 670
328 TOTRAY = TOTRAY + 1 TRT2 671
329 IF( NLRAY .GT. MAXRYS )MAXRYS = NLRAY TRT2 672
330 ENDIF TRT2 673
331 ENDIF TRT2 674

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332      C
333      C-- END OF LESS THAN MAXIMUM RAY STACK DEPTH
334      C
335      ENDIF
336      C
337      C-- IF THIS RAY DOESN'T HIT ANYTHING, ADD IN THE BACKGROUND COLOUR.
338      C
339      ELSE
340      CALL CALCBK
341      COLR = COLR + BACKR * CWGTR
342      COLG = COLG + BACKG * CWGTG
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343      COLB = COLB + BACKB * CWGTB
344      ENDIF
345      C
346      RETURN
347      END

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--VARIABLE MAP--(LO=A)

-NAME-	ADDRESS-	BLOCK-	PROPERTIES-	TYPE-	SIZE	-NAME-	ADDRESS-	BLOCK-	PROPERTIES-	TYPE-	SIZE
ACCEL	4B	/SCREEI/		INTEGER		ITRAY	2005B	/INLSI/		INTEGER	514
APER	1B	/SCREER/		REAL		ITYP	3007B	/INLSI/		INTEGER	514
ASECT	404B			INTEGER		K2	364B			REAL	
BACKB	12B	/SCREER/		REAL		LINEB	20024B	/SCREER/		REAL	4096
BACKG	11B	/SCREER/		REAL		LINEG	10024B	/SCREER/		REAL	4096
BACKR	10B	/SCREER/		REAL		LINER	24B	/SCREER/		REAL	4096
BKBD	23B	/SCREER/		REAL		LRWGTB	372B			REAL	
BKBF	22B	/SCREER/		REAL		LRWGTG	371B			REAL	
BKBI	21B	/SCREER/		REAL		LRWGTR	370B			REAL	
BKGD	20B	/SCREER/		REAL		MATL	403B			INTEGER	
BKGF	17B	/SCREER/		REAL		MATTER	1B	/PRMLST/		INTEGER	1024
BKGI	16B	/SCREER/		REAL		MAXDPS	0B	/STATSI/		INTEGER	
BKRD	15B	/SCREER/		REAL		MAXISS	2B	/STATSI/		INTEGER	
BKRF	14B	/SCREER/		REAL		MAXRYS	1B	/STATSI/		INTEGER	
BKRI	13B	/SCREER/		REAL		MCAB	200B	/MTRLSR/		REAL	32
BKT	6B	/SCREEI/		INTEGER		MCAG	140B	/MTRLSR/		REAL	32
COLB	7B	/SCREER/		REAL		MCAR	100B	/MTRLSR/		REAL	32
COLG	6B	/SCREER/		REAL		MCDB	340B	/MTRLSR/		REAL	32
COLR	5B	/SCREER/		REAL		MCDG	300B	/MTRLSR/		REAL	32
COS1	362B			REAL		MCDR	240B	/MTRLSR/		REAL	32
COS22	363B			REAL		MCSB	500B	/MTRLSR/		REAL	32
CRAY	1B	/RAYSTK/		INTEGER		MCSG	440B	/MTRLSR/		REAL	32
CURX	7B	/SCREEI/		INTEGER		MCSR	400B	/MTRLSR/		REAL	32
CURY	10B	/SCREEI/		INTEGER		META	540B	/MTRLSR/		REAL	32
CWGTB	401B			REAL		MGLS	600B	/MTRLSR/		REAL	32
CWGTG	400B			REAL		MINWGT	4B	/SCREER/		REAL	
CWGTR	377B			REAL		MKR	0B	/MTRLSR/		REAL	32
DEP	405B			INTEGER		MKT	40B	/MTRLSR/		REAL	32
DX	354B			REAL		MRGH	640B	/MTRLSR/		REAL	32
DY	355B			REAL		NACC	5B	/STATSI/		INTEGER	
DZ	356B			REAL		NDOTI	357B			REAL	
ETA	360B			REAL		NINS	0B	/INLSI/		INTEGER	
FOCAL	2B	/SCREER/		REAL		NINST	402B			INTEGER	
FPD	0B	/SCREER/		REAL		NLRAY	0B	/RAYLSI/		INTEGER	
FSTOP	3B	/SCREER/		REAL		NMTR	0B	/MTRLSI/		INTEGER	
ICOLB	10020B	/INLSR/		REAL	514	NOACC	6B	/STATSI/		INTEGER	
ICOLG	7016B	/INLSR/		REAL	514	NPRM	0B	/PRMLST/		INTEGER	
ICOLR	6014B	/INLSR/		REAL	514	NSECTS	0B	/STATSR/		REAL	
IDUM	NONE		UNUSED/*S*	INTEGER		NSRAY	0B	/RAYSTK/		INTEGER	

NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE	NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE
INX	3006B	/INLSR/		REAL	514	OS		3B	/SCREEI/	INTEGER	
INY	4010B	/INLSR/		REAL	514	OX		351B		REAL	
INZ	5012B	/INLSR/		REAL	514	OY		352B		REAL	
IPRIM	1B	/INLSI/		INTEGER	514	OZ		353B		REAL	
IPX	0B	/INLSR/		REAL	514	PACCEL	2001B		/PRMLST/	INTEGER	1024
IPY	1002B	/INLSR/		REAL	514	PRAYID	4001B		/PRMLST/	INTEGER	1024
IPZ	2004B	/INLSR/		REAL	514	PRIM	NONE			INTEGER	
IRRAY	1003B	/INLSI/		INTEGER	514	PRMIDX	10001B		/PRMLST/	INTEGER	1024
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PRMTYP	6001B	/PRMLST/		INTEGER	1024	RWGTG	7000B		/RAYLSR/	REAL	512
RAY	2B	/RAYSTK/		INTEGER	512	RWGTR	6000B		/RAYLSR/	REAL	512
RAYNUM	1B	/RAYLSI/		INTEGER		SHADOW	5B		/SCREEI/	INTEGER	
RDEP	2002B	/RAYLSI/		INTEGER	512	SMAXDP	2B		/SCREEI/	INTEGER	
RDX	3000B	/RAYLSR/		REAL	512	SNX	0B		/SCREEI/	INTEGER	
RDY	4000B	/RAYLSR/		REAL	512	SNY	1B		/SCREEI/	INTEGER	
RDZ	5000B	/RAYLSR/		REAL	512	SWGT	365B			REAL	
RETA	361B			REAL		TOTFEL	4B		/STATSI/	INTEGER	
RISECT	2B	/RAYLSI/		INTEGER	512	TOTRAY	3B		/STATSI/	INTEGER	
ROX	0B	/RAYLSR/		REAL	512	TTYP	406B			INTEGER	
ROY	1000B	/RAYLSR/		REAL	512	TVAL	366B			REAL	
ROZ	2000B	/RAYLSR/		REAL	512	TWGT	373B			REAL	
RRAYID	3002B	/RAYLSI/		INTEGER	512	TWGTB	376B			REAL	
RTYPE	1002B	/RAYLSI/		INTEGER	512	TWGTG	375B			REAL	
RWGT	367B			REAL		TWGTR	374B			REAL	
RWGTB	10000B	/RAYLSR/		REAL	512						

--SYMBOLIC CONSTANTS--(LO=A)

NAME	TYPE	VALUE	NAME	TYPE	VALUE
BKCNST	INTEGER	0	LGTCOS	INTEGER	1
BKHORZ	INTEGER	2	MAXFLT	REAL	0"20235327435361326142"
BKVERT	INTEGER	1	MAXINS	INTEGER	512
DAXX	INTEGER	1	MAXMTR	INTEGER	32
DAXY	INTEGER	2	MAXPRM	INTEGER	1024
DAXZ	INTEGER	3	MAXPXL	INTEGER	4096
DEGRAD	REAL	0"17124357506472324711"	MAXRAY	INTEGER	512
DIMINS	INTEGER	514	MAXSTK	INTEGER	512
DIMMTR	INTEGER	32	MINEPS	REAL	0"16775174265421615510"
DIMPRM	INTEGER	1024	MINFLT	REAL	0"57542450342416451635"
DIMPXL	INTEGER	4096	NEWINS	INTEGER	513
DIMRAY	INTEGER	512	NOACL	INTEGER	0
DIMSTK	INTEGER	512	RFLRAY	INTEGER	2
ENTER	INTEGER	1	SHDINS	INTEGER	514
EPS	REAL	0"16706553762465362572"	SPHPRM	INTEGER	1
EYERAY	INTEGER	1	SUBACL	INTEGER	1
GTHUGE	REAL	0"17474611320000000000"	TRIPRM	INTEGER	2
LEAVE	INTEGER	2	TRNRAY	INTEGER	3
LGTBRN	INTEGER	2	TRTPI	REAL	0"17216220773232113302"
LGTCON	INTEGER	0			

--PROCEDURES--(LO=A)

NAME	TYPE	ARGS	CLASS	NAME	TYPE	ARGS	CLASS
CALCBK		0	SUBROUTINE	NRMVEC		3	SUBROUTINE
CELSCT		10	SUBROUTINE	SHADE		2	SUBROUTINE
GENSCT		10	SUBROUTINE	SQRT	GENERIC	1	INTRINSIC
SUBROUTINE TRACE			73/720	OPT=2		FTN	5.1+538
						05/08/09. 12.28.37	PAGE 9

--ENTRY POINTS--(LO=A)
 -NAME---ADDRESS--ARGS---

TRACE 3B 0

--STATISTICS--

PROGRAM-UNIT LENGTH 407B = 263
 CM LABELLED COMMON LENGTH 76006B = 31750
 CM STORAGE USED 60000B = 24576
 COMPILE TIME 0.722 SECONDS
 □ SUBROUTINE CALCBK 73/720 OPT=2

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1	C		TRT2	691
2	C		TRT2	692
3		SUBROUTINE CALCBK	TRT2	693
4		IMPLICIT CHARACTER*1 (A-Z)	TRT2	694
5		C*****	TRT2	695
6		C CALCULATE THE BACKGROUND COLOUR FOR GRADED BACKGROUNDS	TRT2	696
7		C*****	TRT2	697
8	C		PARAMS	1
9	C	-----	PARAMS	2
10	C	-- SUNDRY PARAMETERS --	PARAMS	3
11	C	-----	PARAMS	4
12	C		PARAMS	5
13		REAL GTHUGE, MINEPS, EPS, MINFLT, MAXFLT, TRTPI, DEGRAD	PARAMS	6
14		PARAMETER(GTHUGE=1E7)	PARAMS	7
15		PARAMETER(MINEPS=1E-5)	PARAMS	8
16		PARAMETER(EPS=1E-7)	PARAMS	9
17		PARAMETER(MINFLT=-1E20)	PARAMS	10
18		PARAMETER(MAXFLT=1E20)	PARAMS	11
19		PARAMETER(TRTPI=3.1415926)	PARAMS	12
20		PARAMETER(DEGRAD=TRTPI/180.0)	PARAMS	13
21	C		PARAMS	14
22		INTEGER EYERAY, RFLRAY, TRNRAY	PARAMS	15
23		PARAMETER(EYERAY=1)	PARAMS	16
24		PARAMETER(RFLRAY=2)	PARAMS	17
25		PARAMETER(TRNRAY=3)	PARAMS	18
26	C		PARAMS	19
27		INTEGER ENTER, LEAVE	PARAMS	20
28		PARAMETER(ENTER=1)	PARAMS	21
29		PARAMETER(LEAVE=2)	PARAMS	22
30	C		PARAMS	23
31		INTEGER NOACL, SUBACL	PARAMS	24
32		PARAMETER(NOACL=0)	PARAMS	25
33		PARAMETER(SUBACL=1)	PARAMS	26
34	C		PARAMS	27
35		INTEGER BKCNST, BKVERT, BKHORZ	PARAMS	28
36		PARAMETER(BKCNST=0)	PARAMS	29
37		PARAMETER(BKVERT=1)	PARAMS	30
38		PARAMETER(BKHORZ=2)	PARAMS	31
39	C		PARAMS	32
40		INTEGER LGTCOS, LGTCON, LGTBRN	PARAMS	33
41		PARAMETER(LGTCOS=0)	PARAMS	34
42		PARAMETER(LGTCON=1)	PARAMS	35
43		PARAMETER(LGTBRN=2)	PARAMS	36
44	C		PARAMS	37
45		INTEGER SPHPRM, TRIPRM	PARAMS	38
46		PARAMETER(SPHPRM=1)	PARAMS	39
47		PARAMETER(TRIPRM=2)	PARAMS	40
48	C		PARAMS	41

49	INTEGER DAXX, DAXY, DAXZ	PARAMS	42
50	PARAMETER(DAXX=1)	PARAMS	43
51	PARAMETER(DAXY=2)	PARAMS	44
52	PARAMETER(DAXZ=3)	PARAMS	45
53	C	SCREEN	1
54	C-----	SCREEN	2
55	C-- SCREEN COMMON BLOCK --	SCREEN	3
56	C-----	SCREEN	4
57	C SIZE: 3 * DIMPXL + 15 WORDS = 12303	SCREEN	5
□	SUBROUTINE CALCBK 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
		PAGE	2
58	C	SCREEN	6
59	INTEGER MAXPXL, DIMPXL	SCREEN	7
60	PARAMETER(MAXPXL=4096)	SCREEN	8
61	PARAMETER(DIMPXL=MAXPXL)	SCREEN	9
62	C	SCREEN	10
63	INTEGER SNX, SNY, SMAZDP, OS, ACCEL, SHADOW, BKT, CURX, CURY	SCREEN	11
64	COMMON /SCREEI/ SNX, SNY, SMAZDP, OS, ACCEL, SHADOW, BKT,	SCREEN	12
65	+ CURX, CURY	SCREEN	13
66	C	SCREEN	14
67	REAL FPD, APER, FOCAL, FSTOP, MINWGT	SCREEN	15
68	REAL COLR, COLG, COLB	SCREEN	16
69	REAL BACKR, BACKG, BACKB	SCREEN	17
70	REAL BKRI, BKRF, BKRD	SCREEN	18
71	REAL BKGI, BKGf, BKGD	SCREEN	19
72	REAL BKBI, BKBF, BKBD	SCREEN	20
73	REAL LINER(DIMPXL), LINEG(DIMPXL), LINEB(DIMPXL)	SCREEN	21
74	COMMON /SCREER/ FPD, APER, FOCAL, FSTOP, MINWGT,	SCREEN	22
75	+ COLR, COLG, COLB,	SCREEN	23
76	+ BACKR, BACKG, BACKB,	SCREEN	24
77	+ BKRI, BKRF, BKRD,	SCREEN	25
78	+ BKGI, BKGf, BKGD,	SCREEN	26
79	+ BKBI, BKBF, BKBD,	SCREEN	27
80	+ LINER, LINEG, LINEB	SCREEN	28
81	C	TRT2	700
82	INTEGER CX, CY	TRT2	701
83		TRT2	702
84	CX = CURX - 1	TRT2	703
85	CY = CURY - 1	TRT2	704
86	IF(BKT .EQ. BKCNST)THEN	TRT2	705
87	BACKR = BKRI	TRT2	706
88	BACKG = BKGI	TRT2	707
89	BACKB = BKBI	TRT2	708
90	ELSE IF(BKT .EQ. BKVERT)THEN	TRT2	709
91	BACKR = BKRI + BKRD * CY	TRT2	710
92	BACKG = BKGI + BKGD * CY	TRT2	711
93	BACKB = BKBI + BKBD * CY	TRT2	712
94	ELSE IF(BKT .EQ. BKHORZ)THEN	TRT2	713
95	BACKR = BKRI + BKRD * CX	TRT2	714
96	BACKG = BKGI + BKGD * CX	TRT2	715
97	BACKB = BKBI + BKBD * CX	TRT2	716
98	ENDIF	TRT2	717
99	IF(BACKR .LT. 0.0)THEN	TRT2	718
100	BACKR = 0.0	TRT2	719
101	ELSE IF(BACKR .GT. 1.0)THEN	TRT2	720
102	BACKR = 1.0	TRT2	721
103	ENDIF	TRT2	722
104	IF(BACKG .LT. 0.0)THEN	TRT2	723
105	BACKG = 0.0	TRT2	724
106	ELSE IF(BACKG .GT. 1.0)THEN	TRT2	725
107	BACKG = 1.0	TRT2	726
108	ENDIF	TRT2	727

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109          IF( BACKB .LT. 0.0 )THEN
110             BACKB = 0.0
111          ELSE IF( BACKB .GT. 1.0 )THEN
112             BACKB = 1.0
113          ENDIF
114          C
SUBROUTINE CALCBK      73/720  OPT=2
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115          RETURN
116          END
TRT2      728
TRT2      729
TRT2      730
TRT2      731
TRT2      732
TRT2      733
TRT2      734
TRT2      735

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--VARIABLE MAP--(LO=A)

-NAME-	ADDRESS-	BLOCK-	PROPERTIES-	TYPE-	SIZE	-NAME-	ADDRESS-	BLOCK-	PROPERTIES-	TYPE-	SIZE
ACCEL	4B	/SCREEI/		INTEGER		COLR	5B	/SCREER/		REAL	
APER	1B	/SCREER/		REAL		CURX	7B	/SCREEI/		INTEGER	
BACKB	12B	/SCREER/		REAL		CURY	10B	/SCREEI/		INTEGER	
BACKG	11B	/SCREER/		REAL		CX	67B			INTEGER	
BACKR	10B	/SCREER/		REAL		CY	70B			INTEGER	
BKBD	23B	/SCREER/		REAL		FOCAL	2B	/SCREER/		REAL	
BKBF	22B	/SCREER/		REAL		FPD	0B	/SCREER/		REAL	
BKBI	21B	/SCREER/		REAL		FSTOP	3B	/SCREER/		REAL	
BKGD	20B	/SCREER/		REAL		LINEB	20024B	/SCREER/		REAL	4096
BKGF	17B	/SCREER/		REAL		LINEG	10024B	/SCREER/		REAL	4096
BKGI	16B	/SCREER/		REAL		LINER	24B	/SCREER/		REAL	4096
BKRD	15B	/SCREER/		REAL		MINWGT	4B	/SCREER/		REAL	
BKRF	14B	/SCREER/		REAL		OS	3B	/SCREEI/		INTEGER	
BKRI	13B	/SCREER/		REAL		SHADOW	5B	/SCREEI/		INTEGER	
BKT	6B	/SCREEI/		INTEGER		SMAXDP	2B	/SCREEI/		INTEGER	
COLB	7B	/SCREER/		REAL		SNX	0B	/SCREEI/		INTEGER	
COLG	6B	/SCREER/		REAL		SNY	1B	/SCREEI/		INTEGER	

--SYMBOLIC CONSTANTS--(LO=A)

-NAME-	TYPE-	VALUE	-NAME-	TYPE-	VALUE
BKCNST	INTEGER	0	LGTCOS	INTEGER	0
BKHORZ	INTEGER	2	LGTCOS	INTEGER	1
BKVERT	INTEGER	1	MAXFLT	REAL	0"20235327435361326142"
DAXX	INTEGER	1	MAXPXL	INTEGER	4096
DAXY	INTEGER	2	MINEPS	REAL	0"16775174265421615510"
DAXZ	INTEGER	3	MINFLT	REAL	0"57542450342416451635"
DEGRAD	REAL	0"17124357506472324711"	NOACL	INTEGER	0
DIMPXL	INTEGER	4096	RFLRAY	INTEGER	2
ENTER	INTEGER	1	SPHPRM	INTEGER	1
EPS	REAL	0"16706553762465362572"	SUBACL	INTEGER	1
EYERAY	INTEGER	1	TRIPRM	INTEGER	2
GTHUGE	REAL	0"17474611320000000000"	TRNRAY	INTEGER	3
LEAVE	INTEGER	2	TRTPI	REAL	0"17216220773232113302"
LGTBRN	INTEGER	2			

--ENTRY POINTS--(LO=A)

-NAME-	ADDRESS-	ARGS-				
CALCBK	3B	0				
□	SUBROUTINE CALCBK	73/720	OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE 4

--STATISTICS--

PROGRAM-UNIT LENGTH 71B = 57
 CM LABELLED COMMON LENGTH 30035B = 12317
 CM STORAGE USED 57200B = 24192
 COMPILE TIME 0.201 SECONDS

□ SUBROUTINE SHADE 73/720 OPT=2 FTN 5.1+538 05/08/09. 12.28.37 PAGE 1

1	C		TRT2	736
2	C-----		TRT2	737
3	C SHADING ROUTINES		TRT2	738
4	C-----		TRT2	739
5	C		TRT2	740
6		SUBROUTINE SHADE(I, MATL)	TRT2	741
7		IMPLICIT CHARACTER*1 (A-Z)	TRT2	742
8		INTEGER I, MATL	TRT2	743
9	C*****		TRT2	744
10	C	FIND THE COLOUR AT INTERSECTION I WHERE MATERIAL MATL IS TO BE FOUND.	TRT2	745
11	C*****		TRT2	746
12	C		PARAMS	1
13	C-----		PARAMS	2
14	C-- SUNDRY PARAMETERS --		PARAMS	3
15	C-----		PARAMS	4
16	C		PARAMS	5
17		REAL GTHUGE, MINEPS, EPS, MINFLT, MAXFLT, TRTPI, DEGRAD	PARAMS	6
18		PARAMETER(GTHUGE=1E7)	PARAMS	7
19		PARAMETER(MINEPS=1E-5)	PARAMS	8
20		PARAMETER(EPS=1E-7)	PARAMS	9
21		PARAMETER(MINFLT=-1E20)	PARAMS	10
22		PARAMETER(MAXFLT=1E20)	PARAMS	11
23		PARAMETER(TRTPI=3.1415926)	PARAMS	12
24		PARAMETER(DEGRAD=TRTPI/180.0)	PARAMS	13
25	C		PARAMS	14
26		INTEGER EYERAY, RFLRAY, TRNRAY	PARAMS	15
27		PARAMETER(EYERAY=1)	PARAMS	16
28		PARAMETER(RFLRAY=2)	PARAMS	17
29		PARAMETER(TRNRAY=3)	PARAMS	18
30	C		PARAMS	19
31		INTEGER ENTER, LEAVE	PARAMS	20
32		PARAMETER(ENTER=1)	PARAMS	21
33		PARAMETER(LEAVE=2)	PARAMS	22
34	C		PARAMS	23
35		INTEGER NOACL, SUBACL	PARAMS	24
36		PARAMETER(NOACL=0)	PARAMS	25
37		PARAMETER(SUBACL=1)	PARAMS	26
38	C		PARAMS	27
39		INTEGER BKCNST, BKVERT, BKHORZ	PARAMS	28
40		PARAMETER(BKCNST=0)	PARAMS	29
41		PARAMETER(BKVERT=1)	PARAMS	30
42		PARAMETER(BKHORZ=2)	PARAMS	31
43	C		PARAMS	32
44		INTEGER LGTCON, LGTCOS, LGTBRN	PARAMS	33
45		PARAMETER(LGTCON=0)	PARAMS	34
46		PARAMETER(LGTCOS=1)	PARAMS	35
47		PARAMETER(LGTBRN=2)	PARAMS	36
48	C		PARAMS	37
49		INTEGER SPHPRM, TRIPRM	PARAMS	38
50		PARAMETER(SPHPRM=1)	PARAMS	39
51		PARAMETER(TRIPRM=2)	PARAMS	40
52	C		PARAMS	41
53		INTEGER DAXX, DAXY, DAXZ	PARAMS	42
54		PARAMETER(DAXX=1)	PARAMS	43
55		PARAMETER(DAXY=2)	PARAMS	44
56		PARAMETER(DAXZ=3)	PARAMS	45

57	C				INSLST	1
□	SUBROUTINE SHADE	73/720	OPT=2	FTN 5.1+538	05/08/09.	12.28.37
					PAGE	2
58	C	-----			INSLST	2
59	C	-- INTERSECTION LIST COMMON BLOCK --			INSLST	3
60	C	-----			INSLST	4
61	C	SIZE: 13 * DIMINS + 1 WORDS = 6683			INSLST	5
62	C				INSLST	6
63		INTEGER MAXINS, DIMINS, NEWINS, SHDINS			INSLST	7
64		PARAMETER(MAXINS=512)			INSLST	8
65		PARAMETER(DIMINS=MAXINS+2)			INSLST	9
66		PARAMETER(NEWINS=MAXINS+1)			INSLST	10
67		PARAMETER(SHDINS=MAXINS+2)			INSLST	11
68	C				INSLST	12
69		INTEGER NINS, IPRIM(DIMINS), IRRAY(DIMINS), ITRAY(DIMINS)			INSLST	13
70		INTEGER ITTYP(DIMINS)			INSLST	14
71		COMMON /INLSI/ NINS, IPRIM, IRRAY, ITRAY, ITTYP			INSLST	15
72	C				INSLST	16
73		REAL IPX(DIMINS), IPY(DIMINS), IPZ(DIMINS)			INSLST	17
74		REAL INX(DIMINS), INY(DIMINS), INZ(DIMINS)			INSLST	18
75		REAL ICOLR(DIMINS), ICOLG(DIMINS), ICOLB(DIMINS)			INSLST	19
76		COMMON /INLSR/ IPX, IPY, IPZ, INX, INY, INZ, ICOLR, ICOLG, ICOLB			INSLST	20
77	C				SCREEN	1
78	C	-----			SCREEN	2
79	C	-- SCREEN COMMON BLOCK --			SCREEN	3
80	C	-----			SCREEN	4
81	C	SIZE: 3 * DIMPXL + 15 WORDS = 12303			SCREEN	5
82	C				SCREEN	6
83		INTEGER MAXPXL, DIMPXL			SCREEN	7
84		PARAMETER(MAXPXL=4096)			SCREEN	8
85		PARAMETER(DIMPXL=MAXPXL)			SCREEN	9
86	C				SCREEN	10
87		INTEGER SNX, SNY, SMAZDP, OS, ACCEL, SHADOW, BKT, CURX, CURY			SCREEN	11
88		COMMON /SCREEI/ SNX, SNY, SMAZDP, OS, ACCEL, SHADOW, BKT,			SCREEN	12
89		+ CURX, CURY			SCREEN	13
90	C				SCREEN	14
91		REAL FPD, APER, FOCAL, FSTOP, MINWGT			SCREEN	15
92		REAL COLR, COLG, COLB			SCREEN	16
93		REAL BACKR, BACKG, BACKB			SCREEN	17
94		REAL BKRI, BKRF, BKRD			SCREEN	18
95		REAL BKGI, BKGF, BKGD			SCREEN	19
96		REAL BKBI, BKBF, BKBD			SCREEN	20
97		REAL LINER(DIMPXL), LINEG(DIMPXL), LINEB(DIMPXL)			SCREEN	21
98		COMMON /SCREER/ FPD, APER, FOCAL, FSTOP, MINWGT,			SCREEN	22
99		+ COLR, COLG, COLB,			SCREEN	23
100		+ BACKR, BACKG, BACKB,			SCREEN	24
101		+ BKRI, BKRF, BKRD,			SCREEN	25
102		+ BKGI, BKGF, BKGD,			SCREEN	26
103		+ BKBI, BKBF, BKBD,			SCREEN	27
104		+ LINER, LINEG, LINEB			SCREEN	28
105	C				LGTLST	1
106	C	-----			LGTLST	2
107	C	-- LIGHT LIST COMMON BLOCK --			LGTLST	3
108	C	-----			LGTLST	4
109	C	SIZE: 13 * DIMLGT + 4 WORDS = 420			LGTLST	5
110	C				LGTLST	6
111		INTEGER MAXLGT, DIMLGT			LGTLST	7
112		PARAMETER(MAXLGT=32)			LGTLST	8
113		PARAMETER(DIMLGT=MAXLGT)			LGTLST	9
114	C				LGTLST	10
□	SUBROUTINE SHADE	73/720	OPT=2	FTN 5.1+538	05/08/09.	12.28.37
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115	INTEGER NLGT, LDIR(DIMLGT)	LGTLST	11
116	COMMON /LGTL SI/ NLGT, LDIR	LGTLST	12
117	C	LGTLST	13
118	REAL LCAR, LCAG, LCAB, LOX(DIMLGT), LOY(DIMLGT), LOZ(DIMLGT)	LGTLST	14
119	REAL LCLR(DIMLGT), LCLG(DIMLGT), LCLB(DIMLGT)	LGTLST	15
120	REAL LDX(DIMLGT), LDY(DIMLGT), LDZ(DIMLGT)	LGTLST	16
121	REAL LTGT(DIMLGT), LTG2(DIMLGT), LRAD(DIMLGT)	LGTLST	17
122	COMMON /LGTL SR/ LCAR, LCAG, LCAB, LOX, LOY, LOZ, LCLR, LCLG,	LGTLST	18
123	+ LCLB, LDX, LDY, LDZ, LTGT, LTG2, LRAD	LGTLST	19
124	C	MTRLST	1
125	C-----	MTRLST	2
126	C-- MATERIAL LIST COMMON BLOCK --	MTRLST	3
127	C-----	MTRLST	4
128	C SIZE: 14 * DIMMTR + 1 WORDS = 449	MTRLST	5
129	C	MTRLST	6
130	INTEGER MAXMTR, DIMMTR	MTRLST	7
131	PARAMETER(MAXMTR=32)	MTRLST	8
132	PARAMETER(DIMMTR=MAXMTR)	MTRLST	9
133	C	MTRLST	10
134	INTEGER NMTR	MTRLST	11
135	COMMON /MTRL SI/ NMTR	MTRLST	12
136	C	MTRLST	13
137	REAL MKR(DIMMTR), MKT(DIMMTR)	MTRLST	14
138	REAL MCAR(DIMMTR), MCAG(DIMMTR), MCAB(DIMMTR)	MTRLST	15
139	REAL MCDR(DIMMTR), MCDG(DIMMTR), MCDDB(DIMMTR)	MTRLST	16
140	REAL MCSR(DIMMTR), MCSG(DIMMTR), MCSB(DIMMTR)	MTRLST	17
141	REAL META(DIMMTR), MGLS(DIMMTR), MRGH(DIMMTR)	MTRLST	18
142	COMMON /MTRL SR/ MKR, MKT, MCAR, MCAG, MCAB, MCDR, MCDG, MCDDB,	MTRLST	19
143	+ MCSR, MCSG, MCSB, META, MGLS, MRGH	MTRLST	20
144	C	TRT2	752
145	REAL RANHLF	TRT2	753
146	C	TRT2	754
147	INTEGER L, F	TRT2	755
148	REAL DX, DY, DZ, D, S, VX, VY, VZ, HX, HY, HZ, CR, CG, CB	TRT2	756
149	REAL LATTR, LATTG, LATTB, P	TRT2	757
150	REAL NX, NY, NZ, A, LXF, LYF, LZF, LATTRF, LATTGF, LATTBF	TRT2	758
151	C	TRT2	759
152	INTEGER IDUM	TRT2	760
153	DATA IDUM/12345/	TRT2	761
154	C	TRT2	762
155	C-- INITIALIZE INTERSECTION COLOUR TO AMBIENT TERM.	TRT2	763
156	C	TRT2	764
157	ICOLR(I) = MCAR(MATL) * LCAR	TRT2	765
158	ICOLG(I) = MCAG(MATL) * LCAR	TRT2	766
159	ICOLB(I) = MCAB(MATL) * LCAR	TRT2	767
160	C	TRT2	768
161	C-- STEP OVER LIGHTS. FIND CONTRIBUTION TO INTERSECTION COLOUR FOR EACH	TRT2	769
162	C	TRT2	770
163	DO 1 L=1,NLGT	TRT2	771
164	C	TRT2	772
165	C-- SEE IF THIS LIGHT IS PARTIALLY SHADOWED.	TRT2	773
166	C	TRT2	774
167	IF(SHADOW .EQ. 0)THEN	TRT2	775
168	LATTR = 1.0	TRT2	776
169	LATTG = 1.0	TRT2	777
170	LATTB = 1.0	TRT2	778
171	ELSE IF((SHADOW .EQ. 1) .OR. (LRAD(L) .LT. EPS))THEN	TRT2	779
□	SUBROUTINE SHADE 73/720 OPT=2 FTN 5.1+538	05/08/09. 12.28.37	PAGE 4
172	C-- 1 FEELER RAY = POINT LIGHT SOURCE.	TRT2	780
173	CALL LTFEEL(IPRIM(I), IPX(I), IPY(I), IPZ(I),	TRT2	781


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174 + LOX(L), LOY(L), LOZ(L), LATTR, LATTG, LATTB ) TRT2 782
175 ELSE TRT2 783
176 C-- MULTIPLE FEELER RAYS = UNIFORM SPHERE OF LIGHT. TRT2 784
177 LATTR = 0.0 TRT2 785
178 LATTG = 0.0 TRT2 786
179 LATTB = 0.0 TRT2 787
180 DO 2 F=1,SHADOW TRT2 788
181 LXF = LOX(L) + RANHLF(IDUM) * LRAD(L) TRT2 789
182 LYF = LOY(L) + RANHLF(IDUM) * LRAD(L) TRT2 790
183 LZF = LOZ(L) + RANHLF(IDUM) * LRAD(L) TRT2 791
184 CALL LTFEEL( IPRIM(I), IPX(I), IPY(I), IPZ(I), TRT2 792
185 + LXF, LYF, LZF, LATTRF, LATTGF, LATTBF ) TRT2 793
186 LATTR = LATTR + LATTRF TRT2 794
187 LATTG = LATTG + LATTGF TRT2 795
188 LATTB = LATTB + LATTBF TRT2 796
189 2 CONTINUE TRT2 797
190 LATTR = LATTR / SHADOW TRT2 798
191 LATTG = LATTG / SHADOW TRT2 799
192 LATTB = LATTB / SHADOW TRT2 800
193 ENDIF TRT2 801
194 C TRT2 802
195 C-- FIND UNIT VECTOR FROM SURFACE INTERSECTION TO LIGHT. TRT2 803
196 C TRT2 804
197 DX = LOX(L) - IPX(I) TRT2 805
198 DY = LOY(L) - IPY(I) TRT2 806
199 DZ = LOZ(L) - IPZ(I) TRT2 807
200 CALL NRMVEC( DX, DY, DZ ) TRT2 808
201 C TRT2 809
202 C-- IF THE LIGHT IS DIRECTIONAL, MODIFY LIGHT ATTENUATION BASED ON TRT2 810
203 C-- ANGLE BTW LIGHT-SURFACE VECTOR AND LIGHT DIRECTION. TRT2 811
204 C TRT2 812
205 IF( LDIR(L) .NE. LGTCON )THEN TRT2 813
206 P = DX * LDX(L) + DY * LDY(L) + DZ * LDZ(L) TRT2 814
207 IF( P .LT. 0.0 )THEN TRT2 815
208 P = 0.0 TRT2 816
209 ELSE TRT2 817
210 IF( LDIR(L) .EQ. LGTCOS )THEN TRT2 818
211 C-- RAISED COSINE SORT ... TRT2 819
212 P = P ** LGT(L) TRT2 820
213 ELSE IF( LDIR(L) .EQ. LGTBRN )THEN TRT2 821
214 C-- BARN DOOR SORT ... TRT2 822
215 A = ACOS( P ) TRT2 823
216 IF( A .LT. LGT(L) )THEN TRT2 824
217 P = 1.0 TRT2 825
218 ELSE IF( A .GT. LGT2(L) )THEN TRT2 826
219 P = 0.0 TRT2 827
220 ELSE TRT2 828
221 P = ( ( A - LGT(L) ) / ( LGT2(L) - LGT(L) ) ) TRT2 829
222 C-- NICE SMOOTH HERMITE ... TRT2 830
223 P = 1.0 - ( P * P * ( 3 - 2 * P ) ) TRT2 831
224 ENDIF TRT2 832
225 ENDIF TRT2 833
226 ENDIF TRT2 834
227 LATTR = LATTR * P TRT2 835
228 LATTG = LATTG * P TRT2 836
SUBROUTINE SHADE 73/720 OPT=2 FTN 5.1+538 05/08/09. 12.28.37 PAGE 5
229 LATTB = LATTB * P TRT2 837
230 ENDIF TRT2 838
231 C TRT2 839
232 C-- GET THE NORMAL AND PERTURB IT IF THERE IS SOME ROUGHNESS. TRT2 840
233 C TRT2 841

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234      NX = INX(I)
235      NY = INY(I)
236      NZ = INZ(I)
237      IF( MRGH(MATL) .GT. 0.0 )THEN
238          NX = NX + RANHLLF(IDUM) * MRGH(MATL)
239          NY = NY + RANHLLF(IDUM) * MRGH(MATL)
240          NZ = NZ + RANHLLF(IDUM) * MRGH(MATL)
241          CALL NRMVEC( NX, NY, NZ )
242      ENDIF
243      C
244      C-- DIFFUSE TERM.
245      C
246          D = DX * NX + DY * NY + DZ * NZ
247          IF( D .LT. 0.0 )D = 0.0
248      C
249      C-- SPECULAR TERM.
250      C
251          VX = - IPX(I)
252          VY = - IPY(I)
253          VZ = - IPZ(I)
254          CALL NRMVEC( VX, VY, VZ )
255      C
256          HX = 0.5 * ( DX + VX )
257          HY = 0.5 * ( DY + VY )
258          HZ = 0.5 * ( DZ + VZ )
259      C
260          S = HX * NX + HY * NY + HZ * NZ
261          IF( S .LT. 0.0 )THEN
262              S = 0.0
263          ELSE
264              S = S ** MGLS(MATL)
265          ENDIF
266      C
267      C-- FIND COLOUR DUE TO THIS LIGHT.
268      C
269          CR = LCLR(L) * LATTR * ( D * MCDR(MATL) + S * MCSR(MATL) )
270          CG = LCLG(L) * LATTG * ( D * MCDG(MATL) + S * MCSG(MATL) )
271          CB = LCLB(L) * LATTB * ( D * MCDB(MATL) + S * MCSB(MATL) )
272      C
273      C-- ADD TO INTERSECTION COLOUR.
274      C
275          ICOLR(I) = ICOLR(I) + CR
276          ICOLG(I) = ICOLG(I) + CG
277          ICOLB(I) = ICOLB(I) + CB
278      1  CONTINUE
279      C
280          RETURN
281      END

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TRT2	842
TRT2	843
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TRT2	889

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--VARIABLE MAP--(LO=A)

-NAME	---ADDRESS	---BLOCK	-----PROPERTIES	-----TYPE	-----SIZE	-NAME	---ADDRESS	---BLOCK	-----PROPERTIES	-----TYPE	-----SIZE
A	373B		REAL	ITTP	3007B	/INLSI/			INTEGER		514
ACCEL	4B	/SCREEI/	INTEGER	L	352B				INTEGER		
APER	1B	/SCREER/	REAL	LATTB	366B				REAL		
BACKB	12B	/SCREER/	REAL	LATTBF	401B				REAL		
BACKG	11B	/SCREER/	REAL	LATTG	365B				REAL		
BACKR	10B	/SCREER/	REAL	LATTGF	400B				REAL		
BKBD	23B	/SCREER/	REAL	LATTR	364B				REAL		
BKBF	22B	/SCREER/	REAL	LATTRF	377B				REAL		
BKBI	21B	/SCREER/	REAL	LCAB	2B	/LGTLR/			REAL		

BKGD	20B	/SCREER/	REAL	LACG	1B	/LGTLR/	REAL	
BKGF	17B	/SCREER/	REAL	LCAR	0B	/LGTLR/	REAL	
BKGI	16B	/SCREER/	REAL	LCLB	243B	/LGTLR/	REAL	32
BKRD	15B	/SCREER/	REAL	LCLG	203B	/LGTLR/	REAL	32
BKRF	14B	/SCREER/	REAL	LCLR	143B	/LGTLR/	REAL	32
BKRI	13B	/SCREER/	REAL	LDIR	1B	/LGTLR/	INTEGER	32
BKT	6B	/SCREEI/	INTEGER	LDX	303B	/LGTLR/	REAL	32
CB	NONE		REAL	LDY	343B	/LGTLR/	REAL	32
CG	NONE		REAL	LDZ	403B	/LGTLR/	REAL	32
COLB	7B	/SCREER/	REAL	LINEB	20024B	/SCREER/	REAL	4096
COLG	6B	/SCREER/	REAL	LINEG	10024B	/SCREER/	REAL	4096
COLR	5B	/SCREER/	REAL	LINER	24B	/SCREER/	REAL	4096
CR	NONE		REAL	LOX	3B	/LGTLR/	REAL	32
CURX	7B	/SCREEI/	INTEGER	LOY	43B	/LGTLR/	REAL	32
CURY	10B	/SCREEI/	INTEGER	LOZ	103B	/LGTLR/	REAL	32
D	357B		REAL	LRAD	543B	/LGTLR/	REAL	32
DX	354B		REAL	LTGT	443B	/LGTLR/	REAL	32
DY	355B		REAL	LTG2	503B	/LGTLR/	REAL	32
DZ	356B		REAL	LXF	374B		REAL	
F	353B		INTEGER	LYF	375B		REAL	
FOCAL	2B	/SCREER/	REAL	LZF	376B		REAL	
FPD	0B	/SCREER/	REAL	MATL	2	DUMMY-ARG	INTEGER	
FSTOP	3B	/SCREER/	REAL	MCAB	200B	/MTRLR/	REAL	32
HX	NONE		REAL	MCAG	140B	/MTRLR/	REAL	32
HY	NONE		REAL	MCAR	100B	/MTRLR/	REAL	32
HZ	NONE		REAL	MCDB	340B	/MTRLR/	REAL	32
I	1	DUMMY-ARG	INTEGER	MCDG	300B	/MTRLR/	REAL	32
ICOLB	10020B	/INSLR/	REAL	MCDR	240B	/MTRLR/	REAL	32
ICOLG	7016B	/INSLR/	REAL	MCSB	500B	/MTRLR/	REAL	32
ICOLR	6014B	/INSLR/	REAL	MCSG	440B	/MTRLR/	REAL	32
IDUM	402B		INTEGER	MCSR	400B	/MTRLR/	REAL	32
INX	3006B	/INSLR/	REAL	META	540B	/MTRLR/	REAL	32
INY	4010B	/INSLR/	REAL	MGLS	600B	/MTRLR/	REAL	32
INZ	5012B	/INSLR/	REAL	MINWGT	4B	/SCREER/	REAL	
IPRIM	1B	/INLSI/	INTEGER	MKR	0B	/MTRLR/	REAL	32
IPX	0B	/INSLR/	REAL	MKT	40B	/MTRLR/	REAL	32
IPY	1002B	/INSLR/	REAL	MRGH	640B	/MTRLR/	REAL	32
IPZ	2004B	/INSLR/	REAL	NINS	0B	/INLSI/	INTEGER	
IRRAY	1003B	/INLSI/	INTEGER	NLGT	0B	/LGTLR/	INTEGER	
ITRAY	2005B	/INLSI/	INTEGER	NMTR	0B	/MTRLR/	INTEGER	
NX	370B		REAL	SMAXDP	2B	/SCREEI/	INTEGER	
NY	371B		REAL	SNX	0B	/SCREEI/	INTEGER	
NZ	372B		REAL	SNY	1B	/SCREEI/	INTEGER	
OS	3B	/SCREEI/	INTEGER	VX	361B		REAL	
P	367B		REAL	VY	362B		REAL	

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-NAME	-ADDRESS	-BLOCK	-PROPERTIES	-TYPE	-SIZE	-NAME	-ADDRESS	-BLOCK	-PROPERTIES	-TYPE	-SIZE
S	360B			REAL		VZ	363B			REAL	
SHADOW	5B	/SCREEI/		INTEGER							

--SYMBOLIC CONSTANTS-- (LO=A)

-NAME	-TYPE	-VALUE	-NAME	-TYPE	-VALUE
BKCNST	INTEGER	0	LGTCOS	INTEGER	1
BKHORZ	INTEGER	2	MAXFLT	REAL	0"20235327435361326142"
BKVERT	INTEGER	1	MAXINS	INTEGER	512
DAXX	INTEGER	1	MAXLGT	INTEGER	32
DAXY	INTEGER	2	MAXMTR	INTEGER	32
DAXZ	INTEGER	3	MAXPXL	INTEGER	4096
DEGRAD	REAL	0"17124357506472324711"	MINEPS	REAL	0"16775174265421615510"
DIMINS	INTEGER	514	MINFLT	REAL	0"57542450342416451635"

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DIMLGT  INTEGER                32      NEWINS  INTEGER                513
DIMMTR  INTEGER                32      NOACL   INTEGER                0
DIMPXL  INTEGER                4096    RFLRAY  INTEGER                2
ENTER   INTEGER                1       SHDINS  INTEGER                514
EPS     REAL                    0"16706553762465362572"  SPHPRM  INTEGER                1
EYERAY  INTEGER                1       SUBACL  INTEGER                1
GTHUGE  REAL                    0"17474611320000000000"  TRIPRM  INTEGER                2
LEAVE   INTEGER                2       TRNRAY  INTEGER                3
LGTBRN  INTEGER                2       TRTPI   REAL                    0"17216220773232113302"
LGTCON  INTEGER                0

```

--PROCEDURES--(LO=A)

```

-NAME-----TYPE-----ARGS-----CLASS-----
ACOS      GENERIC          1      INTRINSIC
LTFEEL    SUBROUTINE      10     SUBROUTINE
NRMVEC    SUBROUTINE      3      SUBROUTINE
RANHLLF   REAL            1      FUNCTION

```

--STATEMENT LABELS--(LO=A)

```

-LABEL-ADDRESS-----PROPERTIES-----DEF
1  INACTIVE  DO-TERM      278
2  INACTIVE  DO-TERM      189

```

--ENTRY POINTS--(LO=A)

```

-NAME---ADDRESS--ARGS---
SHADE      3B      2
SUBROUTINE SHADE      73/720  OPT=2      FTN 5.1+538      05/08/09. 12.28.37      PAGE      8

```

--STATISTICS--

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PROGRAM-UNIT LENGTH      405B = 261
CM LABELLED COMMON LENGTH 46635B = 19869
CM STORAGE USED          57700B = 24512
COMPILE TIME             0.598 SECONDS
SUBROUTINE LTFEEL      73/720  OPT=2      FTN 5.1+538      05/08/09. 12.28.37      PAGE      1

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1      C      TRT2      890
2      C      TRT2      891
3      SUBROUTINE LTFEEL( SRFIDX, PX, PY, PZ, LX, LY, LZ,
4      +      LATTR, LATTG, LATTB )      TRT2      892
5      IMPLICIT CHARACTER*1 (A-Z)      TRT2      893
6      INTEGER SRFIDX      TRT2      894
7      REAL PX, PY, PZ, LX, LY, LZ, LATTR, LATTG, LATTB      TRT2      895
8      C*****      TRT2      896
9      C GENERATE A LIGHT FEELER RAY FROM SURFACE POINT (PX,PY,PZ) TO LIGHT (LX,LY,LZ)      TRT2      897
10     C SEE WHAT THIS INTERSECTS AND GENERATE AN APPROPRIATE (ISH) LIGHT ATTENTRT2      898
11     C THIS TRIES TO DEAL WITH TRANSPARENT OBJECTS AS WELL AS OPAQUE ONES. ITTRT2      899
12     C INCORRECTLY, AS REFRACTION CANNOT BE TAKEN INTO ACCOUNT.      TRT2      900
13     C*****      TRT2      901
14     C      TRT2      902
15     C-----      PARAMS      1
16     C-- SUNDRY PARAMETERS --      PARAMS      2
17     C-----      PARAMS      3
18     C      PARAMS      4
19     REAL GTHUGE, MINEPS, EPS, MINFLT, MAXFLT, TRTPI, DEGRAD      PARAMS      5

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20	PARAMETER(GTHUGE=1E7)	PARAMS	7		
21	PARAMETER(MINEPS=1E-5)	PARAMS	8		
22	PARAMETER(EPS=1E-7)	PARAMS	9		
23	PARAMETER(MINFLT=-1E20)	PARAMS	10		
24	PARAMETER(MAXFLT=1E20)	PARAMS	11		
25	PARAMETER(TRTPI=3.1415926)	PARAMS	12		
26	PARAMETER(DEGRAD=TRTPI/180.0)	PARAMS	13		
27	C	PARAMS	14		
28	INTEGER EYERAY, RFLRAY, TRNRAY	PARAMS	15		
29	PARAMETER(EYERAY=1)	PARAMS	16		
30	PARAMETER(RFLRAY=2)	PARAMS	17		
31	PARAMETER(TRNRAY=3)	PARAMS	18		
32	C	PARAMS	19		
33	INTEGER ENTER, LEAVE	PARAMS	20		
34	PARAMETER(ENTER=1)	PARAMS	21		
35	PARAMETER(LEAVE=2)	PARAMS	22		
36	C	PARAMS	23		
37	INTEGER NOACL, SUBACL	PARAMS	24		
38	PARAMETER(NOACL=0)	PARAMS	25		
39	PARAMETER(SUBACL=1)	PARAMS	26		
40	C	PARAMS	27		
41	INTEGER BKNST, BKVERT, BKHORZ	PARAMS	28		
42	PARAMETER(BKNST=0)	PARAMS	29		
43	PARAMETER(BKVERT=1)	PARAMS	30		
44	PARAMETER(BKHORZ=2)	PARAMS	31		
45	C	PARAMS	32		
46	INTEGER LGTCOS, LGTCOS, LGTBRN	PARAMS	33		
47	PARAMETER(LGTCOS=0)	PARAMS	34		
48	PARAMETER(LGTCOS=1)	PARAMS	35		
49	PARAMETER(LGTBRN=2)	PARAMS	36		
50	C	PARAMS	37		
51	INTEGER SPHPRM, TRIPRM	PARAMS	38		
52	PARAMETER(SPHPRM=1)	PARAMS	39		
53	PARAMETER(TRIPRM=2)	PARAMS	40		
54	C	PARAMS	41		
55	INTEGER DAXX, DAXY, DAXZ	PARAMS	42		
56	PARAMETER(DAXX=1)	PARAMS	43		
57	PARAMETER(DAXY=2)	PARAMS	44		
□	SUBROUTINE LTFEEL 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE	2
58	PARAMETER(DAXZ=3)	PARAMS	45		
59	C	STATS	1		
60	C-----	STATS	2		
61	C-- STATISTICS COMMON BLOCK --	STATS	3		
62	C-----	STATS	4		
63	C SIZE: 8 WORDS.	STATS	5		
64	C	STATS	6		
65	INTEGER MAXDPS, MAXRYS, MAXISS, TOTRAY, TOTFEL, NACC, NOACC	STATS	7		
66	COMMON /STATSI/ MAXDPS, MAXRYS, MAXISS, TOTRAY, TOTFEL, NACC,	STATS	8		
67	+ NOACC	STATS	9		
68	C	STATS	10		
69	REAL NSECTS	STATS	11		
70	COMMON /STATSR/ NSECTS	STATS	12		
71	C	SCREEN	1		
72	C-----	SCREEN	2		
73	C-- SCREEN COMMON BLOCK --	SCREEN	3		
74	C-----	SCREEN	4		
75	C SIZE: 3 * DIMPXL + 15 WORDS = 12303	SCREEN	5		
76	C	SCREEN	6		
77	INTEGER MAXPXL, DIMPXL	SCREEN	7		
78	PARAMETER(MAXPXL=4096)	SCREEN	8		
79	PARAMETER(DIMPXL=MAXPXL)	SCREEN	9		

80	C		SCREEN	10
81		INTEGER SNX, SNY, SMAXD, OS, ACCEL, SHADOW, BKT, CURX, CURY	SCREEN	11
82		COMMON /SCREEI/ SNX, SNY, SMAXD, OS, ACCEL, SHADOW, BKT,	SCREEN	12
83	+	CURX, CURY	SCREEN	13
84	C		SCREEN	14
85		REAL FPD, APER, FOCAL, FSTOP, MINWGT	SCREEN	15
86		REAL COLR, COLG, COLB	SCREEN	16
87		REAL BACKR, BACKG, BACKB	SCREEN	17
88		REAL BKRI, BKRF, BKRD	SCREEN	18
89		REAL BKGI, BKGF, BKGD	SCREEN	19
90		REAL BKBI, BKBF, BKBD	SCREEN	20
91		REAL LINER(DIMPXL), LINEG(DIMPXL), LINEB(DIMPXL)	SCREEN	21
92		COMMON /SCREER/ FPD, APER, FOCAL, FSTOP, MINWGT,	SCREEN	22
93	+	COLR, COLG, COLB,	SCREEN	23
94	+	BACKR, BACKG, BACKB,	SCREEN	24
95	+	BKRI, BKRF, BKRD,	SCREEN	25
96	+	BKGI, BKGF, BKGD,	SCREEN	26
97	+	BKBI, BKBF, BKBD,	SCREEN	27
98	+	LINER, LINEG, LINEB	SCREEN	28
99	C		INSLST	1
100	C-----		INSLST	2
101	C-- INTERSECTION LIST COMMON BLOCK --		INSLST	3
102	C-----		INSLST	4
103	C SIZE: 13 * DIMINS + 1 WORDS = 6683		INSLST	5
104	C		INSLST	6
105		INTEGER MAXINS, DIMINS, NEWINS, SHDINS	INSLST	7
106		PARAMETER(MAXINS=512)	INSLST	8
107		PARAMETER(DIMINS=MAXINS+2)	INSLST	9
108		PARAMETER(NEWINS=MAXINS+1)	INSLST	10
109		PARAMETER(SHDINS=MAXINS+2)	INSLST	11
110	C		INSLST	12
111		INTEGER NINS, IPRIM(DIMINS), IRRAY(DIMINS), ITRAY(DIMINS)	INSLST	13
112		INTEGER ITTYP(DIMINS)	INSLST	14
113		COMMON /INLSI/ NINS, IPRIM, IRRAY, ITRAY, ITTYP	INSLST	15
114	C		INSLST	16
	□ SUBROUTINE	LTFEEL 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
				PAGE 3
115		REAL IPX(DIMINS), IPY(DIMINS), IPZ(DIMINS)	INSLST	17
116		REAL INX(DIMINS), INY(DIMINS), INZ(DIMINS)	INSLST	18
117		REAL ICOLR(DIMINS), ICOLG(DIMINS), ICOLB(DIMINS)	INSLST	19
118		COMMON /INLSR/ IPX, IPY, IPZ, INX, INY, INZ, ICOLR, ICOLG, ICOLB	INSLST	20
119	C		PRMLST	1
120	C-----		PRMLST	2
121	C-- PRIMITIVE LIST COMMON BLOCK --		PRMLST	3
122	C-----		PRMLST	4
123	C SIZE: 5 * DIMPRM + 1 WORDS = 5121		PRMLST	5
124	C		PRMLST	6
125		INTEGER MAXPRM, DIMPRM	PRMLST	7
126		PARAMETER(MAXPRM=1024)	PRMLST	8
127		PARAMETER(DIMPRM=MAXPRM)	PRMLST	9
128	C		PRMLST	10
129		INTEGER NPRM, MATTER(DIMPRM), PACCEL(DIMPRM), PRAYID(DIMPRM)	PRMLST	11
130		INTEGER PRMTYP(DIMPRM), PRMIDX(DIMPRM)	PRMLST	12
131		COMMON /PRMLST/ NPRM, MATTER, PACCEL, PRAYID, PRMTYP, PRMIDX	PRMLST	13
132	C		MTRLST	1
133	C-----		MTRLST	2
134	C-- MATERIAL LIST COMMON BLOCK --		MTRLST	3
135	C-----		MTRLST	4
136	C SIZE: 14 * DIMMTR + 1 WORDS = 449		MTRLST	5
137	C		MTRLST	6
138		INTEGER MAXMTR, DIMMTR	MTRLST	7
139		PARAMETER(MAXMTR=32)	MTRLST	8

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140     PARAMETER( DIMMTR=MAXMTR )
141     C
142     INTEGER NMTR
143     COMMON /MTRLSI/ NMTR
144     C
145     REAL MKR(DIMMTR), MKT(DIMMTR)
146     REAL MCAR(DIMMTR), MCAG(DIMMTR), MCAB(DIMMTR)
147     REAL MCDR(DIMMTR), MCDG(DIMMTR), MCDDB(DIMMTR)
148     REAL MCSR(DIMMTR), MCSG(DIMMTR), MCSB(DIMMTR)
149     REAL META(DIMMTR), MGLS(DIMMTR), MRGH(DIMMTR)
150     COMMON /MTRLSR/ MKR, MKT, MCAR, MCAG, MCAB, MCDR, MCDG, MCDDB,
151     + MCSR, MCSG, MCSB, META, MGLS, MRGH
152     C
153     REAL DX, DY, DZ, DS, ACATR, ACATG, ACATB, MINCAT
154     INTEGER PRIM, ASECT, MATL
155     REAL TVAL, POX, POY, POZ
156     REAL OBDX, OBDY, OBDZ, OBDS
157     C
158     C-- FIND DISTANCE BETWEEN SURFACE POINT & LIGHT AND A NORMALIZED VECTOR
159     C-- POINTING FROM THE SURFACE TO THE LIGHT. IF POINT IS VERY CLOSE TO LIGHT
160     C-- NO ATTENUATION.
161     C
162     LATTR = 1.0
163     LATTG = 1.0
164     LATTB = 1.0
165     TOTFEL = TOTFEL + 1
166     C
167     DX = LX - PX
168     DY = LY - PY
169     DZ = LZ - PZ
170     DS = DX * DX + DY * DY + DZ * DZ
171     IF( DS .LT. MINEPS )THEN
SUBROUTINE LTFEEL      73/720  OPT=2
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PAGE 4
MTRLST 9
MTRLST 10
MTRLST 11
MTRLST 12
MTRLST 13
MTRLST 14
MTRLST 15
MTRLST 16
MTRLST 17
MTRLST 18
MTRLST 19
MTRLST 20
TRT2 909
TRT2 910
TRT2 911
TRT2 912
TRT2 913
TRT2 914
TRT2 915
TRT2 916
TRT2 917
TRT2 918
TRT2 919
TRT2 920
TRT2 921
TRT2 922
TRT2 923
TRT2 924
TRT2 925
TRT2 926
TRT2 927
TRT2 928
172     LATTR = 1.0
173     LATTG = 1.0
174     LATTB = 1.0
175     RETURN
176     ENDIF
177     C
178     C-- ATTEMPT TO GET AROUND DX,DY,DZ APPEARING IN GENSCT/CELSCT AS
179     C-- INDEFINITES WHEN COMPILED OPT=2 ON CDC FTN 5
180     C-- NOTE THAT JUST *OUTPUTTING* DX,DY,DZ IN A WRITE STATEMENT *DID*
181     C-- FIX THE PROBLEM. IT LOOKS LIKE THE OPTIMIZER HAD DECIDED THAT
182     C-- DS OR DX,DY,DZ ARE SUPERFLUOUS BY THIS POINT. (WRONGLY, OBVIOUSLY).
183     C-- *EVENTUALLY* ;- ) INTRODUCING OBDS FINALLY FIXED THIS ACCEPTABLY.
184     C
185     OBDS = SQRT( DS )
186     OBDX = DX / OBDS
187     OBDY = DY / OBDS
188     OBDZ = DZ / OBDS
189     C
190     C-- FIND ALL INTERSECTING PRIMITIVES. IF A PRIMITIVE IS MADE OF FULLY
191     C-- OPAQUE MATERIAL, OR THE ACCUMULATED ATTENUATION IS VERY GREAT,
192     C-- ABANDON SEARCH AND RETURN LATT=0.
193     C
194     ACATR = 1.0
195     ACATG = 1.0
196     ACATB = 1.0
197     C
198     POX = PX
199     POY = PY
MTRLST 929
MTRLST 930
MTRLST 931
MTRLST 932
MTRLST 933
MTRLST 934
MTRLST 935
MTRLST 936
MTRLST 937
MTRLST 938
MTRLST 939
MTRLST 940
MTRLST 941
MTRLST 942
MTRLST 943
MTRLST 944
MTRLST 945
MTRLST 946
MTRLST 947
MTRLST 948
MTRLST 949
MTRLST 950
MTRLST 951
MTRLST 952
MTRLST 953
MTRLST 954
MTRLST 955
MTRLST 956

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                                TRT2_20050809_130554.lpr
200          POZ = PZ                                TRT2      957
201      C                                           TRT2      958
202      1 CONTINUE                                  TRT2      959
203          IF( ACCEL .EQ. NOACL )THEN              TRT2      960
204              CALL GENSCT( POX, POY, POZ, OBDX, OBDY, OBDZ, SHDINS,
205                  +      CALL CELSCT( POX, POY, POZ, OBDX, OBDY, OBDZ, SHDINS,
206                      +      ELSE
207                          CALL CELSCT( POX, POY, POZ, OBDX, OBDY, OBDZ, SHDINS,
208                              +      ASECT, TVAL, 0 )
209                      ENDIF
210      C                                           TRT2      966
211      C-- SEE IF THERE IS AN INTERSECTION BETWEEN THE SURFACE POINT BEING SHAD
212      C-- AND THE LIGHT (NOT BEYOND IT).           TRT2      967
213      C                                           TRT2      968
214          IF( ASECT .EQ. 0 .OR. TVAL .LT. 0.0 .OR. TVAL .GT. DS )GOTO 2
215          IF( ASECT .NE. 0 )THEN                  TRT2      969
216      C                                           TRT2      970
217      C-- CHECK INTERSECTION IS NOT WITH PRIMITIVE WE ARE FINDING SHADOWS FOR.
218      C-- (PRIMITIVES CANNOT SHADE THEMSELVES - DIFFICULT NUMERICAL ISSUES IF
219      C                                           TRT2      971
220          IF( ASECT .NE. SRFIDX )THEN              TRT2      972
221      C-- PRIMITIVE INDEX WE HAVE INTERSECTED WITH.
222          PRIM = IPRIM(SHDINS)                    TRT2      973
223      C-- MATERIAL INDEX PRIMITIVE IS MADE FROM.
224          MATL = MATTER(PRIM)                       TRT2      974
225          IF( MKT(MATL) .LT. MINWGT )THEN          TRT2      975
226              LATTR = 0.0                           TRT2      976
227              LATTG = 0.0                           TRT2      977
228              LATTB = 0.0                           TRT2      978
229      C                                           TRT2      979
230      SUBROUTINE LTFEEL      73/720 OPT=2            TRT2      980
231      C                                           TRT2      981
232          RETURN                                     TRT2      982
233          ENDIF                                     TRT2      983
234      C                                           TRT2      984
235          ACATR = ACATR * ( MKT(MATL) * MCDR(MATL) )
236          ACATG = ACATG * ( MKT(MATL) * MCDG(MATL) )
237          ACATB = ACATB * ( MKT(MATL) * MCDB(MATL) )
238      C                                           TRT2      985
239          MINCAT = ACATR                            TRT2      986
240          IF( ACATG .LT. MINCAT )MINCAT = ACATG
241          IF( ACATB .LT. MINCAT )MINCAT = ACATB
242          IF( MINCAT .LT. MINWGT )THEN
243              LATTR = 0.0
244              LATTG = 0.0
245              LATTB = 0.0
246              RETURN
247          ENDIF
248          ENDIF
249      C                                           TRT2      1000
250      C-- FOUND AN INTERSECTION (POSSIBLY WITH SELF).
251      C-- MOVE A TAD FURTHER ALONG THE FEELER AND SEE IF WE INTERSECT ANYTHING
252      C-- PRECISION!                                TRT2      1001
253      C                                           TRT2      1002
254          POX = IPX(SHDINS) + EPS * OBDX            TRT2      1003
255          POY = IPY(SHDINS) + EPS * OBDY            TRT2      1004
256          POZ = IPZ(SHDINS) + EPS * OBDZ            TRT2      1005
257          ENDIF
258          GOTO 1
259      2 CONTINUE
260      C                                           TRT2      1006
261          LATTR = ACATR                              TRT2      1007
262          LATTG = ACATG                              TRT2      1008

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260 LATTB = ACATB
 261 RETURN
 262 END

TRT2 1017
 TRT2 1018
 TRT2 1019

--VARIABLE MAP-- (LO=A)

--VARIABLE MAP-- (LO=A)						--VARIABLE MAP-- (LO=A)					
NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE	NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE
ACATB	162B			REAL		BKT	6B	/SCREEI/		INTEGER	
ACATG	161B			REAL		COLB	7B	/SCREER/		REAL	
ACATR	160B			REAL		COLG	6B	/SCREER/		REAL	
ACCEL	4B	/SCREEI/		INTEGER		COLR	5B	/SCREER/		REAL	
APER	1B	/SCREER/		REAL		CURX	7B	/SCREEI/		INTEGER	
ASECT	164B			INTEGER		CURY	10B	/SCREEI/		INTEGER	
BACKB	12B	/SCREER/		REAL		DS	157B			REAL	
BACKG	11B	/SCREER/		REAL		DX	154B			REAL	
BACKR	10B	/SCREER/		REAL		DY	155B			REAL	
BKBD	23B	/SCREER/		REAL		DZ	156B			REAL	
BKBF	22B	/SCREER/		REAL		FOCAL	2B	/SCREER/		REAL	
BKBI	21B	/SCREER/		REAL		FPD	0B	/SCREER/		REAL	
BKGD	20B	/SCREER/		REAL		FSTOP	3B	/SCREER/		REAL	
BKGF	17B	/SCREER/		REAL		ICOLB	10020B	/INLSR/		REAL	514
BKGI	16B	/SCREER/		REAL		ICOLG	7016B	/INLSR/		REAL	514
BKRD	15B	/SCREER/		REAL		ICOLR	6014B	/INLSR/		REAL	514
BKRF	14B	/SCREER/		REAL		INX	3006B	/INLSR/		REAL	514
BKRI	13B	/SCREER/		REAL		INX	4010B	/INLSR/		REAL	514
SUBROUTINE LTFEEL 73/720 OPT=2						FTN 5.1+538 05/08/09. 12.28.37 PAGE 6					
NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE	NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE
INZ	5012B	/INLSR/		REAL	514	MINWGT	4B	/SCREER/		REAL	
IPRIM	1B	/INLSI/		INTEGER	514	MKR	0B	/MTRLSR/		REAL	32
IPX	0B	/INLSR/		REAL	514	MKT	40B	/MTRLSR/		REAL	32
IPY	1002B	/INLSR/		REAL	514	MRGH	640B	/MTRLSR/		REAL	32
IPZ	2004B	/INLSR/		REAL	514	NACC	5B	/STATSI/		INTEGER	
IRRAY	1003B	/INLSI/		INTEGER	514	NINS	0B	/INLSI/		INTEGER	
ITRAY	2005B	/INLSI/		INTEGER	514	NMTR	0B	/MTRLSI/		INTEGER	
ITYP	3007B	/INLSI/		INTEGER	514	NOACC	6B	/STATSI/		INTEGER	
LATTB	10	DUMMY-ARG		REAL		NPRM	0B	/PRMLST/		INTEGER	
LATTG	9	DUMMY-ARG		REAL		NSECTS	0B	/STATSR/		REAL	
LATTR	8	DUMMY-ARG		REAL		OBDS	NONE			REAL	
LINEB	20024B	/SCREER/		REAL	4096	OBDX	172B			REAL	
LINEG	10024B	/SCREER/		REAL	4096	OBDY	173B			REAL	
LINER	24B	/SCREER/		REAL	4096	OBDZ	174B			REAL	
LX	5	DUMMY-ARG		REAL		OS	3B	/SCREEI/		INTEGER	
LY	6	DUMMY-ARG		REAL		PACCEL	2001B	/PRMLST/		INTEGER	1024
LZ	7	DUMMY-ARG		REAL		POX	167B			REAL	
MATL	165B			INTEGER		POY	170B			REAL	
MATTER	1B	/PRMLST/		INTEGER	1024	POZ	171B			REAL	
MAXDPS	0B	/STATSI/		INTEGER		PRAYID	4001B	/PRMLST/		INTEGER	1024
MAXISS	2B	/STATSI/		INTEGER		PRIM	NONE			INTEGER	
MAXRYS	1B	/STATSI/		INTEGER		PRMIDX	10001B	/PRMLST/		INTEGER	1024
MCAB	200B	/MTRLSR/		REAL	32	PRMTYP	6001B	/PRMLST/		INTEGER	1024
MCAG	140B	/MTRLSR/		REAL	32	PX	2	DUMMY-ARG		REAL	
MCAR	100B	/MTRLSR/		REAL	32	PY	3	DUMMY-ARG		REAL	
MADB	340B	/MTRLSR/		REAL	32	PZ	4	DUMMY-ARG		REAL	
MCDG	300B	/MTRLSR/		REAL	32	SHADOW	5B	/SCREEI/		INTEGER	
MCDR	240B	/MTRLSR/		REAL	32	SMAXDP	2B	/SCREEI/		INTEGER	
MCSB	500B	/MTRLSR/		REAL	32	SNX	0B	/SCREEI/		INTEGER	
MCSG	440B	/MTRLSR/		REAL	32	SNY	1B	/SCREEI/		INTEGER	
MCSR	400B	/MTRLSR/		REAL	32	SRFIDX	1	DUMMY-ARG		INTEGER	
META	540B	/MTRLSR/		REAL	32	TOTFEL	4B	/STATSI/		INTEGER	
MGLS	600B	/MTRLSR/		REAL	32	TOTRAY	3B	/STATSI/		INTEGER	
MINCAT	163B			REAL		TVAL	166B			REAL	

--SYMBOLIC CONSTANTS--(LO=A)

-NAME-	-TYPE-	VALUE	-NAME-	-TYPE-	VALUE
BKCNST	INTEGER	0	LGTCOS	INTEGER	1
BKHORZ	INTEGER	2	MAXFLT	REAL	0"20235327435361326142"
BKVERT	INTEGER	1	MAXINS	INTEGER	512
DAXX	INTEGER	1	MAXMTR	INTEGER	32
DAXY	INTEGER	2	MAXPRM	INTEGER	1024
DAXZ	INTEGER	3	MAXPXL	INTEGER	4096
DEGRAD	REAL	0"17124357506472324711"	MINEPS	REAL	0"16775174265421615510"
DIMINS	INTEGER	514	MINFLT	REAL	0"57542450342416451635"
DIMMTR	INTEGER	32	NEWINS	INTEGER	513
DIMPRM	INTEGER	1024	NOACL	INTEGER	0
DIMPXL	INTEGER	4096	RFLRAY	INTEGER	2
ENTER	INTEGER	1	SHDINS	INTEGER	514
EPS	REAL	0"16706553762465362572"	SPHPRM	INTEGER	1
EYERAY	INTEGER	1	SUBACL	INTEGER	1
GTHUGE	REAL	0"17474611320000000000"	TRIPRM	INTEGER	2
LEAVE	INTEGER	2	TRNRAY	INTEGER	3
LGTBRN	INTEGER	2	TRTPI	REAL	0"17216220773232113302"
LGTCON	INTEGER	0			
SUBROUTINE LTFEEL 73/720 OPT=2			FTN 5.1+538 05/08/09. 12.28.37 PAGE 7		

--PROCEDURES--(LO=A)

-NAME-	-TYPE-	ARGS-	CLASS-
CELSCT		10	SUBROUTINE
GENSCT		10	SUBROUTINE
SQRT	GENERIC	1	INTRINSIC

--STATEMENT LABELS--(LO=A)

-LABEL-	-ADDRESS-	-PROPERTIES-	-DEF
1	46B		202
2	124B		256

--ENTRY POINTS--(LO=A)

-NAME-	-ADDRESS-	-ARGS-
LTFEEL	3B	10

--STATISTICS--

PROGRAM-UNIT LENGTH	175B = 125
CM LABELLED COMMON LENGTH	60002B = 24578
CM STORAGE USED	57600B = 24448
COMPILE TIME	0.393 SECONDS
SUBROUTINE GENSCT 73/720 OPT=2	

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1	C	TRT2	1020
2	C-----	TRT2	1021
3	C INTERSECTION TESTING ROUTINES	TRT2	1022
4	C-----	TRT2	1023
5	C	TRT2	1024
6	SUBROUTINE GENSCT(OX, OY, OZ, DX, DY, DZ, NINST, ASECT, TVAL,	TRT2	1025
7	+ URAYID)	TRT2	1026

8	IMPLICIT CHARACTER*1 (A-Z)	TRT2	1027
9	REAL OX, OY, OZ, DX, DY, DZ, TVAL	TRT2	1028
10	INTEGER NINST, ASECT, URAYID	TRT2	1029
11	C*****	TRT2	1030
12	C GENERAL INTERSECTION FINDER. GIVEN RAY WITH ORIGIN (OX,OY,OZ) AND UNIT	TRT2	1031
13	C DIRECTION VECTOR (DX,DY,DZ), THE INDEX OF THE NEXT FREE ELEMENT IN THE	TRT2	1032
14	C INTERSECTION LIST (NINST), FIND THE INTERSECTION CLOSEST TO (OX,OY,OZ)	TRT2	1033
15	C FOR ALL PRIMITIVES. IF THERE IS AN INTERSECTION, RETURN	TRT2	1034
16	C (ASECT) SET TO THE INDEX OF THE PRIMITIVE WE HIT ELSE SET IT TO 0.	TRT2	1035
17	C IN THE CASE OF AN INTERSECTION, ITS POSITION AND THE SURFACE	TRT2	1036
18	C NORMAL AT THAT POSITION WILL BE IN INSLST.XXX(NINST).	TRT2	1037
19	C IF THERE IS AN INTERSECTION, RETURN THE RAY PARAMETER OF THE	TRT2	1038
20	C INTERSECTION IN (TVAL).	TRT2	1039
21	C IF (URAYID), USE RAY ID BASED INTERSECTION ACCELERATION.	TRT2	1040
22	C THIS CAN'T BE DONE FOR SHADOW FEELERS.	TRT2	1041
23	C*****	TRT2	1042
24	C	PARAMS	1
25	C-----	PARAMS	2
26	C-- SUNDRY PARAMETERS --	PARAMS	3
27	C-----	PARAMS	4
28	C	PARAMS	5
29	REAL GTHUGE, MINEPS, EPS, MINFLT, MAXFLT, TRTPI, DEGRAD	PARAMS	6
30	PARAMETER(GTHUGE=1E7)	PARAMS	7
31	PARAMETER(MINEPS=1E-5)	PARAMS	8
32	PARAMETER(EPS=1E-7)	PARAMS	9
33	PARAMETER(MINFLT=-1E20)	PARAMS	10
34	PARAMETER(MAXFLT=1E20)	PARAMS	11
35	PARAMETER(TRTPI=3.1415926)	PARAMS	12
36	PARAMETER(DEGRAD=TRTPI/180.0)	PARAMS	13
37	C	PARAMS	14
38	INTEGER EYERAY, RFLRAY, TRNRAY	PARAMS	15
39	PARAMETER(EYERAY=1)	PARAMS	16
40	PARAMETER(RFLRAY=2)	PARAMS	17
41	PARAMETER(TRNRAY=3)	PARAMS	18
42	C	PARAMS	19
43	INTEGER ENTER, LEAVE	PARAMS	20
44	PARAMETER(ENTER=1)	PARAMS	21
45	PARAMETER(LEAVE=2)	PARAMS	22
46	C	PARAMS	23
47	INTEGER NOACL, SUBACL	PARAMS	24
48	PARAMETER(NOACL=0)	PARAMS	25
49	PARAMETER(SUBACL=1)	PARAMS	26
50	C	PARAMS	27
51	INTEGER BKNST, BKVERT, BKHORZ	PARAMS	28
52	PARAMETER(BKNST=0)	PARAMS	29
53	PARAMETER(BKVERT=1)	PARAMS	30
54	PARAMETER(BKHORZ=2)	PARAMS	31
55	C	PARAMS	32
56	INTEGER LGTCOS, LGTCOS, LGTBRN	PARAMS	33
57	PARAMETER(LGTCOS=0)	PARAMS	34
□	SUBROUTINE GENSCT 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
			PAGE 2
58	PARAMETER(LGTCOS=1)	PARAMS	35
59	PARAMETER(LGTBRN=2)	PARAMS	36
60	C	PARAMS	37
61	INTEGER SPHPRM, TRIPRM	PARAMS	38
62	PARAMETER(SPHPRM=1)	PARAMS	39
63	PARAMETER(TRIPRM=2)	PARAMS	40
64	C	PARAMS	41
65	INTEGER DAXX, DAXY, DAXZ	PARAMS	42
66	PARAMETER(DAXX=1)	PARAMS	43
67	PARAMETER(DAXY=2)	PARAMS	44

68	PARAMETER(DAXZ=3)	PARAMS	45
69	C	RAYSTK	1
70	C---- IN-MEMORY AND GLOBALLY ACCESSIBLE DATA STRUCTURES	RAYSTK	2
71	C	RAYSTK	3
72	C-----	RAYSTK	4
73	C-- RAY STACK COMMON BLOCK --	RAYSTK	5
74	C-----	RAYSTK	6
75	C SIZE: DIMSTK + 2 WORDS = 514	RAYSTK	7
76	C	RAYSTK	8
77	INTEGER MAXSTK, DIMSTK	RAYSTK	9
78	PARAMETER(MAXSTK=512)	RAYSTK	10
79	PARAMETER(DIMSTK=MAXSTK)	RAYSTK	11
80	C	RAYSTK	12
81	INTEGER NSRAY, CRAY	RAYSTK	13
82	INTEGER RAY(DIMSTK)	RAYSTK	14
83	COMMON /RAYSTK/ NSRAY, CRAY, RAY	RAYSTK	15
84	C	INSLST	1
85	C-----	INSLST	2
86	C-- INTERSECTION LIST COMMON BLOCK --	INSLST	3
87	C-----	INSLST	4
88	C SIZE: 13 * DIMINS + 1 WORDS = 6683	INSLST	5
89	C	INSLST	6
90	INTEGER MAXINS, DIMINS, NEWINS, SHDINS	INSLST	7
91	PARAMETER(MAXINS=512)	INSLST	8
92	PARAMETER(DIMINS=MAXINS+2)	INSLST	9
93	PARAMETER(NEWINS=MAXINS+1)	INSLST	10
94	PARAMETER(SHDINS=MAXINS+2)	INSLST	11
95	C	INSLST	12
96	INTEGER NINS, IPRIM(DIMINS), IRRAY(DIMINS), ITRAY(DIMINS)	INSLST	13
97	INTEGER ITTYP(DIMINS)	INSLST	14
98	COMMON /INLSI/ NINS, IPRIM, IRRAY, ITRAY, ITTYP	INSLST	15
99	C	INSLST	16
100	REAL IPX(DIMINS), IPY(DIMINS), IPZ(DIMINS)	INSLST	17
101	REAL INX(DIMINS), INY(DIMINS), INZ(DIMINS)	INSLST	18
102	REAL ICOLR(DIMINS), ICOLG(DIMINS), ICOLB(DIMINS)	INSLST	19
103	COMMON /INLSR/ IPX, IPY, IPZ, INX, INY, INZ, ICOLR, ICOLG, ICOLB	INSLST	20
104	C	RAYLST	1
105	C-----	RAYLST	2
106	C-- RAY LIST COMMON BLOCK --	RAYLST	3
107	C-----	RAYLST	4
108	C SIZE: 13 * DIMRAY + 2 WORDS = 6658	RAYLST	5
109	C	RAYLST	6
110	INTEGER MAXRAY, DIMRAY	RAYLST	7
111	PARAMETER(MAXRAY=512)	RAYLST	8
112	PARAMETER(DIMRAY=MAXRAY)	RAYLST	9
113	C	RAYLST	10
114	INTEGER NLRAY, RAYNUM, RISECT(DIMRAY), RTYPE(DIMRAY)	RAYLST	11
114	SUBROUTINE GENSTC 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
			PAGE 3
115	INTEGER RDEP(DIMRAY), RRAYID(DIMRAY)	RAYLST	12
116	COMMON /RAYLSI/ NLRAY, RAYNUM, RISECT, RTYPE, RDEP, RRAYID	RAYLST	13
117	C	RAYLST	14
118	REAL ROX(DIMRAY), ROY(DIMRAY), ROZ(DIMRAY)	RAYLST	15
119	REAL RDX(DIMRAY), RDY(DIMRAY), RDZ(DIMRAY)	RAYLST	16
120	REAL RWGTR(DIMRAY), RWGTG(DIMRAY), RWGTB(DIMRAY)	RAYLST	17
121	COMMON /RAYLSR/ ROX, ROY, ROZ, RDX, RDY, RDZ, RWGTR, RWGTG, RWGTB	RAYLST	18
122	C	PRMLST	1
123	C-----	PRMLST	2
124	C-- PRIMITIVE LIST COMMON BLOCK --	PRMLST	3
125	C-----	PRMLST	4
126	C SIZE: 5 * DIMPRM + 1 WORDS = 5121	PRMLST	5
127	C	PRMLST	6

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128      INTEGER MAXPRM, DIMPRM          PRMLST      7
129      PARAMETER( MAXPRM=1024 )       PRMLST      8
130      PARAMETER( DIMPRM=MAXPRM )    PRMLST      9
131      C                               PRMLST     10
132      INTEGER NPRM, MATTER(DIMPRM),  PRMLST     11
133      INTEGER PRMTYP(DIMPRM), PRMIDX(DIMPRM) PRMLST     12
134      COMMON /PRMLST/ NPRM, MATTER, PACCEL, PRAYID, PRMTYP, PRMIDX PRMLST     13
135      INTEGER I, SECT, PIDX          TRT2       1048
136      REAL T, TMIN                   TRT2       1049
137      C                               TRT2       1050
138      ASECT = 0                       TRT2       1051
139      RISECT(CRAY) = 0                 TRT2       1052
140      DO 1 I=1, NPRM                   TRT2       1053
141          IF( (PRAYID(I) .NE. RRAYID(CRAY)) .OR. (URAYID .EQ. 0) )THEN TRT2       1054
142              PIDX = PRMIDX(I)         TRT2       1055
143              IF( PRMTYP(I) .EQ. SPHPRM )THEN TRT2       1056
144                  CALL SPHINS( OX, OY, OZ, DX, DY, DZ, PIDX, SECT, T, I ) TRT2       1057
145              ELSE IF( PRMTYP(I) .EQ. TRIPRM )THEN TRT2       1058
146                  CALL TRIINS( OX, OY, OZ, DX, DY, DZ, PIDX, SECT, T, I ) TRT2       1059
147              ELSE                     TRT2       1060
148                  WRITE(6,100)          TRT2       1061
149                  FORMAT( 1X,'INTERNAL ERROR: GENSTCT.' ) TRT2       1062
150                  WRITE(6,101)          TRT2       1063
151                  FORMAT( 6X,'UNKNOWN PRIMITIVE TYPE.' ) TRT2       1064
152                  STOP                  TRT2       1065
153              ENDIF                    TRT2       1066
154              IF( SECT .NE. 0 )THEN     TRT2       1067
155                  IF( ASECT .EQ. 0 )THEN TRT2       1068
156                      TMIN = T          TRT2       1069
157                      CALL CPYINS( NINST, NEWINS ) TRT2       1070
158                      RISECT(CRAY) = NINST TRT2       1071
159                      ASECT = I         TRT2       1072
160                      PRAYID(I) = RRAYID(CRAY) TRT2       1073
161                  ELSE                 TRT2       1074
162                      IF( T .LT. TMIN )THEN TRT2       1075
163                          TMIN = T      TRT2       1076
164                          CALL CPYINS( NINST, NEWINS ) TRT2       1077
165                          RISECT(CRAY) = NINST TRT2       1078
166                          ASECT = I     TRT2       1079
167                          RRAYID(I) = RRAYID(CRAY) TRT2       1080
168                      ENDIF            TRT2       1081
169                  ENDIF                TRT2       1082
170              ENDIF                    TRT2       1083
171      ENDIF                             TRT2       1084
172      SUBROUTINE GENSTCT 73/720 OPT=2    FTN 5.1+538    05/08/09. 12.28.37    PAGE 4
173
174      1 CONTINUE                       TRT2       1085
175      IF( ASECT .NE. 0 )THEN           TRT2       1086
176          TVAL = TMIN                   TRT2       1087
177      ELSE                               TRT2       1088
178          TVAL = 0.0                     TRT2       1089
179      ENDIF                             TRT2       1090
180      C                               TRT2       1091
181      RETURN                             TRT2       1092
182      END                                 TRT2       1093

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--VARIABLE MAP--(LO=A)

-NAME-	ADDRESS-	BLOCK-	PROPERTIES-	TYPE-	SIZE	-NAME-	ADDRESS-	BLOCK-	PROPERTIES-	TYPE-	SIZE
ASECT	8	DUMMY-ARG		INTEGER		OZ	3	DUMMY-ARG		REAL	
CRAY	1B	/RAYSTK/		INTEGER		PACCEL	2001B	/PRMLST/		INTEGER	1024

DX	4	DUMMY-ARG	REAL	PIDX	176B	INTEGER	
DY	5	DUMMY-ARG	REAL	PRAYID	4001B	INTEGER	1024
DZ	6	DUMMY-ARG	REAL	PRMIDX	10001B	INTEGER	1024
I	174B		INTEGER	PRMTYP	6001B	INTEGER	1024
ICOLB	10020B	/INLSR/	REAL	RAY	2B	INTEGER	512
ICOLG	7016B	/INLSR/	REAL	RAYNUM	1B	INTEGER	
ICOLR	6014B	/INLSR/	REAL	RDEP	2002B	INTEGER	512
INX	3006B	/INLSR/	REAL	RDX	3000B	REAL	512
INY	4010B	/INLSR/	REAL	RDY	4000B	REAL	512
INZ	5012B	/INLSR/	REAL	RDZ	5000B	REAL	512
IPRIM	1B	/INLSI/	INTEGER	RISECT	2B	INTEGER	512
IPX	0B	/INLSR/	REAL	ROX	0B	REAL	512
IPY	1002B	/INLSR/	REAL	ROY	1000B	REAL	512
IPZ	2004B	/INLSR/	REAL	ROZ	2000B	REAL	512
IRRAY	1003B	/INLSI/	INTEGER	RRAYID	3002B	INTEGER	512
ITRAY	2005B	/INLSI/	INTEGER	RTYPE	1002B	INTEGER	512
ITTYP	3007B	/INLSI/	INTEGER	RWGTB	10000B	REAL	512
MATTER	1B	/PRMLST/	INTEGER	RWGTG	7000B	REAL	512
NINS	0B	/INLSI/	INTEGER	RWGTR	6000B	REAL	512
NINST	7	DUMMY-ARG	INTEGER	SECT	175B	INTEGER	
NLRAY	0B	/RAYLSI/	INTEGER	T	177B	REAL	
NPRM	0B	/PRMLST/	INTEGER	TMIN	200B	REAL	
NSRAY	0B	/RAYSTK/	INTEGER	TVAL	9	REAL	
OX	1	DUMMY-ARG	REAL	URAYID	10	INTEGER	
OY	2	DUMMY-ARG	REAL				

--SYMBOLIC CONSTANTS--(LO=A)

-NAME----	TYPE-----	VALUE-----	-NAME----	TYPE-----	VALUE-----
BKCNST	INTEGER	0	ENTER	INTEGER	1
BKHORZ	INTEGER	2	EPS	REAL	0"16706553762465362572"
BKVERT	INTEGER	1	EYERAY	INTEGER	1
DAXX	INTEGER	1	GTHUGE	REAL	0"17474611320000000000"
DAXY	INTEGER	2	LEAVE	INTEGER	2
DAXZ	INTEGER	3	LGTRBN	INTEGER	2
DEGRAD	REAL	0"17124357506472324711"	LGTCOS	INTEGER	0
DIMINS	INTEGER	514	LGTCOS	INTEGER	1
DIMPRM	INTEGER	1024	MAXFLT	REAL	0"20235327435361326142"
DIMRAY	INTEGER	512	MAXINS	INTEGER	512
DIMSTK	INTEGER	512	MAXPRM	INTEGER	1024
□ SUBROUTINE	GENSCT	73/720 OPT=2			FTN 5.1+538 05/08/09. 12.28.37
-NAME---- <th>TYPE-----</th> <th>VALUE-----</th> <th>-NAME----</th> <th>TYPE-----</th> <th>VALUE-----</th>	TYPE-----	VALUE-----	-NAME----	TYPE-----	VALUE-----
MAXRAY	INTEGER	512	SHDINS	INTEGER	514
MAXSTK	INTEGER	512	SPHPRM	INTEGER	1
MINEPS	REAL	0"16775174265421615510"	SUBACL	INTEGER	1
MINFLT	REAL	0"57542450342416451635"	TRIPRM	INTEGER	2
NEWINS	INTEGER	513	TRNRAY	INTEGER	3
NOACL	INTEGER	0	TRTPI	REAL	0"17216220773232113302"
RFLRAY	INTEGER	2			

--PROCEDURES--(LO=A)

-NAME----	TYPE-----	ARGS-----	CLASS-----
CPYINS		2	SUBROUTINE
SPHINS		10	SUBROUTINE
TRIINS		10	SUBROUTINE

--STATEMENT LABELS--(LO=A)

-LABEL-ADDRESS-----PROPERTIES-----DEF

1	INACTIVE	DO-TERM	172
100	121B	FORMAT	149
101	126B	FORMAT	151

--ENTRY POINTS--(LO=A)
 -NAME---ADDRESS--ARGS---

GENSCT 3B 10

--I/O UNITS--(LO=A)
 -NAME--- PROPERTIES-----

TAPE6 FMT/SEQ

--STATISTICS--

PROGRAM-UNIT LENGTH	235B = 157
CM LABELLED COMMON LENGTH	45040B = 18976
CM STORAGE USED	57400B = 24320
COMPILE TIME	0.286 SECONDS

□	SUBROUTINE CELSCT	73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE	1
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1	C		TRT2	1094
2	C		TRT2	1095
3		SUBROUTINE CELSCT(OX, OY, OZ, DX, DY, DZ, NINST, ASECT, TVAL,	TRT2	1096
4	+	URAYID)	TRT2	1097
5		IMPLICIT CHARACTER*1 (A-Z)	TRT2	1098
6		REAL OX, OY, OZ, DX, DY, DZ, TVAL	TRT2	1099
7		INTEGER NINST, ASECT, URAYID	TRT2	1100
8	C	*****	TRT2	1101
9	C	FIND AN INTERSECTION USING THE ACCELERATION STRUCTURE.	TRT2	1102
10	C	THE ARGUMENTS ARE THE SAME AS FOR GENST().	TRT2	1103
11	C	*****	TRT2	1104
12	C		PARAMS	1
13	C	-----	PARAMS	2
14	C	-- SUNDRY PARAMETERS --	PARAMS	3
15	C	-----	PARAMS	4
16	C		PARAMS	5
17		REAL GTHUGE, MINEPS, EPS, MINFLT, MAXFLT, TRTPI, DEGRAD	PARAMS	6
18		PARAMETER(GTHUGE=1E7)	PARAMS	7
19		PARAMETER(MINEPS=1E-5)	PARAMS	8
20		PARAMETER(EPS=1E-7)	PARAMS	9
21		PARAMETER(MINFLT=-1E20)	PARAMS	10
22		PARAMETER(MAXFLT=1E20)	PARAMS	11
23		PARAMETER(TRTPI=3.1415926)	PARAMS	12
24		PARAMETER(DEGRAD=TRTPI/180.0)	PARAMS	13
25	C		PARAMS	14
26		INTEGER EYERAY, RFLRAY, TRNRAY	PARAMS	15
27		PARAMETER(EYERAY=1)	PARAMS	16
28		PARAMETER(RFLRAY=2)	PARAMS	17
29		PARAMETER(TRNRAY=3)	PARAMS	18
30	C		PARAMS	19
31		INTEGER ENTER, LEAVE	PARAMS	20
32		PARAMETER(ENTER=1)	PARAMS	21
33		PARAMETER(LEAVE=2)	PARAMS	22
34	C		PARAMS	23
35		INTEGER NOACL, SUBACL	PARAMS	24
36		PARAMETER(NOACL=0)	PARAMS	25

37		PARAMETER(SUBACL=1)		PARAMS	26
38	C			PARAMS	27
39		INTEGER BKCNST, BKVERT, BKHORZ		PARAMS	28
40		PARAMETER(BKCNST=0)		PARAMS	29
41		PARAMETER(BKVERT=1)		PARAMS	30
42		PARAMETER(BKHORZ=2)		PARAMS	31
43	C			PARAMS	32
44		INTEGER LGTCON, LGTCOS, LGTBRN		PARAMS	33
45		PARAMETER(LGTCON=0)		PARAMS	34
46		PARAMETER(LGTCOS=1)		PARAMS	35
47		PARAMETER(LGTBRN=2)		PARAMS	36
48	C			PARAMS	37
49		INTEGER SPHPRM, TRIPRM		PARAMS	38
50		PARAMETER(SPHPRM=1)		PARAMS	39
51		PARAMETER(TRIPRM=2)		PARAMS	40
52	C			PARAMS	41
53		INTEGER DAXX, DAXY, DAXZ		PARAMS	42
54		PARAMETER(DAXX=1)		PARAMS	43
55		PARAMETER(DAXY=2)		PARAMS	44
56		PARAMETER(DAXZ=3)		PARAMS	45
57	C			RAYSTK	1
	□	SUBROUTINE CELSCT	73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
					PAGE 2
58		C---- IN-MEMORY AND GLOBALLY ACCESSIBLE DATA STRUCTURES		RAYSTK	2
59	C			RAYSTK	3
60		C-----		RAYSTK	4
61		C-- RAY STACK COMMON BLOCK --		RAYSTK	5
62		C-----		RAYSTK	6
63		C SIZE: DIMSTK + 2 WORDS = 514		RAYSTK	7
64	C			RAYSTK	8
65		INTEGER MAXSTK, DIMSTK		RAYSTK	9
66		PARAMETER(MAXSTK=512)		RAYSTK	10
67		PARAMETER(DIMSTK=MAXSTK)		RAYSTK	11
68	C			RAYSTK	12
69		INTEGER NSRAY, CRAY		RAYSTK	13
70		INTEGER RAY(DIMSTK)		RAYSTK	14
71		COMMON /RAYSTK/ NSRAY, CRAY, RAY		RAYSTK	15
72	C			INSLST	1
73		C-----		INSLST	2
74		C-- INTERSECTION LIST COMMON BLOCK --		INSLST	3
75		C-----		INSLST	4
76		C SIZE: 13 * DIMINS + 1 WORDS = 6683		INSLST	5
77	C			INSLST	6
78		INTEGER MAXINS, DIMINS, NEWINS, SHDINS		INSLST	7
79		PARAMETER(MAXINS=512)		INSLST	8
80		PARAMETER(DIMINS=MAXINS+2)		INSLST	9
81		PARAMETER(NEWINS=MAXINS+1)		INSLST	10
82		PARAMETER(SHDINS=MAXINS+2)		INSLST	11
83	C			INSLST	12
84		INTEGER NINS, IPRIM(DIMINS), IRRAY(DIMINS), ITRAY(DIMINS)		INSLST	13
85		INTEGER ITTYP(DIMINS)		INSLST	14
86		COMMON /INLSI/ NINS, IPRIM, IRRAY, ITRAY, ITTYP		INSLST	15
87	C			INSLST	16
88		REAL IPX(DIMINS), IPY(DIMINS), IPZ(DIMINS)		INSLST	17
89		REAL INX(DIMINS), INY(DIMINS), INZ(DIMINS)		INSLST	18
90		REAL ICOLR(DIMINS), ICOLG(DIMINS), ICOLB(DIMINS)		INSLST	19
91		COMMON /INLSR/ IPX, IPY, IPZ, INX, INY, INZ, ICOLR, ICOLG, ICOLB		INSLST	20
92	C			RAYLST	1
93		C-----		RAYLST	2
94		C-- RAY LIST COMMON BLOCK --		RAYLST	3
95		C-----		RAYLST	4
96		C SIZE: 13 * DIMRAY + 2 WORDS = 6658		RAYLST	5

97	C		RAYLST	6		
98		INTEGER MAXRAY, DIMRAY	RAYLST	7		
99		PARAMETER(MAXRAY=512)	RAYLST	8		
100		PARAMETER(DIMRAY=MAXRAY)	RAYLST	9		
101	C		RAYLST	10		
102		INTEGER NLRAY, RAYNUM, RISECT(DIMRAY), RTYPE(DIMRAY)	RAYLST	11		
103		INTEGER RDEP(DIMRAY), RRAYID(DIMRAY)	RAYLST	12		
104		COMMON /RAYLSI/ NLRAY, RAYNUM, RISECT, RTYPE, RDEP, RRAYID	RAYLST	13		
105	C		RAYLST	14		
106		REAL ROX(DIMRAY), ROY(DIMRAY), ROZ(DIMRAY)	RAYLST	15		
107		REAL RDX(DIMRAY), RDY(DIMRAY), RDZ(DIMRAY)	RAYLST	16		
108		REAL RWGTR(DIMRAY), RWGTG(DIMRAY), RWGTB(DIMRAY)	RAYLST	17		
109		COMMON /RAYLSR/ ROX, ROY, ROZ, RDX, RDY, RDZ, RWGTR, RWGTG, RWGTB	RAYLST	18		
110	C		PRMLST	1		
111	C	-----	PRMLST	2		
112	C	-- PRIMITIVE LIST COMMON BLOCK --	PRMLST	3		
113	C	-----	PRMLST	4		
114	C	C SIZE: 5 * DIMPRM + 1 WORDS = 5121	PRMLST	5		
114	□	SUBROUTINE CELSCT 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE	3
115	C		PRMLST	6		
116		INTEGER MAXPRM, DIMPRM	PRMLST	7		
117		PARAMETER(MAXPRM=1024)	PRMLST	8		
118		PARAMETER(DIMPRM=MAXPRM)	PRMLST	9		
119	C		PRMLST	10		
120		INTEGER NPRM, MATTER(DIMPRM), PACCEL(DIMPRM), PRAYID(DIMPRM)	PRMLST	11		
121		INTEGER PRMTYP(DIMPRM), PRMIDX(DIMPRM)	PRMLST	12		
122		COMMON /PRMLST/ NPRM, MATTER, PACCEL, PRAYID, PRMTYP, PRMIDX	PRMLST	13		
123	C		ACCEL	1		
124	C	-----	ACCEL	2		
125	C	-- ACCELERATION --	ACCEL	3		
126	C	-----	ACCEL	4		
127		C FOR TYPICAL SCENES, THE "MAX CELLS" WOULD BE BEST AROUND 20 TO 40.	ACCEL	5		
128		C (MAYBE - MY TESTS SAY 10 IS GOOD). BUT THE MEMORY COST IS QUITE HIGH.	ACCEL	6		
129		C LIKewise, IT WOULD BE GOOD TO ALLOW LARGISH PRIMITIVES TO BE INDEXED,	ACCEL	7		
130		C BUT THE MAXIMUM POSSIBLE LIST SIZE GOES UP AS THE CUBE OF THE LARGEST	ACCEL	8		
131		C NUMBER OF CELLS ALLOWED IN ANY DIRECTION FOR THE PRIMITIVE TO BE ACCEPACCEL	ACCEL	9		
132		C FOR INDEXING. SO THE MEMORY COST IS (POTENTIALLY) VERY HIGH. IT WOULD ACCEL	ACCEL	10		
133		C POSSIBLE TO USE THE SAME LIST FOR MORE THAN ONE GRID CELL IF IT IS IDEACCEL	ACCEL	11		
134		C TO THAT FOR ANOTHER CELL. WE DON'T TRY TO DETECT THAT, THOUGH.	ACCEL	12		
135		C IF THE RATIO OF THE BIGGEST DIMENSION RANGE TO THE SMALLEST EXCEEDS ACCEL	ACCEL	13		
136		C MXDMRT, ADJUST THE RANGES FOR CALCULATING THE GRID PARAMETERS. THIS SEACCEL	ACCEL	14		
137		C TO BE ALWAYS A GOOD IDEA (HENCE SET TO 1.0).	ACCEL	15		
138	C		ACCEL	16		
139	C	C SIZE: CELDIM + 2 * LSTDIM + 13 WORDS = 1000 + 2 * 8000 + 13 = 17013 WOACCEL	ACCEL	17		
140	C		ACCEL	18		
141		INTEGER MXCELX, MXCELY, MXCELZ, DMCELX, DMCELY, DMCELZ	ACCEL	19		
142		INTEGER CELDIM, MXCELS, MXPCVR, MAXLST, LSTDIM	ACCEL	20		
143		REAL MXDMRT	ACCEL	21		
144		PARAMETER(MXCELX=10)	ACCEL	22		
145		PARAMETER(MXCELY=10)	ACCEL	23		
146		PARAMETER(MXCELZ=10)	ACCEL	24		
147		PARAMETER(DMCELX=MXCELX)	ACCEL	25		
148		PARAMETER(DMCELY=MXCELY)	ACCEL	26		
149		PARAMETER(DMCELZ=MXCELZ)	ACCEL	27		
150		PARAMETER(CELDIM=DMCELX*DMCELY*DMCELZ)	ACCEL	28		
151		PARAMETER(MXCELS=MXCELX*MXCELY*MXCELZ)	ACCEL	29		
152		PARAMETER(MXPCVR=2)	ACCEL	30		
153		PARAMETER(MAXLST=2*2*2*MXCELS)	ACCEL	31		
154		PARAMETER(LSTDIM=MAXLST)	ACCEL	32		
155		PARAMETER(MXDMRT=1.0)	ACCEL	33		
156	C		ACCEL	34		

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TRT2_20050809_130554.lpr
157 INTEGER NLIST, ANX, ANY, ANZ, CELLS(CELDIM) ACCEL 35
158 INTEGER LPRIM(LSTDIM), LNEXT(LSTDIM) ACCEL 36
159 COMMON /ACCELI/ NLIST, ANX, ANY, ANZ, CELLS, LPRIM, LNEXT ACCEL 37
160 C ACCEL 38
161 REAL AXL, AXH, AYL, AYH, AZL, AZH, ADXS, ADYS, ADZS ACCEL 39
162 COMMON /ACCELR/ AXL, AXH, AYL, AYH, AZL, AZH, ADXS, ADYS, ADZS ACCEL 40
163 C GRID 1
164 C----- GRID 2
165 C-- GRID TRAVERSAL -- GRID 3
166 C----- GRID 4
167 C SIZE: 10 WORDS. GRID 5
168 C GRID 6
169 INTEGER VNINST, VASECT, VURAYI GRID 7
170 COMMON /VSCACI/ VNINST, VASECT, VURAYI GRID 8
171 C GRID 9
SUBROUTINE CELSCT 73/720 OPT=2 FTN 5.1+538 05/08/09. 12.28.37 PAGE 4

172 REAL VOX, VOY, VOZ, VDX, VDY, VDZ, VTMIN GRID 10
173 COMMON /VSCACR/ VOX, VOY, VOZ, VDX, VDY, VDZ, VTMIN GRID 11
174 REAL XCELL, YCELL, ZCELL TRT2 1112
175 INTEGER BSECT TRT2 1113
176 REAL XI, YI, ZI TRT2 1114
177 INTEGER I, SECT, PIDX TRT2 1115
178 REAL T, TMIN TRT2 1116
179 C TRT2 1117
180 C-- CALCULATE THE ORIGIN COORDINATES IN THE CELL COORDINATE SYSTEM. TRT2 1118
181 C TRT2 1119
182 XCELL = ( ( OX - AXL ) / ADXS ) * ANX TRT2 1120
183 YCELL = ( ( OY - AYL ) / ADYS ) * ANY TRT2 1121
184 ZCELL = ( ( OZ - AZL ) / ADZS ) * ANZ TRT2 1122
185 C TRT2 1123
186 C-- CHECK WE ARE INSIDE THE GRID. EXCEPT FOR EYE RAYS, WE SHOULD ALWAYS TRT2 1124
187 C-- IF NOT, THEN SEE IF THE RAY INTERSECTS THE BOUNDING BOX OF THE SCENETR2 1125
188 C TRT2 1126
189 IF( XCELL .LT. 0 .OR. XCELL .GE. MXCELX .OR. TRT2 1127
190 + YCELL .LT. 0 .OR. YCELL .GE. MXCELY .OR. TRT2 1128
191 + ZCELL .LT. 0 .OR. ZCELL .GE. MXCELZ )THEN TRT2 1129
192 CALL BOXINS( OX, OY, OZ, DX, DY, DZ, BSECT, XI, YI, ZI ) TRT2 1130
193 C TRT2 1131
194 C-- THE RAY DOESN'T HIT THE BOUNDING BOX. NO INTERSECTION. TRT2 1132
195 C TRT2 1133
196 IF( BSECT .EQ. 0 )THEN TRT2 1134
197 ASECT = 0 TRT2 1135
198 RETURN TRT2 1136
199 ENDIF TRT2 1137
200 C TRT2 1138
201 C-- USE THE INTERSECTION POINT TO FIND THE INITIAL GRID CELL TO TRAVERSE TRT2 1139
202 C TRT2 1140
203 XCELL = ( ( XI - AXL ) / ADXS ) * ANX TRT2 1141
204 YCELL = ( ( YI - AYL ) / ADYS ) * ANY TRT2 1142
205 ZCELL = ( ( ZI - AZL ) / ADZS ) * ANZ TRT2 1143
206 ENDIF TRT2 1144
207 C TRT2 1145
208 C-- SAVE RAY DATA FOR USE BY VISCEL() TRT2 1146
209 C TRT2 1147
210 VASECT = 0 TRT2 1148
211 VDX = DX TRT2 1149
212 VDY = DY TRT2 1150
213 VDZ = DZ TRT2 1151
214 VOX = OX TRT2 1152
215 VOY = OY TRT2 1153
216 VOZ = OZ TRT2 1154

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217	VNINST = NINST	TRT2	1155
218	VURAYI = URAYID	TRT2	1156
219	C	TRT2	1157
220	C-- TRAVERSE THE CELL GRID. EACH CELL VISITED IS HANDLED BY VISCEL()	TRT2	1158
221	C-- NOTE CORRECTION TO THE DIRECTION VECTOR FOR GRID SPACE!	TRT2	1159
222	C	TRT2	1160
223	CALL GRDTRV(XCELL, YCELL, ZCELL, DX/ADXS, DY/ADYS, DZ/ADZS,	TRT2	1161
224	+ ANX, ANY, ANZ)	TRT2	1162
225	C	TRT2	1163
226	C-- GRID TRAVERSAL ENDS EITHER WHEN WE HAVE FALLEN OFF THE SIDES OF THE	TRT2	1164
227	C-- OR VISCEL() HAS FOUND AN INTERSECTION. RETURN (ASECT) IN EITHER CASE	TRT2	1165
228	C	TRT2	1166
□	SUBROUTINE CELSCT 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
			PAGE 5
229	ASECT = VASECT	TRT2	1167
230	C	TRT2	1168
231	C-- NOW CHECK ALL THE PRIMITIVES THAT WERE TOO LARGE TO BE INDEXED IN TH	TRT2	1169
232	C-- ACCELERATION STRUCTURE. ONE OF THESE MAY HAVE A CLOSER INTERSECTION.	TRT2	1170
233	C	TRT2	1171
234	IF(ASECT .NE. 0)TMIN = VTMIN	TRT2	1172
235	C	TRT2	1173
236	DO 1 I=1,NPRM	TRT2	1174
237	IF(PACCEL(I) .EQ. 0)THEN	TRT2	1175
238	IF(PRAYID(I) .NE. RRAYID(CRAY) .OR. URAYID .EQ. 0)THEN	TRT2	1176
239	PIDX = PRMIDX(I)	TRT2	1177
240	IF(PRMTYP(I) .EQ. SPHPRM)THEN	TRT2	1178
241	CALL SPHINS(OX, OY, OZ, DX, DY, DZ, PIDX, SECT,	TRT2	1179
242	+ T, I)	TRT2	1180
243	ELSE IF(PRMTYP(I) .EQ. TRIPRM)THEN	TRT2	1181
244	CALL TRIINS(OX, OY, OZ, DX, DY, DZ, PIDX, SECT,	TRT2	1182
245	+ T, I)	TRT2	1183
246	ELSE	TRT2	1184
247	WRITE(6,100)	TRT2	1185
248	100 FORMAT(1X, 'INTERNAL ERROR: CELSCT.')	TRT2	1186
249	WRITE(6,101)	TRT2	1187
250	101 FORMAT(6X, 'UNKNOWN PRIMITIVE TYPE.')	TRT2	1188
251	STOP	TRT2	1189
252	ENDIF	TRT2	1190
253	IF(SECT .NE. 0)THEN	TRT2	1191
254	IF(ASECT .EQ. 0)THEN	TRT2	1192
255	TMIN = T	TRT2	1193
256	CALL CPYINS(NINST, NEWINS)	TRT2	1194
257	RISECT(CRAY) = NINST	TRT2	1195
258	ASECT = I	TRT2	1196
259	PRAYID(I) = RRAYID(CRAY)	TRT2	1197
260	ELSE	TRT2	1198
261	IF(T .LT. TMIN)THEN	TRT2	1199
262	TMIN = T	TRT2	1200
263	CALL CPYINS(NINST, NEWINS)	TRT2	1201
264	RISECT(CRAY) = NINST	TRT2	1202
265	ASECT = I	TRT2	1203
266	PRAYID(I) = RRAYID(CRAY)	TRT2	1204
267	ENDIF	TRT2	1205
268	ENDIF	TRT2	1206
269	ENDIF	TRT2	1207
270	ENDIF	TRT2	1208
271	ENDIF	TRT2	1209
272	1 CONTINUE	TRT2	1210
273	C	TRT2	1211
274	IF(ASECT .NE. 0)THEN	TRT2	1212
275	TVAL = TMIN	TRT2	1213
276	ELSE	TRT2	1214

```

277          TVAL = 0.0
278          ENDIF
279          C
280          RETURN
281          END

```

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```

TRT2      1215
TRT2      1216
TRT2      1217
TRT2      1218
TRT2      1219
05/08/09 12.28.37

```

SUBROUTINE CELSCT 73/720 OPT=2 FTN 5.1+538 PAGE 6

--VARIABLE MAP--(LO=A)

NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE	NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE
ADXS	6B	/ACCELR/		REAL		OY	2	DUMMY-ARG		REAL	
ADYS	7B	/ACCELR/		REAL		OZ	3	DUMMY-ARG		REAL	
ADZS	10B	/ACCELR/		REAL		PACCEL	2001B	/PRMLST/		INTEGER	1024
ANX	1B	/ACCELI/		INTEGER		PIDX	340B			INTEGER	
ANY	2B	/ACCELI/		INTEGER		PRAYID	4001B	/PRMLST/		INTEGER	1024
ANZ	3B	/ACCELI/		INTEGER		PRMIDX	10001B	/PRMLST/		INTEGER	1024
ASECT	8	DUMMY-ARG		INTEGER		PRMTYP	6001B	/PRMLST/		INTEGER	1024
AXH	1B	/ACCELR/		REAL		RAY	2B	/RAYSTK/		INTEGER	512
AXL	0B	/ACCELR/		REAL		RAYNUM	1B	/RAYLSI/		INTEGER	
AYH	3B	/ACCELR/		REAL		RDEP	2002B	/RAYLSI/		INTEGER	512
AYL	2B	/ACCELR/		REAL		RDX	3000B	/RAYLSR/		REAL	512
AZH	5B	/ACCELR/		REAL		RDY	4000B	/RAYLSR/		REAL	512
AZL	4B	/ACCELR/		REAL		RDZ	5000B	/RAYLSR/		REAL	512
BSECT	332B			INTEGER		RISECT	2B	/RAYLSI/		INTEGER	512
CELLS	4B	/ACCELI/		INTEGER	1000	ROX	0B	/RAYLSR/		REAL	512
CRAY	1B	/RAYSTK/		INTEGER		ROY	1000B	/RAYLSR/		REAL	512
DX	4	DUMMY-ARG		REAL		ROZ	2000B	/RAYLSR/		REAL	512
DY	5	DUMMY-ARG		REAL		RRAYID	3002B	/RAYLSI/		INTEGER	512
DZ	6	DUMMY-ARG		REAL		RTYPE	1002B	/RAYLSI/		INTEGER	512
I	336B			INTEGER		RWGTB	10000B	/RAYLSR/		REAL	512
ICOLB	10020B	/INLSR/		REAL	514	RWGTG	7000B	/RAYLSR/		REAL	512
ICOLG	7016B	/INLSR/		REAL	514	RWGTR	6000B	/RAYLSR/		REAL	512
ICOLR	6014B	/INLSR/		REAL	514	SECT	337B			INTEGER	
INX	3006B	/INLSR/		REAL	514	T	341B			REAL	
INY	4010B	/INLSR/		REAL	514	TMIN	342B			REAL	
INZ	5012B	/INLSR/		REAL	514	TVAL	9	DUMMY-ARG		REAL	
IPRIM	1B	/INLSI/		INTEGER	514	URAYID	10	DUMMY-ARG		INTEGER	
IPX	0B	/INLSR/		REAL	514	VASECT	1B	/VSCACI/		INTEGER	
IPY	1002B	/INLSR/		REAL	514	VDX	3B	/VSCACR/		REAL	
IPZ	2004B	/INLSR/		REAL	514	VDY	4B	/VSCACR/		REAL	
IRRAY	1003B	/INLSI/		INTEGER	514	VDZ	5B	/VSCACR/		REAL	
ITRAY	2005B	/INLSI/		INTEGER	514	VNINST	0B	/VSCACI/		INTEGER	
ITTP	3007B	/INLSI/		INTEGER	514	VOX	0B	/VSCACR/		REAL	
LNEXT	21454B	/ACCELI/		INTEGER	8000	VOY	1B	/VSCACR/		REAL	
LPRIM	1754B	/ACCELI/		INTEGER	8000	VOZ	2B	/VSCACR/		REAL	
MATTER	1B	/PRMLST/		INTEGER	1024	VTMIN	6B	/VSCACR/		REAL	
NINS	0B	/INLSI/		INTEGER		VURAYI	2B	/VSCACI/		INTEGER	
NINST	7	DUMMY-ARG		INTEGER		XCELL	327B			REAL	
NLIST	0B	/ACCELI/		INTEGER		XI	333B			REAL	
NLRAY	0B	/RAYLSI/		INTEGER		YCELL	330B			REAL	
NPRM	0B	/PRMLST/		INTEGER		YI	334B			REAL	
NSRAY	0B	/RAYSTK/		INTEGER		ZCELL	331B			REAL	
OX	1	DUMMY-ARG		REAL		ZI	335B			REAL	

--SYMBOLIC CONSTANTS--(LO=A)

NAME	TYPE	VALUE	NAME	TYPE	VALUE
BKCNST	INTEGER	0	DAXZ	INTEGER	3
BKHORZ	INTEGER	2	DEGRAD	REAL	0"17124357506472324711"
BKVERT	INTEGER	1	DIMINS	INTEGER	514
CELDIM	INTEGER	1000	DIMPRM	INTEGER	1024

```

DAXX    INTEGER          1
DAXY    INTEGER          2
SUBROUTINE CELSCT      73/720  OPT=2
-NAME---TYPE-----VALUE
DMCELY  INTEGER          10
DMCELY  INTEGER          10
DMCELY  INTEGER          10
ENTER   INTEGER          1
EPS     REAL              0"16706553762465362572"
EYERAY  INTEGER          1
GTHUGE  REAL              0"17474611320000000000"
LEAVE   INTEGER          2
LGTBRN  INTEGER          2
LGTCON  INTEGER          0
LGTCOS  INTEGER          1
LSTDIM  INTEGER          8000
MAXFLT  REAL              0"20235327435361326142"
MAXINS  INTEGER          512
MAXLST  INTEGER          8000
MAXPRM  INTEGER          1024
MAXRAY  INTEGER          512
MAXSTK  INTEGER          512

```

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DIMRAY  INTEGER          512
DIMSTK  INTEGER          512
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-NAME---TYPE-----VALUE
MINEPS  REAL              0"16775174265421615510"
MINFLT  REAL              0"57542450342416451635"
MXCELS  INTEGER          1000
MXCELY  INTEGER          10
MXCELZ  INTEGER          10
MXCELZ  INTEGER          10
MXDMRT  REAL              0"17204000000000000000"
MXPCVR  INTEGER          2
NEWINS  INTEGER          513
NOACL   INTEGER          0
RFLRAY  INTEGER          2
SHDINS  INTEGER          514
SPHPRM  INTEGER          1
SUBACL  INTEGER          1
TRIPRM  INTEGER          2
TRNRAY  INTEGER          3
TRTPI   REAL              0"17216220773232113302"

```

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--PROCEDURES-- (LO=A)

```

-NAME-----TYPE-----ARGS-----CLASS-----
BOXINS          10      SUBROUTINE
CPYINS          2       SUBROUTINE
GRDTRV          9       SUBROUTINE
SPHINS          10      SUBROUTINE
TRIINS          10      SUBROUTINE

```

--STATEMENT LABELS-- (LO=A)

```

-LABEL-ADDRESS-----PROPERTIES-----DEF
1    INACTIVE  DO-TERM      272
100  223B     FORMAT         248
101  230B     FORMAT         250

```

--ENTRY POINTS-- (LO=A)

```

-NAME---ADDRESS--ARGS---
CELSCT    3B    10

```

--I/O UNITS-- (LO=A)

```

-NAME--- PROPERTIES-----

```

```

TAPE6    FMT/SEQ
SUBROUTINE CELSCT      73/720  OPT=2

```

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--STATISTICS--

```

PROGRAM-UNIT LENGTH      377B = 255
CM LABELLED COMMON LENGTH 106237B = 35999
CM STORAGE USED          57700B = 24512
COMPILE TIME              0.488 SECONDS
SUBROUTINE VISCEL        73/720  OPT=2

```

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1	C	TRT2	1220
2	C	TRT2	1221
3	SUBROUTINE VISCEL(X, Y, Z, QUIT)	TRT2	1222
4	IMPLICIT CHARACTER*1 (A-Z)	TRT2	1223
5	INTEGER X, Y, Z, QUIT	TRT2	1224
6	C*****	TRT2	1225
7	C PROCESS GRID CELL (X,Y,Z). IF THERE ARE ANY PRIMITIVES IN THIS CELL,	TRT2	1226
8	C CHECK THEM FOR INTERSECTION WITH THE CURRENT RAY (IN VSCACC.XXX).	TRT2	1227
9	C IF AN INTERSECTION IS FOUND, LEAVE THE PRIMITIVE INDEX IN VSCACC.ASECT	TRT2	1228
10	C WITH THE POSITION AND NORMAL STORED IN INSLST.XXX(VSCACC.NINST) IN	TRT2	1229
11	C THE USUAL WAY. AND TERMINATE GRID TRAVERSAL.	TRT2	1230
12	C (IF WE WANT TO STOP GRID TRAVERSAL AT THIS CELL, RETURN (QUIT)	TRT2	1231
13	C NON-ZERO, ELSE 0.)	TRT2	1232
14	C*****	TRT2	1233
15	C	PARAMS	1
16	C-----	PARAMS	2
17	C-- SUNDRY PARAMETERS --	PARAMS	3
18	C-----	PARAMS	4
19	C	PARAMS	5
20	REAL GTHUGE, MINEPS, EPS, MINFLT, MAXFLT, TRTPI, DEGRAD	PARAMS	6
21	PARAMETER(GTHUGE=1E7)	PARAMS	7
22	PARAMETER(MINEPS=1E-5)	PARAMS	8
23	PARAMETER(EPS=1E-7)	PARAMS	9
24	PARAMETER(MINFLT=-1E20)	PARAMS	10
25	PARAMETER(MAXFLT=1E20)	PARAMS	11
26	PARAMETER(TRTPI=3.1415926)	PARAMS	12
27	PARAMETER(DEGRAD=TRTPI/180.0)	PARAMS	13
28	C	PARAMS	14
29	INTEGER EYERAY, RFLRAY, TRNRAY	PARAMS	15
30	PARAMETER(EYERAY=1)	PARAMS	16
31	PARAMETER(RFLRAY=2)	PARAMS	17
32	PARAMETER(TRNRAY=3)	PARAMS	18
33	C	PARAMS	19
34	INTEGER ENTER, LEAVE	PARAMS	20
35	PARAMETER(ENTER=1)	PARAMS	21
36	PARAMETER(LEAVE=2)	PARAMS	22
37	C	PARAMS	23
38	INTEGER NOACL, SUBACL	PARAMS	24
39	PARAMETER(NOACL=0)	PARAMS	25
40	PARAMETER(SUBACL=1)	PARAMS	26
41	C	PARAMS	27
42	INTEGER BKCNST, BKVERT, BKHORZ	PARAMS	28
43	PARAMETER(BKCNST=0)	PARAMS	29
44	PARAMETER(BKVERT=1)	PARAMS	30
45	PARAMETER(BKHORZ=2)	PARAMS	31
46	C	PARAMS	32
47	INTEGER LGTCOS, LGTCOS, LGTBRN	PARAMS	33
48	PARAMETER(LGTCOS=0)	PARAMS	34
49	PARAMETER(LGTCOS=1)	PARAMS	35
50	PARAMETER(LGTBRN=2)	PARAMS	36
51	C	PARAMS	37
52	INTEGER SPHPRM, TRIPRM	PARAMS	38
53	PARAMETER(SPHPRM=1)	PARAMS	39
54	PARAMETER(TRIPRM=2)	PARAMS	40
55	C	PARAMS	41
56	INTEGER DAXX, DAXY, DAXZ	PARAMS	42
57	PARAMETER(DAXX=1)	PARAMS	43
□	SUBROUTINE VISCEL 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
			PAGE 2
58	PARAMETER(DAXY=2)	PARAMS	44

59	PARAMETER(DAXZ=3)	PARAMS	45
60	C	RAYSTK	1
61	C---- IN-MEMORY AND GLOBALLY ACCESSIBLE DATA STRUCTURES	RAYSTK	2
62	C	RAYSTK	3
63	C-----	RAYSTK	4
64	C-- RAY STACK COMMON BLOCK --	RAYSTK	5
65	C-----	RAYSTK	6
66	C SIZE: DIMSTK + 2 WORDS = 514	RAYSTK	7
67	C	RAYSTK	8
68	INTEGER MAXSTK, DIMSTK	RAYSTK	9
69	PARAMETER(MAXSTK=512)	RAYSTK	10
70	PARAMETER(DIMSTK=MAXSTK)	RAYSTK	11
71	C	RAYSTK	12
72	INTEGER NSRAY, CRAY	RAYSTK	13
73	INTEGER RAY(DIMSTK)	RAYSTK	14
74	COMMON /RAYSTK/ NSRAY, CRAY, RAY	RAYSTK	15
75	C	RAYLST	1
76	C-----	RAYLST	2
77	C-- RAY LIST COMMON BLOCK --	RAYLST	3
78	C-----	RAYLST	4
79	C SIZE: 13 * DIMRAY + 2 WORDS = 6658	RAYLST	5
80	C	RAYLST	6
81	INTEGER MAXRAY, DIMRAY	RAYLST	7
82	PARAMETER(MAXRAY=512)	RAYLST	8
83	PARAMETER(DIMRAY=MAXRAY)	RAYLST	9
84	C	RAYLST	10
85	INTEGER NLRAY, RAYNUM, RISECT(DIMRAY), RTYPE(DIMRAY)	RAYLST	11
86	INTEGER RDEP(DIMRAY), RRAYID(DIMRAY)	RAYLST	12
87	COMMON /RAYLSI/ NLRAY, RAYNUM, RISECT, RTYPE, RDEP, RRAYID	RAYLST	13
88	C	RAYLST	14
89	REAL ROX(DIMRAY), ROY(DIMRAY), ROZ(DIMRAY)	RAYLST	15
90	REAL RDX(DIMRAY), RDY(DIMRAY), RDZ(DIMRAY)	RAYLST	16
91	REAL RWGTR(DIMRAY), RWGTG(DIMRAY), RWGTB(DIMRAY)	RAYLST	17
92	COMMON /RAYLSR/ ROX, ROY, ROZ, RDX, RDY, RDZ, RWGTR, RWGTG, RWGTB	RAYLST	18
93	C	PRMLST	1
94	C-----	PRMLST	2
95	C-- PRIMITIVE LIST COMMON BLOCK --	PRMLST	3
96	C-----	PRMLST	4
97	C SIZE: 5 * DIMPRM + 1 WORDS = 5121	PRMLST	5
98	C	PRMLST	6
99	INTEGER MAXPRM, DIMPRM	PRMLST	7
100	PARAMETER(MAXPRM=1024)	PRMLST	8
101	PARAMETER(DIMPRM=MAXPRM)	PRMLST	9
102	C	PRMLST	10
103	INTEGER NPRM, MATTER(DIMPRM), PACCEL(DIMPRM), PRAYID(DIMPRM)	PRMLST	11
104	INTEGER PRMTYP(DIMPRM), PRMIDX(DIMPRM)	PRMLST	12
105	COMMON /PRMLST/ NPRM, MATTER, PACCEL, PRAYID, PRMTYP, PRMIDX	PRMLST	13
106	C	ACCEL	1
107	C-----	ACCEL	2
108	C-- ACCELERATION --	ACCEL	3
109	C-----	ACCEL	4
110	C FOR TYPICAL SCENES, THE "MAX CELLS" WOULD BE BEST AROUND 20 TO 40.	ACCEL	5
111	C (MAYBE - MY TESTS SAY 10 IS GOOD). BUT THE MEMORY COST IS QUITE HIGH.	ACCEL	6
112	C LIKewise, IT WOULD BE GOOD TO ALLOW LARGISH PRIMITIVES TO BE INDEXED,	ACCEL	7
113	C BUT THE MAXIMUM POSSIBLE LIST SIZE GOES UP AS THE CUBE OF THE LARGEST	ACCEL	8
114	C NUMBER OF CELLS ALLOWED IN ANY DIRECTION FOR THE PRIMITIVE TO BE ACCEPTED	ACCEL	9
114	SUBROUTINE VISCEL 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
			PAGE 3
115	C FOR INDEXING. SO THE MEMORY COST IS (POTENTIALLY) VERY HIGH. IT WOULD	ACCEL	10
116	C POSSIBLE TO USE THE SAME LIST FOR MORE THAN ONE GRID CELL IF IT IS	ACCEL	11
117	C TO THAT FOR ANOTHER CELL. WE DON'T TRY TO DETECT THAT, THOUGH.	ACCEL	12
118	C IF THE RATIO OF THE BIGGEST DIMENSION RANGE TO THE SMALLEST EXCEEDS	ACCEL	13

119	C MXDMRT, ADJUST THE RANGES FOR CALCULATING THE GRID PARAMETERS. THIS SEACCEL	14
120	C TO BE ALWAYS A GOOD IDEA (HENCE SET TO 1.0).	15
121	C	16
122	C SIZE: CELDIM + 2 * LSTDIM + 13 WORDS = 1000 + 2 * 8000 + 13 = 17013 WOACCEL	17
123	C	18
124	INTEGER MXCELX, MXCELY, MXCELZ, DMCELX, DMCELY, DMCELZ	19
125	INTEGER CELDIM, MXCELS, MXPCVR, MAXLST, LSTDIM	20
126	REAL MXDMRT	21
127	PARAMETER(MXCELX=10)	22
128	PARAMETER(MXCELY=10)	23
129	PARAMETER(MXCELZ=10)	24
130	PARAMETER(DMCELX=MXCELX)	25
131	PARAMETER(DMCELY=MXCELY)	26
132	PARAMETER(DMCELZ=MXCELZ)	27
133	PARAMETER(CELDIM=DMCELX*DMCELY*DMCELZ)	28
134	PARAMETER(MXCELS=MXCELX*MXCELY*MXCELZ)	29
135	PARAMETER(MXPCVR=2)	30
136	PARAMETER(MAXLST=2*2*2*MXCELS)	31
137	PARAMETER(LSTDIM=MAXLST)	32
138	PARAMETER(MXDMRT=1.0)	33
139	C	34
140	INTEGER NLIST, ANX, ANY, ANZ, CELLS(CELDIM)	35
141	INTEGER LPRIM(LSTDIM), LNEXT(LSTDIM)	36
142	COMMON /ACCELI/ NLIST, ANX, ANY, ANZ, CELLS, LPRIM, LNEXT	37
143	C	38
144	REAL AXL, AXH, AYL, AYH, AZL, AZH, ADXS, ADYS, ADZS	39
145	COMMON /ACCELR/ AXL, AXH, AYL, AYH, AZL, AZH, ADXS, ADYS, ADZS	40
146	C	GRID
147	C-----	1
148	C-- GRID TRAVERSAL --	2
149	C-----	3
150	C SIZE: 10 WORDS.	4
151	C	5
152	INTEGER VNINST, VASECT, VURAYI	6
153	COMMON /VSCACI/ VNINST, VASECT, VURAYI	7
154	C	8
155	REAL VOX, VOY, VOZ, VDX, VDY, VDZ, VTMIN	9
156	COMMON /VSCACR/ VOX, VOY, VOZ, VDX, VDY, VDZ, VTMIN	10
157	C	GRID
158	C-----	11
159	C-- INTERSECTION LIST COMMON BLOCK --	1
160	C-----	2
161	C SIZE: 13 * DIMINS + 1 WORDS = 6683	3
162	C	4
163	INTEGER MAXINS, DIMINS, NEWINS, SHDINS	5
164	PARAMETER(MAXINS=512)	6
165	PARAMETER(DIMINS=MAXINS+2)	7
166	PARAMETER(NEWINS=MAXINS+1)	8
167	PARAMETER(SHDINS=MAXINS+2)	9
168	C	10
169	INTEGER NINS, IPRIM(DIMINS), IRRAY(DIMINS), ITRAY(DIMINS)	11
170	INTEGER ITTYP(DIMINS)	12
171	COMMON /INLSI/ NINS, IPRIM, IRRAY, ITRAY, ITTYP	13
172	SUBROUTINE VISCEL	14
173	73/720 OPT=2	15
174	FTN 5.1+538	16
175	05/08/09. 12.28.37	17
176	PAGE	18
177	4	19
178	C	INSLST
	REAL IPX(DIMINS), IPY(DIMINS), IPZ(DIMINS)	16
	REAL INX(DIMINS), INY(DIMINS), INZ(DIMINS)	17
	REAL ICOLR(DIMINS), ICOLG(DIMINS), ICOLB(DIMINS)	18
	COMMON /INLSR/ IPX, IPY, IPZ, INX, INY, INZ, ICOLR, ICOLG, ICOLB	19
	INTEGER CI, LI, LP, PIDX	20
	INTEGER SECT, LASECT, CX, CY, CZ	TRT2 1241
		TRT2 1242


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179     REAL XCELL, YCELL, ZCELL, T, TMIN
180     C
181     C-- SEE IF THERE IS A LIST OF PRIMITIVES FOR THIS CELL.
182     C-- IF NOT CONTINUE TRAVERSAL.
183     C
184         CI = X + Y * ANX + Z * ( ANX * ANY ) + 1
185         LI = CELLS(CI)
186         IF( LI .EQ. 0 )THEN
187             VASECT = 0
188             QUIT = 0
189             RETURN
190         ENDIF
191     C
192     C-- THERE IS A LIST OF PRIMITIVES STARTING AT LIST INDEX LI.
193     C-- MOVE OVER THIS LIST LOOKING FOR INTERSECTIONS WITH EACH
194     C-- PRIMITIVE ON THE LIST IN TURN.
195     C
196         LASECT = 0
197     1  CONTINUE
198         LP = LPRIM(LI)
199         IF( PRAYID(LP) .NE. RRAYID(CRAY) .OR. VURAYI .EQ. 0 )THEN
200             PIDX = PRIMDX(LP)
201             IF( PRMTYP(LP) .EQ. SPHPRM )THEN
202                 CALL SPHINS( VOX, VOY, VOZ, VDX, VDY, VDZ, PIDX,
203                     +      SECT, T, LP )
204             ELSE IF( PRMTYP(LP) .EQ. TRIPRM )THEN
205                 CALL TRIINS( VOX, VOY, VOZ, VDX, VDY, VDZ, PIDX,
206                     +      SECT, T, LP )
207             ELSE
208                 WRITE(6,100)
209                 100  FORMAT( 1X, 'INTERNAL ERROR: VISCEL.' )
210                 WRITE(6,101)
211                 101  FORMAT( 6X, 'UNKNOWN PRIMITIVE TYPE.' )
212                 STOP
213             ENDIF
214             IF( SECT .NE. 0 )THEN
215                 C
216                 C-- CHECK THAT THIS INTERSECTION LIES INSIDE THIS GRID CELL.
217                 C
218                     XCELL = ( ( IPX(NEWINS) - AXL ) / ADXS ) * ANX
219                     YCELL = ( ( IPY(NEWINS) - AYL ) / ADYS ) * ANY
220                     ZCELL = ( ( IPZ(NEWINS) - AZL ) / ADZS ) * ANZ
221                     CX = INT(XCELL)
222                     CY = INT(YCELL)
223                     CZ = INT(ZCELL)
224                 C
225                     IF( X .EQ. CX .AND. Y .EQ. CY .AND. Z .EQ. CZ )THEN
226                     C
227                     C-- YES - A VALID INTERSECTION. IS IT THE CLOSEST IN THIS CELL?
228                     C
SUBROUTINE VISCEL      73/720  OPT=2

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```

TRT2 1243
TRT2 1244
TRT2 1245
TRT2 1246
TRT2 1247
TRT2 1248
TRT2 1249
TRT2 1250
TRT2 1251
TRT2 1252
TRT2 1253
TRT2 1254
TRT2 1255
TRT2 1256
TRT2 1257
TRT2 1258
TRT2 1259
TRT2 1260
TRT2 1261
TRT2 1262
TRT2 1263
TRT2 1264
TRT2 1265
TRT2 1266
TRT2 1267
TRT2 1268
TRT2 1269
TRT2 1270
TRT2 1271
TRT2 1272
TRT2 1273
TRT2 1274
TRT2 1275
TRT2 1276
TRT2 1277
TRT2 1278
TRT2 1279
TRT2 1280
TRT2 1281
TRT2 1282
TRT2 1283
TRT2 1284
TRT2 1285
TRT2 1286
TRT2 1287
TRT2 1288
TRT2 1289
TRT2 1290
TRT2 1291
TRT2 1292
TRT2 05/08/09. 12.28.37

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```

229         IF( LASECT .EQ. 0 )THEN
230             TMIN = T
231             CALL CPYINS( VNINST, NEWINS )
232             RISECT(CRAY) = VNINST
233             LASECT = LP
234             PRAYID(LP) = RRAYID(CRAY)
235         ELSE
236             IF( T .LT. TMIN )THEN
237                 TMIN = T
238                 CALL CPYINS( VNINST, NEWINS )

```

```

TRT2 1293
TRT2 1294
TRT2 1295
TRT2 1296
TRT2 1297
TRT2 1298
TRT2 1299
TRT2 1300
TRT2 1301
TRT2 1302

```

```

239             RISECT(CRAY) = VNINST
240             LASECT = LP
241             PRAYID(LP) = RRAYID(CRAY)
242             ENDIF
243             ENDIF
244             ENDIF
245             ENDIF
246             ENDIF
247     C
248             LI = LNEXT(LI)
249             IF( LI .EQ. 0 )GOTO 2
250             GOTO 1
251     2     CONTINUE
252     C
253     C-- NO INTERSECTION WITH PRIMITIVES IN THIS CELL. CONTINUE TRAVERSAL.
254     C
255             IF( LASECT .EQ. 0 )THEN
256                 VASECT = 0
257                 QUIT = 0
258             ELSE
259     C
260     C-- INTERSECTION FOUND. TERMINATE TRAVERSAL.
261     C
262                 VASECT = LASECT
263                 VTMIN = TMIN
264                 QUIT = 1
265             ENDIF
266     C
267             RETURN
268             END

```

```

TRT2 1303
TRT2 1304
TRT2 1305
TRT2 1306
TRT2 1307
TRT2 1308
TRT2 1309
TRT2 1310
TRT2 1311
TRT2 1312
TRT2 1313
TRT2 1314
TRT2 1315
TRT2 1316
TRT2 1317
TRT2 1318
TRT2 1319
TRT2 1320
TRT2 1321
TRT2 1322
TRT2 1323
TRT2 1324
TRT2 1325
TRT2 1326
TRT2 1327
TRT2 1328
TRT2 1329
TRT2 1330
TRT2 1331
TRT2 1332

```

--VARIABLE MAP--(LO=A)

NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE	NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE
ADXS	6B	/ACCELR/		REAL		CELLS	4B	/ACCELI/		INTEGER	1000
ADYS	7B	/ACCELR/		REAL		CI	NONE			INTEGER	
ADZS	10B	/ACCELR/		REAL		CRAY	1B	/RAYSTK/		INTEGER	
ANX	1B	/ACCELI/		INTEGER		CX	NONE			INTEGER	
ANY	2B	/ACCELI/		INTEGER		CY	NONE			INTEGER	
ANZ	3B	/ACCELI/		INTEGER		CZ	NONE			INTEGER	
AXH	1B	/ACCELR/		REAL		ICOLB	10020B	/INLSLR/		REAL	514
AXL	0B	/ACCELR/		REAL		ICOLG	7016B	/INLSLR/		REAL	514
AYH	3B	/ACCELR/		REAL		ICOLR	6014B	/INLSLR/		REAL	514
AYL	2B	/ACCELR/		REAL		INX	3006B	/INLSLR/		REAL	514
AZH	5B	/ACCELR/		REAL		INZ	4010B	/INLSLR/		REAL	514
AZL	4B	/ACCELR/		REAL		INZ	5012B	/INLSLR/		REAL	514
SUBROUTINE VISCEL 73/720 OPT=2						FTN 5.1+538 05/08/09. 12.28.37 PAGE 6					
NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE	NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE
IPRIM	1B	/INLSI/		INTEGER	514	RDZ	5000B	/RAYLSR/		REAL	512
IPX	0B	/INLSR/		REAL	514	RISECT	2B	/RAYLSI/		INTEGER	512
IPY	1002B	/INLSR/		REAL	514	ROX	0B	/RAYLSR/		REAL	512
IPZ	2004B	/INLSR/		REAL	514	ROY	1000B	/RAYLSR/		REAL	512
IRRAY	1003B	/INLSI/		INTEGER	514	ROZ	2000B	/RAYLSR/		REAL	512
ITRAY	2005B	/INLSI/		INTEGER	514	RRAYID	3002B	/RAYLSI/		INTEGER	512
ITTP	3007B	/INLSI/		INTEGER	514	RTYPE	1002B	/RAYLSI/		INTEGER	512
LASECT	210B			INTEGER		RWGTB	10000B	/RAYLSR/		REAL	512
LI	204B			INTEGER		RWGTG	7000B	/RAYLSR/		REAL	512
LNEXT	21454B	/ACCELI/		INTEGER	8000	RWGTR	6000B	/RAYLSR/		REAL	512
LP	205B			INTEGER		SECT	207B			INTEGER	
LPRIM	1754B	/ACCELI/		INTEGER	8000	T	211B			REAL	
MATTER	1B	/PRMLST/		INTEGER	1024	TMIN	212B			REAL	

NINS	0B	/INLSI/	INTEGER	VASECT	1B	/VSCACI/	INTEGER
NLIST	0B	/ACCELI/	INTEGER	VDX	3B	/VSCACR/	REAL
NLRAY	0B	/RAYLSI/	INTEGER	VDY	4B	/VSCACR/	REAL
NPRM	0B	/PRMLST/	INTEGER	VDZ	5B	/VSCACR/	REAL
NSRAY	0B	/RAYSTK/	INTEGER	VNINST	0B	/VSCACI/	INTEGER
PACCEL	2001B	/PRMLST/	INTEGER	VOX	0B	/VSCACR/	REAL
PIDX	206B		INTEGER	VOY	1B	/VSCACR/	REAL
PRAYID	4001B	/PRMLST/	INTEGER	VOZ	2B	/VSCACR/	REAL
PRMIDX	10001B	/PRMLST/	INTEGER	VTMIN	6B	/VSCACR/	REAL
PRMTYP	6001B	/PRMLST/	INTEGER	VURAYI	2B	/VSCACI/	INTEGER
QUIT	4	DUMMY-ARG	INTEGER	X	1	DUMMY-ARG	INTEGER
RAY	2B	/RAYSTK/	INTEGER	XCELL	NONE		REAL
RAYNUM	1B	/RAYLSI/	INTEGER	Y	2	DUMMY-ARG	INTEGER
RDEP	2002B	/RAYLSI/	INTEGER	YCELL	NONE		REAL
RDX	3000B	/RAYLSR/	REAL	Z	3	DUMMY-ARG	INTEGER
RDY	4000B	/RAYLSR/	REAL	ZCELL	NONE		REAL

--SYMBOLIC CONSTANTS--(LO=A)

-NAME-	-TYPE-	-VALUE-	-NAME-	-TYPE-	-VALUE-
BKCNST	INTEGER	0	LSTDIM	INTEGER	8000
BKHORZ	INTEGER	2	MAXFLT	REAL	0"20235327435361326142"
BKVERT	INTEGER	1	MAXINS	INTEGER	512
CELDIM	INTEGER	1000	MAXLST	INTEGER	8000
DAXX	INTEGER	1	MAXPRM	INTEGER	1024
DAXY	INTEGER	2	MAXRAY	INTEGER	512
DAXZ	INTEGER	3	MAXSTK	INTEGER	512
DEGRAD	REAL	0"17124357506472324711"	MINEPS	REAL	0"16775174265421615510"
DIMINS	INTEGER	514	MINFLT	REAL	0"57542450342416451635"
DIMPRM	INTEGER	1024	MXCELS	INTEGER	1000
DIMRAY	INTEGER	512	MXCELY	INTEGER	10
DIMSTK	INTEGER	512	MXCELZ	INTEGER	10
DMCELY	INTEGER	10	MXDMRT	REAL	0"17204000000000000000"
DMCELZ	INTEGER	10	MXPCVR	INTEGER	2
ENTER	INTEGER	1	NEWINS	INTEGER	513
EPS	REAL	0"16706553762465362572"	NOACL	INTEGER	0
EYERAY	INTEGER	1	RFLRAY	INTEGER	2
GTHUGE	REAL	0"17474611320000000000"	SHDINS	INTEGER	514
LEAVE	INTEGER	2	SPHPRM	INTEGER	1
LGTBRN	INTEGER	2	SUBACL	INTEGER	1
LGTCOS	INTEGER	0	TRIPRM	INTEGER	2
LGTCOS	INTEGER	1	TRNRAY	INTEGER	3
SUBROUTINE VISCEL 73/720 OPT=2			FTN 5.1+538 05/08/09. 12.28.37		
TRTPI	REAL	0"17216220773232113302"			PAGE 7

--PROCEDURES--(LO=A)

-NAME-	-TYPE-	-ARGS-	-CLASS-
CPYINS		2	SUBROUTINE
INT	GENERIC	1	INTRINSIC
SPHINS		10	SUBROUTINE
TRIINS		10	SUBROUTINE

--STATEMENT LABELS--(LO=A)

-LABEL-	-ADDRESS-	-PROPERTIES-	-DEF
1	23B		197

2	122B		251
100	136B	FORMAT	209
101	143B	FORMAT	211

--ENTRY POINTS--(LO=A)
 -NAME---ADDRESS---ARGS---

VISCEL 3B 4

--I/O UNITS--(LO=A)
 -NAME--- PROPERTIES-----

TAPE6 FMT/SEQ

--STATISTICS--

PROGRAM-UNIT LENGTH	213B = 139
CM LABELLED COMMON LENGTH	106237B = 35999
CM STORAGE USED	57600B = 24448
COMPILE TIME	0.392 SECONDS
□ SUBROUTINE SPHINS	73/720 OPT=2

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1	C		TRT2	1333
2	C		TRT2	1334
3		SUBROUTINE SPHINS(OX, OY, OZ, DX, DY, DZ, I, SECT, T, INPRIM)	TRT2	1335
4		IMPLICIT CHARACTER*1 (A-Z)	TRT2	1336
5		REAL OX, OY, OZ, DX, DY, DZ, T	TRT2	1337
6		INTEGER I, SECT, INPRIM	TRT2	1338
7		C*****	TRT2	1339
8		C SEE IF THE RAY FROM (OX,OY,OZ) DIRECTION (DX,DY,DZ) INTERSECTS	TRT2	1340
9		C SPHERE I. THE PRIMITIVE INDEX IS INPRIM.	TRT2	1341
10		C IF SO, SET SECT NON-ZERO AND SET T TO THE INTERSECTION PARAMETER.	TRT2	1342
11		C OTHERWISE SET SECT TO ZERO.	TRT2	1343
12		C IF THERE IS AN INTERSECTION SAVE THE POSITION AND NORMAL IN	TRT2	1344
13		C INSLST.XXX(NEWINS).	TRT2	1345
14		C*****	TRT2	1346
15		C	PARAMS	1
16		C-----	PARAMS	2
17		C-- SUNDRY PARAMETERS --	PARAMS	3
18		C-----	PARAMS	4
19		C	PARAMS	5
20		REAL GTHUGE, MINEPS, EPS, MINFLT, MAXFLT, TRTPI, DEGRAD	PARAMS	6
21		PARAMETER(GTHUGE=1E7)	PARAMS	7
22		PARAMETER(MINEPS=1E-5)	PARAMS	8
23		PARAMETER(EPS=1E-7)	PARAMS	9
24		PARAMETER(MINFLT=-1E20)	PARAMS	10
25		PARAMETER(MAXFLT=1E20)	PARAMS	11
26		PARAMETER(TRTPI=3.1415926)	PARAMS	12
27		PARAMETER(DEGRAD=TRTPI/180.0)	PARAMS	13
28		C	PARAMS	14
29		INTEGER EYERAY, RFLRAY, TRNRAY	PARAMS	15
30		PARAMETER(EYERAY=1)	PARAMS	16
31		PARAMETER(RFLRAY=2)	PARAMS	17
32		PARAMETER(TRNRAY=3)	PARAMS	18
33		C	PARAMS	19
34		INTEGER ENTER, LEAVE	PARAMS	20
35		PARAMETER(ENTER=1)	PARAMS	21
36		PARAMETER(LEAVE=2)	PARAMS	22
37		C	PARAMS	23

38	INTEGER NOACL, SUBACL	PARAMS	24
39	PARAMETER(NOACL=0)	PARAMS	25
40	PARAMETER(SUBACL=1)	PARAMS	26
41	C	PARAMS	27
42	INTEGER BKNST, BKVERT, BKHORZ	PARAMS	28
43	PARAMETER(BKNST=0)	PARAMS	29
44	PARAMETER(BKVERT=1)	PARAMS	30
45	PARAMETER(BKHORZ=2)	PARAMS	31
46	C	PARAMS	32
47	INTEGER LGTCOS, LGTCON, LGTBRN	PARAMS	33
48	PARAMETER(LGTCON=0)	PARAMS	34
49	PARAMETER(LGTCOS=1)	PARAMS	35
50	PARAMETER(LGTBRN=2)	PARAMS	36
51	C	PARAMS	37
52	INTEGER SPHPRM, TRIPRM	PARAMS	38
53	PARAMETER(SPHPRM=1)	PARAMS	39
54	PARAMETER(TRIPRM=2)	PARAMS	40
55	C	PARAMS	41
56	INTEGER DAXX, DAXY, DAXZ	PARAMS	42
57	PARAMETER(DAXX=1)	PARAMS	43
□	SUBROUTINE SPHINS 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
			PAGE 2
58	PARAMETER(DAXY=2)	PARAMS	44
59	PARAMETER(DAXZ=3)	PARAMS	45
60	C	SPHLST	1
61	C-----	SPHLST	2
62	C-- SPHERE LIST --	SPHLST	3
63	C-----	SPHLST	4
64	C SIZE: 4 * DIMSPH + 1 WORDS = 4097	SPHLST	5
65	C	SPHLST	6
66	INTEGER MAXSPH, DIMSPH	SPHLST	7
67	PARAMETER(MAXSPH=1024)	SPHLST	8
68	PARAMETER(DIMSPH=MAXSPH)	SPHLST	9
69	C	SPHLST	10
70	INTEGER NSPH	SPHLST	11
71	COMMON /SPHLSI/ NSPH	SPHLST	12
72	C	SPHLST	13
73	REAL SOX(DIMSPH), SOY(DIMSPH), SOZ(DIMSPH), SRAD(DIMSPH)	SPHLST	14
74	COMMON /SPHLSR/ SOX, SOY, SOZ, SRAD	SPHLST	15
75	C	INSLST	1
76	C-----	INSLST	2
77	C-- INTERSECTION LIST COMMON BLOCK --	INSLST	3
78	C-----	INSLST	4
79	C SIZE: 13 * DIMINS + 1 WORDS = 6683	INSLST	5
80	C	INSLST	6
81	INTEGER MAXINS, DIMINS, NEWINS, SHDINS	INSLST	7
82	PARAMETER(MAXINS=512)	INSLST	8
83	PARAMETER(DIMINS=MAXINS+2)	INSLST	9
84	PARAMETER(NEWINS=MAXINS+1)	INSLST	10
85	PARAMETER(SHDINS=MAXINS+2)	INSLST	11
86	C	INSLST	12
87	INTEGER NINS, IPRIM(DIMINS), IRRAY(DIMINS), ITRAY(DIMINS)	INSLST	13
88	INTEGER ITTYP(DIMINS)	INSLST	14
89	COMMON /INLSI/ NINS, IPRIM, IRRAY, ITRAY, ITTYP	INSLST	15
90	C	INSLST	16
91	REAL IPX(DIMINS), IPY(DIMINS), IPZ(DIMINS)	INSLST	17
92	REAL INX(DIMINS), INY(DIMINS), INZ(DIMINS)	INSLST	18
93	REAL ICOLR(DIMINS), ICOLG(DIMINS), ICOLB(DIMINS)	INSLST	19
94	COMMON /INLSR/ IPX, IPY, IPZ, INX, INY, INZ, ICOLR, ICOLG, ICOLB	INSLST	20
95	C	STATS	1
96	C-----	STATS	2
97	C-- STATISTICS COMMON BLOCK --	STATS	3

98	C-----	STATS	4
99	C SIZE: 8 WORDS.	STATS	5
100	C	STATS	6
101	INTEGER MAXDPS, MAXRYS, MAXISS, TOTRAY, TOTFEL, NACC, NOACC	STATS	7
102	COMMON /STATSI/ MAXDPS, MAXRYS, MAXISS, TOTRAY, TOTFEL, NACC,	STATS	8
103	+ NOACC	STATS	9
104	C	STATS	10
105	REAL NSECTS	STATS	11
106	COMMON /STATSR/ NSECTS	STATS	12
107	REAL OCX, OCY, OCZ, RS	TRT2	1351
108	REAL B, C, D, T0, T1, TMIN	TRT2	1352
109	C	TRT2	1353
110	C-- INITIALIZE.	TRT2	1354
111	C	TRT2	1355
112	C CALL PMDDUMP	TRT2	1356
113	NSECTS = NSECTS + 1	TRT2	1357
114	SECT = 0	TRT2	1358
	SUBROUTINE SPHINS 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
			PAGE 3
115	T = 0.0	TRT2	1359
116	C	TRT2	1360
117	C-- SOLVE IMPLICIT QUADRATIC EQUATION	TRT2	1361
118	C	TRT2	1362
119	OCX = OX - SOX(I)	TRT2	1363
120	OCY = OY - SOY(I)	TRT2	1364
121	OCZ = OZ - SOZ(I)	TRT2	1365
122	RS = SRAD(I)	TRT2	1366
123	B = -2 * (DX * OCX + DY * OCY + DZ * OCZ)	TRT2	1367
124	C = OCX * OCX + OCY * OCY + OCZ * OCZ - RS * RS	TRT2	1368
125	D = B * B - 4 * C	TRT2	1369
126	C	TRT2	1370
127	C-- IF DISCRIMINANT -VE, NO INTERSECTION.	TRT2	1371
128	C	TRT2	1372
129	IF(D .GE. 0.0)THEN	TRT2	1373
130	D = SQRT(D)	TRT2	1374
131	C	TRT2	1375
132	C-- OK - TWO POSSIBLE INTERSECTIONS TO BE FOUND - T0 AND T1.	TRT2	1376
133	C-- PRECISION!	TRT2	1377
134	C	TRT2	1378
135	C-- T1 MUST BE .GT. T0 ... T1 WOULD BE EXITING THE SPHERE IF T0 ALSO VAL	TRT2	1379
136	C	TRT2	1380
137	T1 = 0.5 * (B + D)	TRT2	1381
138	IF(T1 .GT. MINEPS)THEN	TRT2	1382
139	C	TRT2	1383
140	C-- T1 IS AHEAD, SO WE HAVE AN INTERSECTION.	TRT2	1384
141	C-- SO T0 MIGHT BE AHEAD AND CLOSER ...	TRT2	1385
142	C	TRT2	1386
143	TMIN = T1	TRT2	1387
144	SECT = 1	TRT2	1388
145	C	TRT2	1389
146	C-- THIS WOULD BE LEAVING THE SPHERE.	TRT2	1390
147	C	TRT2	1391
148	ITYP(NEWINS) = LEAVE	TRT2	1392
149	C	TRT2	1393
150	T0 = 0.5 * (B - D)	TRT2	1394
151	IF(T0 .GT. MINEPS)THEN	TRT2	1395
152	C	TRT2	1396
153	C-- T0 IS AHEAD, WE HAVE A CLOSER INTERSECTION ...	TRT2	1397
154	C	TRT2	1398
155	TMIN = T0	TRT2	1399
156	C	TRT2	1400
157	C-- THIS WOULD BE ENTERING THE SPHERE.	TRT2	1401

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158      C
159          ITTYP(NEWINS) = ENTER
160      ENDIF
161      C
162      C-- FILL IN ALL THE REQUIRED INFO FOR THE NEW INTERSECTION
163      C
164          IPRIM(NEWINS) = INPRIM
165          IRRAY(NEWINS) = 0
166          ITRAY(NEWINS) = 0
167          ICOLR(NEWINS) = 0.0
168          ICOLG(NEWINS) = 0.0
169          ICOLB(NEWINS) = 0.0
170          IPX(NEWINS) = OX + TMIN * DX
171          IPY(NEWINS) = OY + TMIN * DY
171 SUBROUTINE SPHINS      73/720 OPT=2      FTN 5.1+538      05/08/09. 12.28.37      PAGE      4

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172          IPZ(NEWINS) = OZ + TMIN * DZ
173          INX(NEWINS) = ( IPX(NEWINS) - SOX(I) ) / RS
174          INY(NEWINS) = ( IPY(NEWINS) - SOY(I) ) / RS
175          INZ(NEWINS) = ( IPZ(NEWINS) - SOZ(I) ) / RS
176      C
177      C--- HAND BACK THE INTERSECTION PARAMETER
178      C
179          T = TMIN
180      ENDIF
181      ENDIF
182      C
183      RETURN
184      END

```

--VARIABLE MAP--(LO=A)

NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE	NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE
B	115B			REAL		NACC	5B	/STATSI/		INTEGER	
C	NONE			REAL		NINS	0B	/INLSI/		INTEGER	
D	116B			REAL		NOACC	6B	/STATSI/		INTEGER	
DX	4	DUMMY-ARG		REAL		NSECTS	0B	/STATSR/		REAL	
DY	5	DUMMY-ARG		REAL		NSPH	0B	/SPHLSI/		INTEGER	
DZ	6	DUMMY-ARG		REAL		OCX	NONE			REAL	
I	7	DUMMY-ARG		INTEGER		OCY	NONE			REAL	
ICOLB	10020B	/INLSR/		REAL	514	OCZ	NONE			REAL	
ICOLG	7016B	/INLSR/		REAL	514	OX	1	DUMMY-ARG		REAL	
ICOLR	6014B	/INLSR/		REAL	514	OY	2	DUMMY-ARG		REAL	
INPRIM	10	DUMMY-ARG		INTEGER		OZ	3	DUMMY-ARG		REAL	
INX	3006B	/INLSR/		REAL	514	RS	114B			REAL	
INY	4010B	/INLSR/		REAL	514	SECT	8	DUMMY-ARG		INTEGER	
INZ	5012B	/INLSR/		REAL	514	SOX	0B	/SPHLSR/		REAL	1024
IPRIM	1B	/INLSI/		INTEGER	514	SOY	2000B	/SPHLSR/		REAL	1024
IPX	0B	/INLSR/		REAL	514	SOZ	4000B	/SPHLSR/		REAL	1024
IPY	1002B	/INLSR/		REAL	514	SRAD	6000B	/SPHLSR/		REAL	1024
IPZ	2004B	/INLSR/		REAL	514	T	9	DUMMY-ARG		REAL	
IRRAY	1003B	/INLSI/		INTEGER	514	TMIN	121B			REAL	
ITRAY	2005B	/INLSI/		INTEGER	514	TOTFEL	4B	/STATSI/		INTEGER	
ITTYP	3007B	/INLSI/		INTEGER	514	TOTRAY	3B	/STATSI/		INTEGER	
MAXDPS	0B	/STATSI/		INTEGER		T0	117B			REAL	
MAXISS	2B	/STATSI/		INTEGER		T1	120B			REAL	
MAXRYS	1B	/STATSI/		INTEGER							

--SYMBOLIC CONSTANTS--(LO=A)

NAME	TYPE	VALUE	NAME	TYPE	VALUE
------	------	-------	------	------	-------

BKCNST	INTEGER	0	EPS	REAL	0"16706553762465362572"
BKHORZ	INTEGER	2	EYERAY	INTEGER	1
BKVERT	INTEGER	1	GTHUGE	REAL	0"17474611320000000000"
DAXX	INTEGER	1	LEAVE	INTEGER	2
DAXY	INTEGER	2	LGTRN	INTEGER	2
DAXZ	INTEGER	3	LGTCOS	INTEGER	0
DEGRAD	REAL	0"17124357506472324711"	LGTCOS	INTEGER	1
DIMINS	INTEGER	514	MAXFLT	REAL	0"20235327435361326142"
DIMSPH	INTEGER	1024	MAXINS	INTEGER	512
ENTER	INTEGER	1	MAXSPH	INTEGER	1024

□ SUBROUTINE SPHINS 73/720 OPT=2 FTN 5.1+538 05/08/09. 12.28.37 PAGE 5
 --NAME--TYPE-----VALUE --NAME--TYPE-----VALUE

MINEPS	REAL	0"16775174265421615510"	SPHPRM	INTEGER	1
MINFLT	REAL	0"57542450342416451635"	SUBACL	INTEGER	1
NEWINS	INTEGER	513	TRIPRM	INTEGER	2
NOACL	INTEGER	0	TRNRAY	INTEGER	3
RFLRAY	INTEGER	2	TRTPI	REAL	0"17216220773232113302"
SHDINS	INTEGER	514			

--PROCEDURES--(LO=A)
 --NAME-----TYPE-----ARGS-----CLASS-----
 SQRT GENERIC 1 INTRINSIC

--ENTRY POINTS--(LO=A)
 --NAME---ADDRESS--ARGS---
 SPHINS 3B 10

--STATISTICS--

PROGRAM-UNIT LENGTH 122B = 82
 CM LABELLED COMMON LENGTH 25044B = 10788
 CM STORAGE USED 57300B = 24256
 COMPILE TIME 0.279 SECONDS

□ SUBROUTINE TRIINS 73/720 OPT=2 FTN 5.1+538 05/08/09. 12.28.37 PAGE 1

1	C		TRT2	1429
2	C		TRT2	1430
3		SUBROUTINE TRIINS(OX, OY, OZ, DX, DY, DZ, I, SECT, T, INPRIM)	TRT2	1431
4		IMPLICIT CHARACTER*1 (A-Z)	TRT2	1432
5		REAL OX, OY, OZ, DX, DY, DZ, T	TRT2	1433
6		INTEGER I, SECT, INPRIM	TRT2	1434
7		C*****	TRT2	1435
8		C SEE IF THE RAY FROM (OX,OY,OZ) DIRECTION (DX,DY,DZ) INTERSECTS	TRT2	1436
9		C TRIANGLE I. THE PRIMITIVE INDEX IS INPRIM.	TRT2	1437
10		C IF SO, SET SECT NON-ZERO AND SET T TO THE INTERSECTION PARAMETER.	TRT2	1438
11		C OTHERWISE SET SECT TO ZERO.	TRT2	1439
12		C IF THERE IS AN INTERSECTION SAVE THE POSITION AND NORMAL	TRT2	1440
13		C IN INSLST.XXX(NEWINS).	TRT2	1441
14		C*****	TRT2	1442
15		C	PARAMS	1
16		C-----	PARAMS	2
17		C-- SUNDRY PARAMETERS --	PARAMS	3
18		C-----	PARAMS	4
19		C	PARAMS	5
20		REAL GTHUGE, MINEPS, EPS, MINFLT, MAXFLT, TRTPI, DEGRAD	PARAMS	6

21	PARAMETER(GTHUGE=1E7)	PARAMS	7		
22	PARAMETER(MINEPS=1E-5)	PARAMS	8		
23	PARAMETER(EPS=1E-7)	PARAMS	9		
24	PARAMETER(MINFLT=-1E20)	PARAMS	10		
25	PARAMETER(MAXFLT=1E20)	PARAMS	11		
26	PARAMETER(TRTPI=3.1415926)	PARAMS	12		
27	PARAMETER(DEGRAD=TRTPI/180.0)	PARAMS	13		
28	C	PARAMS	14		
29	INTEGER EYERAY, RFLRAY, TRNRAY	PARAMS	15		
30	PARAMETER(EYERAY=1)	PARAMS	16		
31	PARAMETER(RFLRAY=2)	PARAMS	17		
32	PARAMETER(TRNRAY=3)	PARAMS	18		
33	C	PARAMS	19		
34	INTEGER ENTER, LEAVE	PARAMS	20		
35	PARAMETER(ENTER=1)	PARAMS	21		
36	PARAMETER(LEAVE=2)	PARAMS	22		
37	C	PARAMS	23		
38	INTEGER NOACL, SUBACL	PARAMS	24		
39	PARAMETER(NOACL=0)	PARAMS	25		
40	PARAMETER(SUBACL=1)	PARAMS	26		
41	C	PARAMS	27		
42	INTEGER BKCNST, BKVERT, BKHORZ	PARAMS	28		
43	PARAMETER(BKCNST=0)	PARAMS	29		
44	PARAMETER(BKVERT=1)	PARAMS	30		
45	PARAMETER(BKHORZ=2)	PARAMS	31		
46	C	PARAMS	32		
47	INTEGER LGTCON, LGTCOS, LGTBRN	PARAMS	33		
48	PARAMETER(LGTCON=0)	PARAMS	34		
49	PARAMETER(LGTCOS=1)	PARAMS	35		
50	PARAMETER(LGTBRN=2)	PARAMS	36		
51	C	PARAMS	37		
52	INTEGER SPHPRM, TRIPRM	PARAMS	38		
53	PARAMETER(SPHPRM=1)	PARAMS	39		
54	PARAMETER(TRIPRM=2)	PARAMS	40		
55	C	PARAMS	41		
56	INTEGER DAXX, DAXY, DAXZ	PARAMS	42		
57	PARAMETER(DAXX=1)	PARAMS	43		
□	SUBROUTINE TRIINS 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE	2

58	PARAMETER(DAXY=2)	PARAMS	44
59	PARAMETER(DAXZ=3)	PARAMS	45
60	C	TRILST	1
61	C-----	TRILST	2
62	C-- TRIANGLE LIST --	TRILST	3
63	C-----	TRILST	4
64	C 23 * DIMTRI + 1 WORDS = 5889	TRILST	5
65	C	TRILST	6
66	INTEGER MAXTRI, DIMTRI	TRILST	7
67	PARAMETER(MAXTRI=256)	TRILST	8
68	PARAMETER(DIMTRI=MAXTRI)	TRILST	9
69	C	TRILST	10
70	INTEGER NTRI, DAX(DIMTRI)	TRILST	11
71	COMMON /TRILSI/ NTRI, DAX	TRILST	12
72	C	TRILST	13
73	REAL TX1(DIMTRI), TY1(DIMTRI), TZ1(DIMTRI)	TRILST	14
74	REAL TX2(DIMTRI), TY2(DIMTRI), TZ2(DIMTRI)	TRILST	15
75	REAL TX3(DIMTRI), TY3(DIMTRI), TZ3(DIMTRI)	TRILST	16
76	REAL TNX(DIMTRI), TNY(DIMTRI), TNZ(DIMTRI), TND(DIMTRI)	TRILST	17
77	REAL NVX1(DIMTRI), NVY1(DIMTRI), NVZ1(DIMTRI)	TRILST	18
78	REAL NVX2(DIMTRI), NVY2(DIMTRI), NVZ2(DIMTRI)	TRILST	19
79	REAL NVX3(DIMTRI), NVY3(DIMTRI), NVZ3(DIMTRI)	TRILST	20
80	COMMON /TRILSR/ TX1, TY1, TZ1, TX2, TY2, TZ2, TX3, TY3, TZ3,	TRILST	21

		TRT2_20050809_130554.lpr		
81	+	TNX, TNY, TNZ, NVX1, NVY1, NVZ1, NVX2, NVY2,	TRILST	22
82	+	NVZ2, NVX3, NVY3, NVZ3, TND	TRILST	23
83	C		INSLST	1
84	C-----		INSLST	2
85	C-- INTERSECTION LIST COMMON BLOCK --		INSLST	3
86	C-----		INSLST	4
87	C SIZE: 13 * DIMINS + 1 WORDS = 6683		INSLST	5
88	C		INSLST	6
89	INTEGER MAXINS, DIMINS, NEWINS, SHDINS		INSLST	7
90	PARAMETER(MAXINS=512)		INSLST	8
91	PARAMETER(DIMINS=MAXINS+2)		INSLST	9
92	PARAMETER(NEWINS=MAXINS+1)		INSLST	10
93	PARAMETER(SHDINS=MAXINS+2)		INSLST	11
94	C		INSLST	12
95	INTEGER NINS, IPRIM(DIMINS), IRRAY(DIMINS), ITRAY(DIMINS)		INSLST	13
96	INTEGER ITTYP(DIMINS)		INSLST	14
97	COMMON /INLSI/ NINS, IPRIM, IRRAY, ITRAY, ITTYP		INSLST	15
98	C		INSLST	16
99	REAL IPX(DIMINS), IPY(DIMINS), IPZ(DIMINS)		INSLST	17
100	REAL INX(DIMINS), INY(DIMINS), INZ(DIMINS)		INSLST	18
101	REAL ICOLR(DIMINS), ICOLG(DIMINS), ICOLB(DIMINS)		INSLST	19
102	COMMON /INLSR/ IPX, IPY, IPZ, INX, INY, INZ, ICOLR, ICOLG, ICOLB		INSLST	20
103	C		STATS	1
104	C-----		STATS	2
105	C-- STATISTICS COMMON BLOCK --		STATS	3
106	C-----		STATS	4
107	C SIZE: 8 WORDS.		STATS	5
108	C		STATS	6
109	INTEGER MAXDPS, MAXRYS, MAXISS, TOTRAY, TOTFEL, NACC, NOACC		STATS	7
110	COMMON /STATSI/ MAXDPS, MAXRYS, MAXISS, TOTRAY, TOTFEL, NACC,		STATS	8
111	+ NOACC		STATS	9
112	C		STATS	10
113	REAL NSECTS		STATS	11
114	COMMON /STATSR/ NSECTS		STATS	12
□	SUBROUTINE TRIINS	73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
				PAGE 3
115	REAL NDOTD, NDOTO, PX, PY, PZ, U0, U1, U2, V0, V1, V2		TRT2	1447
116	REAL ALPHA, BETA, GAMMA, NPX, NPY, NPZ		TRT2	1448
117	C		TRT2	1449
118	C-- INITIALIZE. BUMP INTERSECTION TEST COUNT.		TRT2	1450
119	C		TRT2	1451
120	NSECTS = NSECTS + 1		TRT2	1452
121	C		TRT2	1453
122	C-- CHECK RAY IS NOT PARALLEL TO PLANE EMBEDDING TRIANGLE.		TRT2	1454
123	C-- PRECISION!		TRT2	1455
124	C		TRT2	1456
125	NDOTD = TNX(I) * DX + TNY(I) * DY + TNZ(I) * DZ		TRT2	1457
126	IF(ABS(NDOTD) .GT. EPS)THEN		TRT2	1458
127	C		TRT2	1459
128	C-- FIND INTERSECTION PARAMETER WITH PLANE.		TRT2	1460
129	C		TRT2	1461
130	NDOTO = TNX(I) * OX + TNY(I) * OY + TNZ(I) * OZ		TRT2	1462
131	T = -(NDOTO + TND(I)) / NDOTD		TRT2	1463
132	C		TRT2	1464
133	C-- FIND INTERSECTION POINT WITH EMBEDDING PLANE.		TRT2	1465
134	C		TRT2	1466
135	PX = OX + T * DX		TRT2	1467
136	PY = OY + T * DY		TRT2	1468
137	PZ = OZ + T * DZ		TRT2	1469
138	C		TRT2	1470
139	C-- FIND CONSTANTS FOR LOCATING INTERSECTION POINT IN TERMS OF PARAMETRITRT2		TRT2	1471
140	C-- COORDINATES IN A COORDINATE SYSTEM USING TWO EDGES OF THE TRIANGLE ATRT2		TRT2	1472

141	C-- ITS BASIS VECTORS. USE THE "BIGGEST NORMAL COMPONENT" PRECOMPUTED	ASTRT2	1473
142	C-- TO SELECT THE PLANE NORMAL TO THE LEAST DEGENERATE POSSIBLE PARAMETR	TRT2	1474
143	C	TRT2	1475
144	IF(DAX(I) .EQ. DAXX)THEN	TRT2	1476
145	U0 = PY - TY1(I)	TRT2	1477
146	U1 = TY2(I) - TY1(I)	TRT2	1478
147	U2 = TY3(I) - TY1(I)	TRT2	1479
148	V0 = PZ - TZ1(I)	TRT2	1480
149	V1 = TZ2(I) - TZ1(I)	TRT2	1481
150	V2 = TZ3(I) - TZ1(I)	TRT2	1482
151	ELSE IF(DAX(I) .EQ. DAXY)THEN	TRT2	1483
152	U0 = PX - TX1(I)	TRT2	1484
153	U1 = TX2(I) - TX1(I)	TRT2	1485
154	U2 = TX3(I) - TX1(I)	TRT2	1486
155	V0 = PZ - TZ1(I)	TRT2	1487
156	V1 = TZ2(I) - TZ1(I)	TRT2	1488
157	V2 = TZ3(I) - TZ1(I)	TRT2	1489
158	ELSE IF(DAX(I) .EQ. DAXZ)THEN	TRT2	1490
159	U0 = PX - TX1(I)	TRT2	1491
160	U1 = TX2(I) - TX1(I)	TRT2	1492
161	U2 = TX3(I) - TX1(I)	TRT2	1493
162	V0 = PY - TY1(I)	TRT2	1494
163	V1 = TY2(I) - TY1(I)	TRT2	1495
164	V2 = TY3(I) - TY1(I)	TRT2	1496
165	ELSE	TRT2	1497
166	WRITE(6,100)	TRT2	1498
167	100 FORMAT(1X,'INTERNAL ERROR: TRIINS.')	TRT2	1499
168	WRITE(6,101)	TRT2	1500
169	101 FORMAT(6X,'UNKNOWN PRIMITIVE TYPE.')	TRT2	1501
170	STOP	TRT2	1502
171	ENDIF	TRT2	1503
□	SUBROUTINE TRIINS 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37 PAGE 4
172	C	TRT2	1504
173	C-- FIND THE (ALPHA,BETA) COORDINATES OF THE INTERSECTION POINT.	TRT2	1505
174	C-- PRECISION!	TRT2	1506
175	C	TRT2	1507
176	IF(ABS(U1) .LT. MINEPS)THEN	TRT2	1508
177	BETA = U0 / U2	TRT2	1509
178	IF(BETA .GE. 0.0 .AND. BETA .LE. 1.0)THEN	TRT2	1510
179	ALPHA = (V0 - BETA * V2) / V1	TRT2	1511
180	ELSE	TRT2	1512
181	T = 0.0	TRT2	1513
182	SECT = 0	TRT2	1514
183	RETURN	TRT2	1515
184	ENDIF	TRT2	1516
185	ELSE	TRT2	1517
186	BETA = (V0 * U1 - U0 * V1) / (V2 * U1 - U2 * V1)	TRT2	1518
187	IF(BETA .GE. 0.0 .AND. BETA .LE. 1.0)THEN	TRT2	1519
188	ALPHA = (U0 - BETA * U2) / U1	TRT2	1520
189	ELSE	TRT2	1521
190	T = 0.0	TRT2	1522
191	SECT = 0	TRT2	1523
192	RETURN	TRT2	1524
193	ENDIF	TRT2	1525
194	ENDIF	TRT2	1526
195	C	TRT2	1527
196	C-- FIND THE GAMMA COORDINATE.	TRT2	1528
197	C	TRT2	1529
198	GAMMA = ALPHA + BETA	TRT2	1530
199	IF(ALPHA .LT. 0.0 .OR. GAMMA .GT. 1.0)THEN	TRT2	1531
200	T = 0.0	TRT2	1532

```

201          SECT = 0
202          RETURN
203          ENDIF
204          C
205          C-- WE ARE INSIDE THE TRIANGLE.
206          C-- USE (ALPHA,BETA,GAMMA) TO INTERPOLATE THE VERTEX PROPERTIES (CURRENT
207          C
208          NPX = GAMMA * NVX1(I) + ALPHA * NVX2(I) + BETA * NVX3(I)
209          NPY = GAMMA * NVY1(I) + ALPHA * NVY2(I) + BETA * NVY3(I)
210          NPZ = GAMMA * NVZ1(I) + ALPHA * NVZ2(I) + BETA * NVZ3(I)
211          CALL NRMVEC( NPX, NPY, NPZ )
212          C
213          C-- SET THE INTERSECTION DATA.
214          C
215          IPRIM(NEWINS) = INPRIM
216          IRRAY(NEWINS) = 0
217          ITRAY(NEWINS) = 0
218          ICOLR(NEWINS) = 0.0
219          ICOLG(NEWINS) = 0.0
220          ICOLB(NEWINS) = 0.0
221          IPX(NEWINS) = PX
222          IPY(NEWINS) = PY
223          IPZ(NEWINS) = PZ
224          INX(NEWINS) = NPX
225          INY(NEWINS) = NPY
226          INZ(NEWINS) = NPZ
227          C
228          C-- GUESS WHETHER WE ARE ENTERING OR LEAVING.
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229          C
230          NDOTD = NPX * DX + NPY * DY + NPZ * DZ
231          IF( NDOTD .LT. 0.0 )THEN
232             ITTYP(NEWINS) = ENTER
233          ELSE
234             ITTYP(NEWINS) = LEAVE
235          ENDIF
236          SECT = 1
237          C
238          C-- RAY IS PARALLEL TO EMBEDDING PLANE. NO INTERSECTION POSSIBLE.
239          C
240          ELSE
241             T = 0.0
242             SECT = 0
243          ENDIF
244          C
245          RETURN
246          END

```

--VARIABLE MAP--(LO=A)

-NAME-	ADDRESS-	BLOCK-	PROPERTIES-	TYPE-	SIZE	-NAME-	ADDRESS-	BLOCK-	PROPERTIES-	TYPE-	SIZE
ALPHA	312B			REAL		NTRI	0B	/TRILSI/		INTEGER	
BETA	313B			REAL		NVX1	6000B	/TRILSR/		REAL	256
DAX	1B	/TRILSI/		INTEGER	256	NVX2	7400B	/TRILSR/		REAL	256
DX	4	DUMMY-ARG		REAL		NVX3	11000B	/TRILSR/		REAL	256
DY	5	DUMMY-ARG		REAL		NVY1	6400B	/TRILSR/		REAL	256
DZ	6	DUMMY-ARG		REAL		NVY2	10000B	/TRILSR/		REAL	256
GAMMA	314B			REAL		NVY3	11400B	/TRILSR/		REAL	256
I	7	DUMMY-ARG		INTEGER		NVZ1	7000B	/TRILSR/		REAL	256
ICOLB	10020B	/INLSR/		REAL	514	NVZ2	10400B	/TRILSR/		REAL	256

ICOLG	7016B	/INLSR/	REAL	514	NVZ3	12000B	/TRILSR/	REAL	256
ICOLR	6014B	/INLSR/	REAL	514	OX	1	DUMMY-ARG	REAL	
INPRIM	10	DUMMY-ARG	INTEGER		OY	2	DUMMY-ARG	REAL	
INX	3006B	/INLSR/	REAL	514	OZ	3	DUMMY-ARG	REAL	
INY	4010B	/INLSR/	REAL	514	PX	301B		REAL	
INZ	5012B	/INLSR/	REAL	514	PY	302B		REAL	
IPRIM	1B	/INLSI/	INTEGER	514	PZ	303B		REAL	
IPX	0B	/INLSR/	REAL	514	SECT	8	DUMMY-ARG	INTEGER	
IPY	1002B	/INLSR/	REAL	514	T	9	DUMMY-ARG	REAL	
IPZ	2004B	/INLSR/	REAL	514	TND	12400B	/TRILSR/	REAL	256
IRRAY	1003B	/INLSI/	INTEGER	514	TNX	4400B	/TRILSR/	REAL	256
ITRAY	2005B	/INLSI/	INTEGER	514	TNY	5000B	/TRILSR/	REAL	256
ITTYP	3007B	/INLSI/	INTEGER	514	TNZ	5400B	/TRILSR/	REAL	256
MAXDPS	0B	/STATSI/	INTEGER		TOTFEL	4B	/STATSI/	INTEGER	
MAXISS	2B	/STATSI/	INTEGER		TOTRAY	3B	/STATSI/	INTEGER	
MAXRYS	1B	/STATSI/	INTEGER		TX1	0B	/TRILSR/	REAL	256
NACC	5B	/STATSI/	INTEGER		TX2	1400B	/TRILSR/	REAL	256
NDOTD	300B		REAL		TX3	3000B	/TRILSR/	REAL	256
NDOTO	NONE		REAL		TY1	400B	/TRILSR/	REAL	256
NINS	0B	/INLSI/	INTEGER		TY2	2000B	/TRILSR/	REAL	256
NOACC	6B	/STATSI/	INTEGER		TY3	3400B	/TRILSR/	REAL	256
NPX	315B		REAL		TZ1	1000B	/TRILSR/	REAL	256
NPY	316B		REAL		TZ2	2400B	/TRILSR/	REAL	256
NPZ	317B		REAL		TZ3	4000B	/TRILSR/	REAL	256
NSECTS	0B	/STATSR/	REAL		U0	304B		REAL	

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PAGE
6

-NAME	---	ADDRESS	---	BLOCK	---	PROPERTIES	---	TYPE	---	SIZE	-NAME	---	ADDRESS	---	BLOCK	---	PROPERTIES	---	TYPE	---	SIZE
U1		305B						REAL			V1		310B						REAL		
U2		306B						REAL			V2		311B						REAL		
V0		307B						REAL													

--SYMBOLIC CONSTANTS--(LO=A)

-NAME	---	TYPE	---	VALUE	-NAME	---	TYPE	---	VALUE
BKCNST		INTEGER		0	LGTCOS		INTEGER		1
BKHORZ		INTEGER		2	MAXFLT	REAL		0"20235327435361326142"	
BKVERT		INTEGER		1	MAXINS	INTEGER		512	
DAXX		INTEGER		1	MAXTRI	INTEGER		256	
DAXY		INTEGER		2	MINEPS	REAL		0"16775174265421615510"	
DAXZ		INTEGER		3	MINFLT	REAL		0"57542450342416451635"	
DEGRAD	REAL		0"17124357506472324711"		NEWINS	INTEGER		513	
DIMINS	INTEGER		514		NOACL	INTEGER		0	
DIMTRI	INTEGER		256		RFLRAY	INTEGER		2	
ENTER	INTEGER		1		SHDINS	INTEGER		514	
EPS	REAL	0"16706553762465362572"			SPHPRM	INTEGER		1	
EYERAY	INTEGER		1		SUBACL	INTEGER		1	
GTHUGE	REAL	0"17474611320000000000"			TRIPRM	INTEGER		2	
LEAVE	INTEGER		2		TRNRAY	INTEGER		3	
LGTBRN	INTEGER		2		TRTPI	REAL	0"17216220773232113302"		
LGTCON	INTEGER		0						

--PROCEDURES--(LO=A)

-NAME	---	TYPE	---	ARGS	---	CLASS	---
ABS		GENERIC		1		INTRINSIC	
NRMVEC				3		SUBROUTINE	

--STATEMENT LABELS--(LO=A)

-LABEL-ADDRESS-----PROPERTIES-----DEF

100 240B FORMAT 167
 101 245B FORMAT 169

--ENTRY POINTS--(LO=A)
 -NAME---ADDRESS---ARGS---

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--I/O UNITS--(LO=A)
 -NAME--- PROPERTIES-----

TAPE6 FMT/SEQ
 □ SUBROUTINE TRIINS 73/720 OPT=2 FTN 5.1+538 05/08/09. 12.28.37 PAGE 7

--STATISTICS--

PROGRAM-UNIT LENGTH 320B = 208
 CM LABELLED COMMON LENGTH 30444B = 12580
 CM STORAGE USED 57500B = 24384
 COMPILE TIME 0.505 SECONDS

□ SUBROUTINE CPYINS 73/720 OPT=2 FTN 5.1+538 05/08/09. 12.28.37 PAGE 1

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1          C                                TRT2    1579
2          C                                TRT2    1580
3          SUBROUTINE CPYINS( I, J )        TRT2    1581
4          IMPLICIT CHARACTER*1 (A-Z)      TRT2    1582
5          INTEGER I, J                     TRT2    1583
6          C*****                          TRT2    1584
7          C MOVE A NEWLY FOUND INTERSECTION FROM INSLST.XXX(J) TO INSLST.XXX(I) TRT2    1585
8          C*****                          TRT2    1586
9          C                                INSLST    1
10         C-----                          INSLST    2
11         C-- INTERSECTION LIST COMMON BLOCK -- INSLST    3
12         C-----                          INSLST    4
13         C SIZE: 13 * DIMINS + 1 WORDS = 6683 INSLST    5
14         C                                INSLST    6
15         INTEGER MAXINS, DIMINS, NEWINS, SHDINS INSLST    7
16         PARAMETER( MAXINS=512 )          INSLST    8
17         PARAMETER( DIMINS=MAXINS+2 )     INSLST    9
18         PARAMETER( NEWINS=MAXINS+1 )     INSLST   10
19         PARAMETER( SHDINS=MAXINS+2 )     INSLST   11
20         C                                INSLST   12
21         INTEGER NINS, IPRIM(DIMINS), IRRAY(DIMINS), ITRAY(DIMINS) INSLST   13
22         INTEGER ITTYP(DIMINS)            INSLST   14
23         COMMON /INLSI/ NINS, IPRIM, IRRAY, ITRAY, ITTYP INSLST   15
24         C                                INSLST   16
25         REAL IPX(DIMINS), IPY(DIMINS), IPZ(DIMINS) INSLST   17
26         REAL INX(DIMINS), INY(DIMINS), INZ(DIMINS) INSLST   18
27         REAL ICOLR(DIMINS), ICOLG(DIMINS), ICOLB(DIMINS) INSLST   19
28         COMMON /INLSR/ IPX, IPY, IPZ, INX, INY, INZ, ICOLR, ICOLG, ICOLB INSLST   20
29         IPRIM(I) = IPRIM(J)              TRT2    1588
30         IRRAY(I) = IRRAY(J)              TRT2    1589
31         ITRAY(I) = ITRAY(J)              TRT2    1590
32         ICOLR(I) = ICOLR(J)              TRT2    1591
33         ICOLG(I) = ICOLG(J)              TRT2    1592
34         ICOLB(I) = ICOLB(J)              TRT2    1593
35         IPX(I) = IPX(J)                  TRT2    1594
36         IPY(I) = IPY(J)                  TRT2    1595
    
```

```

37          IPZ(I) = IPZ(J)
38          INX(I) = INX(J)
39          INY(I) = INY(J)
40          INZ(I) = INZ(J)
41          ITTYP(I) = ITTYP(J)
42      C
43          RETURN
44      END

```

```

TRT2      1596
TRT2      1597
TRT2      1598
TRT2      1599
TRT2      1600
TRT2      1601
TRT2      1602
TRT2      1603

```

--VARIABLE MAP--(LO=A)

-NAME-	ADDRESS-	BLOCK-	PROPERTIES-	TYPE-	SIZE-	-NAME-	ADDRESS-	BLOCK-	PROPERTIES-	TYPE-	SIZE-
I	1	DUMMY-ARG		INTEGER		IPX	0B	/INLSR/		REAL	514
ICOLB	10020B	/INLSR/		REAL	514	IPY	1002B	/INLSR/		REAL	514
ICOLG	7016B	/INLSR/		REAL	514	IPZ	2004B	/INLSR/		REAL	514
ICOLR	6014B	/INLSR/		REAL	514	IRRAY	1003B	/INLSI/		INTEGER	514
INX	3006B	/INLSR/		REAL	514	ITRAY	2005B	/INLSI/		INTEGER	514
INY	4010B	/INLSR/		REAL	514	ITTYP	3007B	/INLSI/		INTEGER	514
INZ	5012B	/INLSR/		REAL	514	J	2	DUMMY-ARG		INTEGER	
IPRIM	1B	/INLSI/		INTEGER	514	NINS	0B	/INLSI/		INTEGER	
□	SUBROUTINE	CPYINS	73/720	OPT=2		FTN	5.1+538		05/08/09. 12.28.37	PAGE	2

--SYMBOLIC CONSTANTS--(LO=A)

-NAME-	TYPE-	VALUE-
DIMINS	INTEGER	514
MAXINS	INTEGER	512
NEWINS	INTEGER	513
SHDINS	INTEGER	514

--ENTRY POINTS--(LO=A)

-NAME-	ADDRESS-	ARGS-
CPYINS	3B	2

--STATISTICS--

```

PROGRAM-UNIT LENGTH      46B = 38
CM LABELLED COMMON LENGTH 15033B = 6683
CM STORAGE USED          57000B = 24064
COMPILE TIME              0.092 SECONDS

```

□	SUBROUTINE	INITDB	73/720	OPT=2		FTN	5.1+538		05/08/09. 12.28.37	PAGE	1
---	------------	--------	--------	-------	--	-----	---------	--	--------------------	------	---

```

1      C
2      C-----
3      C DATABASE ROUTINES
4      C-----
5      C
6          SUBROUTINE INITDB
7          IMPLICIT CHARACTER*1 (A-Z)
8      C*****
9      C INITIALIZE THE SCENE DATABASE
10     C*****
11     C
12     C-----
13     C-- PRIMITIVE LIST COMMON BLOCK --
14     C-----
15     C SIZE: 5 * DIMPRM + 1 WORDS = 5121

```

```

TRT2      1604
TRT2      1605
TRT2      1606
TRT2      1607
TRT2      1608
TRT2      1609
TRT2      1610
TRT2      1611
TRT2      1612
TRT2      1613
PRMLST    1
PRMLST    2
PRMLST    3
PRMLST    4
PRMLST    5

```

16	C		PRMLST	6
17		INTEGER MAXPRM, DIMPRM	PRMLST	7
18		PARAMETER(MAXPRM=1024)	PRMLST	8
19		PARAMETER(DIMPRM=MAXPRM)	PRMLST	9
20	C		PRMLST	10
21		INTEGER NPRM, MATTER(DIMPRM), PACCEL(DIMPRM), PRAYID(DIMPRM)	PRMLST	11
22		INTEGER PRMTYP(DIMPRM), PRMIDX(DIMPRM)	PRMLST	12
23		COMMON /PRMLST/ NPRM, MATTER, PACCEL, PRAYID, PRMTYP, PRMIDX	PRMLST	13
24	C		SPHLST	1
25	C-----		SPHLST	2
26	C-- SPHERE LIST --		SPHLST	3
27	C-----		SPHLST	4
28	C	C SIZE: 4 * DIMSPH + 1 WORDS = 4097	SPHLST	5
29	C		SPHLST	6
30		INTEGER MAXSPH, DIMSPH	SPHLST	7
31		PARAMETER(MAXSPH=1024)	SPHLST	8
32		PARAMETER(DIMSPH=MAXSPH)	SPHLST	9
33	C		SPHLST	10
34		INTEGER NSPH	SPHLST	11
35		COMMON /SPHLSI/ NSPH	SPHLST	12
36	C		SPHLST	13
37		REAL SOX(DIMSPH), SOY(DIMSPH), SOZ(DIMSPH), SRAD(DIMSPH)	SPHLST	14
38		COMMON /SPHLR/ SOX, SOY, SOZ, SRAD	SPHLST	15
39	C		MTRLST	1
40	C-----		MTRLST	2
41	C-- MATERIAL LIST COMMON BLOCK --		MTRLST	3
42	C-----		MTRLST	4
43	C	C SIZE: 14 * DIMMTR + 1 WORDS = 449	MTRLST	5
44	C		MTRLST	6
45		INTEGER MAXMTR, DIMMTR	MTRLST	7
46		PARAMETER(MAXMTR=32)	MTRLST	8
47		PARAMETER(DIMMTR=MAXMTR)	MTRLST	9
48	C		MTRLST	10
49		INTEGER NMTR	MTRLST	11
50		COMMON /MTRLSI/ NMTR	MTRLST	12
51	C		MTRLST	13
52		REAL MKR(DIMMTR), MKT(DIMMTR)	MTRLST	14
53		REAL MCAR(DIMMTR), MCAG(DIMMTR), MCAB(DIMMTR)	MTRLST	15
54		REAL MCDR(DIMMTR), MCDG(DIMMTR), MCDB(DIMMTR)	MTRLST	16
55		REAL MCSR(DIMMTR), MCSG(DIMMTR), MCSB(DIMMTR)	MTRLST	17
56		REAL META(DIMMTR), MGLS(DIMMTR), MRGH(DIMMTR)	MTRLST	18
57		COMMON /MTRLSR/ MKR, MKT, MCAR, MCAG, MCAB, MCDR, MCDG, MCDB,	MTRLST	19
	□	SUBROUTINE INITDB 73/720 OPT=2		
			FTN 5.1+538	05/08/09. 12.28.37
				PAGE 2
58		+ MCSR, MCSG, MCSB, META, MGLS, MRGH	MTRLST	20
59	C		LGTLST	1
60	C-----		LGTLST	2
61	C-- LIGHT LIST COMMON BLOCK --		LGTLST	3
62	C-----		LGTLST	4
63	C	C SIZE: 13 * DIMLGT + 4 WORDS = 420	LGTLST	5
64	C		LGTLST	6
65		INTEGER MAXLGT, DIMLGT	LGTLST	7
66		PARAMETER(MAXLGT=32)	LGTLST	8
67		PARAMETER(DIMLGT=MAXLGT)	LGTLST	9
68	C		LGTLST	10
69		INTEGER NLGT, LDIR(DIMLGT)	LGTLST	11
70		COMMON /LGTLR/ NLGT, LDIR	LGTLST	12
71	C		LGTLST	13
72		REAL LCAR, LCAG, LCAB, LOX(DIMLGT), LOY(DIMLGT), LOZ(DIMLGT)	LGTLST	14
73		REAL LCLR(DIMLGT), LCLG(DIMLGT), LCLB(DIMLGT)	LGTLST	15
74		REAL LDX(DIMLGT), LDY(DIMLGT), LDZ(DIMLGT)	LGTLST	16
75		REAL LTGT(DIMLGT), LTG2(DIMLGT), LRAD(DIMLGT)	LGTLST	17


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76          COMMON /LGTLR/ LCAR, LCAG, LCAB, LOX, LOY, LOZ, LCLR, LCLG, LGTLST 18
77          +          LCLB, LDX, LDY, LDZ, LTGT, LTG2, LRAD          LGTLST 19
78          C          RAYLST 1
79          C----- RAYLST 2
80          C-- RAY LIST COMMON BLOCK -- RAYLST 3
81          C----- RAYLST 4
82          C SIZE: 13 * DIMRAY + 2 WORDS = 6658 RAYLST 5
83          C          RAYLST 6
84          INTEGER MAXRAY, DIMRAY RAYLST 7
85          PARAMETER( MAXRAY=512 ) RAYLST 8
86          PARAMETER( DIMRAY=MAXRAY ) RAYLST 9
87          C          RAYLST 10
88          INTEGER NLRAY, RAYNUM, RISECT(DIMRAY), RTYPE(DIMRAY) RAYLST 11
89          INTEGER RDEP(DIMRAY), RRAYID(DIMRAY) RAYLST 12
90          COMMON /RAYLSI/ NLRAY, RAYNUM, RISECT, RTYPE, RDEP, RRAYID RAYLST 13
91          C          RAYLST 14
92          REAL ROX(DIMRAY), ROY(DIMRAY), ROZ(DIMRAY) RAYLST 15
93          REAL RDX(DIMRAY), RDY(DIMRAY), RDZ(DIMRAY) RAYLST 16
94          REAL RWGTR(DIMRAY), RWGTG(DIMRAY), RWGTB(DIMRAY) RAYLST 17
95          COMMON /RAYLSR/ ROX, ROY, ROZ, RDX, RDY, RDZ, RWGTR, RWGTG, RWGTB RAYLST 18
96          C          TRILST 1
97          C----- TRILST 2
98          C-- TRIANGLE LIST -- TRILST 3
99          C----- TRILST 4
100         C 23 * DIMTRI + 1 WORDS = 5889 TRILST 5
101         C          TRILST 6
102         INTEGER MAXTRI, DIMTRI TRILST 7
103         PARAMETER( MAXTRI=256 ) TRILST 8
104         PARAMETER( DIMTRI=MAXTRI ) TRILST 9
105         C          TRILST 10
106         INTEGER NTRI, DAX(DIMTRI) TRILST 11
107         COMMON /TRILSI/ NTRI, DAX TRILST 12
108         C          TRILST 13
109         REAL TX1(DIMTRI), TY1(DIMTRI), TZ1(DIMTRI) TRILST 14
110         REAL TX2(DIMTRI), TY2(DIMTRI), TZ2(DIMTRI) TRILST 15
111         REAL TX3(DIMTRI), TY3(DIMTRI), TZ3(DIMTRI) TRILST 16
112         REAL TNX(DIMTRI), TNY(DIMTRI), TNZ(DIMTRI), TND(DIMTRI) TRILST 17
113         REAL NVX1(DIMTRI), NVY1(DIMTRI), NVZ1(DIMTRI) TRILST 18
114         REAL NVX2(DIMTRI), NVY2(DIMTRI), NVZ2(DIMTRI) TRILST 19
115         SUBROUTINE INITDB 73/720 OPT=2 FTN 5.1+538 05/08/09. 12.28.37 PAGE 3
116         REAL NVX3(DIMTRI), NVY3(DIMTRI), NVZ3(DIMTRI) TRILST 20
117         COMMON /TRILSR/ TX1, TY1, TZ1, TX2, TY2, TZ2, TX3, TY3, TZ3, TRILST 21
118         +          TNX, TNY, TNZ, NVX1, NVY1, NVZ1, NVX2, NVY2, TRILST 22
119         +          NVZ2, NVX3, NVY3, NVZ3, TND TRILST 23
120         NPRM = 0 TRT2 1620
121         NSPH = 0 TRT2 1621
122         NTRI = 0 TRT2 1622
123         NMTR = 0 TRT2 1623
124         NLGT = 0 TRT2 1624
125         RAYNUM = 0 TRT2 1625
126         C          TRT2 1626
127         RETURN TRT2 1627
            END TRT2 1628

```

--VARIABLE MAP--(LO=A)

-NAME-	ADDRESS-	BLOCK-	PROPERTIES-----	TYPE-----	SIZE	-NAME-	ADDRESS-	BLOCK-	PROPERTIES-----	TYPE-----	SIZE
DAX	1B	/TRILSI/		INTEGER	256	NVX2	7400B	/TRILSR/		REAL	256
LCAB	2B	/LGTLR/		REAL		NVX3	11000B	/TRILSR/		REAL	256
LCAG	1B	/LGTLR/		REAL		NVY1	6400B	/TRILSR/		REAL	256

LCLB	243B	/LGTLSR/	REAL	32	NVY2	10000B	/TRILSR/	REAL	256
LCLG	203B	/LGTLSR/	REAL	32	NVY3	11400B	/TRILSR/	REAL	256
LCLR	143B	/LGTLSR/	REAL	32	NVZ1	7000B	/TRILSR/	REAL	256
LDIR	1B	/LGTLSI/	INTEGER	32	NVZ2	10400B	/TRILSR/	REAL	256
LDX	303B	/LGTLSR/	REAL	32	NVZ3	12000B	/TRILSR/	REAL	256
LDY	343B	/LGTLSR/	REAL	32	PACCEL	2001B	/PRMLST/	INTEGER	1024
LDZ	403B	/LGTLSR/	REAL	32	PRAYID	4001B	/PRMLST/	INTEGER	1024
LOX	3B	/LGTLSR/	REAL	32	PRMIDX	10001B	/PRMLST/	INTEGER	1024
LOY	43B	/LGTLSR/	REAL	32	PRMTYP	6001B	/PRMLST/	INTEGER	1024
LOZ	103B	/LGTLSR/	REAL	32	RAYNUM	1B	/RAYLSI/	INTEGER	
LRAD	543B	/LGTLSR/	REAL	32	RDEP	2002B	/RAYLSI/	INTEGER	512
LTGT	443B	/LGTLSR/	REAL	32	RDX	3000B	/RAYLSR/	REAL	512
LTG2	503B	/LGTLSR/	REAL	32	RDY	4000B	/RAYLSR/	REAL	512
MATTER	1B	/PRMLST/	INTEGER	1024	RDZ	5000B	/RAYLSR/	REAL	512
MCAB	200B	/MTRLSR/	REAL	32	RISECT	2B	/RAYLSI/	INTEGER	512
MCAG	140B	/MTRLSR/	REAL	32	ROX	0B	/RAYLSR/	REAL	512
MCAR	100B	/MTRLSR/	REAL	32	ROY	1000B	/RAYLSR/	REAL	512
MCDB	340B	/MTRLSR/	REAL	32	ROZ	2000B	/RAYLSR/	REAL	512
MCDG	300B	/MTRLSR/	REAL	32	RRAYID	3002B	/RAYLSI/	INTEGER	512
MCDR	240B	/MTRLSR/	REAL	32	RTYPE	1002B	/RAYLSI/	INTEGER	512
MCSB	500B	/MTRLSR/	REAL	32	RWGTB	10000B	/RAYLSR/	REAL	512
MCSG	440B	/MTRLSR/	REAL	32	RWGTG	7000B	/RAYLSR/	REAL	512
MCSR	400B	/MTRLSR/	REAL	32	RWGTR	6000B	/RAYLSR/	REAL	512
META	540B	/MTRLSR/	REAL	32	SOX	0B	/SPHLSR/	REAL	1024
MGLS	600B	/MTRLSR/	REAL	32	SOY	2000B	/SPHLSR/	REAL	1024
MKR	0B	/MTRLSR/	REAL	32	SOZ	4000B	/SPHLSR/	REAL	1024
MKT	40B	/MTRLSR/	REAL	32	SRAD	6000B	/SPHLSR/	REAL	1024
MRGH	640B	/MTRLSR/	REAL	32	TND	12400B	/TRILSR/	REAL	256
NLGT	0B	/LGTLSI/	INTEGER	32	TNX	4400B	/TRILSR/	REAL	256
NLRAY	0B	/RAYLSI/	INTEGER		TNY	5000B	/TRILSR/	REAL	256
NMTR	0B	/MTRLSI/	INTEGER		TNZ	5400B	/TRILSR/	REAL	256
NPRM	0B	/PRMLST/	INTEGER		TX1	0B	/TRILSR/	REAL	256
NSPH	0B	/SPHLSI/	INTEGER		TX2	1400B	/TRILSR/	REAL	256
NTRI	0B	/TRILSI/	INTEGER		TX3	3000B	/TRILSR/	REAL	256
NVX1	6000B	/TRILSR/	REAL	256	TY1	400B	/TRILSR/	REAL	256
					TY2	2000B	/TRILSR/	REAL	256

SUBROUTINE INITDB 73/720 OPT=2 FTN 5.1+538 05/08/09. 12.28.37 PAGE 4
 -NAME-----ADDRESS--BLOCK-----PROPERTIES-----TYPE-----SIZE -NAME---ADDRESS--BLOCK-----PROPERTIES-----TYPE-----SIZE

TY3	3400B	/TRILSR/	REAL	256	TZ2	2400B	/TRILSR/	REAL	256
TZ1	1000B	/TRILSR/	REAL	256	TZ3	4000B	/TRILSR/	REAL	256

--SYMBOLIC CONSTANTS--(LO=A)

-NAME-----TYPE-----VALUE	-NAME-----TYPE-----VALUE
DIMLGT INTEGER 32	MAXLGT INTEGER 32
DIMMTR INTEGER 32	MAXMTR INTEGER 32
DIMPRM INTEGER 1024	MAXPRM INTEGER 1024
DIMRAY INTEGER 512	MAXRAY INTEGER 512
DIMSPH INTEGER 1024	MAXSPH INTEGER 1024
DIMTRI INTEGER 256	MAXTRI INTEGER 256

--ENTRY POINTS--(LO=A)

-NAME-----ADDRESS--ARGS---
INITDB 3B 0

--STATISTICS--

PROGRAM-UNIT LENGTH 25B = 21

CM LABELLED COMMON LENGTH 54152B = 22634
 CM STORAGE USED 57400B = 24320
 COMPILE TIME 0.158 SECONDS
 SUBROUTINE INITBK 73/720 OPT=2

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PAGE 1

1	C		TRT2	1629
2	C		TRT2	1630
3		SUBROUTINE INITBK	TRT2	1631
4		IMPLICIT CHARACTER*1 (A-Z)	TRT2	1632
5	C	*****	TRT2	1633
6	C	INITIALISE THINGS FOR GRADED BACKGROUNDS	TRT2	1634
7	C	*****	TRT2	1635
8	C		PARAMS	1
9	C	-----	PARAMS	2
10	C	-- SUNDRY PARAMETERS --	PARAMS	3
11	C	-----	PARAMS	4
12	C		PARAMS	5
13		REAL GTHUGE, MINEPS, EPS, MINFLT, MAXFLT, TRTPI, DEGRAD	PARAMS	6
14		PARAMETER(GTHUGE=1E7)	PARAMS	7
15		PARAMETER(MINEPS=1E-5)	PARAMS	8
16		PARAMETER(EPS=1E-7)	PARAMS	9
17		PARAMETER(MINFLT=-1E20)	PARAMS	10
18		PARAMETER(MAXFLT=1E20)	PARAMS	11
19		PARAMETER(TRTPI=3.1415926)	PARAMS	12
20		PARAMETER(DEGRAD=TRTPI/180.0)	PARAMS	13
21	C		PARAMS	14
22		INTEGER EYERAY, RFLRAY, TRNRAY	PARAMS	15
23		PARAMETER(EYERAY=1)	PARAMS	16
24		PARAMETER(RFLRAY=2)	PARAMS	17
25		PARAMETER(TRNRAY=3)	PARAMS	18
26	C		PARAMS	19
27		INTEGER ENTER, LEAVE	PARAMS	20
28		PARAMETER(ENTER=1)	PARAMS	21
29		PARAMETER(LEAVE=2)	PARAMS	22
30	C		PARAMS	23
31		INTEGER NOACL, SUBACL	PARAMS	24
32		PARAMETER(NOACL=0)	PARAMS	25
33		PARAMETER(SUBACL=1)	PARAMS	26
34	C		PARAMS	27
35		INTEGER BKCNST, BKVERT, BKHORZ	PARAMS	28
36		PARAMETER(BKCNST=0)	PARAMS	29
37		PARAMETER(BKVERT=1)	PARAMS	30
38		PARAMETER(BKHORZ=2)	PARAMS	31
39	C		PARAMS	32
40		INTEGER LGTCOS, LGTCON, LGTBRN	PARAMS	33
41		PARAMETER(LGTCOS=0)	PARAMS	34
42		PARAMETER(LGTCON=1)	PARAMS	35
43		PARAMETER(LGTBRN=2)	PARAMS	36
44	C		PARAMS	37
45		INTEGER SPHPRM, TRIPRM	PARAMS	38
46		PARAMETER(SPHPRM=1)	PARAMS	39
47		PARAMETER(TRIPRM=2)	PARAMS	40
48	C		PARAMS	41
49		INTEGER DAXX, DAXY, DAXZ	PARAMS	42
50		PARAMETER(DAXX=1)	PARAMS	43
51		PARAMETER(DAXY=2)	PARAMS	44
52		PARAMETER(DAXZ=3)	PARAMS	45
53	C		SCREEN	1
54	C	-----	SCREEN	2
55	C	-- SCREEN COMMON BLOCK --	SCREEN	3
56	C	-----	SCREEN	4
57	C	SIZE: 3 * DIMPXL + 15 WORDS = 12303	SCREEN	5

```

58      C
59      INTEGER MAXPXL, DIMPXL
60      PARAMETER( MAXPXL=4096 )
61      PARAMETER( DIMPXL=MAXPXL)
62      C
63      INTEGER SNX, SNY, SMAXDP, OS, ACCEL, SHADOW, BKT, CURX, CURY
64      COMMON /SCREEI/ SNX, SNY, SMAXDP, OS, ACCEL, SHADOW, BKT,
65      +          CURX, CURY
66      C
67      REAL FPD, APER, FOCAL, FSTOP, MINWGT
68      REAL COLR, COLG, COLB
69      REAL BACKR, BACKG, BACKB
70      REAL BKRI, BKRF, BKRD
71      REAL BKGI, BKGF, BKGD
72      REAL BKBI, BKBF, BKBD
73      REAL LINER(DIMPXL), LINEG(DIMPXL), LINEB(DIMPXL)
74      COMMON /SCREER/ FPD, APER, FOCAL, FSTOP, MINWGT,
75      +          COLR, COLG, COLB,
76      +          BACKR, BACKG, BACKB,
77      +          BKRI, BKRF, BKRD,
78      +          BKGI, BKGF, BKGD,
79      +          BKBI, BKBF, BKBD,
80      +          LINER, LINEG, LINEB
81      REAL FN
82      C
83      IF( BKT .EQ. BKVERT )THEN
84          FN = SNY - 1
85      ELSE IF( BKT .EQ. BKHORZ )THEN
86          FN = SNX - 1
87      ELSE
88          FN = 1.0
89      ENDIF
90      BKRD = ( BKRF - BKRI ) / FN
91      BKGD = ( BKGF - BKGI ) / FN
92      BKBD = ( BKBF - BKBI ) / FN
93      C
94      RETURN
95      END

```

SCREEN	6
SCREEN	7
SCREEN	8
SCREEN	9
SCREEN	10
SCREEN	11
SCREEN	12
SCREEN	13
SCREEN	14
SCREEN	15
SCREEN	16
SCREEN	17
SCREEN	18
SCREEN	19
SCREEN	20
SCREEN	21
SCREEN	22
SCREEN	23
SCREEN	24
SCREEN	25
SCREEN	26
SCREEN	27
SCREEN	28
TRT2	1638
TRT2	1639
TRT2	1640
TRT2	1641
TRT2	1642
TRT2	1643
TRT2	1644
TRT2	1645
TRT2	1646
TRT2	1647
TRT2	1648
TRT2	1649
TRT2	1650
TRT2	1651
TRT2	1652

--VARIABLE MAP--(LO=A)

-NAME--	-ADDRESS--	-BLOCK--	-PROPERTIES--	-TYPE--	-SIZE	-NAME--	-ADDRESS--	-BLOCK--	-PROPERTIES--	-TYPE--	-SIZE
ACCEL	4B	/SCREEI/		INTEGER		BKT	6B	/SCREEI/		INTEGER	
APER	1B	/SCREER/		REAL		COLB	7B	/SCREER/		REAL	
BACKB	12B	/SCREER/		REAL		COLG	6B	/SCREER/		REAL	
BACKG	11B	/SCREER/		REAL		COLR	5B	/SCREER/		REAL	
BACKR	10B	/SCREER/		REAL		CURX	7B	/SCREEI/		INTEGER	
BKBD	23B	/SCREER/		REAL		CURY	10B	/SCREEI/		INTEGER	
BKBF	22B	/SCREER/		REAL		FN	46B			REAL	
BKBI	21B	/SCREER/		REAL		FOCAL	2B	/SCREER/		REAL	
BKGD	20B	/SCREER/		REAL		FPD	0B	/SCREER/		REAL	
BKGF	17B	/SCREER/		REAL		FSTOP	3B	/SCREER/		REAL	
BKGI	16B	/SCREER/		REAL		LINEB	20024B	/SCREER/		REAL	4096
BKRD	15B	/SCREER/		REAL		LINEG	10024B	/SCREER/		REAL	4096
BKRF	14B	/SCREER/		REAL		LINER	24B	/SCREER/		REAL	4096
BKRI	13B	/SCREER/		REAL		MINWGT	4B	/SCREER/		REAL	

OS 3B /SCREEI/
SHADOW 5B /SCREEI/
SMA XDP 2B /SCREEI/

INTEGER SNX 0B /SCREEI/
INTEGER SNY 1B /SCREEI/
INTEGER

INTEGER
INTEGER

--SYMBOLIC CONSTANTS--(LO=A)

NAME	TYPE	VALUE	NAME	TYPE	VALUE
BKCNST	INTEGER	0	LGTCOS	INTEGER	0
BKHORZ	INTEGER	2	LGTCOS	INTEGER	1
BKVERT	INTEGER	1	MAXFLT	REAL	0"20235327435361326142"
DAXX	INTEGER	1	MAXPXL	INTEGER	4096
DAXY	INTEGER	2	MINEPS	REAL	0"16775174265421615510"
DAXZ	INTEGER	3	MINFLT	REAL	0"57542450342416451635"
DEGRAD	REAL	0"17124357506472324711"	NOACL	INTEGER	0
DIMPXL	INTEGER	4096	RFLRAY	INTEGER	2
ENTER	INTEGER	1	SPHPRM	INTEGER	1
EPS	REAL	0"16706553762465362572"	SUBACL	INTEGER	1
EYERAY	INTEGER	1	TRIPRM	INTEGER	2
GTHUGE	REAL	0"17474611320000000000"	TRNRAY	INTEGER	3
LEAVE	INTEGER	2	TRTPI	REAL	0"17216220773232113302"
LGTBRN	INTEGER	2			

--ENTRY POINTS--(LO=A)

-NAME---ADDRESS--ARGS---

INITBK 3B 0

--STATISTICS--

PROGRAM-UNIT LENGTH 47B = 39
 CM LABELLED COMMON LENGTH 30035B = 12317
 CM STORAGE USED 57200B = 24192
 COMPILE TIME 0.124 SECONDS
 SUBROUTINE INITLG 73/720 OPT=2

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1 C TRT2 1653
2 C TRT2 1654
3 SUBROUTINE INITLG TRT2 1655
4 IMPLICIT CHARACTER*1 (A-Z) TRT2 1656
5 C***** TRT2 1657
6 C NORMALIZE AND INVERT THE LIGHT POINTING VECTORS FOR DIRECTIONAL LIGHTSTRT2 1658
7 C***** TRT2 1659
8 C PARAMS 1
9 C----- PARAMS 2
10 C-- SUNDRY PARAMETERS -- PARAMS 3
11 C----- PARAMS 4
12 C PARAMS 5
13 REAL GTHUGE, MINEPS, EPS, MINFLT, MAXFLT, TRTPI, DEGRAD PARAMS 6
14 PARAMETER( GTHUGE=1E7 ) PARAMS 7
15 PARAMETER( MINEPS=1E-5 ) PARAMS 8
16 PARAMETER( EPS=1E-7 ) PARAMS 9
17 PARAMETER( MINFLT=-1E20 ) PARAMS 10
18 PARAMETER( MAXFLT=1E20 ) PARAMS 11
19 PARAMETER( TRTPI=3.1415926 ) PARAMS 12
20 PARAMETER( DEGRAD=TRTPI/180.0 ) PARAMS 13
21 C PARAMS 14
22 INTEGER EYERAY, RFLRAY, TRNRAY PARAMS 15
23 PARAMETER( EYERAY=1 ) PARAMS 16
24 PARAMETER( RFLRAY=2 ) PARAMS 17

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25		PARAMETER(TRNRAY=3)		PARAMS	18
26	C			PARAMS	19
27		INTEGER ENTER, LEAVE		PARAMS	20
28		PARAMETER(ENTER=1)		PARAMS	21
29		PARAMETER(LEAVE=2)		PARAMS	22
30	C			PARAMS	23
31		INTEGER NOACL, SUBACL		PARAMS	24
32		PARAMETER(NOACL=0)		PARAMS	25
33		PARAMETER(SUBACL=1)		PARAMS	26
34	C			PARAMS	27
35		INTEGER BKCNST, BKVERT, BKHORZ		PARAMS	28
36		PARAMETER(BKCNST=0)		PARAMS	29
37		PARAMETER(BKVERT=1)		PARAMS	30
38		PARAMETER(BKHORZ=2)		PARAMS	31
39	C			PARAMS	32
40		INTEGER LGTCON, LGTCOS, LGTBRN		PARAMS	33
41		PARAMETER(LGTCON=0)		PARAMS	34
42		PARAMETER(LGTCOS=1)		PARAMS	35
43		PARAMETER(LGTBRN=2)		PARAMS	36
44	C			PARAMS	37
45		INTEGER SPHPRM, TRIPRM		PARAMS	38
46		PARAMETER(SPHPRM=1)		PARAMS	39
47		PARAMETER(TRIPRM=2)		PARAMS	40
48	C			PARAMS	41
49		INTEGER DAXX, DAXY, DAXZ		PARAMS	42
50		PARAMETER(DAXX=1)		PARAMS	43
51		PARAMETER(DAXY=2)		PARAMS	44
52		PARAMETER(DAXZ=3)		PARAMS	45
53	C			LGTLST	1
54	C	-----		LGTLST	2
55	C	-- LIGHT LIST COMMON BLOCK --		LGTLST	3
56	C	-----		LGTLST	4
57	C	C SIZE: 13 * DIMLGT + 4 WORDS = 420		LGTLST	5
	□	SUBROUTINE INITLG 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE 2
58	C			LGTLST	6
59		INTEGER MAXLGT, DIMLGT		LGTLST	7
60		PARAMETER(MAXLGT=32)		LGTLST	8
61		PARAMETER(DIMLGT=MAXLGT)		LGTLST	9
62	C			LGTLST	10
63		INTEGER NLGT, LDIR(DIMLGT)		LGTLST	11
64		COMMON /LGTLSI/ NLGT, LDIR		LGTLST	12
65	C			LGTLST	13
66		REAL LCAR, LCAG, LCAB, LOX(DIMLGT), LOY(DIMLGT), LOZ(DIMLGT)		LGTLST	14
67		REAL LCLR(DIMLGT), LCLG(DIMLGT), LCLB(DIMLGT)		LGTLST	15
68		REAL LDX(DIMLGT), LDY(DIMLGT), LDZ(DIMLGT)		LGTLST	16
69		REAL LTGT(DIMLGT), LTG2(DIMLGT), LRAD(DIMLGT)		LGTLST	17
70		COMMON /LGTLSR/ LCAR, LCAG, LCAB, LOX, LOY, LOZ, LCLR, LCLG,		LGTLST	18
71		+ LCLB, LDX, LDY, LDZ, LTGT, LTG2, LRAD		LGTLST	19
72		INTEGER L		TRT2	1662
73	C			TRT2	1663
74		DO 1 L=1,NLGT		TRT2	1664
75		IF(LDIR(L) .NE. LGTCON)THEN		TRT2	1665
76		CALL NRMVEC(LDX(L), LDY(L), LDZ(L))		TRT2	1666
77		LDX(L) = -LDX(L)		TRT2	1667
78		LDY(L) = -LDY(L)		TRT2	1668
79		LDZ(L) = -LDZ(L)		TRT2	1669
80		ENDIF		TRT2	1670
81	1	CONTINUE		TRT2	1671
82	C			TRT2	1672
83		RETURN		TRT2	1673
84		END		TRT2	1674

--VARIABLE MAP--(LO=A)

-NAME-	-ADDRESS-	-BLOCK-	-PROPERTIES-	-TYPE-	-SIZE-	-NAME-	-ADDRESS-	-BLOCK-	-PROPERTIES-	-TYPE-	-SIZE-
L	46B			INTEGER		LDY	343B	/LGTLR/		REAL	32
LCAB	2B	/LGTLR/		REAL		LDZ	403B	/LGTLR/		REAL	32
LCAG	1B	/LGTLR/		REAL		LOX	3B	/LGTLR/		REAL	32
LCAR	0B	/LGTLR/		REAL		LOY	43B	/LGTLR/		REAL	32
LCLB	243B	/LGTLR/		REAL	32	LOZ	103B	/LGTLR/		REAL	32
LCLG	203B	/LGTLR/		REAL	32	LRAD	543B	/LGTLR/		REAL	32
LCLR	143B	/LGTLR/		REAL	32	LTGT	443B	/LGTLR/		REAL	32
LDIR	1B	/LGTLR/		INTEGER	32	LTG2	503B	/LGTLR/		REAL	32
LDX	303B	/LGTLR/		REAL	32	NLGT	0B	/LGTLR/		INTEGER	32

--SYMBOLIC CONSTANTS--(LO=A)

-NAME-	-TYPE-	-VALUE-	-NAME-	-TYPE-	-VALUE-
BKCNST	INTEGER	0	GTHUGE	REAL	0"1747461132000000000"
BKHORZ	INTEGER	2	LEAVE	INTEGER	2
BKVERT	INTEGER	1	LGTRN	INTEGER	2
DAXX	INTEGER	1	LGTCN	INTEGER	0
DAXY	INTEGER	2	LGTCOS	INTEGER	1
DAXZ	INTEGER	3	MAXFLT	REAL	0"20235327435361326142"
DEGRAD	REAL	0"17124357506472324711"	MAXLGT	INTEGER	32
DIMLGT	INTEGER	32	MINEPS	REAL	0"16775174265421615510"
ENTER	INTEGER	1	MINFLT	REAL	0"57542450342416451635"
EPS	REAL	0"16706553762465362572"	NOACL	INTEGER	0
EYERAY	INTEGER	1	RFLRAY	INTEGER	2
SUBROUTINE INITLG 73/720 OPT=2			FTN 5.1+538 05/08/09. 12.28.37		
PAGE 3					
-NAME-	-TYPE-	-VALUE-	-NAME-	-TYPE-	-VALUE-
SPHPRM	INTEGER	1	TRNRAY	INTEGER	3
SUBACL	INTEGER	1	TRTPI	REAL	0"17216220773232113302"
TRIPRM	INTEGER	2			

--PROCEDURES--(LO=A)

-NAME-	-TYPE-	-ARGS-	-CLASS-
NRMVEC		3	SUBROUTINE

--STATEMENT LABELS--(LO=A)

-LABEL-	-ADDRESS-	-PROPERTIES-	-DEF-
1	INACTIVE	DO-TERM	81

--ENTRY POINTS--(LO=A)

-NAME-	-ADDRESS-	-ARGS-
INITLG	3B	0

--STATISTICS--

PROGRAM-UNIT LENGTH	50B = 40
CM LABELLED COMMON LENGTH	644B = 420
CM STORAGE USED	57100B = 24128
COMPILE TIME	0.120 SECONDS
SUBROUTINE INITRI	73/720 OPT=2

1	C	TRT2	1675
2	C	TRT2	1676
3	SUBROUTINE INITRI(I)	TRT2	1677
4	IMPLICIT CHARACTER*1 (A-Z)	TRT2	1678
5	INTEGER I	TRT2	1679
6	C*****	TRT2	1680
7	C PRECOMPUTE PLANE EQUATION AND DOMINANT AXIS INFO FOR TRIANGLE (I)	TRT2	1681
8	C*****	TRT2	1682
9	C	PARAMS	1
10	C-----	PARAMS	2
11	C-- SUNDRY PARAMETERS --	PARAMS	3
12	C-----	PARAMS	4
13	C	PARAMS	5
14	REAL GTHUGE, MINEPS, EPS, MINFLT, MAXFLT, TRTPI, DEGRAD	PARAMS	6
15	PARAMETER(GTHUGE=1E7)	PARAMS	7
16	PARAMETER(MINEPS=1E-5)	PARAMS	8
17	PARAMETER(EPS=1E-7)	PARAMS	9
18	PARAMETER(MINFLT=-1E20)	PARAMS	10
19	PARAMETER(MAXFLT=1E20)	PARAMS	11
20	PARAMETER(TRTPI=3.1415926)	PARAMS	12
21	PARAMETER(DEGRAD=TRTPI/180.0)	PARAMS	13
22	C	PARAMS	14
23	INTEGER EYERAY, RFLRAY, TRNRAY	PARAMS	15
24	PARAMETER(EYERAY=1)	PARAMS	16
25	PARAMETER(RFLRAY=2)	PARAMS	17
26	PARAMETER(TRNRAY=3)	PARAMS	18
27	C	PARAMS	19
28	INTEGER ENTER, LEAVE	PARAMS	20
29	PARAMETER(ENTER=1)	PARAMS	21
30	PARAMETER(LEAVE=2)	PARAMS	22
31	C	PARAMS	23
32	INTEGER NOACL, SUBACL	PARAMS	24
33	PARAMETER(NOACL=0)	PARAMS	25
34	PARAMETER(SUBACL=1)	PARAMS	26
35	C	PARAMS	27
36	INTEGER BKNST, BKVERT, BKHORZ	PARAMS	28
37	PARAMETER(BKNST=0)	PARAMS	29
38	PARAMETER(BKVERT=1)	PARAMS	30
39	PARAMETER(BKHORZ=2)	PARAMS	31
40	C	PARAMS	32
41	INTEGER LGTCOS, LGTCOS, LGTBRN	PARAMS	33
42	PARAMETER(LGTCOS=0)	PARAMS	34
43	PARAMETER(LGTCOS=1)	PARAMS	35
44	PARAMETER(LGTBRN=2)	PARAMS	36
45	C	PARAMS	37
46	INTEGER SPHPRM, TRIPRM	PARAMS	38
47	PARAMETER(SPHPRM=1)	PARAMS	39
48	PARAMETER(TRIPRM=2)	PARAMS	40
49	C	PARAMS	41
50	INTEGER DAXX, DAXY, DAXZ	PARAMS	42
51	PARAMETER(DAXX=1)	PARAMS	43
52	PARAMETER(DAXY=2)	PARAMS	44
53	PARAMETER(DAXZ=3)	PARAMS	45
54	C	TRILST	1
55	C-----	TRILST	2
56	C-- TRIANGLE LIST --	TRILST	3
57	C-----	TRILST	4

□ SUBROUTINE INITRI 73/720 OPT=2 FTN 5.1+538 05/08/09. 12.28.37 PAGE 2

58 C 23 * DIMTRI + 1 WORDS = 5889

TRILST 5

59			TRILST	6
60	C	INTEGER MAXTRI, DIMTRI	TRILST	7
61		PARAMETER(MAXTRI=256)	TRILST	8
62		PARAMETER(DIMTRI=MAXTRI)	TRILST	9
63	C		TRILST	10
64		INTEGER NTRI, DAX(DIMTRI)	TRILST	11
65		COMMON /TRILSI/ NTRI, DAX	TRILST	12
66	C		TRILST	13
67		REAL TX1(DIMTRI), TY1(DIMTRI), TZ1(DIMTRI)	TRILST	14
68		REAL TX2(DIMTRI), TY2(DIMTRI), TZ2(DIMTRI)	TRILST	15
69		REAL TX3(DIMTRI), TY3(DIMTRI), TZ3(DIMTRI)	TRILST	16
70		REAL TNX(DIMTRI), TNY(DIMTRI), TNZ(DIMTRI), TND(DIMTRI)	TRILST	17
71		REAL NVX1(DIMTRI), NVY1(DIMTRI), NVZ1(DIMTRI)	TRILST	18
72		REAL NVX2(DIMTRI), NVY2(DIMTRI), NVZ2(DIMTRI)	TRILST	19
73		REAL NVX3(DIMTRI), NVY3(DIMTRI), NVZ3(DIMTRI)	TRILST	20
74		COMMON /TRILSR/ TX1, TY1, TZ1, TX2, TY2, TZ2, TX3, TY3, TZ3,	TRILST	21
75		+ TNX, TNY, TNZ, NVX1, NVY1, NVZ1, NVX2, NVY2,	TRILST	22
76		+ NVZ2, NVX3, NVY3, NVZ3, TND	TRILST	23
77		REAL DXA, DYA, DZA, DXB, DYB, DZB	TRT2	1685
78		REAL FNX, FNY, FNZ, LEN, NVX, NVY, NVZ	TRT2	1686
79	C		TRT2	1687
80		DXA = TX2(I) - TX1(I)	TRT2	1688
81		DYA = TY2(I) - TY1(I)	TRT2	1689
82		DZA = TZ2(I) - TZ1(I)	TRT2	1690
83		DXB = TX3(I) - TX1(I)	TRT2	1691
84		DYB = TY3(I) - TY1(I)	TRT2	1692
85		DZB = TZ3(I) - TZ1(I)	TRT2	1693
86		TNX(I) = DYA * DZB - DZA * DYB	TRT2	1694
87		TNY(I) = DZA * DXB - DXA * DZB	TRT2	1695
88		TNZ(I) = DXA * DYB - DYA * DXB	TRT2	1696
89		TND(I) = - (TX1(I) * TNX(I) + TY1(I) * TNY(I) +	TRT2	1697
90		+ TZ1(I) * TNZ(I))	TRT2	1698
91		IF(TNX(I) .GT. TNY(I) .AND. TNX(I) .GT. TNZ(I))THEN	TRT2	1699
92		DAX(I) = DAXX	TRT2	1700
93		ELSE IF(TNY(I) .GT. TNX(I) .AND. TNY(I) .GT. TNZ(I))THEN	TRT2	1701
94		DAX(I) = DAXY	TRT2	1702
95		ELSE	TRT2	1703
96		DAX(I) = DAXZ	TRT2	1704
97		ENDIF	TRT2	1705
98	C		TRT2	1706
99		C-- IF THE VERTEX NORMAL LENGTH FOR A VERTEX IS TINY, SUBSTITUTE A UNIT	TRT2	1707
100		C-- OTHERWISE, ENSURE THE VERTEX NORMALS ARE UNIT VECTORS.	TRT2	1708
101	C		TRT2	1709
102		FNX = TNX(I)	TRT2	1710
103		FNY = TNY(I)	TRT2	1711
104		FNZ = TNZ(I)	TRT2	1712
105		CALL NRMVEC(FNX, FNY, FNZ)	TRT2	1713
106	C		TRT2	1714
107		NVX = NVX1(I)	TRT2	1715
108		NVY = NVY1(I)	TRT2	1716
109		NVZ = NVZ1(I)	TRT2	1717
110		LEN = NVX * NVX + NVY * NVY + NVZ * NVZ	TRT2	1718
111		C-- PRECISION!	TRT2	1719
112		IF(LEN .LT. (MINEPS*MINEPS))THEN	TRT2	1720
113		NVX1(I) = FNX	TRT2	1721
114		NVY1(I) = FNY	TRT2	1722
		SUBROUTINE INITRI 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
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115		NVZ1(I) = FNZ	TRT2	1723
116		ELSE	TRT2	1724
117		LEN = SQRT(LEN)	TRT2	1725
118		NVX1(I) = NVX1(I) / LEN	TRT2	1726

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119          NVY1(I) = NVY1(I) / LEN
120          NVZ1(I) = NVZ1(I) / LEN
121      ENDIF
122  C
123      NVX = NVX2(I)
124      NVY = NVY2(I)
125      NVZ = NVZ2(I)
126      LEN = NVX * NVX + NVY * NVY + NVZ * NVZ
127  C-- PRECISION!
128      IF( LEN .LT. (MINEPS*MINEPS) )THEN
129          NVX2(I) = FNX
130          NVY2(I) = FNY
131          NVZ2(I) = FNZ
132      ELSE
133          LEN = SQRT( LEN )
134          NVX2(I) = NVX2(I) / LEN
135          NVY2(I) = NVY2(I) / LEN
136          NVZ2(I) = NVZ2(I) / LEN
137      ENDIF
138  C
139      NVX = NVX3(I)
140      NVY = NVY3(I)
141      NVZ = NVZ3(I)
142      LEN = NVX * NVX + NVY * NVY + NVZ * NVZ
143  C-- PRECISION!
144      IF( LEN .LT. (MINEPS*MINEPS) )THEN
145          NVX3(I) = FNX
146          NVY3(I) = FNY
147          NVZ3(I) = FNZ
148      ELSE
149          LEN = SQRT( LEN )
150          NVX3(I) = NVX3(I) / LEN
151          NVY3(I) = NVY3(I) / LEN
152          NVZ3(I) = NVZ3(I) / LEN
153      ENDIF
154  C
155      RETURN
156      END

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TRT2 1727
TRT2 1728
TRT2 1729
TRT2 1730
TRT2 1731
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TRT2 1761
TRT2 1762
TRT2 1763
TRT2 1764

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--VARIABLE MAP--(LO=A)

NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE
DAX	1B	/TRILSI/		INTEGER	256
DXA	NONE			REAL	
DXB	NONE			REAL	
DYA	NONE			REAL	
DYB	NONE			REAL	
DZA	NONE			REAL	
DZB	NONE			REAL	
FNX	156B			REAL	
FNY	157B			REAL	
FNZ	160B			REAL	
SUBROUTINE INITRI 73/720 OPT=2					
NVY3	11400B	/TRILSR/		REAL	256
NVZ	NONE			REAL	
NVZ1	7000B	/TRILSR/		REAL	256
NVZ2	10400B	/TRILSR/		REAL	256
NVZ3	12000B	/TRILSR/		REAL	256
TND	12400B	/TRILSR/		REAL	256
TNX	4400B	/TRILSR/		REAL	256

NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE
I	1	DUMMY-ARG		INTEGER	
LEN	161B			REAL	
NTRI	0B	/TRILSI/		INTEGER	
NVX	NONE			REAL	
NVX1	6000B	/TRILSR/		REAL	256
NVX2	7400B	/TRILSR/		REAL	256
NVX3	11000B	/TRILSR/		REAL	256
NVY	NONE			REAL	
NVY1	6400B	/TRILSR/		REAL	256
NVY2	10000B	/TRILSR/		REAL	256
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TX1	0B	/TRILSR/		REAL	256
TX2	1400B	/TRILSR/		REAL	256
TX3	3000B	/TRILSR/		REAL	256
TY1	400B	/TRILSR/		REAL	256
TY2	2000B	/TRILSR/		REAL	256
TY3	3400B	/TRILSR/		REAL	256
TZ1	1000B	/TRILSR/		REAL	256

TRT2_20050809_130554.lpr

TNY	5000B	/TRILSR/	REAL	256	TZ2	2400B	/TRILSR/	REAL	256
TNZ	5400B	/TRILSR/	REAL	256	TZ3	4000B	/TRILSR/	REAL	256

--SYMBOLIC CONSTANTS--(LO=A)

-NAME----	TYPE-----	VALUE	-NAME----	TYPE-----	VALUE
BKCNST	INTEGER	0	LGTCN	INTEGER	0
BKHORZ	INTEGER	2	LGTCOS	INTEGER	1
BKVERT	INTEGER	1	MAXFLT	REAL	0"20235327435361326142"
DAXX	INTEGER	1	MAXTRI	INTEGER	256
DAXY	INTEGER	2	MINEPS	REAL	0"16775174265421615510"
DAXZ	INTEGER	3	MINFLT	REAL	0"57542450342416451635"
DEGRAD	REAL	0"17124357506472324711"	NOACL	INTEGER	0
DIMTRI	INTEGER	256	RFLRAY	INTEGER	2
ENTER	INTEGER	1	SPHPRM	INTEGER	1
EPS	REAL	0"16706553762465362572"	SUBACL	INTEGER	1
EYERAY	INTEGER	1	TRIPRM	INTEGER	2
GTHUGE	REAL	0"17474611320000000000"	TRNRAY	INTEGER	3
LEAVE	INTEGER	2	TRTPI	REAL	0"17216220773232113302"
LGTBRN	INTEGER	2			

--PROCEDURES--(LO=A)

-NAME-----	TYPE-----	ARGS-----	CLASS-----
NRMVEC		3	SUBROUTINE
SQRT	GENERIC	1	INTRINSIC

--ENTRY POINTS--(LO=A)

-NAME-----	ADDRESS---	ARGS---
INITRI	3B	1

--STATISTICS--

PROGRAM-UNIT LENGTH	162B =	114
CM LABELLED COMMON LENGTH	13401B =	5889
CM STORAGE USED	57200B =	24192
COMPILE TIME	0.327 SECONDS	
□ SUBROUTINE READDB	73/720	OPT=2

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1	C	TRT2	1765
2	C	TRT2	1766
3	SUBROUTINE READDB(RDOK)	TRT2	1767
4	IMPLICIT CHARACTER*1 (A-Z)	TRT2	1768
5	INTEGER RDOK	TRT2	1769
6	C*****	TRT2	1770
7	C READ THE SCENE DATABASE.	TRT2	1771
8	C THE FORMAT OF THE DATABASE IS PRETTY HORRIBLE.	TRT2	1772
9	C RETURN 1 IN RDOK IF OK, 0 IF SOMETHING BAD HAPPENED.	TRT2	1773
10	C	TRT2	1774
11	C WE USE LIST DIRECTED IO. ANY INPUT THAT SUPPLIES THE REQUIRED DATA	TRT2	1775
12	C AS SET OUT BELOW AND IS COMPATIBLE WITH THE RULES FOR LIST DIRECTED	TRT2	1776
13	C READS IS ACCEPTABLE. THE INPUT DATA IS DESCRIBED IN TERMS OF "GROUPS"	TRT2	1777
14	C BELOW. SOME SETS OF GROUPS MUST BE REPEATED IN THE INPUT TO SUPPLY	TRT2	1778
15	C THE SPECIFIED NUMBER OF ITEMS. HOPEFULLY WHAT THIS MEANS WILL BE	TRT2	1779
16	C CLEAR WHEN READING THE DESCRIPTION THAT FOLLOWS.	TRT2	1780
17	C	TRT2	1781
18	C GROUP 1: TRACING CONTROL PARAMETERS	TRT2	1782

19	C ACCEL SHADOW	TRT2	1783		
20	C (INT) (INT)	TRT2	1784		
21	C ACCEL = 1 FOR ACCELERATED INTERSECTION TESTING (CELSCT)	TRT2	1785		
22	C 0 FOR THE SIMPLER "TRY EVERYTHING" (GENSCT)	TRT2	1786		
23	C SHADOW = 0 FOR NO SHADOWS	TRT2	1787		
24	C N (INTEGER) FOR NUMBER OF FEELER RAYS TO USE FOR SHADOWS.	TRT2	1788		
25	C N .GT. 1 CAN GIVE SOFT SHADOWS.	TRT2	1789		
26	C	TRT2	1790		
27	C GROUP 2: OUTPUT IMAGE PARAMETERS	TRT2	1791		
28	C NX NY OS	TRT2	1792		
29	C (INT) (INT) (INT)	TRT2	1793		
30	C NX = NUMBER OF OUTPUT PIXELS	TRT2	1794		
31	C NY = NUMBER OF OUTPUT LINES	TRT2	1795		
32	C OS = OVERSAMPLING RATE FOR JITTERED STOCHASTIC ANTI-ALIASING	TRT2	1796		
33	C	TRT2	1797		
34	C GROUP 3: CAMERA PARAMETERS	TRT2	1798		
35	C APER FPD FOCAL FSTOP	TRT2	1799		
36	C (REAL) (REAL) (REAL) (REAL)	TRT2	1800		
37	C APER = APERTURE IN FILM PLANE (E.G. IN MM)	TRT2	1801		
38	C FPD = FOCAL PLANE DISTANCE (E.G. IN MM)	TRT2	1802		
39	C DISTANCE FROM LENS CENTER ON WHICH YOU ARE FOCUSING.	TRT2	1803		
40	C FOCAL = FOCAL LENGTH OF LENS (E.G. IN MM)	TRT2	1804		
41	C FSTOP = LENS FSTOP (USED FOR DEPTH OF FIELD - OS .GT. 1)	TRT2	1805		
42	C	TRT2	1806		
43	C GROUP 4: TRACING TERMINATION PARAMETERS	TRT2	1807		
44	C MAXDEP MINWGT	TRT2	1808		
45	C (INT) (REAL)	TRT2	1809		
46	C MAXDEP = MAXIMUM TREE DEPTH OVER WHICH TRACING A RAY WILL STOP.	TRT2	1810		
47	C MINWGT = MINIMUM WEIGHT UNDER WHICH TRACING A RAY WILL STOP.	TRT2	1811		
48	C	TRT2	1812		
49	C GROUP 5: BACKGROUND COLOUR PARAMETERS	TRT2	1813		
50	C BKTYPE IBACKR IBACKG IBACKB FBACKR FBACKG FBACKB	TRT2	1814		
51	C (INT) (REAL) (REAL) (REAL) (REAL) (REAL) (REAL)	TRT2	1815		
52	C BKTYPE = 0:CONSTANT, 1:VERTICAL GRADE, 2:HORIZ GRADE	TRT2	1816		
53	C	TRT2	1817		
54	C GROUP 6: MATERIALS COUNT	TRT2	1818		
55	C NUMMTR	TRT2	1819		
56	C (INT)	TRT2	1820		
57	C NUMMTR = NUMBER OF MATERIALS BEING SPECIFIED	TRT2	1821		
□	SUBROUTINE READDB 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE	2
58	C GROUPS 7,8,9,10 MUST FOLLOW. THERE MUST BE NUMMTR REPETITIONS	TRT2	1822		
59	C OF THIS SET OF GROUPS	TRT2	1823		
60	C	TRT2	1824		
61	C GROUP 7: AMBIENT MATERIAL COLOUR	TRT2	1825		
62	C CAR CAG CAB	TRT2	1826		
63	C (REAL) (REAL) (REAL)	TRT2	1827		
64	C CAR = AMBIENT LIGHT REFLECTED (RED COMPONENT)	TRT2	1828		
65	C CAG = AMBIENT LIGHT REFLECTED (GREEN COMPONENT)	TRT2	1829		
66	C CAB = AMBIENT LIGHT REFLECTED (BLUE COMPONENT)	TRT2	1830		
67	C ALL USUALLY IN THE RANGE 0 TO 1	TRT2	1831		
68	C	TRT2	1832		
69	C GROUP 8: DIFFUSE MATERIAL COLOUR	TRT2	1833		
70	C CDR CDG CDB	TRT2	1834		
71	C (REAL) (REAL) (REAL)	TRT2	1835		
72	C CDR = DIFFUSE LIGHT REFLECTED (RED COMPONENT)	TRT2	1836		
73	C CDG = DIFFUSE LIGHT REFLECTED (GREEN COMPONENT)	TRT2	1837		
74	C CDB = DIFFUSE LIGHT REFLECTED (BLUE COMPONENT)	TRT2	1838		
75	C ALL USUALLY IN THE RANGE 0 TO 1	TRT2	1839		
76	C	TRT2	1840		
77	C GROUP 9: SPECULAR MATERIAL COLOUR	TRT2	1841		
78	C CSR CSG CSB	TRT2	1842		

79	C (REAL) (REAL) (REAL)	TRT2	1843
80	C CSR = SPECULAR LIGHT REFLECTED (RED COMPONENT)	TRT2	1844
81	C CSG = SPECULAR LIGHT REFLECTED (GREEN COMPONENT)	TRT2	1845
82	C CSB = SPECULAR LIGHT REFLECTED (BLUE COMPONENT)	TRT2	1846
83	C ALL USUALLY IN THE RANGE 0 TO 1	TRT2	1847
84	C	TRT2	1848
85	C GROUP 10: VARIOUS MATERIAL PARAMETERS	TRT2	1849
86	C KR KT ETA GLOSS ROUGH	TRT2	1850
87	C (REAL) (REAL) (REAL) (REAL) (REAL)	TRT2	1851
88	C KR = COEFFICIENT OF REFLECTION	TRT2	1852
89	C KT = COEFFICIENT OF TRANSMISSION	TRT2	1853
90	C KR + KT .LE. 1.0 USUALLY	TRT2	1854
91	C ETA = REFRACTIVE INDEX (FOR TRANSMISSION)	TRT2	1855
92	C ETA = 1.0 FOR "AIR", "GLASS" AROUND 1.45, ETC.	TRT2	1856
93	C GLOSS = SHARPNESS OF SPECULAR HIGHLIGHT	TRT2	1857
94	C GLOSS = 1.0 TO 250.0 (RAISED COSINE PROFILE)	TRT2	1858
95	C ROUGH = ROUGHNESS OF SURFACE (RANDOM NORMAL PERTURBATION)	TRT2	1859
96	C ROUGH = 0.0 TO 1.0	TRT2	1860
97	C	TRT2	1861
98	C GROUP 11: AMBIENT LIGHT	TRT2	1862
99	C LAR LAG LAB	TRT2	1863
100	C (REAL) (REAL) (REAL)	TRT2	1864
101	C LAR = AMBIENT LIGHT (RED COMPONENT)	TRT2	1865
102	C LAG = AMBIENT LIGHT (GREEN COMPONENT)	TRT2	1866
103	C LAB = AMBIENT LIGHT (BLUE COMPONENT)	TRT2	1867
104	C ALL USUALLY IN THE RANGE 0 TO 1	TRT2	1868
105	C	TRT2	1869
106	C GROUP 12: LIGHTS COUNT	TRT2	1870
107	C NUMLGT	TRT2	1871
108	C (INT)	TRT2	1872
109	C NUMLGT = NUMBER OF LIGHTS TO USE.	TRT2	1873
110	C GROUPS 13,14 MUST FOLLOW. THERE MUST BE NUMLGT REPETITIONS	TRT2	1874
111	C OF THIS PAIR OF GROUPS.	TRT2	1875
112	C	TRT2	1876
113	C GROUP 13: LIGHT PROPERTIES 1	TRT2	1877
114	C OX OY OZ CLR CLG CLB RADIUS	TRT2	1878
□	SUBROUTINE READDB 73/720 OPT=2 FTN 5.1+538	05/08/09.	12.28.37 PAGE 3
115	C (REAL) (REAL) (REAL) (REAL) (REAL) (REAL) (REAL)	TRT2	1879
116	C OX = X COORDINATE OF LIGHT (CAMERA SPACE) (E.G. IN MM)	TRT2	1880
117	C OY = Y COORDINATE OF LIGHT (CAMERA SPACE) (E.G. IN MM)	TRT2	1881
118	C OZ = Z COORDINATE OF LIGHT (CAMERA SPACE) (E.G. IN MM)	TRT2	1882
119	C CLR = RED COMPONENT OF LIGHT COLOUR (0 TO 1 USUALLY)	TRT2	1883
120	C CLG = GREEN COMPONENT OF LIGHT COLOUR (0 TO 1 USUALLY)	TRT2	1884
121	C CLB = BLUE COMPONENT OF LIGHT COLOUR (0 TO 1 USUALLY)	TRT2	1885
122	C RADIUS = SIZE OF LIGHT SOURCE (RADIUS OF SPHERE, E.G. IN MM)	TRT2	1886
123	C	TRT2	1887
124	C GROUP 14: LIGHT PROPERTIES 2	TRT2	1888
125	C DTYPE DX DY DZ ANG1 ANG2	TRT2	1889
126	C (INT) (REAL) (REAL) (REAL) (REAL) (REAL)	TRT2	1890
127	C DTYPE = DIRECTIONAL TYPE OF LIGHT.	TRT2	1891
128	C 0 = NOT DIRECTIONAL, 1 = RAISED COSINE, 2 = "BARN DOOR"	TRT2	1892
129	C DX = X COMPONENT OF DIRECTION VECTOR (NOT NORMALISED)	TRT2	1893
130	C DY = Y COMPONENT OF DIRECTION VECTOR (NOT NORMALISED)	TRT2	1894
131	C DZ = Z COMPONENT OF DIRECTION VECTOR (NOT NORMALISED)	TRT2	1895
132	C ANG1 = POWER FOR RAISED COSINE (DTYPE = 1)	TRT2	1896
133	C = FULL POWER HALF ANGLE (DEGREES) (DTYPE = 2)	TRT2	1897
134	C ANG2 = ZERO POWER HALF ANGLE (DEGREES) (DTYPE = 2)	TRT2	1898
135	C	TRT2	1899
136	C GROUP 15: SPHERE OBJECT COUNT	TRT2	1900
137	C NUMSPH	TRT2	1901
138	C (INT)	TRT2	1902

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TRT2_20050809_130554.lpr
139 C NUMSPH = NUMBER OF SPHERES IN SCENE. TRT2 1903
140 C GROUP 16 MUST FOLLOW. THERE MUST BE NUMSPH REPETITIONS TRT2 1904
141 C OF THIS GROUP. TRT2 1905
142 C TRT2 1906
143 C GROUP 16: SPHERE SPECIFICATION TRT2 1907
144 C MTRIDX OX OY OZ RAD TRT2 1908
145 C (INT) (REAL) (REAL) (REAL) (REAL) TRT2 1909
146 C MTRIDX = INDEX NUMBER OF MATERIAL FROM WHICH SPHERE IS MADE. TRT2 1910
147 C MATERIAL INDEX NUMBERS START AT 1 FOR THE FIRST OF TRT2 1911
148 C THE NUMMTR MATERIALS DEFINED (SEE ABOVE). TRT2 1912
149 C OX = X CENTER POSITION IN CAMERA SPACE (E.G. IN MM) TRT2 1913
150 C OY = Y CENTER POSITION IN CAMERA SPACE (E.G. IN MM) TRT2 1914
151 C OZ = Z CENTER POSITION IN CAMERA SPACE (E.G. IN MM) TRT2 1915
152 C RAD = RADIUS OF SPHERE (E.G. IN MM) TRT2 1916
153 C TRT2 1917
154 C GROUP 17: TRIANGLE OBJECT COUNT TRT2 1918
155 C NUMTRI TRT2 1919
156 C (INT) TRT2 1920
157 C NUMTRI = NUMBER OF TRIANGLES IN THE SCENE TRT2 1921
158 C GROUPS 18,19,20,21 MUST FOLLOW. THERE MUST BE NUMTRI TRT2 1922
159 C REPETITIONS OF THIS SET OF GROUPS TO DEFINE THE TRIANGLES. TRT2 1923
160 C TRT2 1924
161 C GROUP 18: TRIANGLE MATERIAL TRT2 1925
162 C MTRIDX TRT2 1926
163 C (INT) TRT2 1927
164 C MTRIDX = INDEX OF MATERIAL FROM WHICH THE TRIANGLE IS MADE. TRT2 1928
165 C MATERIAL INDEX NUMBERS START AT 1 FOR THE FIRST OF TRT2 1929
166 C THE NUMMTR MATERIALS DEFINED (SEE ABOVE). TRT2 1930
167 C TRT2 1931
168 C GROUP 19: FIRST TRIANGLE VERTEX SPECIFICATION TRT2 1932
169 C X1 Y1 Z1 NX1 NY1 NZ1 TRT2 1933
170 C (REAL) (REAL) (REAL) (REAL) (REAL) (REAL) TRT2 1934
171 C X1 = X COORDINATE IN CAMERA SPACE (E.G. IN MM) TRT2 1935
172 C SUBROUTINE READDB 73/720 OPT=2 FTN 5.1+538 05/08/09. 12.28.37 PAGE 4
173 C Y1 = Y COORDINATE IN CAMERA SPACE (E.G. IN MM) TRT2 1936
174 C Z1 = Z COORDINATE IN CAMERA SPACE (E.G. IN MM) TRT2 1937
175 C NX1 = X COMPONENT OF NORMAL VECTOR AT THE VERTEX. TRT2 1938
176 C NY1 = Y COMPONENT OF NORMAL VECTOR AT THE VERTEX. TRT2 1939
177 C NZ1 = Z COMPONENT OF NORMAL VECTOR AT THE VERTEX. TRT2 1940
178 C IF NX1=NY1=NZ1 = 0 THEN A FACET NORMAL WILL BE CALCULATED TRT2 1941
179 C AND USED AT ALL VERTICES OF THE TRIANGLE. TRT2 1942
180 C TRT2 1943
181 C GROUP 20: SECOND TRIANGLE VERTEX SPECIFICATION TRT2 1944
182 C X2 Y2 Z2 NX2 NY2 NZ2 TRT2 1945
183 C (REAL) (REAL) (REAL) (REAL) (REAL) (REAL) TRT2 1946
184 C SEE GROUP 19. TRT2 1947
185 C TRT2 1948
186 C GROUP 21: THIRD TRIANGLE VERTEX SPECIFICATION TRT2 1949
187 C X3 Y3 Z3 NX3 NY3 NZ3 TRT2 1950
188 C (REAL) (REAL) (REAL) (REAL) (REAL) (REAL) TRT2 1951
189 C SEE GROUP 19. TRT2 1952
190 C ***** TRT2 1953
191 C PARAMS 1
192 C----- PARAMS 2
193 C-- SUNDRY PARAMETERS -- PARAMS 3
194 C----- PARAMS 4
195 C PARAMS 5
196 REAL GTHUGE, MINEPS, EPS, MINFLT, MAXFLT, TRTPI, DEGRAD PARAMS 6
197 PARAMETER( GTHUGE=1E7 ) PARAMS 7
198 PARAMETER( MINEPS=1E-5 ) PARAMS 8
PARAMETER( EPS=1E-7 ) PARAMS 9

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199		PARAMETER(MINFLT=-1E20)	PARAMS	10	
200		PARAMETER(MAXFLT=1E20)	PARAMS	11	
201		PARAMETER(TRTPI=3.1415926)	PARAMS	12	
202		PARAMETER(DEGRAD=TRTPI/180.0)	PARAMS	13	
203	C		PARAMS	14	
204		INTEGER EYERAY, RFLRAY, TRNRAY	PARAMS	15	
205		PARAMETER(EYERAY=1)	PARAMS	16	
206		PARAMETER(RFLRAY=2)	PARAMS	17	
207		PARAMETER(TRNRAY=3)	PARAMS	18	
208	C		PARAMS	19	
209		INTEGER ENTER, LEAVE	PARAMS	20	
210		PARAMETER(ENTER=1)	PARAMS	21	
211		PARAMETER(LEAVE=2)	PARAMS	22	
212	C		PARAMS	23	
213		INTEGER NOACL, SUBACL	PARAMS	24	
214		PARAMETER(NOACL=0)	PARAMS	25	
215		PARAMETER(SUBACL=1)	PARAMS	26	
216	C		PARAMS	27	
217		INTEGER BKCNST, BKVERT, BKHORZ	PARAMS	28	
218		PARAMETER(BKCNST=0)	PARAMS	29	
219		PARAMETER(BKVERT=1)	PARAMS	30	
220		PARAMETER(BKHORZ=2)	PARAMS	31	
221	C		PARAMS	32	
222		INTEGER LGTCON, LGTCOS, LGTBRN	PARAMS	33	
223		PARAMETER(LGTCON=0)	PARAMS	34	
224		PARAMETER(LGTCOS=1)	PARAMS	35	
225		PARAMETER(LGTBRN=2)	PARAMS	36	
226	C		PARAMS	37	
227		INTEGER SPHPRM, TRIPRM	PARAMS	38	
228		PARAMETER(SPHPRM=1)	PARAMS	39	
□	SUBROUTINE READDB	73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE 5
229		PARAMETER(TRIPRM=2)	PARAMS	40	
230	C		PARAMS	41	
231		INTEGER DAXX, DAXY, DAXZ	PARAMS	42	
232		PARAMETER(DAXX=1)	PARAMS	43	
233		PARAMETER(DAXY=2)	PARAMS	44	
234		PARAMETER(DAXZ=3)	PARAMS	45	
235	C		SCREEN	1	
236	C-----		SCREEN	2	
237	C-- SCREEN COMMON BLOCK --		SCREEN	3	
238	C-----		SCREEN	4	
239	C SIZE: 3 * DIMPXL + 15 WORDS = 12303		SCREEN	5	
240	C		SCREEN	6	
241		INTEGER MAXPXL, DIMPXL	SCREEN	7	
242		PARAMETER(MAXPXL=4096)	SCREEN	8	
243		PARAMETER(DIMPXL=MAXPXL)	SCREEN	9	
244	C		SCREEN	10	
245		INTEGER SNX, SNY, SMAXD, OS, ACCEL, SHADOW, BKT, CURX, CURY	SCREEN	11	
246		COMMON /SCREEI/ SNX, SNY, SMAXD, OS, ACCEL, SHADOW, BKT,	SCREEN	12	
247	+	CURX, CURY	SCREEN	13	
248	C		SCREEN	14	
249		REAL FPD, APER, FOCAL, FSTOP, MINWGT	SCREEN	15	
250		REAL COLR, COLG, COLB	SCREEN	16	
251		REAL BACKR, BACKG, BACKB	SCREEN	17	
252		REAL BKRI, BKRF, BKRD	SCREEN	18	
253		REAL BKG, BKGF, BKGD	SCREEN	19	
254		REAL BKBI, BKBF, BKBD	SCREEN	20	
255		REAL LINER(DIMPXL), LINEG(DIMPXL), LINEB(DIMPXL)	SCREEN	21	
256		COMMON /SCREER/ FPD, APER, FOCAL, FSTOP, MINWGT,	SCREEN	22	
257	+	COLR, COLG, COLB,	SCREEN	23	
258	+	BACKR, BACKG, BACKB,	SCREEN	24	

259	+	BKRI, BKRF, BKRD,	SCREEN	25
260	+	BKGI, BKGf, BKGD,	SCREEN	26
261	+	BKBI, BKBF, BKBD,	SCREEN	27
262	+	LINER, LINEG, LINEB	SCREEN	28
263	C		MTRLST	1
264	C-----		MTRLST	2
265	C-- MATERIAL LIST COMMON BLOCK --		MTRLST	3
266	C-----		MTRLST	4
267	C SIZE: 14 * DIMMTR + 1 WORDS = 449		MTRLST	5
268	C		MTRLST	6
269		INTEGER MAXMTR, DIMMTR	MTRLST	7
270		PARAMETER(MAXMTR=32)	MTRLST	8
271		PARAMETER(DIMMTR=MAXMTR)	MTRLST	9
272	C		MTRLST	10
273		INTEGER NMTR	MTRLST	11
274		COMMON /MTRLSI/ NMTR	MTRLST	12
275	C		MTRLST	13
276		REAL MKR(DIMMTR), MKT(DIMMTR)	MTRLST	14
277		REAL MCAR(DIMMTR), MCAG(DIMMTR), MCAB(DIMMTR)	MTRLST	15
278		REAL MCDR(DIMMTR), MCDG(DIMMTR), MCDDB(DIMMTR)	MTRLST	16
279		REAL MCSR(DIMMTR), MCSG(DIMMTR), MCSB(DIMMTR)	MTRLST	17
280		REAL META(DIMMTR), MGLS(DIMMTR), MRGH(DIMMTR)	MTRLST	18
281		COMMON /MTRLSR/ MKR, MKT, MCAR, MCAG, MCAB, MCDR, MCDG, MCDDB,	MTRLST	19
282	+	MCSR, MCSG, MCSB, META, MGLS, MRGH	MTRLST	20
283	C		LGTLST	1
284	C-----		LGTLST	2
285	C-- LIGHT LIST COMMON BLOCK --		LGTLST	3
	□ SUBROUTINE READDB	73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
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286	C-----		LGTLST	4
287	C SIZE: 13 * DIMLGT + 4 WORDS = 420		LGTLST	5
288	C		LGTLST	6
289		INTEGER MAXLGT, DIMLGT	LGTLST	7
290		PARAMETER(MAXLGT=32)	LGTLST	8
291		PARAMETER(DIMLGT=MAXLGT)	LGTLST	9
292	C		LGTLST	10
293		INTEGER NLGT, LDIR(DIMLGT)	LGTLST	11
294		COMMON /LGTL SI/ NLGT, LDIR	LGTLST	12
295	C		LGTLST	13
296		REAL LCAR, LCAG, LCAB, LOX(DIMLGT), LOY(DIMLGT), LOZ(DIMLGT)	LGTLST	14
297		REAL LCLR(DIMLGT), LCLG(DIMLGT), LCLB(DIMLGT)	LGTLST	15
298		REAL LDX(DIMLGT), LDY(DIMLGT), LDZ(DIMLGT)	LGTLST	16
299		REAL LTGT(DIMLGT), LTG2(DIMLGT), LRAD(DIMLGT)	LGTLST	17
300		COMMON /LGTL SR/ LCAR, LCAG, LCAB, LOX, LOY, LOZ, LCLR, LCLG,	LGTLST	18
301	+	LCLB, LDX, LDY, LDZ, LTGT, LTG2, LRAD	LGTLST	19
302	C		PRMLST	1
303	C-----		PRMLST	2
304	C-- PRIMITIVE LIST COMMON BLOCK --		PRMLST	3
305	C-----		PRMLST	4
306	C SIZE: 5 * DIMPRM + 1 WORDS = 5121		PRMLST	5
307	C		PRMLST	6
308		INTEGER MAXPRM, DIMPRM	PRMLST	7
309		PARAMETER(MAXPRM=1024)	PRMLST	8
310		PARAMETER(DIMPRM=MAXPRM)	PRMLST	9
311	C		PRMLST	10
312		INTEGER NPRM, MATTER(DIMPRM), PACCEL(DIMPRM), PRAYID(DIMPRM)	PRMLST	11
313		INTEGER PRMTYP(DIMPRM), PRMIDX(DIMPRM)	PRMLST	12
314		COMMON /PRMLST/ NPRM, MATTER, PACCEL, PRAYID, PRMTYP, PRMIDX	PRMLST	13
315	C		SPHLST	1
316	C-----		SPHLST	2
317	C-- SPHERE LIST --		SPHLST	3
318	C-----		SPHLST	4

319	C SIZE: 4 * DIMSPH + 1 WORDS = 4097	SPHLST	5
320	C	SPHLST	6
321	INTEGER MAXSPH, DIMSPH	SPHLST	7
322	PARAMETER(MAXSPH=1024)	SPHLST	8
323	PARAMETER(DIMSPH=MAXSPH)	SPHLST	9
324	C	SPHLST	10
325	INTEGER NSPH	SPHLST	11
326	COMMON /SPHLSI/ NSPH	SPHLST	12
327	C	SPHLST	13
328	REAL SOX(DIMSPH), SOY(DIMSPH), SOZ(DIMSPH), SRAD(DIMSPH)	SPHLST	14
329	COMMON /SPHLR/ SOX, SOY, SOZ, SRAD	SPHLST	15
330	C	TRILST	1
331	C-----	TRILST	2
332	C-- TRIANGLE LIST --	TRILST	3
333	C-----	TRILST	4
334	C 23 * DIMTRI + 1 WORDS = 5889	TRILST	5
335	C	TRILST	6
336	INTEGER MAXTRI, DIMTRI	TRILST	7
337	PARAMETER(MAXTRI=256)	TRILST	8
338	PARAMETER(DIMTRI=MAXTRI)	TRILST	9
339	C	TRILST	10
340	INTEGER NTRI, DAX(DIMTRI)	TRILST	11
341	COMMON /TRILSI/ NTRI, DAX	TRILST	12
342	C	TRILST	13
□	SUBROUTINE READB 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
			PAGE 7
343	REAL TX1(DIMTRI), TY1(DIMTRI), TZ1(DIMTRI)	TRILST	14
344	REAL TX2(DIMTRI), TY2(DIMTRI), TZ2(DIMTRI)	TRILST	15
345	REAL TX3(DIMTRI), TY3(DIMTRI), TZ3(DIMTRI)	TRILST	16
346	REAL TNX(DIMTRI), TNY(DIMTRI), TNZ(DIMTRI), TND(DIMTRI)	TRILST	17
347	REAL NVX1(DIMTRI), NVY1(DIMTRI), NVZ1(DIMTRI)	TRILST	18
348	REAL NVX2(DIMTRI), NVY2(DIMTRI), NVZ2(DIMTRI)	TRILST	19
349	REAL NVX3(DIMTRI), NVY3(DIMTRI), NVZ3(DIMTRI)	TRILST	20
350	COMMON /TRILSR/ TX1, TY1, TZ1, TX2, TY2, TZ2, TX3, TY3, TZ3,	TRILST	21
351	+ TNX, TNY, TNZ, NVX1, NVY1, NVZ1, NVX2, NVY2,	TRILST	22
352	+ NVZ2, NVX3, NVY3, NVZ3, TND	TRILST	23
353	INTEGER I, CLINE	TRT2	1961
354	CHARACTER*80 CDIAG	TRT2	1962
355	C	TRT2	1963
356	C-- SCREEN/CAMERA SPECIFICATION.	TRT2	1964
357	C	TRT2	1965
358	CLINE = 1	TRT2	1966
359	CDIAG = 'ACCELERATION SCHEME OR SHADOW FEELERS'	TRT2	1967
360	READ(5,*,END=998,ERR=999)ACCEL, SHADOW	TRT2	1968
361	CLINE = CLINE + 1	TRT2	1969
362	CDIAG = 'RESOLUTION OR OVERSAMPLING'	TRT2	1970
363	READ(5,*,END=998,ERR=999)SNX, SNY, OS	TRT2	1971
364	CLINE = CLINE + 1	TRT2	1972
365	CDIAG = 'CAMERA PARAMETERS'	TRT2	1973
366	READ(5,*,END=998,ERR=999)APER, FPD, FOCAL, FSTOP	TRT2	1974
367	CLINE = CLINE + 1	TRT2	1975
368	CDIAG = 'TRACE TERMINATION DEPTH OR WEIGHT'	TRT2	1976
369	READ(5,*,END=998,ERR=999)SMAXDP, MINWGT	TRT2	1977
370	C	TRT2	1978
371	C-- CHECK HORIZONTAL RESOLUTION IS IN LIMITS	TRT2	1979
372	C	TRT2	1980
373	IF(SNX .GT. MAXPXL)THEN	TRT2	1981
374	WRITE(6,100)SNX, MAXPXL	TRT2	1982
375	100 FORMAT(1X,'HORIZONTAL RESOLUTION ',I5,' EXCEEDS MAXIMUM ',I5)	TRT2	1983
376	GOTO 999	TRT2	1984
377	ENDIF	TRT2	1985
378	C	TRT2	1986

379	C-- FORCE OVERSAMPLE RATE TO BE ODD.	TRT2	1987
380	C	TRT2	1988
381	IF(OS .GT. 0)THEN	TRT2	1989
382	IF(((OS/2)*2) .EQ. OS)OS = OS + 1	TRT2	1990
383	ENDIF	TRT2	1991
384	CLINE = CLINE + 1	TRT2	1992
385	CDIAG = 'BACKGROUND SPECIFICATION'	TRT2	1993
386	READ(5,*,END=998,ERR=999)BKT, BKRI, BKGI, BKBI, BKRF, BKGF, BKBF	TRT2	1994
387	C	TRT2	1995
388	C-- CHECK GRADE TYPE	TRT2	1996
389	C	TRT2	1997
390	IF(BKT .LT. BKCNST .OR. BKT .GT. BKHORZ)THEN	TRT2	1998
391	WRITE(6,101)	TRT2	1999
392	101 FORMAT(1X,'INVALID BACKGROUND GRADE TYPE')	TRT2	2000
393	GOTO 999	TRT2	2001
394	ENDIF	TRT2	2002
395	C	TRT2	2003
396	C-- INITIALIZE BACKGROUND DATA	TRT2	2004
397	C	TRT2	2005
398	CALL INITBK	TRT2	2006
399	C	TRT2	2007
□	SUBROUTINE READB 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
			PAGE 8
400	C-- MATERIALS SPECIFICATION.	TRT2	2008
401	C	TRT2	2009
402	CLINE = CLINE + 1	TRT2	2010
403	CDIAG = 'MATERIAL COUNT'	TRT2	2011
404	READ(5,*,END=998,ERR=999)NMTR	TRT2	2012
405	C	TRT2	2013
406	C-- CHECK COUNT IS IN LIMITS	TRT2	2014
407	C	TRT2	2015
408	IF(NMTR .GT. MAXMTR)THEN	TRT2	2016
409	WRITE(6,102)NMTR, MAXMTR	TRT2	2017
410	102 FORMAT(1X,'TOO MANY MATERIALS ',I5,' LIMIT ',I5)	TRT2	2018
411	GOTO 999	TRT2	2019
412	ENDIF	TRT2	2020
413	C	TRT2	2021
414	C-- READ ALL THOSE MATERIALS	TRT2	2022
415	C	TRT2	2023
416	DO 1 I=1,NMTR	TRT2	2024
417	CLINE = CLINE + 1	TRT2	2025
418	CDIAG = 'MATERIAL AMBIENT'	TRT2	2026
419	READ(5,*,END=998,ERR=999)MCAR(I), MCAG(I), MCAB(I)	TRT2	2027
420	CLINE = CLINE + 1	TRT2	2028
421	CDIAG = 'MATERIAL DIFFUSE'	TRT2	2029
422	READ(5,*,END=998,ERR=999)MCDR(I), MCDG(I), MCDB(I)	TRT2	2030
423	CLINE = CLINE + 1	TRT2	2031
424	CDIAG = 'MATERIAL SPECULAR'	TRT2	2032
425	READ(5,*,END=998,ERR=999)MCSR(I), MCSG(I), MCSB(I)	TRT2	2033
426	CLINE = CLINE + 1	TRT2	2034
427	CDIAG = 'MATERIAL OTHER'	TRT2	2035
428	READ(5,*,END=998,ERR=999)MKR(I), MKT(I), META(I),	TRT2	2036
429	+ MGLS(I), MRGH(I)	TRT2	2037
430	1 CONTINUE	TRT2	2038
431	C	TRT2	2039
432	C-- READ AMBIENT LIGHT	TRT2	2040
433	C	TRT2	2041
434	CLINE = CLINE + 1	TRT2	2042
435	CDIAG = 'LIGHT AMBIENT'	TRT2	2043
436	READ(5,*,END=998,ERR=999)LCAR, LCAG, LCAB	TRT2	2044
437	C	TRT2	2045
438	C-- LIGHT COUNT	TRT2	2046

439	C		TRT2	2047	
440		CLINE = CLINE + 1	TRT2	2048	
441		CDIAG = 'LIGHT COUNT'	TRT2	2049	
442		READ(5,*,END=998,ERR=999)NLGT	TRT2	2050	
443	C		TRT2	2051	
444	C--	CHECK COUNT IS IN LIMITS	TRT2	2052	
445	C		TRT2	2053	
446		IF(NLGT .GT. MAXLGT)THEN	TRT2	2054	
447		WRITE(6,109)NLGT, MAXLGT	TRT2	2055	
448	109	FORMAT(1X,'TOO MANY LIGHTS ',I5,' LIMIT ',I5)	TRT2	2056	
449		GOTO 999	TRT2	2057	
450		ENDIF	TRT2	2058	
451	C		TRT2	2059	
452	C--	READ ALL THOSE LIGHTS	TRT2	2060	
453	C		TRT2	2061	
454		DO 2 I=1,NLGT	TRT2	2062	
455		CLINE = CLINE + 1	TRT2	2063	
456		CDIAG = 'LIGHT POS, COL, RAD'	TRT2	2064	
	□	SUBROUTINE READDB 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE 9
457		READ(5,*,END=998,ERR=999)LOX(I), LOY(I), LOZ(I),	TRT2	2065	
458	+	LCLR(I), LCLG(I), LCLB(I), LRAD(I)	TRT2	2066	
459		CLINE = CLINE + 1	TRT2	2067	
460		CDIAG = 'LIGHT DIR, VEC, ANG'	TRT2	2068	
461		READ(5,*,END=998,ERR=999)LDIR(I), LDX(I), LDY(I), LDZ(I),	TRT2	2069	
462	+	LTGT(I), LTG2(I)	TRT2	2070	
463		IF(LTG2(I) .LE. LTGT(I))LTG2(I) = LTGT(I) + 0.0001	TRT2	2071	
464		LTGT(I) = LTGT(I) * DEGRAD	TRT2	2072	
465		LTG2(I) = LTG2(I) * DEGRAD	TRT2	2073	
466	2	CONTINUE	TRT2	2074	
467	C		TRT2	2075	
468	C--	INITIALIZE THE LIGHTS DATABASE	TRT2	2076	
469	C		TRT2	2077	
470		CALL INITLG	TRT2	2078	
471	C		TRT2	2079	
472	C--	NO GEOMETRIC PRIMITIVES YET	TRT2	2080	
473	C		TRT2	2081	
474		NPRM = 0	TRT2	2082	
475	C		TRT2	2083	
476	C--	SPHERE COUNT	TRT2	2084	
477	C		TRT2	2085	
478		CLINE = CLINE + 1	TRT2	2086	
479		CDIAG = 'SPHERE COUNT'	TRT2	2087	
480		READ(5,*,END=998,ERR=999)NSPH	TRT2	2088	
481	C		TRT2	2089	
482	C--	CHECK COUNT IS IN LIMITS	TRT2	2090	
483	C		TRT2	2091	
484		IF(NSPH .GT. MAXSPH)THEN	TRT2	2092	
485		WRITE(6,103)NSPH, MAXSPH	TRT2	2093	
486	103	FORMAT(1X,'TOO MANY SPHERES ',I5,' LIMIT ',I5)	TRT2	2094	
487		GOTO 999	TRT2	2095	
488		ENDIF	TRT2	2096	
489	C		TRT2	2097	
490	C--	READ ALL THOSE SPHERES	TRT2	2098	
491	C		TRT2	2099	
492		DO 3 I=1,NSPH	TRT2	2100	
493		NPRM = NPRM + 1	TRT2	2101	
494		IF(NPRM .GT. MAXPRM)THEN	TRT2	2102	
495		WRITE(6,104)NPRM, MAXPRM	TRT2	2103	
496	104	FORMAT(1X,'TOO MANY PRIMITIVES ',I5,' LIMIT ',I5)	TRT2	2104	
497		GOTO 999	TRT2	2105	
498		ENDIF	TRT2	2106	

		TRT2_20050809_130554.lpr		
499		CLINE = CLINE + 1	TRT2	2107
500		CDIAG = 'SPHERE'	TRT2	2108
501		READ(5,*,END=998,ERR=999)MATTER(NPRM),	TRT2	2109
502	+	SOX(I), SOY(I), SOZ(I), SRAD(I)	TRT2	2110
503		IF(MATTER(NPRM) .GT. NMTR .OR. MATTER(NPRM) .LT. 1)THEN	TRT2	2111
504		WRITE(6,105) MATTER(NPRM), CLINE	TRT2	2112
505	105	FORMAT(1X,'MTR IDX ',I5,' INVALID. LINE ',I5)	TRT2	2113
506		GOTO 999	TRT2	2114
507		ENDIF	TRT2	2115
508		C-- NOT IN ACCELERATION STRUCTURE.	TRT2	2116
509		PACCEL(NPRM) = 0	TRT2	2117
510		C-- NO RAY HAS INTERSECTED IT YET.	TRT2	2118
511		PRAYID(NPRM) = 0	TRT2	2119
512		C-- PRIMITIVE TYPE: SPHERE.	TRT2	2120
513		PRMTYP(NPRM) = SPHPRM	TRT2	2121
□	SUBROUTINE READDB	73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
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514		C-- INDEX OF DEFINITION IN SPHERE TABLE.	TRT2	2122
515		PRMIDX(NPRM) = I	TRT2	2123
516	3	CONTINUE	TRT2	2124
517	C		TRT2	2125
518		C-- TRIANGLE COUNT	TRT2	2126
519	C		TRT2	2127
520		CLINE = CLINE + 1	TRT2	2128
521		CDIAG = 'TRIANGLE COUNT'	TRT2	2129
522		READ(5,*,END=998,ERR=999)NTRI	TRT2	2130
523	C		TRT2	2131
524		C-- CHECK COUNT IS IN LIMITS	TRT2	2132
525	C		TRT2	2133
526		IF(NTRI .GT. MAXTRI)THEN	TRT2	2134
527		WRITE(6,106)NTRI, MAXTRI	TRT2	2135
528	106	FORMAT(1X,'TOO MANY TRIANGLES ',I5,' LIMIT ',I5)	TRT2	2136
529		GOTO 999	TRT2	2137
530		ENDIF	TRT2	2138
531	C		TRT2	2139
532		C-- READ ALL THOSE TRIANGLES	TRT2	2140
533	C		TRT2	2141
534		DO 4 I=1,NTRI	TRT2	2142
535		NPRM = NPRM + 1	TRT2	2143
536		IF(NPRM .GT. MAXPRM)THEN	TRT2	2144
537		WRITE(6,104)NPRM, MAXPRM	TRT2	2145
538		GOTO 999	TRT2	2146
539		ENDIF	TRT2	2147
540		CLINE = CLINE + 1	TRT2	2148
541		CDIAG = 'TRIANGLE MTR'	TRT2	2149
542		READ(5,*,END=998,ERR=999)MATTER(NPRM)	TRT2	2150
543		IF(MATTER(NPRM) .GT. NMTR .OR. MATTER(NPRM) .LT. 1)THEN	TRT2	2151
544		WRITE(6,105) MATTER(NPRM), CLINE	TRT2	2152
545		GOTO 999	TRT2	2153
546		ENDIF	TRT2	2154
547		CLINE = CLINE + 1	TRT2	2155
548		CDIAG = 'TRIANGLE V1'	TRT2	2156
549		READ(5,*,END=998,ERR=999)TX1(I), TY1(I), TZ1(I),	TRT2	2157
550	+	NVX1(I), NVY1(I), NVZ1(I)	TRT2	2158
551		CLINE = CLINE + 1	TRT2	2159
552		CDIAG = 'TRIANGLE V2'	TRT2	2160
553		READ(5,*,END=998,ERR=999)TX2(I), TY2(I), TZ2(I),	TRT2	2161
554	+	NVX2(I), NVY2(I), NVZ2(I)	TRT2	2162
555		CLINE = CLINE + 1	TRT2	2163
556		CDIAG = 'TRIANGLE V3'	TRT2	2164
557		READ(5,*,END=998,ERR=999)TX3(I), TY3(I), TZ3(I),	TRT2	2165
558	+	NVX3(I), NVY3(I), NVZ3(I)	TRT2	2166

```

559      C
560      C-- INITIALIZE THE TRIANGLE DATABASE (FOR THIS TRIANGLE)
561      C
562          CALL INITRI( I )
563      C-- NOT IN ACCELERATION STRUCTURE.
564          PACCEL(NPRM) = 0
565      C-- NO RAY HAS INTERSECTED IT YET.
566          PRAYID(NPRM) = 0
567      C-- PRIMITIVE TYPE: SPHERE.
568          PRMTYP(NPRM) = TRIPRM
569      C-- INDEX OF DEFINITION IN SPHERE TABLE.
570          PRMIDX(NPRM) = I

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571      4 CONTINUE
572      C
573      C-- FINISHED SUCCESSFULLY.
574      C
575          RDOK = 1
576          RETURN
577      C
578      C-- ERROR ON READ
579      C
580      999 CONTINUE
581          WRITE(6,107)CDIAG, CLINE
582      107 FORMAT(1X,'READ ERROR DOING: ',A,' LINE ',I5)
583          RDOK = 0
584          RETURN
585      C
586      C-- END OF FILE ON READ
587      C
588      998 CONTINUE
589          WRITE(6,108)CLINE
590      108 FORMAT(1X,'END OF FILE ON READ AT LINE ',I5)
591          RDOK = 0
592          RETURN
593      END

```

--VARIABLE MAP--(LO=A)

-NAME---ADDRESS--BLOCK-----PROPERTIES-----TYPE-----SIZE				-NAME---ADDRESS--BLOCK-----PROPERTIES-----TYPE-----SIZE			
ACCEL	4B	/SCREEI/	INTEGER	LCAR	0B	/LGTLR/	REAL
APER	1B	/SCREER/	REAL	LCLB	243B	/LGTLR/	REAL 32
BACKB	12B	/SCREER/	REAL	LCLG	203B	/LGTLR/	REAL 32
BACKG	11B	/SCREER/	REAL	LCLR	143B	/LGTLR/	REAL 32
BACKR	10B	/SCREER/	REAL	LDIR	1B	/LGTLR/	INTEGER 32
BKBD	23B	/SCREER/	REAL	LDX	303B	/LGTLR/	REAL 32
BKBF	22B	/SCREER/	REAL	LDY	343B	/LGTLR/	REAL 32
BKBI	21B	/SCREER/	REAL	LDZ	403B	/LGTLR/	REAL 32
BKGD	20B	/SCREER/	REAL	LINEB	20024B	/SCREER/	REAL 4096
BKGF	17B	/SCREER/	REAL	LINEG	10024B	/SCREER/	REAL 4096
BKGI	16B	/SCREER/	REAL	LINER	24B	/SCREER/	REAL 4096
BKRD	15B	/SCREER/	REAL	LOX	3B	/LGTLR/	REAL 32
BKRF	14B	/SCREER/	REAL	LOY	43B	/LGTLR/	REAL 32
BKRI	13B	/SCREER/	REAL	LOZ	103B	/LGTLR/	REAL 32
BKT	6B	/SCREEI/	INTEGER	LRAD	543B	/LGTLR/	REAL 32
CDIAG	1361B		CHAR*80	LTGT	443B	/LGTLR/	REAL 32
CLINE	1360B		INTEGER	LTG2	503B	/LGTLR/	REAL 32
COLB	7B	/SCREER/	REAL	MATTER	1B	/PRMLT/	INTEGER 1024
COLG	6B	/SCREER/	REAL	MCAB	200B	/MTRLR/	REAL 32
COLR	5B	/SCREER/	REAL	MCAG	140B	/MTRLR/	REAL 32

CURX	7B	/SCREEI/	INTEGER		MCAR	100B	/MTRLSR/	REAL	32
CURY	10B	/SCREEI/	INTEGER		MCDB	340B	/MTRLSR/	REAL	32
DAX	1B	/TRILSI/	INTEGER	256	MCDG	300B	/MTRLSR/	REAL	32
FOCAL	2B	/SCREER/	REAL		MCDR	240B	/MTRLSR/	REAL	32
FPD	0B	/SCREER/	REAL		MCSB	500B	/MTRLSR/	REAL	32
FSTOP	3B	/SCREER/	REAL		MCSG	440B	/MTRLSR/	REAL	32
I	1357B		INTEGER		MCSR	400B	/MTRLSR/	REAL	32
LCAB	2B	/LGTLSR/	REAL		META	540B	/MTRLSR/	REAL	32
LCAG	1B	/LGTLSR/	REAL		MGLS	600B	/MTRLSR/	REAL	32

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 -NAME-----ADDRESS--BLOCK-----PROPERTIES-----TYPE-----SIZE

MINWGT	4B	/SCREER/	REAL		RDOK	1	DUMMY-ARG	INTEGER	
MKR	0B	/MTRLSR/	REAL	32	SHADOW	5B	/SCREEI/	INTEGER	
MKT	40B	/MTRLSR/	REAL	32	SMAXDP	2B	/SCREEI/	INTEGER	
MRGH	640B	/MTRLSR/	REAL	32	SNX	0B	/SCREEI/	INTEGER	
NLGT	0B	/LGTLSI/	INTEGER		SNY	1B	/SCREEI/	INTEGER	
NMTR	0B	/MTRLSI/	INTEGER		SOX	0B	/SPHLSR/	REAL	1024
NPRM	0B	/PRMLST/	INTEGER		SOY	2000B	/SPHLSR/	REAL	1024
NSPH	0B	/SPHLSI/	INTEGER		SOZ	4000B	/SPHLSR/	REAL	1024
NTRI	0B	/TRILSI/	INTEGER		SRAD	6000B	/SPHLSR/	REAL	1024
NVX1	6000B	/TRILSR/	REAL	256	TND	12400B	/TRILSR/	REAL	256
NVX2	7400B	/TRILSR/	REAL	256	TNX	4400B	/TRILSR/	REAL	256
NVX3	11000B	/TRILSR/	REAL	256	TNY	5000B	/TRILSR/	REAL	256
NVY1	6400B	/TRILSR/	REAL	256	TNZ	5400B	/TRILSR/	REAL	256
NVY2	10000B	/TRILSR/	REAL	256	TX1	0B	/TRILSR/	REAL	256
NVY3	11400B	/TRILSR/	REAL	256	TX2	1400B	/TRILSR/	REAL	256
NVZ1	7000B	/TRILSR/	REAL	256	TX3	3000B	/TRILSR/	REAL	256
NVZ2	10400B	/TRILSR/	REAL	256	TY1	400B	/TRILSR/	REAL	256
NVZ3	12000B	/TRILSR/	REAL	256	TY2	2000B	/TRILSR/	REAL	256
OS	3B	/SCREEI/	INTEGER		TY3	3400B	/TRILSR/	REAL	256
PACCEL	2001B	/PRMLST/	INTEGER	1024	TZ1	1000B	/TRILSR/	REAL	256
PRAYID	4001B	/PRMLST/	INTEGER	1024	TZ2	2400B	/TRILSR/	REAL	256
PRMIDX	10001B	/PRMLST/	INTEGER	1024	TZ3	4000B	/TRILSR/	REAL	256
PRMTYP	6001B	/PRMLST/	INTEGER	1024					

--SYMBOLIC CONSTANTS-- (LO=A)

-NAME-----TYPE-----VALUE	-NAME-----TYPE-----VALUE
BKCNST INTEGER 0	LGTCON INTEGER 0
BKHORZ INTEGER 2	LGTCOS INTEGER 1
BKVERT INTEGER 1	MAXFLT REAL 0"20235327435361326142"
DAXX INTEGER 1	MAXLGT INTEGER 32
DAXY INTEGER 2	MAXMTR INTEGER 32
DAXZ INTEGER 3	MAXPRM INTEGER 1024
DEGRAD REAL 0"17124357506472324711"	MAXPXL INTEGER 4096
DIMLGT INTEGER 32	MAXSPH INTEGER 1024
DIMMTR INTEGER 32	MAXTRI INTEGER 256
DIMPRM INTEGER 1024	MINEPS REAL 0"16775174265421615510"
DIMPXL INTEGER 4096	MINFLT REAL 0"57542450342416451635"
DIMSPH INTEGER 1024	NOACL INTEGER 0
DIMTRI INTEGER 256	RFLRAY INTEGER 2
ENTER INTEGER 1	SPHPRM INTEGER 1
EPS REAL 0"16706553762465362572"	SUBACL INTEGER 1
EYERAY INTEGER 1	TRIPRM INTEGER 2
GTHUGE REAL 0"17474611320000000000"	TRNRAY INTEGER 3
LEAVE INTEGER 2	TRTPI REAL 0"17216220773232113302"
LGTBRN INTEGER 2	

--PROCEDURES-- (LO=A)

-NAME-----TYPE-----ARGS-----CLASS-----

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INITBK          0      SUBROUTINE
INITLG          0      SUBROUTINE
INITRI          1      SUBROUTINE
SUBROUTINE READB 73/720 OPT=2      FTN 5.1+538      05/08/09. 12.28.37      PAGE 13
    
```

```

--STATEMENT LABELS--(LO=A)
-LABEL-ADDRESS-----PROPERTIES----DEF      -LABEL-ADDRESS-----PROPERTIES----DEF      -LABEL-ADDRESS-----PROPERTIES----DEF
1 INACTIVE DO-TERM 430      102 622B FORMAT 410      107 664B FORMAT 582
2 INACTIVE DO-TERM 466      103 635B FORMAT 486      108 671B FORMAT 590
3 INACTIVE DO-TERM 516      104 643B FORMAT 496      109 630B FORMAT 448
4 INACTIVE DO-TERM 571      105 651B FORMAT 505      998 512B FORMAT 588
100 606B FORMAT 375      106 656B FORMAT 528      999 506B FORMAT 580
101 615B FORMAT 392
    
```

```

--ENTRY POINTS--(LO=A)
-NAME---ADDRESS--ARGS---
READDB      3B      1
    
```

```

--I/O UNITS--(LO=A)
-NAME--- PROPERTIES-----
TAPE5      FMT/SEQ
TAPE6      FMT/SEQ
    
```

--STATISTICS--

```

PROGRAM-UNIT LENGTH      1375B = 765
CM LABELLED COMMON LENGTH 67205B = 28293
CM STORAGE USED          63400B = 26368
COMPILE TIME              0.970 SECONDS
SUBROUTINE STACEL        73/720 OPT=2      FTN 5.1+538      05/08/09. 12.28.37      PAGE 1
    
```

```

1      C      TRT2      2202
2      C-----TRT2      2203
3      C GRID SPACE SUBDIVISION ACCELERATION ROUTINES      TRT2      2204
4      C-----TRT2      2205
5      C      TRT2      2206
6      SUBROUTINE STACEL      TRT2      2207
7      IMPLICIT CHARACTER*1 (A-Z)      TRT2      2208
8      C*****      TRT2      2209
9      C SET UP THE ACCELERATION STRUCTURE. THIS IS A SIMPLE RECTANGULAR SPACE      TRT2      2210
10     C SUBDIVISION SCHEME. (BUT ARE THESE THINGS EVER REALLY SIMPLE?)      TRT2      2211
11     C*****      TRT2      2212
12     C      PARAMS      1
13     C-----PARAMS      2
14     C-- SUNDRY PARAMETERS --PARAMS      3
15     C-----PARAMS      4
16     C      PARAMS      5
17     REAL GTHUGE, MINEPS, EPS, MINFLT, MAXFLT, TRTPI, DEGRAD      PARAMS      6
18     PARAMETER( GTHUGE=1E7 )      PARAMS      7
19     PARAMETER( MINEPS=1E-5 )      PARAMS      8
20     PARAMETER( EPS=1E-7 )      PARAMS      9
21     PARAMETER( MINFLT=-1E20 )      PARAMS     10
22     PARAMETER( MAXFLT=1E20 )      PARAMS     11
23     PARAMETER( TRTPI=3.1415926 )      PARAMS     12
    
```

24		PARAMETER(DEGRAD=TRTPI/180.0)	PARAMS	13
25	C		PARAMS	14
26		INTEGER EYERAY, RFLRAY, TRNRAY	PARAMS	15
27		PARAMETER(EYERAY=1)	PARAMS	16
28		PARAMETER(RFLRAY=2)	PARAMS	17
29		PARAMETER(TRNRAY=3)	PARAMS	18
30	C		PARAMS	19
31		INTEGER ENTER, LEAVE	PARAMS	20
32		PARAMETER(ENTER=1)	PARAMS	21
33		PARAMETER(LEAVE=2)	PARAMS	22
34	C		PARAMS	23
35		INTEGER NOACL, SUBACL	PARAMS	24
36		PARAMETER(NOACL=0)	PARAMS	25
37		PARAMETER(SUBACL=1)	PARAMS	26
38	C		PARAMS	27
39		INTEGER BKNST, BKVERT, BKHORZ	PARAMS	28
40		PARAMETER(BKNST=0)	PARAMS	29
41		PARAMETER(BKVERT=1)	PARAMS	30
42		PARAMETER(BKHORZ=2)	PARAMS	31
43	C		PARAMS	32
44		INTEGER LGTCOS, LGTCOS, LGTBRN	PARAMS	33
45		PARAMETER(LGTCOS=0)	PARAMS	34
46		PARAMETER(LGTCOS=1)	PARAMS	35
47		PARAMETER(LGTBRN=2)	PARAMS	36
48	C		PARAMS	37
49		INTEGER SPHPRM, TRIPRM	PARAMS	38
50		PARAMETER(SPHPRM=1)	PARAMS	39
51		PARAMETER(TRIPRM=2)	PARAMS	40
52	C		PARAMS	41
53		INTEGER DAXX, DAXY, DAXZ	PARAMS	42
54		PARAMETER(DAXX=1)	PARAMS	43
55		PARAMETER(DAXY=2)	PARAMS	44
56		PARAMETER(DAXZ=3)	PARAMS	45
57	C		STATS	1
□		SUBROUTINE STACEL 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
				PAGE 2
58	C	-----	STATS	2
59	C	-- STATISTICS COMMON BLOCK --	STATS	3
60	C	-----	STATS	4
61	C	SIZE: 8 WORDS.	STATS	5
62	C		STATS	6
63		INTEGER MAXDPS, MAXRYS, MAXISS, TOTRAY, TOTFEL, NACC, NOACC	STATS	7
64		COMMON /STATSI/ MAXDPS, MAXRYS, MAXISS, TOTRAY, TOTFEL, NACC,	STATS	8
65		+ NOACC	STATS	9
66	C		STATS	10
67		REAL NSECTS	STATS	11
68		COMMON /STATSR/ NSECTS	STATS	12
69	C		PRMLST	1
70	C	-----	PRMLST	2
71	C	-- PRIMITIVE LIST COMMON BLOCK --	PRMLST	3
72	C	-----	PRMLST	4
73	C	SIZE: 5 * DIMPRM + 1 WORDS = 5121	PRMLST	5
74	C		PRMLST	6
75		INTEGER MAXPRM, DIMPRM	PRMLST	7
76		PARAMETER(MAXPRM=1024)	PRMLST	8
77		PARAMETER(DIMPRM=MAXPRM)	PRMLST	9
78	C		PRMLST	10
79		INTEGER NPRM, MATTER(DIMPRM), PACCEL(DIMPRM), PRAYID(DIMPRM)	PRMLST	11
80		INTEGER PRMTYP(DIMPRM), PRMIDX(DIMPRM)	PRMLST	12
81		COMMON /PRMLST/ NPRM, MATTER, PACCEL, PRAYID, PRMTYP, PRMIDX	PRMLST	13
82	C		ACCEL	1
83	C	-----	ACCEL	2

84	C-- ACCELERATION --	ACCEL	3
85	C-----	ACCEL	4
86	C FOR TYPICAL SCENES, THE "MAX CELLS" WOULD BE BEST AROUND 20 TO 40.	ACCEL	5
87	C (MAYBE - MY TESTS SAY 10 IS GOOD). BUT THE MEMORY COST IS QUITE HIGH.	ACCEL	6
88	C LIKEWISE, IT WOULD BE GOOD TO ALLOW LARGISH PRIMITIVES TO BE INDEXED,	ACCEL	7
89	C BUT THE MAXIMUM POSSIBLE LIST SIZE GOES UP AS THE CUBE OF THE LARGEST	ACCEL	8
90	C NUMBER OF CELLS ALLOWED IN ANY DIRECTION FOR THE PRIMITIVE TO BE ACCEPACCEL	ACCEL	9
91	C FOR INDEXING. SO THE MEMORY COST IS (POTENTIALLY) VERY HIGH. IT WOULD ACCEL	ACCEL	10
92	C POSSIBLE TO USE THE SAME LIST FOR MORE THAN ONE GRID CELL IF IT IS IDEACCEL	ACCEL	11
93	C TO THAT FOR ANOTHER CELL. WE DON'T TRY TO DETECT THAT, THOUGH.	ACCEL	12
94	C IF THE RATIO OF THE BIGGEST DIMENSION RANGE TO THE SMALLEST EXCEEDS	ACCEL	13
95	C MXDMRT, ADJUST THE RANGES FOR CALCULATING THE GRID PARAMETERS. THIS SEACCEL	ACCEL	14
96	C TO BE ALWAYS A GOOD IDEA (HENCE SET TO 1.0).	ACCEL	15
97	C	ACCEL	16
98	C SIZE: CELDIM + 2 * LSTDIM + 13 WORDS = 1000 + 2 * 8000 + 13 = 17013 WOACCEL	ACCEL	17
99	C	ACCEL	18
100	INTEGER MXCELX, MXCELY, MXCELZ, DMCELX, DMCELY, DMCELZ	ACCEL	19
101	INTEGER CELDIM, MXCELS, MXPCVR, MAXLST, LSTDIM	ACCEL	20
102	REAL MXDMRT	ACCEL	21
103	PARAMETER(MXCELX=10)	ACCEL	22
104	PARAMETER(MXCELY=10)	ACCEL	23
105	PARAMETER(MXCELZ=10)	ACCEL	24
106	PARAMETER(DMCELX=MXCELX)	ACCEL	25
107	PARAMETER(DMCELY=MXCELY)	ACCEL	26
108	PARAMETER(DMCELZ=MXCELZ)	ACCEL	27
109	PARAMETER(CELDIM=DMCELX*DMCELY*DMCELZ)	ACCEL	28
110	PARAMETER(MXCELS=MXCELX*MXCELY*MXCELZ)	ACCEL	29
111	PARAMETER(MXPCVR=2)	ACCEL	30
112	PARAMETER(MAXLST=2*2*2*MXCELS)	ACCEL	31
113	PARAMETER(LSTDIM=MAXLST)	ACCEL	32
114	PARAMETER(MXDMRT=1.0)	ACCEL	33
□	SUBROUTINE STACEL 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
			PAGE 3
115	C	ACCEL	34
116	INTEGER NLIST, ANX, ANY, ANZ, CELLS(CELDIM)	ACCEL	35
117	INTEGER LPRIM(LSTDIM), LNEXT(LSTDIM)	ACCEL	36
118	COMMON /ACCELI/ NLIST, ANX, ANY, ANZ, CELLS, LPRIM, LNEXT	ACCEL	37
119	C	ACCEL	38
120	REAL AXL, AXH, AYL, AYH, AZL, AZH, ADXS, ADYS, ADZS	ACCEL	39
121	COMMON /ACCELR/ AXL, AXH, AYL, AYH, AZL, AZH, ADXS, ADYS, ADZS	ACCEL	40
122	INTEGER I, J, K, P, PIDX	TRT2	2217
123	REAL PXL, PXH, PYL, PYH, PZL, PZH	TRT2	2218
124	REAL DXC, DYC, DZC	TRT2	2219
125	REAL CXL, CXH, CYL, CYH, CZL, CZH	TRT2	2220
126	INTEGER IXL, IXH, IYL, IYH, IZL, IZH	TRT2	2221
127	REAL MAXDIR, MINDIR, XC, YC, ZC	TRT2	2222
128	C	TRT2	2223
129	ANX = MXCELX	TRT2	2224
130	ANY = MXCELY	TRT2	2225
131	ANZ = MXCELZ	TRT2	2226
132	C	TRT2	2227
133	C-- SET ALL "POINTERS" TO PRIMITIVE LISTS IN THE CELLS TO "NULL".	TRT2	2228
134	C-- PRIMITIVE LISTS ARE EMPTY	TRT2	2229
135	C	TRT2	2230
136	DO 1 K=0,ANZ-1	TRT2	2231
137	DO 2 J=0,ANY-1	TRT2	2232
138	DO 3 I=0,ANX-1	TRT2	2233
139	CELLS(I+J*ANX+K*(ANX*ANY)+1) = 0	TRT2	2234
140	3 CONTINUE	TRT2	2235
141	2 CONTINUE	TRT2	2236
142	1 CONTINUE	TRT2	2237
143	NLIST = 0	TRT2	2238

144	C				TRT2	2239
145	C--	SURVEY THE SCENE TO GET ITS BOUNDS.			TRT2	2240
146	C				TRT2	2241
147		DO 4 P=1,NPRM			TRT2	2242
148		PIDX = PRMIDX(P)			TRT2	2243
149		IF(PRMTYP(P) .EQ. SPHPRM)THEN			TRT2	2244
150		CALL SPHBND(PIDX, PXL, PXH, PYL, PYH, PZL, PZH)			TRT2	2245
151		ELSE IF(PRMTYP(P) .EQ. TRIPRM)THEN			TRT2	2246
152		CALL TRIBND(PIDX, PXL, PXH, PYL, PYH, PZL, PZH)			TRT2	2247
153		ELSE			TRT2	2248
154		WRITE(6,100)			TRT2	2249
155	100	FORMAT(1X,'INTERNAL ERROR: STACEL.')			TRT2	2250
156		WRITE(6,101)			TRT2	2251
157	101	FORMAT(6X,'UNKNOWN PRIMITIVE TYPE.')			TRT2	2252
158		STOP			TRT2	2253
159		ENDIF			TRT2	2254
160		IF(P .EQ. 1)THEN			TRT2	2255
161		AXL = PXL			TRT2	2256
162		AXH = PXH			TRT2	2257
163		AYL = PYL			TRT2	2258
164		AYH = PYH			TRT2	2259
165		AZL = PZL			TRT2	2260
166		AZH = PZH			TRT2	2261
167		ELSE			TRT2	2262
168		IF(PXL .LT. AXL)AXL = PXL			TRT2	2263
169		IF(PXH .GT. AXH)AXH = PXH			TRT2	2264
170		IF(PYL .LT. AYL)AYL = PYL			TRT2	2265
171		IF(PYH .GT. AYH)AYH = PYH			TRT2	2266
□	SUBROUTINE STACEL	73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE	4
172		IF(PZL .LT. AZL)AZL = PZL			TRT2	2267
173		IF(PZH .GT. AZH)AZH = PZH			TRT2	2268
174		ENDIF			TRT2	2269
175	4	CONTINUE			TRT2	2270
176		ADXS = AXH - AXL			TRT2	2271
177		ADYS = AYH - AYL			TRT2	2272
178		ADZS = AZH - AZL			TRT2	2273
179	C				TRT2	2274
180	C--	OUTPUT USEFUL INFORMATION			TRT2	2275
181	C				TRT2	2276
182		WRITE(6,102)			TRT2	2277
183	102	FORMAT(1X,'ACCELERATION STRUCTURE INFORMATION:')			TRT2	2278
184		WRITE(6,103)ANX, ANY, ANZ			TRT2	2279
185	103	FORMAT(1X,'GRID DIMENSIONS = ',I4,' X ',I4,' X ',I4)			TRT2	2280
186		WRITE(6,104)MXPCVR, MXPCVR, MXPCVR			TRT2	2281
187	104	FORMAT(1X,'INDEXABLE SIZE (CELLS) = ',I4,' X ',I4,' X ',I4)			TRT2	2282
188		WRITE(6,105)MXDMRT			TRT2	2283
189	105	FORMAT(1X,'ADJUST IF RATIO EXCEEDS = ',F8.3)			TRT2	2284
190		WRITE(6,106)AXL, AXH			TRT2	2285
191	106	FORMAT(1X,'SCENE X RANGE = (',F8.3,':',F8.3,')')			TRT2	2286
192		WRITE(6,107)AYL, AYH			TRT2	2287
193	107	FORMAT(1X,'SCENE Y RANGE = (',F8.3,':',F8.3,')')			TRT2	2288
194		WRITE(6,108)AZL, AZH			TRT2	2289
195	108	FORMAT(1X,'SCENE Z RANGE = (',F8.3,':',F8.3,')')			TRT2	2290
196	C				TRT2	2291
197	C--	OPTIONALLY, CHOOSE THE BIGGEST AXIS TO SCALE THE WHOLE GRID			TRT2	2292
198	C--	IF THERE IS A BIG DISPARITY IN THE DIMENSIONS OF THE AXES, THIS CAN			TRT2	2293
199	C--	ENSURE THAT CELLS ARE MADE BIG ENOUGH TO STILL INDEX PRIMITIVES. IF			TRT2	2294
200	C--	ARE MADE VERY SMALL IN ONE DIRECTION, IT MAY BE THAT TOO MANY ARE			TRT2	2295
201	C--	OTHERWISE, AND THE ACCELERATION SCHEME CAN'T BE USED.			TRT2	2296
202	C--	IT SEEMS LIKE THIS IS ALMOST ALWAYS A GOOD IDEA ANYWAY.			TRT2	2297
203	C				TRT2	2298

204	MAXDIR = ADXS		TRT2	2299
205	IF(ADYS .GT. MAXDIR)MAXDIR = ADYS		TRT2	2300
206	IF(ADZS .GT. MAXDIR)MAXDIR = ADZS		TRT2	2301
207	C		TRT2	2302
208	MINDIR = ADXS		TRT2	2303
209	IF(ADYS .LT. MINDIR)MINDIR = ADYS		TRT2	2304
210	IF(ADZS .LT. MINDIR)MINDIR = ADZS		TRT2	2305
211	C		TRT2	2306
212	C--TUNE THIS FOR WHEN TO DO IT...		TRT2	2307
213	C		TRT2	2308
214	IF((MAXDIR / MINDIR) .GT. MXDMRT)THEN		TRT2	2309
215	XC = 0.5 * (AXL + AXH)		TRT2	2310
216	YC = 0.5 * (AYL + AYH)		TRT2	2311
217	ZC = 0.5 * (AZL + AZH)		TRT2	2312
218	AXL = XC - 0.5 * MAXDIR		TRT2	2313
219	AXH = XC + 0.5 * MAXDIR		TRT2	2314
220	AYL = YC - 0.5 * MAXDIR		TRT2	2315
221	AYH = YC + 0.5 * MAXDIR		TRT2	2316
222	AZL = ZC - 0.5 * MAXDIR		TRT2	2317
223	AZH = ZC + 0.5 * MAXDIR		TRT2	2318
224	ADXS = MAXDIR		TRT2	2319
225	ADYS = MAXDIR		TRT2	2320
226	ADZS = MAXDIR		TRT2	2321
227	WRITE(6,109)		TRT2	2322
228	109 FORMAT(1X,'SCENE RANGES ADJUSTED FOR DIMENSIONAL UNIFORMITY')		TRT2	2323
	SUBROUTINE STACEL 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE 5
229	WRITE(6,110)AXL, AXH		TRT2	2324
230	110 FORMAT(1X,'SCENE X RANGE (ADJ) = (' ,F8.3,':',F8.3,')')		TRT2	2325
231	WRITE(6,111)AYL, AYH		TRT2	2326
232	111 FORMAT(1X,'SCENE Y RANGE (ADJ) = (' ,F8.3,':',F8.3,')')		TRT2	2327
233	WRITE(6,112)AZL, AZH		TRT2	2328
234	112 FORMAT(1X,'SCENE Z RANGE (ADJ) = (' ,F8.3,':',F8.3,')')		TRT2	2329
235	ENDIF		TRT2	2330
236	C		TRT2	2331
237	C-- CALCULATE THE SIZE OF EACH CELL IN EYE SPACE		TRT2	2332
238	C		TRT2	2333
239	DXC = ADXS / ANX		TRT2	2334
240	DYC = ADYS / ANY		TRT2	2335
241	DZC = ADZS / ANZ		TRT2	2336
242	WRITE(6,113)DXC, DYC, DZC		TRT2	2337
243	113 FORMAT(1X,'CELL SIZES = (' ,F8.3,' X',F8.3,' X',F8.3)		TRT2	2338
244	C		TRT2	2339
245	C-- GO OVER THE PRIMITIVES AGAIN, ASSIGNING THEM TO CELLS.		TRT2	2340
246	C-- IF THE PRIMITIVE BOUNDS COVER MORE THAN MXPCVR CELLS IN ANY DIMENSION		TRT2	2341
247	C-- DON'T USE ACCELERATION FOR THAT PRIMITIVE. THIS IS TO LIMIT THE SIZE		TRT2	2342
248	C-- THE CELL LISTS.		TRT2	2343
249	C		TRT2	2344
250	DO 5 P=1,NPRM		TRT2	2345
251	PIDX = PRMIDX(P)		TRT2	2346
252	IF(PRMTYP(P) .EQ. SPHPRM)THEN		TRT2	2347
253	CALL SPHBND(PIDX, PXL, PXH, PYL, PYH, PZL, PZH)		TRT2	2348
254	ELSE IF(PRMTYP(P) .EQ. TRIPRM)THEN		TRT2	2349
255	CALL TRIBND(PIDX, PXL, PXH, PYL, PYH, PZL, PZH)		TRT2	2350
256	ELSE		TRT2	2351
257	WRITE(6,100)		TRT2	2352
258	WRITE(6,101)		TRT2	2353
259	STOP		TRT2	2354
260	ENDIF		TRT2	2355
261	CXL = (PXL - AXL) / DXC		TRT2	2356
262	CXH = (PXH - AXL) / DXC		TRT2	2357
263	CYL = (PYL - AYL) / DYC		TRT2	2358

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264          CYH = ( PYH - AYL ) / DYC          TRT2      2359
265          CZL = ( PZL - AZL ) / DZC          TRT2      2360
266          CZH = ( PZH - AZL ) / DZC          TRT2      2361
267      C                                       TRT2      2362
268      C-- MOVE TO INTEGER GRID CELL COORDINATES.          TRT2      2363
269      C                                       TRT2      2364
270          IXL = INT(CXL)                    TRT2      2365
271          IXH = INT(CXH)                    TRT2      2366
272          IYL = INT(CYL)                    TRT2      2367
273          IYH = INT(CYH)                    TRT2      2368
274          IZL = INT(CZL)                    TRT2      2369
275          IZH = INT(CZH)                    TRT2      2370
276      C                                       TRT2      2371
277      C-- ADD PRIMITIVE TO THE LIST OF PRIMITIVES FOR EACH CELL COVERED BY THE          TRT2      2372
278      C-- IF THE PRIMITIVE IS TOO BIG, DON'T USE THE ACCELERATION STRUCTURE ATT          TRT2      2373
279      C-- THIS IS TO LIMIT THE SIZE OF THE PRIMITIVE LISTS IN NASTY CASES.          TRT2      2374
280      C                                       TRT2      2375
281          IF( IXL .EQ. IXH .AND. IYL .EQ. IYH .AND. IZL .EQ. IZH )THEN          TRT2      2376
282              PACCEL(P) = 1                    TRT2      2377
283              NACC = NACC + 1                  TRT2      2378
284              CALL ADDLST( IXL, IYL, IZL, P )          TRT2      2379
285      ELSE                                       TRT2      2380

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□ SUBROUTINE STACEL 73/720 OPT=2 FTN 5.1+538 05/08/09. 12.28.37 PAGE 6

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286          IF( ( IXH - IXL ) .GE. MXPCVR .OR.          TRT2      2381
287          +   ( IYH - IYL ) .GE. MXPCVR .OR.          TRT2      2382
288          +   ( IZH - IZL ) .GE. MXPCVR )THEN          TRT2      2383
289              PACCEL(P) = 0                    TRT2      2384
290              NOACC = NOACC + 1                TRT2      2385
291          ELSE                                       TRT2      2386
292              PACCEL(P) = 1                    TRT2      2387
293              NACC = NACC + 1                  TRT2      2388
294              DO 6 K=IZL,IZH                    TRT2      2389
295                  DO 7 J=IYL,IYH                TRT2      2390
296                      DO 8 I=IXL,IXH            TRT2      2391
297                          CALL ADDLST( I, J, K, P )          TRT2      2392
298          8          CONTINUE                    TRT2      2393
299          7          CONTINUE                    TRT2      2394
300          6          CONTINUE                    TRT2      2395
301              ENDIF                                       TRT2      2396
302          ENDIF                                       TRT2      2397
303          5          CONTINUE                    TRT2      2398
304      C                                       TRT2      2399
305          WRITE(6,114)NACC                    TRT2      2400
306          114      FORMAT(1X,'PRIMITIVES INDEXED      = ',I5)          TRT2      2401
307          WRITE(6,115)NOACC                    TRT2      2402
308          115      FORMAT(1X,'PRIMITIVES NOT INDEXED = ',I5)          TRT2      2403
309      C                                       TRT2      2404
310          RETURN                                       TRT2      2405
311          END                                       TRT2      2406

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--VARIABLE MAP--(LO=A)

-NAME-	ADDRESS-	BLOCK-	PROPERTIES-----	TYPE-----	SIZE	-NAME-	ADDRESS-	BLOCK-	PROPERTIES-----	TYPE-----	SIZE
ADXS	6B	/ACCEL/		REAL		IYL	725B			INTEGER	
ADYS	7B	/ACCEL/		REAL		IZH	730B			INTEGER	
ADZS	10B	/ACCEL/		REAL		IZL	727B			INTEGER	
ANX	1B	/ACCELI/		INTEGER		J	706B			INTEGER	
ANY	2B	/ACCELI/		INTEGER		K	707B			INTEGER	
ANZ	3B	/ACCELI/		INTEGER		LNEXT	21454B	/ACCELI/		INTEGER	8000
AXH	1B	/ACCEL/		REAL		LPRIM	1754B	/ACCELI/		INTEGER	8000

TRT2_20050809_130554.lpr

AXL	0B	/ACCEL/	REAL	MATTER	1B	/PRMLST/	INTEGER	1024
AYH	3B	/ACCEL/	REAL	MAXDIR	731B		REAL	
AYL	2B	/ACCEL/	REAL	MAXDPS	0B	/STATSI/	INTEGER	
AZH	5B	/ACCEL/	REAL	MAXISS	2B	/STATSI/	INTEGER	
AZL	4B	/ACCEL/	REAL	MAXRYS	1B	/STATSI/	INTEGER	
CELLS	4B	/ACCELI/	INTEGER	MINDIR	732B		REAL	
CXH	NONE		REAL	NACC	5B	/STATSI/	INTEGER	
CXL	NONE		REAL	NLIST	0B	/ACCELI/	INTEGER	
CYH	NONE		REAL	NOACC	6B	/STATSI/	INTEGER	
CYL	NONE		REAL	NPRM	0B	/PRMLST/	INTEGER	
CZH	NONE		REAL	NSECTS	0B	/STATSR/	REAL	
CZL	NONE		REAL	P	710B		INTEGER	
DXC	720B		REAL	PACCEL	2001B	/PRMLST/	INTEGER	1024
DYC	721B		REAL	PIDX	711B		INTEGER	
DZC	722B		REAL	PRAYID	4001B	/PRMLST/	INTEGER	1024
I	705B		INTEGER	PRMIDX	10001B	/PRMLST/	INTEGER	1024
IXH	724B		INTEGER	PRMTYP	6001B	/PRMLST/	INTEGER	1024
IXL	723B		INTEGER	PXH	713B		REAL	
IYH	726B		INTEGER	PXL	712B		REAL	

□ SUBROUTINE STACEL 73/720 OPT=2 FTN 5.1+538 05/08/09. 12.28.37 PAGE 7
 -NAME---ADDRESS---BLOCK-----PROPERTIES-----TYPE-----SIZE -NAME---ADDRESS---BLOCK-----PROPERTIES-----TYPE-----SIZE

PYH	715B		REAL	TOTRAY	3B	/STATSI/	INTEGER	
PYL	714B		REAL	XC	733B		REAL	
PZH	717B		REAL	YC	734B		REAL	
PZL	716B		REAL	ZC	735B		REAL	
TOTFEL	4B	/STATSI/	INTEGER					

--SYMBOLIC CONSTANTS--(LO=A)

-NAME-----TYPE-----	VALUE	-NAME-----TYPE-----	VALUE
BKCNST	INTEGER 0	LSTDIM	INTEGER 8000
BKHORZ	INTEGER 2	MAXFLT	REAL 0"20235327435361326142"
BKVERT	INTEGER 1	MAXLST	INTEGER 8000
CELDIM	INTEGER 1000	MAXPRM	INTEGER 1024
DAXX	INTEGER 1	MINEPS	REAL 0"16775174265421615510"
DAXY	INTEGER 2	MINFLT	REAL 0"57542450342416451635"
DAXZ	INTEGER 3	MXCELS	INTEGER 1000
DEGRAD	REAL 0"17124357506472324711"	MXCELX	INTEGER 10
DIMPRM	INTEGER 1024	MXCELY	INTEGER 10
DMCELX	INTEGER 10	MXCELZ	INTEGER 10
DMCELY	INTEGER 10	MXDMRT	REAL 0"17204000000000000000"
DMCELZ	INTEGER 10	MXPCVR	INTEGER 2
ENTER	INTEGER 1	NOACL	INTEGER 0
EPS	REAL 0"16706553762465362572"	RFLRAY	INTEGER 2
EYERAY	INTEGER 1	SPHPRM	INTEGER 1
GTHUGE	REAL 0"17474611320000000000"	SUBACL	INTEGER 1
LEAVE	INTEGER 2	TRIPRM	INTEGER 2
LGTBRN	INTEGER 2	TRNRAY	INTEGER 3
LGTCON	INTEGER 0	TRTPI	REAL 0"17216220773232113302"
LGTCOS	INTEGER 1		

--PROCEDURES--(LO=A)

-NAME-----TYPE-----	ARGS-----	CLASS-----
ADDLST	4	SUBROUTINE
INT	1	INTRINSIC
SPHND	7	SUBROUTINE
TRIBND	7	SUBROUTINE

```
--STATEMENT LABELS--(LO=A)
-LABEL-ADDRESS-----PROPERTIES-----DEF          -LABEL-ADDRESS-----PROPERTIES-----DEF          -LABEL-ADDRESS-----PROPERTIES-----DEF
1  INACTIVE  DO-TERM    142          100  367B  FORMAT      155          108  450B  FORMAT      195
2  INACTIVE  DO-TERM    141          101  374B  FORMAT      157          109  457B  FORMAT      228
3  INACTIVE  DO-TERM    140          102  401B  FORMAT      183          110  466B  FORMAT      230
4  INACTIVE  DO-TERM    175          103  407B  FORMAT      185          111  475B  FORMAT      232
5  INACTIVE  DO-TERM    303          104  416B  FORMAT      187          112  504B  FORMAT      234
6  INACTIVE  DO-TERM    300          105  425B  FORMAT      189          113  513B  FORMAT      243
7  INACTIVE  DO-TERM    299          106  432B  FORMAT      191          114  522B  FORMAT      306
8  INACTIVE  DO-TERM    298          107  441B  FORMAT      193          115  527B  FORMAT      308
[]  SUBROUTINE STACEL    73/720  OPT=2          FTN 5.1+538          05/08/09. 12.28.37          PAGE      8
```

```
--ENTRY POINTS--(LO=A)
-NAME---ADDRESS--ARGS---
STACEL    3B    0
```

```
--I/O UNITS--(LO=A)
-NAME--- PROPERTIES-----
TAPE6    FMT/SEQ
```

--STATISTICS--

```
PROGRAM-UNIT LENGTH          743B = 483
CM LABELLED COMMON LENGTH    53176B = 22142
CM STORAGE USED               60000B = 24576
COMPILE TIME                  0.740 SECONDS
[]  SUBROUTINE ADDLST        73/720  OPT=2          FTN 5.1+538          05/08/09. 12.28.37          PAGE      1
```

```
1  C          TRT2      2407
2  C          TRT2      2408
3  SUBROUTINE ADDLST( I, J, K, P )          TRT2      2409
4  IMPLICIT CHARACTER*1 (A-Z)              TRT2      2410
5  INTEGER I, J, K, P                       TRT2      2411
6  C*****                                  TRT2      2412
7  C ADD PRIMITIVE P TO THE LIST ASSOCIATED WITH CELL (I,J,K) IF IT ISN'T          TRT2      2413
8  C ALREADY ON THE LIST. *** N.B.: (I,J,K) ARE ZERO BASED! ***                    TRT2      2414
9  C*****                                  TRT2      2415
10 C          PARAMS      1
11 C-----                                  PARAMS      2
12 C-- SUNDRY PARAMETERS --                  PARAMS      3
13 C-----                                  PARAMS      4
14 C          PARAMS      5
15 REAL GTHUGE, MINEPS, EPS, MINFLT, MAXFLT, TRTPI, DEGRAD          PARAMS      6
16 PARAMETER( GTHUGE=1E7 )                    PARAMS      7
17 PARAMETER( MINEPS=1E-5 )                    PARAMS      8
18 PARAMETER( EPS=1E-7 )                       PARAMS      9
19 PARAMETER( MINFLT=-1E20 )                    PARAMS     10
20 PARAMETER( MAXFLT=1E20 )                    PARAMS     11
21 PARAMETER( TRTPI=3.1415926 )                PARAMS     12
22 PARAMETER( DEGRAD=TRTPI/180.0 )            PARAMS     13
23 C          PARAMS     14
24 INTEGER EYERAY, RFLRAY, TRNRAY              PARAMS     15
25 PARAMETER( EYERAY=1 )                       PARAMS     16
26 PARAMETER( RFLRAY=2 )                       PARAMS     17
27 PARAMETER( TRNRAY=3 )                       PARAMS     18
28 C          PARAMS     19
```

29	INTEGER ENTER, LEAVE	PARAMS	20
30	PARAMETER(ENTER=1)	PARAMS	21
31	PARAMETER(LEAVE=2)	PARAMS	22
32	C	PARAMS	23
33	INTEGER NOACL, SUBACL	PARAMS	24
34	PARAMETER(NOACL=0)	PARAMS	25
35	PARAMETER(SUBACL=1)	PARAMS	26
36	C	PARAMS	27
37	INTEGER BKCNST, BKVERT, BKHORZ	PARAMS	28
38	PARAMETER(BKCNST=0)	PARAMS	29
39	PARAMETER(BKVERT=1)	PARAMS	30
40	PARAMETER(BKHORZ=2)	PARAMS	31
41	C	PARAMS	32
42	INTEGER LGTCON, LGTCOS, LGTBRN	PARAMS	33
43	PARAMETER(LGTCON=0)	PARAMS	34
44	PARAMETER(LGTCOS=1)	PARAMS	35
45	PARAMETER(LGTBRN=2)	PARAMS	36
46	C	PARAMS	37
47	INTEGER SPHPRM, TRIPRM	PARAMS	38
48	PARAMETER(SPHPRM=1)	PARAMS	39
49	PARAMETER(TRIPRM=2)	PARAMS	40
50	C	PARAMS	41
51	INTEGER DAXX, DAXY, DAXZ	PARAMS	42
52	PARAMETER(DAXX=1)	PARAMS	43
53	PARAMETER(DAXY=2)	PARAMS	44
54	PARAMETER(DAXZ=3)	PARAMS	45
55	C	ACCEL	1
56	C-----	ACCEL	2
57	C-- ACCELERATION --	ACCEL	3
	SUBROUTINE ADDLST 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
			PAGE 2
58	C-----	ACCEL	4
59	C FOR TYPICAL SCENES, THE "MAX CELLS" WOULD BE BEST AROUND 20 TO 40.	ACCEL	5
60	C (MAYBE - MY TESTS SAY 10 IS GOOD). BUT THE MEMORY COST IS QUITE HIGH.	ACCEL	6
61	C LIKewise, IT WOULD BE GOOD TO ALLOW LARGISH PRIMITIVES TO BE INDEXED,	ACCEL	7
62	C BUT THE MAXIMUM POSSIBLE LIST SIZE GOES UP AS THE CUBE OF THE LARGEST	ACCEL	8
63	C NUMBER OF CELLS ALLOWED IN ANY DIRECTION FOR THE PRIMITIVE TO BE ACCEPACCEL	ACCEL	9
64	C FOR INDEXING. SO THE MEMORY COST IS (POTENTIALLY) VERY HIGH. IT WOULD	ACCEL	10
65	C POSSIBLE TO USE THE SAME LIST FOR MORE THAN ONE GRID CELL IF IT IS IDEACCEL	ACCEL	11
66	C TO THAT FOR ANOTHER CELL. WE DON'T TRY TO DETECT THAT, THOUGH.	ACCEL	12
67	C IF THE RATIO OF THE BIGGEST DIMENSION RANGE TO THE SMALLEST EXCEEDS	ACCEL	13
68	C MXDMRT, ADJUST THE RANGES FOR CALCULATING THE GRID PARAMETERS. THIS SEACCEL	ACCEL	14
69	C TO BE ALWAYS A GOOD IDEA (HENCE SET TO 1.0).	ACCEL	15
70	C	ACCEL	16
71	C SIZE: CELDIM + 2 * LSTDIM + 13 WORDS = 1000 + 2 * 8000 + 13 = 17013 WOACCEL	ACCEL	17
72	C	ACCEL	18
73	INTEGER MXCELX, MXCELY, MXCELZ, DMCELX, DMCELY, DMCELZ	ACCEL	19
74	INTEGER CELDIM, MXCELS, MXPCVR, MAXLST, LSTDIM	ACCEL	20
75	REAL MXDMRT	ACCEL	21
76	PARAMETER(MXCELX=10)	ACCEL	22
77	PARAMETER(MXCELY=10)	ACCEL	23
78	PARAMETER(MXCELZ=10)	ACCEL	24
79	PARAMETER(DMCELX=MXCELX)	ACCEL	25
80	PARAMETER(DMCELY=MXCELY)	ACCEL	26
81	PARAMETER(DMCELZ=MXCELZ)	ACCEL	27
82	PARAMETER(CELDIM=DMCELX*DMCELY*DMCELZ)	ACCEL	28
83	PARAMETER(MXCELS=MXCELX*MXCELY*MXCELZ)	ACCEL	29
84	PARAMETER(MXPCVR=2)	ACCEL	30
85	PARAMETER(MAXLST=2*2*2*MXCELS)	ACCEL	31
86	PARAMETER(LSTDIM=MAXLST)	ACCEL	32
87	PARAMETER(MXDMRT=1.0)	ACCEL	33
88	C	ACCEL	34

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                                TRT2_20050809_130554.lpr
89      INTEGER NLIST, ANX, ANY, ANZ, CELLS(CELDIM)      ACCEL      35
90      INTEGER LPRIM(LSTDIM), LNEXT(LSTDIM)            ACCEL      36
91      COMMON /ACCELI/ NLIST, ANX, ANY, ANZ, CELLS, LPRIM, LNEXT ACCEL      37
92      C                                                ACCEL      38
93      REAL AXL, AXH, AYL, AYH, AZL, AZH, ADXS, ADYS, ADZS ACCEL      39
94      COMMON /ACCELR/ AXL, AXH, AYL, AYH, AZL, AZH, ADXS, ADYS, ADZS ACCEL      40
95      INTEGER CI, LP, LC                                TRT2      2418
96      C                                                TRT2      2419
97      CI = I + J * ANX + K * ( ANX * ANY ) + 1        TRT2      2420
98      IF( CELLS(CI) .EQ. 0 )THEN                       TRT2      2421
99          NLIST = NLIST + 1                            TRT2      2422
100         IF( NLIST .GT. MAXLST )THEN                  TRT2      2423
101             WRITE(6,100)                             TRT2      2424
102         100     FORMAT(1X,'ADDLST: TRYING TO ADD TOO MANY LIST ELEMENTS.') TRT2      2425
103         ELSE                                         TRT2      2426
104             CELLS(CI) = NLIST                         TRT2      2427
105             LPRIM(NLIST) = P                         TRT2      2428
106             LNEXT(NLIST) = 0                        TRT2      2429
107         ENDIF                                       TRT2      2430
108     ELSE                                           TRT2      2431
109         LP = 0                                       TRT2      2432
110         LC = CELLS(CI)                               TRT2      2433
111     1     CONTINUE                                  TRT2      2434
112         IF( LC .EQ. 0 )GOTO 2                       TRT2      2435
113         IF( LPRIM(LC) .EQ. P )THEN                  TRT2      2436
114             RETURN                                    TRT2      2437
SUBROUTINE ADDLST      73/720 OPT=2                    FTN 5.1+538    05/08/09. 12.28.37    PAGE      3

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115         ELSE                                       TRT2      2438
116             LP = LC                                 TRT2      2439
117             LC = LNEXT(LC)                         TRT2      2440
118         ENDIF                                       TRT2      2441
119         GOTO 1                                       TRT2      2442
120     2     CONTINUE                                  TRT2      2443
121         NLIST = NLIST + 1                            TRT2      2444
122         IF( NLIST .GT. MAXLST )THEN                  TRT2      2445
123             WRITE(6,100)                             TRT2      2446
124         ELSE                                         TRT2      2447
125             LNEXT(LP) = NLIST                       TRT2      2448
126             LPRIM(NLIST) = P                       TRT2      2449
127             LNEXT(NLIST) = 0                        TRT2      2450
128         ENDIF                                       TRT2      2451
129     ENDIF                                           TRT2      2452
130     C                                                TRT2      2453
131     RETURN                                           TRT2      2454
132     END                                              TRT2      2455

```

--VARIABLE MAP--(LO=A)

NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE	NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE
ADXS	6B	/ACCELR/		REAL		CELLS	4B	/ACCELI/		INTEGER	1000
ADYS	7B	/ACCELR/		REAL		CI	105B			INTEGER	
ADZS	10B	/ACCELR/		REAL		I	1	DUMMY-ARG		INTEGER	
ANX	1B	/ACCELI/		INTEGER		J	2	DUMMY-ARG		INTEGER	
ANY	2B	/ACCELI/		INTEGER		K	3	DUMMY-ARG		INTEGER	
ANZ	3B	/ACCELI/		INTEGER		LC	107B			INTEGER	
AXH	1B	/ACCELR/		REAL		LNEXT	21454B	/ACCELI/		INTEGER	8000
AXL	0B	/ACCELR/		REAL		LP	106B			INTEGER	
AYH	3B	/ACCELR/		REAL		LPRIM	1754B	/ACCELI/		INTEGER	8000
AYL	2B	/ACCELR/		REAL		NLIST	0B	/ACCELI/		INTEGER	
AZH	5B	/ACCELR/		REAL		P	4	DUMMY-ARG		INTEGER	

AZL 4B /ACCEL/

REAL TRT2_20050809_130554.lpr

--SYMBOLIC CONSTANTS--(LO=A)

NAME	TYPE	VALUE
BKCNST	INTEGER	0
BKHORZ	INTEGER	2
BKVERT	INTEGER	1
CELDIM	INTEGER	1000
DAXX	INTEGER	1
DAXY	INTEGER	2
DAXZ	INTEGER	3
DEGRAD	REAL	0"17124357506472324711"
DMCELX	INTEGER	10
DMCELY	INTEGER	10
DMCELZ	INTEGER	10
ENTER	INTEGER	1
EPS	REAL	0"16706553762465362572"
EYERAY	INTEGER	1
GTHUGE	REAL	0"17474611320000000000"
LEAVE	INTEGER	2
LGTBRN	INTEGER	2
SUBROUTINE ADDLST 73/720 OPT=2		
TRIPRM	INTEGER	2
TRNRAY	INTEGER	3

NAME	TYPE	VALUE
LGTCN	INTEGER	0
LGTCOS	INTEGER	1
LSTDIM	INTEGER	8000
MAXFLT	REAL	0"20235327435361326142"
MAXLST	INTEGER	8000
MINEPS	REAL	0"16775174265421615510"
MINFLT	REAL	0"57542450342416451635"
MXCELS	INTEGER	1000
MXCELX	INTEGER	10
MXCELY	INTEGER	10
MXCELZ	INTEGER	10
MXDMRT	REAL	0"17204000000000000000"
MXPCVR	INTEGER	2
NOACL	INTEGER	0
RFLRAY	INTEGER	2
SPHPRM	INTEGER	1
SUBACL	INTEGER	1
FTN 5.1+538 05/08/09. 12.28.37		
TRTPI	REAL	0"17216220773232113302"

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--STATEMENT LABELS--(LO=A)

LABEL	ADDRESS	PROPERTIES	DEF
1	33B		111
2	41B		120
100	56B	FORMAT	102

--ENTRY POINTS--(LO=A)

NAME	ADDRESS	ARGS
ADDLST	3B	4

--I/O UNITS--(LO=A)

NAME	PROPERTIES
TAPE6	FMT/SEQ

--STATISTICS--

PROGRAM-UNIT LENGTH	110B = 72
CM LABELLED COMMON LENGTH	41165B = 17013
CM STORAGE USED	57200B = 24192
COMPILE TIME	0.196 SECONDS
SUBROUTINE SPHBND 73/720 OPT=2	

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1	C	
2	C	
3		SUBROUTINE SPHBND(I, PXL, PXH, PYL, PYH, PZL, PZH)
4		IMPLICIT CHARACTER*1 (A-Z)

TRT2	2456
TRT2	2457
TRT2	2458
TRT2	2459

```

5          INTEGER I
6          REAL PXL, PXH, PYL, PYH, PZL, PZH
7          C*****
8          C FIND A BOUNDING BOX FOR A SPHERE PRIMITIVE. VERY EASY!
9          C*****
10         C
11         C-----
12         C-- SPHERE LIST --
13         C-----
14         C SIZE: 4 * DIMSPH + 1 WORDS = 4097
15         C
16         INTEGER MAXSPH, DIMSPH
17         PARAMETER( MAXSPH=1024 )
18         PARAMETER( DIMSPH=MAXSPH )
19         C
20         INTEGER NSPH
21         COMMON /SPHLSI/ NSPH
22         C
23         REAL SOX(DIMSPH), SOY(DIMSPH), SOZ(DIMSPH), SRAD(DIMSPH)
24         COMMON /SPHLSR/ SOX, SOY, SOZ, SRAD
25         PXL = SOX(I) - SRAD(I)
26         PXH = SOX(I) + SRAD(I)
27         PYL = SOY(I) - SRAD(I)
28         PYH = SOY(I) + SRAD(I)
29         PZL = SOZ(I) - SRAD(I)
30         PZH = SOZ(I) + SRAD(I)
31         C
32         RETURN
33         END

```

```

TRT2 2460
TRT2 2461
TRT2 2462
TRT2 2463
TRT2 2464
SPHLST 1
SPHLST 2
SPHLST 3
SPHLST 4
SPHLST 5
SPHLST 6
SPHLST 7
SPHLST 8
SPHLST 9
SPHLST 10
SPHLST 11
SPHLST 12
SPHLST 13
SPHLST 14
SPHLST 15
TRT2 2466
TRT2 2467
TRT2 2468
TRT2 2469
TRT2 2470
TRT2 2471
TRT2 2472
TRT2 2473
TRT2 2474

```

--VARIABLE MAP--(LO=A)

-NAME-	-ADDRESS-	-BLOCK-	-PROPERTIES-	-TYPE-	-SIZE-	-NAME-	-ADDRESS-	-BLOCK-	-PROPERTIES-	-TYPE-	-SIZE-
I	1	DUMMY-ARG		INTEGER		PZH	7	DUMMY-ARG		REAL	
NSPH	0B	/SPHLSI/		INTEGER		PZL	6	DUMMY-ARG		REAL	
PXH	3	DUMMY-ARG		REAL		SOX	0B	/SPHLSR/		REAL	1024
PXL	2	DUMMY-ARG		REAL		SOY	2000B	/SPHLSR/		REAL	1024
PYH	5	DUMMY-ARG		REAL		SOZ	4000B	/SPHLSR/		REAL	1024
PYL	4	DUMMY-ARG		REAL		SRAD	6000B	/SPHLSR/		REAL	1024

--SYMBOLIC CONSTANTS--(LO=A)

-NAME-	-TYPE-	-VALUE-	-NAME-	-ADDRESS-	-BLOCK-	-PROPERTIES-	-TYPE-	-SIZE-
DIMSPH	INTEGER	1024						
MAXSPH	INTEGER	1024						
SPHBND	SUBROUTINE	73/720 OPT=2	FTN	5.1+538		05/08/09. 12.28.37	PAGE	2

--ENTRY POINTS--(LO=A)

-NAME-	-ADDRESS-	-ARGS-
SPHBND	3B	7

--STATISTICS--

PROGRAM-UNIT LENGTH	36B = 30						
CM LABELLED COMMON LENGTH	10001B = 4097						
CM STORAGE USED	57000B = 24064						
COMPILE TIME	0.064 SECONDS						
TRIBND	SUBROUTINE	73/720 OPT=2	FTN	5.1+538	05/08/09. 12.28.37	PAGE	1

1	C		TRT2	2475	
2	C		TRT2	2476	
3		SUBROUTINE TRIBND(I, PXL, PXH, PYL, PYH, PZL, PZH)	TRT2	2477	
4		IMPLICIT CHARACTER*1 (A-Z)	TRT2	2478	
5		INTEGER I	TRT2	2479	
6		REAL PXL, PXH, PYL, PYH, PZL, PZH	TRT2	2480	
7		C*****	TRT2	2481	
8		C FIND A BOUNDING BOX FOR A TRIANGLE PRIMITIVE. VERY EASY!	TRT2	2482	
9		C*****	TRT2	2483	
10	C		TRILST	1	
11	C	-----	TRILST	2	
12		C-- TRIANGLE LIST --	TRILST	3	
13		-----	TRILST	4	
14		C 23 * DIMTRI + 1 WORDS = 5889	TRILST	5	
15	C		TRILST	6	
16		INTEGER MAXTRI, DIMTRI	TRILST	7	
17		PARAMETER(MAXTRI=256)	TRILST	8	
18		PARAMETER(DIMTRI=MAXTRI)	TRILST	9	
19	C		TRILST	10	
20		INTEGER NTRI, DAX(DIMTRI)	TRILST	11	
21		COMMON /TRILSI/ NTRI, DAX	TRILST	12	
22	C		TRILST	13	
23		REAL TX1(DIMTRI), TY1(DIMTRI), TZ1(DIMTRI)	TRILST	14	
24		REAL TX2(DIMTRI), TY2(DIMTRI), TZ2(DIMTRI)	TRILST	15	
25		REAL TX3(DIMTRI), TY3(DIMTRI), TZ3(DIMTRI)	TRILST	16	
26		REAL TNX(DIMTRI), TNY(DIMTRI), TNZ(DIMTRI), TND(DIMTRI)	TRILST	17	
27		REAL NVX1(DIMTRI), NVY1(DIMTRI), NVZ1(DIMTRI)	TRILST	18	
28		REAL NVX2(DIMTRI), NVY2(DIMTRI), NVZ2(DIMTRI)	TRILST	19	
29		REAL NVX3(DIMTRI), NVY3(DIMTRI), NVZ3(DIMTRI)	TRILST	20	
30		COMMON /TRILSR/ TX1, TY1, TZ1, TX2, TY2, TZ2, TX3, TY3, TZ3,	TRILST	21	
31		+ TNX, TNY, TNZ, NVX1, NVY1, NVZ1, NVX2, NVY2,	TRILST	22	
32		+ NVZ2, NVX3, NVY3, NVZ3, TND	TRILST	23	
33		PXL = TX1(I)	TRT2	2485	
34		IF(TX2(I) .LT. PXL)PXL = TX2(I)	TRT2	2486	
35		IF(TX3(I) .LT. PXL)PXL = TX3(I)	TRT2	2487	
36	C		TRT2	2488	
37		PYL = TY1(I)	TRT2	2489	
38		IF(TY2(I) .LT. PYL)PYL = TY2(I)	TRT2	2490	
39		IF(TY3(I) .LT. PYL)PYL = TY3(I)	TRT2	2491	
40	C		TRT2	2492	
41		PZL = TZ1(I)	TRT2	2493	
42		IF(TZ2(I) .LT. PZL)PZL = TZ2(I)	TRT2	2494	
43		IF(TZ3(I) .LT. PZL)PZL = TZ3(I)	TRT2	2495	
44	C		TRT2	2496	
45		PXH = TX1(I)	TRT2	2497	
46		IF(TX2(I) .GT. PXH)PXH = TX2(I)	TRT2	2498	
47		IF(TX3(I) .GT. PXH)PXH = TX3(I)	TRT2	2499	
48	C		TRT2	2500	
49		PYH = TY1(I)	TRT2	2501	
50		IF(TY2(I) .GT. PYH)PYH = TY2(I)	TRT2	2502	
51		IF(TY3(I) .GT. PYH)PYH = TY3(I)	TRT2	2503	
52	C		TRT2	2504	
53		PZH = TZ1(I)	TRT2	2505	
54		IF(TZ2(I) .GT. PZH)PZH = TZ2(I)	TRT2	2506	
55		IF(TZ3(I) .GT. PZH)PZH = TZ3(I)	TRT2	2507	
56	C		TRT2	2508	
57		RETURN	TRT2	2509	
		SUBROUTINE TRIBND 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE 2
58		END	TRT2	2510	

--VARIABLE MAP--(LO=A)

--VARIABLE MAP--(LO=A)				--VARIABLE MAP--(LO=A)							
NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE	NAME	ADDRESS	BLOCK	PROPERTIES	TYPE	SIZE
DAX	1B	/TRILSI/		INTEGER	256	PZH	7	DUMMY-ARG		REAL	
I	1	DUMMY-ARG		INTEGER		PZL	6	DUMMY-ARG		REAL	
NTRI	0B	/TRILSI/		INTEGER		TND	12400B	/TRILSR/		REAL	256
NVX1	6000B	/TRILSR/		REAL	256	TNX	4400B	/TRILSR/		REAL	256
NVX2	7400B	/TRILSR/		REAL	256	TNY	5000B	/TRILSR/		REAL	256
NVX3	11000B	/TRILSR/		REAL	256	TNZ	5400B	/TRILSR/		REAL	256
NVY1	6400B	/TRILSR/		REAL	256	TX1	0B	/TRILSR/		REAL	256
NVY2	10000B	/TRILSR/		REAL	256	TX2	1400B	/TRILSR/		REAL	256
NVY3	11400B	/TRILSR/		REAL	256	TX3	3000B	/TRILSR/		REAL	256
NVZ1	7000B	/TRILSR/		REAL	256	TY1	400B	/TRILSR/		REAL	256
NVZ2	10400B	/TRILSR/		REAL	256	TY2	2000B	/TRILSR/		REAL	256
NVZ3	12000B	/TRILSR/		REAL	256	TY3	3400B	/TRILSR/		REAL	256
PXH	3	DUMMY-ARG		REAL		TZ1	1000B	/TRILSR/		REAL	256
PXL	2	DUMMY-ARG		REAL		TZ2	2400B	/TRILSR/		REAL	256
PYH	5	DUMMY-ARG		REAL		TZ3	4000B	/TRILSR/		REAL	256
PYL	4	DUMMY-ARG		REAL							

--SYMBOLIC CONSTANTS--(LO=A)

NAME	TYPE	VALUE
DIMTRI	INTEGER	256
MAXTRI	INTEGER	256

--ENTRY POINTS--(LO=A)

NAME	ADDRESS	ARGS
TRIBND	3B	7

--STATISTICS--

PROGRAM-UNIT LENGTH 107B = 71
 CM LABELLED COMMON LENGTH 13401B = 5889
 CM STORAGE USED 57000B = 24064
 COMPILE TIME 0.181 SECONDS
 SUBROUTINE GRDTRV 73/720 OPT=2

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```

1          C                                TRT2    2511
2          C                                TRT2    2512
3          C      SUBROUTINE GRDTRV( UX, UY, UZ, VX, VY, VZ, NX, NY, NZ ) TRT2    2513
4          C      IMPLICIT CHARACTER*1 (A-Z) TRT2    2514
5          C      REAL UX, UY, UZ, VX, VY, VZ TRT2    2515
6          C      INTEGER NX, NY, NZ TRT2    2516
7          C***** TRT2    2517
8          C VISIT ALL CELLS IN A 3D INTEGER GRID OF NX X NY X NZ CELLS THAT ARE TRT2    2518
9          C PIERCED BY A RAY WITH ORIGIN (UX,UY,UZ) - **POSITIVE AND WITHIN THE TRT2    2519
10         C GRID** - AND DIRECTION VECTOR (VX,VY,VZ) - NOT NECESSARILY NORMALIZED. TRT2    2520
11         C *** N.B.: CELL COORDINATES PASSED TO VISCEL() ARE ZERO BASED. *** TRT2    2521
12         C THIS IS AMANTIDES & WOO'S ALGORITHM. TRT2    2522
13         C***** TRT2    2523
14         C                                PARAMS    1
15         C----- TRT2    2524
16         C-- SUNDRY PARAMETERS -- TRT2    2525
17         C----- TRT2    2526
18         C                                PARAMS    5
    
```

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                                TRT2_20050809_130554.lpr
19      REAL GTHUGE, MINEPS, EPS, MINFLT, MAXFLT, TRTPI, DEGRAD      PARAMS      6
20      PARAMETER( GTHUGE=1E7 )      PARAMS      7
21      PARAMETER( MINEPS=1E-5 )      PARAMS      8
22      PARAMETER( EPS=1E-7 )      PARAMS      9
23      PARAMETER( MINFLT=-1E20 )      PARAMS     10
24      PARAMETER( MAXFLT=1E20 )      PARAMS     11
25      PARAMETER( TRTPI=3.1415926 )      PARAMS     12
26      PARAMETER( DEGRAD=TRTPI/180.0 )      PARAMS     13
27      C      PARAMS     14
28      INTEGER EYERAY, RFLRAY, TRNRAY      PARAMS     15
29      PARAMETER( EYERAY=1 )      PARAMS     16
30      PARAMETER( RFLRAY=2 )      PARAMS     17
31      PARAMETER( TRNRAY=3 )      PARAMS     18
32      C      PARAMS     19
33      INTEGER ENTER, LEAVE      PARAMS     20
34      PARAMETER( ENTER=1 )      PARAMS     21
35      PARAMETER( LEAVE=2 )      PARAMS     22
36      C      PARAMS     23
37      INTEGER NOACL, SUBACL      PARAMS     24
38      PARAMETER( NOACL=0 )      PARAMS     25
39      PARAMETER( SUBACL=1 )      PARAMS     26
40      C      PARAMS     27
41      INTEGER BKNST, BKVERT, BKHORZ      PARAMS     28
42      PARAMETER( BKNST=0 )      PARAMS     29
43      PARAMETER( BKVERT=1 )      PARAMS     30
44      PARAMETER( BKHORZ=2 )      PARAMS     31
45      C      PARAMS     32
46      INTEGER LGTCOS, LGTCON, LGTBRN      PARAMS     33
47      PARAMETER( LGTCON=0 )      PARAMS     34
48      PARAMETER( LGTCOS=1 )      PARAMS     35
49      PARAMETER( LGTBRN=2 )      PARAMS     36
50      C      PARAMS     37
51      INTEGER SPHPRM, TRIPRM      PARAMS     38
52      PARAMETER( SPHPRM=1 )      PARAMS     39
53      PARAMETER( TRIPRM=2 )      PARAMS     40
54      C      PARAMS     41
55      INTEGER DAXX, DAXY, DAXZ      PARAMS     42
56      PARAMETER( DAXX=1 )      PARAMS     43
57      PARAMETER( DAXY=2 )      PARAMS     44
□ SUBROUTINE GRDTRV      73/720 OPT=2      FTN 5.1+538      05/08/09. 12.28.37      PAGE      2

58      PARAMETER( DAXZ=3 )      PARAMS     45
59      C      ACCEL      1
60      C-----      ACCEL      2
61      C-- ACCELERATION --      ACCEL      3
62      C-----      ACCEL      4
63      C FOR TYPICAL SCENES, THE "MAX CELLS" WOULD BE BEST AROUND 20 TO 40.      ACCEL      5
64      C (MAYBE - MY TESTS SAY 10 IS GOOD). BUT THE MEMORY COST IS QUITE HIGH.      ACCEL      6
65      C LIKEWISE, IT WOULD BE GOOD TO ALLOW LARGISH PRIMITIVES TO BE INDEXED,      ACCEL      7
66      C BUT THE MAXIMUM POSSIBLE LIST SIZE GOES UP AS THE CUBE OF THE LARGEST      ACCEL      8
67      C NUMBER OF CELLS ALLOWED IN ANY DIRECTION FOR THE PRIMITIVE TO BE ACCEPACCEL      9
68      C FOR INDEXING. SO THE MEMORY COST IS (POTENTIALLY) VERY HIGH. IT WOULD ACCEL     10
69      C POSSIBLE TO USE THE SAME LIST FOR MORE THAN ONE GRID CELL IF IT IS IDEACCEL     11
70      C TO THAT FOR ANOTHER CELL. WE DON'T TRY TO DETECT THAT, THOUGH.      ACCEL     12
71      C IF THE RATIO OF THE BIGGEST DIMENSION RANGE TO THE SMALLEST EXCEEDS      ACCEL     13
72      C MXDMRT, ADJUST THE RANGES FOR CALCULATING THE GRID PARAMETERS. THIS SEACCEL     14
73      C TO BE ALWAYS A GOOD IDEA (HENCE SET TO 1.0).      ACCEL     15
74      C      ACCEL     16
75      C SIZE: CELDIM + 2 * LSTDIM + 13 WORDS = 1000 + 2 * 8000 + 13 = 17013 WOACCEL     17
76      C      ACCEL     18
77      INTEGER MXCELX, MXCELY, MXCELZ, DMCELX, DMCELY, DMCELZ      ACCEL     19
78      INTEGER CELDIM, MXCELS, MXPCVR, MAXLST, LSTDIM      ACCEL     20

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79	REAL MXDMRT	ACCEL	21
80	PARAMETER(MXCELX=10)	ACCEL	22
81	PARAMETER(MXCELY=10)	ACCEL	23
82	PARAMETER(MXCELZ=10)	ACCEL	24
83	PARAMETER(DMCELX=MXCELX)	ACCEL	25
84	PARAMETER(DMCELY=MXCELY)	ACCEL	26
85	PARAMETER(DMCELZ=MXCELZ)	ACCEL	27
86	PARAMETER(CELDIM=DMCELX*DMCELY*DMCELZ)	ACCEL	28
87	PARAMETER(MXCELS=MXCELX*MXCELY*MXCELZ)	ACCEL	29
88	PARAMETER(MXPCVR=2)	ACCEL	30
89	PARAMETER(MAXLST=2*2*2*MXCELS)	ACCEL	31
90	PARAMETER(LSTDIM=MAXLST)	ACCEL	32
91	PARAMETER(MXDMRT=1.0)	ACCEL	33
92	C	ACCEL	34
93	INTEGER NLIST, ANX, ANY, ANZ, CELLS(CELDIM)	ACCEL	35
94	INTEGER LPRIM(LSTDIM), LNEXT(LSTDIM)	ACCEL	36
95	COMMON /ACCELI/ NLIST, ANX, ANY, ANZ, CELLS, LPRIM, LNEXT	ACCEL	37
96	C	ACCEL	38
97	REAL AXL, AXH, AYL, AYH, AZL, AZH, ADXS, ADYS, ADZS	ACCEL	39
98	COMMON /ACCELR/ AXL, AXH, AYL, AYH, AZL, AZH, ADXS, ADYS, ADZS	ACCEL	40
99	INTEGER X, Y, Z, SX, SY, SZ, JX, JY, JZ, QUIT	TRT2	2526
100	REAL TX, TY, TZ, DX, DY, DZ	TRT2	2527
101	C	TRT2	2528
102	C-- INITIAL CELL COORDINATES	TRT2	2529
103	C	TRT2	2530
104	X = INT(UX)	TRT2	2531
105	Y = INT(UY)	TRT2	2532
106	Z = INT(UZ)	TRT2	2533
107	C	TRT2	2534
108	C-- VISIT THE INITIAL CELL	TRT2	2535
109	C	TRT2	2536
110	CALL VISCEL(X, Y, Z, QUIT)	TRT2	2537
111	IF(QUIT .NE. 0)RETURN	TRT2	2538
112	C	TRT2	2539
113	C-- INTEGER CELL STEPS FOR THE VECTOR	TRT2	2540
114	C	TRT2	2541
115	IF(VX .LT. 0.0)THEN	TRT2	2542
116	SX = -1	TRT2	2543
117	ELSE	TRT2	2544
118	SX = 1	TRT2	2545
119	ENDIF	TRT2	2546
120	IF(VY .LT. 0.0)THEN	TRT2	2547
121	SY = -1	TRT2	2548
122	ELSE	TRT2	2549
123	SY = 1	TRT2	2550
124	ENDIF	TRT2	2551
125	IF(VZ .LT. 0.0)THEN	TRT2	2552
126	SZ = -1	TRT2	2553
127	ELSE	TRT2	2554
128	SZ = 1	TRT2	2555
129	ENDIF	TRT2	2556
130	C	TRT2	2557
131	C-- FIND TX, TY, TZ - THE T VALUES THAT MOVE ALONG THE RAY TO THE BOUNDARY	TRT2	2558
132	C-- OF THE INITIAL CELL.	TRT2	2559
133	C-- FIND DX, DY, DZ - THE T VALUES THAT STEP THE WIDTH, HEIGHT AND DEPTH	TRT2	2560
134	C-- OF A FULL CELL.	TRT2	2561
135	C-- PRECISION!	TRT2	2562
136	C	TRT2	2563
137	IF(ABS(VX) .LT. EPS)THEN	TRT2	2564
138	TX = GTHUGE	TRT2	2565

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139	DX = GTHUGE	TRT2	2566
140	ELSE IF(VX .GT. 0)THEN	TRT2	2567
141	TX = ((X + 1) - UX) / VX	TRT2	2568
142	DX = 1.0 / VX	TRT2	2569
143	ELSE	TRT2	2570
144	TX = (X - UX) / VX	TRT2	2571
145	DX = -1.0 / VX	TRT2	2572
146	ENDIF	TRT2	2573
147	IF(ABS(VY) .LT. EPS)THEN	TRT2	2574
148	TY = GTHUGE	TRT2	2575
149	DY = GTHUGE	TRT2	2576
150	ELSE IF(VY .GT. 0)THEN	TRT2	2577
151	TY = ((Y + 1) - UY) / VY	TRT2	2578
152	DY = 1.0 / VY	TRT2	2579
153	ELSE	TRT2	2580
154	TY = (Y - UY) / VY	TRT2	2581
155	DY = -1.0 / VY	TRT2	2582
156	ENDIF	TRT2	2583
157	IF(ABS(VZ) .LT. EPS)THEN	TRT2	2584
158	TZ = GTHUGE	TRT2	2585
159	DZ = GTHUGE	TRT2	2586
160	ELSE IF(VZ .GT. 0)THEN	TRT2	2587
161	TZ = ((Z + 1) - UZ) / VZ	TRT2	2588
162	DZ = 1.0 / VZ	TRT2	2589
163	ELSE	TRT2	2590
164	TZ = (Z - UZ) / VZ	TRT2	2591
165	DZ = -1.0 / VZ	TRT2	2592
166	ENDIF	TRT2	2593
167	C	TRT2	2594
168	C-- IF ANY OF THE T VALUES TO MOVE TO THE BOUNDARY ARE EXACTLY ZERO,	TRT2	2595
169	C-- BUMP THEM A BIT.	TRT2	2596
170	C-- PRECISION!	TRT2	2597
171	C	TRT2	2598
□	SUBROUTINE GRDTRV 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
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172	IF(TX .EQ. 0)TX = TX + EPS	TRT2	2599
173	IF(TY .EQ. 0)TY = TY + EPS	TRT2	2600
174	IF(TZ .EQ. 0)TZ = TZ + EPS	TRT2	2601
175	C	TRT2	2602
176	C-- FIND JUST OUT OF BOUNDS CELL COORDS FOR THE RAY ALONG EACH AXIS	TRT2	2603
177	C	TRT2	2604
178	IF(SX .GT. 0)THEN	TRT2	2605
179	JX = NX	TRT2	2606
180	ELSE	TRT2	2607
181	JX = -1	TRT2	2608
182	ENDIF	TRT2	2609
183	IF(SY .GT. 0)THEN	TRT2	2610
184	JY = NY	TRT2	2611
185	ELSE	TRT2	2612
186	JY = -1	TRT2	2613
187	ENDIF	TRT2	2614
188	IF(SZ .GT. 0)THEN	TRT2	2615
189	JZ = NZ	TRT2	2616
190	ELSE	TRT2	2617
191	JZ = -1	TRT2	2618
192	ENDIF	TRT2	2619
193	C	TRT2	2620
194	C-- STEP THROUGH THE CELLS UNTIL WE EXIT THE ARRAY	TRT2	2621
195	C	TRT2	2622
196	1 CONTINUE	TRT2	2623
197	IF(TX .LT. TY)THEN	TRT2	2624
198	IF(TX .LT. TZ)THEN	TRT2	2625

```

199           X = X + SX
200           IF( X .EQ. JX )RETURN
201           TX = TX + DX
202           ELSE
203             Z = Z + SZ
204             IF( Z .EQ. JZ )RETURN
205             TZ = TZ + DZ
206           ENDIF
207           ELSE
208             IF( TY .LT. TZ )THEN
209               Y = Y + SY
210               IF( Y .EQ. JY )RETURN
211               TY = TY + DY
212             ELSE
213               Z = Z + SZ
214               IF( Z .EQ. JZ )RETURN
215               TZ = TZ + DZ
216             ENDIF
217           ENDIF
218           C
219           C-- VISIT THE CURRENT CELL
220           C
221           CALL VISCEL( X, Y, Z, QUIT )
222           IF( QUIT .NE. 0 )RETURN
223           GOTO 1
224           C
225           END

```

```

TRT2 2626
TRT2 2627
TRT2 2628
TRT2 2629
TRT2 2630
TRT2 2631
TRT2 2632
TRT2 2633
TRT2 2634
TRT2 2635
TRT2 2636
TRT2 2637
TRT2 2638
TRT2 2639
TRT2 2640
TRT2 2641
TRT2 2642
TRT2 2643
TRT2 2644
TRT2 2645
TRT2 2646
TRT2 2647
TRT2 2648
TRT2 2649
TRT2 2650
TRT2 2651
TRT2 2652

```

□ SUBROUTINE GRDTRV 73/720 OPT=2 FTN 5.1+538 05/08/09. 12.28.37 PAGE 5

--VARIABLE MAP--(LO=A)

--NAME--ADDRESS--BLOCK--PROPERTIES--TYPE--SIZE				--NAME--ADDRESS--BLOCK--PROPERTIES--TYPE--SIZE			
ADXS	6B	/ACCEL/	REAL	NLIST	0B	/ACCELI/	INTEGER
ADYS	7B	/ACCEL/	REAL	NX	7	DUMMY-ARG	INTEGER
ADZS	10B	/ACCEL/	REAL	NY	8	DUMMY-ARG	INTEGER
ANX	1B	/ACCELI/	INTEGER	NZ	9	DUMMY-ARG	INTEGER
ANY	2B	/ACCELI/	INTEGER	QUIT	266B		INTEGER
ANZ	3B	/ACCELI/	INTEGER	SX	260B		INTEGER
AXH	1B	/ACCEL/	REAL	SY	261B		INTEGER
AXL	0B	/ACCEL/	REAL	SZ	262B		INTEGER
AYH	3B	/ACCEL/	REAL	TX	267B		REAL
AYL	2B	/ACCEL/	REAL	TY	270B		REAL
AZH	5B	/ACCEL/	REAL	TZ	271B		REAL
AZL	4B	/ACCEL/	REAL	UX	1	DUMMY-ARG	REAL
CELLS	4B	/ACCELI/	INTEGER	UY	2	DUMMY-ARG	REAL
DX	272B		REAL	UZ	3	DUMMY-ARG	REAL
DY	273B		REAL	VX	4	DUMMY-ARG	REAL
DZ	274B		REAL	VY	5	DUMMY-ARG	REAL
JX	263B		INTEGER	VZ	6	DUMMY-ARG	REAL
JY	264B		INTEGER	X	255B		INTEGER
JZ	265B		INTEGER	Y	256B		INTEGER
LNEXT	21454B	/ACCELI/	INTEGER	Z	257B		INTEGER
LPRIM	1754B	/ACCELI/	INTEGER				

--SYMBOLIC CONSTANTS--(LO=A)

--NAME--TYPE--VALUE			--NAME--TYPE--VALUE		
BKCNST	INTEGER	0	LSTDIM	INTEGER	8000
BKHORZ	INTEGER	2	MAXFLT	REAL	0"20235327435361326142"
BKVERT	INTEGER	1	MAXLST	INTEGER	8000
CELDIM	INTEGER	1000	MINEPS	REAL	0"16775174265421615510"


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                                TRT2_20050809_130554.lpr
DAXX  INTEGER                1      MINFLT  REAL          0"57542450342416451635"
DAXY  INTEGER                2      MXCELS  INTEGER      1000
DAXZ  INTEGER                3      MXCELX  INTEGER      10
DEGRAD REAL          0"17124357506472324711"  MXCELY  INTEGER      10
DMCELX INTEGER                10     MXCELZ  INTEGER      10
DMCELY INTEGER                10     MXDMRT  REAL          0"1720400000000000000"
DMCELZ INTEGER                10     MXPCVR  INTEGER      2
ENTER  INTEGER                1      NOACL   INTEGER      0
EPS    REAL          0"16706553762465362572"  RFLRAY  INTEGER      2
EYERAY INTEGER                1      SPHPRM  INTEGER      1
GTHUGE REAL          0"17474611320000000000"  SUBACL  INTEGER      1
LEAVE  INTEGER                2      TRIPRM  INTEGER      2
LGTBRN INTEGER                2      TRNRAY  INTEGER      3
LGTCON INTEGER                0      TRTPI   REAL          0"17216220773232113302"
LGTCOS INTEGER                1

```

```

SUBROUTINE GRDTRV          73/720  OPT=2          FTN 5.1+538          05/08/09. 12.28.37          PAGE 6

```

--PROCEDURES--(LO=A)

-NAME-----TYPE-----ARGS-----CLASS-----

```

ABS      GENERIC            1      INTRINSIC
INT      GENERIC            1      INTRINSIC
VISCEL   SUBROUTINE        4

```

--STATEMENT LABELS--(LO=A)

-LABEL-ADDRESS-----PROPERTIES-----DEF

```

1      161B          196

```

--ENTRY POINTS--(LO=A)

-NAME---ADDRESS---ARGS---

```

GRDTRV      3B      9

```

--STATISTICS--

```

PROGRAM-UNIT LENGTH          275B = 189
CM LABELLED COMMON LENGTH    41165B = 17013
CM STORAGE USED              57300B = 24256
COMPILE TIME                  0.414 SECONDS

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SUBROUTINE BOXINS          73/720  OPT=2          FTN 5.1+538          05/08/09. 12.28.37          PAGE 1

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```

1      C      TRT2      2653
2      C      TRT2      2654
3      SUBROUTINE BOXINS( OX, OY, OZ, DX, DY, DZ, SECT, XI, YI, ZI ) TRT2      2655
4      IMPLICIT CHARACTER*1 (A-Z) TRT2      2656
5      REAL OX, OY, OZ, DX, DY, DZ, XI, YI, ZI TRT2      2657
6      INTEGER SECT TRT2      2658
7      C***** TRT2      2659
8      C SEE IF THE RAY WITH ORIGIN (OX,OY,OZ) DIRECTION (DX, DY, DZ) TRT2      2660
9      C (NOT NECESSARILY NORMALISED) INTERSECTS THE BOUNDING TRT2      2661
10     C BOX FOR THE SCENE GEOMETRIC OBJECTS FOUND BY STACEL(). IF SO, RETURN TRT2      2662
11     C SECT SET TO 1 AND THE INTERSECTION POINT IN TRT2      2663
12     C (XI, YI, ZI). OTHERWISE, RETURN SECT 0. TRT2      2664
13     C***** TRT2      2665
14     C      PARAMS      1
15     C-----          PARAMS      2
16     C-- SUNDRY PARAMETERS --          PARAMS      3

```

17	C-----				PARAMS	4
18	C				PARAMS	5
19		REAL GTHUGE, MINEPS, EPS, MINFLT, MAXFLT, TRTPI, DEGRAD			PARAMS	6
20		PARAMETER(GTHUGE=1E7)			PARAMS	7
21		PARAMETER(MINEPS=1E-5)			PARAMS	8
22		PARAMETER(EPS=1E-7)			PARAMS	9
23		PARAMETER(MINFLT=-1E20)			PARAMS	10
24		PARAMETER(MAXFLT=1E20)			PARAMS	11
25		PARAMETER(TRTPI=3.1415926)			PARAMS	12
26		PARAMETER(DEGRAD=TRTPI/180.0)			PARAMS	13
27	C				PARAMS	14
28		INTEGER EYERAY, RFLRAY, TRNRAY			PARAMS	15
29		PARAMETER(EYERAY=1)			PARAMS	16
30		PARAMETER(RFLRAY=2)			PARAMS	17
31		PARAMETER(TRNRAY=3)			PARAMS	18
32	C				PARAMS	19
33		INTEGER ENTER, LEAVE			PARAMS	20
34		PARAMETER(ENTER=1)			PARAMS	21
35		PARAMETER(LEAVE=2)			PARAMS	22
36	C				PARAMS	23
37		INTEGER NOACL, SUBACL			PARAMS	24
38		PARAMETER(NOACL=0)			PARAMS	25
39		PARAMETER(SUBACL=1)			PARAMS	26
40	C				PARAMS	27
41		INTEGER BKNST, BKVERT, BKHORZ			PARAMS	28
42		PARAMETER(BKNST=0)			PARAMS	29
43		PARAMETER(BKVERT=1)			PARAMS	30
44		PARAMETER(BKHORZ=2)			PARAMS	31
45	C				PARAMS	32
46		INTEGER LGTCON, LGTCOS, LGTBRN			PARAMS	33
47		PARAMETER(LGTCON=0)			PARAMS	34
48		PARAMETER(LGTCOS=1)			PARAMS	35
49		PARAMETER(LGTBRN=2)			PARAMS	36
50	C				PARAMS	37
51		INTEGER SPHPRM, TRIPRM			PARAMS	38
52		PARAMETER(SPHPRM=1)			PARAMS	39
53		PARAMETER(TRIPRM=2)			PARAMS	40
54	C				PARAMS	41
55		INTEGER DAXX, DAXY, DAXZ			PARAMS	42
56		PARAMETER(DAXX=1)			PARAMS	43
57		PARAMETER(DAXY=2)			PARAMS	44
	□	SUBROUTINE BOXINS 73/720 OPT=2		FTN 5.1+538	05/08/09. 12.28.37	PAGE 2
58		PARAMETER(DAXZ=3)			PARAMS	45
59	C				ACCEL	1
60	C-----				ACCEL	2
61	C-- ACCELERATION --				ACCEL	3
62	C-----				ACCEL	4
63		C FOR TYPICAL SCENES, THE "MAX CELLS" WOULD BE BEST AROUND 20 TO 40.			ACCEL	5
64		C (MAYBE - MY TESTS SAY 10 IS GOOD). BUT THE MEMORY COST IS QUITE HIGH.			ACCEL	6
65		C LIKEWISE, IT WOULD BE GOOD TO ALLOW LARGISH PRIMITIVES TO BE INDEXED,			ACCEL	7
66		C BUT THE MAXIMUM POSSIBLE LIST SIZE GOES UP AS THE CUBE OF THE LARGEST			ACCEL	8
67		C NUMBER OF CELLS ALLOWED IN ANY DIRECTION FOR THE PRIMITIVE TO BE ACCEPACCEL			ACCEL	9
68		C FOR INDEXING. SO THE MEMORY COST IS (POTENTIALLY) VERY HIGH. IT WOULD ACCEL			ACCEL	10
69		C POSSIBLE TO USE THE SAME LIST FOR MORE THAN ONE GRID CELL IF IT IS IDEACCEL			ACCEL	11
70		C TO THAT FOR ANOTHER CELL. WE DON'T TRY TO DETECT THAT, THOUGH.			ACCEL	12
71		C IF THE RATIO OF THE BIGGEST DIMENSION RANGE TO THE SMALLEST EXCEEDS			ACCEL	13
72		C MXDMRT, ADJUST THE RANGES FOR CALCULATING THE GRID PARAMETERS. THIS SEACCEL			ACCEL	14
73		C TO BE ALWAYS A GOOD IDEA (HENCE SET TO 1.0).			ACCEL	15
74	C				ACCEL	16
75		C SIZE: CELDIM + 2 * LSTDIM + 13 WORDS = 1000 + 2 * 8000 + 13 = 17013 WOACCEL			ACCEL	17
76	C				ACCEL	18

```

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77      INTEGER MXCELX, MXCELY, MXCELZ, DMCELX, DMCELY, DMCELZ
78      INTEGER CELDIM, MXCELS, MXPCVR, MAXLST, LSTDIM
79      REAL MXDMRT
80      PARAMETER( MXCELX=10 )
81      PARAMETER( MXCELY=10 )
82      PARAMETER( MXCELZ=10 )
83      PARAMETER( DMCELX=MXCELX )
84      PARAMETER( DMCELY=MXCELY )
85      PARAMETER( DMCELZ=MXCELZ )
86      PARAMETER( CELDIM=DMCELX*DMCELY*DMCELZ )
87      PARAMETER( MXCELS=MXCELX*MXCELY*MXCELZ )
88      PARAMETER( MXPCVR=2 )
89      PARAMETER( MAXLST=2*2*2*MXCELS )
90      PARAMETER( LSTDIM=MAXLST )
91      PARAMETER( MXDMRT=1.0 )
92      C
93      INTEGER NLIST, ANX, ANY, ANZ, CELLS(CELDIM)
94      INTEGER LPRIM(LSTDIM), LNEXT(LSTDIM)
95      COMMON /ACCELI/ NLIST, ANX, ANY, ANZ, CELLS, LPRIM, LNEXT
96      C
97      REAL AXL, AXH, AYL, AYH, AZL, AZH, ADXS, ADYS, ADZS
98      COMMON /ACCELR/ AXL, AXH, AYL, AYH, AZL, AZH, ADXS, ADYS, ADZS
99      REAL T1, T2, TNEAR, TFAR, T
100     C
101     XI = 0.0
102     YI = 0.0
103     ZI = 0.0
104     SECT = 0
105     TNEAR = MINFLT
106     TFAR = MAXFLT
107     C
108     C-- PRECISION!
109     C
110     IF( ABS( DX ) .LT. EPS )THEN
111     IF( OX .LT. AXL .OR. OX .GT. AXH )THEN
112     SECT = 0
113     RETURN
114     ENDIF
SUBROUTINE BOXINS      73/720 OPT=2
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115     ELSE
116     TNEAR = ( AXL - OX ) / DX
117     TFAR = ( AXH - OX ) / DX
118     IF( TNEAR .GT. TFAR )THEN
119     T = TNEAR
120     TNEAR = TFAR
121     TFAR = T
122     ENDIF
123     IF( TFAR .LT. 0.0 )THEN
124     SECT = 0
125     RETURN
126     ENDIF
127     ENDIF
128     C
129     C-- PRECISION!
130     C
131     IF( ABS( DY ) .LT. EPS )THEN
132     IF( OY .LT. AYL .OR. OY .GT. AYH )THEN
133     SECT = 0
134     RETURN
135     ENDIF
136     ELSE

```

137	T1 = (AYL - OY) / DY	TRT2	2706
138	T2 = (AYH - OY) / DY	TRT2	2707
139	IF(T1 .GT. T2)THEN	TRT2	2708
140	T = T1	TRT2	2709
141	T1 = T2	TRT2	2710
142	T2 = T	TRT2	2711
143	ENDIF	TRT2	2712
144	IF(T1 .GT. TNEAR)TNEAR = T1	TRT2	2713
145	IF(T2 .LT. TFAR)TFAR = T2	TRT2	2714
146	IF(TNEAR .GT. TFAR)THEN	TRT2	2715
147	SECT = 0	TRT2	2716
148	RETURN	TRT2	2717
149	ENDIF	TRT2	2718
150	IF(TFAR .LT. 0.0)THEN	TRT2	2719
151	SECT = 0	TRT2	2720
152	RETURN	TRT2	2721
153	ENDIF	TRT2	2722
154	ENDIF	TRT2	2723
155	C	TRT2	2724
156	C-- PRECISION!	TRT2	2725
157	C	TRT2	2726
158	IF(ABS(DZ) .LT. EPS)THEN	TRT2	2727
159	IF(OZ .LT. AZL .OR. OZ .GT. AZH)THEN	TRT2	2728
160	SECT = 0	TRT2	2729
161	RETURN	TRT2	2730
162	ENDIF	TRT2	2731
163	ELSE	TRT2	2732
164	T1 = (AZL - OZ) / DZ	TRT2	2733
165	T2 = (AZH - OZ) / DZ	TRT2	2734
166	IF(T1 .GT. T2)THEN	TRT2	2735
167	T = T1	TRT2	2736
168	T1 = T2	TRT2	2737
169	T2 = T	TRT2	2738
170	ENDIF	TRT2	2739
171	IF(T1 .GT. TNEAR)TNEAR = T1	TRT2	2740
□	SUBROUTINE BOXINS 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37
			PAGE 4
172	IF(T2 .LT. TFAR)TFAR = T2	TRT2	2741
173	IF(TNEAR .GT. TFAR)THEN	TRT2	2742
174	SECT = 0	TRT2	2743
175	RETURN	TRT2	2744
176	ENDIF	TRT2	2745
177	IF(TFAR .LT. 0.0)THEN	TRT2	2746
178	SECT = 0	TRT2	2747
179	RETURN	TRT2	2748
180	ENDIF	TRT2	2749
181	ENDIF	TRT2	2750
182	C	TRT2	2751
183	C-- THERE IS AN INTERSECTION. FIND WHERE.	TRT2	2752
184	C	TRT2	2753
185	XI = OX + TNEAR * DX	TRT2	2754
186	YI = OY + TNEAR * DY	TRT2	2755
187	ZI = OZ + TNEAR * DZ	TRT2	2756
188	SECT = 1	TRT2	2757
189	C	TRT2	2758
190	RETURN	TRT2	2759
191	END	TRT2	2760

--VARIABLE MAP--(LO=A)

-NAME---ADDRESS---BLOCK-----PROPERTIES-----TYPE-----SIZE -NAME---ADDRESS---BLOCK-----PROPERTIES-----TYPE-----SIZE

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ADXS	6B	/ACCELR/	REAL		LNEXT	21454B	/ACCELI/	INTEGER	8000
ADYS	7B	/ACCELR/	REAL		LPRIM	1754B	/ACCELI/	INTEGER	8000
ADZS	10B	/ACCELR/	REAL		NLIST	0B	/ACCELI/	INTEGER	
ANX	1B	/ACCELI/	INTEGER		OX	1	DUMMY-ARG	REAL	
ANY	2B	/ACCELI/	INTEGER		OY	2	DUMMY-ARG	REAL	
ANZ	3B	/ACCELI/	INTEGER		OZ	3	DUMMY-ARG	REAL	
AXH	1B	/ACCELR/	REAL		SECT	7	DUMMY-ARG	INTEGER	
AXL	0B	/ACCELR/	REAL		T	NONE		REAL	
AYH	3B	/ACCELR/	REAL		TFAR	214B		REAL	
AYL	2B	/ACCELR/	REAL		TNEAR	213B		REAL	
AZH	5B	/ACCELR/	REAL		T1	211B		REAL	
AZL	4B	/ACCELR/	REAL		T2	212B		REAL	
CELLS	4B	/ACCELI/	INTEGER	1000	XI	8	DUMMY-ARG	REAL	
DX	4	DUMMY-ARG	REAL		YI	9	DUMMY-ARG	REAL	
DY	5	DUMMY-ARG	REAL		ZI	10	DUMMY-ARG	REAL	
DZ	6	DUMMY-ARG	REAL						

--SYMBOLIC CONSTANTS--(LO=A)

-NAME----	TYPE-----	VALUE-----	-NAME----	TYPE-----	VALUE-----
BKCNST	INTEGER	0	ENTER	INTEGER	1
BKHORZ	INTEGER	2	EPS	REAL	0"16706553762465362572"
BKVERT	INTEGER	1	EYERAY	INTEGER	1
CELDIM	INTEGER	1000	GTHUGE	REAL	0"17474611320000000000"
DAXX	INTEGER	1	LEAVE	INTEGER	2
DAXY	INTEGER	2	LGTBRN	INTEGER	2
DAXZ	INTEGER	3	LGTCOS	INTEGER	0
DEGRAD	REAL	0"17124357506472324711"	LGTCOS	INTEGER	1
DMCELX	INTEGER	10	LSTDIM	INTEGER	8000
DMCELY	INTEGER	10	MAXFLT	REAL	0"20235327435361326142"
DMCELZ	INTEGER	10	MAXLST	INTEGER	8000
SUBROUTINE BOXINS 73/720 OPT=2			FTN 5.1+538 05/08/09. 12.28.37		
MINEPS	REAL	0"16775174265421615510"	NOACL	INTEGER	0
MINFLT	REAL	0"57542450342416451635"	RFLRAY	INTEGER	2
MXCELS	INTEGER	1000	SPHPRM	INTEGER	1
MXCELX	INTEGER	10	SUBACL	INTEGER	1
MXCELY	INTEGER	10	TRIPRM	INTEGER	2
MXCELZ	INTEGER	10	TRNRAY	INTEGER	3
MXDMRT	REAL	0"17204000000000000000"	TRTPI	REAL	0"17216220773232113302"
MXPCVR	INTEGER	2			

--PROCEDURES--(LO=A)

-NAME-----	TYPE-----	ARGS-----	CLASS-----
ABS	GENERIC	1	INTRINSIC

--ENTRY POINTS--(LO=A)

-NAME----	ADDRESS---	ARGS---
BOXINS	3B	10

--STATISTICS--

PROGRAM-UNIT LENGTH	215B = 141
CM LABELLED COMMON LENGTH	41165B = 17013
CM STORAGE USED	57300B = 24256
COMPILE TIME	0.335 SECONDS

```

1      C
2      C-----
3      C UTILITY ROUTINES
4      C-----
5      C
6          REAL FUNCTION RANHLF( IDUM )
7          IMPLICIT CHARACTER*1 (A-Z)
8          INTEGER IDUM
9          C*****
10         C RETURN A RANDOM NUMBER IN THE RANGE +/- 0.5
11         C*****
12         RANHLF = RANF() - 0.5
13         RETURN
14        END

```

```

TRT2 2761
TRT2 2762
TRT2 2763
TRT2 2764
TRT2 2765
TRT2 2766
TRT2 2767
TRT2 2768
TRT2 2769
TRT2 2770
TRT2 2771
TRT2 2772
TRT2 2773
TRT2 2774

```

--VARIABLE MAP--(LO=A)
 -NAME---ADDRESS--BLOCK-----PROPERTIES-----TYPE-----SIZE

```

IDUM      1  DUMMY-ARG UNUSED      INTEGER
RANHLF    NONE

```

--PROCEDURES--(LO=A)
 -NAME-----TYPE-----ARGS-----CLASS-----

```

RANF      REAL      0      INTRINSIC

```

--ENTRY POINTS--(LO=A)
 -NAME---ADDRESS--ARGS---

```

RANHLF    4B      1

```

--STATISTICS--

```

PROGRAM-UNIT LENGTH      47B = 39
CM STORAGE USED          56700B = 24000
COMPILE TIME              0.029 SECONDS

```

```

1      C
2      C
3          SUBROUTINE NRMVEC( DX, DY, DZ )
4          IMPLICIT CHARACTER*1 (A-Z)
5          REAL DX, DY, DZ
6          C*****
7          C MAKE (DX,DY,DZ) A UNIT VECTOR
8          C*****
9          C
10         C-----
11         C-- SUNDRY PARAMETERS --
12         C-----
13         C
14         REAL GTHUGE, MINEPS, EPS, MINFLT, MAXFLT, TRTPI, DEGRAD
15         PARAMETER( GTHUGE=1E7 )
16         PARAMETER( MINEPS=1E-5 )
17         PARAMETER( EPS=1E-7 )

```

```

TRT2 2775
TRT2 2776
TRT2 2777
TRT2 2778
TRT2 2779
TRT2 2780
TRT2 2781
TRT2 2782
PARAMS 1
PARAMS 2
PARAMS 3
PARAMS 4
PARAMS 5
PARAMS 6
PARAMS 7
PARAMS 8
PARAMS 9

```

18		PARAMETER(MINFLT=-1E20)		PARAMS	10
19		PARAMETER(MAXFLT=1E20)		PARAMS	11
20		PARAMETER(TRTPI=3.1415926)		PARAMS	12
21		PARAMETER(DEGRAD=TRTPI/180.0)		PARAMS	13
22	C			PARAMS	14
23		INTEGER EYERAY, RFLRAY, TRNRAY		PARAMS	15
24		PARAMETER(EYERAY=1)		PARAMS	16
25		PARAMETER(RFLRAY=2)		PARAMS	17
26		PARAMETER(TRNRAY=3)		PARAMS	18
27	C			PARAMS	19
28		INTEGER ENTER, LEAVE		PARAMS	20
29		PARAMETER(ENTER=1)		PARAMS	21
30		PARAMETER(LEAVE=2)		PARAMS	22
31	C			PARAMS	23
32		INTEGER NOACL, SUBACL		PARAMS	24
33		PARAMETER(NOACL=0)		PARAMS	25
34		PARAMETER(SUBACL=1)		PARAMS	26
35	C			PARAMS	27
36		INTEGER BKCNST, BKVERT, BKHORZ		PARAMS	28
37		PARAMETER(BKCNST=0)		PARAMS	29
38		PARAMETER(BKVERT=1)		PARAMS	30
39		PARAMETER(BKHORZ=2)		PARAMS	31
40	C			PARAMS	32
41		INTEGER LGTCON, LGTCOS, LGTBRN		PARAMS	33
42		PARAMETER(LGTCON=0)		PARAMS	34
43		PARAMETER(LGTCOS=1)		PARAMS	35
44		PARAMETER(LGTBRN=2)		PARAMS	36
45	C			PARAMS	37
46		INTEGER SPHPRM, TRIPRM		PARAMS	38
47		PARAMETER(SPHPRM=1)		PARAMS	39
48		PARAMETER(TRIPRM=2)		PARAMS	40
49	C			PARAMS	41
50		INTEGER DAXX, DAXY, DAXZ		PARAMS	42
51		PARAMETER(DAXX=1)		PARAMS	43
52		PARAMETER(DAXY=2)		PARAMS	44
53		PARAMETER(DAXZ=3)		PARAMS	45
54		REAL LEN		TRT2	2784
55	C			TRT2	2785
56		LEN = SQRT(DX*DX + DY*DY + DZ*DZ)		TRT2	2786
57	C			TRT2	2787
	□	SUBROUTINE NRMVEC 73/720 OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE 2
58		C-- PRECISION!		TRT2	2788
59		C		TRT2	2789
60		IF(LEN .GT. EPS)THEN		TRT2	2790
61		DX = DX / LEN		TRT2	2791
62		DY = DY / LEN		TRT2	2792
63		DZ = DZ / LEN		TRT2	2793
64		ENDIF		TRT2	2794
65		C		TRT2	2795
66		RETURN		TRT2	2796
67		END		TRT2	2797

--VARIABLE MAP--(LO=A)
 -NAME---ADDRESS--BLOCK-----PROPERTIES-----TYPE-----SIZE

DX	1	DUMMY-ARG	REAL
DY	2	DUMMY-ARG	REAL
DZ	3	DUMMY-ARG	REAL
LEN	55B		REAL

--SYMBOLIC CONSTANTS--(LO=A)

NAME	TYPE	VALUE
BKCNST	INTEGER	0
BKHORZ	INTEGER	2
BKVERT	INTEGER	1
DAXX	INTEGER	1
DAXY	INTEGER	2
DAXZ	INTEGER	3
DEGRAD	REAL	0"17124357506472324711"
ENTER	INTEGER	1
EPS	REAL	0"16706553762465362572"
EYERAY	INTEGER	1
GTHUGE	REAL	0"17474611320000000000"
LEAVE	INTEGER	2
LGTBRN	INTEGER	2

NAME	TYPE	VALUE
LGTCON	INTEGER	0
LGTCOS	INTEGER	1
MAXFLT	REAL	0"20235327435361326142"
MINEPS	REAL	0"16775174265421615510"
MINFLT	REAL	0"57542450342416451635"
NOACL	INTEGER	0
RFLRAY	INTEGER	2
SPHPRM	INTEGER	1
SUBACL	INTEGER	1
TRIPRM	INTEGER	2
TRNRAY	INTEGER	3
TRTPI	REAL	0"17216220773232113302"

--PROCEDURES--(LO=A)

NAME	TYPE	ARGS	CLASS
SQRT	GENERIC	1	INTRINSIC

--ENTRY POINTS--(LO=A)

NAME ADDRESS ARGS

NRMVEC	3B	3					
□	SUBROUTINE	NRMVEC	73/720	OPT=2	FTN 5.1+538	05/08/09. 12.28.37	PAGE 3

--STATISTICS--

PROGRAM-UNIT LENGTH	56B = 46
CM STORAGE USED	57000B = 24064
COMPILE TIME	0.084 SECONDS

□ AAAIOQL. 05/08/09. HCCC CDC CYBER 173 (NOS 1.4) NOS 1.4-552

12.28.33. TRT2.
 12.28.33. UCCR, 7361, 3.137KCDS.
 12.28.33. USER, NICK, .
 12.28.33. * JOB TO COMPILE TRT2 AND SAVE THE
 12.28.33. * BINARY FOR LATER EXECUTION.
 12.28.33. * RESULT: TRT2 PERM FILE.
 12.28.33. SETJSL, 7777.
 12.28.33. SETASL, 7777.
 12.28.33. MODIFY, P=0, C, F, Z. /*CREATE INPUT
 12.28.36. MODIFICATION COMPLETE.
 12.28.36. *
 12.28.36. * FTN5, I=COMPILE, OPT=1, DB=PMD, B.
 12.28.36. * FTN5, I=COMPILE, OPT=1, DB=PMD, PL, B.
 12.28.37. FTN5, I=COMPILE, OPT=2, DB=0, B.
 12.29.14. 63400 CM STORAGE USED.
 12.29.14. 9.236 CP SECONDS COMPILATION TIME.
 12.29.14. *
 12.29.14. REPLACE, BIN=TRT2.
 12.29.15. AESR, 14.298UNTS.
 12.30.01. UCLP, 7307, 9.792KLNS.