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Fixed Site Neutralization Model Programmer's Manual

Volume II (Listings)

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7.0 SOURCE LISTINGS

This chapter presents the source listings for the Fixed Site Neutralization Model and its supporting modules, the Plex Preprocessor and the Data Preprocessor. These three programs employ identical common blocks and block data subroutines; their listings are presented once, as an economy and convenience, in section 7.1. In the listings in the subsequent sections, lines of code detailing the contents of common blocks will be abbreviated to the form "COMMON /NAME/ " with the understanding that the full contents of /NAME/ are accessible in section 7.1.

The Plex Preprocessor listings are in section 7.2; the Data Preprocessor listings, section 7.3; and the Fixed Site Neutralization Model listings, section 7.4. The utility routines are called by both the Plex Preprocessor and the Fixed Site Neutralization model; for economy and convenience, these are listed but once, in alphabetical order, in section 7.5.

Throughout the listings the reader will find liberal use of comment cards. Detailed verbal descriptions of the logic are available in volume 1 of this manual, as follows: the Plex Preprocessor, section 2.1; the Data Preprocessor, section 2.2; and the Fixed Site Neutralization Model, section 2.3.

7.1 Common and Block Data

This subsection contains a listing of common blocks and the block data subroutine that are shared by two or more programs in the system. The common blocks are presented first because they are referred to in the block data routine.

COMMON BLOCKS - ALL PROGRAMS

```
ISN
 1          COMMON /STATEV/ DTMIN,FORCES(4,2),IPLAYR,ISIDE,ISECPL(2),NMSTAT,
           +     TMIN,TMRESP,
           +     LISTND(2,4000),LOCATN(4,800),CHANGE(4,200),SITE(10,6),
           +     BLDG(10,8),FLOOR(12,12),BARIER(12,30),YARD(15,60),
           +     ROOM(13,40),HALL(13,12),ROOF(11,10),STAIRS(10,20),
           +     DOOR(17,120),WINDOW(16,100),WEAPON(2,600),EQUIP(2,720),
           +     VEHCLE(7,36),PERSON(18,350),SENSOR(6,720),ACTIVD(4,20),
           +     CONNET(3,20),PRCEPT(4,900),MESAGE(5,300),ACTION(6,500),
           +     RELN(3,300),GROUP(4,10),GOALND(6,10),NIMPAC(5,120),
           +     FORCE(8,24)
 2          DIMENSION ITEM(41900),DITEM(41900)
 3          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 4          COMMON /PARS/ DTPNAM(30),FLDNAM(250),FORMOT(12,30),
           +     DTPABR(30),IAVAIL(30),IDTOFF(30),IDTPOK(30),IFDNPT(30),
           +     IPHSOB(6),IRCOFF(30),IRECIO(30),LSTREC(30),MACTTP(3,8),
           +     MRELTP(2,20),NFLDS(30),NRECS(30),NRECSO(30),
           +     IFAIL,IOK,IRN(6),IRTNCD,NULL
 5          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 6          REAL*8 DTPNAM,FLDNAM,FORMOT
 7          COMMON /PARS1/
           +     JACSON,JACTIV,JADVRQ,JADVRS,JALLEG,JAMT,JATTR,JBARIN,
           +     JBARRS,JBLDGS,JCBARS,JCBDGS,JCMNTS,JCONT,JCONTS,JCOV,
           +     JCOVRG,JCOV1,JCOV2,JCOV3,JCOV4,JCRED,JDOER,JDRACC,
           +     JDRIVR,JELEMS,JENVIR,JEQPRQ,JFALEG,JFLDR,JFLOOR,JFLRS,
           +     JFPLNS,JFRAC,JFSOPS,JFSTAT,JGARDS,JHALLS,JHIGH,JHIST,
           +     JHORIZ,JID,JINCOM,JINFLR,JLEADR,JLOCK,JLOCN,JLOS,JMESS,
           +     JMODS,JNBRS,JNSGEN,JNUM,JNVAL,JNXT,JOWNER,JPAR,
           +     JPAR1,JPAR2,JPAR3,JPEN,JPLACE,JPLANS,JPORT,JPORTS,
           +     JPOSTR,JPRCPS,JPROPS,JPSTAT,JRCVRS,JRMACC,JROOFS,JROOMS,
           +     JRTYPE,JSENS,JSINK,JSITN,JSOPS,JSOURC,JSTAIR,JSTARS,
           +     JSTAT,JSUBJ,JSUBS,JSUCRS,JSUPRN,JTIM,JTIME,
           +     JTIMRQ,JTREQ,JTYPE,JVAL,JVEHS,JVEL,JVERT,JVIEW,
           +     JVIS,JWALLS,JWEAPS,JXCO,JXCO1,JXCO2,JXLEN,JYARDS,JYCO,
           +     JYCO1,JYCO2,JYLEN,JZCO,JZLEN,KAFE,KAIR,KALARM,KAPC
 8          COMMON /PARS2/
```

COMMON BLOCKS - ALL PROGRAMS

```
ISN
        +     KBARS,KBINFL,KBINRC,KBINRY,KBRBLD,KBRICK,KCAPNG,KCAPTR,
        +     KCAR,KCLEAN,KCLOSD,KCOMAL,KCOMBT,KCOMCB,KCOMIF,KCOMNG,
        +     KCOMPH,KCPTRG,KCRAWL,KCRDSN,KCRED1,KCRED2,KCRED3,KDANGR,
        +     KDARK,KDEAD,KDESTR,KDETFI,KDETHV,KDETNG,KDETPN,KDETSK,
        +     KDETST,KDETVE,KECH1,KECH2,KECH3,KEFFCL,KEQPCL,
        +     KFIGRN,KFILAW,KFIMG,KFIRIF,KFIRNG,KFTRSK,KFRTSK,KGLASS,
        +     KGMASK,KGRNAD,KHEL,KIMMOB,KKEY,KKEYLK,KLAMIN,KLATER,
        +     KLAW,KLIGHT,KLIM1,KLIM2,KLIM3,KLIM4,KLIM5,KLOCKD,KLOCKR,
        +     KLSPKR,KMCGUN,KMETSN,KMODNS,KMOVE,KMOVNG,KMOVSK,KNGAS,
        +     KNKYLK,KNLOCK,KNOISY,KNVGAS,KOPEN,KOPERL,KORDER,KPBLIC,
        +     KPHONE,KPICFL,KPICRC,KPISTL,KPLAN,KPLNNG,KPOPAQ,KPORCL,
        +     KPORSN,KPPKEY,KPPOPE,KPPUNL,KPPWEP,KPSN,KPSNCL,
        +     KPV1SN,KPV2SN,KPWHOL,KPWOUN,KQUIET,KRADAL,KRADIO,KRADO2,
        +     KREST,KRIFLE,KRSTNG,KRUN,KSABOT,KSAFE,KSCALE,KSCALR,
        +     KSECRT,KSECUR,KSENAC,KSENCL,KSFE,KSHBUL,KSHGAS,
        +     KSIGNL,KSITN1,KSITN2,KSITN3,KSITN4,KSITN5,KSNM,KSNMON
  9     COMMON /PARS3/
        +     KSNMSN,KSTAT,KSTEEL,KSTOLN,KTGARV,KTGAS,KTGPO3,KTGPO6,
        +     KTGPO7,KTGPSN,KTGSEN,KTGVEH,KTOPAQ,KTRANP,KTRGAS,KTRIPD,
        +     KTRUCK,KVEH,KVEHCL,KVEST,KVFAST,KVISFI,KVISMV,KVISST,
        +     KVNORM,KVOICE,KVOLUM,KWALK,KWALL,KWEPCL,KWHOLE,KWIRE,
        +     KWOOD,KWORKR,KWOUND,KXPLSN,KXPRES,LACTD,LACTN,LBARR,
        +     LBLDG,LCHNG,LCOMNT,LDOOR,LEQUIP,LFLOOR,LFORCE,LFUNC,LGOAL,
        +     LGROUP,LHALL,LINODE,LLIST,LLOCN,LMESS,LPERCP,LPERSN,
        +     LRELN,LROOF,LROOM,LSENS,LSITE,LSTAIR,LVEHIC,LWEAP,
        +     LWIND,LYARD,NACPAR,NACSTP,NACTTP,NACTVY,NALLEG,NATTRK,
        +     NCHEM,NCOMRK,NCOMTP,NDETCL,NDETTP,NDTYPE,NDWPTP,NENG,NEQPTP,
        +     NEVAL,NFDXRC,NFEATR,NFORWD,NGENRC,NHFLIM,NINFRQ,NIXSID,
        +     NLIGHT,NLOCK,NMOVCL,NMPOTP,NNMSIT,NNOISE,NOBJCL,NOCTNT,
        +     NPCOND,NPCRED,NPEN,NPERSN,NPHCAT,NPORST,NPOTP,NPSITE,NPSNTP,
        +     NRELTP,NRLPAR,NRNGCL,NRNGXS,NROLTP,NSECRQ,NSENTP,NSHDTP,
        +     NSIDE,NSKLTP,NSNRTP,NSPOTP,NSTATE,NSTDDV,NTGTTP,NVEHTP,
        +     NVOLOR,NVOPCL,NVOPTP,NWEPRK,NVIS,NWEPTP,NWTCL,
        +     NDATAV,NPARSQ
 10     COMMON /DATAV/ ACTRAT(25),AREA(25),BASLOD(7,2),COMDLA(7),
        +     DEGVUL(7,2),DETANG(8),DETPHI,DETRAT(3),DETSEN(17,7),
```

```
ISN
           +      DNGDET(9,2),DNGWEP(5,8),DTPLAN,DTSEC,EVALN(60),HFLIMS(5,2),
           +      IACTTP(25),IARMTP(4),ICOMRQ(2,5,25),IFIRTP(7),IRNKWP(7,7),
           +      ISECAC(25),ISECRQ(4,2),LABEL(25),MINPLR(2),MPEN(5),
           +      NDTSEC(25),PK(7,7),POBATT(31),POBPSN(2,2,7),
           +      POBSEN(2),POBVEH(2,2),POSTUR(25),PSIG(8,7,7),
           +      PWOUND(7,7),RESFIR(50),RESMOV(50),RESOBS(50),
           +      RESPLN(50),RESSUR(50),RESPTM,RESWND(50),RISK(4,2),
           +      RNGLET(7),RNGMAX(7),RNGMIN(7),SENRNG(7),
           +      SKILL(4,2,50),SUPDEC(2),SUPFIR(2),SUPMOV(2),SUPOBS(2),
           +      TFIN,TSTALE,WIDTH(5)
 11         DIMENSION ACTTIM(25)
 12         EQUIVALENCE (ACTTIM(1),ACTRAT(1))
 13         COMMON /RECREF/ IGOALS,IRSITE,ISITE,IMNOBS(4),IOBSV(50),LASMNT,
           +      LINTCP(50),LNODIN(2),LOCAL(5),NOLDSN,NWSNLT
 14         DIMENSION RECRFQ(140)
 15         EQUIVALENCE (RECRFQ(1),IGOALS)
 16         COMMON /GARCOL/ ACTIVE(9800),ICRECS(30),IQ,IRECQ(1500),
           +      IVRECS(30),NCOLCT,NRECRF,NSTACK
 17         LOGICAL*1 ACTIVE
 18         COMMON /PARS4/ JTMIN,KAND,KEQ,KEQF,KGE,KGEF,KGT,KGTF,KIF,KLE,
           +      KLEF,KLT,KLTF,KNE,KNEF,KNOT,KOR,KUNTIL,KWHEN
```

BLOCK DATA - ALL PROGRAMS

```
ISN
  1          BLOCK DATA
  2          COMMON /PARS/
  3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  4          REAL*8 DTPNAM,FLDNAM,FORMOT
  5          COMMON /PARS1/
  6          COMMON /PARS2/
  7          COMMON /PARS3/
  8          COMMON /GARCOL/
  9          LOGICAL*1 ACTIVE
 10          COMMON /PARS4/
      C
 11          DATA
           +      JACSON/18/,JACTIV/15/,JADVRQ/6/,JADVPS/5/,JALLEG/4/,
           +      JAMT/2/,JATTR/3/,JBARIN/17/,JBARRS/6/,JBLDGS/1/,
           +      JCBARS/3/,JCBDGS/12/,JCMNTS/12/,JCONT/5/,JCONTS/4/,
           +      JCOV/11/,JCOVRG/4/,JCOV1/12/,JCOV2/13/,JCOV3/14/,
           +      JCOV4/15/,JCRED/5/,JDOER/6/,JDRACC/13/,JDRIVR/7/,
           +      JELEMS/3/,JENVIR/7/,JEQPRQ/5/,JFALEG/2/,JFLDR/3/,
           +      JFLOOR/13/,JFLRS/4/,JFPLNS/7/,JFRAC/3/,JFSOPS/8/,
           +      JFSTAT/5/,JGARDS/4/,JHALLS/5/,JHIGH/10/,JHIST/3/,
           +      JHORIZ/14/,JID/1/,JINCOM/5/,JINFLR/9/,JLEADR/10/,
           +      JLOCK/9/,JLOCN/3/,JLOS/10/,JMESS/3/,JMODS/5/,
           +      JNBRS/6/,JNSGEN/5/,JNUM/2/,JNVAL/4/,JNXT/1/,JOWNER/5/,
           +      JPAR/2/,JPAR1/2/,JPAR2/3/,JPAR3/4/,JPEN/11/,JPLACE/4/,
           +      JPLANS/16/,JPORT/16/,JPORTS/9/,JPOSTR/8/,JPRCPS/13/,
           +      JPROPS/4/,JPSTAT/2/,JRCVRS/2/,JRMACC/12/,JROOFS/6/,
           +      JROOMS/4/,JRTYPE/6/,JSENS/5/,JSINK/2/,JSITN/6/,
           +      JSOPS/17/,JSOURC/1/,JSTAIR/8/,JSTARS/6/,JSTAT/8/
 12          DATA
           +      JSUBJ/2/,JSUBS/11/,JSUCRS/2/,JSUPRN/7/,JTIM/4/,
           +      JTIME/4/,JTIMRQ/3/,JTREQ/14/,
           +      JTYPE/1/,JVAL/2/,JVEHS/6/,JVEL/6/,JVERT/15/,JVIEW/2/,
           +      JVIS/12/,JWALLS/5/,JWEAPS/9/,JXCO/1/,JXCO1/1/,
           +      JXCO2/3/,JXLEN/8/,JYARDS/2/,JYCO/2/,JYCO1/2/,JYCO2/4/,
           +      JYLEN/9/,JZCO/3/,JZLEN/10/,KAFE/2/,KAIR/1/,KALARM/6/,
```

BLOCK DATA - ALL PROGRAMS

```
ISN
          +     KAPC/3/,KBARS/5/,KBINFL/1/,KBINRC/2/,KBINRY/1/,
          +     KBRICK/7/,KCAPNG/4/,KCAPTR/2/,KCAR/1/,KBRBLD/11/,
          +     KCLEAN/1/,KCLOSD/3/,KCOMAL/22/,KCOMBT/3/,KCOMCB/21/,
          +     KCOMIF/24/,KCOMNG/6/,KCOMPH/23/,KCPTRG/20/,KCRAWL/1/,
          +     KCRDSN/7/,KCRED1/1/,KCRED2/2/,KCRED3/3/,KDANGR/2/,
          +     KDARK/1/,KDEAD/1/,KDESTR/1/,KDETFI/18/,KDETMV/17/,
          +     KDETNG/3/,KDETPN/2/,KDETSK/4/,KDETST/16/,KDETVE/1/,
          +     KECH1/1/,KECH2/2/,KECH3/3/,KEPFCL/6/,KEQPCL/2/,
          +     KEQPTP/5/,KFIGRN/15/,KFILAW/14/,KFING/13/,KFIRIF/12/,
          +     KFIRNG/2/,KFIRSK/3/,KFRTSK/2/,KGLASS/2/,KGMASK/5/
 13        DATA
          +     KGRNAD/5/,KHEL/4/,KIMMOB/2/,KKEY/1/,KKEYLK/2/,
          +     KLAMIN/9/,KLATER/1/,KLAW/4/,KLIGHT/2/,KLIM1/1/,
          +     KLIM2/2/,KLIM3/3/,KLIM4/4/,KLIM5/5/,KLOCKD/4/,
          +     KLOCKR/1/,KLSPKR/7/,KMCGUN/3/,KMETSN/2/,KMODNS/2/,
          +     KMOVE/2/,KMOVNG/1/,KMOVSK/1/,KNGAS/3/,KNKYLK/3/,
          +     KNLOCK/1/,KNOISY/3/,KNVGAS/7/,KOPEN/2/,KOPERL/3/,
          +     KORDER/2/,KPBLIC/1/,KPHONE/1/,KPICFL/3/,KPICRC/4/,
          +     KPISTL/1/,KPLAN/25/,KPLNNG/7/,KPOPAQ/1/,KPORCL/7/,
          +     KPORSN/4/,KPPKEY/9/,KPPOPE/7/,KPPUNL/8/,KPPWEP/10/,
          +     KPSN/2/,KPSNCL/4/,KPSNTP/1/,KPV1SN/5/,KPV2SN/6/,
          +     KPWHOL/2/,KPWOUN/1/,KQUIET/1/,KRADAL/2/,KRADIO/2/,
          +     KRADO2/3/,KREST/19/,KRIFLE/2/,KRSTNG/5/,KRUN/3/,
          +     KSABOT/3/,KSAFE/1/,KSCALE/4/,KSCALR/2/,KSECRT/2/,
          +     KSECUR/5/,KSENAC/2/,KSENCL/5/,KSFE/1/,KSHBUL/1/,
          +     KSHGAS/2/,KSIGNL/5/,KSITN1/1/,KSITN2/2/,
          +     KSITN3/3/,KSITN4/4/,KSITN5/5/,KSNM/3/,KSNMON/2/
 14        DATA
          +     KSNMSN/3/,KSTAT/1/,KSTEEL/8/,KSTOLN/4/,KTGARV/1/,
          +     KTGAS/2/,KTGPO3/5/,KTGPO6/6/,KTGPO7/7/,KTGPSN/3/,
          +     KTGSEN/4/,KTGVEH/2/,KTOPAQ/2/,KTRANP/3/,KTRGAS/6/,
          +     KTRIPD/2/,KTRUCK/2/,KVEH/1/,KVEHCL/3/,KVEST/4/,
          +     KVFAST/6/,KVISPI/3/,KVISMV/2/,KVISST/1/,KVNORM/5/,
          +     KVOICE/4/,KVOLUN/1/,KWALK/2/,KWALL/6/,KWEPCL/1/,
          +     KWHOLE/4/,KWIRE/3/,KWOOD/4/,KWORKR/1/,KWOUND/3/,
          +     KXPLSN/1/,KXPRES/2/,LACTD/21/,LACTN/25/,LBARR/8/,
```

BLOCK DATA - ALL PROGRAMS

```
ISN
         +      LBLDG/6/,LCHNG/4/,LCONNT/22/,LDOOR/14/,LEQUIP/17/,
         +      LFLOOR/7/,LFORCE/30/,LGOAL/28/,LGROUP/27/,LHALL/11/,
         +      LINODE/29/,LLIST/2/,LLOCN/3/,LMESS/24/,LPERCP/23/,
         +      LPERSN/19/,LRELN/26/,LROOF/12/,LROOM/10/,LSENS/20/,
         +      LSITE/5/,LSTAIR/13/,LVEHIC/18/,LWEAP/16/,LWIND/15/,
         +      LYARD/9/,NACPAR/3/,NACSTP/25/,NACTTP/8/,NACTVY/7/,
         +      NALLEG/2/,NATTRK/5/,NCHEM/3/,NCOMRK/7/,NCOMTP/7/,
         +      NDETCL/3/,NDETTP/9/,NDTYPE/30/,NDWPTP/8/,NENG/3/
15         DATA
         +      NEVAL/60/,NFDXRC/250/,NFEATR/31/,NFORWD/12/,NGENRC/4/,
         +      NHFLIM/5/,NINFRQ/2/,NIXSID/4/,NLIGHT/2/,NLOCK/3/,
         +      NMOVCL/2/,NMPOTP/17/,NNMSIT/4/,NNOISE/3/,NOBJCL/7/,
         +      NOCTNT/8/,NPCOND/2/,NPCRED/3/,NPEN/9/,NPERSN/50/,
         +      NPHCAT/4/,NPORST/5/,NPOTP/25/,NPSITN/4/,NRELTP/20/,
         +      NRLPAR/2/,NRNGCL/4/,NRNGXS/8/,NROLTP/3/,NSECRQ/2/,
         +      NSENTP/7/,NSHDTP/2/,NSIDE/2/,NSKLTP/4/,NSNRTP/4/,
         +      NSPOTP/8/,NSTDDV/2/,NTGTTP/7/,NVEHTP/4/,NVIS/3/,
         +      NVOLOR/2/,NVOPCL/2/,NVOPTP/5/,NWEPRK/7/,NWEPTP/7/,
         +      NWTCL/4/,NSTATE/41900/,NPARSQ/1690/,NDATAV/2103/,LFUNC/31/,
         +      JTMIN/15/
16         DATA NCOLCT/9610/,NRECRF/140/,NSTACK/1500/
17         DATA NRECS/1,4000,800,200,6,8,12,30,60,40,12,10,20,120,100,
         +      600,720,36,350,720,20,20,900,300,500,300,10,10,120,24/
18         DATA NFLDS/16,2,4,4,10,10,12,12,15,13,13,11,10,17,16,
         +      2,2,7,18,6,4,3,4,5,6,3,4,6,5,8/
19         DATA MACTTP/3,3,5, 3,3,2, 2,3,2, 3,5,2/
20         DATA MRELTP/24*4,12*3/
21         DATA NULL/-9999/,IFAIL/-9998/,IOK/0/
22         DATA IDTPOK/8*0,7*1,2*0,3*2,10*0/
23         DATA
         +      KLT/1/,KLE/2/,KEQ/3/,KNE/4/,KGT/5/,KGE/6/,KLTF/7/,
         +      KLEF/8/,KEQF/9/,KNEF/10/,KGTF/11/,KGEF/12/,KAND/13/,
         +      KOR/14/,KNOT/15/,KIF/16/,KUNTIL/17/,KWHEN/18/
24         END
```

7.2 *Plex Preprocessor*

This subsection contains listings for the Plex Preprocessor. Detailed contents of the common blocks for this program are displayed in section 7.1. Utility routines, used to process the plex structure and associated lists, are in section 7.5.[1] All other subprograms are listed following the main program. Detailed verbal discussions of the logic of the main program and its subprograms may be found in section 2.1, in volume 1 of this manual.

---

[1]Essentially, those routines needed to accomplish the processing as described in section 3.3, in volume 1 of this manual.

PLEX PREPROCESSOR -MAIN PROGRAM

```
ISN
      C     MAIN ROUTINE OF THE PLEX PREPROCESSOR.  THE PLEX PREPROCESSOR
      C  READS IN THE PLEX RECORD DESCRIPTION, THE INITIAL PLEX DATA FILE,
      C  AND THE RESPONSE FORCE DATA FILE, CONVERTING THEM TO INTERNAL FORM
      C  AND STORING THEM IN COMMON /STATEV/.  AS IT READS IN THE PLEX
      C  STRUCTURE IT DOES ERROR CHECKING AND ALERTS THE USER TO ANY ERRORS
      C  ENCOUNTERED.  THE PLEX PREPROCESSOR ALSO GENERATES THE VALUES OF
      C  CERTAIN VARIABLES BASED ON THE USER INPUT, RELIEVING HIM OF THE
      C  NECESSITY OF INPUTTING DATA WHICH CAN BE INFERRED FROM A BASIC SET.
      C  AFTER THE PLEX PREPROCESSOR HAS READ AND STORED THE PLEX STRUCTURE,
      C  IT WRITES IT OUT.  A COPY OF THE PLEX STRUCTURE IS WRITTEN IN
      C  EXTERNAL FORM SIMILAR TO THE INPUT PLEX STRUCTURE, TO ALLOW THE
      C  USER TO CHECK THAT THE PROCESSING WAS SATISFACTORY AND TO ALLOW HIM
      C  TO OBSERVE ANY CORRECTIONS MADE.  THE PLEX PREPROCESSOR ALSO
      C  WRITES SEVERAL LARGE BINARY DATA BLOCKS SO THAT IT CAN TRANSMIT
      C  THE INTERNAL PLEX STRUCTURE BUILT TO THE MAIN SIMULATION.  A THIRD
      C  OUTPUT PRODUCED IS A MAP OF THE SITE DEFINED BY THE PLEX STRUCTURE.
      C
      C  INPUT FILES:
      C      3   RECORD DESCRIPTION FILE
      C      4   RECORD DATA FILE
      C      5   RESPONSE FORCE FILE
      C  OUTPUT FILES
      C      6   BINARY PLEX STRUCTURE
      C      7   ERROR COMMENTS
      C      8   PLEX STRUCTURE IN EXTERNAL FORM
      C      9   MAP OF SITE
      C
            COMMON /STATEV/
            DIMENSION ITEM(41900),DITEM(41900)
            EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
            COMMON /PARS/
            EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
            REAL*8 DTPNAM,FLDNAM,FORMOT
            COMMON /PARS1/
            COMMON /PARS2/
```

FLEX PREPROCESSOR -MAIN PROGRAM

```
      COMMON /PARS3/
      COMMON /RECREF/
      DIMENSION RECREQ(140)
      EQUIVALENCE (RECREQ(1),IGOALS)
      COMMON IDATA(50),IMAX(50),IMIN(50),IUSED(10100),MAXLIS
      DIMENSION XMIN(50),XMAX(50),DATA(50)
      EQUIVALENCE (XMAX(1),IMAX(1)),(XMIN(1),IMIN(1))
      EQUIVALENCE(DATA(1),IDATA(1))
      LOGICAL ENDFL1,ENDFL2
C
C ... TEMPORARY CODE UNTIL PARS UPDATED
      MINSDR = 5
      KINSDR = 4
C
C  INITIALIZE VARIABLES
C
      CALL INITPP
C
C  ESTABLISH INTERNAL BUFFER
C
      CALL FTNCMD('BUFFER 99 LENGTH=300',20)
C
C  INPUT RECORD DESCRIPTIONS
C
      NDTYPE=1
      CALL INDESC(3)
C
C ... SET UP FOR INPUT OF PLEX DATA
C
      CALL FTNCMD('SET MODECHECK=OFF',17)
      MAXLIS=0
      ENDFL1=.FALSE.
      ENDFL2=.FALSE.
      N=1
      DO 5 I=2,NDTYPE
    5 N=N+NRECS(I)
```

```
ISN
31             CALL NULIFY(IUSED,N)
      C
      C ... GET FIXED INITIAL DATA
      C
32    10       CALL INPLEX(4,IDTYP)
33             IF(IDTYP.EQ.LSITE) ISITE=NEWREF(LSITE,LSTREC(LSITE),0)
34             IF(IDTYP.EQ.LPERCP) GO TO 20
35             IF(IDTYP.NE.NULL) GO TO 10
36             ENDFL1=.TRUE.
      C
      C ... GET FIXED RESPONSE FORCE DATA
      C
37    20       CALL INPLEX(5,IDTYP)
38             IF(IDTYP.EQ.LPERCP) GO TO 205
39             IF(IDTYP.EQ.LSITE) IRSITE=NEWREF(LSITE,LSTREC(LSITE),0)
40             IF(IDTYP.NE.NULL) GO TO 20
41             ENDFL2=.TRUE.
      C
      C   -- CHECK CONTENT FIELD OF ALL REGIONS FOR LOCATIONS
      C        OF PLAYERS,VEHICLES,SENSORS, AND ACTIVATED DELAYS
      C      DO PERSONS AND VEHICLES FIRST. WHILE DOING PERSONS
      C      PERFORM INSIDER CHECK ALSO
      C
42       205 NN=0
43             DO 220 JL=JGARDS,JVEHS
44                  IPLRST=IVAL(JL,ISITE)
45                  IPLARF=IFIRST(IPLRST,KA)
46    210           IF(IPLARF .EQ. NULL) GO TO 220
47                  CALL KONTNT(IPLARF)
48                  CALL PARSRF(IPLARF,ID,IREC,IDUM)
49                  IF(ID .NE. LPERSN) GO TO 212
50                  IF(IVAL(JTYPE,IPLARF) .NE. KINSDR) GO TO 212
51                  NN = NN + 1
52                  IF(NN .LE. KINSDR) GO TO 211
53     1002         FORMAT('0*** MORE THAN',I2,' INSIDERS ENCOUNTERED'/
           +     ' PERSON',I3,' CHANGED TO COMBATANT')
```

PLEX PREPROCESSOR -MAIN PROGRAM

```
ISN
54                  WRITE(7,1002) NINSOR,IREC
55                  GO TO 212
56     211          CALL INCHK(IPLARF,NN)
57     212          IPLARF=NEXT(IPLRST,KA)
58                  GO TO 210
59     220     CONTINUE
       C
       C INSURE SENSORS AND ACTIVATED DELAYS ON APPROPRIATE
       C CONTENTS LISTS.  ALSO FOR SENSORS, INSURE THEY ARE
       C ON APPROPRIATE SENSOR LISTS
60             DO 250 IDTYP=LSENS,LACTD
61                  NN=LSTREC(IDTYP)
62                  IF(NN .LE. 0) GO TO 250
63                  DO 240 I=1,NN
64                       IRECRF=NEWREF(IDTYP,I,0)
65                       CALL KONTNT(IRECRF)
66                       IF(IDTYP .EQ. LACTD) GO TO 240
       C
       C  MARK COVERAGE FIELDS FOR SENSORS
       C
67                       ICOVLS=IVAL(JCOVRG,IRECRF)
68                       ILOC=IFIRST(ICOVLS,KC)
69     230               IF(ILOC .EQ.  NULL) GO TO 240
70                       ILIST=IVAL(JSENS,ILOC)
       C
       C  SEE IF ILOC HAS THIS SENSOR ON COVERAGE LIST
       C
71                       ION=LSRCH(ILIST,IRECRF,NULL,NULL,NULL)
72                       IF(ION .NE. NULL) GO TO 235
       C
       C  ADD TO COVERAGE LIST
       C
73                       ILIST=ISTACK(IRECRF,ILIST)
74                       IPTR=IREF1(ILOC)
75                       ITEM(IPTR+JSENS)=ILIST
76     235               ILOC=NEXT(ICOVLS,KC)
```

```
ISN
77                    GO TO 230
78    240          CONTINUE
79    250     CONTINUE
      C
      C ADD FORCE REFERENCE TO JACSON FIELD OF PERSONS
      C
80            NN=LSTREC(LFORCE)
81            IF(NN .LE. 0) GO TO 30
82            DO 260 I=1,NN
83               IFORC=NEWREF(LFORCE,I,0)
84               ILIST=IVAL(JCONTS,IFORC)
85               IPLARF=IFIRST(ILIST,KP)
86    255        IF(IPLARF .EQ. NULL) GO TO 260
      C
      C   ONLY CONCERNED WITH PERSONS
      C
87               CALL PARSRF(IPLARF,IDTYP,IRECNO,IDUM)
88               IF(IDTYP .NE. LPERSN) GO TO 258
      C .
      C ... INSURE THAT INSIDER NOT INCLUDED ON FORCE
      C
89               IF(IVAL(JTYPE,IPLARF) .NE. KINSDR) GO TO 256
90               CALL DELIST(KP,JCONTS,IFORC)
91     1001      FORMAT('0*** INSIDER INCLUDED IN FORCE',I2,' ERRONEOUSLY',//
            + ' PERSON-',I2,' DELETED FROM FORCE CONTENTS')
92               WRITE(7,1001) I,IRECNO
93               GO TO 258
      C
94    256        IPTR=IREFI(IPLARF)
95               ITEM(IPTR+JACSON)=IFORC
96    258        IPLARF=NEXT(ILIST,KP)
97               GO TO 255
98    260     CONTINUE
      C
      C ... INPUT OF FIXED PLEX RECORDS COMPLETE
      C       SET NRECSO
```

PLEX PREPROCESSOR -MAIN PROGRAM

```
 ISN
        C
  99   30     DO 40 I=1,NDTYPE
 100                NRECSO(I)=LSTREC(I)
 101   40     CONTINUE
        C
        C ... GET REPLACEABLE INITIAL DATA
        C
 102          IF(ENDFL1) GO TO 60
 103   50     CALL INPLEX(4,IDTYP)
 104          IF(IDTYP.NE.NULL) GO TO 50
        C
        C ... GET REPLACEABLE RESPONSE FORCE DATA
        C
 105   60     IF(ENDFL2) GO TO 80
 106   70     CALL INPLEX(5,IDTYP)
 107          IF(IDTYP.NE.NULL) GO TO 70
        C
        C ... REVIEW IUSED TO IDENTIFY UNSATISFIED REFERENCES
        C     PROCESS LISTS SEPARATELY
        C
 108     80   DO 90  I=1,MAXLIS
 109                LISREF=IUSED(I)
 110                IF(LISREF.EQ.NULL) GO TO 90
 111                CALL PARSPT(LISREF,IDTYP,IRN,IFN)
 112                IF(IDTYP.EQ.LLIST) GO TO 90
        C
        C ...       LIST REFERENCED BUT NOT INITIALIZED
        C     RETURN LIST NODE TO AVAILABLE SPACE LIST
        C
 113                IRECRF=IVALI(LISREF)
 114                IPTR=IREFI(LISREF)
 115                ITEM(IPTR)=NULL
 116                CALL DELREC(IRECRF)
 117                CALL ERR(15,3,LLIST,I,I)
 118     90   CONTINUE
        C
```

```
ISN
     C ... LISTS CLEANED UP, NOW DO OTHER RECORDS
     C
119           N1=LLIST+1
120           DO 120 IDTYP=N1,NOTYPE
121                N2=LSTREC(IDTYP)
122                IF(N2.LE.0) GO TO 120
123                JJ=IUSPTR(IDTYP,0,LLIST,NRECS,NULL)
     C
     C ... IF AVAILABLE SPACE LIST EXISTS, CLEAN IT UP
     C
124      92          IF(IAVAIL(IDTYP) .EQ. NULL) GO TO 95
125                  IRECTP = NEWREF(IDTYP,IAVAIL(IDTYP),0)
126                  IAVAIL(IDTYP) = IVAL(JNXT,IRECTP)
127                  IRECTP = IREF(1,IRECTP)
128                  CALL NULIFY(ITEM(IRECTP),NFLDS(IDTYP))
129                  GO TO 92
130      95        DO 110 I=1,N2
131                     MVAL=IUSED(JJ+I)
132                     IF(MVAL.EQ.1) GO TO 110
133                     CALL DELREC(NEWREF(IDTYP,I,0))
134                     IF(MVAL.EQ.NULL) GO TO 100
     C
     C ...                  REFERENCED BUT NOT INITIALIZED
     C
135                     CALL ERR(15,9,IDTYP,I,IDUM)
136                     GO TO 110
     C
     C ...                  RECORD SKIPPED IN SEQUENCE
     C
137  100                CALL ERR(16,9,IDTYP,I,IDUM)
138  110           CONTINUE
139     120 CONTINUE
     C
     C  OUTPUT PLEX STRUCTURE IN EXTERNAL FORM
     C
140           DO 150 IDTYP=LLIST,NOTYPE
```

```
 ISN
141              LAST=LSTREC(IDTYP)
142              CALL AUTPLX(IDTYP,1,LAST,8,1,1)
143    150   CONTINUE
       C
       C  OUTPUT MAP OF SITE
       C
144    160   CALL MAPSIT
       C
       C  OUTPUT BINARY COMMON BLOCKS
       C
145          CALL OUTBLK(ITEM(1),ITEM(20001),DTPNAM(1),20000,NSTATE-20000,
           +      NPARSO)
       C
146          STOP
147          END
```

```
      SUBROUTINE AUTLIS(LISREF,LUNO)
C
C ... OUTLIS IS USED TO PRINT A LIST OF SYMBOLIC
C     REFERENCES.
C     INPUT PARAMETERS
C          LISREF ... A LIST REFERENCE FOR LIST TO BE PRINTED
C          LUNO   ... LU# FOR OUTPUT
      COMMON /PARS/
      EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
      REAL*8 DTPNAM,FLDNAM,FORMOT
      COMMON IDATA(50),IMAX(50),IMIN(50),IUSED(10100),MAXLIS
      DIMENSION XMIN(50),XMAX(50),DATA(50)
      EQUIVALENCE (XMAX(1),IMAX(1)),(XMIN(1),IMIN(1))
      EQUIVALENCE(DATA(1),IDATA(1))
C
C ... IF NOT A LIST RETURN
C
      I=IFIRST(LISREF,LPTR)
      IF(LPTR.EQ.NULL) RETURN
      CALL PARSRF(LISREF,IRF,ILIS,IDUM)
      MPTR=0
      MFLDS=0
C
C ... BUILD OUTPUT LIST IN IDATA
C
   10 IF(I.LT.1000000000) GO TO 20
      MFLDS=MFLDS+1
      CALL PARSRF(I,IDTYP,IRECNO,IFLD)
      MPTR=MPTR+1
      DATA(MPTR)=DTPABR(IDTYP)
      MPTR=MPTR+1
      IDATA(MPTR)=IRECNO
      IF(MFLDS.LT.14) GO TO 20
C
C ... LINE COMPLETE, OUTPUT IT
```

PLEX PREPROCESSOR - AUTLIS SUBROUTINE

```
ISN
      C
22          WRITE(LUNO,1000) ILIS,(IDATA(I),I=1,28)
23          NFLDS=0
24          NPTR=0
25    20    I=NEXT(LISREF,LPTR)
26          IF(I.NE.NULL) GO TO 10
      C
      C ... END OF LIST PRINT LINE
      C
27          IF(NFLDS.EQ.0) RETURN
28          WRITE(LUNO,1000) ILIS,(IDATA(I),I=1,NPTR)
29    1000  FORMAT(' ',I4,2X,14(A2,I4,2X))
30          RETURN
31          END
```

PLEX PREPROCESSOR - AUTPLX SUBROUTINE

```
ISN
 1          SUBROUTINE AUTPLX(IDTYP,MREC1,MREC2,LUNO,MODE1,MODE2)
      C ... A ROUTINE TO OUTPUT PLEX RECORDS ON LOGICAL UNIT SPECIFIED
      C     BY CALLING PROGRAM.
      C
      C ... PARAMETERS:
      C          IDTYP ... RECORD DATATYPE
      C          IREC1 ... 1ST RECORD NUMBER TO BE PRINTED
      C          IREC2 ... LAST RECORD NUMBER TO BE PRINTED.
      C          MODE1 ... 0 PRINT RECORD WITHOUT HEADINGS
      C                    1 PRINT RECORD WITH HEADINGS
      C          MODE2 ... 0 DO NOT PRINT REFERENCED LISTS
      C                    1 PRINT REFERENCED LISTS
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
 8          COMMON /PARS3/
 9          COMMON IDATA(50),IMAX(50),IMIN(50),IUSED(10100),MAXLIS
10          DIMENSION XMIN(50),XMAX(50),DATA(50)
11          EQUIVALENCE (XMAX(1),IMAX(1)),(XMIN(1),IMIN(1))
12          EQUIVALENCE(DATA(1),IDATA(1))
13          REAL*8 BUF(50),BLANK,FMT(12)
14          DATA BLANK /8H        /
      C
      C ... INSURE ARGUMENTS IN RANGE
      C
15          I1REF=NULL
16          IF(IDTYP.LE.LLIST .OR. IDTYP.GT.NDTYPE) RETURN
17          IF(LSTREC(IDTYP).LE.0) RETURN
18          IREC1=MREC1
19          IREC2=MREC2
20          CALL FTNCMD('SET MODECHECK=OFF',17)
21          IRCMAX=NRECS(IDTYP)-NGENRC
```

PLEX PREPROCESSOR - AUTPLX SUBROUTINE

```
ISN
22          IF(IREC1.LE.0) IREC1=1
23          IF(IREC1.GT.IRCMAX) IREC1=IRCMAX
24          IF(IREC2.GT.IRCMAX) IREC2=IRCMAX
25          IF(IREC2.LT.IREC1) IREC2=IREC1
26          IF(IRECIO(IDTYP).NE.0) GO TO 300
      C
      C ... INITIALIZATION FOR IRECIO=0
      C
27          DO 5 I=1,12
28        5 FMT(I)=FORMOT(I,IDTYP)
29          IF(FMT(1).EQ.BLANK) RETURN
30          NBASE=IREF1(NEWREF(IDTYP,NRECS(IDTYP),0))
31          NFLD=NFLDS(IDTYP)
      C
      C ... COUNT NUMBER OF FIELDS TO BE OUTPUT
      C     AND MOVE FLDNAMES TO BUF
      C
32          NFPTR=IFDNPT(IDTYP)
33          NFLD1=1
34          DO 6 I=1,NFLD
35          IF(ITEM(NBASE+I).GT.3) GO TO 6
36          BUF(NFLD1)=FLDNAM(I+NFPTR)
37          NFLD1=NFLD1+1
38        6 CONTINUE
39          MLIST=0
40          IF(MODE1.EQ.0) GO TO 7
      C
      C ... PRINT HEADING
      C
41          IF (LUNO .EQ. 6) WRITE(LUNO,1003) DTPNAM(IDTYP)
42          IF (LUNO .NE. 6) WRITE(LUNO,1002) DTPNAM(IDTYP)
43     1002 FORMAT(' ',/,A8)
44     1003 FORMAT (' '/'NEW ',A8,' RECORD:')
45          NN=NFLD1-1
46          WRITE(LUNO,1001) BLANK,(BUF(I),I=1,NN)
      C
```

```
ISN
     C ... START RECORD PROCESSING LOOP....................................
     C
47      7 DO 100 IREC=IREC1,IREC2
48            IDATA(1)=IREC
49            NPTR=1
50            CALL NZERO(IUSED,50)
51            IPTR=IREF1(NEWREF(IDTYP,IREC,0))
52             IF(IPTR .EQ. NBASE) GO TO 100
     C
     C ... CHECK FOR NULL RECORD
     C
53                DO 109 I=2,NFLD
54                IF(ITEM(IPTR+I) .NE. NULL) GO TO 8
55   109          CONTINUE
     C
     C ... NULL RECORD UNLESS WEAPON OR EQUIPMENT
     C
56                IF(IDTYP.NE.LWEAP .AND. IDTYP.NE.LEQUIP) GO TO 100
     C
     C ... SPECIAL CHECK FOR WEAPON OR EQUIPMENT
     C
57                MTYP=ITEM(IPTR+1)
58                IF(MTYP .LE. 0) GO TO 100
59                IF(IDTYP.EQ.LWEAP .AND. MTYP.GT.NWEPTP) GO TO 100
60                IF(IDTYP.EQ.LEQUIP .AND. MTYP.GT.NEQPTP) GO TO 100
     C
     C ... IF IRECIO<>0 CALL OUTSET
     C
61   8        IF(IRECIO(IDTYP).EQ.0) GO TO 9
62            CALL OUTSET(IDTYP,NBASE,NFLD,NFLD1,IPTR,FMT)
63            IF(IRTNCD.EQ.IFAIL) GO TO 100
     C
     C ... BUILD RECORD IN IDATA
     C
64   9        DO 50 I=1,NFLD
65             ITYP=ITEM(NBASE+I)
```

```
ISN
66                   IF(ITYP.GT.3)   GO TO 50
67                   GO TO  (10,20,30),ITYP
      C
      C ...          INTEGER
      C
68         10        NPTR=NPTR+1
69                   IDATA(NPTR)=ITEM(IPTR+I)
70                   IF(IDATA(NPTR).NE.NULL)  GO TO 50
71                   IDATA(NPTR)=0
72                   IUSED(I)=1
73                   GO TO 50
      C
      C ...          REAL
      C
74         20        NPTR=NPTR+1
75                   DATA(NPTR)=DITEM(IPTR+I)
76                   IF(IDATA(NPTR).NE.NULL)  GO TO 50
77                   DATA(NPTR)=0.0
78                   IUSED(I)=1
79                   GO TO 50
      C
      C ...          REFERENCE
      C
80         30        IRECRF=ITEM(IPTR+I)
81                   IF(IRECRF.NE.NULL)  GO TO 35
82                   NPTR=NPTR+2
83                   IDATA(NPTR)=0
84                   IUSED(I)=1
85                   GO TO 50
86         35        CALL PARSRF(IRECRF,IDT,IRNO,IPN)
87                   NPTR=NPTR+1
88                   DATA(NPTR)=DTPABR(IDT)
89                   NPTR=NPTR+1
90                   IDATA(NPTR)=IRNO
91                   IF(IDT.NE.LLIST)  GO TO 50
      C
```

```
ISN
       C ...       SAVE LISREF
       C
 92                MLIST=MLIST+1
 93                IUSED(MLIST+50)=IRECRF
 94       50       CONTINUE
       C
       C ...       PRINT A RECORD
       C
 95             WRITE(99,FMT) (IDATA(I),I=1,NPTR)
 96             READ(99,1000)  (BUF(I),I=1,NFLD1)
 97     1000 FORMAT(A6,42A8)
 98     1001 FORMAT(A6,14A8,/,2X,14A8,/,4X,14A8)
       C
       C ... BLANK OUT NULL FIELDS
       C
 99                J=0
100             DO 70 I=1,NFLD
101                IF(ITEM(NBASE+I) .GT. 3)  GO TO 70
102                J=J+1
103                IF(IUSED(I).EQ.0)  GO TO 70
104                BUF(J+1)=BLANK
105       70    CONTINUE
106             WRITE(LUNO,1001)  (BUF(I),I=1,NFLD1)
107      100 CONTINUE
       C ... END RECORD PROCESSING LOOP......................
       C
       C ... IF REQUIRED, PRINT REFERENCED LISTS
       C
108          IF(MODE2.EQ.0.OR.MLIST.EQ.0)  GO TO 250
109          WRITE(LUNO,1002)  DTPNAM(LLIST)
110          DO 200 I=1,MLIST
111          CALL AUTLIS(IUSED(I+50),LUNO)
112      200 CONTINUE
113      250 IF(IIREF .NE. NULL)  CALL DELREC(IIREF)
114          RETURN
       C
```

PLEX PREPROCESSOR - AUTPLX SUBROUTINE

```
      C ... INITIALIZTION FOR IRECIO=1
      C
      300   MLIST=0
            IIREF=NEWREF(IDTYP,NRECS(IDTYP),0)
            IIREF=ICOPY(IIREF)
            NBASE=IREF1(IIREF)
                   NFLD=NFLDS(IDTYP)
            IF(MODE1.EQ.0) GO TO 7
      C
      C ... PRINT HEADING
      C
            N1=IFDNPT(IDTYP)+1
            N2=N1+NFLDS(IDTYP)-1
            IF (LUNO .NE. 6) WRITE(LUNO,1002) DTPNAM(IDTYP)
            IF (LUNO .EQ. 6) WRITE(LUNO,1003) DTPNAM(IDTYP)
            WRITE(LUNO,1001) BLANK,(FLDNAM(I),I=N1,N2)
            GO TO 7
            END
```

PLEX PREPROCESSOR - DSTAIR SUBROUTINE

```
ISN
  1         SUBROUTINE DSTAIR(ISTAIR,X0,Y0,XSCALE,YSCALE)
      C
      C        ROUTINE TO DRAW IN A REPRESENTATION OF A FLIGHT OF STAIRS ON
      C     A MAP.
      C
      C     INPUT PARAMETERS:
      C        ISTAIR    REFERENCE TO A STAIRS RECORD
      C        X0        X COORDINATE OF WEST SIDE OF BUILDING IN WHICH STAIRS
      C                  ARE LOCATED
      C        Y0        Y COORDINATE OF SOUTH SIDE OF BUILDING IN WHICH STAIRS
      C                  ARE LOCATED.
      C        XSCALE    SCALING FACTOR TO APPLY IN THE X DIRECTION
      C        YSCALE    SCALING FACTOR TO APPLY IN THE Y DIRECTION
      C
  2         COMMON /PARS1/
  3         COMMON //
  4         LOGICAL*1 MAP
      C
  5         LOGICAL*1 BAR/'|'/,DASH/'-'/
  6         DATA STRWID/1./
      C
      C     DETERMINE THE DIRECTION OF THE STAIRS
      C
  7         NBR = IVAL(JSTAIR,ISTAIR)
  8         XA = VAL(JXCO,ISTAIR)
  9         XB = VAL(JXCO,NBR)
 10         YA = VAL(JYCO,ISTAIR)
 11         YB = VAL(JYCO,NBR)
 12         IDIREC = 1
 13         X = ABS(XA - XB)
 14         IF (X .LT. .01) IDIREC = 2
      C
      C     BRANCH ACCORDING TO ORIENTATION OF THE STAIRS
      C
 15         IF (IDIREC .EQ. 2) GO TO 20
```

PLEX PREPROCESSOR - DSTAIR SUBROUTINE

```
ISN
      C  STAIRS ORIENTED PARALLEL TO THE X AXIS
16          IF (XB .LT. XA) GO TO 10
17             X1 = XA
18             X2 = XB
19             GO TO 12
20    10    X1 = XB
21          X2 = XA
22    12    MX = (X1-X0)*XSCALE + 1.0
23          NX = (X2-X0)*XSCALE + 1.0
24          MY = (YA-Y0-STRWID/2.)*YSCALE + 1.0
25          NY = (YA-Y0+STRWID/2.)*YSCALE + 1.0
26          DO 15 IY=MY,NY
27             DO 15 IX=MX,NX
28    15          MAP(IX,IY) = BAR
29          RETURN
      C
      C  STAIRS ORIENTED PARALLEL TO THE Y AXIS
30    20    IF (YB .LT. YA) GO TO 25
31             Y1 = YA
32             Y2 = YB
33             GO TO 30
34    25    Y1 = YB
35          Y2 = YA
36    30    MY = (Y1-Y0)*YSCALE + 1.0
37          NY = (Y2-Y0)*YSCALE + 1.0
38          MX = (XA-X0-STRWID/2.)*YSCALE + 1.0
39          NX = (XA-X0+STRWID/2.)*YSCALE + 1.0
40          DO 35 IY=MY,NY
41             DO 35 IX=MX,NX
42    35          MAP(IX,IY) = DASH
43          RETURN
44          END
```

PLEX PREPROCESSOR - IBLMAP FUNCTION

```
          FUNCTION IBLMAP(LX,LY,NC)
C   FUNCTION TO SEE IF A MAP HAS BLANKS IN IT BEGINNING AT (LX,LY)
C   AND CONTINUING FOR NC SPACES.
C
          COMMON /PARS/
          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
          REAL*8 DTPNAM,FLDNAM,FORMOT
          COMMON //
          LOGICAL*1 MAP
          LOGICAL*1 L
          INTEGER I/' '/,BL/' '/
          EQUIVALENCE (L,I)
          IBLMAP = 0
          LC=LX+NC
          IF (LC .GT. 120) RETURN
          IF (LY.LT.1 .OR. LY.GT.72) RETURN
          DO 10 K=1,NC
          L = MAP(LX+K-1,LY)
   10     IF (I .NE. BL) RETURN
          IBLMAP = 1
          RETURN
          END
```

PLEX PREPROCESSOR - INBLK SUBROUTINE

```
ISN
 1          SUBROUTINE INBLK(STATV,STATV2,PARS,DATAV,NSTATV,NSTV2,NPARS,
           +     NDATAV)
      C
      C     ROUTINE TO READ LONG BINARY RECORDS PASSED FROM THE INPUT
      C  PREPROCESSORS.
      C
      C  INPUT PARAMETERS:
      C     STATV     THE FIRST PORTION OF COMMON /STATEV/
      C     STATV2    THE SECOND PORTION OF COMMON /STATEV/
      C     PARS      A VECTOR EQUIVALENCED TO /PARS/
      C     DATAV     A VECTOR EQUIVALENCED TO /DATAV/
      C     NSTATV    THE SIZE OF STATV
      C     NSTV2     THE SIZE OF STATV2
      C     NPARS     THE SIZE OF PARS
      C     NDATAV    THE SIZE OF DATAV
      C
 2          DIMENSION STATV(NSTATV),STATV2(NSTV2),PARS(NPARS),DATAV(NDATAV)
      C
 3          READ (4) DATAV
 4          READ (5) STATV
 5          READ (5) STATV2
 6          READ (5) PARS
 7          RETURN
 8          END
```

PLEX PREPROCESSOR - INCHK SUBROUTINE

```
ISN
  1          SUBROUTINE INCHK(IPLARF,N)
       C     THIS SUBROUTINE IS CALLED BY PLEXPP TO VERIFY THAT AN
       C     INSIDER HAS BEEN PROPERLY DEFINED BY A USER.  IN PARTICULAR
       C     THE SUBROUTINE CHECKS THAT:
       C
       C        1.  ALLEGIANCE IS AFE.  IF NOT, TYPE IS CHANGED TO
       C    COMBATANT; ERROR MESSAGE WRITTEN; AND INSIDER COUNT IS
       C    DECREMENTED.  SUBROUTINE RETURNS WITHOUT PERFORMING
       C    FURTHER CHECKS.
       C
       C        2. FOLLOWING FIELDS SHOULD BE NULL: LEADER,
       C    SUBORDINATES, COMMUNICATION NETS, AND FORCE MEMBERSHIP.
       C    IF THEY ARE NON-NULL, AN ERROR MESSAGE IS WRITTEN AND
       C    FIELD IS SET TO NULL.
       C
  2          COMMON /STATEV/
  3          DIMENSION ITEM(41900),DITEM(41900)
  4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
  5          COMMON /PARS/
  6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  7          REAL*8 DTPNAM,FLDNAM,FORMOT
  8          COMMON /PARS1/
  9          COMMON /PARS2/
 10          COMMON /PARS3/
       C
 11          DIMENSION NNN(4)
 12          REAL*8 TTT(4)
 13          DATA TTT /'LEADER','SUBORDS','COMNETS',' FORCE'/
 14     1001 FORMAT('0*** PERSON-',I2,',AN INSIDER, IS SFE MEMBER'/
            +  ' TYPE CHANGED TO COMBATANT')
 15     1002 FORMAT('0*** PERSON-',I2,',AN INSIDER, HAD NON-NULL VALUE'/
            + ' FOR ',A8,'...SET TO NULL')
 16          NNN(1) = JLEADR
 17          NNN(2) = JSUBS
 18          NNN(3) = JCMNTS
```

PLEX PREPROCESSOR - INCHK SUBROUTINE

```
ISN
19              NNN(4) = JACSON
20              IPTR = IREF1(IPLARF)
      C
21              CALL PARSRF(IPLARF,ID,IREN,IDUM)
22              IF(IVAL(JALLEG,IPLARF) .EQ. KAFE) GO TO 10
23              NN = NN -1
24              ITEM(IPTR+JTYPE) = KCOMBT
25              WRITE(7,1001) IREN
26              RETURN
      C
      C ... CHECK FOR NULL FIELDS
      C
27           10 DO 20 I=1,4
28                 J=NNN(I)
29                 IF(IVAL(J,IPLARF) .EQ. NULL) GO TO 20
30                 WRITE(7,1002) IREN,TTT(I)
31                 ITEM(IPTR+J) = NULL
32           20 CONTINUE
33              RETURN
34              END
```

PLEX PREPROCESSOR - INDESC SUBROUTINE

```
ISN
 1          SUBROUTINE INDESC(LUNO)
      C ... THIS ROUTINE READS RECORD DESCRIPTIONS FROM FILE ASSOCIATED
      C     WITH LUNO AND STORES DATA IN PLEX STRUCRE ARRAYS: DTPNAM,
      C     DTPABR,NFLDS,IDTOFF,IFDNPT.  IT ALSO INITIALIZES THE GENERIC
      C     RECORDS FOR EACH DATA TYPE.
      C ... INPUT PARAMETERS
      C          LUNO ... UNIT FROM WHICH DATA IS TO BE READ
      C
      C ... THE ARRAY IRECIO IS SET FOR EACH DATATYPE. A VALUE OF
      C     0 INDICATES A STANDARD TYPE WITH FIXED FIELDS THAT IS INPUT
      C     VIA INPLEX.  A VALUE OF 1 INDICATES A SPECIAL DATA TYPE
      C     THAT IS CREATED BY THE MODEL AND HAS VARIABLE OUTPUT CHARACTER-
      C     ISTICS.
      C ... THE PROGRAM STORES MIN, MAX AND DEFAULT VALUES FOR EACH
      C     FIELD IN EACH RECORD TYPE.  IT ALSO STORES THE FIELD TYPE
      C     AS FOLLOWS*
      C          1 = INTEGER FIELD
      C          2 = REAL FIELD
      C          3 = RECORD REFERENCE FIELD
      C          4 = VARIABLE FORMAT FIELD (RECORD WILL HAVE IRECIO=1)
      C          5 = VACANT FIELD
      C ... DURING PROCESSING OF A DATATYPE DESCRIPTION FOLLOWING ARRAYS
      C     ARE USED TO STORE DATA UNTIL MOVED TO GENERIC RECORD:
      C          IDATA ... DEFAULT VALUES
      C          IMAX  ... MAX VALUES
      C          IMIN  ... MIN VALUES
      C          IUSED ... KEEP TRACK OF FIELDS NOT DEFINED
      C
 2          REAL*8 BUF(13),BLANK
 3          LOGICAL EQUC
 4          LOGICAL*1 CHAR1,CHAR2,CHAR3,CHAR4
 5          COMMON /STATEV/
 6          DIMENSION ITEM(41900),DITEM(41900)
 7          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 8          COMMON /PARS/
```

PLEX PREPROCESSOR - INDESC SUBROUTINE

```
      EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
      REAL*8 DTPNAM,FLDNAM,FORMOT
      COMMON /PAMS3/
      COMMON IDATA(50),IMAX(50),IMIN(50),IUSED(10100),MAXLIS
      DIMENSION XMIN(50),XMAX(50),DATA(50)
      EQUIVALENCE (XMAX(1),IMAX(1)),(XMIN(1),IMIN(1))
      EQUIVALENCE(DATA(1),IDATA(1))
 1000 FORMAT(12A8,A4)
 1001 FORMAT(A1)
 1002 FORMAT(A8,11X,A2)
 1003 FORMAT(3X,A1,2X,A1,37X,2A1)
 1004 FORMAT(40X,A1,33X,A6,4X,A6,4X,A6)
 1005 FORMAT(39X,2I1,33X,F6.0,4X,F6.0,4X,F6.0)
 1006 FORMAT(39X,2I1,33X,I6,4X,I6,4X,I6)
      DATA BLANK /8H        /
      NPROC=0
      CALL NULIFY(IDATA,50)
      CALL NULIFY(IMIN,50)
      CALL NULIFY(IMAX,50)
      CALL NZERO(IUSED,50)
      CALL FTNCMD('SET MODECHECK=OFF',17)
C
C ... READ A RECORD AND STORE IN INTERNAL BUFFER 99
C
   10 READ(LUNO,1000) BUF
      WRITE(99,1000) BUF
      READ(99,1001) CHAR1
      IF(EQUC('*',CHAR1)) GO TO 10
      IF(EQUC(' ',CHAR1)) GO TO 20
C
C ... PROCESS HEADER
C
      IF(NPROC.EQ.0) GO TO 15
C
C ... CONVERT IDATA,IMIN AND IMAX TO GENERIC RECORDS
C
```

```
ISN
36           NFLD=NFLDS(IDTYP)
37           NREC=NRECS(IDTYP)
38           NBASE=IREF1(NEWREF(IDTYP,NREC,0))
39           MINBAS=IREF1(NEWREF(IDTYP,NREC-1,0))
40           MAXBAS=IREF1(NEWREF(IDTYP,NREC-2,0))
41           MDFBAS=IREF1(NEWREF(IDTYP,NREC-3,0))
42           DO 12 I=1,NFLD
43           IF(IUSED(I).EQ.0) IUSED(I)=5
44           IF(IUSED(I).EQ.4) IRECIO(IDTYP)=1
45           ITEM(NBASE+I)=IUSED(I)
46           ITEM(MINBAS+I)=IMIN(I)
47           ITEM(MAXBAS+I)=IMAX(I)
48           ITEM(MDFBAS+I)=IDATA(I)
49        12 CONTINUE
       C
       C ... SET UP FOR NEW DATA TYPE
       C
50        15 NDTYPE=NDTYPE+1
51           IDTYP=NDTYPE
52           NPROC=1
53           READ(99,1002) DTPNAM(IDTYP),DTPABR(IDTYP)
54           NFLDS(IDTYP)=0
55           IDTOFF(IDTYP)=IDTOFF(IDTYP-1) + NRECS(IDTYP-1)*NFLDS(IDTYP-1)
56           IFDNPT(IDTYP)=IFDNPT(IDTYP-1) + NFLDS(IDTYP-1)
57           IRCOFF(IDTYP)=IRCOFF(IDTYP-1)+NRECS(IDTYP-1)
58           CALL NZERO(IUSED,50)
59           CALL NULIFY(IDATA,50)
60           CALL NULIFY(IMIN,50)
61           CALL NULIFY(IMAX,50)
62        16 GO TO 10
       C
       C ... PROCESS FIELD DESCRIPTION RECORDS
       C
       C ... GET ID NUMBER FIRST
63        20 READ(99,1004) CHAR1
64           READ(99,1005) I1,I2
```

PLEX PREPROCESSOR - INDESC SUBROUTINE

```
              N=I1
              IF(.NOT.EQUC(' ',CHAR1)) N=10*I1 + I2
      C
      C ... DETERMINE AND BRANCH ON RECORD TYPE
      C
              READ(99,1003) CHAR1,CHAR2,CHAR3,CHAR4
              IF(EQUC(' ',CHAR1).AND.EQUC(' ',CHAR2)) GO TO 100
              IF(EQUC(' ',CHAR1)) GO TO 10
              IF(EQUC(' ',CHAR4)) GO TO 30
      C
      C ... TYPE IS REFERENCE
      C
           25 ITYP=3
              IUSED(N)=ITYP
              GO TO 55
           30 IF(EQUC('R',CHAR3)) GO TO 40
              IF(EQUC('I',CHAR3)) GO TO 50
      C
      C ... TYPE NOT DESCRIBED
      C
           35 ITYP=4
              IUSED(N)=ITYP
              GO TO 55
      C
      C ... TYPE IS REAL
      C
           40 READ(99,1004) CHAR1,BUF(1),BUF(2),BUF(3)
              READ(99,1005) I1,I2,X1,X2,X3
              IUSED(N)=2
              IF(BUF(1).NE.BLANK) XMIN(N)=X1
              IF(BUF(2).NE.BLANK) XMAX(N)=X2
              IF(BUF(3).NE.BLANK) DATA(N)=X3
           45 GO TO 55
      C
      C ... TYPE IS INTEGER
      C
```

```
ISN
 86       50 READ(99,1004) CHAR1,BUF(1),BUF(2),BUF(3)
 87          READ(99,1006) I1,I2,N1,N2,N3
 88          IUSED(N)=1
 89          IF(BUF(1).NE.BLANK) IMIN(N)=N1
 90          IF(BUF(2).NE.BLANK) IMAX(N)=N2
 91          IF(BUF(3).NE.BLANK) IDATA(N)=N3
      C
      C ... UPDATE NFLDS COUNTER
      C
 92       55 IF(N.GT.NFLDS(IDTYP)) NFLDS(IDTYP)=N
 93          IOFF = IFDNPT(IDTYP) + N
 94          READ(99,1200) FLONAM(IOFF)
 95     1200 FORMAT(3X,A8)
 96          GO TO 10
      C
      C ... LAST RECORD DESCRIPTION PROCESSED
      C
 97      100 CALL FTNCMD('SET MODECHECK=ON',16)
      C
      C ... CONVERT IDATA,IMIN AND IMAX TO GENERIC RECORDS
      C
 98          NFLD=NFLDS(IDTYP)
 99          NREC=NRECS(IDTYP)
100          NBASE=IREF1(NEWREF(IDTYP,NREC,0))
101          MINBAS=IREF1(NEWREF(IDTYP,NREC-1,0))
102          MAXBAS=IREF1(NEWREF(IDTYP,NREC-2,0))
103          MDFBAS=IREF1(NEWREF(IDTYP,NREC-3,0))
104          DO 112 I=1,NFLD
105          IF(IUSED(I).EQ.0) IUSED(I)=5
106          IF(IUSED(I).EQ.4) IRECIO(IDTYP)=1
107          ITEM(NBASE+I)=IUSED(I)
108          ITEM(MINBAS+I)=IMIN(I)
109          ITEM(MAXBAS+I)=IMAX(I)
110          ITEM(MDFBAS+I)=IDATA(I)
111      112 CONTINUE
112          RETURN
113          END
```

PLEX PREPROCESSOR - INITPP SUBROUTINE

```
ISN
 1          SUBROUTINE INITPP
      C
      C     ROUTINE TO INITIALIZE VARIABLES FOR THE PLEX PREPROCESSOR.
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
 8          COMMON /PARS3/
      C
 9          DATA BLANK/'    '/
10          CALL NULIFY(ITEM,NSTATE)
11          CALL NULIFY(IAVAIL,NDTYPE)
12          CALL INITVL(FORMOT,24*NDTYPE,BLANK)
13          CALL NZERO(IDTOFF,NDTYPE)
14          CALL NZERO(IRCOFF,NDTYPE)
15          CALL NZERO(IFDNPT,NDTYPE)
16          CALL NZERO(LSTREC,NDTYPE)
17          CALL NZERO(IRECIO,NDTYPE)
18          CALL INITVL(DTPNAM,2*NDTYPE,BLANK)
19          CALL INITVL(FLDNAM,2*NFDXRC,BLANK)
20          CALL INITVL(DTPABR,NDTYPE,BLANK)
21          IRTNCD = IOK
22          ISIDE = 1
23          IPLAYR = 1
24          TMIN = 0.0
25          JFORCE=JACSON
26          RETURN
27          END
```

PLEX PREPROCESSOR - INPLEX SUBROUTINE

```
ISN
 1         SUBROUTINE INPLEX(LUNO,IDTYP)
     C ... INPLEX IS A SUBROUTINE TO INPUT PLEX STRUCTURES IN EXTERNAL
     C     FORMAT, PERFORM APPROPRIATE DATA CHECKS AND STORE INTERNALLY
     C     IN /STATEV/
     C ... INPUT PARAMETERS:
     C          LUNO ... LOGICAL UNIT NUMBER FROM WHICH TO GET DATA
     C ... OUTPUT PARAMETERS:
     C         IDTYP ... DATA TYPE OF PLEXRECORDS JUST READ
     C                   OR NULL IF EOF REACHED.
     C
     C     ASSUMPTIONS AND INPUT FORMATS ARE COVERED IN WP #XXXX.XX
     C
     C ... DATA USED ASSUMED TO BE IN COMMON /PARS/
     C     DTPNAM(I) IS 8-CHARACTER NAME FOR DATATYPE I (LEFT ADJ,BLANK-FILL)
     C
     C     DTPABR(I) IS 2-CHAR ABBREVIATION FOR DATATYPE I
     C
     C     NGENRC IS NUMBER OF GENERIC RECORDS USED TO DESCRIBE DATATYPE
     C         RECNO=NRECS(I)   SPECIFIES FIELD TYPE  1=INTEGER, 2=REAL, 3=REF
     C                                 4=SPECIAL  5=VACANT
     C         RECNO=NRECS(I)-1 SPECIFIES MINIMUM ACCEPTABLE VALUE (OR NULL)
     C         RECNO=NRECS(I)-2 SPECIFIES MAXIMUM ACCEPTABLE VALUE (OR NULL)
     C         RECNO=NRECS(I)-3 SPECIFIES DEFAULT VALUE (OR NULL)
     C
     C ... IUSED IS USED TO KEEP TRACK OF RECORDS REFERRED TO AND RECORDS
     C     ACTUALLY INITIALIZED.  (JJ=IUSPTR(IDTYP,IRECNO))
     C
     C          IDTYP   RECORD STATUS      IUSED(JJ)
     C          =LIST   NOT USED            NULL
     C                  REFERENCED         IFLDRF FOR FIELD CONTAINING LISTRF
     C                  DEFINED             LISTRF
     C
     C          <>LIST  NOT USED            NULL
     C                  REFERENCED          0
     C                  DEFINED             1
```

PLEX PREPROCESSOR - INPLEX SUBROUTINE

```
ISN
      C
  2         LOGICAL EQUC
  3         LOGICAL*1 CHAR
  4         REAL*8 DNAME,FMT(12),BLANK,BUF(50)
  5         DIMENSION BADNAM(2)
  6         EQUIVALENCE(DNAME,BADNAM(1))
  7         COMMON /STATEV/
  8         DIMENSION ITEM(41900),DITEM(41900)
  9         EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 10         COMMON /PARS/
 11         EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 12         REAL*8 DTPNAM,FLDNAM,FORMOT
 13         COMMON /PARS1/
 14         COMMON /PARS2/
 15         COMMON /PARS3/
 16         COMMON IDATA(50),IMAX(50),IMIN(50),IUSED(10100),MAXLIS
 17         DIMENSION XMIN(50),XMAX(50),DATA(50)
 18         EQUIVALENCE (XMAX(1),IMAX(1)),(XMIN(1),IMIN(1))
 19         EQUIVALENCE(DATA(1),IDATA(1))
 20         DATA BLANK/8H        /
      C
      C ... READ A RECORD
      C
 21         IIBEF=NULL
 22      10 MLIST=0
 23         READ(LUNO,1000) DNAME,FMT
 24         WRITE(99,1000) DNAME
 25         READ(99,1002) CHAR
 26    1002 FORMAT(A1)
 27    1000 FORMAT (A8,4X,12A8)
      C
      C ... SKIP BLANK RECORD
      C
 28         IF(EQUC(' ',CHAR)) GO TO 450
 29         IF(EQUC('*',CHAR)) GO TO 10
      C
```

```
ISN
      C ... PROCESS FILE HEADER RECORD
      C
30          DO 20 I=1,NDTYPE
31          IF(DNAME.NE.DTPNAM(I)) GO TO 20
32          IDTYP=I
      C
      C ... IF ACTION OR RELATION, SPECIAL PROCESSING
      C
33          IF(IDTYP.EQ.LACTN) GO TO 350
34          IF(IDTYP.EQ.LRELN) GO TO 310
35          IF(IRECIO(IDTYP).NE.0) GO TO 22
36          GO TO 30
37       20 CONTINUE
      C
      C ... INVALID DATATYPE NAME
      C
38       22 CALL ERR(8,9,BADNAM(1),BADNAM(2),I)
      C
      C ... SKIP REMAINDER OF SUBSECTION
      C
39       25 READ(LUNO,1000) DNAME
40          IF(DNAME.NE.BLANK) GO TO 25
41          GO TO 10
      C
      C ... BRANCH ON IDTYP = LLIST
      C
42       30 IF(IDTYP.EQ.LLIST) GO TO 200
43          NREC=NRECS(IDTYP)
44          NBASE=IREF1(NEWREF(IDTYP,NREC,0))
      C
      C ... PROCESS INPUT RECORD
      C
      C ... SAVE I/O FORMAT
      C
45          DO 35 I=1,12
46          FORMOT(I,IDTYP)=FMT(I)
```

PLEX PREPROCESSOR - INPLEX SUBROUTINE

```
ISN
47        35 CONTINUE
      C
      C ... READ RECORD ID TITLE AND FIELD TITLES
      C
48      1003 FORMAT(A6,14A8,2X,14A8,4X,14A8)
49      1004 FORMAT(A6,42A8)
50           NFLD=NFLDS(IDTYP)
      C
      C ... COMPUTE FIELDS TO BE INPUT (TYPE<>5)
      C
51           MFLD=NFLD
52           DO 37 I=1,NFLD
53           IF(ITEM(NBASE+I).EQ.5) MFLD=MFLD-1
54        37 CONTINUE
      C
      C ... READ AND STORE FIELD TITLES
      C
55           NFLD1=MFLD+1
56           N1=IFDNPT(IDTYP)
57           KK=MPREAD(NFLD1,BUF,LUNO)
58           IF(KK.NE.0) GO TO 450
59           J=1
60           DO 38 I=1,NFLD
61           IF(ITEM(NBASE+I).EQ.5) GO TO 38
62           J=J+1
63           FLDNAM(N1+I)=BUF(J)
64        38 CONTINUE
      C
      C ... COMPUTE NUMBER OF DATA IN INPUT RECORD
      C       FIELD TYPE =1 OR 2 HAVE 1 DATUM PER FIELD
      C       FIELD TYPE = 3  HAVE 2 DATA PER FIELD
      C       FIELD TYPE=5 IS NOT INPUT
      C
65           NDATA=0
66           DO 40 I=1,NFLD
67           IF(ITEM(NBASE+I).EQ.5) GO TO 40
```

```
ISN
68            ITYP=ITEM(NBASE+I)/3
69            NDATA=NDATA+1+ITYP
70         40 CONTINUE
      C
      C ... SET UP MIN AND MAX POINTERS
      C
71            MINBAS=IREF1(NEWREF(IDTYP,NREC-1,0))
72            MAXBAS=IREF1(NEWREF(IDTYP,NREC-2,0))
73            MDFBAS=IREF1(NEWREF(IDTYP,NREC-3,0))
      C
      C ... READ INPUT RECORD
      C
74         42 KK=MPREAD(NFLD1,BUF,LUNO)
75            IF(KK.NE.0) GO TO 450
76            WRITE(99,1004) (BUF(I),I=1,NFLD1)
77      43    READ(99,FMT) ID,(DATA(I),I=1,NDATA)
78            IF(ID.EQ.0) GO TO 400
      C
      C ... CHECK FOR ROOM FOR THIS ID
79            IF(ID .GT. NRECS(IDTYP) - NGENRC ) GO TO 44
80            IRECNO=ID
81            JJ=IUSPTR(IDTYP,ID,LLIST,NRECS,NULL)
82            IF(ID.GT.LSTREC(IDTYP)) GO TO 45
83            IF(IUSED(JJ).LE.0) GO TO 50
      C
      C ... WRITE ERR (DUPLICATE RECORD, IGNORED
      C
84         44 CALL ERR(9,9,IDTYP,ID,I)
85            GO TO 42
      C
      C ... UPDATE LSTREC(IDTYP)
      C
86         45 IRECNO=NEWREC(IDTYP)
87            IF(IRECNO.EQ.ID) GO TO 50
88            IF(IRECNO.NE.NULL) GO TO 45
      C
```

```
ISN
      C ... ERROR (NO ROOM IN THE INN, IGNORED
      C
 89           CALL ERR(3,9,IDTYP,ID,I)
 90           GO TO 42
      C
      C ... START FIELD DATA PROCESSING LOOP
 91        50 IUSED(JJ)=1
 92           IPTR=IREF1(NEWREF(IDTYP,IRECNO,0))
 93           NPTR=1
 94           J=1
 95           DO 100 I=1,NFLD
 96                 ITYP=ITEM(NBASE+I)
 97                 IF(ITYP.GT.3) GO TO 100
 98                 II=NEWREF(IDTYP,IRECNO,I)
 99                 J=J+1
100                 GO TO(60,70,80), ITYP
      C
      C ...         PROCESS INTEGER FIELD
      C
101        60       IF(IDATA(NPTR).NE.0 ) GO TO 62
102                 IF(BUF(J).NE.BLANK) GO TO 68
103                 IDATA(NPTR)=ITEM(NDFBAS+I)
104                 GO TO 68
      C
      C ...         CHECK RANGE
      C
105        62       MIN=ITEM(MINBAS+I)
106                 IF(MIN.EQ.NULL) GO TO 64
107                 IF(MIN.LE.IDATA(NPTR)) GO TO 64
      C
      C ...         ERROR, VALUE TOO LOW
      C
108                 CALL ERR(10,9,DATA(NPTR),IDTYP,II)
109        64       MAX=ITEM(MAXBAS+I)
110                 IF(MAX.EQ.NULL) GO TO 68
111                 IF(MAX.GE.IDATA(NPTR)) GO TO 68
```

```
ISN
      C
      C ...        ERROR, VALUE TOO HIGH
      C
112                CALL ERR(10,9,DATA(NPTR),IDTYP,II)
113      68        ITEM(IPTR+I)=IDATA(NPTR)
114                NPTR=NPTR+1
115                GO TO 100
      C
      C ...        PROCESS REAL FIELD
      C
116      70        IF(DATA(NPTR).NE.0.0) GO TO 72
117                IF(BUF(J).NE.BLANK) GO TO 72
118                DATA(NPTR)=DITEM(MDFBAS+I)
119                GO TO 78
      C
      C ...        CHECK RANGE
      C
120      72        ZMIN=DITEM(MINBAS+I)
121                IF(ZMIN.EQ.FNULL) GO TO 74
122                IF(ZMIN.LE.DATA(NPTR)) GO TO 74
      C
      C ...        ERROR, VALUE TOO LOW
      C
123                CALL ERR(10,9,DATA(NPTR),IDTYP,II)
124      74        ZMAX=DITEM(MAXBAS+I)
125                IF(ZMAX.GE.DATA(NPTR)) GO TO 78
126                IF(ZMAX.EQ.FNULL) GO TO 78
      C
      C ...        ERROR, VALUE TOO HIGH
      C
127                CALL ERR(10,9,DATA(NPTR),IDTYP,II)
128      78        DITEM(IPTR+I)=DATA(NPTR)
129                NPTR=NPTR+1
130                GO TO 100
      C
      C ...PROCESS REFERENCE FIELD
```

PLEX PREPROCESSOR - INPLEX SUBROUTINE

```
      C
         80       IF(BUF(J).NE.BLANK) GO TO 90
                  ITEM(IPTR+I)=NULL
                  NPTR=NPTR+2
                  GO TO 100
      C
      C ...       NON NULL REF VALUE, VALIDATE AND CONVERT TO IRECRF
      C
         90       REF=DATA(NPTR)
                  NUM=IDATA(NPTR+1)
                  NPTR=NPTR+2
      C
      C ...       IF REFERENCE TO LIST, UPDATE MAXLIS
      C
                  IF(REF.NE.DTPABR(LLIST)) GO TO 95
                  IF(NUM.GT.MAXLIS. AND .NUM.LE.NRECS(LLIST)) MAXLIS=NUM
         95       IRECRF=IVALRF(REF,NUM,II)
                  ITEM(IPTR+I)=IRECRF
                  IF(IRECRF.NE.NULL) GO TO 100
      C
      C ...       FIELD REFERENCE ERROR PRINT DTPNAM(IDTYP),ID,REF,NUM
      C
                  CALL ERR(11,9,II,REF,NUM)
        100 CONTINUE
        105 GO TO 42
      C
      C ... PROCESS LIST INPUT
      C
      C     ASSUME ALL ARE REC REFERENCES, IGNORE FIELD TITLES
        200 READ(LUNO,1002) DNAME
      C
      C ... READ INPUT RECORD
      C
        205 READ(LUNO,1003) (BUF(I),I=1,15)
            WRITE(99,1004) (BUF(I),I=1,15)
      C
```

```
      C ... COMPUTE FIELDS IN RECORD
      C
            NFLD=14
            DO 210 I=1,15
            IF(BUF(I).NE.BLANK) GO TO 210
            NFLD=I-2
            GO TO 220
        210 CONTINUE
      C
      C ... IF BLANK RECORD GO TO 400
      C
        220 IF(NFLD.LE.0) GO TO 400
            NDATA=2*NFLD
            READ(99,FMT) ID,(IDATA(I),I=1,NDATA)
      C
      C ... CHECK FOR CONTINUATION
      C
            IF(ID.EQ.MLIST) GO TO 230
      C
      C ... CHECK FOR PREVIOUSLY ENTERED
      C
            IF(IUSED(ID).EQ.NULL) GO TO 230
            CALL PARSRF(IUSED(ID),IRT,IRN,IFN)
            IF(IRT.NE.LLIST) GO TO 230
      C
      C ... THIS LIST WAS PREVIOUSLY DEFINED
      C
            CALL ERR(9,9,LLIST,ID,I)
            GO TO 205
      C
      C ... CONVERT TO LIST OF RECORD REFERENCES
      C
        230 MLIST=ID
            IF(ID.GT.MAXLIS) MAXLIS=ID
            NPTR=1
            NREF=0
```

PLEX PREPROCESSOR - INPLEX SUBROUTINE

```
ISN
168              DO 250 I=1,NFLD
169              REF=IDATA(NPTR)
170              NUM=IDATA(NPTR+1)
171              NPTR=NPTR+2
172              IDUM=IVALRF(REF,NUM,NEWREF(LLIST,ID,0))
173              IF(IDUM.NE.NULL) GO TO 240
          C
          C ...  ERROR PRINT DATATYPE,RECNO,BUF(I+1)
          C
174              II=NEWREF(LLIST,ID,0)
175              CALL ERR(11,9,II,REF,NUM)
176              GO TO 250
          C
          C ...  VALID RECREF, ADD TO LIST
          C
177          240 NREF=NREF+1
178              IDATA(NREF)=IDUM
179          250 CONTINUE
          C
          C ...  NOW ADD IDATA(I), I=1,NREF TO LIST(ID)
          C
180          255 IF(NREF.EQ.0) GO TO 205
          C
          C ...  SEE IF LIST HAS BEEN PREVIOUSLY REFERENCED
          C
181              IONE=1
182              LISREF=IUSED(ID)
183              IF(LISREF.NE.NULL) GO TO 260
          C
          C ...  NOT PREVIOUSLY REFERENCED
          C
184              LISTNO=NEWREC(LLIST)
185              IF(LISTNO.NE.NULL) GO TO 270
          C
          C ...  NO ROOM IN THE INN
          C
```

```
ISN
186          CALL ERR(12,9,LLIST,ID,1)
187          GO TO 205
       C
       C ... PREVIOUSLY REFERENCED, HAS IT BEEN INITIALIZED
       C
188      260 CALL PARSRF(LISREF,IDT,IRN,IFN)
189          IF(IDT.EQ.LLIST) GO TO 280
190          LISREF=IVAL1(LISREF)
191          CALL PARSRF(LISREF,IDT,LISTNO,IFN)
192          GO TO 275
       C
       C ... HAS NOT BEEN INITIALIZED, UPDATE IUSED AND
       C     MAKE IDATA(1) THE HEAD OF THE LIST
193      270 LISREF=NEWREF(LLIST,LISTNO,0)
194      275 IUSED(ID)=LISREF
195          LISTND(JVAL,LISTNO)=IDATA(1)
196          IONE=2
197          IF(NREF.LT.2) GO TO 205
       C
       C ... ADDOTHER ELEMENTS TO LIST
       C
198      280 DO 300 I=IONE,NREF
199          IDUM=IQUEUE(IDATA(I),LISREF)
200      300 CONTINUE
201          GO TO 205
       C
       C ... SET UP TO PROCESS RELATION RECORDS
       C
202    310   READ(LUNO,1002) DNAME
203    315   READ(LUNO,1003) (BUF(I),I=1,14)
204          WRITE(99,1004) (BUF(I),I=1,14)
205          READ(99,FMT) ID,LRNTYP
206          IF(ID.EQ.0) GO TO 400
207          NREC=NRECS(IDTYP)
208          IIREF=NEWREF(IDTYP,NRECS(IDTYP),0)
209          IIREF=ICOPY(IIREF)
```

PLEX PREPROCESSOR - INPLEX SUBROUTINE

```
ISN
210              NBASE=IREP1(IIREP)
211              J=JPAR1-1
212              DO 320 I=1,2
213       320    ITEM(NBASE+J+I)=NRELTP(I,LRNTYP)
214              GO TO 372
          C
          C ...SET UP TO PROCESS ACTION RECORDS
          C
          C ... SKIP TITLES
          C
215       350    READ(LUNO,1002) DNAME
          C
          C ... READ FIRST INPUT RECORD TO GET ACTION TYPE
          C
216       355    READ(LUNO,1003) (BUF(I),I=1,14)
217              WRITE(99,1004) (BUF(I),I=1,14)
218              READ(99,FMT) ID,LACTYP
219              IF(ID.EQ.J) GO TO 400
220              IF(LACTYP.GE.1 .AND. LACTYP.LE.KCAPNG) GO TO 360
          C
          C ... ERROR MESSAGE, BAD ACTION TYPE
          C
221              GO TO 355
          C
          C ... SET UP TO USE NORMAL RECORD READ
          C
222       360    NREC=NRECS(IDTYP)
223              IIREF=NEWREF(IDTYP,NRECS(IDTYP),0)
224              IIREF=ICOPY(IIREF)
225              NBASE=IREP1(IIREF)
226              J=JPAR1-1
          C
          C ... INSERT CURRENT TYPE IN VARIABLE TYPE FIELDS IN GENRC
          C
227              DO 370 I=1,3
228              ITEM(NBASE+J+I)=NACTTP(I,LACTYP)
```

```
ISN
229    370   CONTINUE
       C
       C ... COMPUTE FIELDS TO BE INPUT
       C
230    372   NFLD=NFLDS(IDTYP)
231          NDATA=0
232          MFLD=0
233          DO 375 I=1,NFLD
234          IF(ITEM(NBASE+I).EQ.5) GO TO 375
235          MFLD=MFLD+1
236          ITYP=ITEM(NBASE+I)/3
237          NDATA=NDATA+1+ITYP
238    375   CONTINUE
       C
       C ... SET UP MIN AND MAX POINTERS
       C
239          MINBAS=IREF1(NEWREF(IDTYP,NREC-1,0))
240          MAXBAS=IREF1(NEWREF(IDTYP,NREC-2,0))
241          MDFBAS=IREF1(NEWREF(IDTYP,NREC-3,0))
242          NFLD1=MFLD+1
       C
       C ... USE MAINLINE CODE FOR REST OF INPUT
       C
243          GO TO 43
       C
       C ... NORMAL TERMINATION OF INPUT OF SINGLE RECORD TYPE
       C
244    400   IF(IIREF .NE. NULL) CALL DELREC(IIREF)
245          RETURN
       C
       C ... END OF FILE TERMINATION, SET IDTYP=NULL
       C
246    450   IDTYP=NULL
247          GO TO 400
248          END
```

PLEX PREPROCESSOR - IUSPTR FUNCTION

```
ISN
  1              FUNCTION IUSPTR(IDTYP,IRECNO,LLIST,NRECS,NULL)
          C ...  THE PURPOSE OF IUSPTR IS TO COMPUTE A POINTER IN ARRAY IUSED
          C      FOR KEEPING TRACK OF RECORDS REQUESTED AND/OR INITIALIZED IN
          C      INPLEX.  MAKES USE OF THE FACT THAT THIS DATA IS NOT REQUIRED
          C      FOR IDTYP<=LLIST
          C
  2              DIMENSION NRECS(1)
  3              IUSPTR=NULL
          C
          C ...  FOR IDTYP < LLIST, IUSED IS NOT USED
          C
  4              IF(IDTYP.LT.LLIST) RETURN
  5              N1=LLIST
  6              N2=IDTYP-1
  7              IUSE=0
  8              IF(N2.LT.N1) GO TO 20
  9              DO 10 I=N1,N2
 10              IUSE=IUSE+NRECS(I)
 11           10 CONTINUE
 12           20 IUSPTR=IUSE+IRECNO
 13              RETURN
 14              END
```

```
ISN
 1          FUNCTION IVALRF(REF,NUM,IFLDRF)
      C ... IVALRF IS CALLED BY INPLEX TO CONVERT SYMBOLIC RECORD
      C     REFERENCES OF THE FORM "PN 2" OR "#  3" TO A NUMERIC
      C     RECORD REFERENCE AND UPDATE THE IUSED ARRAY.  IF THE
      C     SYMBOLIC REFERENCE IS IN ERROR OR THE REFERENCE IS  AN
      C     UNALLOWED DUPLICATE A NULL VALUE IS RETURNED. OTHERWISE
      C     A VALID RECORD REFERENCE IS RETURNED.
      C
      C ... THE PROGRAM QUERIES AND UPDATES THE ARRAY IUSED.
      C     PROCESSING DEPENDS ON WHETHER REFERENCE IS TO A RECORD
      C     OR TO A LIST.  (JJ=IUSPTR(IDTYP,IRECNO ...)
      C       RECORD: IF IUSED(JJ) IS NULL, IT IS SET TO 0 TO INDICATE
      C               INITIALIZATION EXPECTED.
      C
      C       LIST:   IF IUSED(JJ) IS NULL, IT IS SET TO THE FIELD REFERENCE
      C               THAT REFERS TO THE LIST TO INDICATE INITIALIZATION
      C               EXPECTED.
      C
      C               IF IUSED(JJ) IS ALREADY A LIST REFERENCE A WARNING
      C               MESSAGE IS ISSUED INDICATING REFERENCE TO PREVIOUSLY
      C               DEFINED LIST.
      C
      C               IF IUSED(JJ) IS A RECORD REFERENCE A MULTIPLE LIST
      C               REFERENCE IS DIAGNOSED, AND A NULL VALUE IS RETURNED.
      C
      C
      C ... INPUT PARAMETERS:
      C          REC ... REAL WORD CONTAINING 2-CHAR ABBREVIATION OF
      C                  DATATYPE.
      C          NUM ... RECORD NUMBER IN INTEGER FORMAT
      C       IFLDRF ... FIELD REFERENCE TO FIELD WHERE RECORD REFERENCE
      C                    IS TO BE STORED.   (USED IF REF="#").
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
```

PLEX PREPROCESSOR - IVALRF FUNCTION

```
ISN
  4          REAL*8 DTPNAM,FLDNAM,FORMOT
  5          COMMON /PARS3/
  6          COMMON IDATA(50),IMAX(50),IMIN(50),IUSED(10100),MAXLIS
  7          DIMENSION XMIN(50),XMAX(50),DATA(50)
  8          EQUIVALENCE (XMAX(1),IMAX(1)),(XMIN(1),IMIN(1))
  9          EQUIVALENCE(DATA(1),IDATA(1))
       C
       C ... SEARCH ABBREVIATION LIST TO FIND IDTYP
       C
 10          IVALRF=NULL
 11          DO 10 I=LLIST,NDTYPE
 12          IF(REF.NE.DTPABR(I)) GO TO 10
 13          IDTYP=I
 14          IF(IDTYP.EQ.LLIST) GO TO 40
 15          GO TO 20
 16       10 CONTINUE
       C
       C ... INVALID DATA TYPE ABBREVIATION
       C
 17          RETURN
       C
       C ... RECORD REFERENCE, CHECK FOR NUM IN RANGE
       C
 18       20 IF(NUM.GT.0 .AND. NUM.LE.NRECS(IDTYP)-NGENRC) GO TO 30
       C
       C ... NUM OUT OF RANGE, ERR MESSAGE
       C
 19          RETURN
       C
       C ... PROCESS RECORD REFERENCE
       C
 20       30 JJ=IUSPTR(IDTYP,NUM,LLIST,NRECS,NULL)
 21          IF(IUSED(JJ).EQ.NULL) IUSED(JJ)=0
 22          IVALRF=NEWREF(IDTYP,NUM,0)
 23          RETURN
       C
```

```
ISN
      C ... PROCESS LIST REFERENCE, GET RECORD FROM IUSED
      C
24       40 JJ=IUSPTR(IDTYP,NUM,LLIST,NRECS,NULL)
25          IUSE=IUSED(JJ)
26          IF(IUSE.NE.NULL) GO TO 60
      C
      C ... NEW LIST REFERENCE
      C
27          LISTNO=NEWREC(LLIST)
28          IF(LISTNO.NE.NULL) GO TO 50
      C
      C ... NO MORE LIST SPACE LEFT
      C
29          RETURN
      C
      C ... SET IUSED(JJ)=IFLDRF, RETURN LISTRF
      C
30       50 IUSED(JJ)=IFLDRF
31          IVALRF=NEWREF(LLIST,LISTNO,0)
32          RETURN
      C
      C ... THIS IS NOT NEW LIST REFERENCE
      C
33       60 CALL PARSRF(IUSE,IRT,IRN,IFN)
34          IF(IRT.EQ.LLIST) GO TO 70
      C
      C ... PREVIOUSLY REFERENCED, WRITE ERROR MESSAGE
      C
35          CALL ERR(13,15,NUM,IUSE,IFLDRF)
36          RETURN
      C
      C ... PREVIOUSLY DEFINED LIST, WRITE WARNING
      C
37       70 CALL ERR(14,10,NUM,IFLDRF,NULL)
38          IVALRF=IUSE
39          RETURN
```

PLEX PREPROCESSOR - IVALRF FUNCTION

```
ISN
40          END
```

```
ISN
 1          SUBROUTINE KONTNT(IRECRF)
      C ... THE PURPOSE OF THIS SUBROUTINE IS TO UPDATE THE CONTENTS
      C     FIELDS OF REGIONS, TO INCLUDE THE ENTITY REFERENCED BY
      C     IRECRF.
      C
      C ... IRECRF IS RECORD REFERENCE TO PERSON,VEHICLE, SENSOR
      C    OR ACTIVATED DELAY
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
 8          COMMON /PARS1/
 9          COMMON /PARS3/
      C
      C   CHECK FOR PROPER DATA TYPE
      C
10          CALL PARSRF(IRECRF,IDTYP,IRECNO,IDUM)
11          IF(IDTYP.LT.LVEHIC .OR. IDTYP.GT.LACTD) GO TO 100
      C
      C  GET LOCATION OF IRECRF
      C
12          ILOC=IVAL(JLOCN,IRECRF)
13          IF(ILOC .EQ. NULL) GO TO 100
14          IPLAC=IPLACE(ILOC)
15          ICONLT=IVAL(JCONTS,IPLAC)
      C
      C ... SEE IF IRECRF ON CONTENTS LIST OF IPLAC
      C
16          ION=LSERCH(ICONLT,IRECRF,NULL,NULL,NULL)
17          IF(ION .NE. NULL) GO TO 100
      C
      C ... ADD IRECRF TO CONTENTS LIST
```

PLEX PREPROCESSOR - KONTNT SUBROUTINE

```
C
      IPTR=IREF1(IPLAC)
      ICONLT=ISTACK(IRECRP,ICONLT)
      ITEM(IPTR+JCONTS)=ICONLT
  100 RETURN
      END
```

PLEX PREPROCESSOR - LABL SUBROUTINE

```
ISN
 1           SUBROUTINE LABL(IRECRF,LX,LY)
       C
       C     ROUTINE TO PUT A LABEL ON A MAP OF THE SITE.  THE LABEL CONSISTS
       C   OF A TWO LETTER ABBREVIATION PLUS AN INDEX.  THE LABEL IS CENTERED
       C   ABOUT A POINT ON THE MAP, (LX,LY).
       C
       C   INPUT PARAMETERS:
       C     IRECRF   A REFERENCE TO THE RECORD WHOSE IDENTIFICATION
       C              CONSTITUTES THE LABEL.
       C     LX       THE MAP INDEX OF THE X COORDINATE OF THE CENTER OF THE
       C              LABEL
       C     LY       THE MAP INDEX OF THE Y COORDINTAT OF THE CNETER OF THE
       C              LABEL
       C
 2           COMMON /PARS/
 3           EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4           REAL*8 DTPNAM,FLDNAM,FORMOT
 5           COMMON //
 6           LOGICAL*1 MAP
       C
 7           LOGICAL*1 DIGIT(10)/'1','2','3','4','5','6','7','8','9','0'/,
            +     ABBREV(4,30),BL/' '/,LAB(6)
 8           DIMENSION IDIGS(4),INCX(13),INCY(13)
 9           EQUIVALENCE (ABBREV(1),DTPADR(1))
10           DATA INCX/0,4,-4,-4,8,0,-8,0,4,8,-8,4,0/,
            1     INCY/1,-1,-1,1,1,-2,0,2,1,-2,-2,4,-4/
       C
11           CALL PARSRF(IRECRF,IDTYP,IRECNO,IDUM)
12           LAB(1) = ABBREV(1,IDTYP)
13           LAB(2) = ABBREV(2,IDTYP)
       C
       C BREAK APART RECORD INDEX INTO DIGITS AND STORE IN VECTOR
       C
14           I = 1
15     5     IF (IRECNO .LE. 9) GO TO 10
```

PLEX PREPROCESSOR - LABL SUBROUTINE

```
          IDIG = IRECNO - 10*(IRECNO/10)
          IRECNO = IRECNO/10
          IDIGS(I) = IDIG
          I = I + 1
          GO TO 5
   10     IDIGS(I) = IRECNO
C
C  PUT INDEX INTO LABEL
C
          J = 1
   15     K = IDIGS(I)
          IF (K .EQ. 0) K = 10
          LAB(2+J) = DIGIT(K)
          IF (I .LE. 1) GO TO 30
          I = I - 1
          J = J + 1
          GO TO 15
C   FIND A BLANK AREA OF THE MAP NEAR LX,LY.
      30 J2 = J + 2
          LXC = LX - 2
          LYC = LY
          DO 100 K=1,13
             IF (IBLMAP(LXC,LYC,J2) .EQ. 0) GO TO 50
             IF (LXC .LT. 1) GO TO 50
             IF (LXC .GT. 120) GO TO 50
             IF (LYC .LT. 1) GO TO 50
             IF (LYC .GT. 72) GO TO 50
             GO TO 200
      50     LXC = LXC + INCX(K)
             LYC = LYC + INCY(K)
     100     CONTINUE
          RETURN
  200     CONTINUE
          DO 220 K=1,J2
  220     MAP(LXC+K-1,LYC)=LAB(K)
          RETURN
          END
```

PLEX PREPROCESSOR -MAPBDG SUBROUTINE

```
ISN
 1          SUBROUTINE MAPBDG(IBLDG,XSCALE,YSCALE)
      C
      C        ROUTINE TO DRAW A FLOOR PLAN OF EACH OF THE FLOORS OF A BUILDING
      C   IN THE SITE, INCLUDING ANY PERSONS WHO MAY OCCUPY ANY OF THE ROOMS.
      C
      C   INPUT PARAMETERS
      C        IBLDG     REFERENCE TO THE BUILDING TO BE MAPPED
      C        XSCALE    NUMBER OF MAP UNITS PER METER IN THE X DIRECTION
      C        YSCALE    NUMBER OF MAP UNITS PER METER IN THE Y DIRECTION
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,FLDNAM,FORMOT
 5          COMMON /PARS1/
 6          COMMON /PARS3/
 7          COMMON //
 8          LOGICAL*1 MAP
      C
 9          LOGICAL*1 DASH/'-'/,PAR/'|'/,BLANK/' '/
10          LOGICAL EQUC
      C
11          CALL PARSRF(IBLDG,ICTYP,IBDGNO,IDUM)
12          WRITE (9,1010) IBDGNO
13    1010  FORMAT ('1         MAP OF BUILDING ',I2)
      C
      C   DETERMINE COORDINATES AND DIMENSIONS OF BUILDING
      C
14          XLENB = VAL(JXLEN,IBLDG)
15          YLENB = VAL(JYLEN,IBLDG)
16          X0 = VAL(JXCO,IBLDG) - XLENB / 2.0
17          Y0 = VAL(JYCO,IBLDG) - YLENB / 2.0
18          NXB = XLENB*XSCALE + 1.0
19          NYB = YLENB*YSCALE + 1.0
20          NROWS = NYB
      C
```

PLEX PREPROCESSOR -MAPBDG SUBROUTINE

```
ISN
      C   ITERATE OVER FLOORS OF BUILDING
      C
 21          IFLRS = IVAL(JFLRS,IBLDG)
 22          IFLR = IFIRST(IFLRS,KF)
 23             IFLRNO = 1
 24   10        IF (IFLR .EQ. NULL) GO TO 130
      C
      C   WRITE HEADING TO IDENTIFY THE FLOOR
      C
 25             WRITE (9,1020) IFLRNO,IBDGNO
 26   1020      FORMAT ('-    FLOOR ',I2,' OF BUILDING ',I2/'0')
      C
      C   PUT IN OUTLINE OF FLOOR
      C
 27             DO 20 IX=1,NXB
 28                MAP(IX,1) = DASH
 29   20           MAP(IX,NYB) = DASH
 30             DO 25 IY=1,NYB
 31                MAP(1,IY) = BAR
 32   25           MAP(NXB,IY) = BAR
      C
      C   ITERATE OVER CONTAINED ROOMS, HALLS
      C
 33             IROOMS = IVAL(JROOMS,IFLR)
 34             IFLAG = 1
 35             IROOM = IFIRST(IROOMS,KR)
 36   30           IF (IROOM .EQ. NULL) GO TO 80
      C
      C   DRAW IN WALLS OF ROOM
      C
 37                XLEN = VAL(JXLEN,IROOM)
 38                XLEN2 = XLEN / 2.0
 39                X = VAL(JXCO,IROOM) - X0
 40                MX = (X - XLEN2)*XSCALE + 1.0
 41                NX = (X + XLEN2)*XSCALE + 1.0
 42                YLEN = VAL(JYLEN,IROOM)
```

```
ISN
43                YLEN2 = YLEN / 2.0
44                Y = VAL(JYCO,IROOM) - YO
45                MY = (Y - YLEN2)*YSCALE + 1.0
46                NY = (Y + YLEN2)*YSCALE + 1.0
47                DO 35 IX=MX,NX
48                   IF (EQUC(MAP(IX,MY),BLANK)) MAP(IX,MY) = DASH
49     35            IF (EQUC(MAP(IX,NY),BLANK)) MAP(IX,NY) = DASH
50                DO 40 IY=MY,NY
51                   IF (EQUC(MAP(MX,IY),BLANK)) MAP(MX,IY) = BAR
52     40            IF (EQUC(MAP(NX,IY),BLANK)) MAP(NX,IY) = BAR
       C
       C   PUT ROOM INDEX IN ROOM
       C
53                LX = (MX + NX) / 2
54                LY = (MY + NY) / 2
55                CALL LABL(IROOM,LX,LY)
       C
       C   ITERATE OVER PORTALS OF ROOMS, HALLS
       C
56                NBRS = IVAL(JNBRS,IROOM)
57                IPORT = IFIRST(NBRS,KP)
58     45            IF (IPORT .EQ. NULL) GO TO 70
59                   CALL PARSRF(IPORT,IDTYP,IDUM,IDUM)
60                   IF (IDTYP .NE. LDOOR .AND. IDTYP .NE. LWIND) GO TO 60
       C
       C   DRAW IN DOORS & WINDOWS
       C
61                   IDIREC = 1
62                IPORT1 = IVAL(JPORT,IPORT)
63                X = ABS(VAL(JYCO,IPORT) - VAL(JYCO,IPORT1))
64                   IF (X .LT. .01) IDIREC = 2
65                   CALL MAPPRT(IPORT,IDIREC,XO,YO,XSCALE,YSCALE)
       C
       C   ITERATE OVER ITEMS LOCATED AT WINDOWS AND DOORS
       C
66     50            ICONTS = IVAL(JCONTS,IPORT)
```

PLEX PREPROCESSOR -MAPPDG SUBROUTINE

```
ISN
67                    ICONT = IFIRST(ICONTS,KC)
68     55                IF (ICONT .EQ. NULL) GO TO 60
       C
       C   OUTPUT LABELS DESCRIBING VEHICLE OR PERSON CONTENTS
       C
69                       CALL PARSRF(ICONT,IDTYP,IDUM,IDUM)
70                       IF (IDTYP .LT. LVEHIC .OR. IDTYP .GT. LACTD) GO TO 55
71                       CALL COORDS(IVAL(JLOCN,ICONT),X,Y,Z)
72                       LX = (X-XO)*XSCALE + 1.0
73                       LY = (Y-YO)*YSCALE + 1.0
74                       CALL LABL(ICONT,LX,LY)
       C   END LOOP OVER PORTAL CONTENTS
75                       ICONT = NEXT(ICONTS,KC)
76                       GO TO 55
       C   END LOOP OVER PORTALS
77     60             IPORT = NEXT(NBRS,KP)
78                    GO TO 45
       C
       C   ITERATE OVER CONTENTS OF ROOMS
       C
79     70          ICONTS = IVAL(JCONTS,IROOM)
80                 ICONT = IFIRST(ICONTS,KC)
81     75             IF (ICONT .EQ. NULL) GO TO 78
82                    CALL PARSRF(ICONT,IDTYP,IDUM,IDUM)
83                    IF (IDTYP .LT. LVEHIC .OR. IDTYP .GT. LACTD) GO TO 77
       C
       C   OUTPUT LABELS DESCRIBING VEHICLE OR PERSON CONTENTS
       C
84                    CALL COORDS(IVAL(JLOCN,ICONT),X,Y,Z)
85                    LX = (X-XO)*XSCALE + 1.0
86                    LY = (Y-YO)*YSCALE + 1.0
87                    CALL LABL(ICONT,LX,LY)
       C   END LOOP OVER ROOM CONTENTS
88     77             ICONT = NEXT(ICONTS,KC)
89                    GO TO 75
       C   END LOOP OVER ROOMS OR HALLS
```

```
ISN
 90    78             IROOM = NEXT(IROOMS,KR)
 91                   GO TO 30
       C  CHECK WHETHER SOULD BEGIN LIST OF HALLS OR WHETHER HAVE FINISHED IT.
 92    80             IF (IFLAG .GT. 1) GO TO 90
 93                   IFLAG = 2
 94                   IROOMS = IVAL(JHALLS,IFLR)
 95                   IROOM = IFIRST(IROOMS,KR)
 96                   GO TO 30
       C
       C  ITERATE OVER STAIRS CONTAINED IN FLOOR
       C
 97    90         ISTARS = IVAL(JSTARS,IFLR)
 98               ISTAIR = IFIRST(ISTARS,KS)
 99    95             IF (ISTAIR .EQ. NULL) GO TO 120
       C
       C  DRAW IN STAIRS
       C
100                   CALL DSTAIR(ISTAIR,X0,Y0,XSCALE,YSCALE)
       C
       C  ITERATE OVER CONTENTS OF STAIRS
       C
101                   ICONTS = IVAL(JCONTS,ISTAIR)
102                   ICONT = IFIRST(ICONTS,KC)
103    100               IF (ICONT .EQ. NULL) GO TO 110
104                      CALL PARSPF(ICONT,IDTYP,IDUM,IDUM)
105                      IF (IDTYP .LT. LVEHIC .OR. IDTYP .GT. LACTO) GO TO 100
       C
       C  OUTPUT LABELS DESCRIBING VEHICLE OR PERSON CONTENTS
       C
106                      CALL COORDS(IVAL(JLOCN,ICONT),X,Y,Z)
107                      LX = (X-X0)*XSCALE + 1.0
108                      LY = (Y-Y0)*YSCALE + 1.0
109                      CALL LABL(ICONT,LX,LY)
       C  END LOOP OVER STAIRS CONTENTS
110                      ICONT = NEXT(ICONTS,KC)
111                      GO TO 100
```

PLEX PREPROCESSOR -MAPBDG SUBROUTINE

```
 ISN
      C   END LOOP OVER STAIRS
 112   110          ISTAIR = NEXT(ISTARS,KS)
 113                GO TO 95
      C
      C   DUMP MAP OF FLOOR PRODUCED
      C
 114   120       CALL OUTMAP(MAP,NROWS)
      C
      C   END LOOP OVER FLOORS OF BUILDING
 115             IFLR = NEXT(IFLRS,KF)
 116             IFLRNO = IFLRNO + 1
 117             GO TO 10
      C
 118   130    RETURN
 119          END
```

PLEX PREPROCESSOR - MAPORT SUBROUTINE

```
ISN
  1          SUBROUTINE MAPORT(IPORT,IDIREC,X0,Y0,XSCALE,YSCALE)
      C
      C      ROUTINE TO FILL IN THE PORTAL AS PART OF A SITE MAP.
      C
      C  INPUT PARAMETERS:
      C      IPORT    REFERENCE TO PORTAL TO BE FILLED IN
      C      IDIREC   A FLAG INDICATING THE DIRECTION OF THE PORTAL:
      C               =1 IF PORTAL IS ORIENTED HORIZONTALLY; =2 IF PORTAL IS
      C               ORIENTED VERTICALLY; OTHERWISE IDIREC EQUALS 100 * SLOPE
      C               OF THE PORTAL, WHERE "SLOPE" = DELTY / DELTX.
      C      X0       X COORDINATE CORRESPONDING TO THE LEFT SIDE OF THE MAP
      C      Y0       Y COORDINATE CORRESPONDING TO THE BOTTOM OF THE MAP
      C      XSCALE   NUMBER OF MAP UNITS PER METER IN THE X DIRECTION
      C      YSCALE   NUMBER OF MAP UNITS PER METER IN THE Y DIRECTION
      C
  2          COMMON /PARS1/
  3          COMMON /PARS3/
  4          COMMON //
  5          LOGICAL*1 MAP
      C
  6          LOGICAL*1 DR/'D'/,WI/'W'/,LAB
  7          CALL PARSRF(IPORT,IDTYP,IRECNO,IDUM)
  8          LAB = DR
  9          IF (IDTYP .EQ. LWIND) LAB = WI
 10          NBR = IVAL(JPORT,IPORT)
 11          IF (IDIREC .EQ. 2) GO TO 70
 12          IF (IDIREC .GT. 2) GO TO 80
      C
      C  PORTAL IS PARALLEL TO X AXIS.
      C
 13          X = VAL(JXCO,IPORT) - VAL(JHORIZ,IPORT)/2.
 14          Y = (VAL(JYCO,IPORT) + VAL(JYCO,NBR)) / 2.
 15          MX = (X-X0)*XSCALE + 1.0
 16          NX = (X - X0 + VAL(JHORIZ,IPORT))*XSCALE + 1.0
 17          IY = (Y-Y0)*YSCALE + 1.0
```

PLEX PREPROCESSOR - MAPORT SUBROUTINE

```
ISN
18          DO 65 IX=MX,NX
19    65       MAP(IX,IY) = LAB
20          RETURN
      C
      C  PORTAL IS PARALLEL TO Y AXIS
      C
21    70    X = (VAL(JXCO,IPORT) + VAL(JXCO,NBR)) / 2.
22          Y = VAL(JYCO,IPORT) - VAL(JHORIZ,IPORT)/2.
23          MY = (Y-Y0) * YSCALE + 1.0
24          NY = (Y - YO + VAL(JHORIZ,IPORT))*YSCALE + 1.0
25          IX = (X-X0)*XSCALE + 1.0
26          DO 75 IY=MY,NY
27    75       MAP(IX,IY) = LAB
28          RETURN
      C
      C  PORTAL ORIENTED OBLIQUELY
      C
29    80    SLOPE = FLOAT(IDIREC) / 100.
30          X = (VAL(JXCO,IPORT) + VAL(JXCO,NBR)) / 2.
31          Y = (VAL(JYCO,IPORT) + VAL(JYCO,NBR)) / 2.
32          THETA = ATAN(SLOPE)
33          HLFLEN = VAL(JHORIZ,IPORT) / 2.
34          DX = HLFLEN * COS(THETA)
35          MX = (X - DX - X0)*XSCALE + 1.0
36          NX = (X + DX - X0)*XSCALE + 1.0
37          MY = (Y - YO - DX*SLOPE)*YSCALE + 1.0
38          DELTX = 0.
39          DO 90 IX=MX,NX
40             IY = MY + IFIX(DELTX*SLOPE*YSCALE)
41             DELTX = DELTX + 1.0
42    90       MAP(IX,IY) = LAB
43          RETURN
44          END
```

PLEX PREPROCESSOR - MAPSIT SUBROUTINE

```
ISN
  1          SUBROUTINE MAPSIT
       C
       C     ROUTINE TO DRAW A MAP OF THE SITE, ITS BUILDINGS AND THEIR ROOMS,
       C  PORTALS AND CONTENTS, ITS YARDS AND THEIR PERSON OR VEHICLE
       C  CONTENTS, AND ITS BARRIERS.
       C
  2          COMMON /PARS/
  3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  4          REAL*8 DTPNAM,FLDNAM,FORMOT
  5          COMMON /PARS1/
  6          COMMON /PARS3/
  7          COMMON //
  8          LOGICAL*1 MAP
       C
  9          LOGICAL*1 DASH/'-'/,BAR/'|'/,STAR/'*'/
 10          DATA BL/'    '/,NXDIM/30/,NYDIM/72/,GRDFLR/2.8/
       C
       C  BLANK OUT MAP
       C
 11          CALL INITVL(MAP,NXDIM*NYDIM,BL)
       C
       C  GET SITE DIMENSIONS AND DETERMINE SCALE (NUMBER OF MAP UNITS / METER)
       C
 12          ISITE = NEWREF(LSITE,1,0)
 13          X = VAL(JXLEN,ISITE)
 14          Y = VAL(JYLEN,ISITE)
 15          DMAX = X
 16          IF (Y .GT. DMAX) DMAX = Y
 17          XSCALE = 119.9 / DMAX
       C  MAKE YSCALE LESS THAN XSCALE SINCE A LINE PRINTER PUTS MORE
       C  SPACE BETWEEN LINES THAN BETWEEN CHARACTERS ON A SINGLE LINE.
 18          YSCALE = 0.6 * XSCALE
       C
       C  WRITE HEADER
       C
```

PLEX PREPROCESSOR - MAPSIT SUBROUTINE

```
            WRITE (9,1000)
      1000  FORMAT ('                    MAP OF NUCLEAR REACTOR SITE'/'0')
      C
      C   DRAW OUTLINE OF SITE
      C
            NX = X*XSCALE + 1.0
            NY = Y*YSCALE + 1.0
            DO 10 IX=1,NX
               MAP(IX,1) = DASH
      10       MAP(IX,NY) = DASH
            DO 20 IY=1,NY
               MAP(1,IY) = BAR
      20       MAP(NX,IY) = BAR
            NROWS = NY
            GO TO 120
      C
      C   ITERATE OVER BUILDINGS OF SITE
      C
      25    IBLDGS = IVAL(JBLDGS,ISITE)
            IBLDG = IFIRST(IBLDGS,KB)
               BDGMAX = 0.
      30       IF (IBLDG .EQ. NULL) GO TO 170
      C
      C   DRAW OUTLINES OF BUILDINGS
      C
               XLEN = VAL(JXLEN,IBLDG)
               YLEN = VAL(JYLEN,IBLDG)
               X = VAL(JXCO,IBLDG)
               Y = VAL(JYCO,IBLDG)
               MX = (X - XLEN/2.)*XSCALE + 1.0
               MY = (Y - YLEN/2.)*YSCALE + 1.0
               NX = (X + XLEN/2.)*XSCALE + 1.0
               NY = (Y + YLEN/2.)*YSCALE + 1.0
               DO 40 IX=MX,NX
                  MAP(IX,MY) = DASH
      40          MAP(IX,NY) = DASH
```

```
ISN
46              DO 45 IY=MY,NY
47                 MAP(MX,IY) = BAR
48    45           MAP(NX,IY) = BAR
      C
      C  PUT IN BUILDING INDEX
      C
49              LX = (MX + NX) / 2
50              LY = (MY + NY) / 2
51              CALL LABL(IBLDG,LX,LY)
      C
      C  ITERATE OVER CONTAINED WALLS
      C
52              IWALLS = IVAL(JWALLS,IBLDG)
53              IWALL = IFIRST(IWALLS,KW)
54    50           IF (IWALL .EQ. NULL) GO TO 110
      C  DETERMINE DIRECTION OF WALL
55                 IDIREC = 1
56                 IF (VAL(JXCO1,IWALL) .EQ. VAL(JXCO2,IWALL)) IDIREC = 2
      C
      C  ITERATE OVER CONTAINED PORTALS
      C
57                 IPORTS = IVAL(JPORTS,IWALL)
58                 IPORT = IFIRST(IPORTS,KP)
59    60              IF (IPORT .EQ. NULL) GO TO 100
      C
      C  DRAW IN PORTALS OF GROUND FLOOR
      C
60                    IF (VAL(JZCO,IPORT) .GT. GRDFLR) GO TO 85
61                    CALL MAPORT(IPORT,IDIREC,0.,0.,XSCALE,YSCALE)
      C  END LOOP OVER PORTALS
62    85              IPORT = NEXT(IPORTS,KP)
63                    GO TO 60
      C  END LOOP OVER WALLS
64    100          IWALL = NEXT(IWALLS,KW)
65                 GO TO 50
66    110       SIZ = VAL(JXLEN,IBLDG)
```

PLEX PREPROCESSOR - MAPSIT SUBROUTINE

```
ISN
67             IF (SIZ .GT. BDGMAX) BDGMAX = SIZ
68             SIZ = VAL(JYLEN,IBLDG)
69             IF (SIZ .GT. BDGMAX) BDGMAX = SIZ
     C  END LOOP OVER BUILDINGS
70             IBLDG = NEXT(IBLDGS,KB)
71             GO TO 30
     C
     C  ITERATE OVER BARRIERS OF SITE
     C
72   120    IBARS = IVAL(JCBARS,ISITE)
73          IBAR = IFIRST(IBARS,KB)
74   121       IF (IBAR .EQ. NULL) GO TO 25
     C
     C  DRAW IN BARRIERS
     C
75             X1 = VAL(JXCO1,IBAR)
76             Y1 = VAL(JYCO1,IBAR)
77             X2 = VAL(JXCO2,IBAR)
78             Y2 = VAL(JYCO2,IBAR)
79             IF (X1 .EQ. X2) GO TO 135
80             SLOPE = (Y2 - Y1) / (X2 - X1)
81             IDIREC = 1
82             IF (SLOPE .GT. 0.1) IDIREC = 100. * SLOPE
83             IF (X1 .GT. X2) GO TO 123
84                MX = X1*XSCALE + 1.0
85                NX = X2*XSCALE + 1.0
86                DX = 0.
87                IF (NX-MX .GT. 0) DX = (X2 - X1) / FLOAT(NX - MX)
88                Y = Y1
89                GO TO 127
90   123       MX = X2*XSCALE + 1.0
91             NX = X1*XSCALE + 1.0
92             Y = Y2
     C  BARRIER IS HORIZONTAL OR OBLIQUE
93   127       X = 0.0
94             DO 130 IX=MX,NX
```

```
ISN
 95                  IY = (Y + X*SLOPE)*YSCALE + 1.0
 96                  X = X + DX
 97     130          MAP(IX,IY) = STAR
 98               GO TO 145
       C  BARRIER IS VERTICAL
 99     135       IDIREC = 2
100               IX = X1*XSCALE + 1.0
101               IF (Y1 .GT. Y2) GO TO 137
102                  MY = Y1*YSCALE + 1.0
103                  NY = Y2*YSCALE + 1.0
104                  GO TO 138
105     137       MY = Y2*YSCALE + 1.0
106               NY = Y1*YSCALE + 1.0
107     138       DO 140 IY=MY,NY
108     140          MAP(IX,IY) = STAR
       C
       C  ITERATE OVER PORTALS OF BARRIER
       C
109     145       IPORTS = IVAL(JPORTS,IBAR)
110               IPORT = IFIRST(IPORTS,KP)
111     150          IF (IPORT .EQ. NULL) GO TO 160
       C
       C  DRAW IN PORTALS
       C
112                  CALL MAPORT(IPORT,IDIREC,0.,0.,XSCALE,YSCALE)
       C  END LOOP OVER PORTALS
113                  IPORT = NEXT(IPORTS,KP)
114                  GO TO 150
       C  END LOOP OVER BARRIERS
115     160       IBAR = NEXT(IBARS,KB)
116               GO TO 121
       C
       C  ITERATE OVER YARDS OF SITE
       C
117     170    IYARDS = IVAL(JYARDS,ISITE)
118            IYARD = IFIRST(IYARDS,KY)
```

```
 ISN
119   175      IF (IYARD .EQ. NULL) GO TO 200
      C
      C  PUT IN YARD INDEX
      C
120               LX = VAL(JXCO,IYARD)*XSCALE + 1.0
121               LY = VAL(JYCO,IYARD)*YSCALE + 1.0
122               CALL LABL(IYARD,LX,LY)
      C
      C  ITERATE OVER CONTENTS OF YARDS
      C
123               ICONTS = IVAL(JCONTS,IYARD)
124               ICONT = IFIRST(ICONTS,KC)
125   180            IF (ICONT .EQ. NULL) GO TO 190
      C
      C  PUT IN INDEX OF PERSONS OR VEHICLES LOCATED IN YARDS
      C
126                  LOC = IVAL(JLOCN,ICONT)
127                  CALL COORDS(LOC,X,Y,Z)
128                  LX = X*XSCALE + 1.0
129                  LY = Y*YSCALE + 1.0
130                  CALL LABL(ICONT,LX,LY)
      C  END LOOP OVER CONTENTS OF YARD
131                  ICONT = NEXT(ICONTS,KC)
132                  GO TO 180
      C  END LOOP OVER YARDS
133   190         IYARD = NEXT(IYARDS,KY)
134               GO TO 175
      C
      C  DUMP MAP PRODUCED
      C
135   200   CALL OUTMAP(MAP,NROWS)
      C
      C  DETERMINE SCALE OF MAXIMUM-SIZED BUILDING
      C
136         XSCALB = 119.9 / BDGMAX
137         YSCALB = 0.6 * XSCALB
```

PLEX PREPROCESSOR - MAPSIT SUBROUTINE

```
 ISN
        C
        C  ITERATE OVER BUILDINGS OF SITE, MAPPING EACH
        C
 138            IBLDG = IFIRST(IBLDGS,KB)
 139    210     IF (IBLDG .EQ. NULL) RETURN
 140            CALL MAPBDG(IBLDG,XSCALB,YSCALB)
 141    220     IBLDG = NEXT(IBLDGS,KB)
 142            GO TO 210
 143            END
```

PLEX PREPROCESSOR - MPREAD FUNCTION

```
      FUNCTION MPREAD(NFLD,BUF,LUNO)
C ... MPREAD IS CALLED BY INPLEX TO READ RECORD DATA AND ACCOUNTS
C      FOR THE FACT THAT A LOGICAL RECORD MAY INCLUDE MULTIPLE
C     PHYSICAL (INPUT) RECORDS.  THE FIRST RECORD WILL HAVE ID
C      AND 14 DATA FIELDS OF 8 CHARACTERS. 2ND AND 3RD RECORD
C     WILL HAVE 14 DATA FIELDS OF EIGHT CHARACTERS.
C ... IF FIRST PHYSICAL RECORD IS BLANK, ROUTINE RETURNS
C     WITHOUT READING ANY MORE RECORDS.
C
C ... INPUT PARAMETERS:
C             NFLD ... NUMBER OF FIELDS TO BE READ
C             BUF  ... ADDRESS OF BUFFER INTO WHICH DATA IS READ
C             LUNO ... LU# FOR DATA SOURCE
      REAL*8 BUF(1),BLANK
      DATA BLANK /8H        /
 1001 FORMAT(A6,14A8)
 1002 FORMAT(2X,14A8)
 1003 FORMAT(4X,14A8)
      MPREAD=-1
      IF(NFLD.LE.0. OR .NFLD.GT.43 ) RETURN
      MPREAD=0
      READ(LUNO,1001) (BUF(I),I=1,15)
      IF(NFLD.LT.16) GO TO 15
      DO 5 I=1,15
      IF(BUF(I).NE.BLANK) GO TO 10
    5 CONTINUE
      RETURN
   10 READ(LUNO,1002) (BUF(I),I=16,29)
      IF(NFLD.LT.30) GO TO 15
      READ(LUNO,1003) (BUF(I),I=30,43)
   15 MPREAD=0
      RETURN
      END
```

PLEX PREPROCESSOR - OUTBLK SUBROUTINE

```
ISN
 1          SUBROUTINE OUTBLK(STATV,STATV2,PARS,NSTATV,NSTV2,NPARS)
      C
      C     ROUTINE TO OUTPUT LONG BINARY COMMON BLOCK SECTION TO THE
      C  MAIN SIMULATION.
      C
      C  INPUT PARAMETERS:
      C     STATV     THE FIRST PORTION OF COMMON /STATEV/
      C     STATV2    THE SECOND PORTION OF COMMON /STATEV/
      C     PARS      A VECTOR EQUIVALENCED TO /PARS/
      C     NSTATV    THE SIZE OF STATV
      C     NSTV2     THE SIZE OF STATV2
      C     NPARS     THE SIZE OF PARS
      C
 2          DIMENSION STATV(NSTATV),STATV2(NSTV2),PARS(NPARS)
      C
 3          WRITE (6) STATV
 4          WRITE (6) STATV2
 5          WRITE (6) PARS
 6          RETURN
 7          END
```

PLEX PREPROCESSOR - OUTMAP SUBROUTINE

```
ISN
 1           SUBROUTINE OUTMAP(MAP,NROWS)
       C
       C        ROUTINE TO WRITE A MAP PRODUCED AND TO REINITIALIZE THE MAP'S
       C     STORAGE TO BLANKS.
       C
       C     INPUT PARAMETERS:
       C        MAP       A MAP OF THE SITE TO BE OUTPUT
       C        NROWS     NUMBER OF ROWS OF MAP TO OUTPUT
       C
 2           DIMENSION MAP(30,72)
 3           DATA BL/'    '/,NXDIM/30/
       C
       C     WRITE OUT MAP, LINE BY LINE
       C
 4           WRITE (9,100)
 5     100   FORMAT ('-')
 6           IROW = NROWS
 7     10    WRITE (9,101)  (MAP(ICOL,IROW),ICOL=1,NXDIM)
 8     101   FORMAT ('9',30A4)
 9           IROW = IROW - 1
10           IF (IROW .GE. 1) GO TO 10
       C
       C     REINITIALIZE MAP STORAGE
       C
11           CALL INITVL(MAP,NXDIM*NROWS,BL)
12           RETURN
13           END
```

7.3 Data Preprocessor

This subsection contains listings for the Data Preprocessor. Detailed contents of the common blocks for this program are displayed in section 7.1. The program has no subprograms, utility or otherwise. A detailed discussion of the logic is in section 2.2, in volume I of this manual.

DATA PREPROCESSOR - MAIN PROGRAM

```
ISN
      C     BINARY FORMATTER.  READS A FORMATTED FILE OF DATA VARIABLE
      C  HEADERS FOLLOWED BY DATA FOR EACH VARIABLE, COLLECTS THE DATA INTO
      C  COMMON BLOCK RECORDS, AND OUTPUTS THE RECORDS IN BINARY FORM.  EACH
      C  VARIABLE CONSISTS OF THE FOLLOWING FIELDS:
      C          NAME      COL 1-8    VARIABLE NAME
      C          DIM 1         9-11   1ST DIMENSION OF VARIABLE IN PROGRAM
      C          DIM 2         12-14    2ND DIMENSION OF VARIABLE IN PROGRAM
      C          DIM 3         15-17    3RD DIMENSION OF VARIABLE IN PROGRAM
      C          STAR             19    '*' IF DATA FOR VARIABLE IS ALL ZEROS
      C       RED. DIM 1      20-22     (OPTIONAL) REDUCED DIMENSION APPLYING
      C                                   TO DATA
      C          REPL 1          23     (OPTIONAL) DATA GIVEN ALONG FIRST
      C                                     SECTION
      C                                 OF DIMENSION IS TO BE REPLICATED ALONG
      C                                  LATER SECTIONS IF FIELD CONTAINS "#"
      C          RED DIM 2      24-25    (OPTIONAL) REDUCED DIMENSION 2
      C            REPL 2        26      (OPTIONAL) REPLICATION SYMBOL (#)
      C         RED DIM 3      27-28      (OPTIONAL) REDUCED DIMENSION 3
      C           REPL 3        29        (OPTIONAL) REPLICATION FACTOR 3
      C          FTN FORMAT     31-78      FORTRAN FORMAT (IN PARENTHESES)
      C
      C     THE DATA VALUES FOR A VARIABLE FOLLOW THE HEADER CARD.  FOR
      C  ARRAYS THE NUMBER OF DATA VALUES EXPECTED IS THE PRODUCT OF THE
      C  NON-ZERO DIMENSIONS GIVEN ON THE HEADER CARD.  IF REDUCED DIMENSIONS
      C  ARE SPECIFIED THEY ARE USED INSTEAD OF THE ACTUAL DIMENSIONS IN
      C  COMPUTING THE NUMBER OF EXPECTED DATA VALUES.  FOR SCALARS, VARIABLES
      C  WITH NO DIMENSIONS, A SINGLE VALUE IS EXPECTED.  IF A '*' IS GIVEN
      C  IN THE STAR FIELD, ZERO DATA VALUES ARE EXPECTED & THE NEXT HEADER
      C  CARD SHOULD FOLLOW IMMEDIATELY.  THE FORMAT THAT THE DATA VALUES
      C  APPEAR IN IS UP TO THE USER.  THE FORMAT IS INDICATED ON THE HEADER
      C  CARD & MUST BE A VALID FORTRAN FORMAT SPECIFICATION.
      C     EACH BLOCK OF DATA VARIABLES IS TERMINATED BY A RECORD WITH
      C  "ENDBLK" IN COLS 1-6.  THE FILE ITSELF IS TERMINATED BY A RECORD WITH
      C  "ENDFIL" IN COLS 1-6.  ALL VARIABLES WITHIN A BLOCK MUST BE IN PROPER
      C  SEQUENCE & IN 1:1 CORRESPONDENCE WITH THE VARIABLES OF THE ASSOCIATED
```

DATA PREPROCESSOR - MAIN PROGRAM

```
ISN
      C  COMMON BLOCK USED IN THE MAIN PROGRAM.  SEE THE USER'S MANUAL FOR A
      C  LIST OF THE INPUT VARIABLES EXPECTED, THEIR ORDER, & THEIR
      C  DIMENSIONS.
      C       THE DATA SET REFERENCE NUMBERS USED ARE AS FOLLOWS:
      C    5   INPUT   SANDIA DATA FILE
      C    6   OUTPUT OF BINARY DATA BLOCKS
      C    7   OUTPUT  ECHO OF DATA FILE HEADER CARDS
      C
      C
            REAL VEC(5000),V(1000)
            REAL*8 VAR,ENDBLK,ENDFIL
            INTEGER FMT(12)
            DATA STAR1/1H*/,ENDBLK/6HENDBLK/,ENDFIL/6HENDFIL/
            DATA SHARP/1H#/
            CALL FTNCMD('SET MODECHECK=OFF',17)
      C
       10   JJ0 = 0
       11   READ (5,100) VAR,I,J,K,STAR,I2,S1,J2,S2,K2,S3,FMT
            WRITE (7,101) JJ0,VAR,I,J,K,STAR,I2,S1,J2,S2,K2,S3,FMT
      100   FORMAT (A8,3I3,1X,A1,I3,2(A1,I2),A1,1X,12A4)
      101   FORMAT (I6,2X,A8,3I3,1X,A1,I3,2(A1,I2),A1,1X,12A4)
            IF (VAR .EQ. ENDBLK) GO TO 44
            IF (VAR .EQ. ENDFIL) GO TO 50
            JSIZE = 1
            IF (I .NE. 0) JSIZE = JSIZE*I
            IF (J .NE. 0) JSIZE = JSIZE*J
            IF (K .NE. 0) JSIZE = JSIZE*K
            IF(JSIZE .GT. 5000) STOP 100
            JJ2 = JJ0 + JSIZE
            IF(JJ2 .GT. 5000) STOP 200
            JJ1 = JJ0 + 1
       14   IF (STAR .EQ. STAR1) GO TO 40
      C ***   IF ALL ZEROS, THEN SKIP THIS VARIABLE
            IF (I .NE. 0) GO TO 31
      C ***    IS THIS A SCALAR
            READ (5,FMT) VEC(JJ1)
```

DATA PREPROCESSOR - MAIN PROGRAM

```
            GO TO 40
      C
      31    IF (J .NE. 0) GO TO 32
      C ***   IS IT  A VECTOR ?
            IF (I2 .EQ. 0) I2 = I
            JJ3 = JJ0 + I2
            READ (5,FMT) (VEC(M),M=JJ1,JJ3)
            GO TO 40
      C
      32    IF (K .NE. 0) GO TO 36
      C ***    IS IT A 2-D ARRAY
            IF (I2 .NE. 0) GO TO 33
                READ (5,FMT) (VEC(M),M=JJ1,JJ2),
                GO TO 40
      33    IJ=I2*J2
            READ (5,FMT) (V(M),M=1,IJ)
            DO 34 I1=1,I2
                DO 34 J1=1,J2
                    J11 = J1-1
                    M1 = JJ0+I1+I*J11
                    M2 = I1+I2*J11
      34            VEC(M1) = V(M2)
            GO TO 40
      C
      36    IF (I2 .NE. 0) GO TO 38
            READ (5,FMT) (VEC(M),M=JJ1,JJ2)
            GO TO 40
      38    IJK = I2*J2*K2
            READ (5,FMT) (V(M),M=1,IJK)
            DO 39 I1=1,I2
                DO 39 J1=1,J2
                    J11 = J1-1
                    DO 39 K1=1,K2
                        K11 = K1-1
                        M1=JJ0+I1+I*J11+I*J*K11
                        M2=I1+I2*J11+I2*J2*K11
```

```
ISN
56    39                VEC(M1) = V(M2)
      C
      C
57    40     IREP = 1
58           IF (S1 .EQ. SHARP) IREP = IREP*I
59           IF (S2 .EQ. SHARP) IREP = IREP*J
60           IF (S3 .EQ. SHARP) IREP = IREP*K
61           IF (IREP .EQ. 1) GO TO 43
62           J2SIZE = JSIZE/IREP
63           L1 = JJ0
64           DO 42 ICT=1,IREP
65                L1 = L1 + J2SIZE
66                DO 42 L2=1,J2SIZE
67    42             VEC(L1+L2)=VEC(JJ0+L2)
68    43     JJ0 = JJ0 + JSIZE
69           GO TO 11
      C ***    WRITE BLOCK INTO SEQUENTIAL FILE
70    44     WRITE(6) (VEC(I), I=1,JJ2)
71           GO TO 10
72    50     STOP
73           END
```

7.4 *Fixed Site Neutralization Model*

This subsection contains listings for the Fixed Site Neutralization Model. Detailed contents of the common blocks for this program and its subprograms are displayed in section 7.1. Subprogram listings follow the main program listings. Utility routines, used to process the plex structure and associated lists,[1] are an exception; they are located in section 7.5, because they are also used by the Plex Preprocessor.

The reader is referred to section 2.3, in volume 1 of this manual, for the detailed logic descriptions which supplement these listings.

[1]That is, the processing described in section 3.3, in volume 1 of this manual.

```
C     PROGRAM TO SIMULATE A GROUP OF ADVERSARIES ATTEMPTING TO STEAL
C  OR SABOTAGE NUCLEAR MATERAIL AT A NUCLEAR REACTOR SITE AND THEIR
C  OPPOSITION BY THE SITE'S GUARDS AND THEIR REINFORCEMENTS.  THE
C  SIMULATION UPDATES THE STATUS OF THE PLAYERS AT EACH OF A SERIES OF
C  SMALL FIXED TIME STEPS UNTIL TERMINATION CONDITIONS ARE REACHED.
C  AMONG THE ENTITIES WHICH THE MODEL REPRESENTS ARE THE FOLLOWING:
C  THE NUCLEAR FACILITY SITE, INCLUDING ITS OUT-OF-DOORS REGIONS AND
C  BARRIERS; ITS BUILDINGS WITH THEIR ROOMS, PORTALS, AND CONTENTS;
C  THE GUARDS AND ADVERSARIES WITH THEIR WEAPONS AND EQUIPMENT; VEHICLES
C  USED BY PERSONS; SENSORS; AND REMOTE EFFECTORS (ACTIVATED DELAYS).
C  THE MODELLING OF PERSONS INCLUDES REPRESENTATION OF THEIR PLANS AND
C  ACTIONS, THEIR PERCEPTIONS, AND THE COMMUNICATION OF MESSAGES AMONGST
C  THEM.
C     THE MODEL AND PROGRAM WERE DEVELOPED FOR SANDIA LABS BY VECTOR
C  RESEARCH, INC.
C     THIS IS THE MAIN ROUTINE OF THE SIMULATION PROPER.  THERE ARE ALSO
C  TWO ASSOCIATED PREPROCESSORS FOR READING AND CHECKING THE INPUT.
C  THEY EACH GENERATE LONG BINARY RECORDS WHICH ARE READ BY THE MAIN
C  SIMULATION.
C     THE FOLLOWING IS A SUMMARY OF THE DATA SETS USED BY THE MAIN
C  SIMULATION:
C
C  INPUT FILES:
C     4   BINARY DATA FILE
C     5   BINARY PLEX STRUCTURE
C
C  OUTPUT FILES:
C     6   REPORTS OF CHANGES TO STATE VARIABLES
C     7   ERRORS
C     8   PLEX STRUCTURE AT END OF SIMULATION
C
      COMMON /STATEV/
      DIMENSION ITEM(41900),DITEM(41900)
      EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
      COMMON /PARS/
```

```
      EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
      REAL*8 DTPNAM,FLDNAM,FORMOT
      COMMON /PARS3/
      COMMON /DATAV/
      DIMENSION ACTTIM(25)
      EQUIVALENCE (ACTTIM(1),ACTRAT(1))
C
      DIMENSION SIDE(2)
      REAL*8 PROCES(2,10)
      DATA SIDE/'SFE','AFE'/
      DATA PROCES/'INITIALI','ZATIONS', 'PERSON D','ECISIONS',
     +     'DO MAIN ','ACTIVITY', 'DETECT O','BJECTS',
     +     'PROCESS ','OBSVNS', 'PROCESS ','MESSAGES',
     +     'NEW TIME','SLICE', 'CHECK FO','R END',
     +     'LEADER P','LANNING','BACKUPS ','ARRIVE'/
C
C  READ DATA VARIABLES AND INITIAL VALUES OF STATE VARIABLES
C
      CALL INBLK(ITEM(1),ITEM(20001),DTPNAM(1),ACTRAT(1),20000,
     +     NSTATE-20000,NPARSQ,NDATAV)
      IFLAG=0
C
C  INITIALIZATIONS AT THE BEGINNING OF THE SIMULATION
C
      WRITE (6,100) PROCES(1,1),PROCES(2,1)
  100 FORMAT (' '/'*** ',2A8)
      CALL INIT
C
C  CHECK FOR NEW PLANNING BY LEADERS
C
   10 WRITE (6,100) PROCES(1,9),PROCES(2,9)
      CALL LDRPLN
C
C  FOR EACH PLAYER, DECIDE NEXT ACTIVITY
C
      WRITE (6,100) PROCES(1,2),PROCES(2,2)
```

```
ISN
23            CALL DECIDE
      C
      C   PERFORM MOVEMENT OR FIRING ACTIVITY FOR EACH PLAYER, AS APPROPRIATE
      C
24            WRITE (6,100) PROCES(1,3),PROCES(2,3)
25            CALL ACTTY
      C
      C   DETERMINE THE DETECTIONS MADE BY EACH PERSON & SENSOR FOR THE TIME
      C   STEP
      C
26            WRITE (6,100) PROCES(1,4),PROCES(2,4)
27            CALL OBS
      C
      C   UPDATE EACH PLAYER'S OWN PERCEPTIONS BASED ON HIS OWN OBSERVATIONS.
      C   ADD MESSAGES TO COMMUNICATION NETS TO REPRESENT THE PLAYERS'
      C   COMMUNICATING THEIR OBSERVATIONS TO OTHERS.
      C
28            WRITE (6,100) PROCES(1,5),PROCES(2,5)
29            CALL COMOBS
      C
      C   UPDATE EACH PLAYER'S PERCEPTIONS BASED ON THE COMMUNICATIONS WHICH
      C   REACH HIM THIS TIME SLICE.
      C
30            WRITE (6,100) PROCES(1,6),PROCES(2,6)
31            CALL COMPER
      C
      C   UPDATE THE TIME OF THE SIMULATION
      C
32            WRITE(6,101)
33        101 FORMAT(1H1)
34            WRITE (6,100) PROCES(1,7),PROCES(2,7)
35            TMIN = TMIN + DTMIN
36            CALL CHGVAR(1,TMIN)
      C
      C   CHECK FOR THE ARRIVAL OF GUARD REINFORCEMENTS
      C
```

FSN MODEL - MAIN PROGRAM

```
      WRITE(6,102)
  102 FORMAT(' '/'*** ',32HCHECK FOR RESPONSE FORCE ARRIVAL)
      IF(IFLAG .EQ. 1) GO TO 13
      IF(TMIN .GE. TMRESP) GO TO 12
      WRITE(6,103)
  103 FORMAT('     RESPONSE FORCE DOES NOT ARRIVE')
      GO TO 15
   12 IFLAG=1
      CALL ARRIVL
      WRITE(6,104)
  104 FORMAT('     RESPONSE FORCE DOES ARRIVE')
      GO TO 15
   13 WRITE(6,105)
  105 FORMAT('     RESPONSE FORCE HAS ARRIVED')
C
C  CHECK FOR TERMINATION
C
   15 WRITE (6,100) PROCES(1,8),PROCES(2,8)
      IEND = ITERM(IDUM)
C
C  IF HAVEN'T REACHED THE END OF THE SIMULATION, GO PROCESS ANOTHER
C  TIME SLICE.
C
      IF (IEND .GT. 0) GO TO 18
      WRITE(6,106)
  106 FORMAT('     SIMULATION CONTINUES')
      GO TO 10
C
C  MAKE NOTE OF WHEN THE SIMULATION ENDED & WHO WON.
C
   18 WRITE (7,108) TMIN,SIDE(IEND)
  108 FORMAT (' SIMULATION ENDS AT TIME=',F8.2/A6,' WAS THE WINNER.')
C
C  COLLECT GARBAGE BEFORE OUTPUT OF MAIN STATE VARIABLES
C
      CALL COLECT
```

```
ISN
     C
     C  OUTPUT THE VALUES OF THE MAIN STATE VARIABLES AT THE END OF THE
     C  SIMULATION.
     C
60            DO 20 IDTYP=LLIST,LFORCE
61               CALL OUTPLX(IDTYP,1,LSTREC(IDTYP),8,1,1)
62     20        CONTINUE
     C
63            STOP
64            END
```

FSN MODEL - ACTTY SUBROUTINE

```
ISN
 1          SUBROUTINE ACTTY
      C
      C
      C  --  THE PURPOSES OF THIS SUBROUTINE ARE TO:
      C          1.  UPDATE ALL PLAYERS WITH FIRE OR MOVE
      C               ACTIVITIES WHICH HAVE RESULTED FROM
      C                SUBROUTINE DECIDE.
      C
      C          2.  FOR PLAYER FIRING:
      C                  - FIND THE WEAPON SELECTED AND RATE OF FIRE.
      C                  - CALCULATE A PROBABILITY OF HIT, AND
      C                     MONTE CARLO SAMPLE FOR HIT OR MISS.
      C                  - IF A HIT OCCURS, DETERMINE THE DEGREE OF
      C                     DAMAGE.
      C                  - ASSESS THE FIRE RESULTS AND DECIDE WHEN
      C                     TO TERMINATE FIRING ACTIVITY.
      C
      C          3.  FOR PLAYER MOVING:
      C
      C                    -  MOVE EACH PLAYER AS FAR ALONG
      C                        PATH AS POSSIBLE
      C                    -  IF TWO PLAYERS OF OPPOSITE ALLEGIENCE
      C                        INTERSECT PATHS, A CAPTURE SITUATION
      C                         MUST BE RESOLVED
      C
      C           4.  OBSERVATION WILL BE MADE BY EACH PLAYER
      C                FIRING AND MOVING.
      C
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
```

```
ISN
 8            COMMON /PARS1/
 9            COMMON /PARS2/
10            COMMON /PARS3/
11            COMMON /DATAV/
12            DIMENSION ACTTIM(25)
13            EQUIVALENCE (ACTTIM(1),ACTRAT(1))
14            COMMON /RECREF/
15            DIMENSION RECRFQ(140)
16            EQUIVALENCE (RECRFQ(1),IGOALS)
17            COMMON /PARS4/
18            COMMON /NEW/
19            COMMON /NEW2/
20            DIMENSION INSTAT(2,5)
21            EQUIVALENCE (IOBSV(41),INSTAT(1,1))
       C
22            NINSDR=5
23            KINSDR=4
       C
       C
       C  -- SELECT PLAYER IN FIRING ACTIVITY
       C
24            LASMNT=NULL
25            LNODIN(1)=NULL
26            LNODIN(2)=NULL
27            CALL CHGVAR(11,NULL)
28            CALL CHGVR1(13,NULL,1)
29            CALL CHGVR1(13,NULL,2)
30            JL=JGARDS
31          2 IPLALT=IVAL(JL,ISITE)
32                 IPLARF=IFIRST(IPLALT,KA)
33          3          IF(IPLARF .EQ. NULL) GO TO 80
       C
       C  -- TEST ACTIVITY OF PLAYER
       C         IF NOT FIRING NEXT PLAYER
       C
34            IACTLT=IVAL(JACTIV,IPLARF)
```

```
ISN
35          IACTRF=IFIRST(IACTLT,KB)
36               IF(IVAL(JTYPE,IACTRF) .NE. KFIRNG) GO TO 70
      C
      C  -- TEST IF PLAYER IS INSIDER
      C
37          IF(IVAL(JTYPE,IPLARF) .NE. KINSDR) GO TO 300
      C
      C  -- SET TRIGGER FOR INSIDER EXPOSURE
      C
38          DO 298 IK=1,NINSDR
39          IF(INSTAT(1,IK) .EQ. IPLARF) GO TO 299
40      298 CONTINUE
41          GO TO 300
      C
      C  -- TRIGER VALUE IS 1
      C
42      299 INSTAT(2,IK)=1
      C
      C
      C  -- FIND PHYSICAL STATUS OF PLAYER
      C
43      300 ISHOT=KPWHOL
44          IF(IVAL(JPSTAT,IPLARF) .EQ. KWOUND) ISHOT=KPWOUN
      C
      C  -- FIND TARGET REFERENCE, TARGET TYPE, AND PHYSICAL OBJECT TYPE
      C
45          DREDU=0.0
46          CALL PARSRF(IPLARF,IDYP,IPLAYR,IDUM)
47          CALL CHGVAR(3,IPLAYR)
48          ISIDE=IVAL(JALLEG,IPLARF)
49          CALL CHGVAR(4,ISIDE)
50          IRF=NULL
51          ITARGT=IVAL(JPAR1,IACTRF)
      C
      C  -- FIND WEAPON REFERENCE AND TYPE
      C
```

PSN MODEL - ACTTY SUBROUTINE

```
ISN
52          IWPNRF=IVAL(JPAR3,IACTRF)
53          IWPN=IVAL(JTYPE,IWPNRF)
54          CALL PARSRF(ITARGT,IDYP,IRNO,IDUM)
55          ITYPE=IVAL(JTYPE,ITARGT)
56               IF(IDYP .EQ. LPERSN) ITYPE=1
57          IF(IDYP .EQ. LVEHIC) GO TO 4
58          IF(IDYP .EQ. LPERSN) GO TO 5
      C
      C  --  SENSOR TYPE TARGET
      C
59          TTART=KTGSEN
60          IOBJJ=IPHSOB(5)+ITYPE
61          GO TO 6
      C
      C  -- VEHICLE TYPE TARGET
      C
62    4     I = IVAL(JTYPE,ITARGT)
63          ITART=IARMTP(I)
64          IOBJJ=IPHSOB(3)+ITYPE
65          GO TO 6
      C
      C  -- PERSON TYPE TARGET
      C
66        5 ITART=KTGPSN
67          IOBJJ=IPHSOB(4)+ITYPE
      C
      C -- REDUCE VULNERABILITY FOR EQUIPMENT CARRIED
      C
68          IIELT=IVAL(JWEAPS,ITARGT)
69          IIGRF=IFIRST(IIELT,KKZ)
70     603       IF(IIGRF .EQ. NULL) GO TO 6
71          CALL PARSRF(IIGRF,IDDD,IRRR,IDUM)
72          IF(IDDD .NE. LEQUIP) GO TO 605
73          IF(IVAL(JTYPE,IIGRF) .EQ. KVEST)
          *       DREDU=DREDU+DEGVUL(IWPN,KSHBUL)
74          IF(IVAL(JTYPE,IIGRF) .EQ. KGMASK)
```

```
ISN
            *      DREDU=DREDU+DEGVUL(IWPN,KSHGAS)
75        605 IIGRF=NEXT(IIELT,KKZ)
76            GO TO 603
        C
        C
        C
        C   -- DETERMINE IF AREA WEAPON USED
        C
77          6 IF(IFIRTP(IWPN) .EQ. 1) GO TO 7
        C
        C   -- AREA FIRE WEAPON
        C        CALCULATE PROBABILITY OF HIT FUNCTION
        C
78            SLOP=-1.0/(RNGLET(IWPN)*2.)
79            B=1.0
        C
        C   -- CALCULATE PROBABILITY OF HIT
        C
80          7 RNGE=DIST(IPLARF,ITARGT)
        C
        C   -- INTERPOLATE STANDARD DEVIATION ARRAY
        C
81            RSTEP=(RNGMAX(IWPN)-RNGMIN(IWPN))/FLOAT(NRNGCL-1)
82            SIGL=FCNLIN(PSIG(1,ITART,IWPN),NRNGCL,RNGE,RSTEP)
83            SIGR=FCNLIN(PSIG(NRNGCL+1,ITART,IWPN),NRNGCL,RNGE,RSTEP)
        C
        C   -- ADJUST SIGMAS BY SKILL
        C
84            SIGL=SIGL*SKILL(KFIRSK,ISHOT,IPLAYR)
85            SIGR=SIGR*SKILL(KFIRSK,ISHOT,IPLAYR)
        C
        C   -- GENERATE RANDOM NUMBERS
        C
86         10 CALL GAUSS(IRN(3),SIGL,0.,RNLAT)
87            CALL GAUSS(IRN(4),SIGR,0.,RNRAD)
        C
```

```
ISN
      C  -- TEST IF AREA FIRE WEAPON USED
      C
 88          IF(IFIRTP(IWPN) .EQ. 2) GO TO 40
      C
      C-- DETERMINE IF HIT OR MISS
      C
 89          EXPOS=1.0
      C
      C  -- IF TARGET TYPE IS PERSON FIND POSTURE AND COVER
      C
 90          IF(ITART .NE. KTGPSN) GO TO 15
 91          CALL DIREC(ITARGT,IPLARP,THET,PE)
 92          TEM=COVR(ITARGT,THET)
 93          EXPOS=VAL(JPOSTR,ITARGT)-TEM
      C
      C  -- SET AREA OF PERSON
      C
 94          IF (EXPOS .GE. 0.8) GO TO 11
 95          IF(EXPOS .GE. 0.5) GO TO 12
 96          IF(EXPOS .GE. 0.2) GO TO 13
 97          X1=0.3
 98          X2=-1.0
 99          Y1=0.3
100          Y2=-1.0
101          GO TO 14
102       11 X1=0.3
103          X2=0.5
104          Y1=1.5
105          Y2=0.3
106          GO TO 14
107       12 X1=0.3
108          X2=0.5
109          Y1=1.0
110          Y2=0.3
111          GO TO 14
112       13 X1=0.5
```

FSN MODEL - ACTTY SUBROUTINE

```
 ISN
 113            X2=-1.0
 114            Y1=0.5
 115            Y2=-1.0
          C
          C  -- TEST FOR HIT
          C
 116         14 IPHS=0
 117            IF(ABS(RNLAT) .LE. X1 .AND. ABS(RNRAD) .LE. Y1) GO TO 19
 118            IF(ABS(RNLAT) .GT. X2) GO TO 50
 119            IF(RNRAD .GT. ((Y1/2.)-Y2)) GO TO 50
 120            IF(RNRAD .LT. -(Y1/2.)) GO TO 50
 121            GO TO 19
          C  -- FIND AREA OF EXPOSURE
          C    USE PHYSICAL OBJECT TYPE
          C
 122         15 CCAR=AREA(IOBJJ)*EXPOS
          C
          C  -- ASSUME AREA IS A CIRCLE,
          C        DETERMINE IF (RNLAT,RNRAD) LIES
          C        WITHIN CIRCLE
          C
 123            ART=PI*SQRT(RNLAT**2+RNRAD**2)
 124                 IF(CCAR .LT. ART) GO TO 50
          C
          C  -- SET RESULTS OF HIT TO MISS
          C
 125         18 IPHS=0
          C
          C  -- HAVE RECORDED A HIT
          C       DETERMINE RESULTS OF HIT
          C
 126         19 RNN=URAND(IRN(5))
          C
          C  --  TEST IF AIM TO WOUND
          C
 127            IF(IAIMPT(ISIDE) .EQ. 1) GO TO 22
```

```
ISN
128            IF(IAIMPT(ISIDE) .EQ. 2) GO TO 21
      C
      C   -- AIM TO KILL
      C
129            PP1=PWOUND(ITART,IWPN)
130            PP2=PK(ITART,IWPN)*(1.-DREDU)
131            GO TO 23
      C
      C   -- AIM TO WOUND
      C
132         21 PP1=PWOUND(ITART,IWPN)
133            PP2=PK(ITART,IWPN)*0.25
134            GO TO 23
      C
      C   -- AIM TO WARN
      C
135         22 PP1=0.0
136            PP2=0.0
137         23      IF(RNN .LT. PP1) IPHS=KWOUND
138                 IF(RNN .LT. PP2) IPHS=KDEAD
      C
      C   -- TEST RESULTS OF HIT
      C
139            IF(IPHS .EQ. 0) GO TO 50
      C
      C   -- ADJUST IPHS TO REFLECT PHYSICAL STATUS OF
      C        TARGET TYPE
      C
140            IF(ITART .EQ. KTGPSN) GO TO 30
141            IF(ITART .EQ. KTGSEN) GO TO 20
      C
      C   -- VEHICLE TYPE TARGET
      C
142            IF(IPHS .EQ. KWOUND) IPHS=KIMMOB
143            IF(IPHS .EQ. KDEAD) IPHS=KDESTR
144            GO TO 25
```

FSN MODEL - ACTTY SUBROUTINE

```
ISN
      C
      C   -- SENSOR TARGET
      C
145      20 IF(IPHS .EQ.KWOUND)  IPHS=KDESTR
146         IF(IPHS .EQ. KDEAD) IPHS=KDESTR
      C
      C   -- ADJUST PHYSICAL STATUS
      C
147      25 IPTR=IREF1(ITARGT)
148         ITEM(IPTR+JPSTAT)=IPHS
149         GO TO 50
      C
      C   ADJUST PHYSICAL STATUS OF PERSON
      C
150      30 ICOND=IVAL(JPSTAT,ITARGT)
151         IF(ICOND .EQ. KDEAD) GO TO 50
152         IF(IPHS .EQ. KWOUND .AND. ICOND .EQ. KWOUND) IPHS=KDEAD
153         IF(IPHS .EQ. ICOND) GO TO 50
      C
      C     ADJUST FORCES
      C
154         IIT=KSFE
155         IF(ISIDE .EQ. KSFE) IIT=KAFE
156         FORCES(ICOND,IIT)=FORCES(ICOND,IIT)-1.0
157         FORCES(IPHS,IIT)=FORCES(IPHS,IIT)+1.0
158         CALL CHGVR2(5,FORCES(ICOND,IIT),ICOND,IIT)
159         CALL CHGVR2(5,FORCES(IPHS,IIT),IPHS,IIT)
160         IPTR=IREF1(ITARGT)
161         ITEM(IPTR+JPSTAT)=IPHS
162         IF(IPHS .EQ. KDEAD) CALL DEAD(ITARGT)
163         GO TO 50
      C
      C
      C   -- AREA EFFECTS WEAPON
      C    FIND LOCATION OF CHARGE
      C
```

```
 ISN
164         40 IILOC=IVAL(JLOCN,ITARGT)
165            CALL COORDS(IILOC,X,Y,Z)
166            X=X+RNLAT
167            Y=Y+RNRAD
          C
          C  -- SEARCH PLAYER LIST
168            JL=JGARDS
169         41 IIPLT=IVAL(JL,ISITE)
170            IIPL=IFIRST(IIPLT,KZ)
171         42      IF(IIPL .EQ. NULL) GO TO 46
          C
          C-- FIND RANGE FROM CHARGE
          C
172            IILOC=IVAL(JLOCN,ITART)
173            CALL COORDS(IILOC,X1,Y1,Z1)
174            DD=SQRT((X1-X)**2+(Y1-Y)**2)
175            PHH=SLOP*DD+B
176            IF(PHH .LE. 0.) GO TO 44
          C
          C  -- SAMPLE FOR HIT
          C
177            RNN=URAND(IRN(6))
178            IF(RNN .LE. PHH) GO TO 18
179         44 IIPLT=NEXT(IIPLT,KZ)
180            GO TO 42
          C
          C  -- NEXT PLAYER LIST
          C
181         46 IF(JL .EQ. JADVRS) GO TO 55
182            JL=JADVRS
183            GO TO 41
          C
          C  -- ASSESSMENT OF RESULTS
          C
184         50 CALL FASMNT(IPLARF,ITARGT,IPHS,IRF)
          C
```

FSN MODEL - ACTTY SUBROUTINE

```
 ISN
       C   -- DETERMINE IF AREA FIRE WEAPON
       C
 185          IF(IFIRTP(IWPN) .EQ. 2) GO TO 44
       C
       C   -- UPDATE PLAYER TIME AND AMMUNITION
       C
 186       55 IPTRPL=IREF1(IPLARF)
 187          IACS=NACTSU(IPLARF,NULL)
 188          TEM=ACTTIM(IACS)
 189          IF(IACTTP(IACS) .EQ. 1) TEM=1./ACTRAT(IACS)
 190          TEM=TEM*SKILL(KFRTSK,ISHOT,IPLAYR)
 191          DITEM(IPTRPL+JTREQ)=DITEM(IPTRPL+JTREQ)-TEM
 192          IF(DITEM(IPTRPL+JTREQ) .LT.0.0) DITEM(IPTRPL+JTREQ)=0.0
 193          IPTR=IREF1(IWPNRF)
 194          ITEM(IPTR+JAMT)=ITEM(IPTR+JAMT)-1
       C
       C   -- DECIDE TO FIRE AGAIN
       C
 195          ICODE=NDRFIR(IPLARF,ITARGT,IACTRF,IRF)
       C
 196                IF(ICODE .EQ. 1) GO TO 10
       C
       C   --- PLAYER DECIDES NOT TO FIRE AGAIN
       C         LET PLAYER OBSERVE WHILE FIRING
       C
 197          TT=DTSEC-VAL(JTREQ,IPLARF)
 198          DD=DIREC(IPLARF,ITARGT,THET,PHE)
 199          CALL OBSERV(IPLARF,TT,KFIRNG,THET)
       C
       C   --  ADJUST SITUATIONS OF TARGET AND PLAYER
       C
 200       60 IPTEMP=IPLARF
 201       63 CALL PARSRF(IPTEMP,IDY,IRNO,IDUM)
 202          IF(IDY .NE. LPERSN) GO TO 65
 203          IPTR=IREF1(IPTEMP)
 204          ITEM(IPTR+JSITN)=KSITN4
```

```
 ISN
205         65 IF(IPTEMP .EQ. ITARGT) GO TO 70
206            IPTEMP=ITARGT
207            GO TO 63
          C
          C  -- NEXT PLAYEL
          C
208         70 IPLARF=NEXT(IPLALT,KA)
209            GO TO 3
          C
          C  -- TEST IF LIST OF PLAYERS COMPLETE
          C
210         80 IF(JL .EQ. JADVRS) GO TO 90
211            JL=JADVRS
212            GO TO 2
          C
          C  -- FIRING UPDATE COMPLETE
          C        UPDATE PLAYERS MOVING
          C
213         90 JL=JGARDS
214        105 IPLALT=IVAL(JL,ISITE)
          C
215            IPLARF=IFIRST(IPLALT,KN)
216        108     IF(IPLARF .EQ. NULL) GO TO 200
217                IF(IVAL(JPSTAT,IPLARF) .LE. KCAPTR) GO TO 190
          C
          C  -- FIND ACTIVITY REFERENCE
          C
218            IACTLT=IVAL(JACTIV,IPLARF)
219            IF(IACTLT .EQ. NULL) GO TO 190
220            IACTRF=IFIRST(IACTLT,KD)
221            CALL PARSRF(IPLARF,IDYP,IPLAYR,IDUM)
222            CALL CHGVAR(3,IPLAYR)
223            ISIDE=IVAL(JALLEG,IPLARF)
          C
          C  -- TEST FOR MOVING ACTIVITY, IF NOT - NEXT PLAYER
          C
```

```
 ISN
224              IF(IVAL(JTYPE,IACTRF) .NE. KMOVNG) GO TO 190
      C
      C  -- IDENTIFY LIST OF NODES(PATH)
      C
225          IPTRPL=IREF1(IPLARF)
      C
      C  -- FIND PLAYER POSITION
      C
226          ILOC=IVAL(JLOCN,IPLARF)
227          IPTR=IREF1(ILOC)
228          ISOU=IVAL(JSOURC,ILOC)
229          IPPRF=IVAL(JPLACE,ILOC)
      C
      C  -- FIND FIRST NODE ON PATH
      C
230      120 LSRM=IVAL(JPAR2,IACTRF)
231          ISIN=IFIRST(LSRM,KR)
232              IF(ISIN .EQ. NULL) GO TO 185
      C
      C  -- TEST IF PLAYER AT NODE ON PATH
      C
233          IF(IVAL(JSINK,ILOC) .NE. ISOU) GO TO 130
234          DITEM(IPTR+JFRAC)=0.0
235          IF(ISOU .NE. ISIN) GO TO 130
      C
      C  -- REMOVE NODE FROM LIST
      C
236          CALL DELIST(KR,JPAR2,IACTRF)
237          GO TO 120
      C
      C  -- FIND SUBACTIVITY FOR MOVING
      C
238      130 IACTS=NACTSU(IPLARF,NULL)
      C
      C  -- FIND TRAVEL TIME FOR THIS PLAYER
      C        FROM ISOU TO ISIN
```

```
 ISN
        C
 239            ISUM=NULL
 240            RTIM=TRAVEL(IPLARF,ISOU,ISIN,IACTS,ISUM)
        C
        C   TEST IF TRAVELING THROUGH PORTAL
        C
 241            IF(ISUM .NE. NULL) CALL POROPN(IPLARF,ISOU,ISIN,ISUM)
        C
        C  -- DETERMINE TIME NEEDED FOR THIS LINK
        C
 242            RTIM=RTIM*(1.0-VAL(JFRAC,ILOC))
        C
        C  -- DETERMINE IF TIME IS AVAILABLE TO
        C        TRAVEL OVER LINK
        C
 243            TA=VAL(JTREQ,IPLARF)
 244            TO=RTIM
 245            IF((TA-RTIM) .LT. 0.) TO=TA
        C
        C  -- DETERMINE DIRECTION FOR OBSERVATION
        C
 246            CALL DIREC(ISOU,ISIN,THET,PHE)
        C
        C  -- LET PLAYER OBSERVE WHILE MOVING
        C
 247        135 IF(TO .LE. 0.0) GO TO 136
 248            CALL OBSERV(IPLARF,TO,KMOVNG,THET)
        C
        C  -- DETERMINE IF LINK IS PASSED
        C
 249        136 IOLDRF=ICOPY(ILOC)
 250                 IF(TO .EQ. TA) GO TO 150
        C
        C  -- LINK PASSED
        C        UPDATE PLAYER DESCRIPTION
        C
```

```
 ISN
251        140 DITEM(IPTRPL+JTREQ)=DITEM(IPTRPL+JTREQ)-RTIM
252            ITEM(IPTR+JSOURC)=ISIN
253            ITEM(IPTR+JSINK)=ISIN
254            DITEM(IPTR+JFRAC)=0.0
255            IT=IPLACE(ILOC)
256            CALL CHGFLD(JPLACE,ILOC,IT,1,IDUM)
         C
         C  -- REMOVE ISIN FROM LSRM
         C
257            CALL DELIST(KR,JPAR2,IACTRF)
258            GO TO 160
         C
         C  -- DID NOT PASS LINK
         C
259        150 DITEM(IPTRPL+JTREQ)=0.0
         C
         C  -- UPDATE LOCATION ON LINK
         C
260            ITEM(IPTR+JSINK)=ISIN
261            DITEM(IPTR+JFRAC)=DITEM(IPTR+JFRAC)+
              1                  (TA/RTIM)*(1.-DITEM(IPTR+JFRAC))
262            IT=IPLACE(ILOC)
263            CALL CHGFLD(JPLACE,ILOC,IT,1,IDUM)
264            GO TO 170
         C
         C  -- PORTAL STATUS
         C
265        160 CALL PORTST(IPLARF,IOLDRF)
         C
         C  -- SENSOR DETECTION
         C
266        170 CALL SNSACT(IPLARF,IOLDRF)
         C
         C -- CHECK FOR CAPTURE SITUATION
         C
267            CALL CAPDET(IPLARF,IOLDRF)
```

```
C
C   -- DETERMINE IF MOVEMENT ACTIVITY COMPLETE
C
             IF(VAL(JTREQ,IPLARF) .LE. 0.0) GO TO 188
C
C   -- PLAYER STILL HAS TIME TO MOVE
C
        ISOU=ISIN
        GO TO 120
C
C   -- PLAYER COMPLETED MOVEMENT
C
  185   CONTINUE
C
C   --  UPDATE CONTENTS OF REGIONS
C
    188 CALL CONTNT(IPLARF,IPPRF)
C
C   -- NEXT PLAYER
C
    190 IPLARF=NEXT(IPLALT,KN)
        GO TO 108
C
    200 IF(JL .EQ. JADVRS) GO TO 220
        JL=JADVRS
        GO TO 105
C
    220 CONTINUE
        RETURN
        END
```

FSN MODEL - ADDVAL SUBROUTINE

```
ISN
 1          SUBROUTINE ADDVAL(IREF,P,IARRAY,PARRAY,LCUR,ILOW,PMIN,LMAX)
      C ... THE PURPOSE OF THIS ROUTINE IS TO MAINTAIN TWO PARALLEL
      C     ARRAYS, WHERE IARRAY CONTAINS INFORMATION, PARRAY CONTAINS
      C     AN ASSOCIATED PRIORITY.  DATA IS ADDED TO THE ARRAYS IF THEY
      C     ARE NOT FULL.  IF THE ARRAYS ARE FULL, DATA IS ONLY ADDED IF
      C     ITS PRIORITY IS HIGHER THAN THE LOWEST PRIORITY IN PARRAY.
      C     IN THIS CASE, IT REPLACES THE LOW PIRORITY ITEM.
      C
      C     INPUT PARAMETERS:
      C          IREF   ... DATUM TO BE ADDED
      C          P      ... PRIORITY OF DATUM
      C          IARRAY ... DATA ARRAY
      C          PARRAY ... PARALLEL PRIORITY ARRAY
      C          LCUR   ... NUMBER OF ENTRIES CURRENTLY IN ARRAY
      C          ILOW   ... INDEX FOR LOW PRIORITY ENTRY
      C          PMIN   ... PRIORITY OF LOW PRIORITY ENTRY
      C          LMAX   ... MAXIMUM NUMBER OF ENTRIES ALLOWED IN ARRAYS
      C
      C     OUTPUT PARAMETERS: (UPDATED BY SUBROUTINE)
      C          IARRAY,PARRAY,LCUR,ILOW,PMIN
      C
 2          DIMENSION IARRAY(1),PARRAY(1)
 3          IF(LCUR.EQ.LMAX) GO TO 10
      C
      C ... LCUR < LMAX, UNCONDITIONAL ADD
      C
 4          LCUR=LCUR+1
 5          PARRAY(LCUR)=P
 6          IARRAY(LCUR)=IREF
 7          IF(P.GE.PMIN) RETURN
      C
      C ... UPDATE ILOW,PMIN
      C
 8          PMIN=P
 9          ILOW=LCUR
```

```
ISN
10            RETURN
       C
       C ... ARRAY FULL, ADD ONLY IF P>PMIN
       C
11     10     IF(P.LE.PMIN) RETURN
12            IARRAY(ILOW)=IREF
13            PARRAY(ILOW)=P
14            PMIN=1000.0
       C
       C ... FIND NEW ILOW,PMIN
       C
15            DO 20 I=1,LMAX
16                 IF(PARRAY(I).GT.PMIN) GO TO 20
17                 PMIN=PARRAY(I)
18                 ILOW=I
19     20     CONTINUE
20            RETURN
21            END
```

PSN MODEL - ARRIVL SUBROUTINE

```
ISN
  1          SUBROUTINE ARRIVL
        C
        C    THE PURPOSE OF THIS SUBROUTINE IS TO LINK THE
        C    RESPONSE FORCE PLAYERS TO THE CURRENT ACTIVE PLAYERS
        C    LIST.  AT THIS POINT THE RESPONSE FORCE HAS ARRIVED.
        C    THE CONTENTS OF ALL REGIONS IS UPDATED ALONG WITH
        C    ADDING TO THE FORCES ARRAY.
        C
        C
        C
  2          COMMON /STATEV/
  3          DIMENSION ITEM(41900),DITEM(41900)
  4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
  5          COMMON /PARS/
  6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  7          REAL*8 DTPNAM,FLDNAM,FORMOT
  8          COMMON /PARS1/
  9          COMMON /PARS2/
 10          COMMON /DATAV/
 11          DIMENSION ACTTIM(25)
 12          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
 13          COMMON /RECREF/
 14          DIMENSION RECRFQ(140)
 15          EQUIVALENCE (RECRFQ(1),IGOALS)
        C
        C
        C  -- ADD RESPONSE FORCE TO GUARDS
        C
 16          TMRESP=TFIN
 17          JL=JGARDS
 18          ISIDE=KSFE
 19          IPTR=IREF1(ISITE)
 20          IF(IRSITE .EQ. NULL) GO TO 70
 21       10 IPLRST=IVAL(JL,IRSITE)
 22          IPLARF=IFIRST(IPLRST,KA)
```

```
ISN
      C
23     20      IF(IPLARF .EQ. NULL) GO TO 50
24             CALL PARSRF(IPLARF,IDY,IPLAYR,IDUM)
      C
      C  -- UPDATE CONTENTS
      C
25             ILOC=IVAL(JLOCN,IPLARF)
26             IPLAC=IPLACE(ILOC)
27             IF(IPLAC .EQ. NULL) GO TO 30
28             IPPT=IREF1(IPLAC)
29             LISTRR=IVAL(JCONTS,IPLAC)
30             ITEM(IPPT+JCONTS)=ISTACK(IPLARF,LISTRR)
      C
      C  -- UPDATE FORCES
      C
31     30      IF(JL .EQ. JVEHS) GO TO 40
32             IPHS=IVAL(JPSTAT,IPLARF)
33             FORCES(IPHS,ISIDE)=FORCES(IPHS,ISIDE)+1.0
      C
      C  -- ADD PLAYER TO ISITE PLAYERS LIST
      C
34     40      LISTRF=IVAL(JL,ISITE)
35             ITEM(IPTR+JL)=IQUEUE(IPLARF,LISTRF)
      C
      C  -- NEXT PLAYER
      C
36             IPLARF=NEXT(IPLRST,KA)
37             GO TO 20
      C
      C  -- END OF LIST
      C
38     50      IF(JL .GE. JADVRS) GO TO 60
39             JL=JADVRS
40             ISIDE=KAFE
41             GO TO 10
      C
```

PSN MODEL - ARRIVL SUBROUTINE

```
      60 IF(JL .GE. JVEHS) GO TO 70
         JL=JVEHS
         GO TO 10
C
      70 IRSITE=NULL
         RETURN
         END
```

```
ISN
 1          SUBROUTINE BRECH(IPLARF,IPORT,IWPNRF)
      C
      C
      C   -- THE PURPOSE OF THIS SUBROUTINE IS TO:
      C        1. DETERMINE IF A PLAYER HAS A WEAPON
      C           CAPBALE OF BREECHING THE PORTAL
      C
      C  -- INPUT PARAMETERS
      C
      C      IPLARF -- PLAYER REFERENCE
      C      IPORT -- PORTAL REFERENCE
      C
      C  -- OUTPUT VARIABLES
      C
      C      IWPNRF -- WEAPON REFERENCE
      C
      C
      C  -- PROCEDURE
      C      1. DETERMINE PENETRABILITY OF PORTAL
      C      2. SEARCH EQUIPMENT TO DETERMINE IF WEAPON EXISTS
      C         TO DESTROY PORTAL
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,PLDNAM,PORMOT
 5          COMMON /PARS1/
 6          COMMON /PARS3/
 7          COMMON /DATAV/
 8          DIMENSION ACTTIM(25)
 9          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
      C
      C
      C  -- FIND PENETRABILITY AND TARGET TYPE
      C
10          IPEN=IVAL(JPEN,IPORT)
```

FSN MODEL - BRECH SUBROUTINE

```
ISN
11            ITAR=KTGPO3
12            IF(IPEN .GE. 4) ITAR=KTGPO6
13            IF(IPEN .GE. 7) ITAR=KTGPO7
      C
      C  -- SEARCH EQUIPMENT LIST
      C
14            ITT=99
15            IWPNRF=NULL
16            IEQLT=IVAL(JWEAPS,IPLARF)
17            IWPN=IFIRST(IEQLT,KA)
18         10     IF(IWPN .EQ. NULL) GO TO 50
      C
      C  -- IGNORE EQUIPMENT
      C
19            CALL PARSRF(IWPN,IDY,IR,ID)
20                IF(IDY .NE. LWEAP) GO TO 30
      C
      C  -- TEST AMMUNITION SUPPLY
      C
21            IF(IVAL(JAMT,IWPN) .LE. 0) GO TO 30
22            ITYP=IVAL(JTYPE,IWPN)
      C
      C  -- FIND WEAPON RANKING FOR TARGET TYPE
      C
23            IF(IRNKWP(ITYP,ITAR) .LE. 0) GO TO 30
24            IF(IRNKWP(ITYP,ITAR) .GE. ITT) GO TO 30
25            ITT=IRNKWP(ITYP,ITAR)
26            IWPNRF=IWPN
      C
27         30 IWPN=NEXT(IEQLT,KA)
28            GO TO 10
      C
29         50 CONTINUE
30             RETURN
31             END
```

```
ISN
 1          SUBROUTINE CAPDET(IPLARF,ILOCRF)
      C
      C  -- THE PURPOSE OF THIS SUBROUTINE IS TO:
      C          1.  DETERMINE IF ANY TWO PLAYERS HAVE
      C               OCCUPIED THE SAME LOCATION
      C          2.  AND RESOLVE ANY CAPTURES THAT OCCUR
      C
      C
      C  -- INPUT PARAMETERS
      C
      C     IPLARF -- PLAYER REFERENCE
      C       ILOCRF -- OLD LOCATION REFERENCE
      C
      C  -- OUTPUT
      C
      C     THIS SUBROUTINE ADJUSTS THE ACTIVITY RECORDS
      C     OF ANY PLAYERS IN CAPTURE.
      C     ALSO,  A LIST OF ALL NODES PASSED
      C     IS KEPT TO CHECK FOR CAPTURES
      C
      C
      C  -- PROCEDURE
      C         1. SEARCH LIST OF PLAYERS OF OPPOSITE
      C             ALLEGIENCE
      C
      C                    - TO FIND ANY PLAYER FIRING OR OBSERVING
      C                       THAT IPLARF CROSSED  OVER
      C
      C          2.  SEARCH NOD OF INPACT LIST FOR
      C                INTERSECTION OF PLAYERS MOVING
      C
      C         3.  ADD NEW NODE TO LIST OF INPACT
      C              NODES
      C
 2          COMMON /STATEV/
```

FSN MODEL - CAPDET SUBROUTINE

```
ISN
  3           DIMENSION ITEM(41900),DITEM(41900)
  4           EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
  5           COMMON /PARS/
  6           EQUIVALENCE (PNULL,NULL),(IFAIL,FAIL)
  7           REAL*8 DTPNAM,FLDNAM,FORMOT
  8           COMMON /PARS1/
  9           COMMON /PARS2/
 10           COMMON /PARS3/
 11           COMMON /DATAV/
 12           DIMENSION ACTTIM(25)
 13           EQUIVALENCE (ACTTIM(1),ACTRAT(1))
 14           COMMON /RECREF/
 15           DIMENSION RECRFQ(140)
 16           EQUIVALENCE (RECRFQ(1),IGOALS)
 17           COMMON /PARS4/
 18           DIMENSION INSTAT(2,5)
 19           EQUIVALENCE (IODSV(41),INSTAT(1,1))
      C
 20           NINSDR=5
 21           KINSDR=4
      C
      C
      C  -- TEST IF PLAYER IS A INSIDER
      C
 22           IF(IVAL(JTYPE,IPLARF) .EQ. KINSDR) GO TO 250
      C
      C  -- DESCRIBE IPLARF'S MOVEMENT AS
      C          (A,B,P)
      C
 23           ILOC=IVAL(JLOCN,IPLARF)
 24           IF(IVAL(JSOURC,ILOCRF) .EQ. IVAL(JSINK,ILOCRF)) GO TO 10
      C
      C  -- MOVEMENT CASE 1
      C
 25           ICASE=1
 26           ISIN=IVAL(JSOURC,ILOCRF)
```

```
ISN
27               ISOU=IVAL(JSOURC,ILOC)
28               PRO=1.-VAL(JFRAC,ILOCRF)
29               GO TO 40
       C
30            10 IF(IVAL(JSOURC,ILOC) .EQ. IVAL(JSINK,ILOC)) GO TO 20
       C
       C    -- MOVEMENT CASE 2
       C
31               ICASE=2
32               ISOU=IVAL(JSOURC,ILOC)
33               ISIN=IVAL(JSINK,ILOC)
34               PRO=VAL(JFRAC,ILOC)
35               GO TO 40
       C
       C    -- MOVEMENT CASE 3
       C
36            20 ISOU=IVAL(JSOURC,ILOCRF)
37               ISIN=IVAL(JSOURC,ILOC)
38               PRO=1.0
39               ICASE=3
       C
       C    -- SEARCH LIST OF PLAYERS OF OPPOSITE ALLEGIENCE
       C
40            40 JL=JGARDS
41               IF(IVAL(JALLEG,IPLARF) .EQ. KSFE) JL=JADVRS
42               INODE=ISOU
43               IPLT=IVAL(JL,ISITE)
       C
44               IPRF=IFIRST(IPLT,KA)
45            50      IF(IPRF .EQ. NULL) GO TO 100
       C
       C    -- IGNORE INSIDERS
       C
46               IF(IVAL(JTYPE,IPRF) .EQ. KINSDR) GO TO 70
       C
       C   IGNORE DEAD OR CAPTURED PLAYERS
```

FSN MODEL - CAPDET SUBROUTINE

```
ISN
      C
47          IF(IVAL(JPSTAT,IPRF) .LE. KCAPTR) GO TO 70
      C
48          IARF=IVAL(JACTIV,IPRF)
49          IF(IARF .EQ. NULL) GO TO 70
50               IF(IVAL(JTYPE,IARF) .EQ. KMOVNG) GO TO 70
51          IPLOC=IVAL(JLOCN,IPRF)
      C
      C  -- TEST FOR SAME LINK
      C
52          I1=IVAL(JSOURC,IPLOC)
53          I2=IVAL(JSINK,IPLOC)
54          IF(I1 .EQ. I2) GO TO 55
55          TPRO=PRO
56          IF(I1 .EQ. ISOU .AND. I2 .EQ. ISIN) GO TO 60
57          TPRO=1.-PRO
58          IF(I1 .EQ. ISIN .AND. I2 .EQ. ISOU) GO TO 60
59          GO TO 70
      C
      C  TEST IF SINK IS I2
      C
60       55 IF(ISIN .NE. I2) GO TO 70
61          INODE=ISIN
62          GO TO 180
      C
      C  -- SAME LINK FOR BOTH PLAYERS
      C
      C        FIND IF ON SAME PART OF LINK
      C
63       60 IF(VAL(JFRAC,IPLOC) .GE. TPRO) GO TO 180
      C
      C  -- NEXT PLAYER
      C
64       70 IPRF=NEXT(IPLT,KA)
65          GO TO 50
      C
```

```
ISN
      C  -- TEST MOVEMENT CASE FOR NODE PASSED
      C
66       100 IF(ICASE .EQ. 2) GO TO 300
      C
      C  -- NODE PASSED
      C
67           INODE=IVAL(JSOURC,ILOC)
      C
      C  -- DETERMINE IF ANY PLAYER
      C      OF OPPSITE ALLEGIENCE OCCUPIED
      C        THIS NODE
      C
68           IAL=1
69           IF(IVAL(JALLEG,IPLARF) .EQ. KSFE) IAL=2
      C
      C  -- FIND PLAYER TIME
      C
70           TTIM=(DTSEC-VAL(JTREQ,IPLARF))/60.+TMIN
71           ILIS=IFIRST(LNODIN(IAL),KB)
72       110      IF(ILIS .EQ. NULL) GO TO 140
73           IF(IVAL(JID,ILIS) .NE.INODE) GO TO 120
74           IPRF=IVAL(JCONTS,ILIS)
      C
      C  -- CHECK TIME FOR LOCATION
      C      CURRENT NULE IF WITHIN TIME STEP,
      C       CAPTURE EXISTS
      C
75           IF((VAL(JPAR1,ILIS)-TTIM) .LE. DTSEC) GO TO 150
      C
      C  -- NEXT NODE OF IMPACT
      C
76       120 ILIS=NEXT(LNODIN(IAL),KB)
77           GO TO 110
      C
      C  -- ADD NODE TO LIST
      C
```

FSN MODEL - CAPDET SUBROUTINE

```
ISN
78       140 II=IVAL(JALLEG,IPLARF)
79           IRF = NEWRC5(LINODE,INODE,TTIM,NULL,IPLARF,NULL)
      C
      C   -- ADD RECORD TO LIST
      C
80           IALL=IVAL(JALLEG,IPLARF)
81           CALL CHGLST(IRF,1,9,IALL)
82           LNODIN(IALL)=ISTACK(IRF,LNODIN(IALL))
83           GO TO 300
      C
      C   -- CAPTURE EXISTS
      C         RESOLVE BETWEEN IPLARF AND IPRF
      C           BOTH PLAYERS MOVING
      C
      C
      C   -- RULE
      C         FIRST PLAYER TO REACH NODE CAPTURES
      C        SECOND PLAYER TO REACH NODE
      C
84       150 IF(VAL(JPAR1,ILIS) .LT. TTIM) GO TO 155
85           IWIN=IPLARF
86           ILOS=IPRF
87           GO TO 160
      C
88       155 IWIN=IPRF
89           ILOS=IPLARF
      C
90       160 IP1=NEWREF(1,1,JTMIN)
91           P2=TMIN+ACTTIM(KCPTRG)/60.
92           IFF = NEWRC3(LRELN,KGEF,IP1,P2)
93           CALL CREACT(KCAPNG,ILOS,NULL,NULL,IFF,IWIN,IRF)
      C
      C   -- ADD CAPTURE TO ILOS ACTIVITIES
      C
94           ISLT=IVAL(JACTIV,ILOS)
95           ISLT=ISTACK(IRF,ISLT)
```

```
ISN
 96           IPTR=IREF1(ILOS)
 97           ITEM(IPTR+JACTIV)=ISLT
       C
       C  -- CALL ERROR FOR RECORD
       C
 98           CALL ERR(32,29,IWIN,ILOS,INODE)
 99           GO TO 200
       C
       C  -- CAPTURE EXISTS
       C        IPLARF MOVING, IPRF STATIONARY
       C
       C       RULE
       C       IF IPRF OBSERVING IN DIRECTION OF IPLARF
       C        IPRF WINS
       C
100        180 IACLT=IVAL(JACTIV,IPRF)
101           IARF=IFIRST(IACLT,KS)
102               IF(IVAL(JTYPE,IARF) .EQ. KFIRNG) GO TO 185
103               IF(IVAL(JTYPE,IARF) .EQ. KDETNG) GO TO 188
       C
       C  -- ACTIVITY IS CAPTURING, DETERMINE
       C         IF BEING CAPTURED
104           IF(IVAL(JPAR1,IARF) .EQ. IPRF) GO TO 100
       C
       C  -- IPRF IS CAPTURING ANOTHER PLAYER
       C
105           IWIN=IPLARF
106           ILOS=IPRF
107           GO TO 160
       C
       C  --FIRING ACTIVITY
       C
108        185 IT=IVAL(JPAR1,IARF)
109           CALL DIREC(IPLARF,IT,THET,PHE)
110           GO TO 190
       C
```

FSN MODEL - CAPDET SUBROUTINE

```
ISN
      C  -- OBSERVING ACTIVITY
      C
111      188 THET=VAL(JPAR1,IARF)
      C
112      190 IF(THET .EQ. NULL) GO TO 193
113          IDD=ISOU
      C       IF(ICASE .EQ. 1) IDD=ISIN
114          CALL DIREC(IPRF,IDD,TT,PH)
115          IF(TT .GT.(THET-PI/4.) .AND. TT .LT. (THET+PI/4.))
            *  GO TO 195
      C
      C  -- IPLARF WINS  IPRF LOSES
      C
116      193 IWIN=IPLARF
117          ILOS=IPRF
118          GO TO 160
      C
119      195 IWIN=IPRF
120          ILOS=IPLARF
121          GO TO 160
      C
      C  -- DETERMINE IF LOSING PLAYER IN CAPTURE
      C        PRIOR TO THIS CAPTURE
      C
122      200 IACLT=IVAL(JACTIV,ILOS)
123          IACRF=IFIRST(IACLT,KC)
124      210     IF(IACRF .EQ. NULL) GO TO 225
125          IF(IVAL(JTYPE,IACRF) .NE. KCAPNG) GO TO 220
      C
      C  --  TEST IF BEING CAPTURED
      C
126          IF(IVAL(JPAR1,IACRF) .EQ. ILOS) GO TO 220
127          IPP=IVAL(JPAR1,IACRF)
128          ITT=IREF1(IPP)
129          ITEM(ITT+JACTIV)=NULL
130          DITEM(ITT+JTREQ)=DTSEC
```

```
      CALL DELIST(KC,JACTIV,ILOS)
      GO TO 300
C
  220 IACBF=NEXT(IACLT,KC)
      GO TO 210
C
C  REMOVE ALL IMPACT NODES FROM LIST FOR IWIN ILOS
C
  225 DO 230 IAL=1,2
      IPLS=NULL
      ILST=IFIRST(LNODIN(IAL),KP)
  226     IF(ILST .EQ. NULL) GO TO 229
      IF(IVAL(JCONTS,ILST) .EQ. IWIN) GO TO 227
      IF(IVAL(JCONTS,ILST) .EQ. ILOS) GO TO 227
      IPLS=ISTACK(ILST,IPLS)
C
  227 ILST=NEXT(LNODIN(IAL),KP)
      GO TO 226
C
  229 LNODIN(IAL)=IPLS
  230 CONTINUE
C
C
C   UPDATE LOCATION FOR PLAYERS
C
      IPER=IWIN
  232 ILOC=IVAL(JLOCN,IPER)
      IPTR=IREF1(ILOC)
      ITEM(IPTR+JSOURC)=INODE
      ITEM(IPTR+JSINK)=INODE
      DITEM(IPTR+JFRAC)=0.0
      ITEM(IPTR+JPLACE)=INODE
      IPTR=IREF1(IPER)
      DITEM(IPTR+JTREQ)=0.0
      IF(IPER .EQ. ILOS) GO TO 300
      IPER=ILOS
```

FSN MODEL - CAPDET SUBROUTINE

```
 ISN
157          GO TO 232
        C
        C  -- INSIDER
        C       CAN NOT CAPTURE OR BE CAPTURED
        C
        C    TEST IF IN SAME REGION AS AN AFE MEMBER
        C
158       250 ILOC=IVAL(JLOCN,IPLARF)
159           IINSL=IVAL(JPLACE,ILOC)
160           IPLT=IVAL(JADVRS,ISITE)
        C
161           IPRF=IFIRST(IPLT,KA)
162       255     IF(IPRF .EQ. NULL) GO TO 300
        C
163           ILOC=IVAL(JLOCN,IPRF)
164           IPLAC=IVAL(JPLACE,ILOC)
165           IF(IPLAC .EQ. IINSL) GO TO 260
166           IPRF=NEXT(IPLT,KA)
167           GO TO 255
        C
        C  -- SET TRIGGER
        C
168       260 DO 265 IK=1,NINSDR
169           IF(INSTAT(1,IK) .EQ. IPLARF) GO TO 270
170       265 CONTINUE
171           GO TO 300
        C
        C  -- TRIGGER VALUE IS 3
        C
172       270 INSTAT(2,IK)=3
        C
        C
        C
173       300 CONTINUE
174           RETURN
175           END
```

FSN MODEL - CHKOUT SUBROUTINE

```
ISN
 1          SUBROUTINE CHKOUT(IOBJ,LOC,LEADER,IFORCE)
      C
      C        ROUTINE CALLED BY A LEADER TO DISPATCH ONE OR MORE PERSONS
      C     UNDER HIS COMMAND TO INVESTIGATE AN ALARM OR TO LOOK FOR A MISSING
      C     PERSON.
      C        THE CURRENT VERSION OF THE ROUTINE JUST SCHEDULES A MOVE TO
      C     THE LOCATION OF INTEREST BY EACH OF THE PERSONS DESIGNATED.
      C
      C     INPUT PARAMETERS:
      C        IOBJ      OBJECT TO LOOK FOR
      C        LOC       PLACE TO MOVE TO
      C        LEADER    REFERENCE TO LEADER GIVING ORDERS
      C        IFORCE    REFERENCE TO LIST OF PERSONS WHO ARE TO PERFORM
      C                  THE ACTION
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
 8          COMMON /PARS1/
 9          COMMON /PARS2/
10          COMMON /PARS3/
      C
      C     ITERATE THROUGH PLAYERS WHO ARE TO INVESTIGATE
11          IPERSN = IFIRST(IFORCE,KP)
12     10      IF (IPERSN .EQ. NULL) RETURN
      C
      C     CREATE INSTRUCTIONS FOR HIM TO MOVE
13             IACT = NEWRC6(LACTN,KMOVNG,LOC,NULL,NULL,NULL,IPERSN)
14             IMSG = NEWRC5(LMESS,LEADER,IPERSN,JPLANS,TMIN,IACT)
      C     SEND MESSAGE TO THE PLAYER
15             CALL COMMO(LEADER,IPERSN,IMSG)
      C     GET NEXT PLAYER
```

PSN MODEL - CHKOUT SUBROUTINE

```
          IPERSN = NEXT(IFORCE,KP)
          GO TO 10
      END
```

```
ISN
 1          SUBROUTINE COMMO(IPERSN,IADRES,IMESS)
      C
      C     ROUTINE TO TRANSMIT AN ALREADY SPECIFIED MESSAGE TO AN INDIVIDUAL.
      C
      C  INPUT PARAMETERS:
      C     IPERSN   A REFERENCE TO THE PERSON SENDING THE MESSAGE.
      C     IADRES   A REFERENCE TO THE PERSON TO WHOM THE MESSAGE IS
      C              ADDRESSED.
      C     IMESS    THE MESSAGE TO BE COMMUNICATED.
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
 8          COMMON /PARS1/
      C
      C  IF IPERSN EQUAL IADRES, UPDATE PLAYER RECORD DIRECTLY
 9          IF(IPERSN .NE. IADRES) GO TO 5
10          MCONT=IVAL(JCONT,IMESS)
11          IATTR = IVAL(JATTR,IMESS)
12          IF(IATTR .NE. JPLANS) GO TO 50
      C
      C .. IF CONTENTS FUNCTION RECORD, CONVERT BY CAL TO IFNCVL
13          CALL PARSRF(MCONT,ID,IN,IF)
14          IF(ID .NE. LFUNC) GO TO 2
15          MCONT = IFNCVL(MCONT)
16          IF(MCONT. EQ. 0) GO TO 50
17        2 CALL CHGFLD(IATTR,IPERSN,MCONT,1,NULL)
18          GO TO 50
      C
      C  SELECT A MEANS BY WHICH TO COMMUNICATE WITH THE ADDRESSEE.
      C  THE CURRENT ROUTINE CHOOSES THE FIRST COMMO NET ENCOUNTERED WHICH
      C  IS AVAILABLE TO THE SENDER AND ON WHICH THE ADDRESSEE IS A RECIPIENT.
```

FSN MODEL - COMMO SUBROUTINE

```
ISN
19         5 ICMNTS = IVAL(JCMNTS,IPERSN)
20           ICOMNT = IFIRST(ICMNTS,KC)
21     10       IF (ICOMNT .EQ. NULL) GO TO 50
       C
       C   IS THE ADDRESSEE EITHER UNSPECIFIED OR ON THIS COMNET ?
22              IF (IADRES .EQ. NULL) GO TO 20
23              IRCVRS = IVAL(JRCVRS,ICOMNT)
24              IRCVR = IFIRST(IRCVRS,KR)
25     15          IF (IRCVR .EQ. NULL) GO TO 30
26                 IF (IRCVR .EQ. IADRES) GO TO 20
27                 IRCVR = NEXT(IRCVRS,KR)
28                 GO TO 15
       C
       C   ADD MESSAGE TO THIS COMNET.  FIRST UPDATE TIME OF THE MESSAGE.
29     20       I = IREF(JTIME,IMESS)
30              DITEM(I) = TMIN
       C   GET LIST OF MESSAGES ALREADY ON COMNET & ITS LOCATION
31              MSLIST = IVAL(JMESS,ICOMNT)
32              IMS = IREF(JMESS,ICOMNT)
       C   STACK THE NEW MESSAGE ONTO THIS LIST
33              ITEM(IMS) = ISTACK(IMESS,MSLIST)
       C   UNLESS ADDRESSEE WAS UNSPECIFIED, ARE DONE.
34              IF (IADRES .NE. NULL) GO TO 50
       C   TRY NEXT NET
35     30       ICOMNT = NEXT(ICMNTS,KC)
36              GO TO 10
37        50 RETURN
38           END
```

```
ISN
 1          SUBROUTINE COMOBS
      C ... THE PURPOSES OF THIS ROUTINE ARE AS FOLLOWS:
      C     1. CREATE OBSERVATIONS FOR EACH PLAYER BASED ON ENTITIES HE
      C        OBSERVES DURING A CYCLE (LIST PASSED IN IOBSV)
      C     2. CREATE "SELF-OBSERVATIONS" BASED ON CHANGES THE PLAYER
      C        UNDERWENT DURING THE PREVIOUS CYCLE
      C     3. SUBJECT THESE OBSERVATIONS TO HUMAN FACTORS PROCESSING
      C     4. MERGE THESE OBSERVATIONS WITH "ASSESSMENTS" THAT OCCURED IN THE
      C        ACTIVITY MODULE.
      C     5. UPDATE A PLAYER'S PERCEPTIONS BASED ON HIS OBSERVATIONS AND
      C        ASSESSMENTS
      C     6. CONVERT OBSERVATIONS TO MESSAGES AND ADD THESE MESSAGES TO THE
      C        APPROPRIATE COMMUNICATION NETS.
      C     7. NULL OUT THE OBSERVATION AND ASSESSMENT LISTS AFTER PROCESSING
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
 8          COMMON /PARS1/
 9          COMMON /PARS2/
10          COMMON /PARS3/
11          COMMON /DATAV/
12          DIMENSION ACTTIM(25)
13          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
14          COMMON /RECREF/
15          DIMENSION RECREQ(140)
16          EQUIVALENCE (RECREQ(1),IGOALS)
17          COMMON // LMAX,PMIN,IMSG(50),PMSG(50),NMSG,POBSV,LOWMSG
           +    IPLARF,IOBSRF,JOBSRF,IDUMRF,IASMNT(19),IPCPRF
18          DIMENSION INSTAT(2,5)
19          EQUIVALENCE (INSTAT(1,1),IOBSV(41))
20          KINSOR = 4
21          NINSOR = 5
```

```
C
C ... START PLAYER PROCESSING LOOP
C
      ISIDE=KSEE
      CALL CHGVAR(4,ISIDE)
C
C ... SET UP REPORT LISTING HEADING
C
 1001 FORMAT('2REPORT AT TIME: ',F6.2,/)
      TTTTT = TMIN + DTMIN
      WRITE(7,1001) TTTTT
      LISPLA=IVAL1(NEWREF(LSITE,1,JGARDS))
10    IPLARF=IFIRST(LISPLA,LPTPLA)
20    IF(IPLARF.EQ.NULL) GO TO 200
      CALL PARSRF(IPLARF,IRT,IPLAYR,IFN)
      CALL CHGVAR(3,IPLAYR)
C
C ... REPORT PLAYER STATUS
C
      CALL REPORT(IPLARF,7)
C
C ...  IF PLAYER CANNOT OBSERVE, IGNORE
C
      IF(ICANOB(IPLARF).EQ.NULL) GO TO 190
C
C ... BLOCK I-2 CREATE OBSERVATIONS.........................
C
      PMIN=1000.0
      LOWMSG=0
      NMSG=0
      LISPCP=IVAL(JPRCPS,IPLARF)
      IPCPRF=NULL
      LOCAL(2) = NULL
C
C ... GET LIMIT ON ITEMS OF INFORMATION PLAYER CAN RETAIN AND PROCESS
C
```

```
ISN
40            CALL OPCOM1(IPLARF,LMAX)
        C
        C ... START OBSERVATION PROCESSING LOOP******************************
        C
41            LISOBS=IOBSV(IPLAYR)
42            IOBSRF=IFIRST(LISOBS,LPTOBS)
43      30    IF(IOBSRF.EQ.NULL) GO TO 40
44            IF(IOBSRF.EQ.IPLARF) GO TO 35
        C
        C ... DETERMINE IF PLAYER HAS PERCEPTION OF OBJECT BEING OBSERVED
        C     IF HE DOES SET IPCPRF AND JOBSRF
45            LISPCP=IVAL(JPRCPS,IPLARF)
46            IPCPRF=LSERCH(LISPCP,NULL,NULL,JID,IOBSRF)
47      31    IF(IPCPRF.EQ.NULL) GO TO 32
48            JOBSRF=IVAL(JVIEW,IPCPRF)
        C     IPCPRF ... POINTS TO PERCEPTION RECORD OR IS NULL
        C     JOBSRF ... POINTS TO PLAYER'S VIEW OF OBJECT
        C     IOBSRF ... POINTS TO OBJECT DESCRIPTION
        C
        C ... GET DESCRIPTION OF OBJECT WITH ONLY THOSE ATTRIBUTES
        C     PLAYER CAN OBSERVE(IDUMRF)
        C
49      32    CALL CROBS1
50            LOCAL(3) = IDUMRF
51            IF(IDUMRF.EQ.NULL) GO TO 35
        C
        C ... GET OBSERVATION PRIORITY FOR OBJECT
        C
52            CALL OROBS3
        C
        C ... GENERATE MESSAGES IF OBSERVATION <> PERCEPTION
        C     ADD TO IMSG IF QUALIFIED
        C
53            CALL GENOBS
        C
        C ... IF PLAYER HAS PERCEPTION SET TIME UPDATED
```

```
ISN
      C
54              IF(IPCPRF.NE.NULL) CALL CHGFLD(ITIME,IPCPRF,TMIN,1,IDUM)
      C
      C ... END OBSERVATION PROCESSING LOOP*****************************
      C
55     35       IOBSRF=NEXT(LISOBS,LPTOBS)
56              GO TO 30
      C
      C ... IF PLAYER IS SENSOR MONITOR PROCESS OBSERVATIONS
      C         FROM SENSORS
      C
57     40       IF(IVAL(JTYPE,IPLARF).NE.KSNMON) GO TO 50
58              IPTR = IREF(JSITN,IPLARF)
      C
      C ... START SENSOR MONITOR PROCESS LOOP
      C
59              DO 45 I=1,NSNPTP
60                    LISOBS=IMNOBS(I)
61                    IMSGRF=IFIRST(LISOBS,LPTOBS)
62     41             IF(IMSGRF.EQ.NULL) GO TO 45
63                    IOBSRF=IVAL(JSUBJ,IMSGRF)
64                    IF(IOBSRF.EQ.IPLARF) GO TO 43
      C
      C ... IF IOBSRF IS PERSON OF OPPOSITE ALLEGIANCE
      C         UPDATE IPLARF'S SITUATION
65               IDUM = MOD(IOBSRF,10000000)
66              ITP = IDUM/10000
67              IF(ITP .NE. LPERSN) GO TO 45
68              IDUM = IVAL(JALLEG,IOBSRF)
69              IF(IDUM .NE. ISIDE) ITEM(IPTR) = KSITN4
      C
      C ...           DETERMINE IF PLAYER HAS PERCEPTION
      C
70        45          LISPCP=IVAL(JPRCPS,IPLARF)
71                    IPCPRF=LSERCH(LISPCP,NULL,NULL,JID,IOBSRF)
72                    IF(IPCPRF.EQ.NULL) GO TO 42
```

```
ISN
73                JOBSRF=IVAL(JVIEW,IPCPRF)
74     42         CALL DROBS2(I)
75                LOCAL(3) = IDUMRF
76                IF(IDUMRF.EQ.NULL) GO TO 43
77                CALL DROBS3
78                CALL GENOBS
79                IF(IPCPRF.NE.NULL) CALL CHGFLD(JTIME,IPCPRF,TMIN,1,IDJM)
80     43         IMSGRF=NEXT(LISOBS,LPTOBS)
81                GO TO 41
       C
       C ... END SENSOR MONITOR PROCESS LOOP
       C
82     45     CONTINUE
       C
       C ... BLOCK I-3 CREATE OBSERVATIONS BASED ON OWN ACTIVITY.............
       C
83     50     IOBSRF=IPLARF
84            IPCPRF=LSERCH(LISPCP,NULL,NULL,JID,IOBSRF)
85            JOBSRF=NULL
86            IF(IPCPRF.NE.NULL) JOBSRF=IVAL(JVIEW,IPCPRF)
87            CALL DROBS1
88            LOCAL(3) = IDUMRF
89            CALL DROBS3
90            CALL GENOBS
       C
       C ... BLOCK I-4 HUMAN FACTORS PROCESSING
       C
91     55     IF(NMSG.LE.0) GO TO 60
92            CONTINUE
       C
       C
       C ... BLOCK I-5 MERGE OBSERVATIONS AND ASSESSMENTS
       C
93     60     NASMNT=0
94            IF(LASMNT.EQ.NULL) GO TO 70
95     61     IPREV=NULL
```

```
ISN
      C
      C ... START LOOP THROUGH ASSESSMENTS
      C
 96          IMSGRF=IFIRST(LASMNT,ICUR)
 97   62     IF(IMSGRF.EQ.NULL) GO TO 70
 98          IF(IVAL(JSCURC,IMSGRF).NE.IPLARF) GO TO 68
      C
      C ...CHECK TO SEE IF DATA ALREADY ON IMSG
      C      BASED ON OBSERVATION
      C
 99          IF(NMSG.LE.0) GO TO 64
100          MSUB=IVAL(JSUBJ,IMSGRF)
101          MATT=IVAL(JATTR,IMSGRF)
102          DO 63 I=1,NMSG
103                MSUBA=IVAL(JSUBJ,IMSG(I))
104                MATTA=IVAL(JATTR,IMSG(I))
105                IF(MSUB.NE.MSUBA .OR. MATT.NE.MATTA) GO TO 63
      C
      C            ALREADY IN IMSG, REPLACE WITH ASSESSMENT
      C
106                IMSG(I)=IMSGRF
107                GO TO 65
108   63     CONTINUE
      C
      C ... PROCESS ASSESSMENT PREVIOUSLY MADE BY IPLARF
      C      CALCULATE PRIORITY FOR SUBJECT OF ASSESSMENT
      C
109   64     IOBSRF=IVAL(JSUBJ,IMSGRF)
110          CALL OBOBS3
      C
      C ... CALCULATE PRIORITY FOR ATTRIBUTE ASSESSED
      C
111          CALL PARSRF(IOBSRF,IDTYP,I1,I2)
112          IFEAT=IDTYP-LVEHIC+1
113          INDEX=0
114          GO TO (643,642,641) ,IFEAT
```

```
 ISN
 115    641    INDEX=INDEX+NFLDS(LPERSN)
 116    642    INDEX=INDEX+NFLDS(LVEHIC)
 117    643    INDEX=INDEX+IVAL(JATTR,IMSGRF)
 118           P=POBSV*POBATT(INDEX)
        C
        C ... MERGE ASSESSMENT INTO IMSG
        C
 119           CALL ADDVAL(IMSGRF,P,IMSG,PMSG,NMSG,LOWMSG,PMIN,L4AX)
        C
        C ... SAVE ASSESSMENT FOR PERCEPTION UPDATE
        C
 120    65     NASMNT=NASMNT+1
 121           IASMNT(NASMNT)=IMSGRF
        C
        C ... REMOVE FROM LIST OF ASSESSMENTS
        C
 122           IF(IPREV.EQ.NULL) GO TO 67
        C
        C ... NOT FIRST ITEM ON LIST
        C
 123           LISTND(JNXT,IPREV)=LISTND(JNXT,ICUR)
 124           ICUR=IPREV
 125           GO TO 68
        C
        C ... FIRST ITEM ON LIST
        C
 126    67     LASMNT=NULL
 127           CALL CHGVAR(IL,NULL)
 128           IF(ICUR .EQ. NULL) GO TO 70
 129           IF(LISTND(JNXT,ICUR).EQ.NULL) GO TO 70
 130           LASMNT=NEWREF(LLIST,LISTND(JNXT,ICUR),0)
 131           CALL CHGVAR(IL,LASMNT)
 132           GO TO 61
        C
        C ... END LOOP THROUGH ASSESSMENTS
        C
```

```
 68    IPREV=ICUR
       IMSGRF=NEXT(LASMNT,ICUR)
       GO TO 62
C
C ... ADD OBSERVATIONS TO PERCEPTIONS
C
 70    IF(NMSG.LE.0) GO TO 74
       DO 72 I=1,NMSG
            CALL NEWPCP(IMSG(I),IPLARF)
 72    CONTINUE
C
C ... ADD ASSESSMENTS TO PERCEPTIONS
C
 74    IF(NASMNT.EQ.0) GO TO 90
       DO 86 I=1,NASMNT
            CALL NEWPCP(IASMNT(I),IPLARF)
 86    CONTINUE
C
C ... BLOCK I-6 ADD OBSERVATIONS TO NET
C
C ... START LOOP THROUGH PLAYER'S NETS
C
 90    IF(NMSG.LE.0) GO TO 150
       NETLIS=IVAL(JCMNTS,IPLARF)
       NETREF=IFIRST(NETLIS,LPTNET)
 100   IF(NETREF.EQ.NULL) GO TO 150
       LLRF=IVAL(JMESS,NETREF)
       DO 110 I=1,NMSG
          LLRF=ISTACK(IMSG(I),LLRF)
          CALL CHGFLD(JMESS,NETREF,LLRF,1,IDUM)
 110   CONTINUE
C
C ... END NET LOOP
C
       NETREF=NEXT(NETLIS,LPTNET)
       GO TO 100
```

```
      C
      C ... NULL OUT OBSERVATIONS
      C
      150  IOBSV(IPLAYR)=NULL
           CALL CHGVR1(9,NULL,IPLAYR)
      C
      C ... END PLAYER PROCESSING LOOP
      C
      190  IPLAYR=NEXT(LISPLA,LPTPLA)
           GO TO 20
      200  IF(ISIDE.EQ.KAFE) GO TO 210
           ISIDE=KAFE
           LISPLA=IVAL1(NEWREF(LSITE,1,JADVRS))
           GO TO 10
      C
      C ... PROCESSING COMPLETE
      C
      210  LASMNT=NULL
           LOCAL(2) = NULL
           LOCAL(3) = NULL
           CALL CHGVAR(11,NULL)
      C
      C ... CHECK FOR ANY INSIDERS DISCOVERED THIS CYCLE
      C
           DO 220 I=1,NINSDR
           IF(INSTAT(2,I) .LT. 0) CALL SURFAC(INSTAT(1,I))
           INSTAT(2,I) = 0
        220 CONTINUE
      C
      C ... NULL OUT IMNOBS
           DO 250 I=1,4
              IMNOBS(I) = NULL
              CALL CHGVR1(10,NULL,I)
        250 CONTINUE
           RETURN
           END
```

```
      SUBROUTINE COMPER
C ...THE PURPOSE OF THIS ROUTINE IS TO UPDATE PLAYER
C     PERCEPTIONS BASED ON INFORMATION RECEIVED OVER
C     COMMUNICATION NETS.  UPDATING OF PERCEPTIONS
C     BASED ON OWN OBSERVATION HAS OCCURED PREVIOUSLY
C     IN COMOBS.
C ... PLAYER'S PLANS ARE UPDATED BASED ON ORDERS
C     RECEIVED FROM THEIR LEADER
C ... INTERCEPTED COMMUNICATIONS ARE SAVED FOR
C     RETRANSMISSION THE FOLLOWING CYCLE.
C ... AFTER ALL PLAYERS HAVE BEEN PROCESSED THE
C     STALE MESSAGES ARE REMOVED FROM THE NET QUEUES.
      COMMON /STATEV/
      DIMENSION ITEM(41900),DITEM(41900)
      EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
      COMMON /PARS/
      EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
      REAL*8 DTPNAM,FLDNAM,FORMOT
      COMMON /PARS1/
      COMMON /PARS2/
      COMMON /PARS3/
      COMMON /DATAV/
      DIMENSION ACTTIM(25)
      EQUIVALENCE (ACTTIM(1),ACTRAT(1))
      COMMON /RECREF/
      DIMENSION RECREQ(140)
      EQUIVALENCE (RECREQ(1),IGOALS)
      COMMON  IMSG(50),IMSN(50),IINCP(50),PRMSG(50),PRMSN(50),PRINCP(50)
      LOGICAL INTCPT,PEQUAL
C
C ... START LOOP THROUGH PLAYERS
C
      ISIDE=KSEE
      CALL CHGVAR(4,ISIDE)
         NNET=LSTREC(LCOMNT)
```

```
ISN
22            LISPLA=IVAL(JGARES,ISITE)
23      10    IPLARE=IFIRST(LISPLA,LPTPLA)
24      20    IF(IPLARE.EQ.NULL) GO TO 200
25            CALL PARSRE(IPLARE,IDT,IPLAYR,IDUM)
26            CALL CHGVAR(3,IPLAYR)
        C
        C         INSURE PLAYER IS ACTIVE
        C
27                IF(ICANCR(IPLARE).EQ.NULL) GO TO 190
        C
        C         GET LIMITATIONS ON MESSAGES THAT PLAYER
        C         CAN PROCESS
        C            LMSN IS LIMIT ON MISSION MESSAGES
        C            LMSG IS LIMIT ON OTHER MESSAGES
        C            LINCP IS LIMIT ON MESSAGES INTERCEPTED
        C            LORDER IS LIMIT ON ORDERS RECEIVED
        C
28                CALL DRCON2(IPLARE,LMSN,LMSG,LINCP,LORDER)
29                PMSN=1000.0
30                PINCP=1000.0
31                PMSG=1000.0
32                MMSN=0
33                MINCP=0
34                MMSG=0
35                LISPCP=IVAL(JPRCPS,IPLARE)
        C
        C         START LOOP THROUGH COMNETS
        C
36                NNET=LSTREC(LCCMNT)
37                DO 100 INET=1,NNET
38                   NETREF=NEWREF(LCCMNT,INET,0)
        C            SEE IF PLAYER ON NET
        C
39                   ION=LSERCH(IVAL(JRCVRS,NETREF),IPLARE,NULL,NULL,NULL)
40                   IF(ION.EQ.NULL) GO TO 100
        C
```

```
ISN
      C ...         GET DELAY TIME FOR NET, SEE IF IPLAYR
      C             IS INTERCEPTING NET COMMUNICATIONS
      C
41                  IT = IVAL(JTYPE,NETREF)
42                  DELAY=COMDLA(IT)
43                  CALL DRCOM3(IPLARF,NETREF,INTCPT)
      C
      C             START MSG PROCESS LOOP
      C
44                  LISMSG=IVAL(JMESS,NETREF)
45                  IMSGRF=IFIRST(LISMSG,MPTR)
46    30            IF(IMSGRF.EQ.NULL) GO TO 100
      C                IF IPLARF IS SENDER, IGNORE
      C
47                     IF(IVAL(JSOURC,IMSGRF) .EQ. IPLARF) GO TO 90
      C
      C ...  IF DELAY TIME NOT ELAPSED, IGNORE MESSAGE
      C
48                     IF(VAL(JTIME,IMSGRF) + DELAY .GE. TMIN) GO TO 90
      C
      C                PROCESS MESSAGE
      C
49                     IATTR=IVAL(JATTR,IMSGRF)
50                     IOBSRF=IVAL(JSUBJ,IMSGRF)
51                     CALL PARSRF(IOBSRF,IOTYP,IRECNO,IFLD)
      C
      C                CHECK FOR MISSION MESSAGE
      C
52                     IF(IOTYP .NE. LPERSN) GO TO 40
53                     IF(IATTR.NE.JPLANS .AND. IATTR.NE.JSOPS) GO TO 40
      C
      C                MISSION MESSAGE PROCESSING
      C
      C   IF CONTENTS IS FUNCTION RECORD, CONVERT BY CALL TO IFNCVL
54                     MCONT=IVAL(JCONT,IMSGRF)
55                     CALL PARSRF(MCONT,ID,IN,IF)
```

```
ISN
56                IF(ID .NE. LFUNC) GO TO 34
57                MCONT=IFNCVL(MCONT)
58                IF(MCONT .EQ. 0) GO TO 90
59                IF(IOBSRF .NE. IPLARF) GO TO 90
60     34         IT = NFLOS(LVEHIC) + IATTR
61                P=PCBATT(IT)
62                IF(IOBSRF.NE.IPLARF) GO TO 35
       C
       C          MISSION IS FOR PLAYER, CHECK SENDER
       C
63                ISENDR=IVAL(JSOURC,IMSGRF)
64                IF(ISENDR.NE.IVAL(JLLADR,IPLARF)) GO TO 35
       C
       C ...      DECREMENT ORDER COUNTER
       C
65                LORDER=LORDER-1
66                IF(LORDER.LT.0) GO TO 90
       C
       C          UPDATE PLAYER'S PLANS/SOPS
       C
67                CALL  CHGFLD(IATTR,IPLARF,MCONT,1,NULL)
68                P=2.0*P
69                GO TO 90
       C
       C          ADD INFO TO MISSION LIST
       C
70     35         CALL ADDVAL(IMSGRF,P,IMSN,PRMSN,MMSN,LOWMSN,PMSN,LMSN)
71                GO TO 80
       C
       C ...      PROCESS NON-MISSION MESSAGES
       C          IF PLAYER IS SUBJECT OF MESSAGE, IGNORE
       C
72     40         IF(IVAL(JSUBJ,IMSGRF).EQ.IPLARF) GO TO 90
       C
       C          IF PLAYER HAS NO PERCEPTION GO TO 50
       C
```

FSN MODEL   - COMPER SUBROUTINE

```
ISN
73                        IPCPRF=LSERCH(LISPCP,NULL,NULL,JID,IOBSRF)
74                        IF(IPCPRF.EQ.NULL) GO TO 50
      C
      C ... IF MSG TIME >= PCP TIME, SKIP
      C
75                        IF(VAL(JTIME,IMSGRF) .LE. VAL(JTIME,IPCPRF)) GO TO 90
      C
      C ...               IF PERCEPTION EQUAL MSG, SKIP
      C
76                        IF(PEQUAL(IPCPRF,IMSGRF)) GO TO 90
      C
      C ...               COMPUTE PROCESSING PRIORITY
      C
77    50                  CALL DRCBS4(P,IPLARF,IMSGRF)
      C
      C ...               ADD TO LIST OF MESSAGES
      C
78                        CALL ADDVAL(IMSGRF,P,IMSG,PRMSG,MMSG,LOMSG,PMSG,LMSG)
      C
      C ...               IF INTERCEPT, ADD TO IINCP
79    80                  IF(.NOT.INTCPT) GO TO 90
80                     CALL ADDVAL(IMSGRF,P,IINCP,PRINCP,MINCP,LOINCP,PINCP,LINCP)
81    90                IMSGRF=NEXT(LISMSG,MPTR)
82                      GO TO 30
83    100         CONTINUE
      C
      C            UPDATE PERCEPTIONS
      C
84    110         IF(MMSG.LE.0) GO TO 130
      C
      C ... ADD MESSAGES TO PERCEPTIONS
      C
85                DO 120 I=1,MMSG
86                   CALL NEWPCP(IMSG(I),IPLARF)
87    120         CONTINUE
88    130         IF(MMSN.LE.0) GO TO 150
```

```
ISN
      C
      C ... ADD MISSIONS TO PERCEPTIONS
      C
 89             DO 140 I=1,MMSN
 90                CALL NEWPCP(IMSN(I),IPLARF)
 91   140       CONTINUE
      C
      C ... SAVE INTERCEPTED MESSAGES
      C
 92   150       IF(MINCP.LE.0) GO TO 190
 93             LISREF=NULL
 94             DO 160 I=1,MINCP
 95                LISREF=ISTACK(IINCP(I),LISREF)
 96   160       CONTINUE
      C
      C ... PUT LISREF ON LIST
      C
 97             LINTCP(IPLAYR)=LISREF
      C
      C ...     END PLAYER LOOP
      C
 98   190    IPLARF=NEXT(LISPLA,LPTPLA)
 99          GO TO  20
      C
      C .. END SIDE LOOP
      C
100   200    IF(ISIDE.EQ.KAFE) GO TO 210
101          ISIDE=KAFE
102          LISPLA=IVAL(JADVFS,ISITE)
103          GO TO 10
      C
      C ... DELETE EXPIRED MESSAGES
      C
104   210    DO 250 INET=1,NNET
105          NETREF=NEWREF(LCCMNT,INET,0)
106          LISMSG=IVAL(JMESS,NETREF)
```

FSN MODEL - COMPER SUBROUTINE

```
ISN
107            IT = IVAL(JTYPE,NETREF)
108            DELAY=COMDLA(IT)
109     215    IPREV=NULL
110            IMSGRF=IFIRST(LISMSG,ICUR)
111     220    IF(IMSGRF.EQ.NULL) GO TO 250
        C
        C ... START MESSAGE LOOP, IF MESSAGE
        C     NOT AVAILABLE THIS CYCLE, SKIP IT
112               IF(VAL(JTIME,IMSGRF)+DELAY .GE. TMIN) GO TO 240
        C
        C ... REMOVE MESSAGE FROM LIST
        C
113               IF(IPREV.EQ.NULL) GO TO 230
        C ... NOT FIRST MESSAGE
114               LISTND(JNXT,IPREV)=LISTND(JNXT,ICUR)
115               ICUR=IPREV
116               GO TO 240
        C ... FIRST ITEM ON LIST, NEW HEAD
117     230       IF(LISTND(JNXT,ICUR) .EQ. NULL) GO TO 235
118               LISMSG=NEWREF(LLIST,LISTND(JNXT,ICUR),0)
119               CALL CHGFLD(JMESS,NETREF,LISMSG,1)
120               GO TO 215
        C
        C ...       ONLY ITEM ON LIST
        C
121     235       CALL CHGFLD(JMESS,NETREF,NULL,1,IDUM)
122               GO TO 250
        C
        C ... END MESSAGE LOOP
        C
123     240       IPREV=ICUR
124               IMSGRF=NEXT(LISMSG,ICUR)
125               GO TO 220
126     250    CONTINUE
127            RETURN
128            END
```

FSN MODEL - CONDAC SUBROUTINE

```
ISN
  1          SUBROUTINE CONDAC(IPLARF)
       C
       C        ROUTINE INTERPRETS CONDITIONAL ACTIONS ASSOCIATED WITH PERSON
       C     IPLARF.  A CONDITIONAL ACTION HAS THE FORM: WHEN(BOOLEAN EXPR,ACT).
       C     BOTH THE WHEN( , ) AND THE BOOLEAN EXPRESSION ARE REPRESENTED BY
       C     RELATION RECORDS.  THE "ACT" PART IS REPRESENTED BY EITHER AN
       C     ACTION OR A FUNCTION RECORD.
       C        THIS ROUTINE SEQUENTIALLY TESTS ALL CONDITIONAL ACTIONS
       C     ASSOCIATED WITH THE DESIGNATED PERSON.  IF IT ENCOUNTERS A CONDITION
       C     WHICH IS SATISFIED, IT ACTIVATES THE ASSOCIATED ACT.  "ACTIVATE"
       C     MEANS EITHER (1) STACKING THE ACT ON THE PLAYER'S ACTIVITY LIST, IF
       C     THE ACT IS AN ACTION RECORD, OR (2) EVALUATING THE ACT, IF IT IS
       C     A FUNCTION RECORD.  EVALUATION OF THE FUNCTION CAN RESULT IN AN
       C     ACTION RECORD, IN WHICH CASE ALTERNATIVE (1) IS FOLLOWED FOR THE
       C     RESULT.
       C        THIS ROUTINE RETURNS WHEN ALL OF THE PLAYER'S CONDITIONAL ACTIONS
       C     HAVE BEEN PROCESSED.  THERE MAY ALSO BE CONDITIONAL ACTIONS PERTINENT
       C     TO A PLAYER STORED WITH THE RECORD DESCRIBING THE FORCE HE BELONGS
       C     TO.
       C
       C     INPUT PARAMETERS:
       C        IPLARF   RECORD REFERENCE TO THE PERSON BEING PROCESSED.
       C
  2          COMMON /STATEV/
  3          DIMENSION ITEM(41900),DITEM(41900)
  4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
  5          COMMON /PARS/
  6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  7          REAL*8 DTPNAM,FLDNAM,FORMOT
  8          COMMON /PARS1/
  9          COMMON /PARS3/
 10          COMMON /NEW/
       C
 11          IFLAG = 0
 12          IACTIV = IREF(JACTIV,IPLARF)
```

FSN MODEL - CONDAC SUBROUTINE

```
          ICONDS = IVAL(JSOPS,IPLARF)
    8     ICOND = IFIRST(ICONDS,KC)
    10       IF (ICOND .EQ. NULL) GO TO 50
    C  TEST WHETHER CONDITIONAL ACTION IS SATISFIED.
             IACT = NRTEST(ICOND)
    C  IF NOT, GO TRY NEXT CONDITIONAL ACTION
    15       IF (IACT .EQ. 0) GO TO 40
    C  IF SO, IS RESULT AN ACTION RECORD ?
                CALL PARSRF(IACT,IDTYP,IRECNO,IDUM)
                IF (IDTYP .NE. LACTN) GO TO 20
                   ITEM(IACTIV) = ISTACK(IACT,ITEM(IACTIV))
                   GO TO 40
    C  IF RESULT IS A RELATION RECORD, TEST ITS TRUTH
    20          IF (IDTYP .NE. LRELN) GO TO 30
                   IACT = NRTEST(IACT)
                   GO TO 15
    C  IF RESULT IS A FUNCTION RECORD, EVALUATE IT.
    30          IF (IDTYP .NE. LFUNC) CALL ERR(39,35,IDTYP,0,0)
                   IACT = IFNCVL(IACT)
                   GO TO 15
    C  GET NEXT CONDITIONAL ACTION
    40       ICOND = NEXT(ICONDS,KC)
             GO TO 10
    C
    C  HAVE ANY CONDITIONAL ACTIONS ASSOCIATED WITH THE FORCE THAT THE
    C  BELONGS TO BEEN PROCESSED ?
    50    IF (IFLAG .NE. 0) RETURN
          IFLAG = 1
          IFORCE = IVAL(JFORCE,IPLARF)
          IF (IFORCE .EQ. NULL) RETURN
          CALL PARSRF(IFORCE,IDTYP,IDUM,IDUM)
          IF (IDTYP .NE. LFORCE) RETURN
          ICONDS = IVAL(JFSOPS,IFORCE)
          GO TO 8
          END
```

FSN MODEL - CONTNT SUBROUTINE

```
ISN
 1          SUBROUTINE CONTNT(IPLARF,IPRF)
      C
      C  -- THE PURPOSE OF THIS SUBROUTINE IS TO:
      C        1. UPDATE THE CONTENTS OF ALL REGIONS AFTER
      C            A MOVEMENT HAS OCCURED
      C
      C  -- INPUT PARAMETERS
      C
      C        IPLARF   -- PLAYER REFERENCE
      C         IPRF    --  ORIGINAL PLACE REFERENCE BEFORE MOVE
      C
      C
      C  -- OUTPUT
      C
      C       THIS SUBROUTINE ADJUSTS THE VALUE OF THE
      C         CONTENTS FIELD WITH RESPECT TO MOVEMENT
      C
      C
      C  -- PROCEDURE
      C
      C        1.  DETERMINE IF PLAYER HAS CHANGED REGIONS
      C        2. IF SO, REMOVE FROM OLD REGION CONTENTS AND
      C            ADD TO NEW REGION CONTENTS
      C
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,FLDNAM,FORMOT
 5          COMMON /PARS1/
      C
      C  -- TEST IF NEW PLACE DIFFERENT FROM OLD PLACE
      C
 6          ILOC=IVAL(JLOCN,IPLARF)
 7          IP=IPLACE(ILOC)
 8               IF(IP .EQ. IPRF) GO TO 50
```

FSN MODEL - CONTNT SUBROUTINE

```
ISN
     C
     C  --  NEW REGION, ADJUST CONTENTS OF OLD REGION
     C
 9            ICOLT=IVAL(JCONTS,IPRF)
10            ICORF=IFIRST(ICOLT,KA)
11          5      IF(ICORF .EQ. NULL) GO TO 20
     C
12                 IF(ICORF .NE. IPLARF) GO TO 10
     C
     C  -- REMOVE FROM CONTENTS
     C
13            CALL DELIST(KA,JCONTS,IPRF)
14            GO TO 20
     C
     C  -- NEXT CONTENT
     C
15         10 ICORF=NEXT(ICOLT,KA)
16            GO TO 5
     C
     C  -- ADD IPLARF TO NEW REGION CONTENTS
     C
17         20 ILT=IVAL(JCONTS,IP)
18            ILT=ISTACK(IPLARF,ILT)
19            CALL CHGFLD(JCONTS,IP,ILT,1,IDUM)
     C
20         50 CONTINUE
21            RETURN
22            END
```

```
ISN
 1            FUNCTION COVR(IPLARF,DIRC)
      C
      C
      C  --   THE PURPOSE OF THIS FUNCTION IS TO FIND
      C        THE AVAILABLE COVER FOR A PLAYER
      C
      C
      C  --   INPUT PARAMETERS
      C
      C       IPLARF -- PLAYER REFERENCE
      C
      C       DIRC   -- DIRECTION DESIRED
      C
      C  -- OUTPUT
      C
      C          THE COVER AVAILABLE FOR PLAYER IPLARF
      C
      C
 2            COMMON /PARS/
 3            EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4            REAL*8 DTPNAM,FLDNAM,FORMOT
 5            COMMON /PARS1/
 6            COMMON /PARS2/
 7            COMMON /PARS3/
      C
 8            DATA PI/ 3.14159/
      C
      C  -- DETERMINE IF PLAYER IS AT A NODE
      C
 9            ILOC=IVAL(JLOCN,IPLARF)
10                 IF(VAL(JFRAC,ILOC) .GT. 0.0) GO TO 10
      C
      C  --  NODE MUST BE A YARD NODE FOR QUADRANT COVER
      C
11            INODE=IVAL(JSOURC,ILOC)
```

FSN MODEL · COVR FUNCTION

```
ISN
12            CALL PARSRF(INODE,IDYP,IRNO,IDUM)
13                 IF(IDYP .NE. LYARD) GO TO 10
        C
        C   -- DETERMINE IF DIRECTION GIVEN
        C
14                 IF(DIRC .NE. FNULL) GO TO 8
        C
        C   -- PLAYER AT YARD NODE
        C         DETERMINE ACTIVITY AND DIRECTION
        C
15            IACTLT=IVAL(JACTIV,IPLARF)
16            IACTRF=IFIRST(IACTLT,KA)
17                 IF(IACTRF .EQ. NULL) GO TO 10
18                 IF(IVAL(JTYPE,IACTRF) .EQ. KMOVNG) GO TO 10
19                 IF(IVAL(JTYPE,IACTRF) .EQ. KCAPNG) GO TO 10
20                 IF(IVAL(JTYPE,IACTRF) .EQ. KFIRNG) GO TO 5
        C
        C   --  OBSERVING ACTIVITY
        C
21            DIRC=VAL(JPAR1,IACTRF)
22                 IF(DIRC .EQ. FNULL) GO TO 10
23            GO TO 8
        C
        C
        C   -- FIRING ACTIVITY
        C
24          5 ITRG=IVAL(JPAR1,IACTRF)
25            CALL DIREC(IPLARF,ITRG,DIRC,PHE)
        C
        C   -- FIND QUADRANT
        C
26          8 DIRC=AMOD(DIRC,2*PI)
27            IQUAD=JCOV1
28                 IF(DIRC .GT. 0.5*PI) IQUAD=JCOV2
29                 IF(DIRC .GT. PI) IQUAD=JCOV3
30                 IF(DIRC .GT. (1.5*PI)) IQUAD=JCOV4
```

```
ISN
        C
31            COVR=VAL(IQUAD,INODE)
32            GO TO 20
        C
        C
        C   --   REGION COVER
        C            PLAYER MUST BE IN EITHER YARD,ROOM,OR HALL
        C
33          10 IPL=IVAL(JPLACE,ILOC)
34             CALL PARSRF(IPL,IDY,IRNO,IDUM)
35                  IF(IDY .EQ. LYARD) GO TO 15
36                  IF(IDY .EQ. LHALL) GO TO 15
37                  IF(IDY .EQ. LROOM) GO TO 15
        C
38             COVR=0.0
39             GO TO 20
        C
        C
40          15 COVR=VAL(JCOV,IPL)
        C
41          20 CONTINUE
        C
42             RETURN
43             END
```

FSN MODEL - CREACT SUBROUTINE

```
ISN
 1          SUBROUTINE CREACT(ITYPE,IPAR1,IPAR2,IPAR3,IMODS,IDO,INEWRF)
        C
        C  -- THE PURPOSE OF THIS SUBROUTINE IS TO:
        C        1. CREATE AN ACTION RECORD WITH THE APPROPRIATE
        C           FIELD VALUES
        C        2.  AND, ADD IT TO PLAYER REFERENCE IDO'S ACTIVITY
        C           LIST
        C
        C
        C  -- INPUT PARAMETERS
        C
        C          ITYPE - TYPE OF ACTION RECORD TO CREATE
        C          IPAR1 - PARAMETER 1
        C          IPAR2 - PARAMETER 2
        C          IPAR3 - PARAMETER 3
        C          IMODS -- MODIFIER, TERMINATION CONDITION
        C          IDO   - PLAYER REFERENCE THIS ACTIVITY IS ASSIGNED
        C
        C
        C  -- OUTPUT PARAMETERS
        C
        C
        C          INEWRF - ACTIVITY RECORD REFERENCE THAT WAS
        C                   CREATED
        C
        C
        C  -- ASSUMPTIONS
        C
        C       IT IS ASSUMED THAT ALL PARAMETERS OF THE ACTION
        C         RECORDS CAN BE REPRESENTED AS INTEGERS OR
        C         RECORD REFERENCES.
        C
        C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
```

```
ISN
 4          REAL*8 DTPNAM,FLDNAM,FORMOT
 5          COMMON /PARS1/
 6          COMMON /PARS3/
       C
       C
       C  -- FIND AVAILABLE RECORD
       C
 7          IACTNO=NEWREC(LACTN)
 8               IF(IACTNO .EQ.NULL)GO TO 10
       C
       C  -- GET ACTION RECORD & FILL WITH VALUES
       C
 9          INEWRF = NEWRC6(LACTN,ITYPE,IPAR1,IPAR2,IPAR3,IMODS,IDO)
       C
       C  -- FIND ACTIVITY LIST FOR PLAYER IDO
       C
10          IACTRF=IVAL(JACTIV,IDO)
       C
       C  -- ADD NEW RECORD TO FRONT OF LIST
       C
11          IACTRF=ISTACK(INEWRF,IACTRF)
       C
       C  -- FIND OFFSET IN ITEM TO SAVE ACTIVITY REFERNCE
       C
12          CALL CHGFLD(JACTIV,IDO,IACTRF,1,IDUM)
13          GO TO 20
       C
       C  ERROR -----
       C      ACTION RECORD NOT AVAILABLE
       C
14       10 CONTINUE
       C
15
16       20 CONTINUE
       C
17          RETURN
```

```
ISN
18            END
```

FSN MODEL - CREREL SUBROUTINE

```
ISN
 1          SUBROUTINE CREREL(ITYPE,IPAR1,IPAR2,IRF)
      C
      C  -- THE PURPOSE OF THIS SUBROUTINE IS TO:
      C         1.  CREATE A RELATION RECORD WITH THE INPUT PARAMETERS
      C
      C
      C  -- INPUT PARAMETERS
      C
      C      ITYPE   - TYPE OF RELATION
      C       IPAR1   -- PARAMETER 1
      C        IPAR2   -- PARAMETER 2
      C
      C  -- OUTPUT
      C
      C     IRF   -- REFERENCE TO RECORD
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,FLDNAM,FORMOT
 5          COMMON /PARS1/
 6          COMMON /PARS3/
      C
      C
 7          INO=NEWREC(LRELN)
 8               IF(INO .EQ. NULL) GO TO 10
 9          IRF=NEWREF(LRELN,INO,0)
      C
      C  -- FIND OFFSET IN ITEM
      C
10          CALL CHGFLD(JTYPE,IRF,ITYPE,1,IDUM)
11          CALL CHGFLD(JPAR1,IRF,IPAR1,1,IDUM)
12          CALL CHGFLD(JPAR2,IRF,IPAR2,1,IDUM)
13          GO TO 20
      C
14       10 IRF=NULL
```

FSN MODEL - CREREL SUBROUTINE

```
ISN
      C
15          20 CONTINUE
16             RETURN
17             END
```

```
ISN
 1          SUBROUTINE DEAD(IPLARF)
     C
     C  -  THE PURPOSE OF THIS SUBROUTINE IS TO:
     C        1.  RELEASE ANY LISTS ASSOCIATED WITH PLAYER
     C        2. IF PLAYER IS A LEADER, FIND NEW LEADER
     C
     C
     C  -- INPUT PARAMETERS
     C
     C       IPLARF -- PLAYER REFERENCE
     C
     C
     C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
 8          COMMON /PARS1/
 9          COMMON /PARS2/
10          COMMON /PARS3/
11          COMMON /NEW/
     C
     C
     C  -- DELETE PERCEPTIONS
     C
12          IPTR=IREF1(IPLARF)
13          ITEM(IPTR+JPERPS)=NULL
     C
     C   CREATE MESSAGE OF PHYSICAL STATUS
     C
14          IMSG=NEWRCE(LMESS,IPLARF,IPLARF,JPSTAT,TMIN,KDEAD)
     C
     C  --  REMOVE FROM COMMUNICATION NETS
```

```
ISN
      C
15          ICCNLT=IVAL(JCMNTS,IPLARF)
16          ICON=IFIRST(ICCNLT,KA)
17        5      IF(ICON .EQ. NULL) GO TO 10
      C
      C  ADD MESAGE TO COMO NET
      C
18          ILT=IVAL(JMESS,ICON)
19          ILT=ISTACK(IMSG,ILT)
20          IPP=IREFL(ICON)
21          ITEM(IPP+JMESS)=ILT
      C
      C ... REMOVE IPLARF FROM LIST OF RECEIVERS
      C
22          ILLST=IVAL(JRCVRS,ICON)
23          IDUM=IFIRST(ILLST,KL)
24        6      IF(IDUM .EQ. NULL) GO TO 8
25          IF(IDUM .EQ. IPLARF) GO TO 7
26           IDUM=NEXT(ILLST,KL)
27          GO TO 6
28        7 CALL DELIST(KL,IRCVRS,ICON)
29        8      ICON=NEXT(ICONLT,KA)
30               GO TO 5
      C
      C  -  IF PLAYER IS NOT A LEADER RETURN
      C
31       10 IF(IVAL(JLEADR,IPLARF) .NE. NULL) GO TO 40
      C
      C
      C  -- PLAYER IS A LEADER FIND NEW ONE
      C
32          IFORCE=IVAL(JFORCE,IPLARF)
33          ILNEW=NEWLDR(IPLARF,IFORCE)
34          IF(ILNEW .EQ. NULL) GO TO 40
      C
      C  -- UPDATE ALL SUBORDINATES ON FORCE TO NEW LEADER
```

```
      C      ADJUST FORCE RECORD
      C
                IPTRF=IREF1(IFORCE)
                ITEM(IPTRF+JFLDR)=ILNEW
      C
      C ... CREATE UPDATED LIST OF SUBORDINATES IN ISUBLT
      C
                ISUBLT = NULL
                ILIS = IVAL(JSUBS,IPLARF)
                IPSN = IFIRST(ILIS,LPTR)
             20 IF(IPSN .EQ. NULL) GO TO 30
      C
      C ... IGNORE ILNEW AND DEAD OR CAPTURED PLAYERS
      C
                   IF(IPSN .EQ. ILNEW) GO TO 25
                   IPTR = IREF1(IPSN)
                   IF(ITEM(IPTR+JPSTAT) .LE. KCAPTR) GO TO 25
      C
      C ... GIVE IPSN NEW LEADER REF AND ADD TO ISUBLT
      C
                   ITEM(IPTR+JLEADR) = ILNEW
                   ISUBLT = ISTACK(IPSN,ISUBLT)
             25 IPSN = NEXT(ILIS,LPTR)
                GO TO 20
      C
             30 IPTR=IREF1(ILNEW)
                ITEM(IPTR+JLEADR)=NULL
                ITEM(IPTR+JSUBS)=ISUBLT
                IPTR=IREF1(IPLARF)
                ITEM(IPTR+JSUBS)=NULL
      C
             40 CONTINUE
                RETURN
                END
```

FSN MODEL - DECIDE SUBROUTINE

```
ISN
 1          SUBROUTINE DECIDE
      C
      C
      C      THE PURPOSES OF THIS SUBROUTINE ARE TO:
      C           1.  RESOLVE ANY CAPTURE SITUATIONS WHICH HAVE
      C                RESULTED FROM ACTIVITY UPDATE OR SURRENDER
      C                DECISION.
      C           2.   SET SUPPRESSION LEVELS FOR DECISION MAKING .
      C           3.  FOLLOW PLANS GIVEN FROM LEADERS.
      C           4.  DECIDE TO MOVE ,FIRE, OBSERVE, OR SURRENDER
      C                BASED ON DESIRABILITY OF PERFORMING THESE
      C                ACTIVITES
      C           5. AND, ADD TO A PLAYERS ACTIVITY LIST THE
      C                ACTIVITY SELECTED TO BE PERFORMED.
      C
      C
      C     ASSUMPTIONS
      C
      C          IT IS ASSUMED THAT ACTIVITY LISTS FOR ALL PLAYERS
      C          ARE NULL EXCEPT THOSE PLAYERS INVOLVED IN CAPTURE
      C          ACTIVITES.   IF AN ACTIVITY IS DESIRED TO BE PER-
      C          FORMED IN SUBSEQUEINT TIME INTERVALS, THIS ACTION
      C          RECORD MUST BE THE FIRST ITEM ON THE PLANS LIST.
      C
      C
      C    SUBROUTINE CALLED
      C
      C      NEWRC. -- USED TO CREATE  RECORDS
      C      DETFIR -  USED TO DETECT IF A PLAYER PERCEIVES HIMSELF TO BE
      C                UNDER FIRE
      C      TRGLST  -- USED TO CREATE A TARGET LIST
      C      IPATH  -- USED FOR PATH GENERATION
      C      MDESIR  - DESIRABILITY FUNCTION FOR MOVING
      C      FDESIR  - DESIRABILITY FUNCTION FOR FIRING
      C      ODESIR  - DESIRABILITY FUNCTION FOR OBSERVING
```

```
ISN
     C      SDESIR   - DESIRABILITY FUNCTION FOR SURRENDERING
     C      LOS      - LINE OF SIGHT FUNCTION
     C      NRTEST - USED TO EVALUATE IF RELATION IS SATIFIED
     C      NACTSU -  DETERMINES THE SUB-ACTIVITY FOR PLAYER
     C      NWPNS -- WEAPON SELECTION FOR FIRING
     C      UPACTS -- UPDATE ACTIVITY LSITS OF PLAYERS
     C
     C
     C
     C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
 8          COMMON /PARS1/
 9          COMMON /PARS2/
10          COMMON /PARS3/
11          COMMON /DATAV/
12          DIMENSION ACTTIM(25)
13          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
14          COMMON /RECREF/
15          DIMENSION RECRFQ(140)
16          EQUIVALENCE (RECRFQ(1),IGOALS)
17          COMMON /PARS4/
18          DIMENSION INSTAT(2,5)
19          EQUIVALENCE (IOBSV(41),INSTAT(1,1))
     C
20          NINSDR=5
21          KINSDR=4
     C
     C  -- UPDATE ACTIVITY LISTS OF PLAYERS
     C
22          CALL UPACTS
     C
```

PSN MODEL - DECIDE SUBROUTINE

```
ISN
      C
      C  -- ISITE IS A GLOBAL PARAMETER WHICH IS A POINTER TO THE
      C       SITE RECORD ,  USED TO DEFINE THE LIST OF GUARDS
      C       AND ADVERSITIES.
      C
      C   -- LOCAL VARIABLE JL IS USED TO SEARCH GUARD AND
      C          ADVERSARIES LIST.
      C
      C   -- PROCESS GUARDS FIRST THEN ADVERSARIES.
      C
23           JL=JGARDS
24           ISIDE=1
      C
      C  -- FIND REFERENCE TO LIST OF GUARDS, OR ADVERSARIES.
      C
25         5 IPLRST=IVAL(JL,ISITE)
26           CALL CHGVAR(4,ISIDE)
      C
      C   -- FIND PLAYER REFERENCE TO FIRST PLAYER ON LIST
      C   ** IPLARF=PLAYER REFERENCE
      C
27           IPLARF=IFIRST(IPLRST,KA)
28         8     IF(IPLARF .EQ. NULL) GO TO 510
      C
      C  -- TEST PHYSICAL STATUS OF PLAYER
      C         IF DEAD OR CAPTURED, REMOVE FROM LIST
      C
29                 IF(IVAL(JPSTAT,IPLARF) .EQ. KDEAD) GO TO 35
30                 IF(IVAL(JPSTAT,IPLARF) .EQ. KCAPTR) GO TO 35
      C
      C  -- PROCESS ANY CONDITIONAL ACTIONS ASSOCIATED WITH PLAYER
      C
31           CALL CONDAC(IPLARF)
      C
      C  ** IPLANO=PLAYER NUMBER
      C  ** IPTRPL=OFFSET IN ARRAY ITEM,DITEM TO CHANGE VALUES OF
```

```
ISN
      C               ANY FIELDS FOR PLAYER IPLARF
      C
32          CALL PARSRF(IPLARF,IDY,IPLANO,IDU)
33          IPTRPL=IREF1(IPLARF)
34          IPLAYR=IPLANO
35          CALL CHGVAR(3,IPLAYR)
      C
      C  -- TEST IF INSIDER
      C
36          IF(IVAL(JTYPE,IPLARF) .EQ. KINSDR) GO TO 60
      C
      C  -- TEST IF PLAYER SUPPRESSED
      C
37               IF(VAL(JSUPRN,IPLARF) .LE. 0.0) GO TO 11
      C
      C  -- PLAYER IS SUPPRESSED ; IF PERCEIVED TO BE UNDER FIRE
      C        REMOVE SUPPRESSION;  IF NOT, DECREASE SUPPRESSION
      C        BY SUPDEC(ISIDE)
      C
38          CALL DETFIR(IPLARF,ITARRF)
39               IF(ITARRF .EQ. NULL) GO TO 13
      C
      C  -- PLAYER PERCEIVED TO BE UNDER FIRE
      C       REMOVE SUPPRESSION
      C
40       11 DITEM(IPTRPL+JSUPRN)=0.0
41          GO TO 15
      C
      C  -- PLAYER NOT PERCEIVED TO BE UNDER FIRE,
      C        DECREASE SUPPRESSION BY SUPDEC(ISIDE)
      C
42       13 DITEM(IPTRPL+JSUPRN)=DITEM(IPTRPL+JSUPRN)
         *             -SUPDEC(ISIDE)
      C
      C  -- SEARCH ACTIVITY LIST , FIND IF PLAYER IS INVOLVED IN
      C        CAPTURE.
```

FSN MODEL - DECIDE SUBROUTINE

```
ISN
        C
        C   ** IACTLT= LIST REFERENCE FOR ACTIVITES OF PLAYER
        C
43          15 IACTLT= IVAL(JACTIV,IPLARF)
        C
        C   -- FIND LIST ACTION REFERENCE ON LIST
        C   **  IACTRF= CURRENT ACTION REFERENCE OF PLAYER
        C
44             IACTRF=IFIRST(IACTLT,KB)
45          18      IF(IACTRF .EQ. NULL) GO TO 40
        C
        C   -- TEST FOR ACTION OF CAPTURING
        C
46                  IF(IVAL(JTYPE,IACTRF) .EQ. KCAPNG) GO TO 20
        C
        C   -- FIND NEXT ACTIVITY ON LIST
        C
47             IACTRF=NEXT(IACTLT,KB)
48             GO TO 18
        C
        C   -- PLAYER INVOLVED IN CAPTURING ACTIVITY
        C       DETERMINE IF ACCETPTING CAPTURE
        C
49          20      IF(IVAL(JPAR1,IACTRF) .EQ. IPLARF) GO TO 30
        C
        C   -- PLAYER IS ACCEPTING CAPTURE, DETERMINE IF TIME HAS
        C       PASSED TO MAKE CAPTURE EFFECTIVE.
        C   ** TMIN=GLOBAL VARIABLE FOR GAME TIME
        C
50             IRF=IVAL(JMODS,IACTRF)
51             PAR1=VAL(JPAR2,IRF)
52             IF(PAR1 .GT. TMIN) GO TO 25
        C
        C   -- TIME HAS PASSED FOR CAPTURE TO BECOME EFFECTIVE
        C       REMOVE CAPTURE ACTIVITY FROM ACTIVITY LIST
        C
```

```
ISN
53          CALL DELIST(KB,JACTIV,IPLARF)
54          GO TO 40
      C
      C  -- PLAYER STILL IN CAPTURE ACTIVITY
      C       RESTRICTED IN MOVEMENT
      C
55       25 VTHRES=1.1
56          GO TO 45
      C
      C  -- PLAYER IS SURRENDERING, TEST IF CAPTURING PLAYER
      C     IS DEAD
      C
57       30 IDORF=IVAL(JDOER,IACTRF)
58                IF(IVAL(JPSTAT,IDORF) .NE. KDEAD) GO TO 32
      C
      C  -- CAPTURE UNSUCCESSFUL, REMOVE ACTIVITY FROM LIST
      C
59          CALL DELIST(KB,JACTIV,IPLARF)
60          GO TO 40
      C
      C  -- TEST IF TIME HAS PASSED TO COMPLETE CAPTURE,
      C     IF NOT THE PLAYER SUPPRESSED IN OBSERVATION
      C
61       32 IRF=IVAL(JMODS,IACTRF)
62          PAR1=VAL(JPAR2,IRF)
63          IF(PAR1 .GT. TMIN) GO TO 38
      C
      C  -- TIME HAS PASSED
      C       CHANGE PLAYER STATUS TO CAPTURED
      C
64          ICOND=IVAL(JPSTAT,IPLARF)
65          CALL CHGFLD(JPSTAT,IPLARF,KCAPTR,1,IDUM)
      C
      C  DECREASE NUMBER OF PLAYERS ON FORCES
      C
66          FORCES(ICOND,ISIDE)=FORCES(ICOND,ISIDE)-1.0
```

FSN MODEL - DECIDE SUBROUTINE

```
ISN
67              CALL CHGVR2(5,FORCES(ICOND,ISIDE),ICOND,ISIDE)
68              ICOND=KCAPTR
69              FORCES(ICOND,ISIDE)=FORCES(ICOND,ISIDE)+1.0
70              CALL CHGVR2(5,FORCES(ICOND,ISIDE),ICOND,ISIDE)
71              CALL DEAD(IPLARF)
          C
          C  -- DELETE PLAYER FROM LIST OF PLAYERS AND
          C       FIND NEXT PLAYER ON LIST
          C
72           35 CALL DELIST(KA,JL,ISITE)
73              GO TO 500
          C
          C  -- MARK PLAYER SUPPRESSED IN OBSERVATION
          C
74           30 DITEM(IPTRPL+JSUPRN)=SUPOBS(ISIDE)
75              GO TO 500
          C
          C  -- SET THRESHOLDS ACCORDING TO SUPPRESSION
          C   ** VTHRES=TEMPORARY MOVEMENT THRESHOLD
          C   ** FTHRES=TEMPORARY FIRING THRESHOLD
          C   ** STHRES=TEMPORARY THRESHOLD FOR SURRENDERING
          C
          C  -- SET MOVEMENT THRESHOLD
          C
76           40 IF(VAL(JSUPRN,IPLARF) .GT. (1.-RESMOV(IPLANO))) GO TO 43
77              VTHRES=RESMOV(IPLANO)
78              IF(IVAL(JPSTAT,IPLARF) .EQ. KWOUND)
               * VTHRES=VTHRES+RESWND(IPLANO)
79              GO TO 45
80           43 VTHRES=1.1
          C
          C  -- SET FIRE THRESHOLD
          C
81           45 IF(VAL(JSUPRN,IPLARF) .GT. (1.-RESFIR(IPLANO))) GO TO 48
82              FTHRES=RESFIR(IPLANO)
83              IF(IVAL(JPSTAT,IPLARF) .EQ. KWOUND)
```

```
ISN
             * FTHRES=FTHRES+RESWND(IPLANO)
84              GO TO 50
85           48 FTHRES=1.1
          C
          C  -- SET SURRENDER THRESHOLD
          C
86           50 STHRES=RESSUR(IPLANO)
87              GO TO 100
          C
          C  -- INSIDER TEST FOR PLANS
          C
88           60 IF(IVAL(JPLANS,IPLARF) .EQ. NULL) GO TO 70
          C
          C  -- SET THRESHOLD FOR INSIDER
          C
89              VTHRES=-999.0
90              FTHRES=-999.0
91              STHRES=999.0
92              GO TO 100
          C
          C  --  NO PLANS THEN INSIDER SURFACES
          C
93           70 CALL SURFAC(IPLARF)
94              GO TO 300
          C
          C
          C  -- BEGIN DECISION MAKING PROCESS
          C
          C  -- TEST FOR PLANS,
          C       IF NO PLANS GO TO GENERAL DECISION MAKING
          C
          C
95          100 IPLANS=IVAL(JPLANS,IPLARF)
96              MVPLAN=0
97              MFPLAN=0
          C
```

FSN MODEL - DECIDE SUBROUTINE

```
ISN
          C   -- SET PLAYER TIME FOR ACTIVITY
          C
 98                DITEM(IPT3PL+JTREQ)=DTSEC
          C
          C   ** IACTRF=POINTER TO PLAYER ACTIVITY LIST
          C
 99                IACTRF=IVAL(JACTIV,IPLARF)
          C
          C   -- FIND FIRST PLAN ACTIVITY ON LIST
          C
100                IPLAN=IFIRST(IPLANS,KD)
101                     IF(IPLAN .EQ. NULL) GO TO 300
          C
          C   -- TEST IF PLAN IS FOR MOVING MISSION
          C
102                     IF(IVAL(JTYPE,IPLAN) .NE. KMOVNG) GO TO 150
          C
          C   -- MOVEMENT PLAN,  DETERMINE IF PLAYER IS SUPPRESSED
          C      IN MOVEMENT; IF SO, GO TO GENERAL RULES.
          C
103                     IF(VTHRES .GE. 1.0) GO TO 300
          C
          C   ** IDESID= DESTINATION NODE ID, STORED AS PARAMETER 1
          C       OF MOVEMENT ACTION RECORD.
          C
104                IDESID=IVAL(JPAR1,IPLAN)
105                     IF(IDESID .EQ. NULL) GO TO 550
          C
          C   -- MISSION TO MOVE
          C        ACTION RECORD PARAMETERS DEFINITION
          C             1  -- DESTION LOCATION REFERENCE
          C             2  -- PATH    LIST REFERENCE , LIST ELEMENTS ARE
          C                             LOACTION REFERENCES
          C             3  -- NULL
          C
          C   -- LOWER THRESHOLD FOR MOVEMENT
```

```
 ISN
        C
 106              VTHRES=VTHRES+RESPLN(IPLANO)
 107              MVPLAN=1
        C
        C  -- TEST IF PLAN IS COMPATABLE WITH DESTINATION
        C
 108              IPATLT=IVAL(JPAR2,IPLAN)
 109              INODID=IFIRST(IPATLT,KE)
 110        110        IF(INODID .EQ. NULL) GO TO 120
 111                   IF(INODID .EQ. IDESID) GO TO 125
 112                   INODID=NEXT(IPATLT,KE)
 113                   GO TO 110
        C
        C  -- PATH IS NOT COMPATABLE WITH DESTINATION
        C       GENERATE NEW PATH
        C
 114        120 ILOC=IVAL(JLOCN,IPLARF)
 115            ISOU=IVAL(JSINK,ILOC)
 116                 IF(ISOU .EQ. NULL) ISOU=IVAL(JSOURC,ILOC)
 117            LISTRF= IPATH(IPLARF,ISOU,IDESID,TEMP)
 118            GO TO 127
        C
        C  -- PATH IS COMPATIBLE WITH DESTINATION
        C
 119        125 LISTRF=IPATLT
        C
        C  -- EVALUATE PATH TO DESIRABILITY OF MOVEMENT
        C
 120        127 CALL MDESIR(IPLARF,LISTRF,TEMP)
 121                 IF(TEMP .LT. VTHRES) GO TO 300
        C
        C  -- MOVE PLAN IS ACCEPTABLE, GENERATE NEW ACTION FOR
        C       PLAYER FROM PLANS
        C
 122                 IF(LISTRF .EQ. IPATLT) GO TO 130
        C
```

FSN MODEL - DECIDE SUBROUTINE

```
 ISN
        C   -- NEW PATH GENERATED, ADJUST PATH REFERENCE IN ACTION
        C
 123              IPTR=IREF1(IPLAN)
 124              ITEM(IPTR+JPAR2)=LISTRF
        C
        C   -- ADD ACTIVITY TO PLAYER ACTIVITY LIST
        C
 125          130 IACTRF=ISTACK(IPLAN,IACTRF)
 126              CALL CHGFLD(JACTIV,IPLARF,IACTRF,1,IDUM)
 127              ISUCM=IFIRST(LISTRF,KKZ)
        C
        C
        C   -- NO RELATIONS ADDED TO DETERMINE TERMINATION
        C        CONDITION FOR MOVING ACTIVITY
        C   -- SET PLAYER POSTURE FOR MOVING
        C        FIND SUBACTIVITY FOR ACTIVITY MOVING
        C        POSTURE IS INDEPENDENT OF COVER WHEN MOVING
        C
 128          140 ISUBAC=NACTSU(IPLARF,NULL)
 129              DITEM(IPTRPL+JPOSTR)=POSTUR(ISUBAC)
 130              GO TO 335
        C
        C   -- CHECK FOR FIRING PLAN
        C
 131          150 IF(IVAL(JTYPE,IPLAN) .NE. KFIRNG) GO TO 200
        C
        C   -- MISSION TO FIRE, TEST SUPPRESSION
        C
 132              IF(FTHRES .GE. 1.0) GO TO 300
        C
        C   -- LOWER THRESHOLD TO FOLLOW PLANS
        C
 133              FTHRES=FTHRES+RESPLN(IPLANO)
 134              MFPLAN=1
        C
        C   -- NULL TARGET LIST
```

```
ISN
         C
135                ITRGLT=NULL
         C
         C  -- DETERMINE IF PLAYER REFERENCE GIVEN AS TARGET
         C
         C          ACTION RECORD DEFINITION OF PARAMETERS
         C               1. TARGET  PLAYER REFERENCE
         C               2.  LOCATION REFERENCE
         C               3.  WEAPON SELECTED
         C               MODS. TERMINATION CONDITIONS
         C
136                IF(IVAL(JPAR1,IPLAN) .EQ.NULL) GO TO 170
         C
         C  -- PLAYER REFERENCE GIVEN
         C        TEST FOR DESIRABILITY TO FIRE
         C
137                ITRGLT=IVAL(JPAR1,IPLAN)
         C
         C  -- CHECK FOR LINE OF SIGHT
         C
138                ICC=LOS(IPLARF,ITRGLT)
139                     IF(ICC .EQ. 0) GO TO 170
140                CALL FDESIR(IPLARF,ITRGLT,ICODE,TEMP,FTHRES)
141                     IF(TEMP .GE. FTHRES) GO TO 195
         C
         C  -- GENERATE TARGET LIST   BASED ON REGION
         C        GIVEN IN PLANS
         C
142            170 ILOCID=IVAL(JPAR2,IPLAN)
143                CALL TRGLST(IPLARF,ILOCID,ITRGLT)
         C
         C  -- TEST IF TARGET LIST IS NULL
         C
144            190 IF(ITRGLT .EQ. NULL) GO TO 300
         C
         C  -- TEST DESIRABILITY OF TARGETS ON TARGET LIST
```

FSN MODEL - DECIDE SUBROUTINE

```
 ISN
         C
 145                CALL FDESIR(IPLARF,ITRGLT,ICODE,TEMP,FTHRES)
 146                     IF(TEMP .LT. FTHRES) GO TO 300
         C
         C   -- TARGET FOUND, REFERENCE IS ICODE .
         C        SELECT WEAPON, IF NO WEAPON AVAILABLE GO TO GENERAL RULE
         C
 147            195 CALL NWPNS(IPLARF,ICODE,IWPNRF,IWPN)
 148                     IF(IWPN .EQ. 0) GO TO 300
         C
 149                IPTR=IREF1(IPLAN)
 150                ITEM(IPTR+JPAR1)=ICODE
 151                ITEM(IPTR+JPAR2)=IVAL(JLOCN,ICODE)
 152                ITEM(IPTR+JPAR3)=IWPNRF
         C
         C   -- ADD ACTION TO PLAYER ACTIVITY LIST
         C
 153                IACTRF=ISTACK(IPLAN,IACTRF)
 154                CALL CHGFLD(JACTIV,IPLARF,IACTRF,1,IDUM)
         C
         C   --  SET TERMINATION CONDITIONS FOR FIRING
         C
 155            198 CALL PARSRF(ICODE,IDY,IRR,IDUM)
 156                IPAR1=NEWREF(IDY,IRR,JPSTAT)
 157                IPAR2=KDEAD
 158                IRF = NEWRC3(LRELN,KEQ,IPAR1,IPAR2)
         C
         C   -- ADD RELATION  TO ACTIVITY
         C
 159                IPTR=IREF1(IACTRF)
 160                ITEM(JMODS+IPTR)=IRF
         C
         C   --  DETERMINE SUB-ACTIVITY FOR PLAYER
         C
 161                ISUBA=NACTSU(IPLARF,NULL)
 162                FTEM=FNULL
```

```
ISN
163             DITEM(IPTRPL+JPOSTR)=POSTUR(ISUBA)+COVR(IPLARF,PTEM)
164             GO TO 500
      C
      C  -- CHECK FOR OBSERVATION PLAN
      C
165         200 IF(IVAL(JTYPE,IPLAN) .NE. KDETNG) GO TO 560
      C
      C  -- OBSERVATION MISSION, TEST IF PLAYER
      C       PERCEIVED TO BE UNDER FIRE
      C
166             CALL DETFIR(IPLARF,ITARRF)
167                  IF(ITARRF .NE. NULL) GO TO 300
      C
      C  -- NOT PERCEIVED TO BE UNDER FIRE,
      C        IMPLEMENT OBSERVE ACTIVITY
      C
      C  -- ACTION RECORD PARAMETERS DEFINITION
      C
      C            1. DIRECTION  REAL VALUE IN RADIANS
      C             2. REGION LOCATION REFERENCE
      C            MODS. TERMINATION CONDITIONS
      C
168             IPTR=IREF1(IPLAN)
169                  IF(VAL(JPAR1,IPLAN) .NE. FNULL) GO TO 230
170             INODID=IVAL(JPAR2,IPLAN)
171                  IF(INODID .EQ. NULL) GO TO 220
172             CALL DIREC(IPLARF,INODID,THETA,PHI)
173             GO TO 225
174         220 THETA=FNULL
175         225 DITEM(IPTR+JPAR1)=THETA
      C
176         230 IACTRF=ISTACK(IPLAN,IACTRF)
177             CALL CHGFLD(JACTIV,IPLARF,IACTRF,1,IDUM)
      C
      C  -- NO TERMINATION CONDITIONS FOR OBSERVING
      C        ASSUMED ACTIVITY OCCURS FOR 1 TIME CYCLE
```

FSN MODEL - DECIDE SUBROUTINE

```
ISN
        C  --  DETERMINE SUBACTIVITY FOR OBSERVING
        C
178        240 ISUBA=NACTSU(IPLARF,NULL)
               DITEM(IPTRPL+JPOSTR)=POSTUR(ISUBA)+COVR(IPLARF,THETA)
179
180            GO TO 500
        C
        C  -- GENERAL DECISION RULE
        C  -- TEST FOR LOCAL MOVE, IF ON LINK TEST END NODES
        C       IF AT NODE TEST NEIGHBORS
        C
181        300 IF(VTHRES .GT. 1.0) GO TO 350
182            ILOCRF=IVAL(JLOCN,IPLARF)
183                 IF(VAL(JFRAC,ILOCRF) .GT. 0.0) GO TO 310
        C
        C  -- PLAYER IS AT NODE, TEST IF THIS AN ADVERSARY
        C
184                 IF(IVAL(JALLEG,IPLARF) .EQ. KSFE) GO TO 305
        C
        C  THIS IS AFE PLAYER, TEST IF AT GOAL NODE
        C      SEARCH LIST OF ACTIVE GOALS
        C
185            IPLACE=IVAL(JPLACE,ILOCRF)
        C
        C  ** IGOALS - POINTER TO A LIST OF ACTIVE GOALS
        C
186            IGL=IFIRST(IGOALS,KP)
187        303      IF(IGL .EQ. NULL) GO TO 305
188                 IF(IVAL(JID,IGL) .EQ. IPLACE) GO TO 350
        C
189            IGL=NEXT(IGOALS,KP)
190            GO TO 303
        C
        C  -- PLAYER AT NODE BUT NOT GOAL NODE
        C       LIST ALL NEIGHBORS OF NODE
        C
191        305 INODRF=IVAL(JPLACE,ILOCRF)
```

```
 ISN
192           LISTRF=IVAL(JNBRS,INODRF)
      C
      C  -- ADD LOCATION NODE
      C
193           INODE=IVAL(JSOURC,ILOCRF)
194           LISTRF=ISTACK(INODE,LISTRF)
195           GO TO 320
      C
      C  -- PLAYER NOT AT NODE, CREATE LIST OF NODES
      C        AS END NODES OF LINK
      C
196
197       310 INOD1=IVAL(JSOURC,ILOCRF)
198           INOD2=IVAL(JSINK,ILOCRF)
199           LISTRF=LIST(INOD1,INOD2,NULL,NULL,NULL,NULL)
      C
      C  -- EVALUATE EACH NODE ON LISTRF
      C        FOR DESIRABILITY
      C
200       320 TTHRES=-1.0
201           ISUCM=NULL
202           INODE=IFIRST(LISTRF,KG)
203       321     IF(INODE .EQ. NULL ) GO TO 330
      C
      C  -- EVALUATE DESIRABILITY
      C
204           CALL NDESIR(IPLARF,INODE,TEMP)
205               IF(TEMP .LT. VTHRES) GO TO 325
206               IF(TEMP .LE. TTHRES) GO TO 325
207                   TTHRES=TEMP
208                   ISUCM=INODE
      C
      C  -- NEXT NODE ON LIST
      C
209       325 INODE=NEXT(LISTRF,KG)
210           GO TO 321
```

```
ISN
      C
      C  -- TEST IF ANY MOVE WAS DESIRABLE
      C
211     330 IF(ISUCM .EQ. NULL) GO TO 340
212         IF(ISUCM .EQ. IVAL(JSOURC,ILOCRF)) GO TO 350
      C
      C  -- MOVE SUCCUSSFUL,
      C       RULE  IF MOVE FOUND DESIRABLE THEN MOVE
      C  -- CREATE MOVE ACTION
      C
213         CALL CREACT(KMOVNG,ISUCM,ISUCM,NULL,NULL,IPLARF,INEWRF)
      C
      C  SET PLAYER POSTURE,
      C
214         IACTS=NACTSU(IPLARF,NULL)
215         DITEM(IPTRPL+JPOSTR)=POSTUR(IACTS)
      C
      C  -- DO NOT ADD ACTION REFERENCE TO PLANS
      C  -- TEST IF DESTINATION IS SOURCE NODE
      C
216     335 ILOCRF=IVAL(JLOCN,IPLARF)
217               IF(IVAL(JSOURC,ILOCRF) .NE. ISUCM) GO TO 500
      C
      C  -- REVERSE DIRECTION ALONG LINK
      C
218         IPTR=IREF1(ILOCRF)
219         ITEM(IPTR+JSOURC)=IVAL(JSINK,ILOCRF)
220         ITEM(IPTR+JSINK)=ISUCM
221         DITEM(IPTR+JFRAC)=1.0-DITEM(IPTR+JFRAC)
222         GO TO 500
      C
      C  -- NOT DESIRABLER TO MOVE
      C       CHECK IF GIVEN PLAN TO MOVE;
      C       IF SO , THEN MARK PLAYER SUPPRESSED IN
      C        MOVEMENT
      C
```

```
 ISN
223       340 IF(MVPLAN .EQ. 0) GO TO 350
      C
      C  --PLAYER GIVEN PLAN TO MOVE BUT DID NOT
      C       DECIDE TO MOVE -- SUPPRESSED  IN MOVEMENT
      C
224           DITEM(IPTRPL+JSUPRN)=DITEM(IPTRPL+JSUPRN)+
             *                            SUPMOV(ISIDE)
225           TEM=VAL(JSUPRN,IPLARF)
226           CALL CHGFLD(JSUPRN,IPLARF,TEM,1,IDUM)
      C
      C-- GENERAL DECISION
      C       FIRE AT TARGET
      C   -- GENERATE TARGET LIST
      C
227       350 ITRGLT=NULL
228           ILOCN=NULL
229           CALL TRGLST(IPLARF,ILOCN,ITRGLT)
230                IF(ITRGLT .EQ. NULL) GO TO 400
      C
      C   -- TEST DESIRABILITY OF TARGETS ON LIST
      C
231           CALL FDESIR(IPLARF,ITRGLT,ICODE,TEMP,FTHRES)
      C
232                IF(TEMP .LT. FTHRES) GO TO 390
      C
      C   -- TARGET FOUND, REFERENCE IS ICODE
      C        CREATE ACTION RECORD
      C   -- SELECT WEAPON
      C
233           CALL NWPNS(IPLARF,ICODE,IWPNRF,IWPN)
234                IF(IWPN .EQ. 0) GO TO 390
235           CALL CREACT(KFIRNG,ICODE,NULL,IWPNRF,NULL,IPLARF,INEWRF)
      C
      C   -- ADD ACTIVITY TO PLANS, THIS WILL ALLOW
      C        FOR ACTION TO CARRY OVER SEVERAL TIME
      C         INTERVALS
```

FSN MODEL - DECIDE SUBROUTINE

```
 ISN
      C
236             IPLANS=IVAL(JPLANS,IPLARF)
237             IPLANS=ISTACK(INEWRF,IPLANS)
238             CALL CHGFLD(JPLANS,IPLARF,IPLANS,1,IDUM)
239             IACTRF=INEWRF
240             GO TO 198
      C
      C
      C
      C  -- TEST IF PLAYER SUPPRESSED IN FIRING
      C        IF PLAYER HAS PLANS TO FIRE AND
      C         DECIDES NOT TO FIRE, THEN SUPPRESSED IN
      C        FIRING
      C
241         390 IF(MFPLAN .EQ. 0) GO TO 400
      C
242             DITEM(IPTRPL+JSUPRN)=DITEM(IPTRPL+JSUPRN)+
               *                            SUPFIR(ISIDE)
243             TEM=VAL(JSUPRN,IPLARF)
244             CALL CHGFLD(JSUPRN,IPLARF,TEM,1,IDUM)
      C
      C
      C  --GENERAL DECISION
      C        OBSERVATION ACTIVITY
                 DETERMINE IF PLAYER PERCEIVES TO BE UNDER FIRE.

245         400 CALL DETFIR(IPLARF,ITARRF)
246             IF(ITARRF .NE. NULL) GO TO 450
      C
      C  -- NOT PERCEIVED TO BE UNDER FIRE,
      C       CALCULATE OBSERVATION ANGLE
      C
247             IF(ITRGLT .EQ. NULL) GO TO 430
248             CALL ODESIR(IPLARF,ITRGLT,ICODE)
249                  IF(ICODE .EQ. NULL) GO TO 430
      C
```

```
ISN
     C  -- CALCULATE DIRECTION OF OBSERVATION
     C
250           CALL DIREC(IPLARF,ICODE,THETA,PHI)
     C
     C  -- ADD ACTION TO PLAYER ACTIVITY LIST
     C
251       425 CALL CREACT(KDETNG,THETA,NULL,NULL,NULL,IPLARF,INEWRF)
     C
252           GO TO 240
     C
     C  -- GENERATE DEFAULT ANGLE
     C
253       430 THETA=FNULL
254           GO TO 425
     C
     C  -- SUPPRESSED IN OBSERVATION,
     C       CHECK FOR SURRENDER
     C
255       450 CALL SDESIR(IPLARF,TEMP)
256                  IF(TEMP .LT. STHRES) GO TO 490
     C
     C  -- PLAYER DECIDES TO SURRENDER,
     C         SURRENDER TO PLAYER PERCEIVED TO
     C     BE  UNDER FIRE FROM   ITARRF
     C  -- REMOVE ALL ACTIVITES EXCEPT CAPTURE   OM ACTIVITY
     C      LIST FOR ITARRF
     C
257           INEWRF=NULL
258           IACTLT=IVAL(JACTIV,ITARRF)
259           IACTRF=IFIRST(IACTLT,K8)
260       455        IF(IACTRF .EQ. NULL) GO TO 470
     C
     C  -- TEST IF ACTIVITY IS CAPTURE
     C
261                  IF(IVAL(JTYPE,IACTRF) .NE. KCAPNG) GO TO 460
     C
```

FSN MODEL - DECIDE SUBROUTINE

```
 ISN
        C  -- ADD ACTIVITY TO NEW LIST
        C
 262             INEWRF=IQUEUE(IACTRF,INEWRF)
        C
        C  -- NEXT ACTIVITY
        C
 263        460  IACTRF=NEXT(IACTLT,KR)
 264             GO TO 455
        C
        C  -- CHANGE ACTION REFERENCE TO NEW LIST
        C
 265        470  IPTR=IREF1(ITARRF)
 266             ITEM(IPTR+JACTIV)=INEWRF
        C
        C  -- CREATE ACTION CAPTURE ADD TO
        C       ITARRF ACTIVITY LIST
        C  -- TERMINATION CONDITIONS FOR CAPTURING
        C
 267             ITYPE=KGEF
 268             IPAR1=NEWREF(1,1,JTMIN)
 269             IPAR2=TMIN+ACTTIM(KCPTRG)/60.
 270             IRF = NEWRC3(LRELN,ITYPE,IPAR1,IPAR2)
 271             CALL CREACT(KCAPNG,IPLARF,NULL,NULL,IRF,ITARRF,INEWRF)
        C
        C  -- TEST IF IPLARF ACCEPTING CAPTURE
        C
 272             IACTLT=IVAL(JACTIV,IPLARF)
 273             IACTRF=IFIRST(IACTLT,KS)
 274        473       IF(IACTRF .EQ. NULL) GO TO 480
        C
        C  -- TEST IF ACTIVITY IS CAPTURING
        C
 275                  IF(IVAL(JTYPE,IACTRF) .NE. KCAPNG) GO  TO 475
        C
        C  -- PLAYER INVOLVED IN CAPTURE,  RELEASE
        C       CAPTURE ACTIVITY
```

```
ISN
      C
276          ICAPP=IVAL(JPAR1,IACTRF)
277          IPTR1=IREF1(ICAPP)
278          ITEM(IPTR1+JACTIV)=NULL
      C
      C  -- NEXT ACTIVITY
      C
279     475  IACTRF=NEXT(IACTLT,KS)
280          GO TO 473
      C
      C  -- ADD CAPTURE EVENT TO IPLARF ACTIVITY LIST
      C
281     480  IACTRF=IVAL(JACTIV,IPLARF)
282          IACTRF=ISTACK(INEWRF,IACTRF)
283          ITEM(IPTRPL+JACTIV)=IACTRF
      C
      C  -- MARK PLAYER SUPPRESSED IN OBSERVATION
      C
284     490  TEM=SUPOBS(ISIDE)
285          CALL CHGFLD(JSUPRN,IPLARF,TEM,1,IDUM)
      C
      C -- NEXT PLAYER
      C
286     500  MSITN=IVAL(JSITN,IPLARF)
287          MSITN=MIN0(MSITN,KSITN3)
288          IPTR=IREF1(IPLARF)
289          ITEM(IPTR+JSITN)=MSITN
290          IPLARF=NEXT(IPLRST,KA)
291          GO TO 8
      C
      C -- GURARD OR ADVERSARY LIST COMPLETE
      C
292     510  IF(JL .EQ. JADVRS) GO TO 600
293          JL=JADVRS
294          ISIDE=2
295          GO  TO 5
```

FSN MODEL - DECIDE SUBROUTINE

```
ISN
          C
          C
          C   ****  ERROR-
          C            MOVE MISSION DOES NOT CONTIAN DESTINATION
          C
296          550 I1=IVAL(JPAR1,IPLAN)
297              I2=IVAL(JPAR2,IPLAN)
298              I3=IVAL(JPAR3,IPLAN)
299              CALL ERR(24,26,I1,I2,I3)
300              GO TO 600
          C
          C   ***** ERROR-
          C            PLAN GIVEN BUT ILLGAL ACTIVITY TYPE
          C
301          560 I1=IVAL(JTYPE,IPLAN)
302              CALL ERR(25,26,I1,I2,I3)
          C
303          600 CONTINUE
          C
304              RETURN
305              END
```

```
ISN
 1          SUBROUTINE DETFIR(IPLARF,ITARRF)
      C
      C
      C    THE PURPOSE OF THIS SUBROUTINE IS TO:
      C       1. DETERMINE IF PLAYER REFERENCED HAS A
      C            PERCEPTION OF BEING FIRED UPON.
      C
      C
      C  -- INPUT PARAMETERS
      C
      C          IPLARF - PLAYER REFERENCE
      C
      C  -- OUTPUT VARAIBLES
      C
      C          ITARRF - PLAYER REFERENCE DESIGNATING THE PERSON
      C                   PERCEIVED BY IPLARF TO BE FIRING AT HIM.
      C                    VALUE IS NULL WHEN NOT PERCEIVED TO
      C                     BE UNDER FIRE
      C
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,FLDNAM,FORMOT
 5          COMMON /PARS1/
 6          COMMON /PARS2/
 7          COMMON /PARS3/
      C
      C
      C  -- FIND POINTER TO LIST OF PERCEPTIONS
      C
 8          IPERLT=IVAL(JPRCPS,IPLARF)
      C
      C  -- SEARCH LIST OF PERCEPTIONS, IPERRF IS PERCEPTION RECORD
      C      RECORD REFERENCE
      C
```

```
ISN
 9          IPERRF=IFIRST(IPERLT,KW)
10      10      IF(IPERRF .EQ. NULL) GO TO 50
     C
     C  -- FIND REFERENCE RECORD THAT DESCRIBES PERCEPTION
     C
11          ICURRF=IVAL(JVIEW,IPERRF)
     C
12              CALL PARSRF(ICURRF,IDYY,IRECN,IDUM)
13              IF(IDYY .NE. LPERSN) GO TO 40
     C
     C  --  TEST PERSONS ACTUAL PHYSICAL STATUS
     C
14          ITRUE=IVAL(JID,IPERRF)
15          IF(IVAL(JPSTAT,ITRUE) .LE. KCAPTR) GO TO 40
     C
     C  -- FIND ACTIVITY LIST FOR PERCEPTION
     C
16          IACTLT=IVAL(JACTIV,ICURRF)
     C
     C  -- SEARCH LIST OF PERCEIVED ACTIVITES TO FIND FIRING
     C
17          IACTRF=IFIRST(IACTLT,KX)
18      20      IF(IACTRF .EQ. NULL) GO TO 40
19              IF(IVAL(JTYPE,IACTRF) .NE. KFIRNG) GO TO 30
     C
     C  -- FIRING ACTIVITY FOUND, DETERMINE IF IPLARF IS TARGET
     C
20          IF(IVAL(JPAR1,IACTRF) .EQ. IPLARF) GO TO 60
     C
     C  -- NEXT ACTIVITY PERCEIVED
     C
21      30 IACTRF=NEXT(IACTLT,KX)
22          GO TO 20
     C
     C  -- NEXT PERCEPTION
     C
```

```
ISN
23         40 IPERRF=NEXT(IPERLT,KW)
24            GO TO 10
      C
      C    -- LIST OF PERCEPTIONS SEARCHED
      C         NOT PERCEIVED TO BE UNDER FIRE
      C
25         50 ITARRF=NULL
26            GO TO 70
      C
      C    -- PERCEIVED TO BE UNDER FIRE
      C
27         60 ITARRF=IVAL(JID,IPERRF)
      C
28         70 CONTINUE
29            RETURN
30            END
```

FSN MODEL - DRCOM1 SUBROUTINE

```
ISN
 1            SUBROUTINE DRCOM1(IPLARF,LMAX)
      C ... THIS SUBROUTINE IS CALLED TO DETERMINE HOW MANY ITEMS
      C     OF INFORMATION A PLAYER CAN ASSIMILATE AND COMMUNICATE
      C     DURING A SINGLE GAME CYCLE.
      C
      C ... INPUT PARAMETERS:
      C          IPLARF ... POINTER TO PLAYER DESCRIPTION RECORD
      C
      C ... OUTPUT PARAMETERS:
      C          LMAX   ... MAX NUMBER OF ITEMS
      C
 2            COMMON /STATEV/
 3            DIMENSION ITEM(41900),DITEM(41900)
 4            EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5            COMMON /PARS1/
 6            COMMON /PARS2/
 7            COMMON /DATAV/
 8            DIMENSION ACTTIM(25)
 9            EQUIVALENCE (ACTTIM(1),ACTRAT(1))
      C
      C ... CURRENTLY, DATA TAKEN DIRECTLY FROM HFLIMS
      C
10            LMAX=HFLIMS(KLIM1,ISIDE)
11            IF(IVAL(JTYPE,IPLARF).EQ.KSNMON) LMAX=HFLIMS(KLIM2,ISIDE)
12            RETURN
13            END
```

```
ISN
 1          SUBROUTINE DRCOM2(IPLARF,LMSN,LMSG,LINCP,LORDER)
      C ... CALLED BY COMPER TO ESTABLISH LIMITS FOR MESSAGE
      C     PROCESSING BY A PLAYER.
      C ... INPUT PARAMETERS:
      C         IPLARF ... PLAYER RECORD REFERENCE
      C
      C ... OUTPUT PARAMETERS
      C         LMSN   ... # OF MISSION MESSAGES
      C         LMSG   ... # OF NON-MISSION MESSAGES
      C         LINCP  ... # OF INTERCEPTED MESSAGES THAT
      C                    MAY BE SAVED AND RETRANSMITTED
      C         LORDER... # OF ORDERS FROM LEADER
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS2/
 6          COMMON /DATAV/
 7          DIMENSION ACTTIM(25)
 8          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
      C
 9          LMSN=HFLIMS(KLIM3,ISIDE)
10          LMSG=HFLIMS(KLIM5,ISIDE)
11          LORDER=HFLIMS(KLIM4,ISIDE)
      C
      C ... LIMIT ON INTERCEPTED MESSAGES NOT PRESENTLY
      C     ENTERED EXPLICITLY.
      C
12          LINCP=HFLIMS(KLIM1,ISIDE)
13          RETURN
14          END
```

FSN MODEL - DRCOM3 SUBROUTINE

```
ISN
  1          SUBROUTINE DRCOM3(IPLARF,NETREF,INTCPT)
       C ... SUBROUTINE TO DETERMINE IF A PLAYER WHO CAN
       C     RECEIVE ON A NET IS RECEIVING MESSAGES DIRECTED
       C     TO HIM, OR IS INTERCEPTING THE OTHER SIDE'S
       C     TRANSMISSION.
       C
       C ... INPUT PARAMETERS:
       C        IPLARF ... PLAYER RECORD REFERENCE
       C        NETREF ... COMNET RECORD REFERENCE
       C
       C ... OUTPUT PARAMETERS:
       C        INTCPT ... .TRUE. PLAYER INTERCEPTING
       C                   .FALSE. PLAYER VALID NET MEMBER
       C
  2          COMMON /STATEV/
  3          DIMENSION ITEM(41900),DITEM(41900)
  4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
  5          COMMON /PARS/
  6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  7          REAL*8 DTPNAM,FLDNAM,FORMOT
  8          COMMON /PARS1/
  9          COMMON /PARS2/
 10          LOGICAL INTCPT
 11          DIMENSION KOUNT(2)
       C
       C ... SEE IF PLAYER CAN XMIT ON THIS NET
       C
 12          INTCPT=.FALSE.
 13          NETLIS=IVAL(JCMNTS,IPLARF)
 14          IXMIT=LSERCH(NETLIS,NETREF,NULL,NULL,NULL)
 15          IF(IXMIT.NE.NULL) RETURN
       C
       C ... PLAYER CAN NOT TRANSMIT ON THIS NET
       C     DETERMINE ALLEGIANCE OF PLAYER'S THAT CAN
       C
```

```
ISN
16            IRCLIS=IVAL(JRCVRS,NETREF)
17            IRCVRF=IFIRST(IRCLIS,LPTR)
18            KOUNT(KAFE)=0
19            KOUNT(KSFE)=0
20     10     IF(IRCVRF.EQ.NULL)  GO TO 20
21            INDEX=IVAL(JALLEG,IRCVRF)
22            KOUNT(INDEX)=KOUNT(INDEX)+1
23            IRCVRF=NEXT(IRCLIS,LPTR)
24            GO TO 10
       C
       C ...  IF KOUNT(ISIDE) IS MAX, NO INTERCEPT
       C
25     20     IF(KOUNT(ISIDE).GE.KOUNT(3-ISIDE)) RETURN
       C
       C ...  PLAYER IS INTERCEPTING
       C
26            INTCPT=.TRUE.
27            RETURN
28             END
```

FSN MODEL - DROBS1 SUBROUTINE

```
ISN
 1          SUBROUTINE DROBS1
     C ...  DROBS1 IS CALLED TO FORM A DUMMY OBJECT DESCRIPTION
     C      RECORD CONTAINING ONLY THOSE ATTRIBUTES THAT A PLAYER
     C      MAY OBSERVE ABOUT AN OBJECT.  IN THE CASE A PLAYER IS
     C      "OBSERVING" HIMSELF  A COPY OF HIS DESCRIPTION IS
     C      RETURNED.
     C
     C      INPUT PARAMETERS: (IN BLANK COMMON)
     C           IPLARF ... POINTS TO DESCRIPTION OF OBSERVER
     C           IOBSRF ... POINTS TO RECORD OF OBJECT SEEN
     C
     C      OUTPUT PARAMETERS: (IN BLANK COMMON)
     C           IDUMRF ... POINTS TO PSEUDO RECORD CREATED
     C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
 8          COMMON /PARS1/
 9          COMMON /PARS2/
10          COMMON /PARS3/
11          COMMON // LMAX,PMIN,IMSG(50),PMSG(50),NMSG,POBSV,LOWMSG
           +     IPLARF,IOBSRF,JOBSRF,IDUMRF,IASMNT(19),IPCPRF
     C
     C ...  FOR SELF OBSERVATION CREATE COPY OF PLAYER DESCRIPTION
     C
12          IF(IPLARF.NE.IOBSRF) GO TO 10
13          IDUMRF=ICOPY(IPLARF)
14          RETURN
     C
     C ...  SET-UP FOR PROCESSING OF NORMAL CALL
     C
15   10     CALL PARSRF(IOBSRF,IDTYP,IRECNO,IFLD)
16          IF(IDTYP.EQ.LVEHIC) GO TO 100
```

```
ISN
17          IF(IDTYP.EQ.LPERSN) GO TO 200
18          IF(IDTYP.EQ.LSENS) GO TO 300
19          IDUMRF=NULL
20          RETURN
      C
      C ... PROCESS OBSERVED VEHICLE
      C
21    100   NFLD=NFLDS(LVEHIC)
22          IDUMRF=NEWREF(LVEHIC,NEWREC(LVEHIC),0)
23          IPTR = IREF1(IDUMRF)
24          DO 150 I=1,NFLD
25               IF(I.EQ.JCONTS .OR. I.EQ.JVEL) GO TO 150
26               ITEM(IPTR+I) = IVAL(I,IOBSRF)
27    150   CONTINUE
28          RETURN
      C
      C ... PROCESS OBSERVED PERSON
      C
29    200   IDUMRF=NEWREF(LPERSN,NEWREC(LPERSN),0)
30          IPTR = IREF1(IDUMRF)
31          DO 250 I=1,JPOSTR
32          IF( I .EQ. JSUPRN) GO TO 250
33          ITEM(IPTR+I) = IVAL(I,IOBSRF)
34    250   CONTINUE
      C
      C ... PROCESS ACTIVITY
      C
35          LISACT=IVAL(JACTIV,IOBSRF)
36          IACTRF=IFIRST(LISACT,LPTACT)
37    260   IF(IACTRF.EQ.NULL) GO TO 280
38          IACTYP=IVAL(JTYPE,IACTRF)
39          IF(IACTYP.LT.KOETNG) GO TO 265
      C
      C ... SUPPRESSION STATUS MAY BE OBSERVED
      C
40          ITEM(IPTR+JSUPRN) = IVAL(JSUPRN,IOBSRF)
```

FSN MODEL - DROBS1 SUBROUTINE

```
ISN
41             GO TO 280
        C
        C ...  ACTIVITY AND EQUIPMENT MAY BE OBSERVED
        C
42      265    ITEM(IPTR+JACTIV) = IACTRF
43             ITEM(IPTR+JWEAPS) = IVAL(JWEAPS,IOBSRF)
44             GO TO 280
45      270    IACTRF=NEXT(LISACT,LPTACT)
46             GO TO 260
47      280    RETURN
        C
        C ...  PROCESS OBSERVED SENSOR
        C
48      300    IDUMRF=NEWREF(LSENS,NEWREC(LSENS),0)
49             IPTR = IREF1(IDUMRF)
50             ITEM(IPTR+JTYPE) = IVAL(JTYPE,IOBSRF)
51             ITEM(IPTR+JPSTAT) = IVAL(JPSTAT,IOBSRF)
52             ITEM(IPTR+JLOCN)  = IVAL(JLOCN,IOBSRF)
53             RETURN
54             END
```

FSN MODEL - DROBS2 SUBROUTINE

```
ISN
 1           SUBROUTINE DROBS2(ISENSR)
       C ... DECISION RULE CALLED BY COMOBS TO FORM A DUMMY
       C     OBJECT DESCRIPTION CONTAINING ONLY THOSE FEATURES OF
       C     AN OBJECT THAT COULD BE DISCERNED BASED ON THE TYPE
       C     OF SENSOR REPORT.
       C
       C ... INPUT PARAMETERS: (OR IN BLANK COMMON)
       C          ISENSR ... SENSOR  REPORT TYPE
       C          IPLARF ...POINTS TO RECORD OF OBSERVER
       C          IOBSRF ... POINTS TO RECORD OF OBJECT TRIPPING SENSOR
       C ... OUTPUT PARAMETERS: (IN BLANK COMMON)
       C          IDUMRF ... POINTS TO PSEUDO RECORD CREATED
       C
 2           COMMON /STATEV/
 3           DIMENSION ITEM(41900),DITEM(41900)
 4           EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5           COMMON /PARS/
 6           EQUIVALENCE (FNULL,NULL), (FFAIL,FAIL)
 7           REAL*8 DTPNAM,FLDNAM,FORMOT
 8           COMMON /PARS1/
 9           COMMON /PARS2/
10           COMMON // LMAX,PMIN,IMSG(50),PMSG(50),NMSG,POBSV,LOWMSG
            +    IPLARF,IOBSRF,JOBSRF,IDUMRF,IASMNT(19),IPCPRF
       C
       C ... BRANCH ON SENSOR REPORT TYPE.  IF INVALID
       C     RETURN NULL VALUE IN IDUMRF
       C
11           IDUMRF=NULL
12           CALL PARSRF(IOBSRF,IDTYP,IRECNO,IFLD)
13           IF(ISENSR.EQ.KBINFL .OR. ISENSR.EQ.KBINRC) GO TO 100
14           IF(ISENSR.EQ.KPICFL .OR. ISENSR.EQ.KPICRC) GO TO 200
15           RETURN
       C
       C ... CURRENTLY BINARY SENSOR CAN OBSERVE LOCATION ONLY
       C
16     100   IDUMRF=NEWREF(IDTYP,NEWREC(IDTYP),0)
```

FSN MODEL - DROBS2 SUBROUTINE

```
ISN
17            I = IREF(JLOCN,IDUMRF)
18            ITEM(I) = IVAL(JLOCN,IOBSRF)
19            RETURN
      C
      C ... CURRENTLY PICTURE SENSOR TREATED LIKE NORMAL OBSERVATION
      C
20    200     CALL DROBS1
21    300     RETURN
22            END
```

```
ISN
 1              SUBROUTINE DROBS3
        C ...   DECISION RULE CALLED BY COMOBS TO DETERMINE OBSERVATION
        C       PRIORITY BASED ON THE OBJECT BEING OBSERVED.
        C ...   INPUT PARAMETERS: (IN BLANK COMMON)
        C            IPLARF ...RECORD REFERENCE FOR OBSERVER DESCRIPTION
        C            IOBSRF ... RECORD REFERENCE FOR OBJECT TO BE OBSERVED
        C ...   OUTPUT PARAMETERS: (IN BLANK COMMON)
        C            POBSV  ... OBSERVATION PRIORITY
        C
 2              COMMON /STATEV/
 3              DIMENSION ITEM(41900),DITEM(41900)
 4              EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5              COMMON /PARS/
 6              EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7              REAL*8 DTPNAM,FLDNAM,FORMOT
 8              COMMON /PARS1/
 9              COMMON /PARS3/
10              COMMON /DATAV/
11              DIMENSION ACTTIM(25)
12              EQUIVALENCE (ACTTIM(1),ACTRAT(1))
13              COMMON //  LMAX,PMIN,IMSG(50),PMSG(50),NMSG,POBSV,LOWMSG
              +     IPLARF,IOBSRF,JOBSRF,IDUMRF,IASMNT(19),IPCPRF
        C
        C ...   UNDER CURRENT RULE ONLY VEHICLES, PERSONS AND
        C       SENSORS MAY BE OBSERVED.
        C
14              POBSV=0.0
15              CALL PARSRF(IOBSRF,IDTYP,IRECNO,IDUM)
16              IF(IDTYP.EQ.LVEHIC) GO TO 100
17              IF(IDTYP.EQ.LPERSN) GO TO 200
18              IF(IDTYP.EQ.LSENS) GO TO 300
19              RETURN
        C
        C ...   OBJECT IS VEHICLE
        C
20      100     POBSV=POBVEH(ISIDE,IVAL(JOWNER,IOBSRF))
```

FSN MODEL - DROBS3 SUBROUTINE

```
ISN
21              RETURN
        C
        C ... OBJECT IS PERSON
        C
22      200     IACTRF=IFIRST(IVAL(JACTIV,IOBSRF),LPTR)
23              IF(IACTRF.EQ.NULL) RETURN
24              IACT=IVAL(JTYPE,IACTRF)
25              IALG=IVAL(JALLEG,IOBSRF)
26              POBSV=POBPSN(ISIDE,IALG,IACT)
27              RETURN
        C
        C ... OBJECT IS SENSOR
        C
28      300     POBSV=POBSEN(ISIDE)
29              RETURN
30              END
```

```
ISN
 1          SUBROUTINE DROBS4(P,IPLARF,IMSGRF)
     C      THIS SUBROUTINE IS CALLED BY COMPER TO DETERMINE
     C      PRIORITY ASSOCIATED WITH A PLAYER PROCESSING A
     C      PARTICULAR MESSAGE HE HAS RECEIVED.
     C ...  INPUT PARAMETERS:
     C         IPLARF ... REF TO PLAYER PROCESSING MESSAGE
     C         IMSGRF ... REF TO MESSAGE
     C ...  OUTPUT PARAMETERS
     C         P      ... ASSOCIATED PROCESSING PRIORITY
     C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
 8          COMMON /PARS1/
 9          COMMON /PARS3/
10          COMMON /DATAV/
11          DIMENSION ACTTIM(25)
12          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
     C
     C ...  GET ATTRIBUTE PRIORITY
     C
13          P=0.0
14          IOBSRF=IVAL(JSUBJ,IMSGRF)
15          CALL PARSRF(IOBSRF,IDTYP,IRECNO,IFLD)
16          IATTR=IVAL(JATTR,IMSGRF)
17          INDEX=0
     C
     C ...  COMPUTE INDEX=FEATURES OF OBJECTS
     C
18          IFEA=IDTYP-LVEHIC+1
19          GO TO (30,20,10) ,IFEA
20    10    INDEX=INDEX+NFLDS(LPERSN)
```

FSN MODEL - DHOBS4 SUBROUTINE

```
ISN
21   20     INDEX=INDEX+NFLDS(LVEHIC)
22   30     INDEX=INDEX+IATTR
23          PATTR=POBATT(INDEX)
24          IF(PATTR.LE.0.0) RETURN
     C
     C ... GET PRIORITY ASSOCIATED WITH OBJECT
     C
25          GO TO(40,50,60),IFEA
     C
     C ... OBJECT IS VEHICLE
     C
26   40     P=PATTR*POBVEH(ISIDE,IVAL(JOWNER,IOBSRF))
27          RETURN
     C
     C ... OBJECT IS PERSON
     C
28   50     IACTRF=IFIRST(IVAL(JACTIV,IOBSRF),LPTR)
29          IF(IACTRF.EQ.NULL) RETURN
30          IACT=IVAL(JTYPE,IACTRF)
31          IALG=IVAL(JALLEG,IOBSRF)
32          P=PATTR*POBPSN(ISIDE,IACT,IALG)
33          RETURN
     C
     C ... OBJECT IS SENSOR
     C
34   60     P=PATTR*POBSEN(ISIDE)
35          RETURN
36          END
```

FSN MODEL - EFFTIM FUNCTION

```
ISN
 1          FUNCTION EFFTIM(IPLARF,ISOU,ISIN,IACSUB)
      C
      C
      C  -- THE PURPOSE OF THIS FUNCTION IS TO
      C           1. EVALUATE A LINK ACCORDING TO THE PERCIEVED
      C                DANGER AND ADJUST THE TRAVEL TIME.
      C
      C   -- INPUT PARAMTERS
      C
      C           IPLARF -- PLAYER REFERENCE
      C            ISOU   -  SOURCE NODE OF LINK
      C            ISIN   -- SINK NODE OF LINK
      C            IACTSUB -- ACTIVITY SUB-TYPE
      C
      C  -- OUTPUT
      C
      C           THIS FUNCTION RETURNS THE EFFECTIVE TIME NEEDED
      C            TO TRAVERSE A GIVEN LINK
      C
      C
      C  --   PROCEDURE
      C
      C        1. DETERMINE THE TRAVEL TIME FROM ISOU TO ISIN
      C
      C        2. CALCULATE THE PENALITY
      C              PENALTY --= THE SUM OF PERCIEVED DANGERS
      C
      C        3. EFFTIM=  TRAVEL TIME*(1+PENALTY)
      C
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
```

FSN MODEL - EFFTIM FUNCTION

```
ISN
 7           REAL*8 DTPNAM,FLDNAM,FORMOT
 8           COMMON /PARS1/
 9           COMMON /PARS2/
10           COMMON /PARS3/
11           COMMON /DATAV/
12           DIMENSION ACTTIM(25)
13           EQUIVALENCE (ACTTIM(1),ACTRAT(1))
      C
      C  -- FIND TRAVEL TIME
      C
14           TIM=TRAVEL(IPLARF,ISOU,ISIN,IACSUB,ISUM)
      C
      C  -- CALCULATE PENALTY
      C
      C        IF PERCIEVED THREATS LOCATION HAS LINE OF
      C          SIGHT WITH ISIN THEN ADD DANGER FACTOR
      C          ADJUST DANGER FACTOR FOR EACH THREAT BY DANGER
      C          OF WEAPON PERCIEVED TO BE CARRYING
      C
15           IALL=IVAL(JALLEG,IPLARF)
16           IPERLT=IVAL(JPRCPS,IPLARF)
17           DNGER=0.0
18           IPERRF=IFIRST(IPERLT,KA)
19         5     IF(IPERRF .EQ. NULL) GO TO 50
      C
      C  -- FIND REFERENCE TO PERCEPTION INFORMATION
      C
20           IVRF=IVAL(JVIEW,IPERRF)
21                CALL PARSRF(IVRF,IDY,IDUM,IDUM)
22                IF(IDY .EQ. LFORCE) GO TO 30
      C
      C  -- SET SECRECY PLAN
      C
23           ISEC=ISECPL(IALL)
      C
      C  -- DETERMINE DETECTOR TYPE
```

```
ISN
     C
24              IF(IDY .EQ. LSENS) GO TO 20
25           IF(IDY .EQ. LPERSN) GO TO 7
     C
     C   -- FIND ALLEGIENCE OF PERCEPTION
     C
26           IF(IVAL(JOWNER,IVRF) .EQ. NULL) GO TO 30
27           IF(IVAL(JOWNER,IVRF) .EQ. IALL) GO TO 30
28           GO TO 6
29         7 IF(IVAL(JALLEG,IVRF) .EQ. NULL) GO TO 30
30           IF(IVAL(JALLEG,IVRF) .EQ. IALL) GO TO 30
     C
     C   -- DETERMINE LOCATION
     C
31         6 IF(IVAL(JLOCN,IVRF) .EQ. NULL) GO TO 30
32           IVLOC=IVAL(JLOCN,IVRF)
     C
     C   -- CHECK FOR LINE OF SIGHT
     C
33           ICOD=LOS(ISIN,IVLOC)
34                IF(ICOD .EQ. 0) GO TO 30
35           IF(IDY .EQ. LVEHIC)  GO TO 15
     C
     C   -- FIND MOST DANGEROUS WEAPON FOR PERSON
     C
36           IDETT=KDETPN
37           IVET=NVEHTP+NPSNTP
38           IFELD=NWEPTP+1
39           DNG=DNGWEP(IVET,IFELD)
40           DT=DIST(ISIN,IVRF)
41           IWPLT=IVAL(JWEAPS,IVRF)
42           IWPN=IFIRST(IWPLT,KC)
43         8     IF(IWPN .EQ. NULL) GO TO 12
     C
     C   -- IGNORE EQUIPMENT
     C
```

FSN MODEL - EFFTIM FUNCTION

```
ISN
44          CALL PARSRF(IWPN,IDY,IDUM,IDUM)
45               IF(IDY .NE. LWEAP) GO TO 10
46          IWPNTY=IVAL(JTYPE,IWPN)
47               IF(DT .GT. RNGMAX(IWPNTY)) GO TO 10
48               IF(DNGWEP(IVET,IWPNTY) .LE. DNG) GO TO 10
49          DNG=DNGWEP(IVET,IWPNTY)
50       10 IWPN=NEXT(IWPLT,KC)
51          GO TO 8
      C
      C  -- ADD TO DANGER
      C
52       12 DNGER=DNGER+DNGDET(IDETT,ISEC)*DNG
53          GO TO 30
      C
      C  -- FIND MOST DANGEROUS WEAPON ON VEHICLE
      C
54       15 IDETT=KDETVE
55          IVET=IVAL(JTYPE,IVRF)
56          IFELD=KNVGAS+1
57          DNG=DNGWEP(IVET,IFELD)
58          IWLT=IVAL(JCONTS,KIVRF)
59          IWPN=IFIRST(IWLT,KD)
60       16      IF(IWPN .EQ. NULL) GO TO 12
      C
      C  -- IGNORE PERSON AND EQUIPMENT
      C
61            CALL PARSRF(IWPN,IDY,IDUM,IDUM)
62               IF(IDY .NE. LWEAP) GO TO 18
63          IWPNTY=IVAL(JTYPE,IWPN)
64               IF(DNGWEP(IVET,IWPNTY) .LE. DNG) GO TO 18
65          DNG=DNGWEP(IVET,IWPNTY)
66       18 IWPN=NEXT(IWLT,KD)
67          GO TO 16
      C
      C  -- SENSOR DETECTION
      C
```

FSN MODEL - EFFTIM FUNCTION

```
ISN
     C ... SENSORS SHOULD PROBABLY BE IGNORED FOR SFE MEMBERS...
68      20 IF(IALL .EQ. KSFE) GO TO 30
69         ITEMP=IVAL(JTYPE,IVRF)
70              IF(ITEMP .EQ. NULL) GO TO 30
71         IDETT=ITEMP+KDETPN
     C
     C ... SEE IF IN COVERAGE FIELD
     C
72         ISNREF = IVAL(JID,IPERRF)
73         ICOVL  = IVAL(JCOVRG,ISNREF)
74         ION = LSERCH(ICOVL,ISIN,NULL,NULL,NULL)
75         IF(ION .EQ. NULL) GO TO 30
76         DNGER=DNGER+DNGDET(IDETT,ISEC)
     C
77      30 IPERRF=NEXT(IPERLT,KA)
78         GO TO 5
     C
     C
     C
79      50 EFFTIM=TIM*(1.0+DNGER)
     C
80         RETURN
81         END
```

FSN MODEL - ESCAPE SUBROUTINE

```
ISN
 1          SUBROUTINE ESCAPE(IEXITS,LEADER,IFORCE)
      C
      C     ROUTINE FOR THE LEADER TO SEND INSTRUCTIONS TO MEMBERS OF HIS
      C  FORCE TO ESCAPE FROM THE SITE.
      C
      C  INPUT PARAMETERS:
      C     IEXITS   A NODE OR LIST OF POSSIBLE NODES AT WHICH TO EXIT FROM
      C              THE SITE.  IF A LIST IS PASSED, THE PLAYER IS TO CHOOSE
      C              HIS OWN EXIT POINT FROM THE ALTERNATIVES SPECIFIED.
      C     LEADER   A REFERENCE TO THE LEADER GIVING ORDERS
      C     IFORCE   A LIST OF PERSONS WHOM THE LEADER WISHES TO INSTRUCT
      C              TO EXIT THE SITE.
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
 8          COMMON /PARS1/
 9          COMMON /PARS2/
10          COMMON /PARS3/
      C
      C  ITERATE OVER PLAYERS OF INTEREST
11          IPERSN = IFIRST(IFORCE,KP)
12    10       IF (IPERSN .EQ. NULL) RETURN
      C  GET FIRST POSSIBLE EXIT LOCATION
13             IEXIT = IFIRST(IEXITS,KE)
14             IF (IEXIT .EQ. NULL) RETURN
      C  BRANCH IF THERE IS JUST ONE EXIT SPECIFIED
15             IF (LISTND(JNXT,KE) .LE. 0) GO TO 20
      C  OTHERWISE SELECT THE NEAREST EXIT TO THE PLAYER
16             DISTMN = 99999.
17    15       D = DIST(IPERSN,IEXIT)
18             IF (D .GT. DISTMN) GO TO 18
```

```
ISN
19                DISTMN = D
20                IX = IEXIT
      C  TRY NEXT EXIT
21    18        IEXIT = NEXT(IEXITS,KE)
22              IF (IEXIT .NE. NULL) GO TO 15
23              IEXIT = IX
      C
      C  INSTRUCT PERSON TO MOVE TO EXIT
24    20        IACT = NEWRC6(LACTN,KMOVNG,IEXIT,NULL,NULL,NULL,IPERSN)
25              IMSG = NEWRC5(LMESS,LEADER,IPERSN,JPLANS,TMIN,IACT)
26              CALL COMMO(LEADER,IPERSN,IMSG)
      C  GET NEXT PLAYER
27              IPERSN = NEXT(IFORCE,KP)
28              GO TO 10
29            END
```

FSN MODEL - FASMNT SUBROUTINE

```
ISN
 1          SUBROUTINE FASMNT(IPLARF,ITRG,IPHS,IRF)
       C
       C  -- THE PURPOSE OF THE SUBROUTINE IS TO :
       C        1.  CREATE AN ASSESSMENT OF THE TARGETS
       C              PHYSICAL STATUS
       C
       C  -- INPUT PARAMETERS
       C
       C
       C       IPLARF  -- PLAYER REFERENCE
       C        ITRG --- TARGET REFERENCE
       C        IPHS  -- RESULTS OF FIRING
       C
       C
       C  -- OUTPUT VARIABLES
       C
       C       IRF   - REFERENCE TO MESSAGE RECORD CREATED
       C
       C  -- PROCEDURE
       C
       C       THE RESULTS OF FIRING ARE STORED IN
       C         MESSAGE FORMAT AND ARE ADDED
       C           TO THE LIST LASMNT
       C
       C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
 8          COMMON /PARS1/
 9          COMMON /PARS3/
10          COMMON /DATAV/
11          DIMENSION ACTTIM(25)
```

```
ISN
12          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
13          COMMON /RECREF/
14          DIMENSION RECRFQ(140)
15          EQUIVALENCE (RECRFQ(1),IGOALS)
     C
     C      CALL HUMAN FACTORS
     C       CALL HFAC3
     C
     C   -- TEST IS RESULTS OF FIRE WAS A MISS
     C
16          IF (IPHS .EQ. 0) IPHS=IVAL(JPSTAT,ITRG)
     C
     C   -- DETERMINE IF IPLARF HAS MADE AN ASSESSMENT OF ITRG
     C
17          IRF=IFIRST(LASMNT,KA)
18        5      IF(IRF .EQ. NULL) GO TO 30
     C
19               IF(IVAL(JSOURC,IRF) .NE. IPLARF) GO TO 20
20               IF(IVAL(JSUBJ,IRF) .NE. ITRG) GO TO 20
     C
     C   --MESSAGE EXISTS
     C     TEST IF CONTENTS DIFFERENT
     C
21               IF(IVAL(JCONT,IRF) .EQ. IPHS) GO TO 50
     C
     C   -- ADJUST CONTENTS
     C
22          IPTR=IREF1(IRF)
23          ITEM(JCONT+IPTR)=IPHS
24          GO TO 50
     C
     C   -- NEXT ASSESSMENT
     C
25       20 IRF=NEXT(LASMNT,KA)
26               GO TO 5
     C
```

FSN MODEL - FASMNT SUBROUTINE

```
ISN
     C--  NEW ASSESSMENT
     C  -- GENERATE NEW MESSAGE
     C
27       30 TTIM = TMIN + (DTSEC - VAL(JTREQ,IPLARF)) / 60.
28          IRF = NEWRC5(LMESS,IPLARF,ITRG,JPSTAT,TTIM,IPHS)
     C
     C  -- ADD RECORD TO LASMNT
     C
29          CALL CHGLST(IRF,1,7,0)
30          LASMNT=ISTACK(IRF,LASMNT)
     C
31       50 CONTINUE
32          RETURN
33          END
```

```
ISN
 1          SUBROUTINE FDESIR(IPLARF,ITRG,ICODE,TMAX,FTHRES)
      C
      C
      C  --  THE PURPOSE OF THIS SUBROUTINE IS TO:
      C           1.  EVALUATE THE DESIRABILITY FOR A PLAYER TO
      C                FIRE AT A TARGET.
      C           2.  IF MORE THAN ONE POTENTIAL TARGET, EVALUATE
      C                ALL MEMBERS OF THE LIST AND RETURN THE TARGET
      C                WITH THE LARGEST DESIRABILITY.
      C
      C
      C  --  INPUT PARAMETERS
      C
      C      IPLARF  --  PLAYER REFERENCE FOR PLAYER TO FIRE
      C
      C
      C      ITRG   --   PLAYER REFEHNCE OR LIST REFERENCE
      C                 OF POTENTIAL TARGETS
      C
      C
      C  --  OUTPUT VARIABLES
      C
      C
      C      ICODE  --  PLAYER REFERENCE,  TARGET SELECTED AS MOST
      C                  DESIRABLE.
      C
      C
      C      TMAX  -- VALUE OF DESIRABILITY TO BE COMPARED TO FIRE
      C                 THRESHOLD.
      C
      C
      C  --  PROCEDURE
      C          1. SEARCH TARGET LIST
      C          2. IDENTIFY EACH CASE SUBSET THAT IS APPROPRIATE
      C          3. AND, ADD THE VALUE TO THE DESIRABILITY
```

FSN MODEL - FDESIR SUBROUTINE

```
ISN
       C
  2          COMMON /STATEV/
  3          DIMENSION ITEM(41900),DITEM(41900)
  4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
  5          COMMON /PARS/
  6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  7          REAL*8 DTPNAM,FLDNAM,FORMOT
  8          COMMON /PARS1/
  9          COMMON /PARS2/
 10          COMMON /PARS3/
 11          COMMON /DATAV/
 12          DIMENSION ACTTIM(25)
 13          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
 14          COMMON /RECREF/
 15          DIMENSION RECRFQ(140)
 16          EQUIVALENCE (RECRFQ(1),IGOALS)
 17          COMMON /NEW/
       C
       C
 18          TDMAX=0.
 19          IDCOD=NULL
 20          ICODE=NULL
 21          TMAX=0.
 22          IF(EVALN(30) .LE. 0) EVALN(30)=1.0
       C
       C  --  TEST FOR RESTRICTED FIRING
       C
 23          IF(IFCOND(ISIDE) .GE. 3) GO TO 7
       C
       C  --  TEST FOR DO NOT FIRE
       C
 24          IF(IFCOND(ISIDE) .LT. 2) GO TO 120
       C
       C  -- TEST FOR FIRE ONLY WHEN FIRED UPON
       C
 25          CALL DETFIR(IPLARF,ITTR)
```

```
ISN
26            IF(ITTR .EQ. NULL) GO TO 120
       C
       C  -- SEARCH TARGET LIST
       C
27          7 ITAR=IFIRST(ITRG,KA)
28         10      IF(ITAR .EQ. NULL) GO TO 120
       C
       C  -- TEST PHYSICAL STATUS OF TARGET
       C
29            IF(IVAL(JPSTAT,ITAR) .LE. KCAPTR) GO TO 110
       C
       C  -- DETERMINE IF TARGET WITHIN RANGE OF ANY WEAPON
       C
30            CALL NWPNS(IPLARF,ITAR,IWPNRF,IWPN)
31                 IF(IWPN .EQ. 0) GO TO 110
       C
       C  --  SEARCH PERCEPTIONS TO FIND REFERENCE TO TARGET
       C
32            IPERLT=IVAL(JPRCPS,IPLARF)
33            IPER=IFIRST(IPERLT,KB)
34         30      IF(IPER .EQ. NULL) GO TO 110
35                 IF(IVAL(JID,IPER) .EQ. ITAR) GO TO 50
36         35 IPER=NEXT(IPERLT,KB)
37            GO TO 30
       C
38         50 IPERRF=IVAL(JVIEW,IPER)
39                 CALL PARSRF(IPERRF,IDYY,IRRN,IDDUM)
40                 IF(IDYY .EQ. LFORCE) GO TO 35
41            TEMP=0.0
       C
       C  -- CASE SUBSET 1
       C       TARGET FIRING DIRECTION
       C
       C   FIND PERCIEVED ACTIVITY OF TARGET
       C
42            IACRF=IVAL(JACTIV,IPERRF)
```

FSN MODEL - FDESIR SUBROUTINE

```
ISN
43            IACT=IFIRST(IACRF,KC)
44                 IF(IACT .EQ. NULL) GO TO 57
45            IF(IVAL(JTYPE,IACT) .NE. KFIRNG) GO TO 55
46            IF(IVAL(JPAR1,IACT) .NE. IPLARF) GO TO 53
          C
          C   PERCIEVED TO BE TARGET
          C
47            TEMP=TEMP+EVALN(21)
48            GO TO 60
          C
          C     FIRING BUT NOT TARGET
          C
49         53 TEMP=TEMP+EVALN(22)
50            GO TO 65
          C
          C    NOT FIRING
          C
51         55 TEMP=TEMP+EVALN(23)
52            GO TO 60
          C
          C   NO ACTIVITY PERCIEVED
          C
53         57 TEMP=TEMP+EVALN(23)
54            GO TO 65
          C
          C   -- CASE SUBSET 2
          C         TARGET PERCIEVED TO BE MOVING
          C
          C    TEST ACTIVITY FOR MOVING
          C
55         60 IF(IVAL(JTYPE,IACT) .NE. KMOVNG) GO TO 65
56            TEMP=TEMP+EVALN(25)
57            GO TO 70
          C
          C   NOT MOVING
          C
```

```
ISN
58        65 TEMP=TEMP+EVALN(24)
       C
       C  -- CASE SUBSET 3
       C       COVER OF PLAYER
       C
59        70 CALL DIREC(ITAR,IPLARF,THE1,PHE1)
60           IF(COVR(IPLARF,THE1) .LE. 0.1) GO TO 75
61           TEMP=TEMP+EVALN(26)
62           GO TO 80
       C
       C    NO COVER AVAILABLE
       C
63        75 TEMP=TEMP+EVALN(27)
       C
       C  -- CASE SUBSET 4
       C       COVER OF TARGET
       C
64        80 CALL DIREC(IPLARF,ITAR,THE2,PHE2)
65           IF(COVR(ITAR,THE2) .LE. 0.1) GO TO 85
       C
       C  COVER AVAILABLE
       C
66           TEMP=TEMP+EVALN(31)
67           GO TO 90
       C
       C  NO COVER
       C
68        85 TEMP=TEMP+EVALN(32)
       C
       C  -- CASE SUBSET 5
       C      SENSOR TARGET
       C
69        90 CALL PARSHF(ITAR,IDY,IRR,IDU)
70           IF(IDY .EQ. LSENS) GO TO 95
       C
       C  NOT A SENSOR
```

```
ISN
      C
71            TEMP=TEMP+EVALN(29)
72            GO TO 100
      C
      C   SENSOR
      C
73         95 TEMP=TEMP+EVALN(28)
      C
      C
74        100 IF(TEMP/EVALN(30) .LE. TMAX) GO TO 110
      C
      C   TARGET DESIRABLE
      C    TEST IF ANYONE ELSE FIRING AT THE TARGET
      C
75            JL=JGARDS
76            IF(ISIDE .EQ. KAFE) JL=JADVRS
77            IPLT=IVAL(JL,ISITE)
      C
78            ICOLE=IFIRST(IPLT,KB)
79        101    IF(ICOLE .EQ. IPLARF) GO TO 105
      C
      C   TEST PLANS OF PLAYER
      C
80            IPLNS=IVAL(JPLANS,ICOLE)
81            IPLN=IFIRST(IPLNS,KZ)
82            IF(IPLN .EQ. NULL) GO TO 102
83            IF(IVAL(JTYPE,IPLN) .NE. KFIRNG) GO TO 102
      C
      C   TEST TARGET OF FIRING PLAN
      C
84            IF(IVAL(JPAR1,IPLN) .NE. ITAR) GO TO 102
      C
      C   FREINDLY HAS DECIDED TO FIRE AT TARGET
      C    SAVE FOR LATTER PROCESSING
      C
85            IF(TEMP/EVALN(30) .LE. TDMAX) GO TO 102
```

```
ISN
86            TDMAX=TEMP/EVALN(30)
87            IDCOD=ITAR
88            GO TO 110
      C
89        102 ICODE=NEXT(IPLT,KB)
90            GO TO 101
      C
91        105 TMAX=TEMP/EVALN(30)
92            ICODE=ITAR
      C
93        110 ITAR=NEXT(ITRG,KA)
94            GO TO 10
      C
      C  TEST IF TARGET FOUND
      C
95        120 IF(ICODE .EQ. NULL) GO TO 121
      C
      C  TEST IF TARGET DESIRABLE
      C
96            IF(TMAX .GE. FTHRES) GO TO 125
      C
      C  TARGET NOT FOUND
      C
97        121 IF(IDCOD .EQ. NULL) GO TO 125
98            TMAX=TDMAX
99            ICODE=IDCOD
      C
      C  TARGET FOUND
      C
100       125 IF(TMAX .GT. 1.0) TMAX=1.0
101           RETURN
102           END
```

FSN MODEL - GENOBS SUBROUTINE

```
ISN
 1          SUBROUTINE GENOBS
      C ... THIS SUBROUTINE IS CALLED TO COMPARE A PERSON'S PERCEPTION
      C     OF AN OBJECT WITH A DESCRIPTION OF AN OBJECT CONTAINING ONLY
      C     THOSE ATTRIBUTES HE COULD OBSERVE.  IF A DIFFERENCE EXISTS, OR
      C     THE PERSON HAS NO PERCEPTION OF THE OBJECT, A MESSAGE IS CREATED
      C     FOR EACH ATTRIBUTE THAT IS DIFFERENT.  THE MESSAGES AND THEIR
      C     ASSOCIATED OBSERVATION PRIORITIES ARE ADDED TO THE ARRAYS
      C     IMSG AND PMSG.  LMAX DETERMINES HOW MANY MESSAGES CAN BE
      C     GENERATED BY A PARTICULAR PLAYER
      C
      C ... INPUT PARAMETERS: (IN BLANK COMMON)
      C          IPCPRF ... REFERENCE TO PERCEPTION RECORD, OR NULL
      C          JOBSRF ... REFERENCE TO PERSON'S VIEW OF OBJECT
      C          IDUMRF ... REFERENCE TO PSEUDO OBJECT DESCRIPTION
      C          IPLABF ... REFERENCE TO OBSERVERS DESCRIPTION RECORD
      C          IOBSRF ... REFERENCE TO TRUE OBJECT DESCRIPTION
      C
      C ... OUTPUT PARAMETERS: (IN BLANK COMMON)
      C          IMSG   ... ARRAY OF MESSAGE POINTERS
      C          PMSG   ... ARRAY OF ASSOCIATED PRIORITY VALUES
      C          NMSG   ... NUMBER OF ENTRIES IN IMSG
      C          LOWMSG .. INDEX OF LOWEST PRIORITY MESSAGE IN IMSG
      C          PMIN   ... PRIORITY OF LOWEST PRIORITY MSG IN IMSG
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
 8          COMMON /PARS1/
 9          COMMON /PARS3/
10          COMMON /DATAV/
11          DIMENSION ACTTIM(25)
12          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
```

```
ISN
13           COMMON /RECREF/
14           DIMENSION RECRFQ(140)
15           EQUIVALENCE (RECRFQ(1),IGOALS)
16           COMMON // LMAX,PMIN,IMSG(50),NMSG,POBSV,LOWMSG
            +    IPLARF,IOBSRF,JOBSRF,IDUMRF,IASMNT(19),IPCPRF
17           DIMENSION INSTAT(2,5)
18           EQUIVALENCE (INSTAT(1,1),IOBSV(41))
19           KINSDR = 4
20           KINSDR = 5
      C
      C ...UNLESS OBJECT IS VEHICLE,PERSON OR SENSOR CREATE
      C      NO OBSERVATIONS
      C
21           CALL PARSRF(IDUMRF,IDTYP,IRECNO,IFLD)
22           IF(IDTYP.EQ.LVEHIC) GO TO 100
23           IF(IDTYP.EQ.LPERSN) GO TO 200
24           IF(IDTYP.EQ.LSENS) GO TO 300
25           RETURN
      C
      C ... SET UP TO PROCESS VEHICLE
      C
26    100    NFEPTR=0
27           NSUBR=1
28           GO TO 400
      C
      C ... SET UP TO PROCESS PERSON
      C
29    200    NFEPTR=NFLDS(LVEHIC)
30           NSUBR=2
      C
      C ... MAKE CHECK FOR SFE OBSERVING INSIDER
      C
31           IF(IVAL(JALLEG,IPLARF) .NE. KSFE) GO TO 400
32           IF(IVAL(JTYPE,IOBSRF) .NE. KINSDR) GO TO 400
      C
      C ... SFE OBSERVING INSIDER, FIND INSIDER NUMBER
      C
```

FSN MODEL - GENOBS SUBROUTINE

```
            DO 210 I=1,NINSDR
               IF(INSTAT(1,I) .NE. IOBSRF) GO TO 210
               J=I
               GO TO 220
        210 CONTINUE
            GO TO 400
      C
      C ... IF INSIDER HAS NOT PERFORMED TRIGGER ACTION THIS
      C     CYCLE HE IS OBSERVED AS SFE
      C     NEGATIVE TRIGGER MEANS ALREADY OBSERVED
      C
        220 IF(INSTAT(2,J)) 400,230,240
      C
      C ... NO TRIGGER ACTION
      C
        230 IPTR = IREF1(IDUMRF)
            ITEM(IPTR + JALLEG) = KSFE
            GO TO 400
      C
      C ... NOT PREVIOUSLY SEEN, MARK AS SEEN
      C
        240 INSTAT(2,J) = -INSTAT(2,J)
            GO TO 400
      C
      C ... SET UP TO PROCESS SENSOR
      C
      300   NFEPTR=NFLDS(LVEHIC) + NFLDS(LPERSN)
            NSUBR=3
      C
      C ... SET UP POINTERS
      C
      400   NF=NFLDS(IDTYP)
            NBASE=IREF1(NEWREF(IDTYP,NRECS(IDTYP),0))
            IPTR=IREF1(IDUMRF)
            IF(IPCPRF.NE.NULL) JPTR=IREF1(JOBSRF)
      C
```

```
ISN
      C ... START FIELD COMPARISON LOOP
      C
51          DO 500 IFLD=1,NF
      C
      C ... SKIP FIELD IF NO INFO IN IDUMBF
      C
52                IF(ITEM(IPTR+IFLD).EQ.NULL) GO TO 500
      C
      C ...       SKIP FIELD IF PRIORITY IS 0.0
      C
53                P=POBATT(NFEPTR+IFLD)*POBSV
54                IF(P.LE.0.0) GO TO 500
      C
      C ...       IF LIST FULL AND P TOO LOW, IGNORE FIELD
      C
55                IF(NMSG.EQ.LMAX. AND. P.LE.PMIN) GO TO 500
      C
      C ...       IF PLAYER HAS NO PERCEPTION, GO TO CREATE  OBS
      C
56                ITYP=ITEM(NBASE+IFLD)
57                IF(IPCPBF.EQ.NULL) GO TO 450
58                IF(ITYP.GT.2) GO TO 420
      C
      C ...       ATTRIBUTE IS SCALAR, SKIP FIELD IF EQUAL
      C
59                IF(ITEM(IPTR+IFLD).EQ.ITEM(JPTR+IFLD)) GO TO 500
60                GO TO 450
      C
      C ...       ATTRIBUTE IS REFERENCE, CALL APPROPRIATE
      C           FUNCTION AND SKIP FIELD IF EQUAL
      C
61    420         GO TO (421,422,423),NSUBR
      C
      C ...       OBJECT IS VEHICLE
      C
62    421         IF(ICMPVE(IFLD,JPTR,IPTR) .EQ. IFAIL) GO TO 450
```

FSN MODEL - GENOBS SUBROUTINE

```
ISN
63                  GO TO 500
     C
     C ...          OBJECT IS PERSON
     C
64   422            IF(ICMPPN(IFLD,JPTR,IPTR).EQ.IFAIL) GO TO 450
65                  GO TO 500
     C
     C ...          OBJECT IS SENSOR
     C
66   423            IF(ICMPSN(IFLD,JPTR,IPTR).EQ.IFAIL) GO TO 450
67                  GO TO 500
     C
     C ...          NEW INFORMATION, CREATE A MESSAGE
     C
68   450            IF (ITYP .LE. 2) ICONT = IVAL(IFLD,IDUMRF)
69                  IF (ITYP .GT. 2) ICONT = ICOPY(ITEM(IPTR+IFLD))
70                  IMSGRF = NEWRC5(LMESS,IPLARF,IOBSRF,IFLD,TMIN,ICONT)
     C
     C ... MERGE IMSGRF INTO IMSG
     C
71   470            CALL ADDVAL(IMSGRF,P,IMSG,PMSG,NMSG,LOWMSG,PMIN,LMAX)
     C
     C ... STACK IMSGRF ON LOCAL(2) TO PROTECT FROM GARBAGE COLLECTOR
     C
72                  LOCAL(2) = ISTACK(IMSGRF,LOCAL(2))
     C
     C ... END COMPARISON LOOP
     C
73   500    CONTINUE
74          RETURN
75          END
```

FSN MODEL - ICANOB FUNCTION

```
ISN
 1            FUNCTION ICANOB(IPLARF)
      C ...   FUNCTION CALLED BY COMOBS TO DETERMINE IF PLAYER
      C       IS CAPABLE OF MAKING AND REPORTING OBSERVATIONS.  VALUE
      C       OF NULL IS RETURNED IF PLAYER CAN NOT OBSERVE, IOK
      C       OTHERWISE
      C       INPUT PARAMETER:
      C            IPLARF ... RECORD REFERENCE FOR PLAYER DESCRIPTION
      C
 2            COMMON /STATEV/
 3            DIMENSION ITEM(41900),DITEM(41900)
 4            EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5            COMMON /PARS/
 6            EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7            REAL*8 DTPNAM,FLDNAM,FORMOT
 8            COMMON /PARS1/
 9            COMMON /PARS2/
10            COMMON /DATAV/
11            DIMENSION ACTTIM(25)
12            EQUIVALENCE (ACTTIM(1),ACTRAT(1))
13            ICANOB=NULL
14            IF(IVAL(JPSTAT,IPLARF).LE.KCAPTR)  RETURN
15            IF(VAL(JSUPRN,IPLARF).GE.RESOBS(IPLAYR))  RETURN
16            ICANOB=IOK
17            RETURN
18            END
```

FSN MODEL - ICHOOS FUNCTION

```
ISN
 1            FUNCTION ICHOOS(NOPT,PROBS,ISFED)
      C
      C       ROUTINE TO MAKE A RANDOM CHOICE AMONGST N ALTERNATIVES BASED ON
      C   A DISTRIBUTION OF PROBABILITIES FOR CHOOSING EACH OF THE OPTIONS.
      C   FUNCTION RETURNS AN INDEX OF THE CHOICE SELECTED.
      C
      C   INPUT PARAMETERS:
      C       NOPT      NUMBER OF OPTIONS
      C       PROBS     A VECTOR OF NOPT PROBABILITIES WHICH TOGETHER SUM TO 1.0.
      C       ISEED     RANDOM NUMBER SEED
      C
 2            DIMENSION PROBS(NOPT)
      C
      C   GET A RANDOM NUMBER BETWEEN 0.0 AND 1.0.
 3            RN = URAND(ISEED)
 4            P = 0.
      C   TEST WHAT INTERVAL THE RANDOM NUMBER IS IN
 5            DO 10 ICHOOS=1,NOPT
 6               P = P + PROBS(ICHOOS)
 7               IF (RN .LE. P) RETURN
 8     10        CONTINUE
 9            ICHOOS = NOPT
10            RETURN
11            END
```

```
ISN
 1            FUNCTION ICMPPN(IFLD,IPTR,JPTR)
       C ...  FUNCTION CALLED BY GENOBS TO COMPARE NON-SCALAR FIELDS
       C      IN PERSON DESCRIPTIONS.  THE VALUE RETURNED IS NULL IF AN
       C      INVALID FIELD IS REFERENCED, IOK IF THE PERCEIVED FIELD
       C      VALUE IS EQUIVALENT TO THE ACTUAL VALUE, AND IFAIL IF
       C      THE FIELDS ARE NOT EQUIVALENT
       C
       C ...  INPUT PARAMETERS:
       C           IFLD ... FIELD NUMBER TO BE COMPARED
       C           IPTR ... ZERO OFFSET POINTER TO "VIEW" RECORD
       C           JPTR ... ZERO OFFSET POINTER TO DESCRIPTION RECORD
       C
 2            COMMON /STATEV/
 3            DIMENSION ITEM(41900),DITEM(41900)
 4            EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5            COMMON /PARS/
 6            EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7            REAL*8 DTPNAM,FLDNAM,FORMOT
 8            COMMON /PARS1/
       C
 9            ICMPPN=NULL
10            IF(IFLD.EQ.JLOCN) GO TO 100
11            IF(IFLD.EQ.JWEAPS) GO TO 200
12            IF(IFLD.EQ.JACTIV) GO TO 300
13            RETURN
       C
       C ...  PROCESS LOCATION FIELD
       C
14     100    LOCRF1=ITEM(IFLD+IPTR)
15            LOCRF2=ITEM(IFLD+JPTR)
16            ICMPPN=IFAIL
17            IF(LOCRF1.EQ.NULL) RETURN
       C
       C ...  ONLY THE PLACE FIELD HAS TO AGREE
       C
```

PSN MODEL - ICMPPN FUNCTION

```
ISN
18            IF(IVAL(JPLACE,LOCRF1).EQ.IVAL(JPLACE,LOCRF2)) ICMPPN=IOK
19            RETURN
      C
      C ...   PROCESS WEAPON & EQUIPMENT FIELD
      C
20    200     ICMPPN=IFAIL
      C
      C ...   GET ID AND TYPE (WEAPON OR EQUIPMENT)
      C
21            LWPRF2=ITEM(IFLD+JPTR)
22            JTYP=IVAL(JTYPE,LWPRF2)
23            CALL PARSRF(LWPRF2,JDTYP,IDUM1,IDUM2)
24            LWPLIS=ITEM(IFLD+IPTR)
25            LWPRF1=IFIRST(LWPLIS,LPTR)
      C
      C ...   LOOP TO PERCEIVED LIST TO SEE IF THERE IS MATCH
      C
26    210     IF(LWPRF1.EQ.NULL) RETURN
27            CALL PARSRF(LWPRF1,IDTYP,IDUM1,IDUM2)
28            ITYP=IVAL(JTYPE,LWPRF1)
29            IF(ITYP.NE.JTYP .OR. IDTYP.NE.JDTYP) GO TO 220
30            ICMPPN=IOK
31            RETURN
32    220     LWPRF1=NEXT(LWPLIS,LPTR)
33            GO TO 210
      C
      C ...PROCESS ACTIVITY
      C
34    300     ICMPPN=IFAIL
35            JACTRF=ITEM(IFLD+JPTR)
36            JACTYP=IVAL(JTYPE,JACTRF)
37            LACLIS=ITEM(IFLD+IPTR)
38            IACTRF=IFIRST(LACLIS,LPTR)
      C
      C ...   LOOP THRU PERCEIVED LIST FOR MATCH
      C
```

PSN MODEL - ICMPPN FUNCTION

```
ISN
  310   IF(IACTRF.EQ.NULL) RETURN
        IF(JACTYP.NE.IVAL(JTYPE,IACTRF)) GO TO 320
        ICMPPN=IOK
        RETURN
  320   IACTRF=NEXT(LACLIS,LPTR)
        GO TO 310
        END
```

FSN MODEL - ICMPSN FUNCTION

```
ISN
 1          FUNCTION ICMPSN(IFLD,IPTR,JPTR)
      C ... FUNCTION CALLED BY GENOBS TO COMPARE NON-SCALAR FIELDS
      C     IN SENSOR DESCRIPTIONS.  THE VALUE RETURNED IS NULL IF AN
      C     INVALID FIELD IS REFERENCED, IOK IF THE PERCEIVED FIELD
      C     VALUE IS EQUIVALENT TO THE ACTUAL VALUE, AND IFAIL IF
      C     THE FIELDS ARE NOT EQUIVALENT
      C
      C ... INPUT PARAMETERS:
      C          IFLD ... FIELD NUMBER TO BE COMPARED
      C          IPTR ... ZERO OFFSET POINTER TO "VIEW" RECORD
      C          JPTR ... ZERO OFFSET POINTER TO DESCRIPTION RECORD
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
 8          COMMON /PARS1/
      C
 9          ICMPSN=NULL
10          IF(IFLD.EQ.JLOCN) GO TO 100
11          IF(IFLD.EQ.JCOVRG) GO TO 200
12          IF(IFLD.EQ.JINCOM) GO TO 200
13          RETURN
      C
      C ... PROCESS LOCATION FIELD
      C
14    100   LOCRF1=ITEM(IFLD+IPTR)
15          LOCRF2=ITEM(IFLD+JPTR)
16          ICMPSN=IFAIL
17          IF(LOCRF1.EQ.NULL) RETURN
      C
      C ... ONLY THE PLACE FIELD HAS TO AGREE
      C
```

```
            IF(IVAL(JPLACE,LOCRF1).EQ.IVAL(JPLACE,LOCRF2)) ICMPSN=IOK
            RETURN
C
C ... PROCESS COVERAGE OR "IN COMMO WITH" FIELD
C
  200       ICMPSN=IFAIL
            JCOVRF=ITEM(IFLD+JPTR)
            ICOLIS=ITEM(IFLD+IPTR)
            ICOVRF=IFIRST(ICOLIS,LPTR)
  210       IF(ICOVRF.EQ.NULL) RETURN
            IF(ICOVRF.NE.JCOVRF) GO TO 220
            ICMPSN=IOK
            RETURN
  220       ICOVRF=NEXT(ICOLIS,LPTR)
            GO TO 210
            END
```

FSN MODEL - ICMPVE FUNCTION

```
ISN
 1          FUNCTION ICMPVE(IFLD,IPTR,JPTR)
      C ... FUNCTION CALLED BY GENOBS TO COMPARE NON-SCALAR FIELDS
      C     IN VEHICLE DESCRIPTIONS.  THE VALUE RETURNED IS NULL IF AN
      C     INVALID FIELD IS REFERENCED, IOK IF THE PERCEIVED FIELD
      C     VALUE IS EQUIVALENT TO THE ACTUAL VALUE, AND IFAIL IF
      C     THE FIELDS ARE NOT EQUIVALENT
      C
      C ... INPUT PARAMETERS:
      C          IFLD ... FIELD NUMBER TO BE COMPARED
      C          IPTR ... ZERO OFFSET POINTER TO "VIEW" RECORD
      C          JPTR ... ZERO OFFSET POINTER TO DESCRIPTION RECORD
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
 8          COMMON /PARS1/
 9          ICMPVE=NULL
10          IF(IFLD.NE.JLOCN) RETURN
      C
      C ... ONLY LOCATION FIELD PROCESSED FOR VEHICLE
      C
11          LOCRF1=ITEM(IFLD+IPTR)
12          LOCRF2=ITEM(IFLD+JPTR)
13          ICMPVE=IFAIL
14          IF(LOCRF1.EQ.NULL) RETURN
      C
      C ... ONLY THE PLACE FIELD HAS TO AGREE
      C
15          IF(IVAL(JPLACE,LOCRF1).EQ.IVAL(JPLACE,LOCRF2)) ICMPVE=IOK
16          RETURN
17          END
```

FSN MODEL - INBLK SUBROUTINE

```
ISN
 1          SUBROUTINE INBLK(STATV,STATV2,PARS,DATAV,NSTATV,NSTV2,NPARS,
           +     NDATAV)
      C
      C     ROUTINE TO READ LONG BINARY RECORDS PASSED FROM THE INPUT
      C  PREPROCESSORS.
      C
      C  INPUT PARAMETERS:
      C     STATV    THE FIRST PORTION OF COMMON /STATEV/
      C     STATV2   THE SECOND PORTION OF COMMON /STATEV/
      C     PARS     A VECTOR EQUIVALENCED TO /PARS/
      C     DATAV    A VECTOR EQUIVALENCED TO /DATAV/
      C     NSTATV   THE SIZE OF STATV
      C     NSTV2    THE SIZE OF STATV2
      C     NPARS    THE SIZE OF PARS
      C     NDATAV   THE SIZE OF DATAV
      C
 2          DIMENSION STATV(NSTATV),STATV2(NSTV2),PARS(NPARS),DATAV(NDATAV)
      C
 3          READ (4) DATAV
 4          READ (5) STATV
 5          READ (5) STATV2
 6          READ (5) PARS
 7          RETURN
 8          END
```

FSN MODEL - INIT SUBROUTINE

```
ISN
 1          SUBROUTINE INIT
      C
      C     ROUTINE TO INITIALIZE STATE VARIABLES AT THE BEGINNING OF THE
      C   SIMULATION.
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (ENULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLENAM,FORMOT
 8          COMMON /PARS1/
 9          COMMON /PARS2/
10          COMMON /PARS3/
11          COMMON /DATAV/
12          DIMENSION ACTTIM(25)
13          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
14          COMMON /RECREF/
15          DIMENSION RECREQ(140)
16          EQUIVALENCE (RECREQ(1),IGOALS)
17          COMMON /GARCOL/
18          LOGICAL*1 ACTIVE
19          COMMON /NEW/
20          DIMENSION NGOALS(10)
21          DIMENSION INSTAT(2,5)
22          EQUIVALENCE(INSTAT(1,1),IOBSV(41))
23          REAL*8 RNAME(6),SNAME(8)
24          DATA RNAME/'RESMOV','RESFIR','RESOBS','RESSUR','RESWND','RESPLN'/
25          DATA SNAME/'SKILL11','SKILL21','SKILL31','SKILL41',
           +      'SKILL12','SKILL22','SKILL32','SKILL42'/
      C
      C
      C ... TEMPORARY CODE UNTIL PARS CORRECTED
26          KINSOR = 4
27          MINSOR = 3
```

```
ISN
      C
 28          ISITE = NEWREF(LSITE,1,0)
 29          IRSITE=NEWREF(LSITE,2,0)
 30          DTMIN = DTSEC / 60.
 31          ISECPL(1) = 1
 32          ISECPL(2) = 2
 33          READ(9,101) (IFCCND(I),I=1,2), (IRN(I),I=1,6)
 34      101 FORMAT(2I1,6I10)
 35          TMPESP = 1.E10
 36          TMIN = 0.0
 37          CALL CHGVAR(1,TMIN)
 38          NMSTAT = KSAFE
 39          CALL CHGVAR(2,NMSTAT)
 40          CALL NULIFY(RECREQ(4),NRECRE-3)
 41          IPHSOB(1) = 0
 42          IPHSOB(2) = NWEPTP
 43          IPHSOB(3) = IPHSOB(2) + NEQPTP
 44          IPHSOB(4) = IPHSOB(3) + NVEHTP
 45          IPHSOB(5) = IPHSOB(4) + NPSNTP
 46          IPHSOB(6) = IPHSOB(5) + NSENTP
      C
      C   ESTABLISH INTERNAL BUFFER
 47          CALL FTNCMD('BUFFER 99 LENGTH=300',20)
      C
 48          CALL FTNCMD('SET MODECHECK=OFF',17)
      C
      C   INITIALIZE NUMBER OF PLAYERS ON EACH SIDE IN EACH PHYSICAL COND.
      C   AND THE INSIDER ARRAY
      C
 49          DO 6 I=1,NINSOR
 50             INSTAT(1,I) = NULL
 51             INSTAT(2,I) = 0
 52        6 CONTINUE
 53          CALL NZERO(FORCES,8)
 54          ISIDE = KSFF
 55          NN = 0
```

```
ISN
56            DO 20 ILIST=JGARDS,JADVRS
57               IPSNS = IVAL(ILIST,ISITE)
58               IPSN = IFIRST(IPSNS,KP)
59     10           IF (IPSN .EQ. NULL) GO TO 20
60            CALL PARSRF(IPSN,IDY,IPLAYR,IDU)
      C
      C ... REVIEW FUNCTION
      C
61            WRITE(7,1002)
62            WRITE(7,1002)
63            WRITE(7,1002)
64            WRITE(7,1002)
65        130 WRITE(7,1003) IPLAYR
66            LOCREF= IVAL(JLOCN,IPSN)
67            IF(LOCREF .EQ. NULL) GO TO 135
68            CALL PARSRF(LOCREF,ID,IREC,IDUM)
69            CALL OUTPLX(ID,IREC,IREC,7,0,0)
      C
      C ... PLANS
70        135 WRITE(7,1004)
71            IPLIS=IVAL(JPLANS,IPSN)
72            IF(IPLIS .EQ. NULL) GO TO 140
73            CALL OUTREF(IPLIS,7)
      C
      C ... EQUIPMENT
74        140 WRITE(7,1005)
75            IPLIS=IVAL(JWEAPS,IPSN)
76            IF(IPLIS .EQ. NULL) GO TO 150
77            CALL OUTREF(IPLIS,7)
      C
      C ... THRESHHOLDS
78        150 WRITE(7,1006) RNAME
79            I = IPLAYR
80            WRITE(7,1007) RESMOV(I),RESFIR(I),RESOBS(I),RESSUR(I),
             +  RESWND(I),RESPLN(I)
      C
```

ISN

```
C ... SKILLS
  155 WRITE(7,1006) SNAME
      WRITE(7,1007) ((SKILL(J,K,I),J=1,4),K=1,2)
            ICOND = IVAL(JPSTAT,IPSN)
            FORCES(ICOND,ISIDE) = FORCES(ICOND,ISIDE) + 1.0
            IF(IVAL(JTYPE,IPSN) .NE. KINSDR) GO TO 15
            NN = NN+1
            INSTAT(1,NN) = IPSN
 15         IPSN = NEXT(IPSNS,KP)
            GO TO 10
 20      IF (ISIDE .NE. KAFF) ISIDE = KAFF
C
      DO 22 IS=KSFE,KAFF
      DO 22 IC=1,NPHCAT
         CALL CHGVR2(5,FORCES(IC,IS),IC,IS)
 22      CONTINUE
C
C  ESTABLISH LIST OF GOALS
C
      IGOALS = NULL
      CALL CHGVAR(8,IGOALS)
      NG = NRECSO(LGOAL)
      IF (NG .LE. 0) GO TO 40
      CALL NZERO(MGOALS,NG)
C  MARK ALL GOALS WHICH ARE SUCCESSORS OF SOME OTHER GOAL
      DO 30 I=1,NG
         IGOLRF = NEWREF(LGOAL,I,0)
         ISUCRS = IVAL(ISUCRS,IGOLRF)
         IF(ISUCRS .EQ. NULL) GO TO 30
         ISUCR = IFIRST(ISUCRS,IG)
 25         IF (ISUCR .EQ. NULL) GO TO 30
            CALL PARSRF(ISUCR,IDTYP,IRECNO,IDUM)
            MGOALS(IRECNO) = 1
            ISUCR = NEXT(ISUCRS,IG)
            GO TO 25
 30      CONTINUE
```

```
      C  CHAIN TOGETHER ALL UNMARKED GOALS
              DO 35 I=1,NG
                 IGOLRF = NEWREF(LGOAL,I,0)
                 IF (MGOALS(I) .NE. 0 .OR. IVAL(IADVRQ,IGOLRF) .EQ. NULL)
             +   GO TO 35
                 CALL CHGLST(IGOAL,2,1,0)
                 IGOALS = IQUEUE(IGOLRF,IGOALS)
      35         CONTINUE
      40      CONTINUE
      C
              NEWGOL = NULL
              LOCAFE = NULL
      C
              IAIMPT(1) = 1
              IAIMPT(2) = 3
      C
      C  INITIALIZE SENSOR MONITOR STATION. (FOR THIS VERSION, ASSUME JUST
      C  ONE STATION)
              IMONRM = NULL
              NS = NRECSO(LSENS)
              DO 50 I=1,NS
                 ISENRF = NEWREF(LSENS,I,0)
                 IF(IVAL(JINCOM,ISENRF) .EQ. NULL) GO TO 50
                 IMONRM = IVAL(JINCOM,ISENRF)
                 IMONRM = IFIRST(IMONRM,IO)
                 GO TO 52
      50         CONTINUE
      52      CONTINUE
      C
      C  INITIALIZE NUCLEAR MATERIAL ROOM. (FOR THIS VERSION, ASSUME JUST
      C  ONE SUCH ROOM)
              ISNMRM = NULL
              NR = NRECSO(LROOM)
              DO 55 I=1,NR
                 IREF = NEWREF(LROOM,I,0)
                 ICONT = IVAL(JCONTS,IREF)
```

```
ISN
137             IF (ICONT .EQ. NULL) GO TO 55
138             IFIND = LSERCH(ICONT,NULL,LEQUIP,JTYPE,KSNM)
139             IF (IFIND .NE. NULL) GO TO 60
140     55      CONTINUE
141          GO TO 65
142     60   ISNMRM = IREF
        C
        C  INITIALIZE EXITS FROM SITE.  FOR THE CURRENT VERSION ANY GOAL NODE
        C  WHICH IS NOT THE NUCLEAR MATERIAL ROOM OR SENSOR MONITOR
        C  STATION WILL BE ASSUMED TO BE AN EXIT.
143       65 NG = NRECSO(LGOAL)
144          IEXITS = NULL
145          DO 70 I=1,NG
146             IREF = NEWREF(LGOAL,I,0)
147             IF(IVAL(JTIMRQ,IREF) .EQ. NULL) GO TO 70
148             LOC = IVAL(JIC,IREF)
149             IF (LOC .EQ. ISNMRM .OR. LOC .EQ. IMONRM) GO TO 70
150             IEXITS = ISTACK(LOC,IEXITS)
151     70      CONTINUE
        C
        C  INITIALIZE LEADERS' PERCEPTIONS OF OWN FORCES' SITUATIONS TO 1.
152          CALL INITVL(IFRCPC,NRECSO(LPERSN),1)
        C
153          JFORCE = JACSON
154      1002 FORMAT(1H0)
155      1003 FORMAT(' STATUS: PERSON',I3,/3X,'LOCATION')
156      1004 FORMAT('0PLANS')
157      1005 FORMAT('0EQUIPMENT')
158      1006 FORMAT('0',8A8)
159      1007 FORMAT(1X,6F8.2)
160          RETURN
161          END
```

FSN MODEL - INTLOS FUNCTION

```
      FUNCTION INTLOS(I1, I2)
C   FUNCTION TO CHECK WHETHER NODES I1, I2 HAVE INTERIOR LINE-OF-SIGHT.
      COMMON /PARS/
      EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
      REAL*8 DTPNAM,FLDNAM,FORMOT
      COMMON /PARS1/
      COMMON /PARS2/
      COMMON /PARS3/
      INTLOS = 0
      IF (I1 .EQ. I2) GO TO 60
C   FIND A NEIGHBORING REGION
      NBRR = NBRREG(I1)
      IF (NBRR) 10,20,30
C   HAVE AN EXTERIOR NEIGHBOR--DO NOT USE THIS ROUTINE
   10 RETURN
C   NO REGION NEIGHBORS
   20 NBRR = I1
C   ITERATE THROUGH NBRS OF THE REGION
   30 NLIS = IVAL(JNBRS,NBRR)
      NBR = IFIRST(NLIS,N1)
   40 IF (NBR .EQ. NULL) RETURN
      IF (NBR .EQ. I2) GO TO 60
C   IF THE NBR IS A SEE-THRU PORTAL, CHECK OTHER SIDE
      CALL PARSHF(NBR, ID, IDUM, IDUM)
      IF (ID .NE. LDOOR .AND. ID .NE. LWIND) GO TO 50
      IF (ISEEPT(NBR) .EQ. 0) GO TO 50
      IF (IVAL(JPORT,NBR) .EQ. I2) GO TO 60
   50 NBR = NEXT(NLIS,N1)
      GO TO 40
   60 INTLOS = 1
      RETURN
      END
```

FSN MODEL - INTSCT FUNCTION

```
      FUNCTION INTSCT(A,B,X)
C   A FUNCTION TO CHECK WHETHER OR NOT TWO LINE SEGMENTS ON THE
C   XY PLANE DEFINED BY A:[ (A1,A2),(A3,A4) ] AND B;[ (B1,B2),(B3,B4) ]
C   INTERSECT. THE FUNCTION RETURNS 0 IF NO INTERSECTION, 1 IF
C   A UNIQUE INTERSECTION IN ARRAY X(1), X(2), AND 2 IF THE SEGMENTS
C   ARE COLLINEAR BUT DISJOINT.
      COMMON /PARS/
      EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
      REAL*8 DTPNAM,FLDNAM,FORMOT
      DIMENSION A(1),B(1),X(2)
      NFLAG = 0
      INTSCT = 0
      DXA = A(1)-A(3)
      DYA = A(2)-A(4)
      DXB = B(1)-B(3)
      DYB = B(2)-B(4)
C   IS THE FIRST LINE PARALLEL TO THE Y-AXIS?
      AX = ABS(DXA)
      IF (AX .GT. .1) GO TO 50
      IF (ABS(DYA) .LT. .1) RETURN
      NFLAG = 1
C   IS THE SECOND LINE PARALLEL TO THE Y-AXIS?
   50 AX = ABS(DXB)
      IF (AX .GT. .1) GO TO 80
      IF (ABS(DYB) .LT. .1) RETURN
      IF (NFLAG .EQ. 0) GO TO 70
      AX = ABS(A(1)-B(1))
      IF (AX .GT. .1) RETURN
C   THE 2 PARALLEL TO THE Y-AXIS LINES ARE APPROXIMATELY COLLINEAR. IS THERE ANY OVERLAP?
   60 AH = AMAX1(A(2),A(4)) + .001
      AL = AMIN1(A(2),A(4)) - .001
      BH = AMAX1(B(2),B(4)) + .001
      BL = AMIN1(B(2),B(4)) - .001
   65 IF (BL.LT.AL .AND. BH.GT.AL) RETURN
      IF (AL.LE.BL .AND. AH.GT.BL) RETURN
```

FSN MODEL - INTSCT FUNCTION

```
          INTSCT = 2
          RETURN
C    SECOND LINE PARALLEL TO THE Y-AXIS, FIRST NOT
       70 IY = INTV(B(1),A(1),X(2))
          IF (IY .EQ. 0) RETURN
          X(1) = B(1)
          GO TO 130
       80 IF (NFLAG .EQ. 0) GO TO 100
C    FIRST LINE PARALLEL TO THE Y-AXIS, SECOND NOT
          IY = INTV(A(1),B(1),X(2))
          IF (IY .EQ. 0) RETURN
          X(1) = A(1)
          GO TO 130
C    NEITHER LINE PARALLEL TO THE Y-AXIS -- FIND THE INTERSECTION
      100 S1 = DYA/DXA
          S2 = DYB/DXB
          R1 = A(1)*S1 - A(2)
          R2 = B(1)*S2 - B(2)
          D = S2 - S1
          IF (ABS(D) .GT. .1) GO TO 120
C    PARALLEL LINES -- ARE THEY COLLINEAR?
          D = ABS(B(2)-A(2)-S1*(B(1)-A(1)))
          DEL = ABS(.05*(S1+1))
          IF (D .GT. DEL) RETURN
C    LINES ARE COLLINEAR -- CHECK FOR OVERLAP
          AH = AMAX1(A(1),A(3)) + .001
          AL = AMIN1(A(1),A(3))
          BH = AMAX1(B(1),B(3)) + .001
          BL = AMIN1(B(1),B(3))
          GO TO 65
C     UNIQUE INTERSECTION
      120 X(1) = (R2-R1)/D
          AI = AMAX1(A(1),A(3)) + .001
          IF (X(1) .GT. AI) RETURN
          AI = AMIN1(A(1),A(3)) - .001
          IF (X(1) .LT. AI) RETURN
```

```
      AI = AMAX1(B(1),B(3)) + .001
      IF (X(1) .GT. AI) RETURN
      AI = AMIN1(B(1),B(3)) - .001
      IF (X(1) .LT. AI) RETURN
      X(2) = (S1*R2 - S2*R1)/D
      AI = AMAX1(A(2),A(4)) + .001
      IF (X(2) .GT. AI) RETURN
      AI = AMIN1(A(2),A(4)) - .001
      IF (X(2) .LT. AI) RETURN
      AI = AMAX1(B(2),B(4)) + .001
      IF (X(2) .GT. AI) RETURN
      AI = AMIN1(B(2),B(4)) - .001
      IF (X(2) .LT. AI) RETURN
  130 INTSCT = 1
      RETURN
      END
```

FSN MODEL - INTER FUNCTION

```
ISN
 1           FUNCTION INTER(IPLACE)
       C    FUNCTION TO DETERMINE THE 'INTERIOR STATUS' OF AN PLACE.
       C    RETURNS ONE OF THESE VALUES
       C        -1 = ERROR
       C         0 = COMPLETELY OUTSIDE
       C         1 = OUTSIDE, BUT AT AN OPEN PORTAL
       C         2 = INSIDE, BUT AT AN OPEN EXTERIOR PORTAL
       C         3 = INSIDE, BUT AT AN OPEN INTERIOR PORTAL
       C         4 = INSIDE, NOT AT A PORTAL
       C    HERE 'OPEN' MEANS OPEN, DESTROYED, OR TRANSPARENT.
       C
 2           COMMON /PARS/
 3           EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4           REAL*8 DTPNAM,FLDNAM,FORMOT
 5           COMMON /PARS1/
 6           COMMON /PARS2/
 7           COMMON /PARS3/
 8           CALL PARSRF(IPLACE,IDTYP,IDUM,IDUM)
 9           IF (IDTYP.EQ. LYARD) GO TO 900
10           IF (IDTYP .EQ. LROOF) GO TO 900
11           IF (IDTYP .EQ. LROOM) GO TO 904
12           IF (IDTYP .EQ. LHALL) GO TO 904
13           N = NBRREG(IPLACE)
14           IF (N) 200,904,300
       C    HAVE AN EXTERIOR PORTAL OR STAIR
15     200   IF (IDTYP .EQ. LSTAIR) GO TO 900
       C    CAN SEE THROUGH PORTAL?
16           IF (ISEEPT(IPLACE) .EQ. 0) GO TO 900
17           GO TO 901
       C    HAVE AN INTERIOR PORTAL OR STAIR
18     300   IF (IDTYP .EQ. LSTAIR) GO TO 904
19           IF (ISEEPT(IPLACE) .EQ. 0) GO TO 904
       C    IS THE OTHER SIDE ALSO INTERIOR?
20           IPORT = IVAL(JPORT,IPLACE)
21           NOPP = NBRREG(IPORT)
```

```
      IF (NOPP .LT. 0) GO TO 902
      GO TO 903
  900 INTER=0
      RETURN
  901 INTER=1
      RETURN
  902 INTER=2
      RETURN
  903 INTER=3
      RETURN
  904 INTER=4
      RETURN
      END
```

FSM MODEL - INTV FUNCTION

```
ISN
 1          FUNCTION INTV(X,C,YVAL)
      C   FUNCTION TO SEE IF THE LINE X:[ (X1,X2),(X3,X4) ], PARALLEL TO
      C   THE Y-AXIS INTERSECTS THE
      C   LINE DEFINED BY C:[ (C1,C2),(C3,C4) ]. RETURNS 1 IF
      C   INTERSECTION, 0 IF NONE, AND THE Y COORDINATE IN YVAL.
 2          DIMENSION C(4),X(4)
 3          INTV = 0
 4          XL = AMIN1(C(1),C(3))
 5          IF (X(1) .LT. XL) RETURN
 6          XH = AMAX1(C(1),C(3))
 7          IF (X(1) .GT. XH) RETURN
 8          YVAL =  (X(1)-C(1))*(C(2)-C(4))/(C(1)-C(3)) + C(2)
 9          YL = AMIN1(X(2),X(4))
10          IF (YVAL .LT. YL) RETURN
11          YH = AMAX1(X(2),X(4))
12          IF (YVAL .GT. YH) RETURN
13          INTV = 1
14          RETURN
15          END
```

```
ISN
 1          FUNCTION IPATH(IPLAYR,ISOURC,IGOAL,DMEASR)
      C
      C        ROUTINE TO COMPUTE AN OPTIMAL PATH OF A PLAYER FROM AN INITIAL
      C     POSITION TO A DESTINATION SPECIFIED BY IGOAL.  THE FUNCTION USES
      C     DIJKSTRA'S METHOD TO COMPUTE AN OPTIMAL PATH.  IT CALLS ON AN
      C     EVALUATION FUNCTION TO COMPUTE A NON-NEGATIVE MEASURE OF
      C     DIFFICULTY OR TIME FOR EACH LINK ENCOUNTERED.  THE ALGORITHM
      C     ATTEMPTS TO MINIMIZE THIS MEASURE OVER THE PATH.  IF TWO PATHS
      C     HAVE THE SAME MEASURE THE ALGORITHM MAKES AN ARBITRARY SELECTION
      C     BETWEEN THEM.  IF THERE DOES NOT EXIST ANY PATH FROM ISOURC TO
      C     IGOAL AN ERROR COMMENT IS PRINTED.
      C        THE ROUTINE RETURNS THE PATH COMPUTED AS ITS VALUE.  IT ALSO
      C     RETURNS THE MEASURE COMPUTED BY THE EVALUATION FUNCTION SUMMED
      C     OVER THE LINKS OF THE PATH.
      C
      C     INPUT PARAMETERS:
      C        IPLAYR   A REFERENCE TO THE PERSON OR VEHICLE TO BE TRAVERSING
      C                 THE PATH.
      C        ISOURC   A REFERENCE TO A PERSON, VEHICLE, SENSOR, EFFECTOR
      C                 (ACTIVATED DELAY) OR TO A SITE NODE MARKING THE
      C                 BEGINNING OF THE PATH.
      C        IGOAL    A REFERENCE TO A PERSON, VEHICLE, SENSOR, EFFECTOR
      C                 (ACTIVATED DELAY) OR TO A SITE NODE MARKING THE
      C                 END OF THE PATH.
      C
      C     OUTPUT PARAMETERS:
      C        DMEASR   THE SUM OF THE EVALUATION MEASURE OVER THE OPTIMAL
      C                 PATH.
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,FLDNAM,FORMOT
 5          COMMON /PARS1/
 6          COMMON /PARS2/
 7          COMMON /PARS3/
```

```
      COMMON // IPREV(362), IACTIV(100), D(362)
      DATA NACLIS/100/
C
C  INITIALIZATIONS
C
      IO = IRCOFF(LYARD)
      NNODES = IRCOFF(LWEAP) - IO
      CALL NULIFY(IPREV,NNODES)
      CALL NZERO(D,NNODES)
      CALL NULIFY(IACTIV,NACLIS)
C
C  DETERMINE SOURCE AND GOAL NODES
C
      NODSOU = ISOURC
      CALL PARSRF(ISOURC,IDTYP,IDUM,IDUM)
      IF (IDTPOK(IDTYP) .EQ. 2) NODSOU = IVAL(JPLACE,IVAL(JLOCN,ISOURC))
      IF (IDTPOK(IDTYP) .LE. 0) CALL ERR(17,14,ISOURC,IDTYP,0)
C
      NODGOL = IGOAL
      CALL PARSRF(IGOAL,IDTYP,IDUM,IDUM)
      IF (IDTPOK(IDTYP) .EQ. 2) NODGOL = IVAL(JPLACE,IVAL(JLOCN,IGOAL))
      IF (IDTPOK(IDTYP) .LE. 0) CALL ERR(17,14,IGOAL,IDTYP,0)
C
      NODCUR = NODSOU
      DMCUR = 0.
      CALL PARSRF(NODCUR,IDTYP1,IRECNO,IDUM)
      IOFF = IRCOFF(IDTYP1) - IO + IRECNO
      IPREV(IOFF) = -1
      NA = 0
C
C  CHECK WHETHER HAVE REACHED THE GOAL NODE.
C
   10 IF (NODCUR .EQ. NODGOL) GO TO 100
C
C  ITERATE THROUGH THE NEIGHBORS OF THE CURRENT NODE.
C
```

```
ISN
30          NBRS = IVAL(JNBRS,NODCUR)
31          NBR = IFIRST(NBRS,KN)
32          NBR2 = NULL
33    15        IF (NBR .EQ. NULL) GO TO 32
      C
      C   CHECK WHETHER THIS NEIGHBOR HAS BEEN "USED" OR IS "ACTIVE".
      C
34              CALL PARSRF(NBR,IDTYP,IRECNO,IDUM)
35              IOFF = IRCOFF(IDTYP) - IO + IRECNO
36              IF (IPREV(IOFF) .NE. NULL) GO TO 30
      C   IF FOUND A NON-ACTIVE, NON-USED NODE, ADD IT TO THE ACTIVE LIST
37              DM = EFFTIM(IPLAYR,NODCUR,NBR,KRUN) + DMCUR
38              NA = NA + 1
39              IF (NA .GT. NACLIS) CALL ERR(18,14,1,IPLAYR,NACLIS)
40              IACTIV(NA) = IOFF
41              D(IOFF) = DM
42              IPREV(IOFF) = NODCUR
      C
      C   TEST IF PORTAL NEIGHBOR CHECKED
      C
43        30 IF(NBR2 .NE. NULL) GO TO 40
      C   GET NEXT NEIGHBOR
44              NBR = NEXT(NBRS,KN)
45              GO TO 15
      C   IF THIS IS A DOOR, WINDOW OR STAIRS NODE, GET SPECIAL NEIGHBOR IF
      C   HAVEN'T YET
46    32    IF (IDTYP1 .LT. LSTAIR .OR. IDTYP1 .GT. LWIND) GO TO 40
47          IF (IDTYP1 .EQ. LSTAIR) NBR2 = IVAL(JSTAIR,NODCUR)
48          IF (IDTYP1 .NE. LSTAIR) NBR2 = IVAL(JPORT,NODCUR)
49          IF (NBR .EQ. NBR2) GO TO 40
50              NBR = NBR2
51              GO TO 15
      C
      C   GET NODE FROM ACTIVE LIST HAVING MINIMUM ASSOCIATED MEASURE
      C
52    40    DMIN = 1.E8
```

```
      IF (NA .LE. 0) CALL ERR(19,14,NODCUR,ISOURC,IGOAL)
      DO 50 IA=1,NA
         IOFF = IACTIV(IA)
         IF (D(IOFF) .GT. DMIN) GO TO 50
         DMIN = D(IOFF)
         ICUR = IA
50       CONTINUE
C
C  CONVERT OFFSET OF MINIMUM NODE TO A NODE REFERENCE
C
      IOFF = IACTIV(ICUR)
      DO 55 IDTYP=LYARD,LVEHIC
         IF (IOFF .GT. IRCOFF(IDTYP) - IO) GO TO 55
         IDTYP1 = IDTYP - 1
         NODCUR = 1000000000 + 10000*IDTYP1 + IOFF - IRCOFF(IDTYP1) +IO
         GO TO 60
55       CONTINUE
C
C  DELETE NODE FROM ACTIVE LIST
C
60    DNCUR = DMIN
      IACTIV(ICUR) = IACTIV(NA)
      NA = NA - 1
      GO TO 10
C
C  HAVE FOUND PATH.  SAVE MEASURE.  RETRACE STEPS AND GENERATE PATH
C  IN FORWARD DIRECTION.
C
100   DMEASR = DNCUR
      IPATH = NODCUR
110   CALL PARSRF(NODCUR,IDTYP,IRECNO,IDUM)
      IOFF = IRCOFF(IDTYP) - IO + IRECNO
      NODCUR = IPREV(IOFF)
      IF (NODCUR .LT. 0) RETURN
      IPATH = ISTACK(NODCUR,IPATH)
      GO TO 110
```

```
ISN
79            END
```

FSN MODEL - ISEEPT FUNCTION

```
ISN
  1            FUNCTION ISEEPT(IPORT)
        C   FUNCTION TO CHECK WHETHER CAN SEE THROUGH A PORTAL.
        C   RETURNS 0 IF NO, 1 IF YES
        C
  2            COMMON /PARS/
  3            EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  4            REAL*8 DTPNAM,FLDNAM,FORMOT
  5            COMMON /PARS1/
  6            COMMON /PARS2/
  7            COMMON /PARS3/
  8            ISEEPT = 1
  9            IF (IVAL(JSTAT,IPORT) .LE. KOPEN) RETURN
 10            IF (IVAL(JVIS,IPORT) .EQ. KTRANP) RETURN
 11            ISEEPT = 0
 12            RETURN
 13            END
```

FSN MODEL - ITERM FUNCTION

```
ISN
 1          FUNCTION ITERM(ICOND)
     C ... THIS FUNCTION CHECKS FOR GAME TERMINATION CONDITIONS
     C      AND RETURNS APPROPRIATE VALUE:
     C              0 ... CONTINUE GAME
     C           KSFE ... TERMINATE GAME, SFE WINS
     C           KAFE ... TERMINATE GAME, AFE WINS
     C
     C ... CONDITIONS FOR SFE WIN:
     C           1.  AFE DOES NOT HAVE ENOUGH PLAYERS LEFT
     C           2.  SIMULATED ARRIVAL OF RESPONSE FORCE BEFORE
     C               AFE ACHIEVES A FINAL GOAL
     C
     C ... CONDITIONS FOR AFE WIN:
     C           1.  SFE DOES NOT HAVE ENOUGH PLAYERS LEFT
     C           2.  AFE ACHIEVES FINAL GOAL BEFORE ARRIVAL
     C               OF RESPONSE FORCE.
     C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
 8          COMMON /PARS1/
 9          COMMON /PARS2/
10          COMMON /PARS3/
11          COMMON /DATAV/
12          DIMENSION ACTTIM(25)
13          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
14          COMMON /RECREF/
15          DIMENSION RECREQ(140)
16          EQUIVALENCE (RECREQ(1),IGOALS)
17          COMMON /NEW/
18          DIMENSION INSTAT(2,9)
19          EQUIVALENCE (IOBSV(41),INSTAT(1,1))
```

FSN MODEL - ITERM FUNCTION

```
          TSURF = TFIN
          INSIDL = NULL
          KINSDR = 4
C
          NEWGOL = NULL
          IFLAG=NULL
          IFLAG1 = NULL
C
C ... CHECK THAT AFE HAS ENOUGH PLAYERS LEFT
C
          MFORCE=FORCES(KWCUND,KAFE)+FORCES(KWHOLE,KAFE)
          IF(MFORCE.GE.MINPLR(KAFE)) GO TO 10
          ITERM=KSFF
          RETURN
C
C ... CHECK THAT SFE HAS ENOUGH PLAYERS LEFT
C
     10   MFORCE=FORCES(KWCUND,KSFE)+FORCES(KWHOLE,KSFE)
          IF(MFORCE.GE.MINPLR(KSFE)) GO TO 20
          ITERM=KAFE
          RETURN
C
C ... START LOOP THROUGH ACTIVE GOALS
C
     20   IGOLRF=IFIRST(IGOALS,ICUR)
     22   IF(IGOLRF.EQ.NULL) GO TO 50
C
C ... COUNT NUMBER OF EFFECTIVE AFE AT GOAL WITH
C           PROPER EQUIPMENT
C
          IDEF=IVAL(JID,IGOLRF)
          NEFAFE=0
C
C  ... MAKE COPY OF EQUIPMENT REQUIREMENTS
C
                IEQLIS= LCOPY(IVAL(JEQPRQ,IGOLRF))
```

```
ISN
     C
     C ... START LOOP THROUGH CONTENTS OF GOAL
     C
35                 LISREF=IVAL(JCCNTS,IDRF)
40                 IPLARF=IFIRST(LISREF,LPTR)
41   24            IF(IPLARF.EQ.NULL) GO TO 40
     C
     C ...         IF REQUIREMENTS NOT MET, GET NEXT CONTENT
     C
42                 CALL PARSRF(IPLARF,IDTYP,IRECNO,IFLD)
43                 IF(IDTYP.NE.LPERSN) GO TO 35
44                 IF(IVAL(JALLEG,IPLARF).NE.KAFE) GO TO 35
45                 IF(IVAL(JPSTAT,IPLARF).LT.KWOUND) GO TO 35
46             IF (IVAL(JTYPE,IPLARF) .EQ. KINSDR) INSIDL = ISTACK(IPLARF,INSIDL)
     C
     C ...         EFFECTIVE AFE AT GOAL, LOOP THROUGH
     C             EQUIPMENT REQUIREMENTS, CROSSING OFF ANY SATISFIED BY PERSON
     C
47                 IEQRF1=IFIRST(IEQLIS,LPTEQ1)
48   26            IF(IEQRF1.EQ.NULL) GO TO 33
49                      CALL PARSRF(IEQRF1,IDTYP,IRECNO,IFLD)
50                      ITYP=IVAL(JTYPE,IEQRF1)
51                      JEQLIS=IVAL(JWEAPS,IPLARF)
     C
     C ...                  DOES PLAYER HAVE THIS EQUIPMENT?
     C
52                      IFIND=LSERCH(JEQLIS,NULL,IDTYP,JTYPE,ITYP)
53                      IF(IFIND.NE.NULL) CALL DELIST(LPTEQ1,0,IEQLIS)
     C
     C ...         END EQUIPMENT REQUIRED LOOP
     C
54   31            IEQRF1=NEXT(IEQLIS,LPTEQ1)
55                 GO TO 26
     C
     C ... EFFECTIVE AFE AT GOAL
     C
```

```
ISN
56    33          NEFAFE=NEFAFE+1
      C
      C ... END LOOP THROUGH GOAL CONTENTS
      C
57    35          IPLARF=NEXT(LISREF,LPTR)
58                GO TO 24
      C
      C ... IF AFF DOES NOT CONTROL GOAL, CHECK NEXT GOAL
      C
59    40    IF(NEFAFE.LT.IVAL(JADVRQ,IGOLRF)) GO TO 49
      C
      C  ... CHECK WHETHER ALL EQUIPMENT REQUIREMENTS SATISFIED
      C
60          IF (IEQLIS .NE. NULL) GO TO 49
      C
      C ... INCREMENT TIME CONTROLLED, CHECK FOR COMPLETION
      C
61          INDEX=IRSF(JTIM,IGOLRF)
62               IF(ITEM(INDEX) .EQ. NULL) DITEM(INDEX)=0.0
63          DITEM(INDEX)=DITEM(INDEX)+DTMIN
64          IF(DITEM(INDEX).LT.VAL(JTIMRQ,IGOLRF)) GO TO 49
      C
      C ... GOAL COMPLETED
      C
      C   IF AN INSIDER GOAL, SET FLAG FOR COMPLETED ACTION
65          INSIDR = IFIRST(INSIDL,INS)
66    401   IF (INSIDR .EQ. NULL) GO TO 405
      C   FIND THE INSIDER'S INDEX IN THE INSIDER ARRAY
67          DO 402 K=1,5
68          IF (INSTAT(1,K) .EQ. INSIDR) GO TO 403
69    402   CONTINUE
70          CALL ERR(41,38,INSIDR,0,0)
71          GO TO 404
72    403   INSTAT(2,K) = 4
73    404   INSIDR = NEXT(INSIDL,INS)
74    405   INSIDL = NULL
```

```
ISN
75            NEWGOL = 1
76            IFLAG=ISTACK(IGOLRF,IFLAG)
77            NXTLIS=IVAL(JSUCRS,IGOLRF)
78            IF(NXTLIS.EQ.NULL) GO TO 49
     C
     C ... ACTIVATE SUCCESSOR GOALS
     C
79   41       NXTREF=IFIRST(NXTLIS,LPTR)
80   42       IF(NXTREF.EQ.NULL) GO TO 49
81            CALL CHGLST(NXTREF,2,1,0)
82            IFLAG1 = IQUEUE(NXTREF,IFLAG1)
83            NXTREF=NEXT(NXTLIS,LPTR)
84            GO TO 42
     C
     C ... END LOOP THROUGH GOALS
     C
85   49       IGOLRF=NEXT(IGOALS,ICUR)
86            GO TO 22
     C
     C   DELETE COMPLETED GOALS FROM LIST
     C
87         50 IF(IFLAG .EQ. NULL) GO TO 90
88            ILST=IFIRST(IFLAG,KA)
89         55      IF(ILST .EQ. NULL) GO TO 80
     C
     C   FIND ILST ON GOALS LIST
     C
90            IGLL=IFIRST(IGOALS,ICUR)
91         60   IF(IGLL .EQ. NULL) GO TO 70
92            IF(IGLL .EQ. ILST) GO TO 65
93            IGLL=NEXT(IGOALS,ICUR)
94            GO TO 60
     C
95         65 IF (ICUR .NE. NULL) GO TO 67
96            IGOALS =NULL
97            GO TO 80
```

```
 ISN
  98       67 CALL DELIST(ICUR,0,IGOALS)
      C
  99       70 ILST=NEXT(IFLAG,KA)
 100          GO TO 55
      C
      C  TEST IF ANY GOALS LEFT
      C
 101       80 IGOALS = JOIN(IGOALS,IFLAG1)
 102          IF(IGOALS .NE. NULL) GO TO 90
 103          ITERM=KAFE
 104          RETURN
      C ... IF TIME EXPIRED, SFE WINS
      C
 105  90      ITERM=0
      C    IF IT IS TIME TO SURFACE, INSIDERS BECOME COMBATANTS
 106          DO 100 K=1,5
 107             IPRF = INSTAT(1,K)
 108          IF (IPRF .EQ. NULL) GO TO 200
 109  100     CALL SURFAC(IPRF)
 110  200     TSURF = TFIN + 1.
 111          IF(TFIN.GT.TMIN) RETURN
 112          ITERM=KSFE
 113          RETURN
 114          END
```

```
ISN
 1          SUBROUTINE KEYS(IPLARF,IPORT,IEQRF)
      C
      C  -- THE PURPOSE OF THIS SUBROUTINE IS TO:
      C       1. DETERMINE IF A PLAYER HAS KEYS TO
      C          LOCK OR UNLOCK A PORTAL
      C
      C  -- INPUT PARAMETERS
      C
      C        IPLARF -- PLAYER REFERENCE
      C        IPORT -- PORTAL REFERENCE
      C
      C  -- OUTPUT VARIBLES
      C
      C        IEQRF -- EQUIPMENT REFERENCE
      C
      C  -- PROCEDURE
      C       1. DETERMINE THAT PORTAL IS LOCKED
      C       2. FIND ACCESS TYPE (KEY PARAMETER)
      C       3. SEARCH PLAYERS EQUIPMENT LIST TO
      C            FIND KEY WITH PARAMETER EQUAL TO
      C            ACCESS OF PORTAL
      C
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,FLDNAM,FORMOT
 5          COMMON /PARS1/
 6          COMMON /PARS2/
 7          COMMON /PARS3/
      C
      C
 8          IEQRP=NULL
      C
      C  -- PORTAL STATUS
      C
```

```
ISN
 9           IF(IVAL(JSTAT,IPORT) .LT. KLOCKD) IEQRF=0
10           IF(IVAL(JSTAT,IPORT) .NE. KLOCKD) GO TO 100
      C
      C  -- ASSUMPTION
      C       IF LOACKABLE WITH KEY STATUS THEN ALSO
      C             UNLOKABLE WITH KEY
      C      IF LOCKABLE WITHOUT KEY THEN ALSO UNLOCKABLE
      C             WITHOUT KEY
      C
      C   FIND LOCKABLITY OF PORTAL
      C
11           ILOC=IVAL(JLOCK,IPORT)
12                IF(ILOCK .EQ. 1) GO TO 100
13                IF(ILOCK .EQ. 2) GO TO 5
      C
      C  --LOCKABLE WITHOUT KEY
      C
14           IEQBF=0
15           GO TO 100
      C
      C  -- FIND ACCESS TYPE
      C
16         5 IACS=IVAL(JDRACC,IPORT)
      C
      C  -- FIND KEY TO MATCH
      C
17           IEQLT=IVAL(JWEAPS,IPLARF)
18           IEQUIP=IFIRST(IEQLT,KA)
19        10      IF(IEQUIP .EQ. NULL) GO TO 100
      C
      C  -- IGNORE WEAPONS
      C
20           CALL PARSRF(IEQUIP,IDY,IRR,IDU)
21               IF(IDY .NE. LEQUIP) GO TO 20
      C
      C  -- TEST FOR EQUIPMENT TYPE KEY
```

```
ISN
      C
22          IF(IVAL(JTYPE,IEQUIP) .NE. KKEY) GO TO 20
23          IF(IVAL(JPAR,IEQUIP) .EQ. 0) GO TO 40
24          IF(IVAL(JPAR,IEQUIP) .EQ. IACS) GO TO 40
      C
25       20 IEQUIP=NEXT(IEQLT,KA)
26          GO TO 10
      C
      C  -- KEY FOUND
      C
27       40 IEQRF=IEQUIP
      C
28      100 CONTINUE
29          RETURN
30          END
```

```
ISN
 1          SUBROUTINE LDRPER(IPLARF,LDRFRC,MSITNF)
      C ... THE PURPOSE OF THIS SUBROUTINE IS TO UPDATE LEADER FORCE
      C     PERCEPTIONS.  A LEADER HAS A PERCEPTION OF EACH FORCE ON HIS
      C     SIDE, AND A SINGLE FORCE PERCEPTION INCLUDING ALL OF THE
      C     OPPOSING PLAYERS OF WHICH HE IS AWARE.
      C ... FOR A DESIGNATED LEADER, PROCESS IS AS FOLLOWS:
      C        1. SEARCH PLAYERS LEADER PERCEIVES TO INSURE THAT HE
      C           HAS A FORCE PERCEPTION OF THE APPROPRIATE FORCE.
      C        2. INSURE THAT PLAYER IS INCLUDED IN PERCEPTION OF
      C           APPROPRIATE FORCE CONTENTS.
      C        3. PROCESS ONE FORCE PERCEPTION AT A TIME, UPDATING
      C           IT FROM THE LEADER'S PERCEPTIONS OF THE PLAYERS
      C           CONSTITUTING THE FORCE.
      C ... FP-0 IS ALWAYS THE ENTRY IN THE JID FIELD FOR THE
      C     OPPOSING FORCE PERCEPTION.
      C
      C  INPUT PARAMETERS:
      C     IPLARF   REFERENCE TO LEADER
      C     LDRFRC   REFERENCE TO FORCE THAT LEADER COMMANDS
      C     MSITNF   LEADER'S PREVIOUS PERCEPTION OF HIS FORCE'S SITUATION
      C
      C  OUTPUT PARAMETERS:
      C     MSITNF   LEADER'S CURRENT PERCEPTION OF HIS FORCE'S SITUATION
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
 8          COMMON /PARS1/
 9          COMMON /PARS2/
10          COMMON /PARS3/
11          COMMON /RECREF/
12          DIMENSION RECREO(140)
```

```
          EQUIVALENCE (RECREQ(1),IGOALS)
          COMMON /NEW/
C
C  --  UPDATE LOCAFE BY PLACE OF LEADER
C
          IF(IVAL(JALLEG,IPLARF) .EQ. KAFE)
         *    LOCAFE=IPLACE(IVAL(JLOCN,IPLARF))
C
C         RETURN IF NULL PERCEPTIONS
C
              IF(IVAL(JPRCPS,IPLARF) .EQ. NULL) RETURN
C
C         START LIST THROUGH LEADER'S PERCEPTIONS
C
              IPCLIS=IVAL(JPRCPS,IPLARF)
              IPCPRF=IFIRST(IPCLIS,N2)
   15             IF(IPCPRF .EQ. NULL) GO TO 100
                  IRECRF=IVAL(JID,IPCPRF)
C
C         IF PERCEPTION NOT OF A PERSON, IGNORE
C
                  IF(IRECRF .EQ. NULL) GO TO 90
                  CALL PARSRF(IRECRF,IDTYP,IRECNO,IDUM)
                  IF(IDTYP .NE. LPERSN) GO TO 90
C
C         IF PERCEPTION OF OPPONENT REQUIRE FR-0
C
                  IF(IVAL(JALLEG,IRECRF) .EQ. ISIDE) GO TO 20
                  IFORCE=NEWREF(LFORCE,0,0)
                  GO TO 30
C
C         IF FRIEND, NEED SPECIFIC FORCE
C
   20             IFORCE=IVAL(JFORCE,IRECRF)
C
C         SEE IF LEADER HAS PERCEPTION OF IFORCE
```

FSN MODEL   - LDRPER SUBROUTINE

```
ISN
        C
 28   30         ION=LSERCH(IPCLIS,NULL,NULL,JID,IFORCE)
 29              IF(ION .NE. NULL) GO TO 40
        C
        C      CREATE APPROPRIATE FORCE PERCEPTION
        C
 30              ION=NEWREF(LPERCP,NEWREC(LPERCP),0)
 31              CALL CHGFLD(JID,ION,IFORCE,1,NULL)
 32              NEWFC=NEWREF(LFORCE,NEWREC(LFORCE),0)
 33              CALL CHGFLD(JVIEW,ION,NEWFC,1,NULL)
        C
        C      ADD PERCEPTION TO IPCLIS
        C
 34              IF(N2.NE.NULL) GO TO 35
        C
        C ... CURRENTLY SINGLE REF, NOT LIST
        C
 35              IPCLIS = ISTACK(IPCLIS,ION)
 36              IPTR = IREF(JPRCPS,IPLARF)
 37              ITEM(IPTR) = IPCLIS
 38              IPCPRF = IFIRST(IPCLIS,N2)
 39              GO TO 40
 40   35         N3=NEWREC(LLIST)
 41              LISTND(JNXT,N3)=LISTND(JNXT,N2)
 42              LISTND(JNXT,N2)=N3
 43              LISTND(JVAL,N3)=ION
        C
        C ... INSURE PLAYER INCLUDED IN CONTENTS OF PERCEIVED FORCE
        C
 44   40         IFRCRF = IVAL(JVIEW,ION)
 45              IONLIS=IVAL(JCCNTS,IFRCRF)
 46              ION=LSERCH(IONLIS,IFRCRF,NULL,NULL,NULL)
 47              IF(ION .NE.NULL) GO TO 90
        C
        C      ADD PLAYER TO CONTENTS LIST OF FORCES PERCEIVED
        C
```

```
ISN
48                IONLIS=ISTACK(IRECPF,IONLIS)
49                CALL CHCFLD(JCONTS,IRECPF,IONLIS,L,NULL)
      C
      C      END FIRST LOOP THROUGH PERCEPTIONS
      C
50    90        IPCPRF=NEXT(IPCLIS,N2)
51              GO TO 15
      C
      C      ALL PLAYERS THAT LEADER PERCEIVES ARE INCLUDED AS CONTENTS
      C      IN ONE OF HIS FORCE PERCEPTIONS.  NOW PROCESS HIS FORCE
      C      PERCEPTIONS, UPDATING THE INFORMATION BASED ON HIS PERCEPTIONS
      C      OF PLAYERS.  UPDATING PROCEDURES AS FOLLOWS:
      C
      C      FIELD            FRIEND                     FOE
      C      JTYPE       GET FROM ACTUAL FORCE       DEFAULT=FIRST ECHELON
      C
      C      JALLEG           FRIEND                     FOE
      C
      C      JELOP            GET FROM ACTUAL FORCE        DEFAUL=NULL
      C
      C      JCONTS           AS NOTED                     AS NOTED
      C
      C      JFSTAT           COMPUTED FROM PLAYER         COMPUTED FROM PLAYER
      C                          PERCEPTIONS                  PERCEPTIONS
      C      JSITN            MAX OF PERSONAL              MAX OF PERSONAL
      C                       JSITN OF CONTENTS            JSITN OF CONTENTS
      C
      C      JFPLNS           COPY FROM ACTUAL FORCE       NULL
      C
      C      JFSOPS           COPY FROM ACTUAL FORCE       NULL
      C
      C ... START SECOND LOOP THROUGH PERCEPTIONS
      C      LOOKING FOR FORCE PERCEPTIONS TO UPDATE
52    100    IPCLIS=IVAL(JPRCPS,IPLAFF)
53           IPCPRF=IFIRST(IPCLIS,N2)
54    115      IF(IPCPRF .EQ. NULL) RETURN
```

```
ISN
55              IRECRF=IVAL(JVIEW,IPCPRF)
      C
      C ... IGNORE IF NOT A FORCE
      C
56              IF(IRECRF .EQ. NULL) GO TO 170
57              CALL PARSRF(IRECRF,IDTYP,IRECNO,IDUM)
58              IF(IDTYP .NE. LFORCE) GO TO 170
59              IPTR=IREF1(IRECRF)
      C
      C     INITIALIZE STATUS AND SITUATION COUNTERS
      C
60              CONTT=0.0
61              WHOLE=0.0
62              MSITN=1
      C
      C     GET FIXED VALUES
      C
63              IBASRF=IVAL(JID,IPCPRF)
64              IF(IBASRF .EQ. NULL) GO TO 170
65              CALL PARSRF(IBASRF,IDTYP,IRECNO,IDUM)
66              IF(IRECNO .EQ. 0) GO TO 120
      C
      C     SETUP FOR FRIEND
      C
67              ITEM(IPTR+JTYPE)=IVAL(JTYPE,IBASRF)
68              ITEM(IPTR+JFALEG)=ISIDE
69              ITEM(IPTR+JFLDR)=IVAL(JFLDR,IBASRF)
70              ITEM(IPTR+JFPLNS)=IVAL(JFPLNS,IBASRF)
71              ITEM(IPTR+JFSOPS)=IVAL(JFSOPS,IBASRF)
72              GO TO 130
      C
      C     SET UP FOR FOE
      C
73    120       ITEM(IPTR+JTYPE)=KECH1
74              ITEM(IPTR+JFALEG)=NALLEG+1-ISIDE
      C
```

```
ISN
      C      LOOP THROUGH PERCEIVED FORCE CONTENTS
      C      USING PERCEPTIONS OF MEMBERS TO UPDATE STATUS ...
75    130       LISCON=IVAL(JCONTS,IRECRF)
76              IPRF=IFIRST(LISCON,N3)
77    135          IF(IPRF .EQ. NULL) GO TO 160
78                 CALL PARSRF(IPRF,IDTYP,IRECNO,IDUM)
79                 IF(IDTYP .NE. LPERSN) GO TO 150
      C
      C      GET VIEW OF PLAYER
      C
80                 ION=LSERCH(IPCLIS,NULL,NULL,IID,IPRF)
81                 IF(ION .EQ. NULL) GO TO 150
82                 CONTT=CONTT+1.0
83                 IVWREF=IVAL(JVIEW,ION)
84           IF(IVAL(JPSTAT,IVWREF) .GE. KWOUND .OR.
           +          IVAL(JPSTAT,IVWREF) .EQ. NULL)
           +         WHOLE=WHOLE+1.0
85                 MSITN=MAX0(MSITN,IVAL(JSITN,IVWREF))
      C
      C      END LOOP THROUGH CONTENTS
      C
86    150       IPRF=NEXT(LISCON,N3)
87              GO TO 135
      C
      C       UPDATE FORCE PERCEPTION
      C
88    160       STATUS=0.0
89              MSIDE=IVAL(JFALEG,IRECRF)
90              IF(MSIDE.EQ.KSFE .AND. MSITN.GE.KSITN3)
           +  MSITN=MSITN+1
91              IF(CONTT .LE. 0.0) GO TO 165
92              STATUS=WHOLE/CONTT
      C
      C  IF STATUS DROPS, LEADER PLANNING
      C
93           IF(VAL(JFSTAT,IRECRF) .LE. STATUS) GO TO 165
```

```
 ISN
  94          IF(ISIDE .EQ. KSFE) MSITN=KSITN5
  95          IF(ISIDE .EQ. KAFE) MSITN=KSITN4
  96    165      CALL CHGFLD(JFSTAT,IRECRF,STATUS,1,NULL)
  97          IFLG=IVAL(JFALEG,IRECRF)
  98          IF(ISIDE .EQ. IFLG) MSITNF=MSITN
  99              IF(MSITN .EQ. IVAL(JSITN,IRECRF)) GO TO 170
 100             CALL CHGFLD(JSITN,IRECRF,MSITN,1,NULL)
        C
        C     END LOOP THRU PERCEPTIONS
        C
 101    170   IPCPRF=NEXT(IPCLIS,N2)
 102          GO TO 115
 103    END
```

ISN

```
      SUBROUTINE LDRPLN
C
C     ROUTINE TO PERFORM LEADER PLANNING AND TO IMPLEMENT A LEADER'S
C  TRANSMISSION OF ORDERS TO HIS SUBORDINATES.
C
      COMMON /STATEV/
      DIMENSION ITEM(41900),DITEM(41900)
      EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
      COMMON /PARS/
      EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
      REAL*8 DTPNAM,FLDNAM,FORMOT
      COMMON /PARS1/
      COMMON /PARS2/
      COMMON /PARS3/
      COMMON /DATAV/
      DIMENSION ACTTIM(25)
      EQUIVALENCE (ACTTIM(1),ACTRAT(1))
      COMMON /RECREF/
      DIMENSION RECPFO(140)
      EQUIVALENCE (RECPFO(1),IGOALS)
      COMMON /NEW/
C
C  ITERATE OVER SIDE
      DO 100 ISIDE = 1,2
C
C  ITERATE OVER PLAYERS ON EACH SIDE
      IFLD = JGARDS
      IF (ISIDE .EQ. 2) IFLD = JADVPS
      IPSNS = IVAL(IFLD,ISITE)
      IPERSN = IFIRST(IPSNS,KP)
 10      IF (IPERSN .EQ. NULL) GO TO 100
C  SKIP OVER ANY PERSON WHO IS NOT A LEADER
         IF (IVAL(JSUBS,IPERSN) .EQ. NULL) GO TO 90
C  DETERMINE FORCE WHICH LEADER DIRECTS
         IFORCE = IVAL(IFORCE,IPERSN)
```

```
ISN
        C
        C  --  UPDATE TRUE FORCE RECORD IN WHICH
        C          THIS PLAYER IS A LEADER
        C
 26               CONTT=0.0
 27               WHOLE=0.0
 28               MSITN=1
        C
 29               ILLST=IVAL(JCONTS,IFORCE)
        C
        C  -- SEARCH LIST OF PLAYERS ON FORCE
        C
 30               IPRF=IFIRST(ILLST,KA)
 31            15       IF(IPRF .EQ. NULL) GO TO 16
 32               CONTT=CONTT+1.0
 33               IF(IVAL(JPSTAT,IPRF) .GE. KWOUND)
              +        WHOLE=WHOLE+1.0
 34               MSITN=MAXO(MSITN,IVAL(JSITN,IPRF))
        C
        C  -- NEXT PLAYER ON FORCE
 35               IPRF=NEXT(ILLST,KA)
 36               GO TO 15
        C
        C  -- UPDATE FORCE RECORD
        C
 37            16 STATUS=0.0
 38               MSIDE=IVAL(JFALEG,IFORCE)
 39               IF(MSIDE .EQ. KAFF) GO TO 5
 40               IF(MSITN .GE. KSITN3) MSITN=MSITN+1
 41               IF(MSITN .EQ. KSITN4) IAIMPT(1) = 2
 42               IF(MSITN .LE. KSITN4) GO TO 5
 43               IAIMPT(1) = 3
 44               IFCOND(1) = 3
 45             5 IF(CONTT .LE. 0.0) GO TO 17
 46               STATUS=WHOLE/CONTT
        C
```

```
ISN
      C   IF STATUS DROPS, DO PLANNING
      C
 47           IF(VAL(JFSTAT,IFORCE) .LT. STATUS) GO TO 17
 48           IF(ISIDE .EQ. KSFE) MSITN=KSITN5
 49           IF(ISIDE .EQ. KAFE) MSITN=KSITN4
 50       17 CALL CHGFLD(JFSTAT,IFORCE,STATUS,1,IDUM)
 51           IF(MSITN .EQ. IVAL(JSITN,IFORCE)) GO TO 18
 52           CALL CHGFLD(JSITN,IFORCE,MSITN,1,IDUM)
      C
      C   DETERMINE PERCEPTIONS OF CURRENT SITUATION OF THIS FORCE
 53       18    CALL PAPSRF(IPERSN,IDUM,IPLAYR,IDUM)
      C   GET LEADER'S CURRENT PERCEPTION OF ALL FORCE SITUATIONS
 54              MSITN = IFRCPC(IPLAYR)
 55              MSITNF = MSITN
      C   UPDATE LEADER'S PERCEPTION OF FORCES
 56              CALL LDRPER(IPERSN,IFORCE,MSITNF)
      C
      C
      C   --  TEST IF RESPONSE FORCE SHOULD BE CALLED
      C
 57           MSITNF=IVAL(JSITN,IFORCE)
 58           IF(MSITNF .LT. 3) GO TO 22
      C
      C   -- TEST IF RESPONSE FORCE ALREADY CALLED
      C
 59           IF(TMRESP .GE. 1.E10) TMRESP=TMIN+RESPTM
      C
      C   CHECK WHETHER FORCE IS PERCEIVED TO BE ENGAGED.  IF SO DO PLANNING.
 60        22     IF (ISIDE .EQ. KAFE .AND. MSITNF .EQ. KSITN4) GO TO 30
 61               IF (ISIDE .EQ. KSFE .AND. MSITNF .EQ. KSITN5) GO TO 30
      C ... CHECK FOR GOAL COMPLETION
 62           IF(NEWGOL .NE. NULL) GO TO 30
      C   CHECK WHETHER FORCE'S PERCEIVED SITUATION HAS CHANGED.  IF SO DO
      C   PLANNING
 63               IF (MSITN .EQ. MSITNF) GO TO 90
 64   30          IFRCPC(IPLAYR) = MSITNF
```

ESN MODEL - LDRPLN SUBROUTINE

```
ISN
      C   CALL LEADER'S PLANNING ROUTINE
65              CALL PLANAC(1,IPERSN)
      C
      C   GET NEXT PERSON
66    90        IPERSN = NEXT(IPSNS,KP)
67              GO TO 10
68    100   CONTINUE
69          RETURN
70          END
```

```
ISN
  1          FUNCTION LOS(IR, JR)
       C   FUNCTION TO CHECK WHETHER IR AND JR HAVE LINE-OF-SIGHT.
       C   IR AND JR MAY BE ENTITIES, LOCATIONS, OR SITE NODES.
  2          COMMON /PARS/
  3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  4          REAL*8 DTPNAM,FLDNAM,FORMOT
  5          COMMON /PARS1/
  6          COMMON /PARS2/
  7          COMMON /PARS3/
  8          DIMENSION IREF(2), A(3,2), IN(2), LOC(2)
  9          IREF(1) = IR
 10          IREF(2) = JR
 11          DO 50 J = 1, 2
 12            LOC(J) = -999
 13            CALL PARSRF(IREF(J), ID, IDUM, IDUM)
 14            IF (ID .EQ. LLOCN) GO TO 30
 15            IF (ID .GE. LYARD .AND. ID .LE. LWIND) GO TO 40
 16            IF (ID .GE. LVEHIC .AND. ID .LE. LSENS) GO TO 20
 17       10   LOS = -1
 18            CALL ERR(12, 21, IREF(J), 0, 0)
 19            RETURN
       C
       C ... ENTITY, RETRIEVE LOCATION
 20       20   LOC(J) = IVAL(JLOCN,IREF(J))
 21            IREF(J) = IPLACE(LOC(J))
 22            GO TO 40
       C
       C ... HAVE LOCATION RECORD
 23       30   LOC(J) = IREF(J)
 24            IREF(J) = IVAL(JPLACE,IREF(J))
       C    FIND THE INTERIOR STATUS
 25       40   IN(J) = INTER(IREF(J)) + 1
 26            IF (IN(J) .LT. 1) GO TO 10
 27       50 CONTINUE
       C
```

```
C     EXAMINE INTERIOR RELATIONS
C
          IN1 = IN(1)
          IN2 = IN(2)
          IFLAG = 0
          GO TO (60, 70, 80, 90, 90), IN1
       60 GO TO (150, 150, 140, 190, 190), IN2
       70 GO TO (150, 150, 110, 100, 100), IN2
       80 GO TO (140, 110, 120, 120, 120), IN2
       90 GO TO (190, 120, 120, 120, 120), IN2
      100 ITEMP = IREF(1)
          IREF(1) = IREF(2)
          IREF(2) = ITEMP
          IN1 = IN2
          GO TO 120
      110 IFLAG = 1
      120 IPORT = 0
      125 LOS = INTLOS(IREF(1),IREF(2))
          IF (LOS .EQ. 1) RETURN
          IF (IN1 .NE. 4) GO TO 130
          IF (IPORT .EQ. 1) GO TO 130
          IF (ISEEPT(IREF(1)) .EQ. 0) GO TO 130
          IREF(1) = IVAL(JPORT,IREF(1))
          IPORT = 1
          GO TO 125
      130 CONTINUE
          IF (IFLAG .EQ. 0) RETURN
      140 CONTINUE
          IPORT = 0
          GO TO 160
      150 IPORT = 1
      160 CONTINUE
          DO 180 J = 1, 2
            IF (LOC(J) .EQ. - 999) GO TO 170
            CALL COORDS(LOC(J), A(1,J), A(2,J), A(3,J))
            GO TO 180
```

```
 170   A(1,J) = IVAL(JXCO,IREF(J))
       A(2,J) = IVAL(JYCO,IREF(J))
       A(3,J) = IVAL(JZCO,IREF(J))
 180 CONTINUE
     LOS = LOSXY2(IPORT,A(1,1),A(1,2)) - 1
     LOS = MIN0(1,LOS)
     RETURN
 190 LOS = 0
     RETURN
     END
```

FSN MODEL - LOSLIS FUNCTION

```
      FUNCTION LOSLIS(IREF,I)
C   FUNCTION TO PROVIDE A LIST OF SIGNIFICANT MODEL ENTITIES (PERSONS,
C   VEHICLES, AND SENSORS) HAVING LINE-OF-SIGHT WITH PERSON I.
C
C     IREF     ->  REFERENCE TO PLAYER I, THE OBSERVER
C     I        ->  INDEX OF OBSERVER
C     LOSLIS   <-  REFERENCE TO LIST OF ENTITIES HAVING LOS WITH I
C
      COMMON /PARS/
      EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
      REAL*8 DTPNAM,FLDNAM,FORMOT
      COMMON /PARS1/
      COMMON /PARS2/
      COMMON /PARS3/
      COMMON /RECREF/
      DIMENSION RECRFQ(140)
      EQUIVALENCE (RECRFQ(1),IGOALS)
      LOSLIS =NULL
C
C     ITERATE THROUGH ENTITIES ON THE SITE (GUARDS, ADVERSARIES,
C VEHICLES, AND SENSORS, RESPECTIVELY)
  300 CONTINUE
      ISEN = 0
      JL = JGARDS
  305 LISPN = IVAL(JL,ISITE)
  310 JREF = IFIRST(LISPN,NRENT)
  320 IF (JREF .NE. NULL) GO TO 390
      IF (JL .NE. JGARDS) GO TO 330
      JL = JADVRS
      GO TO 305
  330 IF (JL .NE. JADVRS) GO TO 340
      JL = JVEHS
      GO TO 305
  340 IF (JL .NE. JVEHS) RETURN
C    ITERATE THROUGH SENSORS
```

FSN MODEL - LOSLIS FUNCTION

```
ISN
25            NS = NRECSO(LSENS)
26            IF (NS.LE.0) RETURN
27            ISEN = 1
28            KS = 0
29            JREF = NEWREF(LSENS,0,0)
30     350    IF (KS .GE. NS) RETURN
31            KS = KS + 1
32             JREF = JREF + 1
33            IF (IVAL(JTYPE,JREF) .LT. KXPLSN) GO TO 350
34            IF(IVAL(JTYPE,JREF) .GT. KCRDSN) GO TO 350
       C   PROCESS OBSERVABLE ENTITY J
35       390 CONTINUE
       C   ELIMINATE SELF REFERENCE BY OBSERVER
36            IF (JREF .EQ. IREF) GO TO 490
       C   ELIMINATE DUPLICATE ENTRIES
37     391    IF (LSERCH(LOSLIS,JREF,NULL,NULL,NULL) .NE. NULL) GO TO 490
38       405 L = LOS(IREF,JREF) + 1
39            GO TO (490,410,410),L
       C  HAVE LOS -- ADD TO LIST
40       410 LOSLIS = ISTACK(JREF,LOSLIS)
       C   GET NEXT ENTITY
41     490    IF(ISEN .EQ. 1) GO TO 350
42            JREF = NEXT(LISPN,NRENT)
43            GO TO 320
44            END
```

FSN MODEL - LOSXYZ FUNCTION

```
ISN
 1           FUNCTION LOSXYZ(IPORT,CI,CJ)
       C   FUNCTION TO CHECK IF POINTS CI AND CJ HAVE LOS. RETURNS 1 IF
       C   NO, 2 IF YES,  3 IF TOO CLOSE.
       C   SHOULD NOT BE CALLED FOR LOCATIONS INTERIOR TO BUILDINGS (EXCEPT
       C   FOR EXTERIOR PORTALS). IPORT CONTROLS PORTAL STATUS--IF 1,
       C   ALL PORTALS ARE CONSIDERED OPAQUE.
 2           COMMON /PARS/
 3           EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4           REAL*8 DTPNAM,FLDNAM,FORMOT
 5           COMMON /PARS1/
 6           COMMON /PARS2/
 7           COMMON /PARS3/
 8           COMMON /DATAV/
 9           DIMENSION ACTTIM(25)
10           EQUIVALENCE (ACTTIM(1),ACTRAT(1))
11           COMMON /RECREF/
12           DIMENSION RECRFQ(140)
13           EQUIVALENCE (RECRFQ(1),IGOALS)
14           DIMENSION A(4),B(4),X(2),CI(1),CJ(1)
       C   IF THE LOCATIONS ARE TOO CLOSE, INDICATE ERROR
15        40 D = ABS(CI(1)-CJ(1)) + ABS(CI(2)-CJ(2)) + ABS(CI(3)-CJ(3))
16           IF (D .GT. .1) GO TO 50
17           LOSXYZ = 3
18           RETURN
       C   ITERATE THROUGH ALL BARRIERS ON SITE
19           LISBAR = IVAL(JCBARS,ISITE)
20           IBAREF = IFIRST(LISBAR,NOBAR)
21       100 IF (IBAREF .EQ. NULL) GO TO 200
       C   DISCARD TRANSPARENT BARRIERS
22           IF (IVAL(JVIS,IBAREF) .GE. KTRANP) GO TO 190
       C   GET COORDINATES OF THE PROJECTION OF THE BARRIER ON THE XY PLANE
23           DO 120 K=1,4
24       120 B(K) = VAL(JXCO1+K-1,IBAREF)
       C   SEE IF LINE SEGMENT DEFINED BY THE LOCATIONS INTERSECTS THE
       C   PROJECTION OF THE BARRIER
```

```
ISN
25           A(1)  = CI(1)
26           A(2)  = CI(2)
27           A(3)  = CJ(1)
28           A(4)  = CJ(2)
29           INT = INTSCT(A,B,X)
      C    IF NO INTERSECTION, GET NEXT BARRIER
30           IF (INT .LE. 0) GO TO 190
      C    HAVE AN INTERSECTION. IF COLLINEAR ASSUME LOS**********
31           IF (INT .EQ. 2) GO TO 190
      C
      C    THE PROJECTIONS HAVE A UNIQUE INTERSECTION GIVEN IN X(1), X(2).
      C    USE THE THIRD DIMENSION TO SEE IF THE LINE AND BARRIER ACTUALLY
      C    INTERSECT.
      C
      C    IF THE LINE IS PARALLEL TO THE Y-AXIS, USE THE PROPORTION OF
      C    THE Y'S INSTEAD OF THE X'S.
32           X1 = CI(1)
33           X2 = CJ(1)
34           X3 = X(1)
35           IF (ABS(CI(1)-CJ(1)) .GT. .1) GO TO 150
36           X1 = CI(2)
37           X2 = CJ(2)
38           X3 = X(2)
39         150 ZINT =  CI(3)  +  (CJ(3)-CI(3))*(X3-X1)/(X2-X1)
      C    IF THE LINE CLEARS THE BARRIER, GET NEXT BARRIER
40           IF (ZINT .GT. VAL(JHIGH,IBAREF)) GO TO 190
      C    LINE INTERSECTS BARRIER. CHECK FOR PORTALS UNLESS EXCLUDED
41           IF (IPORT.EQ.1) GO TO 165
42           LISPOR = IVAL(JPORTS,IBAREF)
      C    IF NO PORTALS, NO LOS
43         160 IF (LISPOR .NE. NULL) GO TO 170
44         165 LOSXYZ = 1
45           RETURN
      C    ITERATE THROUGH PORTALS
46         170 IPOREF = IFIRST(LISPOR,NOPOR)
47         175 IF (IPOREF .EQ. NULL) GO TO 165
```

FSN MODEL - LOSXYZ FUNCTION

```
ISN
      C    DOES THE LOS PROJECTION INTERSECT THE PORTAL PROJECTION?
48            DH = VAL(JHORIZ,IPOREF)/2.
49            DV = VAL(JVERT,IPOREF)
50            ZP = VAL(JZCO,IPOREF)
51            ZPT = ZP + DV
52            IF (ZINT.LT.ZP .OR. ZINT.GT.ZPT) GO TO 180
53            DS = (X(1)-VAL(JXCO,IPOREF))**2 + (X(2)-VAL(JYCO,IPOREF))**2
54            DH2 = DH*DH
55            IF (DS .GT. DH2) GO TO 180
      C    THE LOS INTERSECTS THE PORTAL. IF THE PORTAL IS TRANSPARENT
      C    LOS IS STILL POSSIBLE.
56            IF (IVAL(JVIS,IPOREF) .EQ. KTRANP) GO TO 190
      C    IF THE PORTAL HAS A STATUS OF OPEN OR DESTROYED, LOS POSSIBLE.
57            IF (IVAL(JSTAT,IPOREF) .LE. KOPEN) GO TO 190
      C    NO LOS -- BLOCKED BY PORTAL
58            GO TO 165
59        180 IPOREF = NEXT(LISPOR,NOPOR)
60            GO TO 175
61        190 IBAREF = NEXT(LISBAR,NOBAR)
62            GO TO 100
      C    NO LOS INTERRUPTION BY BARRIERS; NOW CHECK ROOFS
63        200 CONTINUE
      C    IF NEITHER LOCATION HAS ELEVATION, NOT NECESSARY
64            IF (ABS(CI(3)-CJ(3)) .LT. .1) GO TO 300
65            LISBLD = IVAL(JBLDGS,ISITE)
66            ZMAX = AMAX1(CI(3),CJ(3))
67            ZMIN = AMIN1(CI(3),CJ(3))
68            IBLDGR = IFIRST(LISBLD,NOBLDG)
69        210 IF (IBLDGR .EQ. NULL) GO TO 300
70            LISRUF = IVAL(JROOFS,IBLDGR)
71        220 IROOF = IFIRST(LISRUF,NOROOF)
72        230 IF (IROOF .EQ. NULL) GO TO 270
73            ZO = VAL(JZCO,IROOF)
74            IF (ZMAX .LT. ZO .OR. ZMIN .GT. ZO) GO TO 250
      C    THE PLANE OF THE ROOF INTERSECTS THE LOS. DOES THE ROOF ITSELF
      C    INTERSECT?
```

FSN MODEL - LOSXYZ FUNCTION

```
ISN
75           CI(1) = X1
76           CJ(1) = X2
77           XC = VAL(JXCO,IROOF)
78           YC = VAL(JYCO,IROOF)
79           DX = VAL(JXLEN,IROOF)/2.
80           DY = VAL(JYLEN,IROOF)/2.
81           SZ = (Z0-CI(3))/(CJ(3)-CI(3))
      C   GET THE X,Y COORDINATES OF THE INTERSECTION
82           X0 = CI(1) + (CJ(1)-CI(1))*SZ
83           Y0 = CI(2) + (CJ(2)-CI(2))*SZ
      C   GET THE EXTREMES OF THE ROOF
84           BL = XC - DX
85           BR = XC + DX
86           BD = YC - DY
87           BU = YC + DY
88           IF (X0.LT.BL .OR. X0.GT.BR .OR. Y0.LT.BD .OR. Y0.GT.BU) GO TO 250
      C   HAVE INTERSECTION, NO LOS
89           LOSXYZ = 1
90           RETURN
      C   GET NEXT ROOF ON LIST
91       250 IROOF = NEXT(LISRUF,NOROOF)
92           GO TO 230
      C   GET NEXT BUILDING
93       270 IBLDGR = NEXT(LISBLD,NOBLDG)
94           GO TO 210
      C   NO LOS INTERRUPTION BY BARRIERS OR ROOFS
95       300 LOSXYZ = 2
96           RETURN
97           END
```

PSN MODEL - MDESIR SUBROUTINE

```
ISN
 1          SUBROUTINE MDESIR(IPLARF,LISTRF,TEMP)
      C
      C
      C  --  THE PURPOSE OF THIS SUBROUTINE IS TO:
      C           1.  EVALUATE THE DESIRABILITY FOR A PLAYER TO MOVE
      C                ALONG A SPECIFIED PATH.
      C
      C
      C  --  INPUT PARAMETERS
      C
      C
      C      IPLAYRF --  PLAYER REFERENCE FOR PLAYER DECIDING TO MOVE
      C
      C      LISTRF  --  LIST REFERNCE TO PATH(LIST OF NODE
      C                   REFERENCES)
      C
      C
      C  --  OUTPUT VARIABLES
      C
      C
      C      TEMP  --  VALUE OF DESIRABILITY TO BE COMPARED TO
      C                  MOVEMENT THRESHOLD
      C
      C
      C       PROCEDURE
      C            1. SEARCH LIST OF CASE SUBSETS
      C                AND ADD VALUES TO DESIRABILITY
      C
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,PLDNAM,FORMOT
 5          COMMON /PARS1/
 6          COMMON /PARS2/
 7          COMMON /PARS3/
```

```
ISN
  8          COMMON /DATAV/
  9          DIMENSION ACTTIM(25)
 10          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
       C
 11          DATA PI/3.14159/
       C  -- SEARCH PATH
       C
 12          TEMP=1.
 13          IF(EVALN(20) .LE. 0.) EVALN(20)=1.0
 14          INODE=IFIRST(LISTRF,KA)
 15        5      IF(INODE .EQ. NULL) GO TO 100
       C
       C  -- SEARCH PERCEPTIONS TO DETERMINE WHAT IS AT NODE
       C
 16          TT=0.
 17          IPLT=IVAL(JPRCPS,IPLARF)
 18          IPER=IFIRST(IPLT,KB)
 19       10      IF(IPER .EQ. NULL) GO TO 90
 20          IPERRF=IVAL(JVIEW,IPER)
 21               CALL PARSRF(IPERRF,IDYY,IRRN,IDDUM)
 22                IF(IDYY .EQ. LFORCE) GO TO 80
       C  CHECK PERCIEVED PYSICAL STATUS
       C
 23          IF(IVAL(JPSTAT,IPERRF) .EQ. KDEAD) GO TO 80
 24          IF(IVAL(JPSTAT,IPERRF) .EQ. KCAPTR) GO TO 80
       C
 25          IND=1
 26          IF(IVAL(JALLEG,IPERRF) .EQ. NULL) GO TO 80
 27          IF(IVAL(JALLEG,IPERRF) .EQ. IVAL(JALLEG,IPLARF))
         *                 IND=11
 28          IALT=IVAL(JACTIV,IPERRF)
 29          IF(IALT .EQ. NULL) GO TO 12
 30          IARF=IFIRST(IALT,KC)
 31          GO TO 15
 32       12 IARF=NULL
       C
```

```
ISN
      C   -- CASE SUBSET 1
      C      PERCIEVED LOCATION
      C
33        15 ILOC=IVAL(JLOCN,IPERRF)
                  IF(ILOC .EQ. NULL) GO TO 40
35           IF(IVAL(JSOURC,ILOC) .NE. INODE) GO TO 20
36           IF(VAL(JFRAC,ILOC) .NE. 0.) GO TO 20
37           TT=TT+EVALN(IND)
38           IND=IND+2
39           GO TO 40
      C
      C   -- CASE SUBSET 2
      C      PERCIEVED MOVING TOWARD NODE
      C
40        20 IND=IND+1
41           IF(IVAL(JSINK,ILOC) .NE. INODE) GO TO 30
42           TT=TT+EVALN(IND)
43           IND=IND+1
44           GO TO 40
      C
      C   -- CASE SUBSET 3
      C      MOVING AWAY FROM NODE
      C
45        30 IND=IND+1
46           IF(IVAL(JSOURC,ILOC) .NE. INODE) GO TO 50
47           TT=TT+EVALN(IND)
      C
      C   -- CASE SUBSET 4
      C       FIRING IN REGION
      C
48        40 IND=IND+1
49           IF(IARF .EQ. NULL) GO TO 80
50           IF(IVAL(JTYPE,IARF) .NE. KFIRNG) GO TO 48
51           TT=TT+EVALN(IND)
52           GO TO 80
53        48 IND=IND+1
```

```
ISN
54            GO TO 60
       C
       C  -- CASE SUBSET 5
       C       FIRING AT REGION
       C
55         50 IND=IND+2
              IF(IARF .EQ. NULL) GO TO 80
56            IF(IVAL(JTYPE,IARF) .NE. KFIRNG) GO TO 60
57            IF(IVAL(JPAR2,IARF) .NE. INODE) GO TO 60
58            TT=TT+EVALN(IND)
59            GO TO 80
60
       C
       C  -- CASE SUBSET 6
       C       OBSERVING IN AREA
       C
61         60 IND=IND+1
62            IF(IVAL(JTYPE,IARF) .NE. KDETNG) GO TO 80
63            ITAR=IVAL(JID,IPER)
64            CALL DIREC(ITAR,INODE,THET,PHE)
65            IF((THET+PI/4.) .GT. VAL(JPAR1,IARF)) GO TO 80
66            IF((THET-PI/4.) .LT. VAL(JPAR1,IARF)) GO TO 80
67            TT=TT+EVALN(IND)
       C
       C  -- NEXT PERCEPTION
       C
68         80 IPER=NEXT(IPLT,KB)
69            GO TO 10
       C
       C  -- NEXT NODE ON LIST
       C
70         90 TEMP=TEMP+TT/EVALN(20)
71            INODE=NEXT(LISTRF,KA)
72            GO TO 5
       C
73        100 CONTINUE
74            IF(TEMP .GT. 1.) TEMP=1.0
```

FSN MODEL - MDESIR SUBROUTINE

```
ISN
75          RETURN
76          END
```

```
ISN
 1          FUNCTION NACTSU(IPLARE,ISUB)
      C
      C  -- THE PURPOSE OF THIS FUNCTION IS TO:
      C        1. DETERMINE THE SUB-ACTIVITY OF A PLAYER
      C
      C
      C  -- INPUT PARAMETERS
      C
      C     IPLARE - PLAYER REFERENCE
      C     ISUB -- ACTIVITY DESIRED
      C
      C
      C  -- OUTPUT
      C
      C      THE FUNCTION RETURNS THE ACTIVITY SUBTYPE VALUE
      C
      C  -- PROCEDURE
      C
      C      1. FIND PLAYER ACTIVITY, IF NULL, NO ACTIVITY SUBTYPE
      C
      C      2. DETERMINE SUBACTIVITY BASED ON ACTIVITY
      C
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,FLDNAM,FOPNOT
 5          COMMON /PARS1/
 6          COMMON /PARS2/
      C
      C  -- FIND ACTIVITY
      C
 7          IACLT=IVAL(JACTIV,IPLARE)
      C
 8          IACTPE=IFIRST(IACLT,KA)
 9              IF(IACTPE .EQ. NULL) GO TO 10
```

```
            IT=IVAL(JTYPE,IACTRF)
                 IF(IT .EQ. KMOVNG) GO TO 20
                 IF(IT .EQ. KFIRNG) GO TO 30
                 IF(IT .EQ. KDETNG) GO TO 40
                 IF(IT .EQ. KCAPNG) GO TO 45
      C
         10 IACTS=KREST
            GO TO 50
      C
      C-- MOVING ACTIVITY
      C        DEFAULT SUB ACTIVITY IS RUNNING
      C
         20 IACTS=KRUN
            GO TO 50
      C
      C   -- FIRING ACTIVITY
      C        DETERMINE SUB-ACTICITY FROM WEAPON SELECTED
      C
         30 IWPRF=IVAL(JPAR3,IACTRF)
            IWPN=IVAL(JTYPE,IWPRF)
      C
      C   -- FIND SUBACTIVITY
      C
            IF(IWPN .EQ. KPISTL) IACTS=KBRBLD
            IF(IPWN .EQ. KRIFLE) IACTS=KFIRIF
            IF(IWPN .EQ. KMGUN) IACTS=KFIRNG
            IF(IWPN .EQ. KLAW) IACTS=KFILAW
            IF(IWPN .EQ. KGRNAD) IACTS=KFIGRN
            GO TO 50
      C
      C-- OBSERVING ACTIVITY
      C      DEFAULT SUB ACTIVITY IS STATIONARY
      C
         40 IACTS=KOSTST
            GO TO 50
      C
```

FSN MODEL - NACTSU FUNCTION

```
C   -- CAPTURING
C
    45 IACTS=KCPTEG
C
    50 IF(ISUB .EQ. NULL) GO TO 100
       IF(ISUB .EQ. IT) GO TO 100
       IF(ISUB .EQ. KMOVNG) GO TO 60
       IF(ISUB .EQ. KDETNG) GO TO 70
       IF(ISUB .EQ. KCAPNG) GO TO 80
       GO TO 100
C
    60 IACTS=KRUN
       GO TO 100
C
    70 IACTS=KDETST
       IF(IT .EQ. KMOVNG) IACTS=KDETMV
       IF(IT .EQ. KFIRNG) IACTS=KDETFI
       GO TO 100
C
    80 IACTS=KCPTRG
C
   100 NACTSU=IACTS
       RETURN
       END
```

FSN MODEL - NBRREG FUNCTION

```
ISN
 1             FUNCTION NBRREG(IPL)
        C   FUNCTION TO SEARCH THROUGH THE NEIGHBORS OF A NODE IPL
        C   AND RETURN THE REGION REFERENCE IF A ROOM OR HALL, OR THE
        C   NEGATIVE OF THE REGION REFERENCE IF A YARD OR ROOF, OR ZERO
        C   IF NO REGION NEIGHBOR.
        C
 2             COMMON /PARS/
 3             EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4             REAL*8 DTPNAM,FLDNAM,FORMOT
 5             COMMON /PARS1/
 6             COMMON /PARS2/
 7             COMMON /PARS3/
 8             NBRREG = 0
 9             NBRLIS = IVAL(JNBRS,IPL)
10             NBR = IFIRST(NBRLIS,INBR)
11      100    IF (NBR.EQ.NULL) RETURN
12             CALL PARSRF(NBR,IDTYP,IDUM,IDUM)
13             IF (IDTYP.NE.LROOM .AND. IDTYP.NE.LHALL) GO TO 150
        C   HAVE FOUND ROOM OR HALL NEIGHBOR
14             NBRREG = NBR
15             RETURN
16      150    IF (IDTYP.NE.LYARD .AND. IDTYP.NE.LROOF) GO TO 200
        C   HAVE FOUND YARD OR ROOF NEIGHBOR
17             NBRREG = -NBR
18             RETURN
19      200    NBR = NEXT(NBRLIS,INBR)
20             GO TO 100
21             END
```

FSN MODEL - NDRFIR FUNCTION

```
ISN
 1         FUNCTION NDRFIR(IPLARF,ITRG,IACTRF,IMNT)
      C
      C  -- THE PURPOSE OF THE FUNCTION IS TO:
      C         1. DETERMINE IF IPLARF WILL FIRE
      C              AT ITRG
      C
      C
      C  -- INPUT PARAMETERS
      C
      C         IPLARF  -- PLAYER REFERENCE
      C        ITRG   -- TARGET REFERENCE
      C        IACTRF -- ACTIVITY REFERENCE
      C        IMNT   -- FIRE ASSESSMENT
      C
      C
      C  -- OUTPUT
      C
      C        THIS FUCTION RETURNS EITHER  A 0 FOR UNACCEPABLE
      C        OR A 1 FOR ACCEPABLE TO FIRE
      C
      C  -- PROCEDURE
      C          1. DETERMINE IF TIME REMAINS FOR IPLARF TO FIRE
      C          2.  DETERMINE IF AMMUNITION AVAILABLE
      C
      C          3.  DETERMINE IF TERMINATION RELATION IS SATISFIED
      C
 2         COMMON /STATEV/
 3         DIMENSION ITEM(41900),DITEM(41900)
 4         EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5         COMMON /PARS/
 6         EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7         REAL*8 DTPNAM,FLDNAM,FORMOT
 8         COMMON /PARS1/
 9         COMMON /DATAV/
10         DIMENSION ACTTIM(25)
```

FSN MODEL - NDRFIR FUNCTION

```
ISN
11            EQUIVALENCE (ACTTIM(1),ACTRAT(1))
       C
       C  -- DETERMINE IF PLAYER TIME REMAINS
       C
12            ISUBA=NACTSU(IPLARF,NULL)
13            IF (VAL(J1REQ,IPLARF) .LT. ACTTIM(ISUBA)) GO TO 50
       C
       C  -- TIME REMAINS
       C        DETERMINE IF AMMUNITION AVAILABLE
       C
14            IWPNRF=IVAL(JPAR3,IACTRF)
15                 IF(IVAL(JAMT,IWPNRF) .LE. 0) GO TO 50
       C
       C  -- TEST IS AREA FIRE WEAPON
       C       DO NOT FIRE AGAIN
       C
16            IWPN=IVAL(JTYPE,IWPNRF)
17            IF(IFIRTP(IWPN) .EQ. 2) GO TO 50
       C
       C  -- TEST FOR RELATION BEING SATISFIED
       C
18            IRLT=IVAL(JMODS,IACTRF)
19            IRF=IFIRST(IRLT,KL)
20        30       IF(IRF .EQ. NULL) GO TO 60
       C
       C  -- TEST RELATION FOR TERMINATION
       C
       C
       C
21            IC=NRTEST(IRF)
22                 IF(IC .EQ. 1) GO TO 50
       C
       C  -- DECIDES TO FIRE AGAIN
       C
23            NDRFIR=1
24            IRF=NEXT(IRLT,KL)
```

```
ISN
25            GO TO 30
      C
      C    -- DO NOT FIRE AGAIN
      C
26         50 NDBFIR=0
      C
27         60 CONTINUE
28            RETURN
29            END
```

FSM MODEL - NEWLDR FUNCTION

```
ISN
 1            FUNCTION NEWLDR(ILEAD,IFORCE)
       C
       C  -- THE PURPOSE OF THIS FUNCTION IS TO:
       C         1. FIND A NEW LEADER FOR THE FORCE
       C
       C
       C  --  INPUT PARAMETERS
       C
       C
       C       ILEAD  -- OLD LEADER
       C
       C       IFORCE  --  REFERENCE TO FORCE RECORD
       C
       C
 2            COMMON /STATEV/
 3            DIMENSION ITEM(41900),DITEM(41900)
 4            EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5            COMMON /PARS/
 6            EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7            REAL*8 DTPNAM,FLDNAM,FCRMOT
 8            COMMON /PARS1/
 9            COMMON /PARS2/
10            COMMON /PARS3/
       C
       C
       C   RULE:  FIRST SUBORDINATE OF LEADER IS NEW LEADER
       C
11            ISUBLT=IVAL(JSUBS,ILEAD)
12            ITEMP=IFIRST(ISUBLT,KA)
13         10 IF(ITEMP .EQ. NULL) GO TO 30
14            IF(IVAL(JPSTAT,ITEMP) .GT. KCAPTR) GO TO 25
15            ITEMP=NEXT(ISUBLT,KA)
16            GO TO 10
       C
17         25 NEWLDR=ITEMP
```

FSN MODEL - NEWLDR FUNCTION

```
      GO TO 50
   30 NEWLDR=NULL
C
   50 CONTINUE
      RETURN
      END
```

FSM MODEL - NEWPCP SUBROUTINE

```
ISN
  1          SUBROUTINE NEWPCP(IMSGRP,IPLARP)
       C ... THE PURPOSE OF THIS ROUTINE IS TO UPDATE A PLAYER'S
       C     PERCEPTIONS OF AN OBJECT BASED ON A MESSAGE ABOUT
       C     THE OBJECT.  IT IS ASSUMED THAT THE ROUTINE IS
       C     CALLED ONLY WHEN IT HAS BEEN DETERMINED THAT THE
       C     PERCEPTION SHOULD BE UPDATED.  CURRENTLY A PLAYER
       C     MAY HAVE PERCEPTIONS OF VEHICLES, PERSONS AND
       C     SENSORS.
       C
       C     INPUT PARAMETERS:
       C          IMSGRP ... POINTS TO MESSAGE
       C          IPLARP ... POINTS TO PLAYER
       C
  2          COMMON /STATEV/
  3          DIMENSION ITEM(41900),DITEM(41900)
  4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
  5          COMMON /PARS/
  6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  7          REAL*8 DTPNAM,FLDNAM,FCSPCT
  8          COMMON /PARS1/
  9          COMMON /PARS2/
 10          COMMON /PARS3/
       C
       C ... DETERMINE TYPE OF OBJECT OBSERVED, RETURN
       C     IF NOT VEHICLE,PERSON OR SENSOR
       C
 11          IOBSRP=IVAL(JSUBJ,IMSGRP)
 12          CALL PARSRP(IOBSRP,IDTYP,IREC,IFLD)
 13          IATTR=IVAL(JATTR,IMSGRP)
 14          IF(IDTYP.LT.LVEHIC  .OR.  IDTYP.GT.LSENS) GO TO 60
       C
       C ... DETERMINE IF PLAYER CURRENTLY HAS PERCEPTION
       C     OF THIS OBJECT
       C
 15          LISPCP=IVAL(JPRCPS,IPLARP)
```

```
ISN
16             IPCPRF=LSERCH(LISPCP,NULL,NULL,JID,IOBSRF)
17             IF(IPCPRF.NE.NULL) GO TO 5
      C
      C ... CREATE A NEW PERCEPTION
      C
18             IVWREF=NEWREF(IDTYP,NEWREC(IDTYP),0)
19             IPCPRF = NEWRC4(LPERCP,IOBSRF,IVWREF,NULL,TMIN)
      C
      C ... ADD TO LIST OF PLAYER'S PERCEPTIONS
      C
20             LISPCP=ISTACK(IPCPRF,LISPCP)
21             CALL CHGFLD(JPRCPS,IPLABF,LISPCP,1,IDUM)
22             GO TO 7
      C
      C ... PERCEPTION EXISTS AND NEEDS TO BE UPDATED
      C      POSSIBILITIES  ARE:
      C            1. MAKE COPY OF MESSAGE CONTENT AND
      C               REPLACE FIELD IN VIEW RECORD WITH
      C               REFERENCE (JLOCN OR JACTIV)
      C            2. REPLACE FIELD IN VIEW RECORD WITH
      C               MESSAGE CONTENT  (ALL SCALARS,JDRIVER
      C               OR JLEADR)
      C            3. ADD MESSAGE CONTENT TO LIST IN VIEW
      C               RECORD. (ALL OTHER ATTRIBUTES)
      C
23     5       IVWREF=IVAL(JVIEW,IPCPRF)
24             CALL CHGFLD(JTIME,IPCPRF,TMIN,1,IDUM)
25     7       NBASE=IREP1(NEWREF(IDTYP,NRECS(IDTYP),0))
26             ITYP=ITEM(NBASE+IATTR)
27             IF(ITYP.GE.3) GO TO 20
      C
      C ... REPLACE FIELD IN VIEW RECORD WITH MESSAGE CONTENT
      C
28     10      CALL CHGFLD(IATTR,IVWREF,IVAL(JCONT,IMSGRF),1,NULL)
29             GO TO 50
      C
```

```
C ... NON-SCALAR FIELD, DETERMINE APPROPRIATE ACTION
C
 20     IF(IDTYP.EQ.LVEHIC .AND. IATTR.EQ.JDRIVR) GO TO 10
        IF(IDTYP.EQ.LPERSN .AND. IATTR.EQ.JLEADR) GO TO 10
        IF(IATTR.EQ.JLCCN) GO TO 40
        IF(IDTYP.EQ.LPERSN .AND. IATTR.EQ.JACTIV) GO TO 40
C
C ... IF NOT LIST ADD CONTENT TO LIST IN VIEW RECORD
C
        ICONT=IVAL(JCCNT,IMSGRF)
        CALL PARSRF(ICONT,ID,IR,IF)
        IF (ID .EQ. LLIST) GO TO 30
        ILIS=IVAL(IATTR,IVWREF)
        ILIS=ISTACK(IVAL(JCCNT,IMSGRF),ILIS)
        CALL CHGFLD(IATTR,IVWREF,ILIS,1,NULL)
        GO TO 50
C
C ... CONTENT IS LIST, ADD FIRST "NEW" ITEM
C
 30     ILIS = IVAL(IATTR,IVWREF)
        IREF = IFIRST(ICONT,NP)
 32     IF (IREF .EQ. NULL) GO TO 50
           ION = LSERCH(ILIS,IREF,NULL,NULL,NULL)
           IF (ION .NE. NULL) GO TO 35
C
C ... NEW ITEM FOUND, ADD TO LIST IN IVWREF
C
           CALL IQUEUE (IREF,ILIS)
           GO TO 50
 35     IREF = NEXT(ICCNT,NP)
        GO TO 32
C
C ... COPY MESSAGE CONTENT, STORE REFERENCE IN
C       APPROPRIATE FIELD OF VIEW RECORD
C
 40     INREF=ICOPY(IVAL(JCONT,IMSGRF))
```

```
ISN
51            CALL CHGFLD(IATTR,IVNREF,IRREF,1,NULL)
        C
        C ... UPDATE SITUATION OF IPLARF IF PERCEPTION IS OF ENEMY
        C
52      50    IF(IVAL(JSITN,IPLARF) .GE. KSITN3) GO TO 60
53            IF(IDTYP .NE. IPERSN) GO TO 60
54            IF(IVAL(JALLEG,IPLARF) .EQ. IVAL(JALLEG,IOBSRF)) GO TO 60
        C
        C ... IF SOURCE OF INFO IS IPLARF, SITN=KSITN3
        C     IF SOURCE OF INFO NOT IPLARF, SITN=KSITN2
55            MSITN=KSITN2
56            IF(IVAL(JSOURC,IMSGRF) .EQ. IPLARF) MSITN=KSITN3
57            IF(IVAL(JSITN,IPLARF) .GE. MSITN) GO TO 60
58            CALL CHGFLD(JSITN,IPLARF,MSITN,1,NULL)
59      60    RETURN
60            END
```

ISM MODEL - WPNS SUBROUTINE

```
ISN
 1          SUBROUTINE WPNS(IPLARF,ITRG,IWPNRF,WTYP)
      C
      C  --  THE PURPOSE OF THIS SUBROUTINE IS TO:
      C        1. SELECT THE MOST DESIRABLE WEAPON THAT
      C             IS CARRIED BY PLAYER IPLARF TO EMPLOY
      C              AGAINST TARGET TYPE ITRG
      C
      C
      C  -- INPUT PARAMETERS
      C
      C     IPLARF - PLAYER REFERENCE
      C
      C      ITRG -  TARGET REFERENCE
      C
      C
      C -- OUTPUT VARIABLES
      C
      C      WTYP -- THE WEAPON TYPE SELECTED
      C
      C      IWPNRF -- WEAPON RECORD REFERENCE
      C
      C  -- PROCEDURE
      C
      C     1. DETERMINE RANGE OF TARGET
      C
      C      2. SEARCH LIST OF WEAPONS CARRIED BY PLAYER
      C            -DETERMINE IF TARGET WITHIN RANGE
      C            - SELECT MOST DESIRABLE WITHIN RANGE
      C
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,FLDNAM,ECRMCT
 5          COMMON /PARS1/
 6          COMMON /PARS3/
```

```
ISN
  7          COMMON /DATAV/
  8          DIMENSION ACTTIM(25)
  9          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
      C
      C  -- DETERMINE TARGET TYPE
      C
 10          CALL PARSRF(ITRG,IDT,IDUM,IDUM)
 11             I = IVAL(JTYPE,ITRG)
 12               IF(IDT .EQ. LVEHIC) ITART=IARMTP(I)
 13               IF(IDT .EQ. LPERSN) ITART=KTGPSN
 14               IF(IDT .EQ. LSENS) ITART=KTGSEN
      C
      C  -- DETERMINE DISTANCE OF TARGET
      C
 15          DT=DIST(IPLARF,ITRG)
      C
      C  -- SEARCH WEAPON LIST FOR PLAYER
      C
 16          IWPLT=IVAL(JWEAPS,IPLARF)
 17          NTYP=0
 18          IRNK=99999
 19          IW=IFIRST(IWPLT,KA)
 20        5     IF(IW .EQ. NULL) GO TO 20
      C
      C  -- IGNORE EQUIPMENT
      C
 21          CALL PARSRF(IW,IDT,IDUM,IDU)
 22               IF(IDT .NE. IWEAP) GO TO 10
 23          ITYP=IVAL(JTYPE,IW)
 24               IF(DT .LT. RNGMIN(ITYP)) GO TO 10
 25               IF(DT .GT. RNGMAX(ITYP)) GO TO 10
      C
      C  -- DETERMINE IF RANK OF WEAPON GREATER THAN OTHERS
      C
 26          IF(IRNKWP(ITYP,ITART) .LE. 0) GO TO 10
 27          IF(IRNKWP(ITYP,ITART) .GE. IRNK) GO TO 10
```

FSE MODEL - NUPMS SUBROUTINE

```
ISN
      C
28          NTYP=ITYP
29          INPNDF=IW
30          IRNK=IRNKUP(ITYP,ITABT)
      C
31       10 IW=NEXT(INPLT,KA)
32                GO TO 5
      C
33       20 CONTINUE
34          RETURN
35          END
```

```
ISN
 1          SUBROUTINE OBS
      C
      C   ROUTINE TO CONDUCT OBSERVATION ACTIVITIES BY
      C   PERSONS -- SPECIFICALLY THOSE  WHICH HAVE OBSERVATION
      C   ORDERED AS AN ACTIVITY BY THE DECISION MODULE.  THE
      C   ROUTINE ALSO CONDUCTS A CHECK AT THE END OF EACH TIME STEP
      C   TO ALLOW TARGETS OF FIRE A CHANCE TO SEE THE FIRER.
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTFNAM,FIDNAM,ECEECT
 8          COMMON /PARS1/
 9          COMMON /PARS2/
10          COMMON /PARS3/
11          COMMON /DATAV/
12          DIMENSION ACTTIM(25)
13          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
14          COMMON /RECREF/
15          DIMENSION RECRFQ(140)
16          EQUIVALENCE (RECRFQ(1),IGOALS)
      C
      C   ITERATE THROUGH PERSONS ON SITE - GUARDS AND ADVERSARIES
17          JSIDE=JGARDS
18       50 CALL CHGVAR(4,JSIDE-JGARDS+1)
19          MPNLIS = IVAL(JSIDE,ISITE)
      C   GET FIRST PERSON ON LIST
20          MPNREF = IFIRST(MPNLIS,ICURNO)
21       60 IF(MPNREF .EQ. NULL) GO TO 300
22          CALL PARSRF(MPNREF,IDUM,IPLAYR,IDUM)
23          CALL CHGVAR(3,IPLAYR)
      C   GET ACTION RECORD OF THIS PERSON TO SEE IF HE IS OBSERVING;
      C   IF NOT, CHECK TIME REMAINING
```

```
ISN
24          NACLT = IVAL(JACTIV,MPNREF)
25          IF(NACLT .EQ. NULL) GO TO 65
26          NACT=IFIRST(NACLT,KK)
27          MTYPA = IVAL(JTYPE,NACT)
28          TR=DTSEC
29          ANGLE = VAL(JPAR1,NACT)
30          IF (MTYPA .EQ. KDETNG) GO TO 70
31       65 TR = VAL(JTREQ,MPNREF)
32          IF (TR.LE.0) GO TO 100
33          ANGLE = FNULL
      C   PERSON IS OBSERVING FOR THE WHOLE TIME INTERVAL - CALL ROUTINE
      C   TO PERFORM THIS ACTIVITY
34    70    CALL OBSERV(MPNREF,TR,KDETNG,ANGLE)
      C   IF PLAYER IS THE SENSOR MONITOR, CHECK SENSOR ACTIVATIONS
35          IF (IVAL(JTYPE,MPNREF) .EQ. KSNMON) CALL SENSE(MPNREF)
      C
      C   PERFORM END-OF-CYCLE FIRING CHECK
      C
      C   SEE IF CURRENT PERSON IS FIRING - IF NOT, DONE WITH HIM
36      100 IF(MTYPA .NE. KFIRNG) GO TO 200
      C   GET REFERENCE TO TARGET OF FIRER
37          MTGTRF = IVAL(JPAR1,NACT)
      C   CHECK THAT TARGET IS A PERSON; IF NOT,DONE
38          CALL EASSRP(MTGTRF,IC,IDUM,IDUM)
39          IF (IC .NE. LPERSN) GO TO 200
      C   SEE IF FIRER IS ALREADY ON OBSERVATION LIST OF TARGET
40          IF(LSERCH(IOBSV(IPLAYR),MTGTRF,NULL,NULL,NULL).NE.NULL)GO TO 200
      C   IF NOT, GIVE TARGET A CHANCE TO SEE FIRER
41          CALL OBSERV(MTGTRF,0.,MPNREF,FNULL)
      C   GET NEXT PERSON
42      200 MPNREF = NEXT(MPNLIS,ICURNO)
43          GO TO 60
44      300 CONTINUE
45          IF(JSIDE .EQ. JADVRS) GO TO 350
46          JSIDE=JADVRS
47          GO TO 50
```

```
  350 CONTINUE
      RETURN
      END
```

FSM MODEL - OBSERV SUBROUTINE

```
ISN
 1          SUBROUTINE OBSERV(IREF,T,JAOF,THETO)
      C
      C   SUBROUTINE TO CREATE AN OBSERVATION LIST OF PHYSICAL OBJECTS
      C   SEEN BY A PERSON IN THE MODEL.  CALLED IN TWO MODES:
      C      (1)T >0 FOR NORMAL OBSERVATION ACTIVITY
      C      (2)T<= 0 FOR END-OF-CYCLE FIRE CHECK
      C
      C
      C        IREF   ->  RECORD REFERENCE TO OBSERVER
      C        T      ->  TIME REMAINING FOR OBSERVATION
      C        JAOF   ->  CODE FOR CURRENT ACTIVITY OF OBSERVER IF T>0;
      C                   REFERENCE TO FIRER IF T<=0
      C        THETA  ->  PRINCIPAL HORIZONTAL ANGLE OF OBSERVATION OF
      C         OBSERVER; IF NULL, UNIFORM SEARCH IS ASSUMED.
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,FLDNAM,ECFMCT
 5          COMMON /PARS1/
 6          COMMON /PARS2/
 7          COMMON /PARS3/
 8          COMMON /DATAV/
 9          DIMENSION ACTTIM(25)
10          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
11          COMMON /RECREF/
12          DIMENSION RECRFQ(140)
13          EQUIVALENCE (RECRFQ(1),IGCALS)
14          COMMON//OCTANT(8)
      C   CHECK THAT IREF IS A PERSON REFERENCE
15          CALL EABSRF(IREF,ID,I,IDUM)
16          IF( ID .EQ. LPERSN) GO TO 50
17             CALL ERR(3,19,LPERSN,IREF,0)
18             RETURN
      C
      C   IS I SUPPRESSED IN OBSERVATION?
```

```
ISN
19        50 IF (ICANOB(IREF) .NE. ICN) RETURN
20           THETA=THETO
     C    CHECK FOR END-OF-CYCLE CONDITION
21           IF(T .LE.0) GO TO 500
     C    DOES ENOUGH TIME REMAIN FOR OBSERVATION?
22           IA = NACTSU(IREF,NOETNG)
23           IF (T .LT. ACTTIM(IA)) RETURN
     C    PRODUCE LOS LIST FOR I
24           ITLOS = LOSLIS(IREF,I)
     C    IF AN ERROR IN LOSLIS OR NO LOS LIST, DONE
25           IF (ITLOS .EQ. NULL .OR. ITLOS .EQ. -1) RETURN
     C    FIND THE PROBABILITY P(K) OF I LOOKING IN OCTANT K
26           CALL POCT(IREF,THETA)
     C    ITERATE THROUGH THE LOS LIST FOR I
27           JREF = IFIRST(ITLOS,JNC)
     C    IF NO MORE PLAYERS, DONE
28       150 IF (JREF .EQ. NULL) RETURN
     C    IF ALREADY ON OBSERVED LIST, SKIP IT
29           IF(ISERCH(IOBSV(I),JREF,NULL,NULL,NULL).NE.NULL)GO TO 200
     C    DETERMINE PROBABILITY OF OBSERVATION
30           P = POBS(IREF,JREF,T)
31           RN = URAND(IRN(1))
32           IF (RN .GT. P) GO TO 200
     C     ADD J TO LIST OF SIGHTINGS FOR I
33           IOBSV(I) = ISTACK(JREF,IOBSV(I))
     C    GET NEXT PLAYER
34       200 JREF = NEXT(ITLOS,JNC)
35           GO TO 150
36       500 CONTINUE
     C
     C    END-OF-CYCLE CHECK FOR BEING UNDER FIRE
     C
     C    IN THIS MODE THE FIRER IS THE THIRD CALLING PARAMETER
37           JREF = JAOP
     C    IF FIRER ALREADY ON I'S OBSERVATION LIST, DONE
38           IF (ISERCH(IOBSV(I),JREF,NULL,NULL,NULL) .NE. NULL) RETURN
```

FSM MODEL - OBSERV SUBROUTINE

```
ISN
     C   VERIFY THAT JREF IS A PERSON REFERENCE
39          CALL PARSRF(JREF,IDJ,IDUE,IDUM)
40          IF (IDJ .EQ. LPERSN) GO TO 520
41          RETURN
     C   DETERMINE I'S PRINCIPAL DIRECTION OF OBSERVATION FROM I'S ACTIVITY
42     520 IACREF = IVAL(JACTIV,IREF)
     C   IF I IS MOVING, FIND I'S PDO FROM I'S LOCATION
43          IV = IVAL(JTYPE,IACREF)
44          IF (IV .NE. KMOVNG) GO TO 550
45          LOCREF = IVAL(JLOCN,IREF)
46          CALL DIREC (IVAL(JSOURC,LOCREF),IVAL(JSINK,LOCREF),THETA,PHI)
47          GO TO 600
     C
     C   IF I IS OBSERVING, FIND I'S PDO FROM I'S ACTION RECORD
48     550 IF (IV .NE. KOBSRG)GO TO 570
49          THETA = VAL(JPAR1,IACREF)
50          GO TO 600
     C   IF I IS FIRING, FIND I'S TARGET AND THEN THE ANGLE TO THE TARGET
51     570 IF (IV .NE. KFIRNG) GO TO 590
52          ITARG = IVAL(JPAR1,IACREF)
53          CALL DIREC(IREF,ITARG,THETA,PHI)
54          GO TO 600
     C   IF NONE OF THE ABOVE APPLIES, NULL THE PDO
55     590 THETA = FNULL
     C
     C   FIND THE PROBABILITY THAT I SEES FIRERS, USING THE WHOLE TIME STEP
56     600 CONTINUE
57          CALL POCT(IREF,THETA)
58          P = POBS(IREF,JREF,DTSEC)
59          RN = URAND(IRN(1))
     C   IF FIRER HAS NOT BEEN SEEN, DONE
60          IF(RN .GT. P) RETURN
     C   FIRER HAS BEEN SEEN.  ADD TO I'S OBSERVATION LIST
61          CALL CHGLST(JREF,1,3,I)
62          IOBSV(I) = ISTACK(JREF,IOBSV(I))
63          RETURN
64          END
```

FSM MODEL - ODESIR SUBROUTINE

```
ISN
 1          SUBROUTINE ODESIR(IPLARF,ITRG,ICODE)
      C
      C
      C  --  THE PURPOSE OF THIS SUBROUTINE IS TO:
      C          1.  EVALUATE TARGET LIST TO DETERMINE
      C               WHICH TARGET IS MOST DESIRABLE TO
      C                OBSERVE.
      C          2.  IF TARGET LIST IS NULL, RETURN NULL VALUE.
      C
      C
      C  -- INPUT PARAMETERS
      C
      C
      C       IPLARF  --  PLAYER REFERENCE OF PLAYER TO OBSERVE
      C
      C
      C       ITRG   --  LIST REFERENCE TO TARGET LIST
      C
      C
      C  -- OUTPUT VARIABLES
      C
      C
      C       ICODE -- TARGET LOCATION REFERENCE FOR OBSERVATION
      C                DIRECTION CALCULATION.
      C                THIS IS NULL WHEN TARGET LIST IS NULL.
      C
      C
      C  -- PROCEDURE
      C         1. SEARCH CASE SUBSETS TO DETERMINE
      C             MOST DESIRABLE TARGET FOR OBSERVATION
      C
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,FLDNAM,FCRMOT
```

```
      COMMON /PARS1/
      COMMON /PARS2/
      COMMON /PARS3/
      COMMON /DATAV/
      DIMENSION ACTTIM(25)
      EQUIVALENCE (ACTTIM(1),ACTRAT(1))
C
C
      ICODE=NULL
      TMAX=-9999.
      IPLT=IVAL(JPERCS,IPLABE)
C
C -- SEARCH TARGET LIST
C
      ITT=IFIRST(ITRG,KE)
    5      IF(ITT .EQ. NULL) GO TO 30
C
C SEARCH PERCEPTIONS LIST
C
      IPER=IFIRST(IPLT,KC)
    8      IF(IPER .EQ. NULL) GO TO 20
      IF(IVAL(JID,IPER) .EQ. ITT) GO TO 10
    9 IPER=NEXT(IPLT,KC)
      GO TO 8
C
C -- CASE SUBSET 1
C       ALLEGIENCE KNOWN
C
   10 IPERRF=IVAL(JVIEW,IPER)
           CALL PARSRF(IPERRF,IDYY,IRRN,ISDUM)
           IF(IDYY .EQ. IFORCE) GO TO 9
      TEMP=0.
      IF(IVAL(JALLEG,IPERRF) .EQ. NULL) TEMP=TEMP+EVALN(41)
C
C -- CASE SUBSET 2
C     LOCATION KNOWN
```

```
ISN
     C
26          IF(IVAL(JLOCN,IPERRF) .EQ. NULL) TEMP=TEMP+EVALN(42)
     C
     C  -- CASE SUBSET 3
     C      PHYSICAL STATUS KNOWN
     C
27          IF(IVAL(JPSTAT,IPERRF) .EQ. NULL) TEMP=TEMP+EVALN(43)
     C
     C  -- CASE SUBSET 4
     C       ACTIVITY KNOWN
     C
28          IF(IVAL(JACTIV,IPERRF) .EQ. NULL) TEMP=TEMP+EVALN(44)
     C
     C  -- CASE SUBSET 5
     C       EQUIPMENT AND WEAPONS KNOWN
     C
29          IF(IVAL(JWEAPS,IPERRF) .EQ. NULL) TEMP=TEMP+EVALN(45)
     C
30          IF(TEMP .LE. TMAX) GO TO 20
31          TMAX=TEMP
32          ICODE=ITT
33       20 ITT=NEXT(ITRG,KE)
34          GO TO 5
     C
35       30 CONTINUE
36          RETURN
37          END
```

FSM MODEL - PEQUAL FUNCTION

```
ISN
 1          FUNCTION PEQUAL(IPCPRF,IMSGRF)
     C ... FUNCTION CALLED BY CCMEES TO DETERMINE IF MESSAGE
     C      CONTENT IS EQUIVALENT TO PLAYER'S CURRENT PERCEPTION
     C      OF THE SUBJECT OF THE MESSAGE.
     C ... INPUT PARAMETERS:
     C         IPCPRF ... POINTER TO PERCEPTION RECORD
     C         IMSGRF ... POINTER TO MESSAGE RECORD
     C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
 8          COMMON /PARS1/
 9          COMMON /PARS3/
10          LOGICAL PEQUAL
     C
     C ... SET UP FOR PROCESSING
     C
11          PEQUAL=.TRUE.
12          IVWREF=IVAL(JVIEW,IPCPRF)
13          IOBSRF=IVAL(JSUBJ,IMSGRF)
14          CALL PARSRF(IOBSRF,IDTYP,IRECNO,IFLD)
15          IATTR=IVAL(JATTR,IMSGRF)
     C
     C ... IF NO PERCEPTION OF THIS ATTRIBUTE RETURN .FALSE.
     C
16          IF(IVAL(IATTR,IVWREF).EQ.NULL) GO TO 50
     C
     C GET POINTER TO GENERIC RECORD TO GET ATTRIBUTE TYPE
     C
17          NBASE=IREF1(NEWREF(IDTYP,NRECS(IDTYP),0))
18          ITYP=ITEM(NBASE+IATTR)
19          IF(ITYP.GE.3) GO TO 20
```

```
C
C ... ATTRIBUTE IS SCALAR OR SINGLE ENTRY FIELD
C     AND DIRECT COMPARISON IS APPROPRIATE
C
 10   IF(IVAL(IATTR,IVNREF) .EQ. IVAL(JCONT,IMSGRF)) RETURN
      GO TO 50
C
C ... NOT SCALAR, DETERMINE PROCESSING REQUIRED
C
 20   IF(IDTYP.EQ.LVEHIC .AND. IATTR.EQ.JDRIVR) GO TO 10
      IF(IDTYP.EQ.LPERSN .AND. IATTR.EQ.JLEADR) GO TO 10
      IF(IATTR.EQ.JLOCN) GO TO 40
      IF(IATTR.EQ.JACTIV .AND. IDTYP.EQ.LPERSN) GO TO 30
C
C ... SIMPLE LIST SEARCH REQUIRED
C
      LISREF=IVAL(IATTR,IVNREF)
      ION=LSERCH(LISREF,IVAL(JCONT,IMSGRF),NULL,NULL,NULL)
      IF(ION.NE.NULL) RETURN
      GO TO 50
C
C ... MESSAGE SUBJECT IS PERSON'S ACTIVITY
C     SPECIAL SEARCH REQUIRED.
 30   LISREF=IVAL(IATTR,IVNREF)
      IACTRF=IVAL(JCONT,IMSGRF)
      IACTYP=IVAL(JTYPE,IACTRF)
      NACTRF=IFIRST(LISREF,LPTR)
 35   IF(NACTRF.EQ.NULL) GO TO 50
         NACTYP=IVAL(JTYPE,NACTRF)
         IF(NACTYP.NE.IACTYP) GO TO 38
C
C        ACTIVITY TYPE MATCH, COMPARE PARAMETERS
C
         DO 37 I=JPAR1,JDOER
            IF(IVAL(I,IACTRF) .NE. IVAL(I,NACTRF)) GO TO 38
 37      CONTINUE
```

FSN MODEL - PEQUAL FUNCTION

```
ISN
       C
       C ... IF WE GET HERE, MATCH
       C
40            RETURN
41     38     MACTRF=NEXT(LISREF,LPTR)
42            GO TO 35
       C
       C ... LOCATION, COMPARE PLACE FIELD ONLY
       C
43     40     LOCRF1=IVAL(IATTR,IVNREF)
44            LOCRF2=IVAL(JCCNT,IMSGRF)
45            IF(IVAL(JPLACE,LOCRF1). EQ .IVAL(JPLACE,LOCRF2)) RETURN
       C
       C ... SET FUNCTION VALUE TO .FALSE.
       C
46     50     PEQUAL=.FALSE.
47            RETURN
48            END
```

FSM MODEL - PLANAC SUBROUTINE

```
ISN
 1         SUBROUTINE PLANAC(IFLAG,LEADER)
      C
      C       A ROUTINE TO IMPLEMENT A LEADER'S PLANNING OF ACTIONS.  THE
      C    ROUTINE SELECTS CERTAIN TYPES OF SITUATIONS TO MONITOR AND SELECTS
      C    ACTIONS ACCORDING TO THESE SITUATIONS.
      C       THE CURRENT SET OF RULES MAKE SOME PROBABILISTIC SELECTIONS FROM
      C    A SET OF ALTERNATIVE ACTIONS, GIVEN A PARTICULAR SITUATION.
      C
      C    INPUT PARAMETERS:
      C       IFLAG    INDICATOR OF WHICH CONDITION CAUSED THE ROUTINE TO BE
      C                CALLED:  (1) A CHANGE IN A FORCE'S SITUATION, (2) NON-
      C                REPORTING OF FORCE MEMBERS AT EXPECTED TIMES.
      C       LEADER   REFERENCE TO LEADER DOING THE PLANNING.
      C
 2         COMMON /STATEV/
 3         DIMENSION ITEM(41900),DITEM(41900)
 4         EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5         COMMON /PARS/
 6         EQUIVALENCE (FNOLI,NOLI),(IFAIL,FAIL)
 7         REAL*8 DTPNAM,FLDNAM,ECRECT
 8         COMMON /PARS1/
 9         COMMON /PARS2/
10         COMMON /PARS3/
11         COMMON /RECREF/
12         DIMENSION RECREQ(140)
13         EQUIVALENCE (RECRFQ(1),IGCALS)
14         COMMON /NEW/
      C
15         DIMENSION PROBS(40),NOPTS(5,2),IPTR(5,2)
16         DATA PROBS/.3,.4,.3, .1,.3,.6, .1,.4,.5, .1,.2,.3,.4,
          +      .2,.8, .6,.4, .8,.2, .9,.1,
          +      .2,.8, .6,.4, .8,.2, .9,.1/
17         DATA NOPTS/0,3,3,3,2, 2,2,2,2,2/
18         DATA IPTR/0,1,4,7,14, 22,22,22,22,22/
      C
```

FSN MODEL - PLANAC SUBROUTINE

```
ISN
      C  GET POINTER TO FORCE THAT LEADER COMMANDS
19          IFORCE = IVAL(JFORCE,LEADER)
      C  GET CURRENT FORCE SITUATION
20          ISITN = IVAL(JSITN,IFORCE)
      C  GET SIDE OF LEADER
21          ISIDE = IVAL(JEALEG,IFORCE)
      C  SEPARATE LIST OF PERSONS IN FORCE INTO THOSE WHO ARE DEAD OR CAPTURED
      C  AND THOSE WHO ARE WHOLE OR JUST WOUNDED.
22          IPSNOK = NULL
23          IPSNX = NULL
24          ISNMON = NULL
25          PSNOK = 0.
26          PSNX = 0.
27          SNMON = 0.
      C
28          IPSNS = IVAL(JCONTS,IFORCE)
29          IPERSN = IFIRST(IPSNS,KP)
30    2        IF (IPERSN .EQ. NULL) GO TO 8
31             IPSTAT = IVAL(JPSTAT,IPERSN)
32             IF (IPSTAT .GE. KWOUND) GO TO 4
      C  PLAYER IS DEAD OR CAPTURED
33                PSNX = PSNX + 1.
34                IPSNX = ISTACK(IPERSN,IPSNX)
35                GO TO 6
      C  AGGREGATE WOUNDED OR WHOLE PERSONS ASSIGNED AS SENSOR MONITORS
36    4        IF (IVAL(JTYPE,IPERSN) .NE. KSNMON) GO TO 5
37                SNMON = SNMON + 1.
38                ISNMON = ISTACK(IPERSN,ISNMON)
39                GO TO 6
      C  PLAYER IS WHOLE OR WOUNDED & NOT SENSOR MONITOR
40    5        PSNOK = PSNOK + 1.
41             IPSNOK = ISTACK(IPERSN,IPSNOK)
      C  CONSIDER NEXT PERSON
42    6        IPERSN = NEXT(IPSNS,KP)
43             GO TO 2
      C
```

```
ISN
     C  SET UP TO SELECT ALTERNATIVE ACTIONS
44   8     IPT = IPTR(ISITN,ISIDE)
45         N = NOPTS(ISITN,ISIDE)
     C
     C
     C  BRANCH ACCORDING TO FLAG
46         GO TO (10,200), IFLAG
     C
     C  BRANCH ACCORDING TO SIDE
     C
47   10    GO TO (12,100),ISIDE
     C
     C  ***  SFE PLAYER
     C
     C  HAVE A CHANGE IN THE FORCE'S SITUATION CODE.  BRANCH ACCORDING
     C  TO SITUATION CODE'S CURRENT VALUE.
48   12    GO TO (15,20,40,60,80), ISITN
     C
49   15    RETURN
     C
     C  SFE ALERTED, BEING RESOLVED BY ANOTHER FORCE
     C  SELECT ALTERNATIVE ACTION
50   20    IOPT = ICHOOS(N,PROBS(IPT),IRN(2))
     C  BRANCH BASED ON ALTERNATIVE SELECTED
51         GO TO (24,28,32), IOPT
     C
     C  OPTION 1:  DO NOTHING
52   24    RETURN
     C
     C  OPTION2:  GUARD SNM BOCE WITH UP TO THREE GUARDS
53   28    NFORCE = NITEMS(3,IPSNOR,IREN)
54         CALL SECURE(ISNERE,LEADER,NFORCE)
55         RETURN
     C
     C  OPTION 3:  DIRECT PERSONS WHO CAN SEE REGION OF ALERT TO LOOK
     C  IN THAT DIRECTION
```

```
ISN
56   32     CALL ELNOBS(LOCAFE,LEADER,IPSNOK)
57          RETURN
        C
        C  SFE ALERTED, BEING RESCIVED BY OWN FORCE
        C  SELECT ALTERNATIVE ACTION
58   40     IOPT = ICHOOS(N,PHOBS(IET),IRN(2))
        C  BRANCH BASED ON ALTERNATIVE SELECTED
59          GO TO (42,46,50), IOPT
        C
        C  OPTION 1:  DO NOTHING
60   42     RETURN
        C
        C  OPTION 2:  SEND UP TO THREE PLAYERS TO SECURE THE SNM ROOM
61   46     NFORCE = NITEMS(3,IPSNOK,IRRM)
62          CALL SECURE(ISNMRM,LEADER,NFORCE)
63          RETURN
        C
        C  OPTION 3:  SEND TWO PLAYERS TO CHECK OUT THE REGION OF THE ALARM
64   50     NFORCE = NITEMS(2,IPSNOK,IREM)
65          CALL CHKOUT(NOIL,LOCAFE,LEADER,NFORCE)
66          RETURN
        C
        C  AFE DETECTED; NO ENGAGEMENT YET.
        C
        C  BRANCH ACCORDING TO WHETHER FREE FIRING IS ALLOWED
67   60     IF (IFCOND(ISIDE) .GE. 3) GO TO 70
        C  SELECT ALTERNATIVE ACTION IF NO FIRING YET PERMITTED
68          IOPT = ICHOOS(N,PROBS(IET),IRN(2))
        C  BRANCH ACCORDING TO OPTION SELECTED
69          GO TO (62,65,68),IOPT
        C
        C  OPTION 1:  DO NOTHING
70   62     RETURN
        C
        C  OPTION 2:  SET FIRING CONDITION TO "DON'T FIRE UNLESS FIRED UPON".
        C  ALSO DISPATCH THREE PLAYERS TO BLOCK ADVERSARY FORCE'S MOVEMENT TO
```

```
ISN
     C  THE SUN ROOM.
71      65      IFCOND(ISIDE) = MAX0(IFCOND(ISIDE),2)
72   66     NFORCE = NITEMS(3,IPSNOK,IREM)
73          CALL PINBLK(NULL,LOCATE,ISNNBR,LEADER,NFORCE)
74          RETURN
     C
     C  OPTION 3:  SET FIRING CONDITION TO "DON'T FIRE UNLESS FIRED UPON".
     C  ALSO DISPATCH THREE PLAYERS TOWARDS PRESUMED ADVERSARY FORCE LOCN.
75      68      IFCOND(ISIDE) = MAX0(IFCOND(ISIDE),2)
76   69     NFORCE = NITEMS(3,IPSNOK,IREM)
77          CALL CHKODT(NULL,LOCATE,LEADER,NFORCE)
78          RETURN
     C
     C  ARE DETECTED, NO ENGAGEMENT YET;  FIRING ALLOWED.
79   70     N = 4
80          IPT = IPT + 3
     C  SELECT ALTERNATIVE ACTION
81          IOPT = ICHOOS(N,PROBS(IPT),IRN(2))
     C  BRANCH ACCORDING TO OPTION SELECTED
82          GO TO (62,65,76,69), IOPT
     C
     C  OPTION 3:  SET AIM POINT CONDITION TO "FIRE TO WOUND".  THEN
     C  BLOCK THE ADVERSARY'S MOVEMENT.
83   76     IAIMPT(ISIDE) = 2
84          GO TO 66
     C
     C  ENGAGEMENT UNDERWAY.  DETERMINE PERCENTAGE OF FORCE REMAINING.
85   80     TOT = PSNOK + PSNX
86          IF (TOT .LE. 0.) GO TO 84
87          PCENT = PSNOK / TOT
88          ISTATE = PCENT*4.999 + 1.0
89          GO TO (84,84,88,92,96), ISTATE
     C
     C  0 - 40% EFFECTIVE STRENGTH
90   84     IOPT = ICHOOS(N,PROBS(IPT),IRN(2))
91          IF (IOPT .EQ. 1) RETURN
```

PSN MODEL - PLANAC SUBROUTINE

```
ISN
 92            GO TO 98
      C
      C  40 - 60% EFFECTIVE STRENGTH
 93   88       IOPT = ICHOOS(N,PROBS(IPT+2),IRN(2))
 94            IF (IOPT .EQ. 1) RETURN
 95            GO TO 98
      C
      C  60 - 80% EFFECTIVE STRENGTH
 96   92       IOPT = ICHOOS(N,PROBS(IPT+4),IRN(2))
 97            IF (IOPT .EQ. 1) RETURN
 98            GO TO 98
      C
      C  80 - 100% EFFECTIVE STRENGTH
 99   96       IOPT = ICHOOS(N,PROBS(IPT+6),IRN(2))
100            IF (IOPT .EQ. 1) RETURN
      C
      C  DISENGAGE; IF ADVERSARY, TRY TO ESCAPE FROM SITE. IF SECURITY FORCE,
      C  RETREAT TO SNM ROCP.
101   98       IF (ISIDE .EQ. 1) CALL SECURE(IMONRM,LEADER,IPSNOK)
102            IF (ISIDE .EQ. 2) CALL ESCAPE(IEXITS,LEADER,IPSNOK)
103            RETURN
      C
      C
      C  ***  ADVERSARY PLANS
      C
      C  IF HAVE JUST ACHIEVED A GOAL AND ARE TO BEGIN WORKING ON A NEW GOAL,
      C  ASSIGN ALL OF AFE FORCE TC MOVE TO IT.
104   100      IF (NEWGOL .EQ. NULL) GO TO 110
105            IGOAL = IFIRST(IGOALS,KG)
106            LCC = IVAL(JID,IGOAL)
107            CALL CHKOUT(NULL,LOC,LEADER,IPSNOK)
108            RETURN
      C
      C  IF NO NEW GOAL, BUT IF THERE IS AN ENGAGEMENT GOING ON, TEST
      C  WHETHER WISH TO BREAK OFF.
      C  TEST  FOR  HOW MANY PLAYER CURRENTLY RESPONDING TO GOAL
```

```
 ISN
       C
 109     110 INOEL=NULL
 110         NUM=0
 111         IGOAL=IFIRST(IGOALS,KN)
 112         LOC=IVAL(JID,IGOAL)
       C
       C  COUNT NUMBER OF PLAYERS AT LOC OR MOVING TO LOC
       C
 113         IPSNS=IVAL(JCONTS,IFORCE)
 114         IPSN=IFIRST(IPSNS,KL)
 115     120     IF(IPSN .EQ. NULL) GO TO 190
       C
       C  TEST PHYSICAL STATUS
       C
 116         IF(IVAL(JPSTAT,IPSN) .LE. KCAPTR) GO TO 180
       C
       C  TEST LOCATION
       C
 117         ILOCO=IPLACE(IVAL(JLOCN,IPSN))
 118         IF(ILOCO .EQ. LOC) GO TO 160
       C
       C  TEST IF MOVING TO LOC
       C
 119         IPLANS=IVAL(JPLANS,IPSN)
 120         IPLAN=IFIRST(IPLANS,KN)
 121     140  IF(IPLAN .EQ. NULL) GO TO 170
 122         IF(IVAL(JTYPE,IPLAN) .NE. KMOVNG) GO TO 150
 123         IF(IVAL(JPAR1,IPLAN) .EQ. LOC) GO TO 160
       C
 124     150 IPLAN=NEXT(IPLANS,KN)
 125         GO TO 140
       C
       C  COUNT PLAYER AS MOVING TOWARD GOAL
       C
 126     160 NUM=NUM+1
 127         GO TO 180
```

FSM MODEL - PLANAC SUBROUTINE

```
ISN
      C
      C   PLAYER NOT ACTIVE FOR GOAL
      C
128     170 INOPL=ISTACK(IPSN,INCPL)
      C
      C  NEXT PLAYER ON FORCE
      C
129     180 IPSN=NEXT(IPSNS,KL)
130         GO TO 120
      C
      C  TEST IF GOAL BEING SATISFIED
      C
131     190 IF(IVAL(JADVRQ,IGOAL) .LE. NUM) GO TO 200
      C
      C  ADDITIONAL PLAYERS NEED TO BE SENT
      C
132         NDIFF=IVAL(JADVRQ,IGOAL) - NUM
133         IPSN=IFIRST(INCPL,KT)
134     191    IF(IPSN .EQ. NULL) GO TO 192
      C
135         IACT=NEWRC6(LACTN,KMCVNG,LOC,NULL,NULL,NULL,IPSN)
136         IMSG=NEWRC5(LMESS,LEADER,IPSN,JPLANS,TMIN,IACT)
137         CALL COMMO(LEADER,IPSN,IMSG)
138         NDIFF=NDIFF-1
139         IF(NDIFF .EQ. 0) GO TO 200
140         IPSN=NEXT(INOPL,KT)
141         GO TO 191
      C
      C  CAN NOT COMPLETE GOAL
      C
142     192 IF(ISITN .NE. 4) GO TO 200
143         GO TO 80
      C
      C  ACTIONS OCCASSIONED BY A NON-REPORTING OF FORCE ARE NOT IMPLEMENTED
      C  IN THIS VERSION
144   200   RETURN
```

```
 ISN
145          END
```

FSN MODEL - PLNBLK SUBROUTINE

```
ISN
          SUBROUTINE PLNBLK(IFORCE,LOCNOW,LOCTO,LEADER,IFORC2)
      C
      C      ROUTINE FOR A LEADER TO PLAN AND ACTIVATE THE DEPLOYMENT OF HIS
      C   FORCES TO BLOCK AN ENEMY FORCE MOVING FROM A CURRENT POSITION
      C   TOWARDS A GOAL POSITION.  THE ROUTINE DETERMINES THE LOCATION OR
      C   LOCATIONS TO WHICH TO DISPATCH THE PERSONS SPECIFIED AND THEN
      C   GENERATES ORDERS FOR THESE PERSONS TO MOVE TO THESE LOCATIONS.
      C      THE CURRENT VERSION OF THE ROUTINE USES THE VERY SIMPLIFIED
      C   STRATEGY OF DISPATCHING EACH OF THE INTERCEPTORS TO THE PRESUMED
      C   GOAL OF THE TO-BE-INTERCEPTED FORCE.
      C
      C   INPUT PARAMETERS:
      C      IFORCE   PERSON OR LIST OF PERSONS OR VEHICLES TO BE INTERCEPTED
      C      LOCNOW   LATEST KNOWN LOCATION OF IFORCE
      C      LOCTO    PRESUMED DESTINATION OF IFORCE
      C      LEADER   REFERENCE TO LEADER PLANNING THE BLOCKING ACTION
      C      IFORC2   LIST OF PERSONS OR VEHICLES TO BE USED FOR THE
      C               BLOCKING ACTION
      C
          COMMON /STATEV/
          DIMENSION ITEM(41900),DITEM(41900)
          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
          COMMON /PARS/
          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
          REAL*8 DTPNAM,FIDNAM,FCRRCT
          COMMON /PARS1/
          COMMON /PARS2/
          COMMON /PARS3/
      C
      C   ITERATE THROUGH EACH OF THE PERSONS TO BE DISPATCHED.
      C
          IPERSN = IFIRST(IFORC2,KP)
       10    IF (IPERSN .EQ. NULL) RETURN
      C
      C   SET UP INSTRUCTIONS FOR THIS PERSON TO MOVE TO THE OPPONENTS'
```

```
ISN
      C  PRESUMED GOAL
13          IACT = NEWRC6(IACTI,RECVNG,LOCTO,NULL,NULL,NULL,IPERSN)
14          IMSG = NEWRC5(LMESS,LEADER,IPERSN,JPLANS,TMIN,IACT)
      C  SEND MESSAGE TO THE PLAYER
15          CALL COMMO(LEADER,IPERSN,IMSG)
      C  GET THE NEXT PERSON ON THE FORCE TO BE DISPATCHED
16          IPERSN = NEXT(IFORC2,RP)
17          GO TO 10
18        END
```

FSM MODEL - PLNOBS SUBROUTINE

```
ISN
 1            SUBROUTINE PLNOBS(LOCS,LEADER,IFORCE)
        C
        C        ROUTINE FOR A LEADER TO CALL TO INSTRUCT EACH OF A GROUP OF
        C     SUBORDINATES WHO HAVE LINE-OF-SIGHT TO A GIVEN LOCATION TO OBSERVE
        C     IN THAT DIRECTION.
        C
        C     INPUT PARAMETERS:
        C        LOCS      NODES AT WHICH TO LOOK
        C        LEADER    REFERENCE TO LEADER GIVING ORDERS
        C        IFORCE    LIST OF PERSONS WHO ORDERS ARE TO BE GIVEN TO
        C
 2            COMMON /STATEV/
 3            DIMENSION ITEM(41900),DITEM(41900)
 4            EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5            COMMON /PARS/
 6            EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7            REAL*8 DTPNAM,FLDNAM,FORMOT
 8            COMMON /PARS1/
 9            COMMON /PARS2/
10            COMMON /PARS3/
        C
        C     ITERATE OVER PERSONS TO GIVE ORDERS TO
11            IPERSN = IFIRST(IFORCE,KP)
12       10      IF (IPERSN .EQ. NULL) RETURN
        C
        C     ITERATE OVER LOCATIONS AT WHICH TO OBSERVE
13               LOC = IFIRST(LOCS,KL)
14       12         IF (LOC .EQ. NULL) GO TO 20
        C     DOES PERSON HAVE LINE-OF-SIGHT TO LOCATION ?
15                  IF (LOS(IPERSN,LOC) .EQ. 0) GO TO 15
        C
        C     IF SO, DIRECT HIM TO OBSERVE IN THAT DIRECTION
16                  CALL DIREC(IPERSN,LOC,THETA,PHI)
17                  IACT = NEWRC6(LACTN,KDETNG,THETA,NULL,NULL,NULL,IPERSN)
18                  IMSG = NEWRC5(LMESS,LEADER,IPERSN,JPLANS,TMIN,IACT)
```

FSN MODEL - PLNOBS SUBROUTINE

```
ISN
19                CALL CONNC(LEADER,IPERSN,IMSG)
20                GO TO 20
      C
      C   GET NEXT LOCATION
21    15          LOC = NEXT(LCCS,KI)
22                GO TO 12
      C
      C   GET NEXT PLAYER
23    20        IPERSN = NEXT(IFCRCE,KP)
24              GO TO 10
25            END
```

FSM MODEL - POBS FUNCTION

```
ISN
  1          FUNCTION POBS(IREF,JREF,T)
      C   FUNCTION TO CALCULATE THE PROBABILITY I SEES J WITHIN TIME T
      C
      C      IREF  ->  REFERENCE TO PERSON I, THE OBSERVER
      C      JREF  ->  REFERENCE TC ENTITY J, THE OBSERVATION TARGET
      C      T     ->  TIME AVAILABLE FOR OBSERVATION
      C
  2          COMMON /PARS/
  3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  4          REAL*8 DTPNAM,FLDNAM,FCRMOT
  5          COMMON /PARS1/
  6          COMMON /PARS2/
  7          COMMON /PARS3/
  8          COMMON /DATAV/
  9          DIMENSION ACTTIM(25)
 10          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
 11          COMMON//OCTANT(8)
      C
 12          DATA PI/3.14159/
      C
 13          POBS = 0.
      C  DETERMINE THE OCTANT OF J RELATIVE TO I
 14          CALL DIREC(IREF,JREF,THETA,PHI)
 15          JOCT = INT((4.*THETA)/PI) + 1
      C   FIND THE EXPOSED AREA OF J
 16          CALL PARSRF(JREF,IDTYP,3,IDUM)
 17          ITYPE = IVAL(JTYPE,JREF)
 18          EXPSR=1.
 19          IF (IDTYP .NE. IPERSN) GO TO 50
 20          ITYPE = 1
      C   GET POSTURE AND COVER OF TARGET
 21          COVER = COVR(JREF,THETA + PI)
 22          POST = VAL(JPOSTR,JREF)
      C   FIND THE EXPOSURE OF THE TARGET
 23          EXPSR = AMIN1(1.,POST - COVER)
```

```
ISN
24           IF (EXPSR .LE. 0.) RETURN
25     50    IPOBTP = IPHSOB(IDTYP-LWIND) + ITYPE
26     60    A = AREA(IPOBTP)*EXPSR
       C   FIND THE RANGE OF J
27           R = DIST(IREF,JREF)
28           IF(R .GT. .1) GO TO 98
29           POBS=1.0
30           RETURN
       C
       C   DETERMINE J'S ACTIVITY REFERENCE
31        98 NACT = 1
       C***IF NOT A PERSON ASSUME STATIONARY
32           IF (IDTYP .NE. IPERSN) GO TO 150
33       100 JACREF = IVAL(JACTIV,JREF)
34           IF(JACREF .EQ. NULL) GO TO 150
       C   FIND THE ACTIVITY OF J
35           NACT = IVAL(JPAR1,JACREF)
36           IF(NACT .NE. NULL) GO TO 200
37       150 NACT=3
38       200 NVDCL=1
39           IF(NACT .EQ. 2) NVDCL=2
40           IF(NACT .EQ. 1) NVDCL=3
       C   GET DETECTION RATE BASED ON J'S VISUAL DETECTION CLASS
41           DETR = DETRAT(NVDCL)*550.04
       C   CALCULATE BASIC DETECTION RATE
42           IPSTAT = IVAL(JPSTAT,IREF)
43           IF (IPSTAT .GT. 4 .OR. IPSTAT .LT. 1) IPSTAT = 4
44           AL = -(DETR/DETEHI)*(A/(R*R))*SKILL(KDETSK,IPSTAT,I)
45           AL = AMAX1(AL,-10.)
       C   CALCULATE PROBABILITY OF OBSERVATION
46           POBS = 1. - EXP(AL*OCTABT(JOCT)*T)
47           RETURN
48           END
```

FSN MODEL - POCT SUBROUTINE

```
ISN
 1          SUBROUTINE POCT(IREF,THETA)
      C
      C   SUBROUTINE TO DETERMINE THE PROBABILITY OF AN OBSERVER SCANNING
      C     IN EACH STANDARD 45 DEGREE OCTANT, MEASURED FROM THE X-AXIS
      C     IREF   ->  REFERENCE TO OBSERVER
      C     THETA  ->  PRINCIPAL DIRECTION OF OBSERVATION; IF NULL, UNIFORM
      C     OCTANT<-  ARRAY OF PROBABILITIES OF SCAN FOR EACH OCTANT
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,FLDNAM,FCRECT
 5          COMMON /PARS1/
 6          COMMON /DATAV/
 7          DIMENSION ACTTIM(25)
 8          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
 9          COMMON//OCTANT(8)
      C
10          DIMENSION Q(4)
11          DATA PI/3.14159/
      C
      C   IF NO PDO INDICATED, EACH OCTANT HAS EQUAL PROBABILITY OF SCAN
12          IF (THETA .NE. FNULL) GO TO 200
13          DO 100 J=1,8
14     100  OCTANT(J) = .125
15          GO TO 550
      C   DETERMINE THE PRIMARY SCAN OCTANT
16     200  THETA = AMOD(THETA,2.*PI)
17          IF(THETA .LT. 0.) THETA=THETA + 2. * PI
18          IOCT = INT((4.*THETA)/PI) + 1
      C   DISTRIBUTE THE PROBABILITIES AMONG THE OCTANTS
19          DO 300 K=1,8
20          J = MOD(IOCT+K-2,8) + 1
21     300  OCTANT(J) = DRTANG(K)
22    400   CONTINUE
      C
```

FSN MODEL - POBS FUNCTION

```
ISN
24           IF (EXPSR .LE. 0.) RETURN
25     50    IPOBTP = IPHSOB(IDTYP-IWIND) + ITYPE
26     60    A = AREA(IPOBTP)*EXPSR
       C   FIND THE RANGE OF J
27           R = DIST(IREF,JREF)
28           IF(R .GT. .1) GO TO 98
29           POBS=1.0
30           RETURN
       C
       C   DETERMINE J'S ACTIVITY REFERENCE
31        98 NACT = 1
       C***IF NOT A PERSON ASSUME STATIONARY
32           IF (IDTYP .NE. IPERSN) GO TO 150
33       100 JACREF = IVAL(JACTIV,JREF)
34           IF(JACREF .EQ. NULL) GO TO 150
       C   FIND THE ACTIVITY OF J
35           NACT = IVAL(JPAR1,JACREF)
36           IF(NACT .NE. NULL) GO TO 200
37       150 NACT=3
38       200 NVDCL=1
39           IF(NACT .EQ. 2) NVDCL=2
40           IF(NACT .EQ. 1) NVDCL=3
       C   GET DETECTION RATE BASED ON J'S VISUAL DETECTION CLASS
41           DETR = DETRAT(NVDCL)*550.04
       C   CALCULATE BASIC DETECTION RATE
42           IPSTAT = IVAL(JPSTAT,IREF)
43           IF (IPSTAT .GT. 4 .OR. IPSTAT .LT. 1) IPSTAT = 4
44           AL = -(DETR/DETEHI)*(A/(5*R))*SKILL(KDETSK,IPSTAT,I)
45           AL = AMAX1(AL,-10.)
       C   CALCULATE PROBABILITY OF OBSERVATION
46           POBS = 1. - EXP(AL*OCTANT(JOCT)*T)
47           RETURN
48           END
```

FSN MODEL - POCT SUBROUTINE

```
ISN
  1          SUBROUTINE POCT(IREF,THETA)
       C
       C   SUBROUTINE TO DETERMINE THE PROBABILITY OF AN OBSERVER SCANNING
       C     IN EACH STANDARD 45 DEGREE OCTANT, MEASURED FROM THE X-AXIS
       C     IREF    ->  REFERENCE TO OBSERVER
       C     THETA   ->  PRINCIPAL DIRECTION OF OBSERVATION; IF NULL, UNIFORM
       C     OCTANT<-  ARRAY OF PROBABILITIES OF SCAN FOR EACH OCTANT
       C
  2          COMMON /PARS/
  3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  4          REAL*8 DTPNAM,FLDNAM,FCHNCT
  5          COMMON /PARS1/
  6          COMMON /DATAV/
  7          DIMENSION ACTTIM(25)
  8          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
  9          COMMON//OCTANT(8)
       C
 10          DIMENSION Q(4)
 11          DATA PI/3.14159/
       C
       C   IF NO P.O INDICATED, EACH OCTANT HAS EQUAL PROBABILITY OF SCAN
 12          IF (THETA .NE. FNULL) GO TO 200
 13          DO 100 J=1,8
 14      100 OCTANT(J) = .125
 15          GO TO 550
       C   DETERMINE THE PRIMARY SCAN OCTANT
 16      200 THETA = AMOD(THETA,2.*PI)
 17          IF(THETA .LT. 0.) THETA=THETA + 2. * PI
 18          IOCT = INT((4.*THETA)/PI) + 1
       C   DISTRIBUTE THE PROBABILITIES AMONG THE OCTANTS
 19          DO 300 K=1,8
 20          J = MOD(IOCT+K-2,8) + 1
 21      300 OCTANT(J) = DETANG(K)
 22     400   CONTINUE
       C
```

FSN MODEL - POCT SUBROUTINE

```
ISN
     C   ADJUST SCAN PROBABILITIES BASED ON ACTIVITY OF OBSERVER
     C
23          IA = NACTSU(IREF,NULL)
24          NOCT = NDTSEC(IA)
25          IF (NOCT .GT. 0) GO TO 450
26   420    CONTINUE
27          DO 430 J=1,8
28   430    OCTANT(J) = 0.
29          RETURN
     C
30   450    IF (NOCT .GE. 8) GO TO 550
     C   DETERMINE THE INDICES OF THE EXTREME OCTANTS TO BE INCLUDED
     C   IN THE SCAN, SYMMETRICALLY ABOUT THE PRIMARY OCTANT
31          NDISP = NOCT/2
32          LMIN = IOCT - NDISP
33          LMAX = IOCT + NDISP
34          IF (LMIN .LT. 1) LMIN = LMIN + 8
35          LMAX = MOD(LMAX-1,8)+1
     C   DETERMINE THE SUM OF THE PROBABILITIES OF THE SCANNED OCTANTS
36          DENOM = 0.
37          L = LMIN
38      470 L = MOD(L-1,8) + 1
39          IF (L .EQ. LMAX) GO TO 490
40          DENOM = DENOM + OCTANT(L)
41          L = L + 1
42          GO TO 470
     C   INCREASE THE PROBABILITIES IN THE SCANNED OCTANTS BY A FACTOR
     C   OF 1/SUM OF SCANNED OCTANTS (= 1/1 - SUM OF EXCLUDED OCTANTS)
43      490 L = LMIN
44      500 L = MOD(L-1,8) + 1
45          IF (L .EQ. LMAX) GO TO 510
46          OCTANT(L) = OCTANT(L)/DENOM
47          L = L + 1
48          GO TO 500
     C   ZERO OUT THE REMAINING PROBABILITIES
49      510 L = LMAX + 1
```

PSN MODEL - POCT SUBROUTINE

```
ISN
50      520 L = MOD(L - 1,8) + 1
51          IF (L .EQ. LMIN) GO TO 550
52          OCTANT(L) = 0.
53          L = L + 1
54          GO TO 520
55     550  CONTINUE
       C
       C   ADJUST SCAN PROBABILITIES BASED ON LOCAL COVER OF OBSERVER
       C
       C   GET OBSERVER'S POSTURE
56          POST = VAL(JPOSTR,IREF)
57          IF (POST .LT. 0. .OR. POST .GT. 1.)POST = 1.
       C   DETERMINE THE OBSERVER'S EXPOSURE IN EACH QUADRANT
58          DO 600 J=1,4
59     600  Q(J) = POST - COVR(IREF,FLOAT(2*J-1)*PI/4.)
       C   ITERATE THROUGH THE QUADRANTS, REDISTRIBUTING SCAN PROBABILITIES
60          PSUM = 0.
61          DO 700 J=1,4
62          IF (Q(J) .GE. .1) GO TO 700
63          PSUM = PSUM + OCTANT(2*J) + OCTANT(2*J-1)
64          OCTANT(2*J) = 0.
65          OCTANT(2*J-1) = 0.
66     700  CONTINUE
       C   IF THE EXCLUDED OCTANTS HAD NO PROBABILITY, DONE
67          IF (PSUM .LE. 0.) RETURN
       C   OTHERWISE, INCREASE REMAINING PROBABILITIES BY 1/1-SUM OF EX-
       C   CLUDED PROBABILITIES
68          IF (PSUM .GT. .99) GO TO 420
69          DO 750 J=1,8
70     750  OCTANT(J) = OCTANT(J)/(1. - PSUM)
71          RETURN
72          END
```

FSN MODEL - PORTST SUBROUTINE

```
ISN
 1          SUBROUTINE PORTST(IPLARF,IOLDRF)
      C
      C  -- THE PURPOSE OF THIS SUBROUTINE IS TO:
      C        1. DETERMINE THE STATUS OF A PORTAL
      C             ONCE A PLAYER HAS PASSED THROUGH IT.
      C
      C  -- INPUT PARAMETERS
      C
      C       IPLARF -- PLAYER REFERENCE
      C        IOLDRF  -- OLD LOCATION REFERENCE
      C
      C
      C  --   OUTPUT
      C
      C       THIS SUBROUTINE ADJUSTS THE STATUS OF THE
      C         PORTAL AFTER IT HAS BEEN PENETRATED
      C
      C
      C  -- PROCEDURE
      C
      C        1.  DETERMINE IF PLAYER HAS PASSED THROUGH PORTAL
      C        2.  IF SO, DETERMINE WHAT THE STATUS OF THE
      C              PORTAL IS.
      C        3.  IF LOCKABLE, DETERMINE IF PAYER HAS A KEY TO
      C              LOCK THE PORTAL
      C        4.  IF SECURED,  DETERMINE IF PLAYER HAS EQUIPMENT TO
      C               DESTROY THE PORTAL
      C
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,FIDNAM,FCFPCT
 5          COMMON /PARS1/
 6          COMMON /PARS2/
 7          COMMON /RECREF/
```

FSM MODEL - PORTST SUBROUTINE

```
ISN
 8          DIMENSION RECREQ(140)
 9          EQUIVALENCE (RECRFQ(1),IGOALS)
10          DIMENSION INSTAT(2,5)
11          EQUIVALENCE(IOPSV(41),INSTAT(1,1))
      C
12          NINSDR=5
13          KINSDR=4
      C
      C
      C  -- FIND LOCATION OF PLAYER
      C
14          ILOC=IVAL(JLOCN,IPLARF)
15          ISOU=IVAL(JSOURC,ICLDRF)
16          ISIN=IVAL(JSINK,ILOC)
      C
      C  -- DETERMINE IF PASSED THROUGH PORTAL
      C
17          IPOSUB=NULL
18          ATIM=TRAVEL(IPLARF,ISOU,ISIN,KRUN,IPOSUB)
19               IF(IPOSUB .EQ. NULL) GO TO 30
      C
      C  -- PASSED THROUGH PORTAL
      C
20          IF(IPOSUB .EQ. KPPNEP) GO TO 20
      C
      C  DETERMINE IF THIS PLAYER OPENED PORTAL
      C
21          IPLNS=IVAL(JPLANS,IPLARF)
22          IPLN=IFIRST(IPLNS,KA)
23           IF(IVAL(JPAR3,IPLN) .EQ. NULL) GO TO 30
      C
      C  DETERMINE IF CAPABLE OF LOCKING PORTAL
      C
24       10 IEQRF=NULL
25          CALL KEYS(IPLARF,ISIN,IEQRF)
26               IF(IEQRF .EQ. NULL) GO TO 15
```

PSM MODEL - PORTST SUBROUTINE

```
ISN
        C
        C   -- CAPABLE OF LOCKING PORTAL
        C
27             CALL CHGFLD(JSTAT,ISOU,KLOCKD,1,IDUM)
28             CALL CHGFLD(JSTAT,ISIN,KLOCKD,1,IDUM)
29             GO TO 30
        C
        C  -- NOT CAPABLE OF LOCKING PORTAL
        C
30          15 CALL CHGFLD(JSTAT,ISOU,KCLOSD,1,IDU)
31             CALL CHGFLD(JSTAT,ISIN,KCLOSD,1,IDU)
32             GO TO 30
        C
        C  -- WEAPON USED AGAINST PORTAL
        C        STATUS IS DESTROYED
        C
33          20 CALL CHGFLD(JSTAT,ISOU,KDESTR,1,IDU)
34             CALL CHGFLD(JSTAT,ISIN,KDESTR,1,IDU)
        C
        C  -- PORTAL DESTROYED, TEST IF INSIDER DID IT
        C
35             IF(IVAL(JTYPE,IPLARF) .NE. KINSDR) GO TO 30
        C
        C  -- SET TRIGGER
        C
36             DO 25 IK=1,NINSDR
37             IF(INSTAT(1,IK) .EQ. IPLARF) GO TO 26
38          25 CONTINUE
39             GO TO 30
        C
        C  -- TRIGGER VALUE OF 5
        C
40          26 INSTAT(2,IK)=5
        C
41          30 CONTINUE
42             RETURN
```

```
ISN
43          END
```

FSM MODEL - POROPN SUBROUTINE

```
ISN
 1          SUBROUTINE POROPN(IPLARF,ISOU,ISIN,ISUM)
      C
      C  -- THE PURPOSE OF THIS SUBROUTINE IS TO OPEN A
      C       PORTAL BEFORE A PLAYER TRAVELS THROUGH IT
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FCRPOT
 8          COMMON /PARS1/
 9          COMMON /PARS2/
10          COMMON /PARS3/
      C
      C  TEST IF BREECHING A BARRIER
      C
11          IF(ISUM .EQ. KPEWEP) GO TO 50
      C
      C   TEST IF SCALING PORTAL
      C
12          IF(ISUM .EQ. KSCALE) GO TO 50
      C
      C  SAVE ORIGINAL STATUS OF PORTAL
      C
13          ISTT=IVAL(JSTAT,ISOU)
14          IF(ISTT .LE. KOPEN) GO TO 50
15          IPLNS=IVAL(JPLANS,IPLARF)
16          IPLN=IFIRST(IPLNS,KA)
17          IPTR=IREF1(IPLN)
18          ITEM(IPTR+JPAR3)=ISTT
      C  PENETRATING A PORTAL SET STATUS TO OPEN
      C
19          CALL CHGFLD(JSTAT,ISOU,KOPEN,1,IDU)
20          CALL CHGFLD(JSTAT,ISIN,KOPEN,1,IDU)
```

FSN MODEL - POROPN SUBROUTINE

```
ISN
      C
21        50 CONTINUE
      C
22           RETURN
23           END
```

FSN MODEL - SCALE SUBROUTINE

```
ISN
 1          SUBROUTINE SCALE(IPLARF,IBARR,IEQRF,AHGT)
      C
      C  -- THE PURPOSE OF THIS SUBROUTINE IS TO:
      C       1. DETERMINE IF A PLAYER HAS EQUIPMENT
      C          NECESSARY TO SCALE A BARRIER
      C
      C  -- INPUT PARAMETERS
      C
      C       IPLARF -- PLAYER REFERENCE
      C       IBARR  -- BARRIER REFERENCE
      C
      C  -- OUTPUT VARIABLES
      C
      C       IEQRF -- EQUIPMENT REFERENCE
      C       AHGT  -- HEIGHT OF BARRIER
      C
      C  -- PROCEDURE
      C       1. DETERMINE HEIGHT OF BARRIER
      C       2. DETERMINE IF ANY EQUIPMENT IS NEEDED
      C       3. DETERMINE IF PLAYER HAS EQUIPMENT TO SCALE
      C            BARRIER
      C
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,FLDNAM,ECBECT
 5          COMMON /PARS1/
 6          COMMON /PARS2/
 7          COMMON /PARS3/
      C
 8          IEQRF=NULL
      C
      C  -- HEIGHT OF BARRIER
      C
 9          AHGT=VAL(JHIGH,IBARR)
```

FSM MODEL - SCALE SUBROUTINE

```
      C
      C  -- RULE
      C       IF HIGHT IS LESS THAN 1 METER, NO EQUIPMENT
      C        IS NEEDED TO SCALE BARRIER
      C
            IF(AHGT .GT. 1.0) GO TO 10
            IEQRF=0
            GO TO 40
      C
      C  -- SEARCH EQUIPMENT LIST OF PLAYER
      C
         10 IEQLT=IVAL(JWEAPS,IPLARF)
            IEQUIP=IFIRST(IEQLT,KA)
         15      IF(IEQUIP .EQ. NULL) GO TO 40
      C
      C  -- IGNORE WEAPONS
      C
            CALL PARSRF(IEQUIP,IDY,IB,ID)
                 IF(IDY .NE. IEQUIP) GO TO 20
      C
      C  -- FIND SCALING EQUIPMENT
      C
            IF(IVAL(JTYPE,IEQUIP) .NE. KSCALR) GO TO 20
      C
      C  -- TEST HEIGHT OF SCALING EQUIPMENT
      C
            IF(FLOAT(IVAL(JPAR,IEQUIP)) .GE. AHGT) GO TO 30
      C
         20 IEQUIP=NEXT(IEQLT,KA)
            GO TO 15
      C
         30 IEQRF=IEQUIP
      C
         40 CONTINUE
            RETURN
            END
```

```
ISN
 1          SUBROUTINE SDESIR(IPLARF,TEMP)
      C
      C
      C  --  THE PURPOSE OF THIS SUBROUTINE IS TO:
      C         1.  EVALUATE THE DESIRABILITY FOR A PLAYER TO
      C                SURRENDER.
      C
      C
      C  --  INPUT PARAMETERS
      C
      C         IPLARF  --  PLAYER REFERENCE FOR SURRENDER
      C                       DECISION
      C
      C
      C  --  OUTPUT PARAMETERS
      C
      C        TEMP --  VALUE OF DESIRABILITY TO BE COMPARED
      C                  TO THE SURRENDER THRESHOLD.
      C
      C
      C
      C  -- PROCEDURE
      C        1. SEARCH PERCEPTIONS OF PLAYER
      C           TO DETERMINE WHICH CASE
      C           SUBSETS APPLY AND ADD THE
      C           APPROPRIATE VALUES
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,FLDNAM,FCRMCT
 5          COMMON /PARS1/
 6          COMMON /PARS2/
 7          COMMON /PARS3/
 8          COMMON /DATAV/
 9          DIMENSION ACTTIM(25)
```

FSM MODEL - SDESIR SUBROUTINE

```
ISN
10              EQUIVALENCE (ACTTIM(1),ACTRAT(1))
      C
      C
11              TEMP=0.
12              IF(EVALN(53) .LE. 0) EVALN(53)=1.0
      C
      C   -- CASE SUBSET 1
      C         PHYSICAL STATUS  WOUNDED
      C
13              IF(IVAL(JPSTAT,IPLARF) .EQ. KWOUND)
             *                  TEMP=TEMP+EVALN(51)
      C
      C   -- CASE SUBSET 2
      C        NUMBER OF THREATS TO BE UNDER FIRE FROM
      C
14              IPLT=IVAL(JPRCPS,IPLARF)
15              IPER=IFIRST(IPLT,KA)
16          21       IF(IPER .EQ. NULL) GO TO 28
17              IPERRF=IVAL(JVIEW,IPER)
18                   CALL PARSRF(IPERRF,IDYY,IRRN,IDDUM)
19                   IF(IDYY .NE. IPERSN) GO TO 25
20              IACLT=IVAL(JACTIV,IPERRF)
21              IF(IACLT .EQ. NULL) GO TO 25
22              IACRF=IFIRST(IACLT,KB)
23          22       IF(IACRF .EQ. NULL) GO TO 25
24              IF(IVAL(JTYPE,IACRF) .NE. KFIRNG) GO TO 24
25              IF(IVAL(JPAR1,IACRF) .EQ. IPLARF) TEMP=TEMP+EVALN(52)
      C
26          24  IACRF=NEXT(IACLT,KB)
27              GO TO 22
      C
28          25  IPER=NEXT(IPLT,KA)
29              GO TO 21
      C
30          28  TEMP=TEMP/EVALN(53)
31              IF(TEMP .GT. 1.) TEMP=1.
```

```
ISN
32          RETURN
33          END
```

FSM MODEL - SECURE SUBROUTINE

```
ISN
 1          SUBROUTINE SECURE(IROOM,LEADER,IFORCE)
      C
      C        ROUTINE BY WHICH A LEADER CAN PLAN AND GIVE INSTRUCTIONS TO
      C     SUBORDINATES TO SECURE A ROOM.  SECURING A ROOM WILL BE ACCOMPLISHED
      C     BY POSTING ONE OR MORE GUARDS AT EACH OF THE PORTALS OF THE ROOM,
      C     AND HAVING ONE OR MORE GUARDS TAKE UP POSITIONS IN THE ROOM.  GUARDS
      C     WILL BE ASSIGNED ONE AT A TIME TO POSITIONS TO BE PROTECTED UNTIL NO
      C     MORE OF THE GUARDS ALLOCATED TO THIS MISSION ARE LEFT.
      C
      C     INPUT PARAMETERS:
      C        IROOM    ROOM TO BE SECURED
      C        LEADER   REFERENCE TO LEADER DOING THE PLANNING
      C        IFORCE   A LIST OF GUARDS TO BE ASSIGNED TO SECURE THE ROOM
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FCBROT
 8          COMMON /PARS1/
 9          COMMON /PARS2/
10          COMMON /PARS3/
      C
      C     INITIALIZE INDEX OF ITERATION
11          ITER = 1
      C     INITIALIZE NEIGHBOR LIST INDEX
12          KN = NULL
      C     GET FIRST PERSON TO BE ASSIGNED A POSITION
13          IPERSN = IFIRST(IFORCE,KE)
      C     GET LIST OF PORTALS TO ROOM.  ( THE LIST OF THE ROOM'S NEIGHBORS
      C     WILL BE USED AS A LIST OF ITS PORTALS.  STRICTLY SPEAKING A NEIGHBOR
      C     DOES NOT HAVE TO BE A PORTAL, BUT IF IT ISN'T, IT IS PROBABLY STILL
      C     WORTH GUARDING.)
14    5       NBRS = IVAL(JNBRS,IROOM)
```

PSN MODEL - SECURE SUBROUTINE

```
      C  TEST WHETHER HAVE RUN OUT OF GUARDS TO ASSIGN
      10      IF (IPERSN .EQ. NULL) RETURN
              IF (KN .NE. NULL) GO TO 12
      C  POSITION THE FIRST GUARD (OF EACH CYC  OVER POSNS) TO BE INSIDE THE
      C  ROOM
                IPOSN = IROOM
      C  GET NEXT PORTAL
                NBR = IFIRST(NBRS,KN)
                GO TO 15
      12      CALL PARSEP(NBR,IDTYP,IDUM,IDUM)
      C  ONLY PROCESS DOORS ON THE FIRST ITERATION, TO GIVE THEM HIGHER
      C  PRIORITY.
              IF (IDTYP .NE. LDOOR .AND. ITER .LE. 1) GO TO 30
      C  STATION GUARD AT NEIGHBOR, BUT OUTSIDE OF PORTAL, IF NEIGHBOR
      C  IS A PORTAL
                IPOSN = NBR
                IF (IDTYP .EQ. LDOOR .OR. IDTYP .EQ. LWIND) IPOSN =
           +      IVAL(JECRT,NBR)
      C
      C  CREATE INSTRUCTIONS TO MOVE TO THE LOCATION IDENTIFIED
      15      IACT = NEWRC6(LACTN,KMOVNG,IPOSN,NULL,NULL,NULL,IPERSN)
              IMSG = NEWRC5(LMESS,LEADER,IPERSN,JPLANS,TMIN,IACT)
      C  SEND THE INSTRUCTIONS TO THE PLAYER
              CALL COMMC(LEADER,IPERSN,IMSG)
      C  GET NEXT PLAYER
              IPERSN = NEXT(IFORCE,KP)
      C  GET ROOM'S NEXT NEIGHBOR
      30      NBR = NEXT(NBRS,KN)
              IF (NBR .NE. NULL) GO TO 10
      C  HAVE RUN OUT OF NEIGHBORS OF THE ROOM BUT NOT OUT OF PERSONS;
      C  MAKE ANOTHER ITERATION OVER NEIGHBORS.
              ITER = ITER + 1
              GO TO 5
            END
```

FSM MODEL - SENSE SUBROUTINE

```
ISN
 1          SUBROUTINE SENSE(IREF)
      C
      C   ROUTINE TO EXAMINE REMOTE SENSOR STIMULI AND CONVERT THEM TO
      C   A LIST OF ENTITIES OBSERVED BY THE SENSOR MONITOR.  THE ROUTINE
      C   UPDATES OLD OBSERVATIONS BY RECORDING SENSORS AND
      C    EXAMINES NEW SENSOR DETECTIONS TO FORM THE LIST.  SOME IMPORTANT
      C    VARIABLES ARE:
      C
      C       IREF  ->  REFERENCE TO THE SENSOR MONITOR
      C
      C        NWSNLT -- REFERENCE TO THE LIST OF NEW SENSOR ACTIVATIONS
      C                   (FROM SNSACT)
      C        NOLDSN -- REFERENCE TO THE LIST OF OLD (RECORDED) ACTIVATIONS
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPHAS,FLONAM,FCSMOT
 8          COMMON /PARS1/
 9          COMMON /PARS2/
10          COMMON /PARS3/
11          COMMON /DATAV/
12          DIMENSION ACTTIM(25)
13          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
14          COMMON /RECREF/
15          DIMENSION RECRFQ(140)
16          EQUIVALENCE (RECRFQ(1),IGCALS)
17          NDET = 0
      C
      C   PROCESS THE NEW SENSOR ACTIVATIONS
      C
      C   GET THE PLACE OF THE SENSOR MONITOR
18          IPLC = IVAL(JPLACE,IVAL(JLOCN,IREF))
```

FSM MODEL - SENSE SUBROUTINE

```
ISN
19           MSGREF = IFIRST(NWSNLT,INW)
20        100 IF (MSGREF .EQ. NULL) GO TO 300
      C      IF A RECORDING SENSOR, ADD THE MESSAGE TO THE OLD SENSOR ACTIVATION
      C   LIST
21           NSEN = IVAL(JSOURC,MSGREF)
22           NRPTYP = IVAL(JRTYPE,NSEN)
23           IF (NRPTYP .NE. KEINRC .AND. NRPTYP .NE. KPICRC) GO TO 200
24           CALL CHGLST(MSGREF,1,11,0)
25           NOLDSN = ISTACK(MSGREF,NOLDSN)
      C    MAKE SURE THE SENSOR MONITOR IS AT THE DESTINATION OF THE MESSAGE
26    200    IF (IPLC .NE. IVAL(JLOCCN,NSEN)) GO TO 290
      C      ADD THE NEW SENSOR DETECTION TO THE LIST OF DETECTIONS BY THE
      C      SENSOR MONITOR,
      C    INDEXED BY THE TYPE OF THE SENSOR
27           NDET = NDET + 1
28           CALL CHGLST(MSGREF,1,4,NRPTYP)
29           INNOBS(NRPTYP) = ISTACK(MSGREF,INNOBS(NRPTYP))
      C    GET NEXT SENSOR ACTIVATION MESSAGE
30        290 MSGREF = NEXT(NWSNLT,INW)
31           GO TO 100
      C
      C      COMPARE THE NUMBER OF DETECTIONS BY THE SENSOR MONITOR WITH THE
      C      MAXIMUM ALLOWED
      C
      C    IF THE NUMBER OF ENTITIES DETECTED IS AT LEAST THE MAXIMUM
      C    NUMBER THE SENSOR MONITOR CAN ASSIMILATE, DONE.
32    300    NTDET = DTSEC * HELIES(KIIE2,ISIDE)
33           IF (NDET .GE. NTDET) GO TO 900
      C
      C    PROCESS OLD DETECTIONS
      C
34        500 CONTINUE
35           MSGREF = IFIRST(NOLDSN,IOLD)
36        600 IF (MSGREF .EQ. NULL) GO TO 900
      C    MAKE SURE THE SENSOR MONITOR IS AT THE DESTINATION OF THE MESSAGE
37           IF (IPLC .NE. IVAL(JCCNT, MSGREF)) GO TO 690
```

FSN MODEL - SENSE SUBROUTINE

```
ISN
     C    IF THE MESSAGE HAS THE CURRENT TIME IT IS ALREADY AN OBSERVATION OF
     C    THE SENSOR MONITOR
38          TIME = VAL(JTIME,MSGREF)
39          AGEM = TMIN - TIME
40          IF (AGEM .LT. .1) GO TO 690
     C    IF THE MESSAGE IS TOO OLD, ELIMINATE IT FROM THE LIST
41          IF (AGEM/60. .LT. TSTALE) GO TO 605
42          CALL CHGLST(IOLD,3,11,0)
43          CALL DELIST(IOLD,0,NOLDSN)
44          GO TO 690
     C    IF THE SENSOR IS A PICTURE SENSOR, SEE IF THE SUBJECT IS STILL
     C WITHIN RANGE
45     605 NSEN = IVAL(JSCURC,MSGREF)
46          IF (IVAL(JRTYPE,NSEN) .NE. KPICRC) GO TO 670
     C    GET THE PLAYER DETECTED AND HIS CURRENT PLACE
47          NPLARF = IVAL(JSUBJ,MSGREF)
48          NPLAC = IVAL(JPLACE,IVAL(JLOCN,NPLARF))
     C    ITERATE THROUGH THE LIST OF SENSORS COVERING THE PLACE, CHECKING
     C    FOR COVERAGE BY THIS SENSOR
49          LSNS = IVAL(JSENS,NPLAC)
50          NSN = IFIRST(LSNS,ISN)
51     610 IF (NSN .EQ. NULL) GO TO 690
52          IF (NSN .NE. NSEN) GO TO 630
     C    CHECK TO SEE IF PLAYER IS CLOSE ENOUGH TO BE DETECTED
53          IF (DIST(NSEN,NPLARF) .GT. SENRNG(IVAL(JTYPE,NSEN))) GO TO 690
     C    THE PLAYER IS STILL COVERED BY THE SENSOR; UPDATE THE TIME OF
     C    OBSERVATION TO CURRENT TIME
54          CALL CHGFLD(JTIME,MSGREF,TSEC,1,NULL)
55          GO TO 670
56   630    NSN = NEXT(LSNS,ISN)
57          GO TO 610
     C    ADD THE MESSAGE TO THE SM'S OBSERVATION LIST
58   670    NRPTYP = IVAL(JRTYPE,NSEN)
     C    IF THE PLAYER IS ALREADY ON THE OBS LIST, SKIP IT
59          IF(LSERCH(IMNOBS(NRPTYP),NULL,NULL,JSUBJ,NULL) .NE. NULL)GO TO 690
60          CALL CHGLST(MSGREF,1,4,NRPTYP)
```

```
ISN
61            INNOBS(NRPTYP) = ISTACK(MSGREF,INNOBS(NRPTYP))
62        690 MSGREF = NEXT(MOLDSN,IOIC)
63            GO TO 600
      C
      C   NULL THE NEW MESSAGE LIST REFERENCE
64    900     NWSMLT = NULL
65            CALL CHGVAR(15,NWSMLT)
66            RETURN
67            END
```

FSM MODEL - SNSACT SUBROUTINE

```
ISN
 1          SUBROUTINE SNSACT(IPLARF,IOLDLC)
      C
      C   SUBROUTINE TO CREATE SENSOR ACTIVATION MESSAGES TO THE SENSOR
      C   MONITOR.  THE ROUTINE IS CALLED FROM THE MOVEMENT MODULE WHENEVER
      C   A MOVING PLAYER CROSSES A NEW NODE.
      C     IPLARF  ->  REFERENCE TO PLAYER MOVING
      C     IOLDLC  ->  REFERENCE TO NODE (PLACE) PLAYER HAS JUST LEFT
      C                     (USEFUL FOR CHECKING PORTAL SENSOR ACTIVATION)
      C
      C   THE ROUTINE PLACES THE SENSOR ACTIVATIONS IN A MESSAGE LIST,
      C   REFERRED TO BY NWSNLT.  THIS LIST IS LATER PROCESSED IN THE
      C   ROUTINE SENSE TO CREATE A LIST OF OBSERVATIONS BY THE SENSOR
      C   MONITOR.
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FCBNCT
 8          COMMON /PARS1/
 9          COMMON /PARS2/
10          COMMON /PARS3/
11          COMMON /DATAV/
12          DIMENSION ACTTIM(25)
13          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
14          COMMON /RECREF/
15          DIMENSION RECRFQ(140)
16          EQUIVALENCE (RECRFQ(1),IGCALS)
      C
      C   GET I'S PLACE
17          IPLAC = IVAL(JPLACE,IVAL(JLCCN,IPLARF))
      C   SEE IF COVERED BY SENSORS - IF NOT, DONE
18          MSENS = IVAL(JSENS,IPLAC)
19          IF (MSENS .EQ. NULL) RETURN
```

```
ISN
     C   ITERATE THROUGH THE LIST OF SENSORS COVERING THIS NODE
20         NSEN = IFIRST(NSENS,INO)
21     100 IF (NSEN .EQ. NULL) RETURN
     C   CHECK TO SEE IF THIS IS INDEED A SENSOR
22         CALL PARSRF(NSEN,IDS,IDUM,IDUM)
23         IF (IDS .EQ. LSENS) GO TO 110
24         CALL ERR(3,29,ISENS,NSEN,0)
25         GO TO 200
     C   IF THE SENSOR IS NOT OPERATIONAL DONE WITH THIS SENSOR
26     110 IF (IVAL(JPSTAT,NSEN) .NE. KOPERL) GO TO 200
     C   FIND THE TYPE OF THE SENSOR AND CHECK TO SEE IF THE PLAYER IS
     C   WITHIN RANGE OF THE SENSOR (IF NOT A PORTAL SENSOR)
27         NSTYP = IVAL(JTYPE,NSEN)
28         IF (NSTYP .EQ. KPORSN) GO TO 40
29         R = DIST(NSEN,IPLARF)
30         IF (R .GT. SENRNG(NSTYP) ) GO TO 200
     C   BRANCH TO THE CHECK FOR THIS TYPE OF SENSOR
31         GO TO (10,20,30,40,50,60,70),NSTYP
     C   EXPLOSIVES SENSOR - CURRENTLY NOT IMPLEMENTED
32      10 CONTINUE
33         GO TO 200
     C   METAL SENSOR - CHECK PLAYER'S EQUIPMENT FOR WEAPONS
34      20 IEQULT = IVAL(JWEAPS,IPLARF)
35         IEQUIP = IFIRST(IEQULT,INUM)
36      25 IF (IEQUIP .EQ. NULL) GO TO 200
37         CALL PARSRF(IEQUIP,IDDD,IRRR,IDUM)
38         IF(IDDD .NE. LWEAP) GO TO 29
     C   CHECK TO SEE IF EQUIPMENT IS METAL
39         IF (IVAL(JTYPE,IEQUIP) .LE.KGRNAD) GO TO 29
     C   THE MATERIAL IS METAL- TRIP THE SENSOR
40         GO TO 150
41      29 IEQUIP = NEXT(IEQULT,INUM)
42         GO TO 25
     C   RADIOACTIVITY SENSOR - ITERATE THROUGH THE PLAYER'S EQUIPMENT
43      30 IEQULT = IVAL(JWEAPS,IPLARF)
44         IEQUIP = IFIRST(IEQULT,INUM)
```

```
                    FSN MODEL  -   SNSACT SUBROUTINE
ISN
45        35 IF (IEQUIP .EQ. NULL) GO TO 200
46           CALL PARSRF(IEQUIP,IDDD,IRRR,IDUM)
47           IF(IDDD .NE. LEQUIP) GO TO 39
      C    CHECK TO SEE IF EQUIPMENT IS NUCLEAR MATERIAL
48           IF (IVAL(JTYPE,IEQUIP) .NE. KSNM) GO TO 39
      C    THE MATERIAL IS NUCLEAR- TRIP THE SENSOR
49           GO TO 150
50        39 IEQUIP = NEXT(IEQUIP,ISUE)
51           GO TO 35
      C    PORTAL STATUS SENSOR - SEE IF I HAS PASSED THROUGH
52        40 CONTINUE
      C    IF I'S CURRENT LOCATION IS NOT A PORTAL, NO ACTIVATION
53           CALL PARSRF(IPLAC,IDTYP,IDUM,IDUM)
54           IF (IDTYP .NE. IDOOR .AND. IDTYP .NE. LWIND) GO TO 200
      C    IF HIS PREVIOUS LOCATION IS A PORTAL PAIRED WITH THIS ONE,
      C    TRIP THE SENSOR
55           ITM=IVAL(JSOURC,ICLOLC)
56           IF (IVAL(JPORT,IPLAC) .NE. ITM) GO TO 200
57           GO TO 150
      C    PERSON-VEHICLE SENSOR 1
58        50 CONTINUE
59           GO TO 150
      C    PERSON-VEHICLE SENSOR 2
60        60 CONTINUE
61           GO TO 150
      C    CREDENTIALS SENSOR - ACTIVATE ONLY IF PLAYER LACKS PROPER
      C     CREDENTIALS
62        70 CONTINUE
63           IF (IVAL(JCRED,IPLARP) .NE. NULL) GO TO 200
64       150 CONTINUE
      C    THE SENSOR IS TRIPPED - CREATE A MESSAGE
65           IPLAC = ICOPY(IVAL(JLOCN,IPLARP))
66           MSGRF = NEWRC5(IMESS,KSEN,IPLARP,JLOCN,TMIN,IPLAC)
      C    SAVE THE REFERENCE TO THE NEW MESSAGE
67           CALL CHGLST(MSGRF,1,12,0)
68           NWSNLT = ISTACK(MSGRF,NWSNLT)
```

```
ISN
      C   GET NEXT SENSOR COVERING THIS NODE
69      200 NSEN = NEXT(NSENS,INO)
70          GO TO 100
71          END
```

```
                              FSM MODEL  -   SURFAC SUBROUTINE
ISN
  1           SUBROUTINE SURFAC(IPLARF)
      C ... THIS SUBROUTINE IS CALLED TO CHANGE AN INSIDER TO A
      C     NORMAL AFF COMBATANT.
      C
      C         IPLARF >-- REFERENCE TO PLAYER TO SURFACE
      C
  2           COMMON /STATEV/
  3           DIMENSION ITEM(41900),DITEM(41900)
  4           EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
  5           COMMON /PARS/
  6           EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  7           REAL*8 DTPNAM,FLDNAM,ICSECT
  8           COMMON /PARS1/
  9           COMMON /PARS2/
 10           COMMON /PARS3/
 11           COMMON /RECREF/
 12           COMMON /NEW/
 13           DIMENSION INSTAT(2,5)
 14           EQUIVALENCE (IOBSV(41),INSTAT(1,1))
 15           LOGICAL INTCPT
      C
      C ... TEMPORARY INITIALIZATION, REMOVE WHEN PARSM UPDATED
      C
 16           NINSDR = 5
 17           KINSDR = 4
      C
      C ... IF PLAYER NOT INSIDER, RETURN
      C
 18           IF(IVAL(JTYPE,IPLARF) .EQ. KINSDR) GO TO 10
 19           CALL ERR(41,37,IPLARF,NULL,NULL)
 20           RETURN
      C
      C ... REMOVE PLAYER FROM INSIDER ARRAY
      C
 21        10 DO 20 I=1,NINSDR
```

FSN MODEL - SURFAC SUBROUTINE

```
ISN
22             IF(INSTAT(1,I) .NE. IPLARF) GO TO 20
23             INSTAT(1,I) = NULL
24             INSTAT(2,I) = 0
25             GO TO 30
26       20 CONTINUE
      C
      C ...ALLOW INSIDER TO EXIT ON ANY AFE NETS ON WHICH HE
      C    CAN CURRENTLY RECEIVE.
      C
27       30 NNET = NRECSO(LCONNT)
28          DO 40 INET = 1,NNET
29             NETREF=NEWREF(LCONNT,INET,0)
      C        SEE IF PLAYER ON NET
      C
30             ION=LSERCH(IVAL(JRCVRS,NETREF),IPLARF,NULL,NULL,NULL)
31             IF(ION.EQ.NULL) GO TO 40
      C
      C ... SEE IF THIS IS AFE NET
      C
32             CALL DRCOM3(IPLARF,NETREF,INTCPT)
33             IF(INTCPT) GO TO 40
      C
      C ... ADD NET TO PLAYE'S LIST
      C
34             NETLIS = IVAL(JCNNTS,IPLARF)
35             NETLIS = ISTACK(NETREF,NETLIS)
36             CALL CHGFLD(JCNNTS,IPLARF,NETLIS,1,IDUM)
37       40 CONTINUE
      C
      C ... FIND A FORCE FOR THE INSIDER
      C
38          NFORCE = NRECSO(LFORCE)
39          DO 50 I=1,NFORCE
40             IFREF = NEWREF(LFORCE,I,0)
41             IF(IVAL(JFALEG,IFREF) .EQ. KAFE) GO TO 60
42       50 CONTINUE
```

```
ISN
      C
      C ... NO APE FORCE FOUND --CREATE FORCE WITH ONLY INSIDER ON IT
      C      AND SET GOALS FLAG FOR PLANNING
      C
43             NEWF = NEWREC(LFORCE)
44           IFREF = NEWREF(LFORCE,NEWF,0)
45           IPTR = IREF1(IFREF)
46           ITEM(IPTR+JTYPE) = KECH1
47           ITEM(IPTR+JFALEG) = KAFE
48           ITEM(IPTR+JFLDR) = IPLARF
49           ITEM(IPTR+JCONTS) = IPLARF
50           ITEM(IPTR+JSITN) = KSITN3
51           DITEM(IPTR+JFSTAT) = 1.0
52           ITEM(IPTR+JFPLNS) = IVAL(JPLANS,IPLARF)
53           NEWGOL = 1
      C   MAKE SUBORDINATES FIELD OF INSIDER NON-NULL, FOR PLANNING PURPOSES
      C   AND ADD THE FORCE REFERENCE TO HIS FORCE FIELD
54           CALL CHGFLD(JSUBS,IPLARF,IPLARF,1,NULL)
55           CALL CHGFLD(JFORCE,IPLARF,IFREF,1,NULL)
56           GO TO 70
      C
      C ... UPDATE FORCE RECORD AND IPLARF TO SHOW FORCE
      C      MEMBERSHIP
57        60 LISMEM = IVAL(JCONTS,IFREF)
58           LISMEM = ISTACK(IPLARF,LISMEM)
59           CALL CHGFLD(JCONTS,IFREF,LISMEM,1,IDUM)
60           CALL CHGFLD(JFORCE,IPLARF,IFREF,1,IDUM)
61           LDRREF = IVAL(JFLDR,IFREF)
62           CALL CHGFLD(JLEADR,IPLARF,LDRREF,1,IDUM)
      C
      C   ADD INSIDER TO SUBORDINATES FIELD OF FORCE LEADER
      C
63           LISSUB = IVAL(JSUBS,LDRREF)
64           LISSUB = ISTACK(IPLARF,LISSUB)
65           CALL CHGFLD(JSUBS,LDRREF,LISSUB,1,IDUM)
      C
```

```
ISN
      C ... CHANGE TYPE TO COMBATANT
      C
66       70 CALL CHGFLD(JTYPE,IPLARF,KCOMBT,1,IDUM)
67          RETURN
68          END
```

FSN MODEL - TRAVEL FUNCTION

```
ISN
 1          FUNCTION TRAVEL(IPLARF,ISOU,ISIN,IACSUB,IPOSUB)
      C
      C
      C  -- THE PURPOSE OF THIS FUNCTION IS TO::
      C           1. EVALUATE  A MOVEMENT LINK FOR THE TRAVEL TIME
      C               IN SECCNDS.
      C
      C
      C  -- INPUT PARAMETERS
      C
      C       IPLARF -- PLAYER REFERENCE
      C        ISOU   -- SOURCE NODE
      C        ISIN  -- SINK NODE
      C        IACSUB  -- ACTIVITY SUBTYPE
      C
      C
      C  --  OUTPUT
      C
      C      FUNCTION RETURNS THE TIME IN SECONDS NEEDED
      C        TO TRAVERSE A GIVEN LINK FOR PLAYER IPLARF
      C       IF PLAYER IS PENETRATING A PORTAL IPOSUB IS THE
      C          SUB ACTIVITY
      C[
      C
      C  -- PRCCEDURE
      C
      C     1. DETERMINE ACTIVITY RATE FOR ACTIVITY SUB-TYPE
      C
      C     2. ADJUST RATE ACCORDING TO WOUND, SKILL.
      C
      C     3. DETERMINE DISTANCE IN METERS
      C
      C     4. TRAVEL=DISTANCE/RATE
      C
      C
```

FSM MODEL - TRAVEL FUNCTION

```
ISN
 2         COMMON /PARS/
 3         EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4         REAL*8 DTPNAM,FLDNAM,FCINOT
 5         COMMON /PARS1/
 6         COMMON /PARS2/
 7         COMMON /PARS3/
 8         COMMON /DATAV/
 9         DIMENSION ACTTIM(25)
10         EQUIVALENCE (ACTTIM(1),ACTRAT(1))
     C
     C  -- FIND SKILL FOR PLAYER
     C
     C   -- SKILL TYPE = KMOVSK
     C
     C   -- FIND PHYSICAL STATUS
     C
11         ITEMP=KPWHOL
12              IF(IVAL(JPSTAT,IPLARF) .EQ. KWOUND) ITEMP=KPWOUN
     C
     C  -- FIND PLAYER NUMBER
     C
13         CALL PARSRF(IPLARF,IDY,IPLANO,IDUM)
     C
     C  CHECK IF PASSING THROUGH PORTAL
     C
14         CALL PARSRF(ISOU,IDY,IRR,IDU)
15         IF(IDY .EQ. LDOOR) GO TO 10
16         IF(IDY .EQ. LWIND) GO TO 10
17         GO TO 100
     C
18      10 CALL PARSRF(ISIN,IDY,IRR,IDU)
19         IF(IDY .EQ. LDOOR) GO TO 12
20         IF(IDY .EQ. LWIND) GO TO 12
21         GO TO 100
     C
     C  -- DETERMINE IF PORTAL
```

PSN MODEL - TRAVEL FUNCTION

```
ISN
      C
22         12 IF(ISOU .NE. IVAL(JPORT,ISIN)) GO TO 100
      C
      C   -- PASSING THROUGH PORTAL
      C         DETERMINE TIME REQUIRED
      C
23            IF(IVAL(JSTAT,ISOU) .EQ. KOPEN) GO TO 15
24            IF(IVAL(JSTAT,ISOU) .EQ. KCLOSD) GO TO 20
25            IF(IVAL(JSTAT,ISOU) .EQ. KLOCKD) GO TO 30
26            GO TO 40
      C
      C   -- PORTAL OPEN
      C
27         15 TEM=ACTTIM(KPPOPE)
28            IF(IACTTP(KPPOPE) .EQ. 1) TEM=1./ACTRAT(KPPOPE)
29            IPOSUB=KPPOPE
30            GO TO 70
      C
      C   -- PORTAL CLOSED
      C
31         20 TEM=ACTTIM(KPPUNL)
32            IF(IACTTP(KPPUNL) .EQ. 1) TEM=1./ACTRAT(KPPUNL)
33            IPOSUB=KPPUNL
34            GO TO 70
      C
      C   -- PORTAL LOCKED
      C         USE KEY
      C
35         30 CALL KEYS(IPLARF,ISOU,IERBF)
36            IF(IERBF .EQ. NULL) GO TO 40
      C
37            TEM=ACTTIM(KPPKEY)
38            IF(IACTTP(KPPKEY) .EQ. 1) TEM=1./ACTRAT(KPPKEY)
39            IPOSUB=KPPKEY
40            GO TO 70
      C
```

```
ISN
      C  -- SCALE PORTAL
      C
41       40 IF(IDY .EQ. LWIND) GO TO 50
42          IF(IVAL(JBARIN,ISCU) .EQ. NULL) GO TO 50
43          IBARR=IVAL(JBARIN,ISOU)
44          CALL SCALE(IPLARP,IBARR,IEQRP,AHEGT)
45               IF(IEQRP .EQ. NULL) GO TO 50
      C
46          TEM=AHEGT/ACTRAT(KSCALE)
47          IF(IACTTP(KSCALE) .EQ. 1)  TEM=AHEGT*ACTTIM(KSCALE)
48          IPOSUB=KSCALE
49          GO TO 70
      C
      C  -- PORTAL SECURED
      C     TEST FOR EQUIPMENT TO BREECH
      C
50       50 CALL BRECH(IPLARP,ISOU,IEQRP)
51          IF(IEQRP .EQ. NULL) GO TO 60
      C
52          TEM=ACTTIM(KPPWEP)
53          IF(IACTTP(KPPWEP) .EQ. 1) TEM=1./ACTRAT(KPPWEP)
54          IPOSUB=KPPWEP
55          GO TO 70
      C
      C  -- IMPOSSIBLE TO PENETRATE PORTAL
      C
56       60 TRAVEL=9999.0
57          GO TO 200
      C
58       70 TRAVEL=TEM*SKILL(KMCVSK,ITEMP,IPLANO)
59          GO TO 200
      C
      C  -- FIND ACTIVITY RATE FOR MOVING
      C
60      100 RATE=ACTRAT(IACSUB)
61          IF(IACTTP(IACSUB) .EQ. 2) RATE=1./RATE
```

FSM MODEL - TRAVEL FUNCTION

```
ISN
62            RATE=RATE*SKILL(KMOVER,ITEMP,IPLANO)
      C
      C   -- CALCULATE DISTANCE
      C
63            X1=(VAL(JXCO,ISIN)-VAL(JXCO,ISOU))**2
64            X2=(VAL(JYCO,ISIN)-VAL(JYCO,ISOU))**2
65            X3=(VAL(JZCO,ISIN)-VAL(JZCO,ISOU))**2
66            DIST=SQRT(X1+X2+X3)
      C
      C   -- FIND TRAVEL TIME
      C
67            TRAVEL=DIST/RATE
      C
68        200 CONTINUE
69            RETURN
70            END
```

FSN MODEL - TRGLST SUBROUTINE

```
ISN
 1         SUBROUTINE TRGLST(IPLARF,ILOCN,ITABLT)
     C
     C
     C  -- THE PURPOSE OF THIS SUBROUTINE IS TO:
     C          1. GENERATE A LIST OF POTENTIAL TARGETS FOR PLAYER
     C            IPLARF.
     C
     C
     C  --  INPUT PARAMETERS
     C
     C
     C          IPLARF   - PLAYER REFERENCE
     C
     C         ILOCN
     C                IF ILOCN IS NULL, TARGETS LOCATION IS
     C                ANYWHERE WITH LINE OF SIGHT
     C                 IF ILOCN IS NON-NULL, TARGETS MUST BE IN
     C                 THIS DEFINED REGION
     C
     C        -- OUTPUT VARIABLES
     C
     C                ITABLT    -  LIST REFERENCE FOR TARGET LIST
     C
     C
     C
     C   TARGET LIST GENERATION
     C        ANY PLAYER PERCEIVED OF OPPOSITE ALLEGIENCE, AND
     C        THE PERCEIVED LOCATION IS IN THE REGION OF INTEREST
     C        IS DEFINED AS A POTENTIAL TARGET.  ONLY IF THE
     C        PERCEIVED LOCATION IS THE SAME AS THE TRUE LOCATION
     C        OF THE PERCEIVED PLAYER AND LINE OF SIGHT EXISTS
     C        WILL THIS PLAYER BE ADDED TO THE TARGET LIST.
     C
     C
     C
```

PSN MODEL - TRGLST SUBROUTINE

```
ISN
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /BARS/
 6          EQUIVALENCE (PNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
 8          COMMON /PARS1/
 9          COMMON /PARS2/
10          COMMON /PARS3/
      C
      C  -- INITIALIZE TARGET LIST
      C
11          ITARLT=NULL
      C
      C  FIND LINE OF SIGHT LIST
      C
12          CALL PARSRF(IPLARF,IDY,IRR,IDUM)
13          ILOSL=LOSLIS(IPLARF,IRR)
      C
      C  -- FIND PERCEIVED LIST OF PLAYERS
      C
14          IPERLT=IVAL(JPRCPS,IPLARF)
15          ISIDE=IVAL(JALLEG,IPLARF)
      C
      C  -- FIND FIRST PERCEPTION RECORD REFERENCE
      C       ON LIST OF PERCEPTIONS
      C
16          IPERRF=IFIRST(IPERLT,KT)
17        5      IF(IPERRF .EQ. NULL) GO TO 30
      C
      C  -- FIND PLAYER REFERENCE OF PERCEPTION
      C
18               ICURRF=IVAL(JVIEW,IPERRF)
19               CALL PARSRF(ICURRF,IDYY,IRRN,IDDUM)
20               IF(IDYY .EQ. LFORCE) GO TO 20
      C
```

```
      C  -- TEST IF ICURRF IS OF OPPOSITE ALLEGIENCE
      C
                  IF(IVAL(JALLEG,ICURRF) .EQ. NULL) GO TO 20
                  IF(IVAL(JALLEG,ICURRF) .EQ. ISIDE) GO TO 20
      C
      C  -- PLAYER PERCEIVED OF OPPOSITE ALLEGIANCE, TEST IF
      C       PLAYER IS IN REGION OF INTEREST
      C
                  IPLOC=IVAL(JLOCN,ICURRF)
                  IF(IPLOC .EQ. NULL) GO TO 20
                  IF(ILOCN .EQ. NULL) GO TO 10
                       IF(IVAL(JPLACE,IPLOC) .NE. ILOCN) GO TO 20
      C
      C  -- PLAYER IN REGION OF INTEREST , TEST TRUE LOCATION
      C
         10 ITRURF=IVAL(JID,IPERRF)
            ITLOC=IVAL(JLOCN,ITRURF)
                  ITEMP=IVAL(JPLACE,ITLOC)
                  IF(IVAL(JPLACE,IPLOC) .NE. ITEMP) GO TO 20
      C
      C  TEST IF PLAYER IS BEING CAPTURED
      C
            IACTL=IVAL(JACTIV,ITRURF)
            IAT=IFIRST(IACTL,KR)
         12    IF(IAT .EQ. NULL) GO TO 17
            IF(IVAL(JTYPE,IAT) .NE. KCAPNG) GO TO 15
            IF(IVAL(JPAR1,IAT) .EQ. ITRURF) GO TO 20
      C
         15 IAT=NEXT(IACTL,KR)
            GO TO 12
      C
      C
      C  -- PLAYER IS IN SAME REGION AS PERCEPTION
      C        TEST FOR LINE OF SIGHT
      C
      C  SEARCH LOS LIST
```

FSM MODEL - TRGLST SUBROUTINE

```
ISN
      C
38       17 ICOD=IFIRST(ILOSL,KS)
39       18   IF(ICOD .EQ. NULL) GO TO 20
40          IF(ICOD .EQ. ITRURF) GO TO 19
41          ICOD=NEXT(ILOSL,KS)
42          GO TO 18
      C
      C  -- ADD PLAYER TO TARGET LIST
      C     LINE OF SIGHT EXISTS
      C
43       19 ITABLT=ISTACK(ITRURF,ITABLT)
      C
      C  -- NEXT PERCEPTION
      C
44       20 IPERRF=NEXT(IPERLT,KT)
45          GO TO 5
      C
      C
      C
46       30 CONTINUE
47          RETURN
48          END
```

FSN MODEL - UPACTS SUBROUTINE

```
ISN
  1          SUBROUTINE UPACTS
       C
       C  -- THE PURPOSE OF THIS SUBROUTINE IS TO:
       C          1.  REMOVE ALL ACTIVITIES FROM EACH PLAYER
       C                LIST EXCEPT CAPTURING
       C         2.  AND, REMOVE PLANS THAT HAVE BEEN COMPLETED
       C
       C
       C  -- OUTPUT
       C        THIS SUBROUTINE ADJUSTS THE ACTIVITY AND PLANS
       C        LIST OF PLAYERS
       C
  2          COMMON /STATEV/
  3          DIMENSION ITEM(41900),DITEM(41900)
  4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
  5          COMMON /PARS/
  6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  7          REAL*8 DTPNAM,FLDNAM,FORECT
  8          COMMON /PARS1/
  9          COMMON /PARS2/
 10          COMMON /DATAV/
 11          DIMENSION ACTTIM(25)
 12          EQUIVALENCE (ACTTIM(1),ACTRAT(1))
 13          COMMON /RECREF/
 14          DIMENSION RECRFQ(140)
 15          EQUIVALENCE (RECRFQ(1),IGCALS)
       C
       C
 16          JL=JGARDS
 17        5 IPRIT=IVAL(JL,ISITE)
 18          IPLARF=IFIRST(IPRIT,KA)
 19       10      IF(IPLARF .EQ. NULL) GO TO 40
 20          INEWLT=NULL
 21          IACTLT=IVAL(JACTIV,IPLARF)
 22          IACTRF=IFIRST(IACTLT,KB)
```

FSN MODEL - UPACTS SUBROUTINE

```
ISN
23      20      IF(IACTRF .EQ. NULL) GO TO 30
24              IF(IVAL(JTYPE,IACTRF) .NE. KCAPNG) GO TO 25
     C
     C  TEST IF EITHER PLAYER IS DEAD OR CAPTURED
     C
25          ISUR=IVAL(JPAR1,IACTRF)
26          IF(IVAL(JPSTAT,ISUR) .LE. KCAPTR) GO TO 25
27          ICAP=IVAL(JDCER,IACTRF)
28          IF(IVAL(JPSTAT,ICAP) .LE. KCAPTR) GO TO 25
29          INERLT=IQUEUE(IACTRF,INERLT)
30      25  IACTRF=NEXT(IACTLT,KB)
31          GO TO 20
32      30  IPTR=IREF1(IPLARF)
33          ITEM(IPTR+JACTIV)=INERLT
     C
     C  -- CHECK PLANS
     C
34          ILST=IVAL(JPLANS,IPLARF)
35          IPLAN=IFIRST(ILST,KP)
36              IF(IPLAN .EQ. NULL) GO TO 38
37          IF(IVAL(JTYPE,IPLAN) .EQ. KMOVNG) GO TO 35
38          IF(IVAL(JTYPE,IPLAN) .EQ. KDETNG) GO TO 32
     C
     C  -- TEST FOR TERMINATION CONDITION
     C
39          IRF=IVAL(JMODS,IPLAN)
40          IF(IRF .EQ. NULL) GO TO 38
41          ICOD=NRTEST(IRF)
42              IF(ICOD .NE. 1) GO TO 38
43              CALL DELIST(KP,JPLANS,IPLARF)
44              ITT=IVAL(JPLANS,IPLARF)
45              CALL CHGFID(JPLANS,IPLARF,ITT,1,IDUM)
46              GO TO 38
     C
     C  OBSERVATION PLAN , CHECK DURATION TIME
     C
```

```
   32 IF(IVAL(JPAR3,IPLAN) .EQ. NULL) GO TO 38
      TT=VAL(JPAR3,IPLAN)
      TT=TT-DTSEC
      IF(TT .LE. 0.0) GO TO 37
      IPTR=IREF1(IPLAN)
      DITEM(IPTR+JPAR3)=TT
      GO TO 38
C
C  -- CHECK LOCATION OF PLAYER
C
   35 IDES=IVAL(JPAR1,IPLAN)
      ILOC=IVAL(JLOCN,IPLARF)
            IPTRA=IREF1(IPLAN)
            ITEM(IPTRA+JPAR2)=NULL
            IF(IVAL(JSOURC,ILOC) .NE. IDES) GO TO 38
   37       CALL DELIST(KP,JPLANS,IPLARF)
            ITT=IVAL(JPLANS,IPLARF)
            CALL CHGFID(JPLANS,IPLARF,ITT,1,IDUM)
   38 IPLARF=NEXT(IPRLT,KA)
      GO TO 10
   40 IF(JL .EQ. JADVRS) GO TO 50
      JL=JADVRS
      GO TO 5
   50 CONTINUE
      RETURN
      END
```

This subsection contains listing for the utility routines used by the Plex Preprocessor and the Fixed Site Neutralization Model. For convenience, they are presented in alphabetical order. For the most part, they are liberally commented. The reader may wish to consult section 3.3, in volume 1 of this manual, for definitions and discussions that are related to this logic. Basically, the utility routines provide record management, reference formation and analysis, storage and retreival, list processing, and input/output functions that are used in connection with the plex data structure.

UTILITIES -   CHGFLD SUBROUTINE

```
ISN
 1          SUBROUTINE CHGFLD(IFIELD,IRECRF,IVALUE,IFLAG,ICHGLS)
      C
      C        ROUTINE TO MAKE AND REPORT A CHANGE TO A RECORD FIELD'S
      C     VALUE.  THE ROUTINE HAS SEVERAL ALTERNATIVE MODES OF ACTION WHICH
      C     DEPEND ON THE IFLAG PARAMETER.  IT MAY EITHER MAKE THE CHANGE
      C     RIGHT AWAY OR DEFER IT UNTIL LATER, SAVING THE CHANGE SPECIFICATION
      C     IN A CHANGE RECORD.  IT MAY EITHER OUTPUT A REPORT OF THE CHANGE
      C     OR NOT.
      C
      C     INPUT PARAMETERS:
      C        IFIELD   INDEX OF FIEID WHICH IS TO BE CHANGED.
      C        IRECRF   REFERENCE TO RECORD CONTAINING THE CHANGED FIELD
      C        IVALUE   NEW VALUE WHICH THE FIELD IS ASSIGNED (MAY BE INTEGER,
      C                 REAL, OR RECORD REFERENCE)
      C        IFLAG    A FLAG INDICATING WHICH OPTION THE ROUTINE IS TO FOLLOW:
      C                   -2  DEFER THE CHANGE, DON'T OUTPUT A REPORT
      C                   -1  MAKE THE CHANGE IMMEDIATELY, DON'T OUTPUT A REPORT
      C                    1  MAKE TFE CHANGE IMMEDIATELY, OUTPUT A REPORT
      C                    2  DEFER THE CHANGE, OUTPUT A REPORT
      C        ICHGLS   IF THE CHANGE IS TO BE DEFERRED, ICHGLS GIVES THE
      C                 RECORD INDEX OF THE FIRST CHANGE RECORD ON A LIST IN
      C                 WHICH THE NEWLY CREATED CHANGE RECORD IS TO BE STACKED
      C                 (OR HAS THE VALUE NULL IF THERE IS NO PRIOR CHANGE LIST).
      C                 NOTE THAT CHANGE RECORDS HAVE A "NEXT" FIELD AND CAN BE
      C                 STACKED VIA THAT FIELD WITHOUT RESORTING TO LISTNDS.
      C
      C     OUTPUT PARAMETERS:
      C        ICHGLS   (SEE ABOVE)
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (PNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
```

UTILITIES - CHGFLD SUBROUTINE

```
ISN
 8            COMMON /PARS1/
 9            COMMON /PARS3/
      C
10            DIMENSION MCHNG(4,1)
11            EQUIVALENCE (VALUE,NEWVAL),(MCHNG(1),CHANGE(1))
12            DATA BLS/'    '/
      C
      C  IF CHANGE IS TO BE OUTPUT, DO SO
      C
13            IF (IFLAG .LT. 0) GO TO 40
      C  GET THE FIELD TYPE FOR THE FIELD
14            CALL PARSRF(IRECRF,IDTYP,IRECNO,IDUM)
      C  GET INDEX OF FIELD NAME
15            IFLDNM = IFDNPT(IDTYP) + IFIELD
      C  BRANCH ACCORDING TO FIELD TYPE
16            IFTYPE = IVAL(IFIELD,NEWREF(IDTYP,NRECS(IDTYP),0))
17            GO TO (5,10,15,20),IFTYPE
      C
      C  INTEGER FIELD
      C  (THE CURRENT VERSION OF THIS ROUTINE DOES NOT HANDLE NULL INTEGER
      C  FIELDS SPECIALLY).
      C
18    5       IOLDVL = IVAL(IFIELD,IRECRF)
19            WRITE (6,100) FLDNAM(IFLDNM),DTPABR(IDTYP),IRECNO,IOLDVL,IVALUE
20    100     FORMAT ('FIELD ',A8,' OF ',A3,I4,' CHANGED FROM ',I8,' TO ',I8)
21            GO TO 40
      C
      C  REAL FIELD
      C  (THE CURRENT VERSION OF THIS ROUTINE DOES NOT HANDLE NULL REAL
      C  FIELDS SPECIALLY).
      C
22    10      OLDVAL = VAL(IFIELD,IRECRF)
23            IF (OLDVAL .EQ. FNULL) OLDVAL = NULL
24            NEWVAL = IVALUE
25            IF (NEWVAL .EQ. NULL) VALUE = NULL
26            WRITE (6,105) FLDNAM(IFLDNM),DTPABR(IDTYP),IRECNO,OLDVAL,VALUE
```

```
ISN
27   105   FORMAT ('FIELD ',A8,' OF ',A3,I4,' CHANGED FROM ',F8.1,' TO ',
          +     F8.1)
28         GO TO 40
     C
     C  REFERENCE FIELD
     C
29   15    IOLDVL = IVAL(IFIELD,IRECRF)
30         IF (IOLDVL .NE. NULL) CALL PARSRF(IOLDVL,IDTPOV,IRECOV,IDUM)
31         IF (IVALUE .NE. NULL) CALL PARSRF(IVALUE,IDTPNV,IRECNV,IDUM)
32         IF (IOLDVL .EQ. NULL) GO TO 16
33         IF (IVALUE .EQ. NULL) GC TO 18
34         WRITE (6,110) FLDNAM(IFLDNM),DTPABR(IDTYP),IRECNO,DTPABR(IDTPOV),
          +     IRECOV,DTPABR(IDTPNV),IRECNV
35   110   FORMAT ('FIELD ',A8,' OF ',A3,I4,' CHANGED FROM ',A3,I4,1X,' TO ',
          +     A3,I4)
36         GO TO 40
     C
     C  OLD VALUE IS NULL
37   16    IF (IVALUE .EQ. NULL) GO TO 19
38         WRITE (6,111) FLDNAM(IFLDNM),DTPABR(IDTYP),IRECNO,BLS,
          +     DTPABR(IDTPNV),IRECNV
39   111   FORMAT ('FIELD ',A8,' OF ',A3,I4,' CHANGED FROM ',A8,' TO ',A3,I4)
40         GO TO 40
     C
     C  NEW VALUE IS NULL
41   18    WRITE (6,113) FLDNAM(IFLDNM),DTPABR(IDTYP),IRECNO,DTPABR(IDTPOV),
          +     IRECOV,BLS
42   113   FORMAT ('FIELD ',A8,' OF ',A3,I4,' CHANGED FROM ',A3,I4,' TO ',A4)
43         GO TO 40
     C
     C  BOTH OLD AND NEW VALUES ARE NULL
44   19    WRITE (6,111) FLDNAM(IFLDNM),DTPABR(IDTYP),IRECNO,BLS,BLS
45         GO TO 40
     C
     C  FIELD CAN HAVE ANY OF SEVERAL TYPES AS VALUE
     C
```

```
ISN
      C  IS THIS A MESSAGE RECORD ?
46    20    IF (IDTYP .NE. LMESS) GO TO 25
      C  IF SO, IT MUST BE THE CONTENT FIELD WHICH IS BEING CHANGED
47          IF (IFIELD .NE. JCONT) CALL ERR(20,15,IFIELD,IRECNO,IDTYP)
      C  GET THE DATA TYPE OF THE SUBJECT OF THE MESSAGE
48          CALL PARSRF(IVAL(JSUBJ,IRECRF),IDTPSB,IDUM,IDUM)
      C  GET THE INDEX OF THE ATTRIBUTE FIELD BEING UPDATED BY THE MESSAGE
49          IATTR = IVAL(JATTR,IRECRF)
      C  GET THE CONTENT DATA TYPE CORRESPONDING TO THE TYPE OF ATTRIBUTE
      C  FIELD
50          ICTYPE = IVAL(IATTR,NEWREF(IDTPSB,NRECS(IDTPSB),0))
      C  BRANCH ACCORDING TO THIS TYPE
51          GO TO (5,10,15),ICTYPE
      C
      C  IS THIS AN ACTION RECORD ?
52    25    IF (IDTYP .NE. LACTN) GO TO 32
      C  IF SO, IS IT ONE OF THE PARAMETER FIELDS WHICH IS TO BE CHANGED ?
53          IF (IFIELD .LT. JPAR1 .OR. IFIELD .GT. JPAR3)
           +     CALL ERR(20,15,IFIELD,IRECNO,IDTYP)
      C  DETERMINE THE TYPE OF THE PARAMETER CORRESPONDING TO THE ACTION
54          IACTTP = IVAL(JTYPE,IRECRF)
55          IF (IACTTP .LE. NACTTP) GO TO 30
56          CALL ERR(21,15,1,IACTTP,0)
57          GO TO 38
      C
      C  GET DATA TYPE OF THE APPROPRIATE FIELD AND BRANCH ACCORDINGLY
58    30    IFTYPE = MACTTP(IFIELD-1,IACTTP)
59          GO TO (5,10,15,38,38),IFTYPE
      C
      C  IS THIS A RELATION RECORD ?  IS IT ONE OF ITS PARAMETER FIELDS
      C  WHICH IS TO BE CHANGED ?
60    32    IF (IDTYP .NE. LRELN .OR. (IFIELD .NE. JPAR1 .AND. IFIELD .NE.
           +     JPAR2)) CALL ERR(20,15,IFIELD,IRECNO,IDTYP)
      C  DETERMINE THE TYPE OF THE PARAMETER CORRESPONDING TO THE RELATION
61          IRELTP = IVAL(JTYPE,IRECRF)
62          IF (IRELTP .LE. NRELTP) GO TO 36
```

```
ISN
63              CALL ERR(21,15,2,IRELTP,0)
64              GO TO 38
     C
     C  GET DATATYPE OF THE APPROPRIATE FIELD AND BRANCH ACCORDINGLY
65   36         IFTYPE = NRELTP(IFIELD-1,IRELTP)
66              GO TO (5,10,15,38,38),IFTYPE
     C
     C  IF CAN'T RECOGNIZE THE TYPE OF THE FIELD BASED ON ITS CONTEXT,
     C  BASE DECSION ON ITS VALUE
67   38         IFTYPE = 1
68              IF (IVALUE .LE. 1009999999 .AND. IVALUE .GE. 1000010001)
             +       IFTYPE = 3
69              IF (IVALUE .GT. 1009999999 .OR. IVALUE .LT. -100) IFTYPE = 2
70              GO TO (5,10,15),IFTYPE
     C
     C  IF A CHANGE IS TO BE MADE RIGHT AWAY, DO SO.
     C
71   40         IF (IABS(IFLAG) .EQ. 2) GO TO 50
72              I = IREF(IFIELD,IRECRF)
73              ITEM(I) = IVALUE
74              RETURN
     C
     C  DEFER MAKING THE CHANGE; STORE CHANGE IN A CHANGE RECORD
     C
75   50         ICHG = NEWREC(LCHNG)
76              MCHNG(JSUBJ,ICHG) = IRECRF
77              MCHNG(JATTR,ICHG) = IFIELD
78              MCHNG(JNVAL,ICHG) = IVALUE
79              MCHNG(JNXT,ICHG) = ICHGLS
80              ICHGLS = ICHG
81              RETURN
82              END
```

UTILITIES - CHGLST SUBROUTINE

```
ISN
 1          SUBROUTINE CHGLST(IELEM,IADD,ILIST,ISUB)
      C
      C     ROUTINE TO REPORT A RECORD BEING ADDED OR DELETED FROM A LIST.
      C
      C  INPUT PARAMETERS:
      C     IELEM    REFERENCE TO THE RECORD BEING ADDED TO LIST
      C     IADD     A FLAG INDICATING HOW THE RECORD IS BEING ADDED:
      C              (1) = STACKED, (2) = QUEUED, (3) = DELETED
      C     ILIST    AN INDEX REFERRING TO THE LIST THAT THE RECORD IS BEING
      C              ADDED TO.  THE INDEX IS USED TO DETERMINE THE LIST'S
      C              FORTRAN NAME AND ITS NUMBER OF DIMENSIONS (ASSUMED TO
      C              BE AT MOST 1).  SEE VARIABLES VARNAM AND NSUBS.
      C     ISUB     THE SUBSCRIPT OF THE VARIABLE DESIGNATED BY "ILIST", IF
      C              THERE IS ONE. (OTHERWISE EQUAL ZERO)
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,FLDNAM,FORMOT
      C
 5          REAL*8 ADDTYP(3),VARNAM(15)
 6          DIMENSION NSUBS(15)
 7          DATA VARNAM/'IGOALS','INEWLT','IOBSV','INNOBS','IPATH','ITARLT',
           +     'LASMNT','LINTCP','LNODIN','LOSLIS','NOLDSN','NWSNLT'/
 8          DATA NSUBS/0,0,1,1,0,0,0,1,1,0,0,0/
 9          DATA ADDTYP/'STACKED','QUEUED','DELETED'/
      C
      C  GET PARAMETERS OF RECORD ADDED TO LIST.
      C  (CURRENT SUBROUTINE CAN'T HANDLE A NON-RECORD BEING ADDED TO LIST)
10          IF (IELEM .LT. 1000000000 .OR. IELEM .GT. 1009999999) RETURN
11          CALL PARSRF(IELEM,IDTYP,IRECNO,IDUM)
      C
      C  DETERMINE NUMBER OF DIMENSIONS OF VARIABLE AND BRANCH ACCORDINGLY
12          IF (NSUBS(ILIST) .GE. 1) GO TO 20
      C  LIST IS A SCALAR.  REPORT IT.
13          WRITE (6,10) DTPABR(IDTYP),IRECNO,ADDTYP(IADD),VARNAM(ILIST)
```

```
 10     FORMAT ('RECORD ',A3,I4,1X,A8,'ON LIST ',A7)
        RETURN
C
C  LIST IS A 1-DIMENSIONAL ARRAY.  REPORT IT.
 20     WRITE (6,25) DTPABR(IDTYP),IRECNO,ADDTYP(IADD),VARNAM(ILIST),ISUB
 25     FORMAT ('RECORD ',A3,I4,1X,A8,'ON LIST ',A7,'(',I3,')')
        RETURN
        END
```

```
ISN
  1         SUBROUTINE CHGVAR(IVAR,VALUE)
  2         ENTRY CHGVR1(IVAR,VALUE,ISUB1)
  3         ENTRY CHGVR2(IVAR,VALUE,ISUB1,ISUB2)
  4         ENTRY CHGVR3(IVAR,VALUE,ISUB1,ISUB2,ISUB3)
      C
      C     ROUTINE TO REPORT THE CHANGE IN VALUE OF A VARIABLE.
      C
      C  INPUT PARAMETERS:
      C     IVAR      A UNIQUE INDEX IDENTIFYING THE VARIABLE WHOSE VALUE IS
      C               TO BE REPORTED BY CHGVAR.  THIS INDEX IS USED TO LOOK UP
      C               THE PROPERTIES OF THE VARIABLE: ITS NAME, TYPE, AND
      C               NUMBER OF DIMENSIONS.  SEE ARRAYS VARNAM, ITYPE, & NSUBS.
      C     VALUE     THE VARIABLE'S NEW VALUE TO BE REPORTED.  IF THE VARIABLE
      C               IS OF TYPE INTEGER, THIS VALUE SHOULD BE PASSED AS AN
      C               INTEGER TO THE ROUTINE, EVEN THOUGH THE DUMMY VARIABLE
      C               "VALUE" IS REAL.
      C     ISUB1     | THE FIRST, SECOND AND THIRD SUBSCRIPTS OF THE
      C     ISUB2     | VARIABLE, IF IT HAS THESE.  A VALUE OF A SUBSCRIPT
      C     ISUB3     | GIVEN FOR A VARIABLE NOT HAVING SUCH A SUBSCRIPT
      C               | WILL BE IGNORED.
      C
  5         COMMON /PARS/
  6         EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  7         REAL*8 DTPNAM,FLDNAM,FORMOT
      C
  8         EQUIVALENCE (IVALUE,FVALUE)
  9         DIMENSION ITYPE(20),NSUBS(20)
 10         REAL*8 VARNAM(20)
 11         DATA VARNAM/'TMIN','NMSTAT','IPLAYR','ISIDE','FORCES','TMRESP',
           +     'ISRCPL','IGOALS','IOBSV','INNOBS','LASMNT','LINTCP',
           +     'LNODIN','NOIDSN','NNSNLT'/
 12         DATA ITYPE/2,1,1,1,2,2,1,3,3,3,3,3,3,3,3/
 13         DATA NSUBS/0,0,0,0,2,0,1,0,1,1,0,1,1,0,0/
      C
      C  DETERMINE THE NUMBER OF DIMENSIONS THE VARIABLE HAS AND BRANCH
```

```
ISN
      C  ACCORDINGLY TO SECTION OF CODE TO HANDLE IT.
14          NS = NSUBS(IVAR) + 1
15          GO TO (10,30,50,70),NS
      C
      C  VARIABLE IS A SCALAR.  REPORT ITS VALUE.
16    10    IF (ITYPE(IVAR) .EQ. 2) GO TO 20
      C  INTEGER VALUE.
17          FVALUE = VALUE
18          IF (ITYPE(IVAR) .EQ. 3 .AND. VALUE .NE. FNULL) GO TO 27
19          WRITE (6,15) VARNAM(IVAR),IVALUE
20    15    FORMAT (A6,10X,' =',I7)
21          RETURN
      C
      C  REAL VALUE
22    20    WRITE (6,25) VARNAM(IVAR),VALUE
23    25    FORMAT(A6,10X,' =',F10.2)
24          RETURN
      C
      C  RECORD REFERENCE VALUE
25    27    CALL PARSRF(IVALUE,IDTYP,IRECNO,IDUM)
26          WRITE (6,28) VARNAM(IVAR),DTPABR(IDTYP),IRECNO
27    28    FORMAT (A6,10X,' =',A3,I4)
28          RETURN
      C
      C  VARIABLE HAS ONE DIMENSION.  REPORT ITS VALUE.
29    30    IF (ITYPE(IVAR) .EQ. 2) GO TO 40
      C  INTEGER VALUE
30          FVALUE = VALUE
31          IF (ITYPE(IVAR) .EQ. 3 .AND. VALUE .NE. FNULL) GO TO 47
32          WRITE (6,35) VARNAM(IVAR),ISUB1,IVALUE
33    35    FORMAT (A6,'(',I2,')',6X,' =',I7)
34          RETURN
      C
      C  REAL VALUE
35    40    WRITE (6,45) VARNAM(IVAR),ISUB1,VALUE
36    45    FORMAT (A6,'(',I2,')',6X,' =',F10.2)
```

```
ISN
37          RETURN
      C
      C  RECORD REFERENCE VALUE
38    47    CALL PARSRF(IVALUE,IDTYP,IRECNO,IDUM)
39          WRITE (6,48) VARNAM(IVAR),ISUB1,DTPABR(IDTYP),IRECNO
40    48    FORMAT (A6,'(',I2,')',6X,' =',A3,I4)
41          RETURN
      C
      C  VARIABLE HAS TWO DIMENSIONS.  REPORT ITS VALUE.
42    50    IF (ITYPE(IVAR) .EQ. 2) GO TO 60
      C  INTEGER VALUE
43          FVALUE = VALUE
44          IF (ITYPE(IVAR) .EQ. 3 .AND. VALUE .NE. FNULL) GO TO 67
45          WRITE (6,55) VARNAM(IVAR),ISUB1,ISUB2,IVALUE
46    55    FORMAT (A6,'(',I2,',',I2,')',3X,' =',I7)
47          RETURN
      C
      C  REAL VALUE
48    60    WRITE (6,65) VARNAM(IVAR),ISUB1,ISUB2,VALUE
49    65    FORMAT (A6,'(',I2,',',I2,')',3X,' =',F10.2)
50          RETURN
      C
      C  RECORD REFERENCE VALUE.
51    67    CALL PARSRF(IVALUE,IDTYP,IRECNO,IDUM)
52          WRITE (6,68) VARNAM(IVAR),ISUB1,ISUB2,DTPABR(IDTYP),IRECNO
53    68    FORMAT (A6,'(',I2,',',I2,')',3X,' =',A3,I4)
54          RETURN
      C
      C  VARIABLE HAS THREE DIMENSIONS.  REPORT ITS VALUE
55    70    IF (ITYPE(IVAR) .EQ. 2) GO TO 80
      C  INTEGER VALUE
56          FVALUE = VALUE
57          IF (ITYPE(IVAR) .EQ. 3 .AND. VALUE .NE. FNULL) GO TO 87
58          WRITE (6,75) VARNAM(IVAR),ISUB1,ISUB2,ISUB3,IVALUE
59    75    FORMAT (A6,'(',I2,',',I2,',',I2,') =',I7)
60          RETURN
```

UTILITIES - CHGVAR SUBROUTINE

```
C
C  REAL VALUE
80    WRITE (6,85) VARNAM(IVAR),ISUB1,ISUB2,ISUB3,VALUE
85    FORMAT (A6,'(',I2,',',I2,',',I2,') =',F10.2)
      RETURN
C
C  RECORD REFERENCE VALUE
87    CALL PANSRF(IVALUE,IDTYP,IRECNO,IDUM)
      WRITE (6,88) VARNAM(IVAR),ISUB1,ISUB2,ISUB3,DTPABR(IDTYP),IRECNO
88    FORMAT (A6,'(',I2,',',I2,',',I2,') =',A3,I4)
      RETURN
      END
```

UTILITIES - COLECT SUBROUTINE

```
ISN
 1          SUBROUTINE COLECT
      C
      C        ROUTINE TO PERFORM GARBAGE COLLECTION OF PLEX RECORDS.
      C     INSTEAD OF A PROGRAMMER'S EXPLICITLY CALLING A DELETE ROUTINE
      C     WHENEVER A RECORD IS NO LONGER NEEDED, OR INSTEAD OF HIS CALLING
      C     A SPECIAL BOOKKEEPING ROUTINE WHENEVER HE ADDS, DELETES, OR
      C     CHANGES A REFERENCE TO A RECORD OR LIST, IT SEEMS EASIEST AND
      C     SAFEST FOR THE PROGRAMMER TO HAVE PROVIDED AN EXPLICIT GARBAGE
      C     COLLECTION ROUTINE.  THEN WHENEVER A PROGRAMMER WISHES TO DELETE
      C     A RECORD OR LIST, HE NEED ONLY SET A REFERENCE TO THAT RECORD OR
      C     LIST TO SOME OTHER VALUE (E.G., A NEW RECORD OR LIST OR TO NULL).
      C     IF THE REFERENCE BEING MODIFIED WAS THE LAST ONE TO THIS RECORD
      C     OR LIST, THE RECORD OR LIST WILL BECOME GARBAGE - PHYSICALLY
      C     ALLOCATED SPACE BUT INACCESSIBLE.  IT WILL REMAIN GARBAGE UNTIL THIS
      C     ROUTINE, THE GARBAGE COLLECTOR, IS CALLED TO FIND AND RECLAIM
      C     THESE RECORDS.
      C        WHEN THE GARBAGE COLLECTOR IS CALLED IT INITIALIZES ALL RECORDS
      C     IN A COLLECTABLE TYPE FILE TO "COLLECTABLE".  IT THEN ITERATES
      C     THROUGH EXTERNAL REFERENCES TO PLEX RECORDS, PLACING THEM ON A STACK.
      C     THE EXTERNAL REFERENCES WILL BE CONTAINED IN (1) THE SCALAR PORTION
      C     OF /STATEV/, (2) THE NON-COLLECTABLE FILES OF /STATEV/, OR (3) A
      C     SPECIAL COMMON BLOCK /RECREF/.  AFTER STACKING ALL EXTERNAL
      C     REFERENCES TO RECORDS, THE ROUTINE TAKES THE FIRST ONE OFF THE
      C     STACK, MARKS THE CORRESPONDING RECORD ACTIVE, AND ADDS ANY STACK
      C     REFERENCES TO OTHER RECORDS CONTAINED IN THIS RECORD TO THE TOP
      C     OF THE STACK.  PROCESSING THEN CONTINUES WITH THE NEXT ITEM ON
      C     THE STACK IN THE SAME MANNER.  WHEN THE STACK HAS BEEN COMPLETELY
      C     PROCESSED AND NO RECORDS REMAIN, THE RECORD WHICH ARE STILL MARKED
      C     "COLLECTABLE" ARE RECLAIMED.
      C        THE GARBAGE COLLECTOR IS CALLED BY NEWREC WHEN IT TRIES TO
      C     ALLOCATE RECORDS AND NONE ARE AVAILABLE OF THE GIVEN TYPE.  SINCE A
      C     CALL TO THE GARBAGE COLLECTOR CAN OCCUR IN MANY DIFFERENT CONTEXTS
      C     IN THE PROGRAM, A PROGRAMMER MUST MAKE SURE THAT ANY LIST OR RECORD
      C     THAT HE DOES NOT WISH RECLAIMED IS ALWAYS REFERENCED, EITHER
      C     DIRECTLY OR INDIRECTLY, BY AN EXTERNAL RECORD REFERENCE ACCESSIBLE
```

```
ISN
     C  BY THE GARBAGE COLLECTOR - EITHER IN /STATEV/ OR IN /RECREF/.
     C     IF INSUFFICIENT SPACE IS INITIALLY SET ASIDE IN ANY DYNAMICALLY
     C  ALLOCATED FILE FOR RECORDS, THE GARBAGE COLLECTOR WILL GET CALLED
     C  MORE AND MORE FREQUENTLY AS STORAGE NEARS EXHAUSTION.  AT SUCH A
     C  POINT IT MIGHT BE BETTER TO STOP AND START OVER AGAIN WITH MORE
     C  ROOM ALLOWED.  EVENTUALLY IT MAY BE REASONABLE TO PUT IN AN
     C  AUTOMATIC CHECK FOR THIS SITUATION.  THIS VERSION OF THE ROUTINE,
     C  HOWEVER, WILL JUST PRINT OUT A STATUS REPORT EVERY TIME THE
     C  GARBAGE COLLECTOR IS CALLED, INDICATING TO THE USER WHEN IT IS
     C  CALLED, HOW MANY RECORDS OF EACH TYPE IT COLLECTS, AND HOW MANY OF
     C  EACH TYPE HAVE NEVER BEEN ALLOCATED.  IT IS UP TO THE USER TO USE
     C  THIS INFORMATION TO MODIFY HOW MANY RECORDS OF A GIVEN TYPE TO
     C  ALLOW ON SUBSEQUENT RUNS, IF NEEDED.
     C
  2         COMMON /STATEV/
  3         DIMENSION ITEM(41900),DITEM(41900)
  4         EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
  5         COMMON /PARS/
  6         EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  7         REAL*8 DTPNAM,FIDNAM,FORECT
  8         COMMON /PARS3/
  9         COMMON /RECREF/
 10         DIMENSION RECRFQ(140)
 11         EQUIVALENCE (RECRFQ(1),IGCALS)
 12         COMMON /GARCOL/
 13         LOGICAL*1 ACTIVE
     C
     C  INITIALIZE RECORDS TO "COLLECTABLE"
     C
 14         DO 10 IR=1,NCOLCT
 15   10       ACTIVE(IR) = .FALSE.
 16         IQ = 0
     C
     C ... INITIALIZE IAVAIL TO NULL
     C
 17         CALL NULIFY(IAVAIL,NDTYPE)
```

```
ISN
      C
      C   ADD EXTERNAL REFERENCES TO RECORDS AND LISTS TO STACK; MARK RECORDS
      C   ACTIVE
18           CALL QXREFS(RECRFQ,1,NRECRF,4)
19           CALL QXREFS(ITEM,1,NFLDS(1),4)
20           DO 20 IDTYP=LSITE,LACTD
21              IOFF = IDTOFF(IDTYP) + 1
22              IOFFG = IDTOFF(IDTYP) + NFLDS(IDTYP)*(NRECS(IDTYP) - 1) +1
23              CALL QXREFS(ITEM(IOFF),NFLDS(IDTYP),NRECSO(IDTYP),ITEM(IOFFG))
24    20        CONTINUE
      C
      C   GET NEXT ITEM OFF STACK
      C
25    30     IQ = IQ - 1
26           IF (IQ .LT. 0) GO TO 40
27           IRECRF = IRECQ(IQ+1)
      C
      C   ADD ANY REFERENCES TO RECORDS AND LISTS NOT ALREADY ON THE STACK TO
      C   THE STACK;  MARK THE RECORD AS ACTIVE
      C
28           CALL PARSRF(IRECRF,IDTYP,IRECNO,IDUM)
29           IF(IDTYP.EQ.LLIST) GO TO 35
30           IOFF = IREF1(IRECRF)+1
31           IOFFG = IDTOFF(IDTYP) + NFLDS(IDTYP)*(NRECS(IDTYP) - 1) +1
32           CALL QXREFS(ITEM(IOFF),NFLDS(IDTYP),1,ITEM(IOFFG))
33           GO TO 30
      C
      C    IRECRF IS A LIST
      C
34    35     NREF=IFIRST(IRECRF,LPTR)
35    36     IF(NREF.EQ.NULL) GO TO  30
36           IF(LPTR.EQ.NULL) GO TO 30
37           CALL QXREFS(LISTND(2,LPTR),1,1,3)
38           IR=IRCOFF(LLIST)+LPTR
39           ACTIVE(IR) = .TRUE.
40           NREF=NEXT(IRECRF,LPTR)
```

```
ISN
41           GO TO 36
      C
      C  ITERATE THROUGH FILE TYPES, SKIPPING OVER THOSE KNOWN TO HAVE NO
      C  COLLECTABLE RECORDS.
      C
42    40     CALL INITVL(ICRECS,NDTYPE,0)
43           DO 60 IDTYP=LLIST,NDTYPE
44              IF (IDTYP .GE. LSITE .AND. IDTYP .LE. LWIND) GO TO 60
      C
      C  DETERMINE THE LOWER AND UPPER INDEXES OF THE ACTIVE VECTOR IN
      C  WHICH TO LOOK FOR INACTIVE RECORDS.
45              IR0 = IRCOFF(IDTYP)
46              NGAP = IRCOFF(LWEAP) - IRCOFF(LSITE)
47              IF (IDTYP .GE. LWEAP) IR0 = IR0 - NGAP
48              IRNN = IR0 + LSTREC(IDTYP)
49              IR1 = IR0 + 1
50              IF (IDTYP .GE. LWEAP .AND. IDTYP .LE. LACTD) IR1 = IR0 +
          +       NRECS0(IDTYP)+1
51             IF(IR1 .GT. IRNN) GO TO 60
      C
      C  ITERATE OVER THE POTENTIALLY INACTIVE RECORDS OF THE CURRENT FILE,
      C  COLLECTING THOSE WHICH ARE GARBAGE.
52              DO 50 IR=IR1,IRNN
53                 IF (ACTIVE(IR)) GO TO 50
54                 IRECRF = NEWREF(IDTYP,IR-IR0,0)
55                 CALL DELREC(IRECRF)
56                 ICRECS(IDTYP) = ICRECS(IDTYP) + 1
57    50           CONTINUE
58    60        CONTINUE
      C
      C  OUTPUT REPORT OF GARBAGE COLLECTION
      C
59           DO 70 I=1,NDTYPE
60    70        IVRECS(I) = NRECS(I) - LSTREC(I) - NGENRC
61           I1 = 1
62           IN = 18
```

```
      WRITE (7,100) TMIN
100   FORMAT ('-GARBAGE COLLECTOR CALLED AT TIME ',F8.2/
     +     40X,'COLLECTION RESULTS:')
80    WRITE(7,105)  (DTPABB(I),I=I1,IN)
      WRITE(7,106) (ICRECS(I),I=I1,IN)
      WRITE(7,107) (NRECS(I),I=I1,IN)
      WRITE(7,108) (IVRECS(I), I=I1,IN)
105   FORMAT ('RECORD TYPE:                ',18(3X,A2))
106   FORMAT ('NUMBER COLLECTED:           ',18I5)
107   FORMAT ('TOTAL NUMBER RECORDS:       ',18I5)
108   FORMAT ('NUMBER NEVER ALLOCATED:     ',18I5,//)
C
      IF (IN .GE. NDTYPE) RETURN
      I1 = I1 + 18
      IN = IN + 18
      IF (IN .GT. NDTYPE) IN = NDTYPE
      GO TO 80
      END
```

UTILITIES - CONDAC SUBROUTINE

```
ISN
  1          SUBROUTINE CONDAC(IPLARF)
      C
      C         ROUTINE INTERPRETS CONDITIONAL ACTIONS ASSOCIATED WITH PERSON
      C      IPLARF.  A CONDITIONAL ACTION HAS THE FORM: WHEN(BOOLEAN EXPR,ACT).
      C      BOTH THE WHEN( , ) AND THE BOOLEAN EXPRESSION ARE REPRESENTED BY
      C      RELATION RECORDS.  THE "ACT" PART IS REPRESENTED BY EITHER AN
      C      ACTION OR A FUNCTION RECORD.
      C         THIS ROUTINE SEQUENTIALLY TESTS ALL CONDITIONAL ACTIONS
      C      ASSOCIATED WITH THE DESIGNATED PERSON.  IF IT ENCOUNTERS A CONDITION
      C      WHICH IS SATISFIED, IT ACTIVATES THE ASSOCIATED ACT.  "ACTIVATE"
      C      MEANS EITHER (1) STACKING THE ACT ON THE PLAYER'S ACTIVITY LIST, IF
      C      THE ACT IS AN ACTION RECORD, OR (2) EVALUATING THE ACT, IF IT IS
      C      A FUNCTION RECORD.  EVALUATION OF THE FUNCTION CAN RESULT IN AN
      C      ACTION RECORD, IN WHICH CASE ALTERNATIVE (1) IS FOLLOWED FOR THE
      C      RESULT.
      C         THIS ROUTINE RETURNS WHEN ALL OF THE PLAYER'S CONDITIONAL ACTIONS
      C      HAVE BEEN PROCESSED.  THERE MAY ALSO BE CONDITIONAL ACTIONS PERTINENT
      C      TO A PLAYER STORED WITH THE RECORD DESCRIBING THE FORCE HE BELONGS
      C      TO.
      C
      C      INPUT PARAMETERS:
      C         IPLARF   RECORD REFERENCE TO THE PERSON BEING PROCESSED.
      C
  2          COMMON /STATEV/
  3          DIMENSION ITEM(41900),DITEM(41900)
  4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
  5          COMMON /PARS/
  6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  7          REAL*8 DTPNAM,FLDNAM,FOBECT
  8          COMMON /PARS1/
  9          COMMON /PARS3/
 10          COMMON /NEW/
      C
 11          IFLAG = 0
 12          IACTIV = IREF(J[illegible]IV,IPLARF)
```

UTILITIES - CONDAC SUBROUTINE

```
ISN
13              ICONDS = IVAL(JSOPS,IPLABP)
14      8       ICOND = IFIRST(ICONDS,KC)
15      10          IF (ICOND .EQ. NULL) GO TO 50
        C  TEST WHETHER CONDITIONAL ACTION IS SATISFIED.
16                  IACT = NRTEST(ICOND)
        C  IF NOT, GO TRY NEXT CONDITIONAL ACTION
17      15          IF (IACT .EQ. 0) GO TO 40
        C  IF SO, IS RESULT AN ACTION RECORD ?
18                      CALL PARSRF(IACT,IDTYP,IRECNO,IDUM)
19                      IF (IDTYP .NE. IACTN) GO TO 20
20                          ITEM(IACTIV) = ISTACK(IACT,ITEM(IACTIV))
21                          GO TO 40
        C  IF RESULT IS A RELATION RECORD, TEST ITS TRUTH
22      20              IF (IDTYP .NE. IRELN) GO TO 30
23                          IACT = NRTEST(IACT)
24                          GO TO 15
        C  IF RESULT IS A FUNCTION RECORD, EVALUATE IT.
25      30              IF (IDTYP .NE. LFUNC) CALL ERR(39,35,IDTYP,0,0)
26                          IACT = IFNCVL(IACT)
27                          GO TO 15
        C  GET NEXT CONDITIONAL ACTION
28      40          ICOND = NEXT(ICONDS,KC)
29                  GO TO 10
        C
        C  HAVE ANY CONDITIONAL ACTIONS ASSOCIATED WITH THE FORCE THAT THE
        C  BELONGS TO BEEN PROCESSED ?
30      50      IF (IFLAG .NE. 0) RETURN
31              IFLAG = 1
32              IFORCE = IVAL(JFORCE,IPLABP)
33              IF (IFORCE .EQ. NULL) RETURN
34              CALL PARSRF(IFORCE,IDTYP,IDUM,IDUM)
35              IF (IDTYP .NE. LFORCE) RETURN
36              ICONDS = IVAL(JFSOPS,IFORCE)
37              GO TO 8
38              END
```

```
ISN
 1          SUBROUTINE COORDS(LOC,X,Y,Z)
      C
      C     ROUTINE TO CALCULATE THE X, Y, AND Z COORDINATES CORRESPONDING TO
      C   A LOCATION SPECIFIED IN TERMS OF A SOURCE, A SINK, AND A FRACTIONAL
      C   DISTANCE BETWEEN.
      C
      C   INPUT PARAMETERS:
      C     LOC       A REFERENCE TO A LOCATION RECORD
      C
      C   OUTPUT PARAMETERS:
      C     X         X COORDINATE OF LOCATION
      C     Y         Y COORDINATE OF LOACTION
      C     Z         Z COORDINATE OF LOCATION
      C
 2          COMMON /PARS1/
      C
 3          ISOURC = IVAL(JSOURC,LOC)
 4          ISINK = IVAL(JSINK,LOC)
 5          FRAC = VAL(JFRAC,LOC)
 6          XSOURC = VAL(JXCO,ISOURC)
 7          YSOURC = VAL(JYCO,ISOURC)
 8          ZSOURC = VAL(JZCO,ISOURC)
 9          X = XSOURC + FRAC*(VAL(JXCO,ISINK) - XSOURC)
10          Y = YSOURC + FRAC*(VAL(JYCO,ISINK) - YSOURC)
11          Z = ZSOURC + FRAC*(VAL(JZCO,ISINK) - ZSOURC)
12          RETURN
13          END
```

UTILITIES - COPY SUBROUTINE

```
ISN
 1             SUBROUTINE COPY(X,Y,N)
       C
       C       ROUTINE TO COPY VECTOR X TO VECTOR Y.
       C
       C   INPUT PARAMETERS:
       C       X          VECTOR TO BE COPIED
       C       Y          VECTOR TO RECEIVE CONTENTS OF X
       C       N          SIZE OF VECTORS X AND Y
       C
 2             DIMENSION X(N),Y(N)
       C
 3             DO 10 I=1,N
 4      10        Y(I) = X(I)
 5             RETURN
 6             END
```

```
ISN
  1          SUBROUTINE DELIST(IELEM,IFIELD,IRECRF)
       C
       C     ROUTINE TO DELETE AN ELEMENT FROM A LIST.  IF THERE IS A
       C  PRIOR ELEMENT ON THE LIST, ITS NEXT FIELD IS SET TO THE SAME
       C  VALUE AS THE NEXT FIELD OF THE ITEM DELETED.  IF THERE IS NO
       C  PRIOR ITEM ON THE LIST, THE HEAD OF THE LIST IS INSTEAD SET TO
       C  THE VALUE IN THIS FIELD.  IF THE ELEMENT DESIGNATED TO BE DELETED
       C  CAN'T BE FOUND, AN ERROR COMMENT IS GENERATED.
       C
       C  INPUT PARAMETERS:
       C     IELEM    INDEX OF LIST NODE REFERRING TO THE ELEMENT TO BE
       C              DELETED FROM THE LIST, OR NULL IF THE ELEMENT IS ON
       C              A ONE-ELEMENT LIST NOT ENCASED IN A LISTND.
       C              (IELEM IS THE VALUE RETURNED AS THE SECOND PARAMETER
       C              OF THE FUNCTIONS IFIRST OR NEXT).
       C     IFIELD   THE PARAMETERS IFIELD AND IRECRF TOGETHER IDENTIFY THE
       C       &      STORAGE LOCATION AT WHICH A REFERENCE TO THE HEAD OF THE
       C     IRECRF   LIST IS STORED.  THERE ARE TWO OPTIONS:
       C              (1) IF IFIELD > 0, IRECRF IS A REFERENCE TO THE RECORD IN
       C              WHICH IT IS STORED; IFIELD IS AN INDEX OF THE FIELD OF
       C              THIS RECORD IN WHICH THE LIST REFERENCE IS STORED.
       C              (2) IF FIEILD <= 0, THEN IRECRF IS ITSELF A VARIABLE
       C              REFERRING TO THE HEAD OF THE LIST.  IT MAY THEN BE
       C              UPDATED.
       C
  2          COMMON /STATEV/
  3          DIMENSION ITEM(41900),DITEM(41900)
  4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
  5          COMMON /PARS/
  6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  7          REAL*8 DTPNAM,FLDNAM,FCBNOT
  8          COMMON /PARS1/
  9          COMMON /PARS3/
       C
       C  IF THIS IS A ONE ELEMENT LIST, TREAT SPECIALLY
```

UTILITIES - DELIST SUBROUTINE

```
ISN
10          IF (IELEM .NE. NULL) GO TO 3
11    2        I = IREF(IFIELD,IRECRF)
12             IF (IFIELD .GT. 0) ITEM(I) = NULL
13             IF (IFIELD .LE. 0) IRECRF = NULL
14             RETURN
15    3     IF (IFIELD .GT. 0) ILIST = IVAL(IFIELD,IRECRF)
16          IF (IFIELD .LE. 0) ILIST = IRECRF
17          IF (ILIST .NE. NULL) GO TO 10
      C  ELEMENT COULDN'T BE LOCATED ON LIST
18    5        CALL ERR(22,16,IELEM,IFIELD,IRECRF)
19             RETURN
20    10    IDUM = IFIRST(ILIST,ILSTND)
21          IF (ILSTND .NE. IELEM) GO TO 20
      C  FIRST ELEMENT ON LIST IS TO BE DELETED
22             IF (IFIELD .GT. 0) IR = IREF(IFIELD,IRECRF)
23             IF (IFIELD .LE. 0) IR = IREF1(IRECRF)
24             IF (ILSTND .NE. NULL) GO TO 15
25                ITEM(IR) = NULL
26                RETURN
27    15       IDUM = NEXT(ILIST,ILSTND)
28                 IF(IDUM .EQ. NULL) GO TO 2
29             ITEM(IR) = NEWREF(ILIST,ILSTND,0)
30             RETURN
      C  SAVE INDEX OF LIST NODE
31    20    IPREV = ILSTND
      C  GET NEXT LIST NODE
32          IDUM = NEXT(ILIST,ILSTND)
33          IF (ILSTND .EQ. NULL) GO TO 5
34          IF (ILSTND .NE. IELEM) GO TO 20
      C  HAVE FOUND LIST NODE OF INTEREST; MAKE PRIOR LIST NODE POINT
      C  TO ITS SUCCESSOR.
35          LISTND(JNXT,IPREV) = LISTND(JNXT,ILSTND)
36          RETURN
37          END
```

```
ISN
  1          SUBROUTINE DELREC(IRECRF)
      C
      C      ROUTINE TO RECLAIM A RECORD WHICH IS NO LONGER NEEDED AND
      C   RETURN IT TO AVAILABLE STORAGE FOR LATER REUSE.  ROUTINE NULLS
      C   OUT THE FIELDS OF THE RECORD.
      C
      C   INPUT PARAMETERS:
      C     IRECRF   A RECORD REFERENCE IDENTIFYING THE RECORD TO BE DELETED.
      C
  2          COMMON /STATEV/
  3          DIMENSION ITEM(41900),DITEM(41900)
  4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
  5          COMMON /PARS/
  6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  7          REAL*8 DTPNAM,FLDNAM,FCRECT
      C
      C   BREAK THE RECORD REFERENCE INTO ITS COMPONENTS
  8          CALL PARSRF(IRECRF,IDTYP,IRECNO,IDUM)
      C   NULL OUT THE CONTENTS OF THE RECORD
  9          IRECPT = IREF(1,IRECRF)
 10          CALL NULIFY(ITEM(IRECPT),NFLDS(IDTYP))
      C   PUSH THE EMPTY RECORD ONTO THE AVAILABLE SPACE LIST.
      C   (IRECPT IDENTIFIES THE JNEXT POSITION OF THE RECORD TO BE RECLAIMED).
 11          ITEM(IRECPT) = IAVAIL(IDTYP)
 12          IAVAIL(IDTYP) = IRECNO
 13          RETURN
 14          END
```

```
ISN
 1            SUBROUTINE DIREC(I,J,THETA,PHI)
      C
      C       ROUTINE TO CALCULATE THE ANGULAR ORIENTATION OF A RAY EXTENDING
      C    FROM ITEM I TO ITEM J.  THE ANGULAR ORIENTATION IS MEASURED IN
      C    RADIANS, USING THE STANDARD POLAR COORDINATE SYSTEM NOTATION,
      C    VIEWING I AS THE ORIGIN.  THE ARGUMENTS I AND J MAY BE EITHER
      C    SITE NODES OR PHYSICAL OBJECTS WHICH HAVE A LOCATION FIELD (VEHICLES,
      C    PERSONS, SENSORS, OR EFFECTORS (ACTIVATED DELAYS)).
      C
      C    INPUT PARAMETERS:
      C       I          A REFERENCE TO A SITE NODE OR A PHYSICAL OBJECT (WITH
      C                  LOCATION FIELD).
      C       J          A REFERENCE TO A SITE NODE OR A PHYSICAL OBJECT (WITH
      C                  LOCATION FIELD).
      C
      C    OUTPUT PARAMETERS:
      C       THETA      THE ANGLE DESCRIBING THE ORIENTATION OF THE RAY I-J
      C                  IN THE X-Y PLANE, IN RADIANS. (0. <= THETA <= 2*PI)
      C       PHI        THE ANGLE DESCRIBING THE ORIENTATION OF THE RAY I-J
      C                  IN THE PLANE VERTICAL TO THE X-Y PLANE.  MEASURED IN
      C                  RADIANS.  -PI/2. <= PHI <= PI/2..
      C
 2            COMMON /PARS/
 3            EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4            REAL*8 DTPNAM,FIDNAM,ROBROT
 5            COMMON /PARS1/
      C
 6            DATA PI/3.14159/,PI2/1.570795/
      C
      C    CHECK WHETHER I IS A VALID ARGUMENT AND IF SO GET ITS COORDINATES.
 7            CALL PARSRP(I,IDTYPI,IDUM,IDUM)
 8            IF (IDTPOK(IDTYPI) .EQ. 2) GO TO 10
 9            IF (IDTPOK(IDTYPI) .LE. 0) CALL ERR(17,13,I,IDTYPI,0)
      C    ARGUMENT I IS A SITE NODE
10            X1 = VAL(JXCO,I)
```

```
ISN
11            Y1 = VAL(JYCO,I)
12            Z1 = VAL(JZCO,I)
13            GO TO 20
     C  ARGUMENT I IS A PHYSICAL OBJECT WITH A LOCATION FIELD
14   10       CALL COORDS(IVAL(JLOCN,I),X1,Y1,Z1)
     C
     C  CHECK WHETHER J IS A VALID ARGUMENT AND IF SO GET ITS COORDINATES.
15   20       CALL PARSRZ(J,IDTYPJ,IDUM,IDUM)
16            IF (IDTPOK(IDTYPJ) .EQ. 2) GO TO 30
17            IF (IDTPOK(IDTYPJ) .LE. 0) CALL ERR(17,13,J,IDTYPJ,0)
     C  ARGUMENT J IS A SITE NODE
18            X2 = VAL(JXCO,J)
19            Y2 = VAL(JYCO,J)
20            Z2 = VAL(JZCO,J)
21            GO TO 40
     C  ARGUMENT J IS A PHYSICAL OBJECT WITH LOCATION FIELD
22   30       CALL COORDS(IVAL(JLOCN,J),X2,Y2,Z2)
     C
     C  DETERMINE THETA
23   40       DX = X2 - X1
24            DY = Y2 - Y1
25            DZ = Z2 - Z1
26            IF (ABS(DX) .GT. 1.E-6) GO TO 45
27               THETA = PI2
28               IF (DY .LT. 0.) THETA = PI + PI2
29               GO TO 50
30   45       THETA = ATAN(DY/DX)
31            IF (DX .LT. 0.) THETA = PI + THETA
32            IF (DX .GT. 0. AND. DY .LT. 0.) THETA = 2.*PI + THETA
     C
     C  DETERMINE PHI
33   50       DR = SQRT(DX**2 + DY**2)
34            IF (DR .GT. 1.E-6) GO TO 55
35               PHI = PI2
36               IF (DZ .LT. 0.) PHI = -PI2
37               RETURN
```

```
ISN
38   55     PHI = ATAN(DZ/DR)
39          RETURN
40          END
```

```
ISN
 1          SUBROUTINE DIREC2(X1,Y1,Z1,X2,Y2,Z2,THETA,PHI)
      C
      C     ROUTINE TO CALCULATE THE ANGULAR ORIENTATION OF A RAY EXTENDING
      C  FROM POINT (X1,Y1,Z1) TO POINT (X2,Y2,Z2).  THE ANGULAR ORIENTATION
      C  IS MEASURED IN RADIANS, USING THE STANDARD POLAR COORDINATE SYSTEM
      C  NOTATION, VIEWING (X1,Y1,Z1) AS THE ORIGIN.
      C
      C  INPUT PARAMETERS:
      C     X1         THE X COORDINATE OF THE ORIGIN
      C     Y1         THE Y COORDINATE OF THE ORIGIN
      C     Z1         THE Z COORDINATE OF THE ORIGIN
      C     X2         THE X COORDINATE OF THE 2ND POINT
      C     Y2         THE Y COORDINATE OF THE 2ND POINT
      C     Z2         THE Z COORDINATE OF THE 2ND POINT
      C
      C  OUTPUT PARAMETERS:
      C     THETA      THE ANGLE DESCRIBING THE ORIENTATION OF THE RAY
      C                IN THE X-Y PLANE, IN RADIANS. (0. <= THETA <= 2*PI)
      C     PHI        THE ANGLE DESCRIBING THE ORIENTATION OF THE RAY
      C                IN THE PLANE VERTICAL TO THE X-Y PLANE.  MEASURED IN
      C                RADIANS.  -PI/2. <= PHI <= PI/2..
      C
      C
 2          DATA TWOPI/6.28318/
      C
      C
      C  DETERMINE THETA
 3    40    DX = X2 - X1
 4          DY = Y2 - Y1
 5          DZ = Z2 - Z1
 6    45    THETA = ATAN2(DY,DX)
 7          IF (THETA .LT. 0.0) THETA = THETA + TWOPI
      C
      C  DETERMINE PHI
 8    50    DR = SQRT(DX**2 + DY**2)
```

UTILITIES - DIREC2 SUBROUTINE

```
55    PHI = ATAN2(DZ,DR)
      RETURN
      END
```

```
ISN
  1          FUNCTION DIST(I,J)
        C
        C     ROUTINE TO RETURN THE DISTANCE BETWEEN TWO ITEMS.  EITHER ITEM
        C  MAY BE A REGION OF THE SITE (I.E., NODE), A PERSON, A VEHICLE,
        C  OR A SENSOR.  THE FUNCTION RETURNS THE DISTANCE BETWEEN THEM.
        C
        C  INPUT PARAMETERS
        C     I        REFERENCE TO NODE OF SITE, PERSON, SENSOR, OR VEHICLE
        C     J        REFERENCE TO NODE OF SITE, PERSON, SENSOR, OR VEHICLE
        C
  2          COMMON /PARS/
  3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  4          REAL*8 DTPNAM,FLDNAM,FORMOT
  5          COMMON /PARS1/
        C
        C
  6          CALL PARSRF(I,IDTYPI,IDUM,IDUM)
  7          CALL PARSRF(J,IDTYPJ,IDUM,IDUM)
  8          IF (IDTPOK(IDTYPI) .LE. 0) CALL ERR(17,11,I,IDTYPI,0)
  9          IF (IDTPOK(IDTYPJ) .LE. 0) CALL ERR(17,11,J,IDTYPJ,0)
        C
        C  GET COORDINATES OF I
        C
 10          IF (IDTPOK(IDTYPI) .EQ. 2) GO TO 10
 11             XI = VAL(JXCO,I)
 12             YI = VAL(JYCO,I)
 13             ZI = VAL(JZCO,I)
 14             GO TO 20
 15      10  CALL COORDS(IVAL(JLOCN,I),XI,YI,ZI)
        C
        C  GET COORDINATES OF J
        C
 16      20  IF (IDTPOK(IDTYPJ) .EQ. 2) GO TO 30
 17             XJ = VAL(JXCO,J)
 18             YJ = VAL(JYCO,J)
```

UTILITIES - DIST FUNCTION

```
ISN
19              ZJ = VAL(JZCO,J)
20              GO TO 40
21    30     CALL COORDS(IVAL(JLOCN,J),XJ,YJ,ZJ)
      C
22    40     DIST = SQRT((XI-XJ)**2 + (YI-YJ)**2 + (ZI-ZJ)**2)
23           RETURN
24           END
```

```
ISN
 1          SUBROUTINE ERR(IERR,ISUBR,IPAR1,IPAR2,IPAR3)
      C
      C        ROUTINE TO FIELD ALL ERRORS AND TO WRITE OUT ERROR MESSAGES TO
      C     THE USER.  THE ROUTINE FIRST PRINTS OUT GLOBAL STATUS VARIABLES
      C     IDENTIFYING THE GENERAL CONDITIONS UNDER WHICH THE ERROR OCCURRED.
      C     INCLUDED IS THE NAME OF THE ROUTINE IN WHICH THE ERROR OCCURRED.
      C     THEN A BRANCH IS TAKEN TO A SPECIFIC SET OF STATEMENTS TO WRITE
      C     OUT A SPECIFIC ERROR MESSAGE AND TO TAKE ANY CORRECTIVE ACTION
      C     DEEMED NECESSARY.
      C
      C     INPUT PARAMETERS:
      C       IERR      A POSITIVE INTEGER IDENTIFYING THE ERROR CONDITION
      C       ISUBR     A POSITIVE INTEGER IDENTIFYING THE SUBROUTINE IN WHICH
      C                 THE ERROR OCCURRED
      C       IPAR1     THE FIRST PARAMETER OF THE ERROR CONDITION
      C       IPAR2     THE SECOND PARAMETER OF THE ERROR CONDITION
      C       IPAR3     THE THIRD PARAMETER OF THE ERROR CONDITION
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORMOT
 8          COMMON /PARS1/
 9          COMMON /PARS2/
10          COMMON /PARS3/
      C
11          REAL*8 SUBRTN(40),DTYP(2),DTABLE(2),ARRAY(10)
12          DIMENSION SIDE(2)
13          EQUIVALENCE (PAR1,MPAR1),(PAR2,MPAR2),(PAR3,MPAR3)
14          DATA SUBRTN/ 'NEWREC','PARSRF','IREF','IVAL','NEXT','ISTACK',
           +     'IQUEUE','ICOPY','INELEX','IVALRF','DIST','LOS','DIREC',
           +     'IPATH','CHGFID','DELIST','QXREFS','OBS','OBSERV','SENSE',
           +     'LOSLIS','POCT','POES','LISTOB','CHKOBS','DECIDE','ACTTY',
```

```
ISN
           +     'MRTEST','CAPDET','ETOSEC','RTOSEC','LOSGEN','ISECDF',
           +     'NEWRC2','CONDAC','ESCAPE','SURFAC','ITERM'/
15          DATA SIDE/'SPE','AFE'/
16          DATA DTYP/'ACTION','RELATION'/,DTABLE/'MACCTP','MRELTP'/
17          DATA ARRAY/'IACTIV'/
      C
      C  EQUATE ARGS SO THAT FLOATING POINT "PARS" ARE DEFINED
18          RPAR1 = IPAR1
19          RPAR2 = IPAR2
20          RPAR3 = IPAR3
21          WRITE (7,5) IERR,SUBRTN(ISUBR)
22    5     FORMAT ('- *****  ERROR ',I3,' IN ROUTINE ',A8)
23          WRITE (7,6) TMIN,SIDE(ISIDE),IPLAYR
24    6     FORMAT (' TIME=',F6.2,'  SIDE=',A4,'  LAST REFERENCED PLAYER=',I3)
      C
25          GO TO (10,20,30,40,50,60,70,80,90,100,110,120,130,140,150,160,
           +     170,180,190,200,210,220,230,240,250,260,270,280,290,300,310,
           +     320,330,340,350,360,370,380,390,400,410,420
           +     ),IERR
      C
26    10    WRITE (7,15) IPAR1
27    15    FORMAT (' THE PARAMETER IDENTIFYING A RECORD DATATYPE HAS THE'/
           +     'VALUE',I5,' AND IS THUS OUT OF RANGE.  FURTHER USE OF THIS'/
           +     ' PARAMETER WILL BE SUPPRESSED.')
28          RETURN
      C
29    20    WRITE (7,25) IPAR1
30    25    FORMAT (' A PARAMETER WHICH IS SUPPOSED TO BE A FIELD OR RECORD'/
           +     ' REFERENCE HAD THE VALUE ',I5,' AND HENCE IS INCORRECT.')
31          RETURN
      C
32    30    WRITE (7,35) DTPNAM(IPAR1),IPAR2
33    35    FORMAT (' A RECORD INDEX USED TO REFER TO A RECORD OF TYPE',A8/
           +     ' HAD THE VALUE ',I5,', AND HENCE WAS OUT OF BOUNDS.')
34          RETURN
      C
```

```
ISN
35   40    WRITE (7,45) IPAR2,DTPNAM(IPAR1),IPAR3
36   45    FORMAT (' A FIELD INDEX REFERENCING A FIELD FROM RECORD NUMBER',
          +     I6/' OF DATATYPE ',A8,' HAD THE VALUE ',I5,' AND HENCE'/
          +     ' WAS OUT OF BOUNDS.')
37         RETURN
     C
38   50    WRITE (7,55) IPAR1
39   55    FORMAT (' A RECORD INDEX FOR A LISTND RECORD HAD THE VALUE',I5/
          +     ' AND WAS THUS OUT OF BOUNDS.')
40         RETURN
     C
41   60    WRITE (7,65) IPAR1,DTPNAM(IPAR2)
42   65    FORMAT (' A RECORD REFERENCE THAT WAS SUPPOSED TO IDENTIFY A'/
          +     'LISTND HAD THE FAULTY VALUE,',I5,'.  IT REFERS TO A RECORD'/
          +     ' OF TYPE ',A8)
43         RETURN
     C
44   70    WRITE (7,75) IPAR1,IPAR2
45   75    FORMAT (' THE CURRENT POINTER WHICH WAS SUPPOSED TO'/
          +     ' IDENTIFY THE CURRENT LISTND OF LIST,',I12/
          +     ' HAD A BAD VALUE: ',I12)
46         RETURN
     C
47      80 WRITE(7,85) PAR1,PAR2
48      85 FORMAT (' INVALID DATATYPE NAME ENCOUNTERED: ',2A4/
          +    ' REMAINDER OF SUBSECTION IGNORED')
49         RETURN
     C
50      90 WRITE(7,95) DTPNAM(IPAR1),IPAR2
51      95 FORMAT(' A RECORD INDEX USED TO REFER TO DATATYPE: ',A8/
          +   ' IS A DUPLICATE. THE INDEX IS: ',I3,' RECORD IGNORED')
52         RETURN
     C
53     100 WRITE(7,105) PAR1,DTPNAM(IPAR2),IPAR3
54     105 FORMAT('WARNING: VALUE OF ',F8.2,' OUT OF RANGE FOR DATATYPE ',A8/
          +   ' RECORD REFERENCE IS: ',I10)
```

```
ISN
55          RETURN
      C
56       110 WRITE(7,115) IPAR1,PAR2,IPAR3
57       115 FORMAT(' BAD RECORD REFERENCE IN RECORD ',I10,' SET TO NULL'/
           +    ' REFERENCE IS ',A2,I3)
58          RETURN
      C
59       120 WRITE(7,125) DTPNAM(IPAR1),IPAR2,IPAR3
60       125 FORMAT (' LIST NODES EXHAUSTED WHILE PROCESSING DATATYPE ',A8/
           +    ' RECORD NUMBER ',I5,' FIELD NUMBER ',I2,'.')
61          RETURN
      C
62       130 WRITE(7,135) IPAR1,IPAR2,IPAR3
63       135 FORMAT('MULTIPLE REFERENCE TO LIST ',I3,'. REFERENCED IN RECORDS'/
           + 2(I10,2X),'SECOND REFERENCE IGNORED.')
64          RETURN
      C
65       140 WRITE(7,145) IPAR1,IPAR2
66       145 FORMAT(' LIST ',I3,' REFERENCED IN RECORD ',I10,' AFTER BEING ',
           +  'DEFINED.'/' REFERENCE ALLOWED, BUT MAY BE IN ERROR')
67          RETURN
      C
68       150 WRITE(7,155) DTPNAM(IPAR1),IPAR2
69       155 FORMAT('DATATYPE ',A8,' RECORD ',I3,' REFERENCED BUT NOT DEFINED')
70          RETURN
      C
71       160 WRITE(7,165) DTPNAM(IPAR1),IPAR2
72       165 FORMAT(' DATATYPE ',A8,' RECORD ',I3,' SKIPPED ON INPUT')
73          RETURN
      C
74      170   WRITE (7,175) IPAR1,DTPNAM(IPAR2)
75      175   FORMAT (' THE RECORD REFERENCE ',I12,' OF DATA TYPE "',A8,'",'/
           +      ' WAS NOT OF A PROPER TYPE AS AN ARGUMENT TO THE FUNCTION'/
           +      ' DIST.')
76          RETURN
      C
```

```
ISN
77   180   CALL PARSRF(IPAR2,IDTYP,IRECNO,IDUM)
78         WRITE (7,185) ARRAY(IPAR1),IPAR3,DTPABR(IDTYP),IRECNO
79   185   FORMAT (' THE AMOUNT OF STORAGE ALLOCATED FOR ARRAY ',A8/
          +    '= ',I5,', WAS OVERFLOWED WHILE PROCESSING RECORD REFERENCE',
          +     A3,I4,'.')
80         RETURN
     C
81   190   CALL PARSRF(IPAR1,IDCUR,IRCCUR,IDUM)
82         CALL PARSRF(IPAR2,IDSCU,IRCSOU,IDUM)
83         CALL PARSRF(IPAR3,IDSNK,IRCSNK,IDUM)
84         WRITE (7,195) DTPABR(IDSCU),IRCSOU,DTPABR(IDSNK),IRCSNK,
          +     DTPABR(IDCUR),IRCCUR
85   195   FORMAT (' NO PATH COULD BE FOUND FROM ',A3,I4,' TO ',A3,I4,'.'/
          +      ' THE PATH ENDED AT ',A3,I4,'.')
86         RETURN
     C
87   200   IFLDNM = IFDNPT(IPAR3) + IPAR1
88         WRITE (7,205) FIDNAM(IFLDNM),DTPABR(IPAR3),IPAR2
89   205   FORMAT (' FIELD ',A8,' OF RECORD ',A3,I4,' IS TO BE CHANGED.'/
          +      ' ITS TYPE INDICATOR IN IT GENERIC RECORD SPECIFIED A "4"'/
          +      ' CODE, INDICATING THAT IT COULD ASSUME VALUES OF MULTIPLE'/
          +      ' DATA CLASSES.  THIS IS INCONSISTENT WITH THE ASSUMPTIONS'/
          +      ' MADE WHEN THE SUBROUTINE DETECTING THE "ERROR" WAS CODED.')
90         RETURN
     C
91   210   WRITE (7,215) DTYP(IPAR1),IPAR2,DTABLE(IPAR1)
92   215   FORMAT (' A ',A8,' OF THE TYPE ',I12,' WAS NOT RECORDED IN TABLE'/
          +      A8,', THUS NOT ALLOWING RELIABLE DETERMINATION OF THE'/
          +      ' DATATYPES OF ITS PARAMETERS.')
93         RETURN
     C
94   220   WRITE (7,225) IPAR1,IPAR2,IPAR3
95   225   FORMAT (' THE ELEMENT OR LIST NODE ',I12,' TO BE DELETED FROM'/
          +      ' A LIST REFERENCED FROM FIELD ',I2,' OF RECORD ',I12/
          +      ' COULD NOT BE FOUND.')
96         RETURN
```

```
ISN
        C
 97     230    WRITE (7,235) IPAR1
 98     235    FORMAT (' OVERFLOW OF GARBAGE COLLECTOR QUEUE AT ',I6,' RECORDS.')
 99            RETURN
100       240 WRITE(7,245)
101            WRITE(7,246) IPAR1,IPAR2,IPAR3
102       245 FORMAT(' ILLEGAL MOVE MISSION -- NULL DESTINATION')
103       246 FORMAT(' PAR1 = ',I4,' PAR2 = ',I4,' PAR3 = ',I4)
104            RETURN
        C
105       250 WRITE(7,255) IPAR1
106       255 FORMAT(' ILLEGAL ACTIVITY TYPE',I6,'GIVEN IN MISSION')
107            RETURN
108     260    WRITE(7,265)IPAR1
109     265    FORMAT(' OVERFLOW IN TABLE JREPT OF POTENTIAL OBSERVATIONS.'/
             +      ' THE CURRENT MAXIMUM SIZE OF THIS TABLE IS ',I3)
110            RETURN
111     270    WRITE(7,275)IPAR1
112     275    FORMAT(' PERSON',I4,' HAS NO PLACE IN HIS LOCATION RECORD')
113            RETURN
        C
114     280    WRITE (7,285) IPAR1,IPAR2
115     285    FORMAT (' MORE THAN ',I3,' LEVELS OF EMBEDDING WERE ENCOUNTERED'/
             +      ' WHILE TRYING TO EVALUATE THE RELATION ',I12)
116            RETURN
        C
117     290    WRITE (7,295) IPAR1,DTPNAM(IPAR2)
118     295    FORMAT ('AN ATTEMPT TO EVALUATE THE RELATION ',I12,' ENCOUNTERED'/
             +      ' A RECORD OF DATATYPE ',A8,' WHERE A RELATION RECORD WAS',
             +      ' EXPECTED.')
119            RETURN
        C
120     300    WRITE (7,305) IPAR3,IPAR2,IPAR1
121     305    FORMAT (' IN ATTEMPTING TO EVALUATE THE RELATION EXPRESSION '/
             +      ' HEADED BY RECORD ',I12,' ROUTINE NRTEST ENCOUNTERED IN '/
             +      ' RECORD ',I12,' THE RELATION INDEX ',I5,', WHICH IS OUT',
```

```
 ISN
              +     ' OF BOUNDS FOR A LEGAL RELATION TYPE.')
122             RETURN
          C
123       310   WRITE (7,315) IPAR1,IPAR2
124       315   FORMAT (' A CONDITIONAL ACTION TYPE OF RELATION WAS ENCOUNTERED '/
              +     ' AT OTHER THAN LEVEL 1.  THE HEAD RELATION WAS ',I12,'.'/
              +     'THE LEVEL AT WHICH THE CONDITIONAL ACTION OCCURRED WAS ',I2)
125             RETURN
          C
126         320 WRITE(7,325) IPAR1,IPAR2,IPAR3
127         325 FORMAT('PLAYER ',I12,' CAPTURED PLAYER ',I12,
              + ' AT LOCATION',I12)
128             RETURN
          C
129       330   WRITE (7,335) IPAR1,DTPAER(IPAR2)
130       335   FORMAT (' THE RECORD REFERENCE ',I12,' WHICH WAS TO REFER TO'/
              +     ' A PLANE, HAD AN IMPROPER DATA TYPE: ',A3,'.')
131             RETURN
          C
132       340   WRITE (7,345) IPAR1,DTPAER(IPAR2)
133       345   FORMAT (' THE RECORD REFERENCE ',I12,' WHICH WAS TO REFER TO'/
              +     ' A REGION, HAD AN IMPROPER DATA TYPE: ',A3,'.')
134             RETURN
          C
135       350   RETURN
136       360   RETURN
137       370   RETURN
138       380   WRITE (7,385) IPAR1,IPAR2
139       385   FORMAT (' THE NUMBER OF FIELD VALUES IN A RECORD OF THE'/
              +     ' CURRENT TYPE IS ',I3,' WHEREAS THE NUMBER OF VALUES '/
              +     ' ALLOWED FOR WAS ONLY ',I3)
140             RETURN
141       390   RETURN
142       400   RETURN
          C
143         410 WRITE(7,415) IPAR1
```

```
     415 FORMAT(' PLAYER REFERENCE',I11,' NOT AN INSIDER')
         RETURN
   C
     420 WRITE(7,425) IPAR1
     425 FORMAT(' COULD NOT FIND APPROPRIATE FORCE FOR PLAYER',I11)
         RETURN
   C
         END
```

```
ISN
 1            FUNCTION FCNLIN(ARRAY,NSTEP,R,RSTEP)
       C
       C        GIVEN A FUNCTION Y=F(X) WHICH IS TABULATED AT N EQUALLY SPACED
       C     POINTS, 0, RSTEP, ..., (N-1)*RSTEP, THIS ROUTINE RETURNS THE VALUE
       C     Y=F(R) FOR AN INPUT R.  IF 0 <= R <= (N-1)*RSTEP, F(R) IS OBTAINED
       C     BY LINEAR INTERPOLATION.  FOR R<0, F(R) = F(0).  FOR R>(N-1)*RSTEP,
       C     F(R) = F((N-1)*RSTEP).
       C
 2            REAL ARRAY(NSTEP)
 3            N=R/RSTEP
 4            N1=N+1
 5            IF(R.GT.0.0) GO TO 25
 6            FCNLIN=ARRAY(1)
 7            RETURN
 8     25     IF(N1.LT.NSTEP) GO TO 35
 9            FCNLIN=ARRAY(NSTEP)
10            RETURN
11     35     FCNLIN=ARRAY(N1)+(ARRAY(N1+1)-ARRAY(N1))*(R-FLOAT(N)*RSTEP)/RSTEP
12            RETURN
13            END
```

```
ISN
 1          FUNCTION FIRST(IARG,ICURNO)
      C
      C        FUNCTION TO RETURN THE FIRST VALUE ON A LIST OF VALUES, OR IF ITS
      C     ARGUMENT IS NOT A LIST, TO RETURN THE ARGUMENT AS ITS VALUE INSTEAD.
      C     THE FUNCTION THUS RETURNS A NULL VALUE IF ITS ARGUMENT IS NULL OR
      C     IF IT IS A LIST CONTAINING A SINGLE NULL VALUE.  IF ITS ARGUMENT
      C     IS A LIST, THIS FUNCTION SETS A CURRENT ITEM REFERENCE TO
      C     REFERENCE THE FIRST ITEM ON THE LIST; OTHERWISE IT SETS THE
      C     CURRENT ITEM POINTER TO NULL.
      C
      C     INPUT PARAMETERS:
      C       IARG      EITHER A REFERENCE TO A LIST, A REFERENCE TO SOME OTHER
      C                 DATA ITEM, AN INTEGER, OR A NULL VALUE.
      C     OUTPUT PARAMETERS:
      C       ICURNO    CURRENT ITEM POINTER IS SET TO THE RECORD
      C                 INDEX OF THE FIRST LISTND OF THE LIST, OR TO
      C                 NULL IF IARG ISN'T A LIST
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,ECBECT
 8          COMMON /PARS1/
 9          COMMON /PARS3/
10          EQUIVALENCE (IFIRST,XFIRST)
      C
      C     CHECK WHETHER THE ARGUMENT IS A LIST
11          IF (IARG .LT. 1000000000) GO TO 10
12             CALL PARSRF(IARG,IDTYP,IRECNO,IDUM)
13             IF (IDTYP .NE. ILIST) GO TO 10
      C     IF DO HAVE A LIST, SET THE CURRENT ELEMENT POINTER TO DESIGNATE
      C     THE HEAD OF THE LIST.
14             ICURNO = IRECNO
```

UTILITIES - FIRST FUNCTION

```
ISN
      C  RETRIEVE THE VALUE OF THE FIRST ITEM ON THE LIST AND RETURN
15             IFIRST = LISTND(JVAL,IRECNO)
16             FIRST = XFIRST
17             RETURN
      C
      C  ARGUMENT IS NOT A LIST.  RETURN WITH THE ARGUMENT AS THE VALUE OF THE
      C  FUNCTION
18     10   IFIRST = IARG
19          FIRST = XFIRST
20          ICURNO = NULL
21          RETURN
22          END
```

UTILITIES -   FNCVAL FUNCTION

```
ISN
 1            FUNCTION FNCVAL(IFNCRF)
      C
      C        FUNCTION TO EVALUATE A FUNCTION RECORD AND RETURN A (REAL)
      C   VALUE.  SEE ALSO IFNCVL.
      C
      C   INPUT PARAMETERS:
      C       IFNCRF   A REFERENCE TO A FUNCTION RECORD TO BE EVALUATED
      C
 2            COMMON /PARS/
 3            EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4            REAL*8 DTPNAM,FLDNAM,FORMOT
 5            COMMON /PARS1/
 6            COMMON /PARS2/
 7            COMMON /PARS3/
      C
 8            FNCVAL = 0.0
 9            RETURN
10            END
```

```
ISN
 1          FUNCTION FNEXT(IARG,ICURNO)
      C
      C       FUNCTION TO RETURN THE NEXT VALUE OF THE LIST SPECIFIED BY IARG.
      C   THE CURRENT ITEM POINTER, ICURNO, IDENTIFIES THE CURRENT
      C   POSITION ON THE LIST.  IF IARG DOES NOT REFER TO A LIST OR IF THE
      C   LIST'S CURRENT ITEM POINTER ALREADY REFERENCES THE LAST ELEMENT OF
      C   THE LIST, THE FUNCTION SETS A FAILURE SIGNAL AND RETURNS A NULL
      C   VALUE.  NOTE THAT "FNEXT" SHOULD NOT BE
      C   CALLED UNLESS "FIRST" WAS INITIALLY CALLED TO INITIALIZE THE
      C   CURRENT POINTER TO REFERENCE THE BEGINNING OF THE LIST.
      C
      C   INPUT PARAMETERS:
      C     IARG      A VALUE WHICH MAY BE EITHER (1) A LIST REFERENCE,
      C                (2) A REFERENCE TO SOME OTHER STRUCTURE, (3) AN INTEGER,
      C               OR (4) NULL.
      C     ICURNO    THE RECORD INDEX OF THE LIST NODE AT THE
      C               CURRENT POSITION IN THE LIST.
      C
      C   OUTPUT PARAMETERS:
      C     ICURNO    UPDATED TO POINT TO THE NEXT LOGICAL LISTND OF
      C               THE LIST, OR TO NULL IF THERE ARE NO MORE ITEMS ON THE
      C               LIST.  NOT CHANGED IF IARG ISN'T A LIST.
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,ECRNOT
 8          COMMON /PARS1/
 9          COMMON /PARS3/
10          EQUIVALENCE (NEXT,XNEXT)
      C
11          IRTNCD = IFAIL
12          FNEXT = FNULL
```

UTILITIES - FNEXT FUNCTION

```
ISN
     C  CHECK WHETHER THE ARGUMENT IS A LIST
13         IF (IARG .LT. 1000000000) RETURN
14         CALL FABSRF(IARG,IDTYP,IRECNO,IDUM)
15         IF (IDTYP .NE. ILIST) RETURN
     C  CHECK WHETHER THE CURRENT POINTER HAS A LEGAL VALUE
16         IF (ICURNO .GE. 1 .AND. ICURNO .LE. NRECS(LLIST)) GO TO 5
17            CALL ERR(7,5,IARG,ICURNO,0)
18            RETURN
     C  IF DO HAVE A LIST, UPDATE THE CURRENT ELEMENT POINTER
19   5     ICURNO = LISTND(JNXT,ICURNO)
     C  IF THERE IS NO NEXT ITEM, RETURN
20         IF (ICURNO .LE. 0) RETURN
     C  IF THERE IS A NEXT ITEM ON THE LIST, GET ITS VALUE
     C  AND RETURN
21         NEXT = LISTND(JVAL,ICURNO)
22         FNEXT = XNEXT
23         IRTNCD = IOK
24         RETURN
25         END
```

```
ISN
 1           FUNCTION ICOPY(IRECRF)
       C
       C     FUNCTION TO MAKE A COPY OF A PLEX RECORD AND RETURN A
       C  REFERENCE TO THIS COPY.  THIS FUNCTION ONLY MAKES A COPY OF THE
       C  RECORD PASSED, NOT OF ANY OF THE RECORDS THIS RECORD MAY POINT
       C  TO.  THUS FOR THOSE PURPOSES WHERE ONE WISHES TO COPY A WHOLE
       C  PLEX STRUCTURE, THE CURRENT ROUTINE MUST BE CALLED MULTIPLE
       C  TIMES.
       C
       C  INPUT PARAMETERS:
       C    IRECRF    A REFERENCE TO A PLEX RECORD
       C
 2           COMMON /STATEV/
 3           DIMENSION ITEM(41900),DITEM(41900)
 4           EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5           COMMON /PARS/
 6           EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7           REAL*8 DTPNAM,FLDNAM,FCRMOT
       C
       C  IS IRECRF AN APPROPRIATE REFERENCE ?
 8           IF (IRECRF .GT. 100000000) GO TO 10
 9              CALL ERR(2,8,IRECRF,0,0)
10              RETURN
11      10   CALL PARSRF(IRECRF,IDTYP,IRECNO,IDUM)
       C  GET A NEW RECORD OF THE SAME TYPE
12           IREC = NEWREC(IDTYP)
       C  GET ZERO DISPLACEMENT POINTERS TO THE OLD AND NEW RECORDS
13           N = NFLDS(IDTYP)
14           IOLD = IDTOFF(IDTYP) + (IRECNO-1)*N
15           INEW = IDTOFF(IDTYP) + (IREC-1)*N
       C  ITERATE THROUGH THE FIELDS OF THE OLD RECORD, COPYING THE CONTENTS
       C  TO THE NEW RECORD
16           DO 15 I=1,N
17      15      ITEM(INEW+I) = ITEM(IOLD+I)
       C  RETURN WITH A REFERENCE TO THE NEW RECORD
```

UTILITIES - ICOPY FUNCTION

```
ISN
18          ICOPY = NEWREP(IDTYP,IREC,0)
19          RETURN
20          END
```

```
      FUNCTION ICOUNT(LIST,NULLCT)
C
C     FUNCTION TO COUNT THE NUMBER OF ITEMS ON A LIST AND RETURN THIS
C  INTEGER.  THE COUNT INCLUDES BOTH NULL AND NON-NULL ITEMS.  HOWEVER,
C  A SEPARATE COUNTER "NULLCT" KEEPS TRACK OF THE NULL ITEMS SO THAT
C  THE CALLING ROUTINE CAN USE WHICHEVER COUNT IS APPROPRIATE.  ANY
C  LIST EMBEDDED IN "LIST" IS COUNTED AS A SINGLE ITEM.  TO FACILITATE
C  GENERAL USE OF THIS ROUTINE, THE PARAMETER "LIST" NEED NOT BE A LIST.
C  IF IT ISN'T, A COUNT OF 1 IS RETURNED BY ICOUNT.
C
C  INPUT PARAMETERS:
C    LIST     A LIST OF ITEMS (OR ANY OTHER DATA ITEM)
C
C  OUTPUT PARAMETERS:
C    NULLCT   A NON-NEGATIVE INTEGER EQUAL TO THE NUMBER OF NULL
C             ITEMS ENCOUNTERED IN "LIST".
C
      COMMON /PARS/
      EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
      REAL*8 DTPNAM,FLDNAM,FCRNCT
C
      ICOUNT = 1
      NULLCT = 0
      IV = IFIRST(LIST,I)
      IF (IV .EQ. NULL) NULLCT = NULLCT + 1
    5 IV = NEXT(LIST,I)
      IF (IRTNCD .EQ. IFAIL) RETURN
      ICOUNT = ICOUNT + 1
      IF (IV .EQ. NULL) NULLCT = NULLCT + 1
      GO TO 5
      END
```

```
ISN
 1          FUNCTION IFIRST(IARG,ICURNO)
      C
      C       FUNCTION TO RETURN THE FIRST VALUE ON A LIST OF VALUES, OR IF ITS
      C    ARGUMENT IS NOT A LIST, TO RETURN THE ARGUMENT AS ITS VALUE INSTEAD.
      C    THE FUNCTION THUS RETURNS A NULL VALUE IF ITS ARGUMENT IS NULL OR
      C    IF IT IS A LIST CONTAINING A SINGLE NULL VALUE.  IF ITS ARGUMENT
      C    IS A LIST, THIS FUNCTION SETS A CURRENT ITEM REFERENCE TO
      C    REFERENCE THE FIRST ITEM ON THE LIST; OTHERWISE IT SETS THE
      C    CURRENT ITEM POINTER TO NULL.
      C
      C    INPUT PARAMETERS:
      C      IARG      EITHER A REFERENCE TO A LIST, A REFERENCE TO SOME OTHER
      C                DATA ITEM, AN INTEGER, OR A NULL VALUE.
      C    OUTPUT PARAMETERS:
      C      ICURNO    CURRENT ITEM POINTER IS SET TO THE RECORD
      C                INDEX OF THE FIRST LISTND OF THE LIST, OR TO
      C                NULL IF IARG ISN'T A LIST
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FCBPOT
 8          COMMON /PARS1/
 9          COMMON /PARS3/
      C
      C    CHECK WHETHER THE ARGUMENT IS A LIST
10          IF (IARG .LT. 1000000000) GO TO 10
11             CALL PARSBF(IARG,IDTYP,IRECNO,IDUM)
12             IF (IDTYP .NE. ILIST) GO TO 10
      C    IF DO HAVE A LIST, SET THE CURRENT ELEMENT POINTER TO DESIGNATE
      C    THE HEAD OF THE LIST.
13             ICURNO = IRECNO
      C    RETRIEVE THE VALUE OF THE FIRST ITEM ON THE LIST AND RETURN
```

```
ISN
14            IFIRST = LISTND(JVAL,IRECNO)
15            RETURN
     C
     C  ARGUMENT IS NOT A LIST.  RETURN WITH THE ARGUMENT AS THE VALUE OF THE
     C  FUNCTION
16   10     IFIRST = IARG
17          ICURNO = NULL
18          RETURN
19          END
```

UTILITIES -   IFNCVL FUNCTION

```
ISN
 1          FUNCTION IFNCVL(IFNCRF)
      C
      C        FUNCTION TO EVALUATE A FUNCTION RECORD AND RETURN AN (INTEGER)
      C   VALUE.  SEE ALSO FNCVAL.
      C
      C   INPUT PARAMETERS:
      C       IFNCRF   A REFERENCE TO A FUNCTION RECORD TO BE EVALUATED
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,FLDNAM,FORMOT
 5          COMMON /PARS1/
 6          COMMON /PARS2/
 7          COMMON /PARS3/
      C
 8          IFNCVL = 0
 9          RETURN
10          END
```

UTILITIES - INITVL SUBROUTINE

```
ISN
 1          SUBROUTINE INITVL(IVEC,N,IVAL)
      C
      C     SUBROUTINE TO INITIALIZE ALL THE ELEMENTS OF AN INTEGER ARRAY TO
      C  A SPECIFIED VALUE.
      C
      C  INPUT PARAMETERS:
      C     IVEC     A BLOCK OF CONTIGUOUS STORAGE TO BE INITIALIZED
      C              (IT NEED NOT BE A SINGLE 1-DIM ARRAY IN THE CALLING
      C              ROUTINE, THOUGH IT IS TREATED AS SUCH IN INITVL).
      C     N        THE NUMBER OF COMPUTER WORDS IN IVEC TO BE INITIALIZED.
      C     IVAL     THE VALUE TO SET EACH OF THE WORDS OF IVEC TO.
      C
 2          DIMENSION IVEC(N)
 3          DO 10 I=1,N
 4     10      IVEC(I) = IVAL
 5          RETURN
 6          END
```

```
ISN
 1            FUNCTION IPLACE(LOC)
        C
        C     FUNCTION TO DETERMINE A RECORD REFERENCE TO A PLACE (I.E., A NODE
        C  VIEWED AS A REGION) WHEN GIVEN A LOCATION (I.E., A SPECIFICATION
        C  IN THE FORM (SOURCE NODE, SINK NODE, FRACTIONAL DISTANCE BETWEEN)).
        C  FUNCTION RETURNS THE PLACE REFERENCE.
        C
        C  INPUT PARAMETERS:
        C     LOC       A REFERENCE TO A LOCN RECORD.
        C
 2            COMMON /PARS1/
        C
 3            DIMENSION IPREC(15)
 4            DATA IPREC/8*0,1,3*2,3,2*4/,EPS/0.5/
        C
 5            ISOURC = IVAL(JSOURC,LOC)
 6            ISINK = IVAL(JSINK,LOC)
 7            FRAC = VAL(JFRAC,LOC)
 8            CALL PARSRF(ISOURC,ISOUTP,IDUM,IDUM)
 9            CALL PARSRF(ISINK,ISNKTP,IDUM,IDUM)
        C
        C  DETERMINE WHETER TO USE THE SOURCE NODE OR THE SINK NODE TO
        C  DETERMINE THE BOUNDARY BETWEEN THEM.
        C
10            NODE = ISOURC
11            NODE2 = ISINK
12            ITYPE = ISOUTP
13            IF (IPREC(ISNKTP) .LE. IPREC(ISOUTP)) GO TO 10
14            NODE = ISINK
15            NODE2 = ISOURC
16            ITYPE = ISNKTP
        C
        C  DETERMINE BOUNDARY BETWEEN NODES BASED ON THE TYPE OF NODE.
        C
17      10    IF (IPREC(ITYPE) .NE. 1) GO TO 20
```

```
ISN
      C
      C  IF DETERMINING NODE IS A YARD NODE, THE PLACE IS THE NODE CLOSEST
      C  TO THE LOC.
      C
18             IPLACE = ISOURC
19             IF (FRAC .GT. 0.5) IPLACE = ISINK
20             RETURN
      C
      C  IF DETERMINING NODE IS OF SOME OTHER TYPE THAN A YARD NODE, BASE
      C  DECISION AS TO PLACE ON WHETHER THE LOCATION FALLS IN THE REGION
      C  OF THE DETERMINING NODE.
      C
21    20    IF (IFREC(ITYPE) .NE. 2) GO TO 30
      C
      C  DETERMINING NODE IS A ROOM, HALL, OR ROOF
      C
22             CALL COORDS(LOC,X,Y,Z)
23             IPLACE = NODE
24             IF (ABS(X - VAL(JXCC,NODE)) .GT. VAL(JXLEN,NODE)/2. .OR.
          +      ABS(Y - VAL(JYCC,NODE)) .GT. VAL(JYLEN,NODE)/2.)
          +      IPLACE = NODE2
25             RETURN
      C
      C  DETERMINING NODE IS A PORTAL OR STAIRS NODE.
      C
26    30    D = DIST(ISOURC,ISINK)
27          IPLACE = NODE2
28          IF (D*FRAC .LE. EPS) IPLACE = NODE
29          RETURN
30          END
```

UTILITIES - IQUEUE FUNCTION

```
ISN
 1          FUNCTION IQUEUE(IELEM,LIST)
      C
      C       A ROUTINE TO ADD AN ITEM ONTO THE END OF A LIST.  TYPICALLY
      C    "IELEM" WILL BE A SCALAR OR NON-LIST REFERENCE AND "LIST" WILL BE
      C    A LIST REFERENCE.  HOWEVER TO FACILITATE EASY USE OF THIS FUNCTION
      C    WITHOUT CHECKING FOR SPECIAL CASES, THE FUNCTION IS CODED TO ALLOW
      C    EITHER PARAMETER TO BE ANY DATATYPE.  IF "LIST" IS NULL, THE FUNCTION
      C    RETURNS "IELEM" AS A VALUE.  IF "LIST" IS NON-NULL BUT "IELEM" IS
      C    NULL, THE FUNCTION RETURNS "LIST" AS A VALUE.  IF "LIST" IS NOT
      C    A LIST REFERENCE, A LIST NODE IS OBTAINED AND "LIST" BECOMES THE
      C    CONTENTS OF THIS LIST NODE.  IF NEITHER "IELEM" NOR "LIST" IS NULL,
      C    A LIST NODE IS ALSO OBTAINED FOR "IELEM".  THIS LIST NODE IS
      C    CHAINED SO THAT IT FOLLOWS "LIST".  THE FUNCTION RETURNS WITH IQUEUE
      C    REFERENCING THE FRONT OF THE RESULTANT LIST.  NOTE THAT IF
      C    IELEM IS A LIST THEN THE LAST ELEMENT ON THE RETURNED LIST IS
      C    ITSELF A LIST.  SEE ALSO ROUTINES ISTACK AND JOIN FOR RELATED
      C    OPERATIONS.
      C
      C    INPUT PARAMETERS:
      C      IELEM     AN ELEMENT TO BE ADDED TO A LIST (ANY DATATYPE)
      C      LIST      A LSIT REFERENCE (OR ITEM OF ANY OTHER DATATYPE)
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORECT
 8          COMMON /PARS1/
 9          COMMON /PARS3/
      C
10          IF (LIST .NE. NULL) GO TO 5
11             IQUEUE = IELEM
12             RETURN
13    5     IF (IELEM .NE. NULL) GO TO 10
```

```
            IQUEUE = LIST
            RETURN
C  NEITHER "IELEM" NOR "LIST" ARE NULL. DOES "LIST" REFERENCE A LIST ?
10       IF (LIST .LT. 1000000000) GO TO 15
            CALL PARSRF(LIST,IDTYP,IRECNO,IDUM)
            IF (IDTYP .EQ. ILIST) GO TO 20
C  PARAMETER "LIST" IS NOT A LIST.  MAKE IT THE CONTENTS OF A LIST NODE.
15       IRECNO = NEWREC(LLIST)
         LISTND(JVAL,IRECNO) = LIST
         LAST = IRECNO
         GO TO 25
C  FIND THE LAST NODE OF "LIST"
20       LAST = IRECNO
22       IR = LISTND(JNXT,LAST)
         IF (IR .EQ. NULL) GO TO 25
         LAST = IR
         GO TO 22
C  GET A LIST NODE TO ENCASE "IELEM" & APPEND TO END OF LIST
25       NEW = NEWREC(LLIST)
         LISTND(JVAL,NEW) = IELEM
         LISTND(JNXT,LAST) = NEW
C  CONVERT THE RECORD INDEX "IRECNO" TO A LIST REFERENCE & RETURN
         IQUEUE = NEWREF(LLIST,IRECNO,0)
         RETURN
         END
```

UTILITIES - IREF FUNCTION

```
ISN
 1          FUNCTION IREF(IFLDNO,IRECRF)
      C
      C     FUNCTION TO TRANSLATE A FIELD INDEX AND RECORD REFERENCE INTO
      C   A LOCATION OF STORAGE RELATIVE TO THE ARRAY ITEM (DITEM).  FUNCTION
      C   RETURNS THIS LOCATION IF IT SUCCEEDS.  IF AN ERROR IS ENCOUNTERED IN
      C   PROCESSING THE FUNCTION RETURNS A NULL VALUE INSTEAD.
      C
      C   INPUT PARAMETERS:
      C     IFLDNO    A FIELD INDEX WITHIN THE RECORD OF INTEREST
      C     IRECRF    A RECORD REFERENCE
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,FLDNAM,FCRECT
      C
 5          IREF = NULL
      C   BREAK RECORD REFERENCE INTO ITS COMPONENTS
 6          CALL PARSRF(IRECRF,IDTYP,IRECNO,IDUM)
      C   CHECK THAT THE FIELD INDEX SPECIFIED HAS A LEGAL VALUE.
 7          IF (IFLDNO .GE. 1 .AND. IFLDNO .LE. NFLDS(IDTYP)) GO TO 10
 8             CALL ERR(4,3,IDTYP,IRECNO,IFLDNO)
 9             RETURN
      C   COMPUTE THE STORAGE LOCATION OFFSET AND RETURN
10     10   IREF = IDTOFF(IDTYP) + (IRECNO-1)*NFLDS(IDTYP) + IFLDNO
11          RETURN
12          END
```

```
ISN
 1           FUNCTION IREF1(IFLDRF)
      C
      C      FUNCTION TO TRANSLATE A FIELD REFERENCE INTO THE IMPLIED
      C   LOCATION OF STORAGE RELATIVE TO THE ARRAY ITEM (DITEM).  FUNCTION
      C   RETURNS THIS LOCATION IF IT SUCCEEDS.
      C
      C   INPUT PARAMETERS:
      C     IFLDRF    A FIELD REFERENCE
      C
 2           COMMON /PARS/
 3           EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4           REAL*8 DTPNAM,FLDNAM,ECBNCT
      C
      C   BREAK RECORD REFERENCE INTO ITS COMPONENTS
 5           CALL PARSRF(IFLDRF,IDTYP,IRECNO,IFLDNO)
      C   COMPUTE THE STORAGE LOCATION OFFSET AND RETURN
 6     10    IREF1 = IDTOFF(IDTYP) + (IRECNO-1)*NFLDS(IDTYP) + IFLDNO
 7           RETURN
 8           END
```

UTILITIES - ISTACK FUNCTION

```
ISN
 1          FUNCTION ISTACK(IELEM,LIST)
      C
      C       A ROUTINE TO PLACE AN ITEM ONTO THE FRONT OF A LIST.  TYPICALLY
      C    "IELEM" WILL BE A SCALAR OR NON-LIST REFERENCE AND "LIST" WILL BE
      C    A LIST REFERENCE.  HOWEVER TO FACILITATE EASY USE OF THIS FUNCTION
      C    WITHOUT CHECKING FOR SPECIAL CASES, THE FUNCTION IS CODED TO ALLOW
      C    EITHER PARAMETER TO BE ANY DATATYPE.  IF "LIST" IS NULL, THE
      C    FUNCTION RETURNS "IELEM" AS A VALUE.  IF "LIST" IS NON-NULL BUT
      C    "IELEM" IS NULL, THE FUNCTION RETURNS "LIST" AS A VALUE.  IF
      C    "LIST" IS NOT A LIST REFERENCE, A LIST NODE IS OBTAINED AND "LIST"
      C    BECOMES THE CONTENTS OF THIS LIST NODE.  IF NEITHER "IELEM" NOR
      C    "LIST" IS NULL A LIST NODE IS ALSO OBTAINED FOR "IELEM".  THIS LIST
      C    NODE IS CHAINED IN FRONT OF THE LIST CONTAINING THE SECOND
      C    ARGUMENT.  ISTACK THEN REFERENCES THE FRONT OF THIS EXPANDED LIST
      C    UPON RETURN.  NOTE THAT IF IELEM IS A LIST THEN THE FIRST ELEMENT
      C    OF THE RETURNED LIST IS A LIST.  SEE ALSO ROUTINES IQUEUE AND JOIN
      C    FOR RELATED OPERATIONS.
      C
      C    INPUT PARAMETERS:
      C      IELEM    AN ELEMENT TO BE ADDED TO A LIST (ANY DATATYPE)
      C      LIST     A LIST REFERENCE (OR ITEM OF ANY OTHER DATATYPE)
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FORECT
 8          COMMON /PARS1/
 9          COMMON /PARS3/
10          COMMON /RECREF/
11          DIMENSION RECRFQ(140)
12          EQUIVALENCE (RECRFQ(1),IGCALS)
      C
13          IF (LIST .NE. NULL) GO TO 5
```

```
ISN
14             ISTACK = IELEM
15             RETURN
16    5     IF (IELEM .NE. NULL) GO TO 10
17             ISTACK = LIST
18             RETURN
     C  NEITHER "IELEM" NOR "LIST" ARE NULL.  DOES "LIST" REFERENCE A LIST?
19   10     IF (LIST .LT. 1000000000) GO TO 15
20             CALL PARSRF(LIST,IDTYP,IRECNO,IDUM)
21             IF (IDTYP .EQ. LLIST) GO TO 20
     C  THE PARAMETER "LIST" IS NOT A LIST.  MAKE IT THE CONTENTS
     C  OF A LIST NODE.
22   15     IRECNO = NEWREC(LLIST)
23          LISTND(JVAL,IRECNO) = LIST
24          ISTACK = NEWREF(LLIST,IRECNO,0)
     C  GET A LIST NODE TO ENCASE "IELEM"
25   20     LOCAL(5) = ISTACK
26          NEW = NEWREC(LLIST)
27          LISTND(JVAL,NEW) = IELEM
28          LISTND(JNXT,NEW) = IRECNO
     C  CONVERT THE RECORD INDEX "NEW" TO A LIST REFERENCE AND RETURN
29          ISTACK = NEWREF(LLIST,NEW,0)
30          RETURN
31          END
```

```
ISN
  1           FUNCTION IVAL(IFLDNO,IRECRF)
        C
        C     FUNCTION TO RETURN THE VALUE REFERRED TO BY A FIELD INDEX AND
        C  RECORD REFERENCE.  IF ANY ERRORS ARE DETECTED IN THE ARGUMENTS
        C  TO THE FUNCTION, A NULL VALUE IS RETURNED INSTEAD.
        C
        C  INPUT PARAMETERS:
        C    IFLDNO   FIELD INDEX
        C    IRECRF   RECORD REFERENCE
        C
  2           COMMON /STATEV/
  3           DIMENSION ITEM(41900),DITEM(41900)
  4           EQUIVALENCE (DTBIN,ITEM(1),DITEM(1))
  5           COMMON /PARS/
  6           EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  7           REAL*8 DTPNAM,FLDNAM,FCNNOT
        C
  8           IVAL = NULL
        C  BREAK RECORD REFERENCE INTO ITS COMPONENTS
  9           CALL PARSRF(IRECRF,IDTYP,IRECNO,IDUM)
        C  CHECK THAT THE FIELD INDEX SPECIFIED HAS A LEGAL VALUE
 10           IF (IFLDNO .GE. 1 .AND. IFLDNO .LE. NFLDS(IDTYP)) GO TO 10
 11              CALL ERR(4,4,IDTYP,IRECNO,IFLDNO)
 12              RETURN
        C  COMPUTE THE STORAGE LOCATION OFFSET
 13     10    IR = IDTOFF(IDTYP) + (IRECNO-1)*NFLDS(IDTYP) + IFLDNO
        C  RETURN THE VALUE STORED AT THIS LOCATION
 14           IVAL = ITEM(IR)
 15           RETURN
 16           END
```

```
ISN
 1            FUNCTION IVAL1(IFLDRF)
        C
        C     FUNCTION TO RETURN THE VALUE REFERRED TO BY A FIELD
        C  REFERENCE.
        C
        C  INPUT PARAMETERS:
        C     IFLDRF  FIELD REFERENCE
        C
 2            COMMON /STATEV/
 3            DIMENSION ITEM(41900),DITEM(41900)
 4            EQUIVALENCE (DTEIN,ITEM(1),DITEM(1))
 5            COMMON /PARS/
 6            EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7            REAL*8 DTPNAM,FLDNAM,FORMOT
        C
        C  BREAK RECORD REFERENCE INTO ITS COMPONENTS
 8            CALL PARSRF(IFLDRF,IDTYP,IRECNO,IFLDNO)
        C  COMPUTE THE STORAGE LOCATION OFFSET
 9      10    IR = IDTOFF(IDTYP) + (IRECNO-1)*NFLDS(IDTYP) + IFLDNO
        C  RETURN THE VALUE STORED AT THIS LOCATION
10            IVAL1 = ITEM(IR)
11            RETURN
12            END
```

UTILITIES - JOIN FUNCTION

```
      FUNCTION JOIN(LIST1,LIST2)
C
C     FUNCTION TO APPEND LIST2 TO LIST1.  IF BOTH ARGUMENTS
C  ARE LISTS, THEN A NEW RESULTANT LIST IS FORMED HAVING THE
C  SUM OF THE NUMBER OF ELEMENTS OF EACH OF THE COMPONENT LISTS.
C  EITHER OR BOTH OF THE ARGUMENTS, HOWEVER, MAY BE OF A DATATYPE
C  OTHER THAN A LIST.  IF EITHER OR BOTH IS NULL IT IS IGNORED IN
C  PRODUCING THE FINAL RESULT.  IF EITHER OR BOTH IS A SINGLE
C  ITEM RATHER THAN A LIST, IT IS TREATED AS A SINGLE ENTITY TO
C  BE JOINED TO THE OTHER TO FORM A RESULTING LIST.  THE FUNCTION
C  RETURNS A POINTER TO THE RESULTANT LIST.  SEE ALSO THE FUNCTIONS
C  ISTACK AND IQUEUE WHICH PERFORM RELATED ACTIONS.
C
C  INPUT PARAMETERS:
C    LIST1    A LIST (OR VARIABLE OF OTHER DATATYPE)
C    LIST2    A LIST (OR VARIABLE OF OTHER DATATYPE)
C
      COMMON /STATEV/
      DIMENSION ITEM(41900),DITEM(41900)
      EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
      COMMON /PARS/
      EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
      REAL*8 DTPRAM,FLDNAM,FORMOT
      COMMON /PARS1/
      COMMON /PARS3/
C
      IF (LIST1 .NE. NULL) GO TO 5
         JOIN = LIST2
         RETURN
    5 IF (LIST2 .NE. NULL) GO TO 10
         JOIN = LIST1
         RETURN
C  NEITHER LIST1 NOR LIST2 ARE NULL.  DOES LIST2 REFERENCE A LIST ?
   10 IF (LIST2 .LT. 1000000000) GO TO 15
         CALL PARSEF(LIST2,IDTYP,L2,IDUM)
```

UTILITIES -   JOIN FUNCTION

```
            IF (IDTYP .EQ. LLIST) GO TO 20
C  THE PARAMETER "LIST2" IS NOT A LIST.  MAKE IT THE CONTENTS
C  OF A LIST NODE.
15       L2 = NEWREC(LLIST)
         LISTND(JVAL,L2) = LIST2
C  IS LIST1 A LIST ?
20       IF (LIST1 .LT. 1000000000) GO TO 25
            JOIN = LIST1
            CALL PARSRF(LIST1,IDTYP,L1,IDUM)
            IF (IDTYP .EQ. LLIST) GO TO 30
C  IF LIST1 ISN'T ALREADY A LIST, ENCASE IT IN A LIST NODE
25       L1 = NEWREC(LLIST)
         LISTND(JVAL,L1) = LIST1
         JOIN = NEWREF(LLIST,L1,0)
         GO TO 35
C  GET LAST NODE ON FIRST LIST
30       IF (LISTND(JNXT,L1) .EQ. NULL) GO TO 35
            L1 = LISTND(JNXT,L1)
            GO TO 30
C  MAKE 2ND LIST THE SUCCESSOR OF THE LAST ELEMENT OF THE FIRST
C  LIST.
35       LISTND(JNXT,L1) = L2
C  RETURN
         RETURN
         END
```

```
ISN
 1           FUNCTION LCOPY(LIST)
       C
       C     FUNCTION TO COPY A LIST AND RETURN A REFERENCE TO IT.
       C
       C  INPUT PARAMETERS:
       C     LIST      REFERENCE TO LIST TO BE COPIED
       C
 2           COMMON /PARS/
 3           EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4           REAL*8 DTPNAM,FLDNAM,FORECT
       C
 5           LCOPY = NULL
 6           ITM = IFIRST(LIST,KI)
 7     10       IF (ITM .EQ. NULL) RETURN
 8              LCOPY = IQUEUE(ITM,LIST)
 9              ITM = NEXT(LIST,KI)
10              GO TO 10
11           END
```

```
ISN
 1          FUNCTION LIST(I1,I2,I3,I4,I5,I6)
      C
      C        ROUTINE TO CREATE A LIST OF ELEMENTS.  AS CURRENTLY FORMULATED
      C     THIS FUNCTION ALLOWS AT MOST SIX ELEMENTS TO BE PUT ON THE LIST WHEN
      C     IT IS CREATED.  OTHERS CAN BE ADDED AFTER THE LIST HAS BEEN CREATED
      C     WITH THE ISTACK, IQUEUE, OR JOIN ROUTINES.  ALSO, IF THIS RESTRICTION
      C     OF HAVING AT MOST SIX INITIAL ITEMS TURNS OUT TO BE BOTHERSOME, THE
      C     NUMBER CAN EASILY BE EXTENDED TO ANY REASONABLE FIXED NUMBER.  THE
      C     ARGUMENTS TO THE FUNCTION ARE ELEMENTS TO BE PLACED ON THE LIST,
      C     IN THE ORDER THEY ARE TO APPEAR ON THE LIST.  IF IT IS DESIRED TO
      C     CREATE A LIST WITH N INITIAL ELEMENTS, 0<=N<6, THEN ONLY THOSE
      C     ELEMENTS TO GO ON THE LIST SHOULD BE SPECIFIED, USING INPUT
      C     ARGUMENTS I1 THROUGH IN.  IN THIS CASE ARGUMENT I(N+1) SHOULD BE
      C     GIVEN A NULL VALUE TO MARK THE END OF THE SET OF ELEMENTS.  THE
      C     CALLING ROUTINE MAY THEREFORE SPECIFY FROM 1 TO 6 ARGUMENTS IN
      C     THE CALL.
      C        THE ELEMENTS TO BE PUT ON THE LIST MAY BE OF ANY DATATYPE,
      C     EXCEPT THAT A NULL VALUE CANNOT BE SPECIFIED AS AN ELEMENT TO BE
      C     ADDED TO THE LIST.  IF A REAL NUMBER IS PASSED TO THIS FUNCTION
      C     IT WILL BE PUT ON THE LIST WITH ITS ORIGINAL CONFIGURATION WITHOUT
      C     ANY CONVERSION.
      C        THE FUNCTION RETURNS A REFERENCE TO THE LIST CREATED, OR A NULL
      C     VALUE IF IT FAILS TO CREATE A LIST DUE TO EXHAUSTION OF LISTND
      C     STORAGE.
      C
      C     INPUT PARAMETERS:
      C         I1-I6     ELEMENTS TO BE PLACED ON A LIST.  IF FEWER THAN 6
      C                   ELEMENTS ARE DESIRED TO BE ON THE LIST INITIALLY,
      C                   THE N+1 PARAMETER SHOULD BE NULL.
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
```

UTILITIES - LIST FUNCTION

```
      REAL*8 DTPNAM,FLDNAM,FORMAT
      COMMON /PARS1/
      COMMON /PARS3/
C
      DIMENSION II(6)
C
      LIST = NULL
      IF (I1 .EQ. NULL) RETURN
C
C  FIRST PUT THE ELEMENTS IN A VECTOR TO MAKE FURTHER PROCESSING MORE
C  UNIFORM
      N = 1
      II(N) = I1
      IF (I2 .EQ. NULL) GO TO 10
      N = N + 1
      II(N) = I2
      IF (I3 .EQ. NULL) GO TO 10
      N = N + 1
      II(N) = I3
      IF (I4 .EQ. NULL) GO TO 10
      N = N + 1
      II(N) = I4
      IF (I5 .EQ. NULL) GO TO 10
      N = N + 1
      II(N) = I5
      IF (I6 .EQ. NULL) GO TO 10
      N = N + 1
      II(N) = I6
C
   10 I = 0
C  GET FIRST LIST NODE
      LIST = NEWREC(ILIST)
      IF (LIST .EQ. NULL) RETURN
C  SET POINTER TO CURRENT LIST NODE ELEMENT
      LPT = LIST
C  SET INDEX OF LIST ELEMENT WORKING ON
```

```
ISN
34    15    I = I + 1
      C  FILL IN THE CONTENTS OF THE LIST NODE.
35          LISTND(JVAL,LPT) = II(I)
      C  IF HAVE REACHED THE END OF THE LIST, EXIT
36          IF (I .GE. N) GO TO 20
      C  OTHERWISE GET A NEW LIST NODE
37          NEW = NEWREC(LLIST)
38          IF (NEW .EQ. NULL) GO TO 20
      C  JOIN THE NEW LIST NODE TO THE PREVIOUS ONE
39          LISTND(JNXT,LPT) = NEW
      C  MAKE THE NEW LIST NODE THE CURRENT ONE & MAKE ANOTHER ITERATION
40          LPT = NEW
41          GO TO 15
      C
      C  CONVERT THE RECORD INDEX IDENTIFYING THE FIRST LISTND ON THE LIST
      C  TO A REFERENCE TO THE LIST
42    20    LIST = NEWREF(LLIST,LIST,0)
43          RETURN
44          END
```

UTILITIES - LSERCH FUNCTION

```
ISN
  1           FUNCTION LSERCH(LISREF,IRECRF,IDTYP,IFLD,IFLDVL)
      C ... LSERCH IS A FUNCTION TO SEARCH A LIST FOR A PARTICULAR
      C     ENTRY.  SEARCH CRITERIA CAN BE EITHER A RECORD REFERENCE,
      C     A RECORD TYPE, A RECORD TYPE AND FIELD VALUE, OR JUST A
      C     FIELD VALUE.  VALUE RETURNED IS NULL IF THE SEARCH FAILS
      C     AND THE ENTRY IF THE SEARCH SUCCEEDS.
      C
      C     INPUT PARAMETERS:
      C          LISREF ... LIST TO BE SEARCHED
      C          IRECRF ... RECORD REFERENCE CRITERION (OR NULL)
      C          IDTYP  ... RECORD TYPE CRITERION (OR NULL)
      C          IFLD   ... FIELD TO BE COMPARED (OR NULL)
      C          IFLDVL ... FIELD VALUE CRITERION (IGNORED IF IFLD IS NULL
      C
  2           COMMON /PARS/
  3           EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  4           REAL*8 DTPNAM,FLDNAM,FCSECT
      C
  5           LSERCH=NULL
      C
      C ... START LIST LOOP
      C
  6           IREF=IFIRST(LISREF,IPTR)
  7    10     IF(IREF.EQ.NULL) RETURN
  8           CALL PARSRF(IREF,JDTYP,JREC,JFLD)
  9           IF(IRECRF.EQ.NULL) GO TO 20
      C
      C ... RECORD REFERENCE CRITERION SET
      C
 10           IF(IREF.NE.IRECRF) GO TO 50
 11    20     IF(IDTYP.EQ.NULL) GO TO 30
      C
      C ... RECORD TYPE CRITERION SET
      C
 12           IF(IDTYP.NE.JDTYP) GO TO 50
```

```
ISN
13   30     IF(IFLD.EQ.NULL) GO TO 40
       C
       C ... FIELD VALUE CRITERION SET
       C
14          IF(IFLDVL.NE.IVAL(IFLD,IREF)) GO TO 50
       C
       C ... ALL CRITERIA MET, RETURN IREF
       C
15   40     LSERCH=IREF
16          RETURN
       C
       C ... END LIST LOOP
       C
17   50     IREF=NEXT(LISREF,LPTR)
18          GO TO 10
19          END
```

UTILITIES - NEWRC2 FUNCTION

```
ISN
      FUNCTION NEWRC2(IDTYP,V1,V2)
      ENTRY NEWRC3(IDTYP,V1,V2,V3)
      ENTRY NEWRC4(IDTYP,V1,V2,V3,V4)
      ENTRY NEWRC5(IDTYP,V1,V2,V3,V4,V5)
      ENTRY NEWRC6(IDTYP,V1,V2,V3,V4,V5,V6)
      ENTRY NEWRC7(IDTYP,V1,V2,V3,V4,V5,V6,V7)
      ENTRY NEWRC8(IDTYP,V1,V2,V3,V4,V5,V6,V7,V8)
      ENTRY NEWRC9(IDTYP,V1,V2,V3,V4,V5,V6,V7,V8,V9)
      ENTRY NEWR18(IDTYP,V1,V2,V3,V4,V5,V6,V7,V8,V9,
     +     V10,V11,V12,V13,V14,V15,V16,V17,V18)
C
C     FUNCTION TO GET A VACANT RECORD OF A SPECIFIED TYPE, FILL ITS
C  FIELDS WITH SPECIFIED VALUES, AND TO OUTPUT A DESCRIPTION  OF THE
C  NEW RECORD TO THE FILE RECORDING THE LIST OF STATE VARIABLE CHANGES.
C  THE FUNCTION RETURNS THE INDEX TO THE NEW RECORD IN THE FILE OF
C  RECORDS OF THIS TYPE.
C
C  INPUT PARAMETERS:
C     IDTYP     RECORD TYPE TO BE ALLOCATED
C     V1        | VALUES FOR UP TO 20 FIELDS OF THE RECORD TO BE INITIAL-
C     ...       | IZED. (CURRENTLY NO RECORD HAS MORE THAN 20 FIELDS).
C     V20       | NEWRC2 USES IDTYP TO DETERMINE HOW MANY VALUES TO
C               | EXPECT.  THE CALLING ROUTINE MUST PROVIDE AT LEAST
C               | THIS MANY VALUES IN ITS CALL TO NEWRC2.
C
      COMMON /STATEV/
      DIMENSION ITEM(41900),DITEM(41900)
      EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
      COMMON /PARS/
      EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
      REAL*8 DTPNAM,FLDNAM,FORMCT
      COMMON /RECREF/
      DIMENSION RECRFQ(140)
      EQUIVALENCE (RECRFQ(1),IOCALS)
C
```

UTILITIES - NEWRC2 FUNCTION

```
ISN
19            DIMENSION VEC(20)
      C
      C  ALLOCATE A NEW RECORD
      C
20            IREC = NEWREC(IDTYP)
      C
      C  DETERMINE THE NUMBER OF FIELD VALUES ASSOCIATED WITH A RECORD OF
      C  THIS TYPE.
21            N = NFLDS(IDTYP)
      C  FILL IN VALUES ACCORDING TO N.
22            IF (N .GT. 20) CALL ERR(38,34,N,20,0)
23            GO TO (20,19,18,17,16,15,14,13,12,11,10,9,8,7,6,5,4,3,2,1),N
24     1      VEC(20) = V20
25     2      VEC(19) = V19
26     3      VEC(18) = V18
27     4      VEC(17) = V17
28     5      VEC(16) = V16
29     6      VEC(15) = V15
30     7      VEC(14) = V14
31     8      VEC(13) = V13
32     9      VEC(12) = V12
33     10     VEC(11) = V11
34     11     VEC(10) = V10
35     12     VEC(9) = V9
36     13     VEC(8) = V8
37     14     VEC(7) = V7
38     15     VEC(6) = V6
39     16     VEC(5) = V5
40     17     VEC(4) = V4
41     18     VEC(3) = V3
42     19     VEC(2) = V2
43     20     VEC(1) = V1
      C
      C  COPY VECTOR TO RECORD
      C
44            IRECRF = NEWREF(IDTYP,IREC,0)
```

```
ISN
45          I = IREF(1,IRECRF)
46          CALL COPY(VEC,DITEM(I),N)
47          LOCAL(1)=IRECRF
      C
      C  REPORT RECORD
      C
48          CALL OUTPLX(IDTYP,IREC,IREC,6,1,0)
      C
49          GO TO (21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38),N
50    21    CONTINUE
51    22    NEWRC2 = IRECRF
52          RETURN
53    23    NEWRC3 = IRECRF
54          RETURN
55    24    NEWRC4 = IRECRF
56          RETURN
57    25    NEWRC5 = IRECRF
58          RETURN
59    26    NEWRC6 = IRECRF
60          RETURN
61    27    NEWRC7 = IRECRF
62          RETURN
63    28    NEWRC8 = IRECRF
64          RETURN
65    29    NEWRC9 = IRECRF
66          RETURN
67    30    CONTINUE
68    31    CONTINUE
69    32    CONTINUE
70    33    CONTINUE
71    34    CONTINUE
72    35    CONTINUE
73    36    CONTINUE
74    37    CONTINUE
75    38    NEWR10 = IRECRF
76          RETURN
```

```
ISN
77          END
```

UTILITIES - NEWREC FUNCTION

```
ISN
  1          FUNCTION NEWREC(IDTYP)
        C
        C       FUNCTION TO GET AN EMPTY RECORD OF A SPECIFIED TYPE FROM THE
        C    FILE OF SUCH RECORDS AND TO RETURN ITS RECORD INDEX.  IF NO
        C    EMPTY RECORDS CAN BE FOUND THE ROUTINE CALLS THE ERROR ROUTINE AND
        C    RETURNS A NULL VALUE.
        C
        C    INPUT PARAMETERS:
        C      IDTYP     POS INTEGER SPECIFYING THE RECORD'S DATA TYPE
        C
  2          COMMON /STATEV/
  3          DIMENSION ITEM(41900),DITEM(41900)
  4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
  5          COMMON /PARS/
  6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  7          REAL*8 DTPNAM,FIDNAM,FCSECT
  8          COMMON /PARS1/
  9          COMMON /PARS3/
        C
 10          NEWREC = NULL
        C    MAKE SURE IDTYP IS IN RANGE
 11          IF (IDTYP .GT. 1 .AND. IDTYP .LE. NDTYPE) GO TO 5
 12             CALL ERR(1,1,IDTYP,0,0)
 13             RETURN
        C
        C    IS THERE A VACANT RECORD ?
 14     5    IF (IAVAIL(IDTYP) .NE. NULL) GO TO 20
 15          IF (LSTREC(IDTYP) .LT. NRECS(IDTYP) - NGENRC) GO TO 10
 16             CALL COLECT
 17             IF (IAVAIL(IDTYP) .NE. NULL) GO TO 20
 18             CALL ERR(2,1,IDTYP,0,0)
 19             RETURN
        C
        C    THE FILE HAS NOT YET BEEN FILLED.  GET THE NEXT VACANT RECORD.
 20     10   LSTREC(IDTYP) = LSTREC(IDTYP) + 1
```

```
ISN
21           NEWREC = LSTREC(IDTYP)
22           RETURN
      C
      C  A RECORD HAS BEEN RECLAIMED.  USE IT.
23    20     NEWREC = IAVAIL(IDTYP)
24                IRECRF=NEWREF(IDTYP,NEWREC,0)
25           IAVAIL(IDTYP) = IVAL(JNXT,IRECRF)
      C  NULL OUT THE NEXT POINTER OF THE NEW RECORD
26           I = IREF(JNXT,IRECRF)
27           ITEM(I) = NULL
28           RETURN
29           END
```

UTILITIES - NEWREF FUNCTION

```
ISN
 1          FUNCTION NEWREF(IDTYP,IRECNO,IFLDNO)
      C
      C        FUNCTION TO PACK TOGETHER A RECORD DATATYPE (YYY),
      C     A RECORD INDEX (ZZZZ), AND (OPTIONALLY) A FIELD INDEX (XX) TO
      C     FORM A FIELD OR RECORD REFERENCE OF THE FORM:  1XXYYYZZZZ.
      C     THE FUNCTION RETURNS THIS RECORD REFERENCE.
      C
      C     INPUT PARAMETERS:
      C       IDTYP     RECORD DATATYPE
      C       IRECNO    RECORD INDEX
      C       IFLDNO    FIELD INDEX
      C
 2          NEWREF = 1000000000 + IFLDNO*10000000 + IDTYP*10000 + IRECNO
 3          RETURN
 4          END
```

```
ISN
 1          FUNCTION NEXT(IARG,ICURNO)
      C
      C     FUNCTION TO RETURN THE NEXT VALUE OF THE LIST SPECIFIED BY IARG.
      C   THE CURRENT ITEM POINTER, ICURNO, IDENTIFIES THE CURRENT
      C   POSITION ON THE LIST.  IF IARG DOES NOT REFER TO A LIST OR IF THE
      C   LIST'S CURRENT ITEM POINTER ALREADY REFERENCES THE LAST ELEMENT OF
      C   THE LIST, THE FUNCTION SETS A FAILURE SIGNAL AND RETURNS A NULL
      C   VALUE.  NOTE THAT "NEXT" SHOULD NOT BE
      C   CALLED UNLESS IFIRST WAS INITIALLY CALLED TO INITIALIZE THE
      C   CURRENT POINTER TO REFERENCE THE BEGINNING OF THE LIST.
      C
      C   INPUT PARAMETERS:
      C     IARG      A VALUE WHICH MAY BE EITHER (1) A LIST REFERENCE,
      C               (2) A REFERENCE TO SOME OTHER STRUCTURE, (3) AN INTEGER,
      C               OR (4) NULL.
      C     ICURNO    THE RECORD INDEX OF THE LIST NODE AT THE
      C               CURRENT POSITION IN THE LIST.
      C
      C   OUTPUT PARAMETERS:
      C     ICURNO    UPDATED TO POINT TO THE NEXT LOGICAL LISTND OF
      C               THE LIST, OR TO NULL IF THERE ARE NO MORE ITEMS ON THE
      C               LIST.  NOT CHANGED IF IARG ISN'T A LIST.
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FCRECT
 8          COMMON /PARS1/
 9          COMMON /PARS3/
      C
10          IRTNCD = IFAIL
11          NEXT = NULL
      C   CHECK WHETHER THE ARGUMENT IS A LIST
```

UTILITIES - NEXT FUNCTION

```
ISN
12           IF (IARG .LT. 1000000000) RETURN
13           CALL PARSRF(IARG,IDTYP,IRECNO,IDUM)
14           IF (IDTYP .NE. ILIST) RETURN
       C  CHECK WHETHER THE CURRENT POINTER HAS A LEGAL VALUE
15           IF (ICURNO .GE. 1 .AND. ICURNO .LE. NRECS(LLIST)) GO TO 5
16              CALL ERR(7,5,IARG,ICURNO,0)
17              RETURN
       C  IF DO HAVE A LIST, UPDATE THE CURRENT ELEMENT POINTER
18     5     ICURNO = LISTND(JNXT,ICURNO)
       C  IF THERE IS NO NEXT ITEM, RETURN
19           IF (ICURNO .LE. 0) RETURN
       C  IF THERE IS A NEXT ITEM ON THE LIST, GET ITS VALUE
       C  AND RETURN
20           NEXT = LISTND(JVAL,ICURNO)
21           IRTNCD = IOK
22           RETURN
23           END
```

```
ISN
 1          FUNCTION NITEMS(N,LIST,IREM)
      C
      C        ROUTINE TO SELECT N ITEMS (ARBITRARILY) FROM A LIST AND
      C    TO RETURN BOTH A LIST OF THE ITEMS SELECTED AND A LIST OF THOSE
      C    NOT SELECTED.
      C        THE CURRENT VERSION OF THE ROUTINE SELECTS THE FIRST N ITEMS
      C    IT ENCOUNTERS.  IF THERE ARE FEWER THAN N ITEMS ON THE LIST IT
      C    RETURNS AS MANY ITEMS AS THERE ARE.
      C
      C    INPUT PARAMETERS:
      C        N         NUMBER OF ITEMS TO SELECT
      C        LIST      LIST OF ITEMS
      C
      C    OUTPUT PARAMETERS:
      C        IREM      LIST OF REMAINING ITEMS NOT SELECTED.
      C
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,FLDNAM,FCRECT
 5          COMMON /PARS1/
 6          COMMON /PARS2/
 7          COMMON /PARS3/
      C
 8          NS = 0
 9          IREM = LIST
10          NITEMS = NULL
11          IF (N .LE. 0) RETURN
      C
12          IR = IFIRST(LIST,KI)
13     10      IF (IR .EQ. NULL) GO TO 20
14             NITEMS = ISTACK(IR,NITEMS)
15             IR = NEXT(LIST,KI)
16             NS = NS + 1
17             IF (NS .LT. N) GO TO 10
      C
```

UTILITIES -   NITEMS FUNCTION

```
ISN
      C  HAVE ENOUGH ITEMS.  MAKE KI A LIST REFERENCE
18          IREM = NEWREP(ILIST,KI,0)
19          RETURN
      C
      C  HAVE EXHAUSTED LIST
20    20    IREM = NULL
21          RETURN
22          END
```

```
ISN
 1          FUNCTION NRTEST(IRELRF)
      C
      C     FUNCTION TO TEST WHETHER A RELATION IS SATISFIED.
      C        THERE ARE TWO CLASSES OF CONSTRUCTS BEING TREATED AS "RELATIONS":
      C     (1) A TRUE BINARY RELATION, AND (2) A CONDITIONAL ACTION.  BOTH ARE
      C     ENCODED IN RELATION RECORDS.  HOWEVER THEY REPRESENT DISTINCT,
      C     THOUGH RELATED, CONCEPTS.  THE TRUE BINARY RELATION IS EXEMPLIFIED
      C     BY A RELATION SUCH AS "EQUAL(X,Y)" OR "GREATER-THAN(X,Y)".  A TRUE
      C     BINARY RELATION MAY BE NOT ONLY A SIMPLE BINARY RELATION BUT AN
      C     EXPRESSION COMPOSED OF SIMPLE BINARY RELATIONS USING "AND", "OR",
      C     AND "NOT" CONNECTIVES.  THUS IT CORRESPONDS ROUGHLY TO A LOGICAL
      C     EXPRESSION IN FORTRAN.  A CONDITIONAL ACTION "RELATION" DIFFERS IN
      C     THAT IT CONSISTS OF TWO DISTINCT COMPONENTS.  THE FIRST IS A TRUE
      C     BINARY RELATION.  THE SECOND IS AN ACTION RECORD.  EXAMPLES OF
      C     CONDITIONAL ACTIONS ARE "IF(RELATION,ACTION) OR "WHENEVER(RELATION,
      C     ACTION)".
      C        IF THE RELATION PASSED TO THE FUNCTION IS A TRUE BINARY RELATION
      C     IT IS EVALUATED FOR TRUTH.  IF TRUE, THE FUNCTION RETURNS 1;
      C     OTHERWISE IT RETURNS 0.  IF THE RELATION PASSED TO NRTEST IS A
      C     CONDITIONAL ACTION, THE FIRST ARGUMENT (A TRUE BINARY RELATION) IS
      C     EVALUATED FOR TRUTH.  IF TRUE, THE FUNCTION RETURNS A REFERENCE TO
      C     THE SECOND ARGUMENT (AN ACTION, OR LIST OF ACTIONS); OTHERWISE THE
      C     FUNCTION RETURNS ZERO.
      C
      C     INPUT PARAMETERS:
      C        IRELRF   A REFERENCE TO A RELATION RECORD
      C
 2          COMMON /PARS1/
 3          COMMON /PARS3/
 4          COMMON /PARS4/
      C
 5          DIMENSION IREFS(10),IRETRN(10)
 6          LOGICAL RESULT(10)
 7          DATA NLEVS/10/
      C
```

```
ISN
 8            IRECRF = IRELRF
 9            ILEV = 0
        C  GET LEVEL OF CURRENT RELATION
10      2     ILEV = ILEV + 1
11            IF (ILEV .GT. NLEVS) CALL ERR(28,28,NLEVS,IRELRF,0)
12            CALL PARSRF(IRECRF,IDTYP,IDUM,IDUM)
13            IF (IDTYP .NE. LRELN) CALL ERR(29,28,IRELRF,IDTYP,0)
14            IRTYPE = IVAL(JTYPE,IRECRF)
15            IF (IRTYPE .LE. 0 .OR. IRTYPE .GT. NRELTP) CALL ERR(30,28,IRTYPE,
             +      IRECRF,IRELRF)
16            GO TO (5,5,5,5,5,5,65,65,65,65,65,65,130,140,150,157,157,157),
             +      IRTYPE
        C
        C  GET VALUE OF FIRST ARGUMENT OF RELATION (VALUE IS INTEGER)
        C
17      5     IPAR1 = IVAL(JPAR1,IRECRF)
        C  IS THE VALUE AN INTEGER OR REFERENCE ?
18            IF (IPAR1 .LE. 100000000) GO TO 7
        C  VALUE IS A REFERENCE.  DETERMINE WHETHER IT REFERS TO A FUNCTION.
19            CALL PARSRF(IPAR1,IDTYP,IDUM,IDUM)
20            IF (IDTYP .NE. LFUNC) IPAR1 = IVAL1(IPAR1)
21            IF (IDTYP .EQ. LFUNC) IPAR1 = IFNCVL(IPAR1)
        C
        C  GET VALUE OF SECOND ARGUMENT OF RELATION
        C
22      7     IPAR2 = IVAL(JPAR2,IRECRF)
        C  IS THE VALUE AN INTEGER ?
23            IF (IPAR2 .LE. 100000000) GO TO 8
        C  VALUE IS A REFERENCE.  DETERMINE WHETHER IT REFERS TO A FUNCTION.
24            CALL PARSRF(IPAR2,IDTYP,IDUM,IDUM)
25            IF (IDTYP .NE. LFUNC) IPAR2 = IVAL1(IPAR2)
26            IF (IDTYP .EQ. LFUNC) IPAR2 = IFNCVL(IPAR2)
        C
        C  BRANCH TO CODE TO EVALUATE RELATION
        C
27      8     GO TO (10,20,30,40,50,60),IRTYPE
```

```
ISN
     C
     C  LT(INTEGER,INTEGER)
     C
28   10     RESULT(ILEV) = IPAR1 .LT. IPAR2
29          GO TO 500
     C
     C  LE(INTEGER,INTEGER)
     C
30   20     RESULT(ILEV) = IPAR1 .LE. IPAR2
31          GO TO 500
     C
     C  EQ(INTEGER,INTEGER)
     C
32   30     RESULT(ILEV) = IPAR1 .EQ. IPAR2
33          GO TO 500
     C
     C  NE(INTEGER,INTEGER)
     C
34   40     RESULT(ILEV) = IPAR1 .NE. IPAR2
35          GO TO 500
     C
     C  GT(INTEGER,INTEGER)
     C
36   50     RESULT(ILEV) = IPAR1 .GT. IPAR2
37          GO TO 500
     C
     C  GE(INTEGER,INTEGER)
     C
38   60     RESULT(ILEV) = IPAR1 .GE. IPAR2
39          GO TO 500
     C
     C  GET VALUE OF FIRST ARGUMENT, A REAL, A FIELD REFERENCE, OR A FUNCTION
     C
40   65     IR = IRTYPE - 6
41          IPAR1 = IVAL(JPAR1,IRECRF)
42          IF (IPAR1 .GT. 100000000 .AND. IPAR1 .LE. 1400359999) GO TO 66
```

```
ISN
      C  VALUE IS REAL
 43          PAR1 = VAL(JPAR1,IRECRF)
 44          GO TO 68
      C  VALUE IS A REFERENCE
 45   66     CALL PARSRF(IPAR1,IDTYP,IDUM,IDUM)
 46          IF (IDTYP .NE. LFUNC) PAR1 = VAL1(IPAR1)
 47          IF (IDTYP .EQ. LFUNC) PAR1 = FNCVAL(IPAR1)
      C
      C  GET VALUE OF SECOND ARGUMENT, A REAL, A FIELD REFERENCE, OR A
      C  FUNCTION
      C
 48   68     IPAR2 = IVAL(JPAR2,IRECRF)
 49          IF (IPAR2 .GT. 1000000000 .AND. IPAR2 .LE. 1400359999) GO TO 69
      C  VALUE IS REAL
 50          PAR2 = VAL(JPAR2,IRECRF)
 51          GO TO (70,80,90,100,110,120),IR
      C  VALUE IS A REFERENCE
 52   69     CALL PARSRF(IPAR2,IDTYP,IDUM,IDUM)
 53          IF (IDTYP .NE. LFUNC) PAR2 = VAL1(IPAR2)
 54          IF (IDTYP .EQ. LFUNC) PAR2 = FNCVAL(IPAR2)
 55          GO TO (70,80,90,100,110,120),IR
      C
      C  LT(REAL,REAL)
      C
 56   70     RESULT(ILEV) = PAR1 .LT. PAR2
 57          GO TO 500
      C
      C  LE(REAL,REAL)
      C
 58   80     RESULT(ILEV) = PAR1 .LE. PAR2
 59          GO TO 500
      C
      C  EQ(REAL,REAL)
      C
 60   90     RESULT(ILEV) = PAR1 .EQ. PAR2
 61          GO TO 500
```

```
ISN
     C
     C  NE(REAL,REAL)
     C
62   100    RESULT(ILEV) = PAR1 .NE. PAR2
63          GO TO 500
     C
     C  GT(REAL,REAL)
     C
64   110    RESULT(ILEV) = PAR1 .GT. PAR2
65          GO TO 500
     C
     C  GE(REAL,REAL)
     C
66   120    RESULT(ILEV) = PAR1 .GE. PAR2
67          GO TO 500
     C
     C  AND(RELN1,RELN2)
     C
     C  SAVE SECOND PARAMETER OF RELATION
68   130    IREPS(ILEV) = IVAL(JPAR2,IRECRF)
     C  GET 1ST PARAMETER
69          IRECRF = IVAL(JPAR1,IRECRF)
     C  SAVE RETURN POINT
70          IRETRN(ILEV) = 1
71          GO TO 2
     C
     C  PROCESS SECOND PORTION OF AND RELATION
     C
     C  IF RESULT OF FIRST ARGUMENT WAS FALSE, THEN WHOLE RELATION IS FALSE
72   135    RESULT(ILEV) = RESULT(ILEV+1)
73          IF (.NOT.RESULT(ILEV)) GO TO 500
     C  SAVE RETURN POINT
74          IRETRN(ILEV) = 2
75          GO TO 2
     C
     C  THE TRUTH OF THE AND RELATION IS THE SAME AS THE TRUTH OF ITS 2ND ARG
```

UTILITIES - NRTEST FUNCTION

```
ISN
      C
76    137    RESULT(ILEV) = RESULT(ILEV+1)
77           GO TO 500
      C
      C  OR(RELN1,RELN2)
      C
      C  SAVE SECOND PARAMETER OF THE RELATION
78    140    IRRFS(ILEV) = IVAL(JPAR2,IRECRF)
      C  GET 1ST PARAMETER
79           IRECRF = IVAL(JPAR1,IRECRF)
      C  SAVE RETURN POINT
80           IRETRN(ILEV) = 3
81           GO TO 2
      C
      C  PROCESS SECOND PORTION OF OR RELATION
      C
      C  IF RESULT OF FIRST ARGUMENT WAS TRUE, WHOLE RELATION IS TRUE.
82    145    RESULT(ILEV) = RESULT(ILEV+1)
83           IF (RESULT(ILEV)) GO TO 500
      C  SAVE RETURN POINT
84           IRETRN(ILEV) = 4
85           GO TO 2
      C
      C  THE TRUTH OF THE OR RELATION IS THE SAME AS THE TRUTH OF ITS 2ND ARG
      C
86    147    RESULT(ILEV) = RESULT(ILEV+1)
87           GO TO 500
      C
      C  NOT(RELN1)
      C
      C  GET 1ST PARAMETER
88    150    IRECRF = IVAL(JPAR1,IRECRF)
      C  SAVE RETURN POINT
89           IRETRN(ILEV) = 5
90           GO TO 2
      C
```

```
ISN
      C  TRUTH OF THE NOT RELATION IS THE OPPOSITIE OT THAT OF ITS
      C  EMBEDDED ARGUMENT
      C
 91   155   RESULT(ILEV) = .NOT.RESULT(ILEV+1)
 92         GO TO 500
      C
      C  COMMON CODE FOR CONDITIONAL ACTIONS
      C
 93   157   IF (ILEV .NE. 1) CALL ERR(31,28,IRELRF,ILEV,0)
      C  SAVE 2ND PARAMETER
 94         NRTEST = IVAL(JPAR2,IRECRF)
      C  SAVE RETURN POINT
 95         IRETRN(ILEV) = 6
 96         GO TO 2
      C
      C  EVALUATION OF CONDITIONAL ACTIONS DEPENDS ON THE EVALUATION OF ITS
      C  ARGUMENT AND ON THE TYPE OF THE CONDITIONAL ACTION.
      C
 97   160   IF (RESULT(ILEV+1) .AND. (IRTYPE .EQ. KIF .OR. IRTYPE .EQ.
     +      KWHEN)) RETURN
 98         IF (.NOT.RESULT(ILEV+1) .AND. IRTYPE .EQ. KUNTIL) RETURN
 99         NRTEST = 0
100         RETURN
      C
      C  POP STACK AND RETURN TO CALLER
      C
101   500   ILEV = ILEV - 1
102         IF (ILEV .GE. 1) GO TO 510
103            NRTEST = 0
104            IF (.NOT.RESULT(1)) RETURN
105            NRTEST = 1
106            RETURN
      C  ARE STILL PROCESSING EMBEDDED RELATIONS.  DETERMINE WHERE TO
      C  BRANCH TO COMPLETE THE EVALUATION OF THE RELATION AND GO THERE.
107   510   IR = IRETRN(ILEV)
108         IRECRF = IREFS(ILEV)
```

UTILITIES -   NBTEST FUNCTION

```
 ISN
109          GO TO (135,137,145,147,155,160),IR
110          END
```

UTILITIES - NULIFY SUBROUTINE

```
ISN
 1            SUBROUTINE NULIFY(IBLCCK,N)
      C
      C       ROUTINE TO NULL OUT THE CCNTENTS OF A BLOCK OF STORAGE.
      C
      C    INPUT PARAMETERES:
      C      IBLOCK    LOCATION OF THE BEGINNING OF THE BLOCK TO BE NULLED.
      C      N         SIZE OF THE BLCCK TO BE NULLED
      C
 2            DIMENSION IBLOCK(N)
 3            DATA NULL/-9999/
      C
 4            DO 10 I=1,N
 5      10       IBLOCK(I) = NULL
 6            RETURN
 7            END
```

UTILITIES - NZERO SUBROUTINE

```
ISN
 1           SUBROUTINE NZERO(IBLOCK,N)
       C
       C ... SUBROUTINE TO SET CONTENTS OF BLOCK OF STORAGE TO
       C     INTEGER ZEROES
       C
       C ... INPUT PARAMETERS:
       C
       C          IBLOCK ... BLOCK ADDRESS
       C          N      ... SIZE OF BLOCK
       C
 2           DIMENSION IBLOCK(N)
 3           DO 10 I=1,N
 4        10 IBLOCK(I)=0
 5           RETURN
 6           END
```

```
ISN
 1          SUBROUTINE OUTLIS(LISREF,LUNO)
      C
      C ... OUTLIS IS USED TO PRINT A LIST OF SYMBOLIC
      C     REFERENCES.
      C     INPUT PARAMETERS
      C          LISREF ... A LIST REFERENCE FOR LIST TO BE PRINTED
      C          LUNO   ... LU# FOR OUTPUT
 2          COMMON /PARS/
 3          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4          REAL*8 DTPNAM,FIDNAM,ECSECT
 5          COMMON /OUT/
 6          DIMENSION XMIN(50),XMAX(50),DATA(50)
 7          EQUIVALENCE (XMAX(1),IMAX(1)),(XMIN(1),IMIN(1))
 8          EQUIVALENCE(DATA(1),IDATA(1))
      C
      C ... IF NOT A LIST RETURN
      C
 9          I=IFIRST(LISREF,LPTR)
10          IF(LPTR.EQ.NULL) RETURN
11          CALL PARSRF(LISREF,IRF,IIIS,IDUM)
12          NPTR=0
13          NFLDS=0
      C
      C ... BUILD OUTPUT LIST IN IDATA
      C
14     10   IF(I.LT.1000000000) GO TO 20
15          NFLDS=NFLDS+1
16          CALL PARSRF(I,IDTYP,IRECNO,IFLD)
17          NPTR=NPTR+1
18          DATA(NPTR)=DTPABR(IDTYP)
19          NPTR=NPTR+1
20          IDATA(NPTR)=IRECNO
21          IF(NFLDS.LT.14) GO TO 20
      C
      C ... LINE COMPLETE, OUTPUT IT
```

UTILITIES - COTLIS SUBROUTINE

```
ISN
      C
22          WRITE(LUNO,1000) ILIS,(IDATA(I),I=1,28)
23          NFLDS=0
24          NPTR=0
25    20    I=NEXT(LISREF,LPTR)
26          IF(I.NE.NULL) GO TO 10
      C
      C ... END OF LIST PRINT LINE
      C
27          IF(NFLDS.EQ.0) RETURN
28          WRITE(LUNO,1000) ILIS,(IDATA(I),I=1,NPTR)
29    1000  FORMAT(' ',I4,2X,14(A2,I4,2X))
30          RETURN
31          END
```

```
ISN
  1         SUBROUTINE OUTPLX(IDTYP,NREC1,NREC2,LUNO,MODE1,MODE2)
      C ... A ROUTINE TO OUTPUT FLEX RECORDS ON LOGICAL UNIT SPECIFIED
      C     BY CALLING PROGRAM.
      C
      C ... PARAMETERS:
      C          IDTYP ... RECORD DATATYPE
      C          IREC1 ... 1ST RECORD NUMBER TO BE PRINTED
      C          IREC2 ... LAST RECORD NUMBER TO BE PRINTED.
      C          MODE1 ... 0 PRINT RECORD WITHOUT HEADINGS
      C                    1 PRINT RECORD WITH HEADINGS
      C          MODE2 ... 0 DO NOT PRINT REFERENCED LISTS
      C                    1 PRINT REFERENCED LISTS
  2         COMMON /STATEV/
  3         DIMENSION ITEM(41900),DITEM(41900)
  4         EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
  5         COMMON /PARS/
  6         EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  7         REAL*8 DTPNAM,FIDNAM,FCBPOT
  8         COMMON /PARS3/
  9         COMMON /OUT/
 10         DIMENSION XMIN(50),XMAX(50),DATA(50)
 11         EQUIVALENCE (XMAX(1),IMAX(1)),(XMIN(1),IMIN(1))
 12         EQUIVALENCE(DATA(1),IDATA(1))
 13         REAL*8 BUF(50),BLANK,FMT(12)
 14         DATA BLANK /8H        /
      C
      C ... INSURE ARGUMENTS IN RANGE
      C
 15         IIREF=NULL
 16         IF(IDTYP.LE.LLIST .OR. IDTYP.GT.NDTYPE) RETURN
 17         IF(ISTREC(IDTYP).LE.0) RETURN
 18         IREC1=NREC1
 19         IREC2=NREC2
 20         CALL FTNCMD('SET MODECHECK=OFF',17)
 21         IRCMAX=NRECS(IDTYP)-NGENRC
```

UTILITIES - OUTPLX SUBROUTINE

```
          IF(IREC1.LE.0) IREC1=1
          IF(IREC1.GT.IRCMAX) IREC1=IRCMAX
          IF(IREC2.GT.IRCMAX) IREC2=IRCMAX
          IF(IREC2.LT.IREC1) IREC2=IREC1
          IF(IRECIO(IDTYP).NE.0) GO TO 300
C
C ... INITIALIZATION FOR IRECIO=0
C
          DO 5 I=1,12
        5 FMT(I)=FORMOT(I,IDTYP)
          IF(FMT(1).EQ.BLANK) RETURN
          NBASE=IREF1(NEMBER(IDTYP,NRECS(IDTYP),0))
          NFLD=NFLDS(IDTYP)
C
C ... COUNT NUMBER OF FIELDS TO BE OUTPUT
C     AND MOVE FLDNAMES TO BUF
C
          NFPTR=IFDNPT(IDTYP)
          NFLD1=1
          DO 6 I=1,NFLD
          IF(ITEM(NBASE+I).GT.3) GO TO 6
          BUF(NFLD1)=FLDNAM(I+NFPTR)
          NFLD1=NFLD1+1
        6 CONTINUE
          NLIST=0
          IF(MODE1.EQ.0) GO TO 7
C
C ... PRINT HEADING
C
          IF (LUNO .EQ. 6) WRITE(LUNO,1003) DTPNAM(IDTYP)
          IF (LUNO .NE. 6) WRITE(LUNO,1002) DTPNAM(IDTYP)
     1002 FORMAT(' ',/,A8)
     1003 FORMAT (' '/'NEW ',A8,' RECORD:')
          NN=NFLD1-1
          WRITE(LUNO,1001) BLANK,(BUF(I),I=1,NN)
C
```

```
ISN
     C ... START RECORD PROCESSING LOOP..................................
     C
47       7 DO 100 IREC=IREC1,IREC2
              IDATA(1)=IREC
49            NPTR=1
50            CALL NZERO(IUSED,50)
51            IPTR=IREF1(NEWREF(IDTYP,IREC,0))
52             IF(IPTR .EQ. NBASE) GO TO 100
     C
     C ... CHECK FOR NULL RECORD
     C
53              DO 109 I=2,NFLD
54              IF(ITEM(IPTR+I) .NE. NULL) GO TO 8
55    109       CONTINUE
     C
     C ... NULL RECORD UNLESS WEAPON OR EQUIPMENT
     C
56              IF(IDTYP.NE.LWEAP .AND. IDTYP.NE.LEQUIP) GO TO 100
     C
     C ... SPECIAL CHECK FOR WEAPON OR EQUIPMENT
     C
57              MTYP=ITEM(IPTR+1)
58              IF(MTYP .LE. 0) GO TO 100
59              IF(IDTYP.EQ.LWEAP .AND. MTYP.GT.NWEPTP) GO TO 100
60              IF(IDTYP.EQ.LEQUIP .AND. MTYP.GT.NEQPTP) GO TO 100
     C
     C ... IF IRECIO<>0 CALL OUTSET
     C
61    8       IF(IRECIO(IDTYP).EQ.0) GO TO 9
62            CALL OUTSET(IDTYP,NBASE,NFLD,NFLD1,IPTR,FMT)
63            IF(IRTNCD.EQ.IFAIL) GO TO 100
     C
     C ... BUILD RECORD IN IDATA
     C
64    9       DO 50 I=1,NFLD
65             ITYP=ITEM(NBASE+I)
```

```
ISN
66                IF(ITYP.GT.3)  GO TO 50
67                GO TO (10,20,30),ITYP
      C
      C ...       INTEGER
      C
68       10       NPTR=NPTR+1
69                IDATA(NPTR)=ITEM(IPTR+I)
70                IF(IDATA(NPTR).NE.NULL) GO TO 50
71                IDATA(NPTR)=0
72                IUSED(I)=1
73                GO TO 50
      C
      C ...       REAL
      C
74       20       NPTR=NPTR+1
75                DATA(NPTR)=DITEM(IPTR+I)
76                IF(IDATA(NPTR).NE.NULL) GO TO 50
77                DATA(NPTR)=0.0
78                IUSED(I)=1
79                GO TO 50
      C
      C ...       REFERENCE
      C
80       30       IRECRF=ITEM(IPTR+I)
81                IF(IRECRF.NE.NULL) GO TO 35
82                NPTR=NPTR+2
83                IDATA(NPTR)=0
84                IUSED(I)=1
85                GO TO 50
86       35       CALL PARSRF(IRECRF,IDT,IRNO,IFN)
87                NPTR=NPTR+1
88                DATA(NPTR)=DTPAER(IDT)
89                NPTR=NPTR+1
90                IDATA(NPTR)=IRNO
91                IF(IDT.NE.ILIST) GO TO 50
      C
```

```
ISN
      C ...       SAVE LISREF
      C
 92               MLIST=MLIST+1
 93               IUSED(MLIST+50)=IRECBF
 94      50       CONTINUE
      C
      C ...       PRINT A RECORD
      C
 95             WRITE(99,FMT) (IDATA(I),I=1,NPTR)
 96             READ(99,1000)  (BUF(I),I=1,NFLD1)
 97     1000 FORMAT(A6,42A8)
 98     1001 FORMAT(A6,14A8,/,2X,14A8,/,4X,14A8)
      C
      C ... BLANK OUT NULL FIELDS
      C
 99               J=0
100             DO 70 I=1,NFLD
101               IF(ITEM(NBASE+I) .GT. 3) GO TO 70
102               J=J+1
103               IF(IUSED(I).EQ.0) GO TO 70
104               BUF(J+1)=BLANK
105      70     CONTINUE
106             WRITE(LUNO,1001)  (BUF(I),I=1,NFLD1)
107     100 CONTINUE
      C ... END RECORD PROCESSING LOOP......................
      C
      C ... IF REQUIRED, PRINT REFERENCED LISTS
      C
108         IF(MODE2.EQ.0.OR.MLIST.EQ.0) GO TO 250
109         WRITE(LUNO,1002) LTPNAM(LLIST)
110         DO 200 I=1,MLIST
111         CALL OUTLIS(IUSED(I+50),LUNO)
112     200 CONTINUE
113     250 IF(IIREF .NE. NULL) CALL DELREC(IIREF)
114         RETURN
      C
```

```
 ISN
      C ... INITIALIZTION FOR IRECIC=1
      C
 115  300   NLIST=0
 116        IIREF=NEWREF(IDTYP,NRECS(IDTYP),0)
 117        IIREF=ICOPY(IIREF)
 118        NBASE=IREF1(IIREF)
 119              NFLD=NFLDS(IDTYP)
 120        IF(MODE1.EQ.0) GO TO 7
      C
      C ... PRINT HEADING
      C
 121        N1=IFDNPT(IDTYP)+1
 122        N2=N1+NFLDS(IDTYP)-1
 123        IF (LUNO .NE. 6) WRITE(LUNO,1002) DTPNAM(IDTYP)
 124        IF (LUNO .EQ. 6) WRITE(LUNO,1003) DTPNAM(IDTYP)
 125        WRITE(LUNO,1001) BLANK,(FLDNAM(I),I=N1,N2)
 126        GO TO 7
 127        END
```

UTILITIES -   OUTREE SUBROUTINE

```
      SUBROUTINE OUTREE(IREF,LUNO)
C ... A SUBROUTINE TO PRINT OUT EITHER A PLEX RECORD, OR,
C     IF IREF IS A LIST TO PRINT OUT THE LIST AND THE RECORDS
C     ON IT
      COMMON /PARS/
      EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
      REAL*8 DTPNAM,FLDNAM,FCFMCT
      COMMON /PARS1/
      COMMON /PARS2/
      COMMON /PARS3/
      CALL PARSRF(IREF,ID,IREC,IDUM)
      IF(ID .EQ. LLIST) GO TO 10
C
C ... SIMPLE REFERENCE, PRINT IT
      CALL OUTPLX(ID,IREC,IREC,LUNO,0,0)
      RETURN
C
C ... IREF IS LIST, PRINT LIST
   10 CALL OUTLIS(IREF,LUNO)
C
C ... PRINT RECORDS ON LIST
      IRECRF = IFIRST(IREF,LPTR)
   20 IF(IRECRF .EQ. NULL) GO TO 30
         CALL PARSRF(IRECRF,ID,IREC,IDUM)
         CALL OUTPLX(ID,IREC,IREC,LUNO,0,0)
      IRECRF = NEXT(IREF,LPTR)
      GO TO 20
   30 RETURN
      END
```

UTILITIES - OUTSET SUBROUTINE

```
ISN
  1          SUBROUTINE OUTSET(IDTYP,NBASE,NFLD,NFLD1,IPTR,FMT,
      C ... OUTSET IS CALLED BY OUTFIX FOR RECORDS FOR WHICH
      C      IRECIC <> 0, I.E. RECORDS WITH VARIABLE FIELD TYPES.
      C      THE SETUP TO OUTPUT THESE RECORDS INVOLVES TWO STEPS:
      C           1. PLACE APPROPRIATE VALUES IN THE GENERIC
      C              RECORD FOR THE DATA FIELD TYPES IN THE
      C              RECORD.
      C           2. BUILD AN SUITABLE OUTPUT FORMAT IN FMT
      C
      C      IRTNCD IS USED TO INDICATE SUCCESS OR FAILURE.
      C
      C      INPUT PARAMETERS:
      C           IDTYP  ... DATA TYPE OF RECORD
      C           IPTR   ... ZERO DISPLACEMENT POINTER TO RECORD
      C
      C      OUTPUT PARAMETERS:
      C           NBASE  ... ZERO DISPLACEMENT POINTER TO TYPE RECORD
      C           NFLD   ... NUMBER OF FIELDS IN RECORD
      C           NFLD1  ... NUMBER OF OUTPUT FIELDS
      C
  2          COMMON /STATEV/
  3          DIMENSION ITEM(41900),DITEM(41900)
  4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
  5          COMMON /PARS/
  6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
  7          REAL*8 DTPNAM,FLDNAM,FCBMCT
  8          COMMON /PARS1/
  9          COMMON /PARS3/
 10          REAL*8 FMTS(7),FMT(12)
 11          DATA BLANK /4H    /
 12          DATA FMTS /8H,I3,5X  ,8H,F6.2,2X,8H,A2,I4  ,8H,2X     ,
     +   8H,8X     ,8H(I4,2X  ,8H)       /
      C
      C ... COMMON SETUP
      C
```

```
ISN
13            NFLD=NFLDS(IDTYP)
14            CALL INITVL(FMT,24,BLANK)
15            IF(IDTYP.EQ.LACTN) GO TO 100
16            IF(IDTYP.EQ.LRELN) GO TO 200
17            IF(IDTYP.EQ.LMESS) GO TO 300
18            IF(IDTYP.EQ.LCHNG) GO TO 400
       C
       C
19            IRTNCD=IFAIL
20            RETURN
       C
       C ... PROCESS ACTION GENERIC RECORD
       C
21      100   ITYP=ITEM(IPTR+JTYPE)
22            J=JFAR1-1
23            DO 110 I=1,3
24            ITEM(NBASE+I+J)=MACTTP(I,ITYP)
25      110   CONTINUE
26            GO TO 500
       C
       C ... PROCESS RELATION
       C
27      200   ITYP=ITEM(IPTR+JTYPE)
28            J=JFAR1-1
29            DO 210 I=1,2
30            ITEM(NBASE+I+J)=MRELTP(I,ITYP)
31      210   CONTINUE
32            GO TO 500
       C
       C ... PROCESS MESSAGE, SET ITYP FOR CONTENT FIELD
       C
33      300   IATTR=ITEM(IPTR+JATTR)
34            ISUBRF=ITEM(IPTR+JSUBJ)
35            IF(ISUBRF.LT.1000000000 .OR. ISUBRF.GT.1009999999)
             +    GO TO 500
36            CALL PARSRF(ISUBRF,IDT,IEN,IFN)
```

```
      NTYPPT=NEWREF(IDT,NRECS(IDT),0)
      ITEM(NBASE+JCONT)=IVAL(IATTR,NTYPPT)
      GO TO 500
C
C ... PROCESS CHANGE, SET ITYP FOR NEW VALUE FIELD
C
  400 IATTR=ITEM(IPTR+JATTR)
      ISUBRF = ITEM(IPTR+JSUBJ)
      CALL PARSRF(ISUBRF,IDT,IRN,IFN)
      NTYPPT = NEWREF(IDT,NRECS(IDT),0)
      ITEM(NBASE+JNVAL) = IVAL(IATTR,NTYPPT)
      GO TO 500
C
C ... BUILD OUTPUT FORMAT
C
 500  FMT(1)=FMTS(6)
      J=2
      DO 510 I=1,NFLD
           ITYP=ITEM(NBASE+I)
           FMT(J)=FMTS(ITYP)
           J=J+1
           IF(ITYP.NE.3) GO TO 510
           FMT(J)=FMTS(4)
           J=J+1
 510  CONTINUE
      FMT(J)=FMTS(7)
      NFLD1=NFLD+1
      IRTNCD=IOK
      RETURN
      END
```

```
      SUBROUTINE PARSRF(IREF,IDTYP,IRECNO,IFLDNO)
C
C        ROUTINE TO BREAK APART A FIELD OR RECORD REFERENCE INTO ITS
C     COMPONENT PARTS, NAMELY: (1) A RECORD DATATYPE, (2) A RECORD INDEX,
C     AND (3) A FIELD INDEX (IF PASSED A FIELD REFERENCE).
C
C     INPUT PARAMETERS:
C        IREF      FIELD OR RECORD REFERENCE (OF FORM:  1XXYYYZZZZ)
C                  WHERE XX IS FIELD INDEX (OR ZERO OTHERWISE)
C                        YYY IS RECORD DATATYPE
C                        ZZZZ IS RECORD INDEX
C
C     OUTPUT VARIABLES:
C       IDTYP     DATA TYPE OF RECORD REFERRED TO BY IREF
C       IRECNO    RECORD INDEX OF RECORD REFERRED TO BY IREF
C       IFLDNO    FIELD INDEX OF FIELD REFERRED TO BY IREF, IF IREF
C                 REFERS TO A FIELD. OTHERWISE ZERO.
C
      COMMON /PARS/
      EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
      REAL*8 DTPNAM,FLDNAM,ICBECT
      COMMON /PARS3/
C
C     CHECK THAT IREF IS OF PROPER REFERENCE FORM
      IF (IREF .GT. 1000000000) GO TO 10
         CALL ERR(2,2,IREF,0,0)
         RETURN
C
C     BREAK THE REFERENCE INTO PIECES
   10 IR = IREF - (IREF/1000000000) * 1000000000
      IFLDNO = IR / 10000000
      IREC = IR - IFLDNO * 10000000
      IDTYP = IREC / 10000
      IRECNO = IREC - IDTYP * 10000
C
```

UTILITIES - PARSRF SUBROUTINE

```
C  CHECK THAT THE PARTS ARE WITHIN AN APPROPRIATE RANGE
         IF (IDTYP .GT. 1 .AND. IDTYP .LE. NDTYPE) GO TO 20
            CALL ERR(1,2,IDTYP,0,0)
            RETURN
   20    IF (IRECNO .GE. 0 .AND. IRECNO .LE. NRECS(IDTYP)) GO TO 30
            CALL ERR(3,2,IDTYP,IRECNO,0)
            RETURN
   30    IF (IFLDNO .LE. NFLDS(IDTYP)) GO TO 40
            CALL ERR(4,2,IDTYP,IRECNO,IFLDNO)
            RETURN
C
C  FUNCTION SUCCEEDED.  RETURN
   40    RETURN
         END
```

```
ISN
 1           SUBROUTINE QXREFS(IBLOCK,N1,N2,ITYPE)
       C
       C     UTILITY ROUTINE USED BY GARBAGE COLLECTOR (COLECT).  THE
       C  ROUTINE ITERATES THROUGH A BLOCK OF STORAGE IN WHICH EXTERNAL
       C  REFERENCES TO RECORD OR LISTS ARE KNOWN TO BE STORED, MARKS THE
       C  CORRESPONDING RECORDS AS BEING ACTIVE, AND STACKS ANY NEW RECORD
       C  REFERENCES ENCOUNTERED ONTO THE ACTIVE RECORD LIST.
       C
       C  INPUT PARAMETERS:
       C     IBLOCK  A BLOCK OF STORAGE CONTAINING EXTERNAL RECORD OR LIST
       C             REFERENCES ("EXTERNAL" MEANS KNOWN TO BE ACTIVE.)
       C             THE BLOCK IS VIEWED AS A FILE OF RECORDS (& AS 2-D ARRAY)
       C     N1      THE NUMBER OF FIELDS IN FILE IBLOCK.
       C     N2      NUMBER OF RECORDS IN FILE IBLOCK
       C     ITYPE   TYPE CODE INDICATING CONTENTS OF FIELDS OF IBLOCK
       C                  1 OR 2 = INTEGER OR REAL
       C                  3 = RECORD REFERENCE
       C                  4 = UNKNOWN TYPE
       C
       C
 2           COMMON /PARS/
 3           EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 4           REAL*8 DTPNAM,FIDNAM,ECRECT
 5           COMMON /PARS3/
 6           COMMON /GARCCL/
 7           LOGICAL*1 ACTIVE
       C
 8           DIMENSION IBLOCK(N1,N2),ITYPE(N1)
       C
 9           DO 30 IFLD=1,N1
10              IF (ITYPE(IFLD) .LE. 2) GO TO 30
11              DO 20 IREC=1,N2
12                 IF (IBLOCK(IFLD,IREC) .LT. 1000000000 .OR. IBLOCK(IFLD,IREC)
            +         .GT. 1009999999) GO TO 20
13                 CALL PARSRF(IBLOCK(IFLD,IREC),IDTYP,IRECNO,IDUM)
```

UTILITIES -   QXREFS SUBROUTINE

```
ISN
     C  SKIP NON-COLLECTABLE REFERENCES
14              IF (IDTYP .GE. LSITE .AND. IDTYP .LE. LWIND) GO TO 20
     C  SKIP OVER NON-COLLECTABLE RECORDS IN PARTIALLY COLLECTABLE FILES
15              IF (IDTYP .GE. LHEAP .AND. IDTYP .LE. LACTD .AND.
          +        IRECNO .LE. NRECSO(IDTYP)) GO TO 20
     C  COMPUTE THE INDEX OF THE RECORD MARKER
16              IR = IRCOFF(IDTYP) + IRECNO
17              NGAP = IRCOFF(LHEAP) - IRCOFF(LSITE)
18              IF (IDTYP .GE. LHEAP) IR = IR - NGAP
     C  CHECK TO SEE IF ALREADY ACTIVE
19              IF(ACTIVE(IR)) GO TO 20
     C  MARK THE RECORD ACTIVE
20              ACTIVE(IR) = .TRUE.
     C  APPEND A REFERENCE TO THE RECORD TO THE STACK
21              IQ = IQ + 1
22              IF (IQ .GT. NSTACK) CALL ERR(23,17,IQ,0,0)
23              IRECQ(IQ) = IBLOCK(IFLD,IREC)
24   20         CONTINUE
25   30      CONTINUE
26        RETURN
27        END
```

```
ISN
          SUBROUTINE REPORT(IPLARF,LUNO)
    C ... SUBROUTINE TO PRINT A PLAYER SUMMARY FOR IPLARF ON
    C     LUNO.  SUMMARY IS IN SENTENCE FORM INDICATING PLAYER
    C     NUMBER, CURRENT LOCATION, ACTIVITY, ANY SENSORS
    C     TRIPPED AND ANY CHANGE IN PHYSICAL STATUS.
          COMMON /STATEV/
          DIMENSION ITEM(41900),DITEM(41900)
          EQUIVALENCE (DTEIN,ITEM(1),DITEM(1))
          COMMON /PARS/
          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
          REAL*8 CTPNAM,FLDNAM,FCBECT
          COMMON /PARS1/
          COMMON /PARS2/
          COMMON /PARS3/
          COMMON /RECREF/
          DIMENSION RECRFQ(140)
          EQUIVALENCE (RECRFQ(1),IGOALS)
          REAL*8 STATUS(4),BUF(14)
          DATA STATUS/'KILLED','CAPTURED','WOUNDED','WHOLE'/
    C
     1000 FORMAT(' PN',I3,' (',A2,I3,') SUPPRESSED')
     1001 FORMAT(' PN',I3,' (',A2,I3,') CAPTURING ',A2,I3)
     1002 FORMAT(' PN',I3,' (',A2,I3,') SURRENDURING TO ',A2,I3)
     1003 FORMAT(' PN',I3,' (',A2,I3,') MOVING TO ',A2,I3)
     1004 FORMAT(' PN',I3,' (',A2,I3,') FIRING AT ',A2,I3)
     1005 FORMAT(' PN',I3,' (',A2,I3,') OBSERVING')
     1006 FORMAT('TRIES ALARM',I3,' AT ',A2,I3)
     1008 FORMAT(9A8)
     1009 FORMAT(6X,14A8)
     1010 FORMAT('  SEES: ',8A8,/,8X,6A8)
     1011 FORMAT('  SEES:  ',A2,I4)
    C
    C ... DETERMINE PLAYER ACTIVITIES
    C
          IBUF = 5
```

```
ISN
28            IACTYP = 0
29            IACTRF = NULL
30            ICAPRF = NULL
31            IACLIS = IVAL(JACTIV,IPLARF)
32            IREF = IFIRST(IACLIS,IPTR)
33         10 IF(IREF .EQ. NULL) GO TO 20
34               IF(IVAL(JTYPE,IREF) .EQ. KCAPNG) GO TO 12
35               IACTYP = IVAL(JTYPE,IREF)
36               IACTRF = IREF
37               GO TO 14
      C
      C ... INVOLVED IN CAPTURE
38         12    ICAPRF = IREF
39         14 IREF = NEXT(IACLIS,IPTR)
40            GO TO 10
      C
      C ... PRINT ACTIVITY PORTION OF OUTPUT LINE
      C
41         20 LOCREF = IVAL(JLOCN,IPLARF)
42            IREF = IVAL(JPLACE,LOCREF)
43            CALL PARSRF(IREF,ILOC,ILOCN,IDUM)
44            IF(IACTYP .GT. 0) GO TO (40,60,80),IACTYP
45            IF(ICAPRF .NE. NULL) GO TO 30
      C
      C ... PLAYER SUPPRESSED
46            WRITE(99,1000) IPLAYR,DTPABR(ILOC),ILOCN
47            GO TO 100
      C
      C ... PRINT BUFFER
48         25 READ(99,1008) (BUF(I),I=1,9)
49            WRITE(LUNO,1008) (BUF(I),I=1,9)
      C
      C ... PLAYER MAKING CAPTURE
50         30 IF(IVAL(JDOER,ICAPRF) .NE. IPLARF) GO TO 35
51            IREF = IVAL(JPAR1,ICAPRF)
52            CALL PARSRF(IREF,ID,INUM,IDUM)
```

```
ISN
53            WRITE(99,1001) IPLAYR,DTPABR(ILOC),ILOCN,DTPABR(ID),INUM
54            GO TO 100
        C
        C ... PLAYER BEING CAPTURED
55         35 IREF = IVAL(JDCER,ICAPRF)
56            CALL PARSRF(IREF,ID,INUM,IDUM)
57            WRITE(99,1002) IPLAYR,DTPABR(ILOC),ILOCN,DTPABR(ID),INUM
58            GO TO 100
        C
        C ... PLAYER MOVING
59         40 IREF = IVAL(JPAR1,IACTRF)
60            CALL PARSRF(IREF,ID,INUM,IDUM)
61            WRITE(99,1003) IPLAYR,DTPABR(ILOC),ILOCN,DTPABR(ID),INUM
62            IF(ICAPRF .NE. NULL) GO TO 25
63            GO TO 100
        C
        C ... PLAYER FIRING
64         60 IREF = IVAL(JPAR1,IACTRF)
65            CALL PARSRF(IREF,ID,INUM,IDUM)
66            WRITE(99,1004) IPLAYR,DTPABR(ILOC),ILOCN,DTPABR(ID),INUM
67            IF(ICAPRF .NE. NULL) GO TO 25
68            GO TO 100
        C
        C ... PLAYER OBSERVING
69         80 WRITE(99,1005) IPLAYR,DTPABR(ILOC),ILOCN
70            IF(ICAPRF .NE. NULL) GO TO 25
        C
        C ... SEE IF PLAYER TRIPPED A BINARY SENSOR
        C
71        100 READ(99,1008) (BUF(I),I=1,9)
72            DO 110 I=1,2
73            ION = LSERCH(IBNOBS(I),NULL,LMESS,JSUBJ,IPLARF)
74            IF(ION .NE. NULL) GO TO 130
75        110 CONTINUE
76            GO TO 150
        C
```

UTILITIES - REPORT SUBROUTINE

```
ISN
      C ... PRINT SENSOR TRIP MESSAGE
 77     130 ISENRF = IVAL(JSOURC,ICN)
 78         ILOCRF = IVAL(JCONT,ICN)
 79         CALL FABSRF(ISENRF,ID,I,IDUM)
 80         IREF = IVAL(JPLACE,ILOCRF)
 81         CALL FABSRF(IREF,ID,INUM,IDUM)
 82         WRITE(99,1006) I,DTPAER(ID),INUM
 83         READ(99,1008)  (BUF(I),I=6,8)
 84         IBUF = 8
      C
      C ... CHECK FOR PHYSICAL STATUS CHANGE
      C
 85     150 I1 = IVAL(JPSTAT,IPLARF)
 86         IF(I1 .EQ. KDEAD) GO TO 160
 87         ILIS = IVAL(JPRCPS,IPLARF)
 88         ICN = LSERCH(ILIS,NULL,IPERCP,JID,IPLARF)
 89         IF(ION .EQ. NULL) GO TO 170
 90         IREF = IVAL(JVIEW,ION)
 91         I2 = IVAL(JPSTAT,IREF)
 92         IF(I1 .GE. I2) GO TO 170
      C
      C ... PRINT NEW PHYSICAL STATUS
 93     160 BUF(9) = STATUS(I1)
 94         IBUF = 9
      C
      C ... PRINT BUFFER
 95     170 WRITE(LUNO,1008)  (BUF(I),I=1,IBUF)
      C
      C
      C ... PRINT LIST OF OBJECTS OBSERVED
 96         LISOB=IOBSV(IPLAYR)
 97         IF(LISOB .EQ. NULL) GO TO 200
 98         CALL FABSRF(LISOB,IDTYP,IRECNO,IDUM)
 99         IF (IDTYP .NE. LLIST) GO TO 180
100         CALL OUTLIS(IOBSV(IPLAYR),99)
101         NN = ICOUNT(IOBSV(IPLAYR),INULL)
```

```
 ISN
102          READ(99,1009) (BUF(I),I=1,NN)
103          WRITE(LUNO,1010) (BUF(I),I=1,NN)
104          GO TO 200
      C
      C ... OBSERVATION IS SINGLE RECORD, NOT LIST
      C
105      180 WRITE(LUNO,1011) DTPAER(IDTYP),IRECNO
      C
      C ... TERMINATION
106      200 RETURN
107          END
```

UTILITIES - VAL FUNCTION

```
ISN
 1          FUNCTION VAL(IFLDNO,IRECRF)
      C
      C     FUNCTION TO RETURN THE VALUE REFERRED TO BY A FIELD INDEX AND
      C   RECORD REFERENCE.  IF ANY ERRORS ARE DETECTED IN THE ARGUMENTS
      C   TO THE FUNCTION, A NULL VALUE IS RETURNED INSTEAD.
      C
      C   INPUT PARAMETERS:
      C     IFLDNO    FIELD INDEX
      C     IRECRF    RECORD REFERENCE
      C
 2          COMMON /STATEV/
 3          DIMENSION ITEM(41900),DITEM(41900)
 4          EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5          COMMON /PARS/
 6          EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7          REAL*8 DTPNAM,FLDNAM,FCROOT
      C
 8          VAL = FNULL
      C   BREAK RECORD REFERENCE INTO ITS COMPONENTS
 9          CALL PARSRF(IRECRF,IDTYP,IRECNO,IDUM)
      C   CHECK THAT THE FIELD INDEX SPECIFIED HAS A LEGAL VALUE
10          IF (IFLDNO .GE. 1 .AND. IFLDNO .LE. NFLDS(IDTYP)) GO TO 10
11             CALL ERR(4,4,IDTYP,IRECNO,IFLDNO)
12             RETURN
      C   COMPUTE THE STORAGE LOCATION OFFSET
13     10   IR = IDTOFF(IDTYP) + (IRECNO-1)*NFLDS(IDTYP) + IFLDNO
      C   RETURN THE VALUE STORED AT THIS LOCATION
14          VAL = DITEM(IR)
15          RETURN
16          END
```

UTILITIES - VAL1 FUNCTION

```
ISN
 1             FUNCTION VAL1(IFLDRF)
      C
      C        FUNCTION TO RETURN THE VALUE REFERRED TO BY A FIELD
      C     REFERENCE.
      C
      C     INPUT PARAMETERS:
      C        IFLDRF   FIELD REFERENCE
      C
 2             COMMON /STATEV/
 3             DIMENSION ITEM(41900),DITEM(41900)
 4             EQUIVALENCE (DTMIN,ITEM(1),DITEM(1))
 5             COMMON /PARS/
 6             EQUIVALENCE (FNULL,NULL),(IFAIL,FAIL)
 7             REAL*8 DTPNAM,FLDNAM,FORMCT
      C
      C     BREAK RECORD REFERENCE INTO ITS COMPONENTS
 8             CALL PARSRF(IFLDRF,IDTYP,IRECNO,IFLDNO)
      C     COMPUTE THE STORAGE LOCATION OFFSET
 9    10       IR = IDTOFF(IDTYP) + (IRECNO-1)*NFLDS(IDTYP) + IFLDNO
      C     RETURN THE VALUE STORED AT THIS LOCATION
10             VAL1 = DITEM(IR)
11             RETURN
12             END
```

8.0 EXAMPLE INPUT FILE LISTINGS

This chapter presents example input file listings for the Plex Preprocessor and the Data Preprocessor. The chapter is organized into two sections corresponding to those modules. The inputs to the Fixed Site Neutralization Model are largely binary, as prepared by these programs. Consequently, a display of such inputs would be uninformative and is omitted. Examples of all other input files are shown.

8.1 Plex Preprocessor

This subsection displays excerpts from sample input files to the Plex Preprocessor. In particular, exhibit 8-1 shows an example RECDESCRIP file; exhibit 8-2, a RECDATA file; and exhibit 8-3, an RFDATA file. These files are input from logical devices numbered 3, 4, and 5, respectively.

Fields showing the optional minimum, maximum, and default fields in file RECDESCRIP are not shown in exhibit 8-1. These are described in subsection 3.2.1. All other portions of the file are shown, including comment records. The lines listed in exhibits 8-2 and 8-3 are excerpts from a sample data file that does not purport to represent an existing site and/or scenario. Any omitted lines or records occur between parts of these exhibits.

The plex data structure is discussed at length in chapter 3, located in volume I of this manual. The RECDESCRIP file is the subject of subsection 3.2.1; RECDATA and RFDATA, subsection 3.2.2.

EXHIBIT 8-1: EXAMPLE RECDESCRIP FILE (Part 1 of 10)

```
*        1         2         3         4         5         6
*234567890123456789012345678901234567890123456789012345678901234567
*
*
*
*     SUMMARY OF RECORD TYPES
*
*  UTILITY
*     LIST NODE                     LLIST      2
*     LOCATION                      LLOCH      3
*     CHANGE                        LCHNG      4
*  SITE DESCRIPTION
*     ORGANIZATIONAL
*        SITE                       LSITE      5
*        BUILDING                   LBLDG      6
*        FLOOR                      LFLOOR     7
*     BARRIER                       LBARR      8
*     REGION
*        YARD                       LYARD      9
*        ROOM                       LROOM      10
*        HALL                       LHALL      11
*        ROOF                       LROOF      12
*     STAIRS                        LSTAIR     13
*     PORTAL
*        DOOR                       LDOOR      14
*        WINDOW                     LWIND      15
*  PHYSICAL OBJECTS
*     WEAPON                        LWEAP      16
*     EQUIPMENT                     LEQUIP     17
*     VEHICLE                       LVEHIC     18
*     PERSON                        LPERSN     19
*     SENSOR                        LSENS      20
*     ACTIVATED DELAY               LACTD      21
*  CONNET                           LCONNT     22
*  INTANGIBLE CONSTRUCTS
*     PERCEPT                       LPERCP     23
*     MESSAGE                       LMESS      24
*     ACTION                        LACTN      25
*     RELATION                      LRELN      26
*  GROUP                            LGROUP     27
*  GOAL NODE                        LGOAL      28
*  NODE-OF-IMPACT                   LINODE     29
*  FORCE                            LFORCE     30
*
*
LIST NODE          *
   NEXT                             JNXT       1      I
   VALUE                            JVAL       2      RC
```

EXHIBIT 8-1: EXAMPLE RECDESCRIP FILE (Part 2 of 10)

```
LOCATION                   LC
   SOURCE                            JSOURC      1     YD,RM,HL,RF,ST,DR,WI
   SINK                              JSINK       2     YD,RM,HL,RF,ST,DR,WI
   FRAC                              JFRAC       3     R
   PLACE                             JPLACE      4     YD,RM,HL,RF,ST,DR,WI,VE
CHANGE                     CH
   NEXT                              JNXT        1     I
   SUBJECT                           JSUBJ       2     RC
   ATTRIBUTE                         JATTR       3     I
   NEW VALUE                         JNVAL       4     -
*
**  SITE DESCRIPTION RECORDS
*
SITE                       SI
   CONTAINED BUILDINGS               JBLDGS      1     BD
   CONTAINED YARDS                   JYARDS      2     YD
   CONTAINED BARRIERS                JCBARS      3     BR
   GUARDS                            JGARDS      4     PN
   ADVERSARIES                       JADVRS      5     PN
   VEHICLES                          JVEHS       6     VE
   ENVIRONMENT  (XYZ)                JENVIR      7     I
      LIGHTING          (X)
      *  DARK                        KDARK       1
      *  LIGHT                       KLIGHT      2
      NOISE LEVEL       (Y)
      *  QUIET                       KQUIET      1
      *  MODERATE NOISE              KMODNS      2
      *  NOISY                       KNOISY      3
      CHEMICAL ENVIRON  (Z)
      *  CLEAN AIR                   KCLEAN      1
      *  TEAR GAS                    KTGAS       2
      *  NERVE GAS                   KNGAS       3
   XLEN                              JXLEN       8     R
   YLEN                              JYLEN       9     R
   ZLEN                              JZLEN       10    R
BUILDING                   BD
   XCOORD                            JXCO        1     R
   YCOORD                            JYCO        2     R
   ZCOORD                            JZCO        3     R
   CONTAINED FLOORS                  JFLRS       4     FL
   CONTAINED WALLS                   JWALLS      5     BR
   CONTAINED ROOFS                   JROOFS      6     RF
   ENVIRONMENT  (XYZ)                JENVIR      7     I
   XLEN                              JXLEN       8     R
   YLEN                              JYLEN       9     R
   ZLEN                              JZLEN       10    R
```

EXHIBIT 8-1: EXAMPLE RECDESCRIP FILE (Part 3 of 10)

```
FLOOR                  FL
   XCOORD                          JXCO        1      R
   YCOORD                          JYCO        2      R
   ZCOORD                          JZCO        3      R
   CONTAINED ROOMS                 JROOMS      4      RM
   CONTAINED HALLS                 JHALLS      5      HL
   CONTAINED STAIRS                JSTARS      6      ST
   ENVIRONMENT  (XYZ)              JENVIR      7      I
   XLEN                            JXLEN       8      R
   YLEN                            JYLEN       9      R
   ZLEN                            JZLEN       10     R
   PENETRABILITY                   JPEN        11     I
   CONTAINING BUILDINGS            JCBDGS      12     BD
BARRIER                BR
   XCOORD1                         JXCO1       1      R
   YCOORD1                         JYCO1       2      R
   XCOORD2                         JXCO2       3      R
   YCOORD2                         JYCO2       4      R
   SENSORS                         JSENS       5      SN
   ADJACENT BARRIERS               JBARRS      8      BR
   CONTAINED PORTALS               JPORTS      9      DR,WI
   HEIGHT                          JHIGH       10     R
   PENETRABILITY                   JPEN        11     I
   VISIBILITY                      JVIS        12     I
*
*  REGIONS
*
YARD                   YD
   XCOORD                          JXCO        1      R
   YCOORD                          JYCO        2      R
   ZCOORD                          JZCO        3      R
   CONTENTS                        JCONTS      4      PN,VE,HP,EQ
   SENSORS                         JSENS       5      SN
   NEIGHBORS                       JNBRS       6      YD,RM,HL,RF,ST,DR,WI
   ENVIRONMENT  (XYZ)              JENVIR      7      I
   BARRIERS                        JBARRS      8      BR
   LINE OF SIGHT                   JLOS        10     YD,RM,HL,RF,ST,DR,WI
   COVER                           JCOV        11     R
   COVER, QUADRANT 1               JCOV1       12     R
   COVER, QUADRANT 2               JCOV2       13     R
   COVER, QUADRANT 3               JCOV3       14     R
   COVER, QUADRANT 4               JCOV4       15     R
```

EXHIBIT 8-1: EXAMPLE RECDESCRIP FILE (Part 4 of 10)

ROOM	RM			
XCOORD		JXCO	1	R
YCOORD		JYCO	2	R
ZCOORD		JZCO	3	R
CONTENTS		JCONTS	4	PN,VE,WP,EQ,AD
SENSORS		JSENS	5	SN
NEIGHBORS		JNBRS	6	YD,RM,HL,RF,ST,DR,WI
ENVIRONMENT (XYZ)		JENVIR	7	I
XLEN		JXLEN	8	R
YLEN		JYLEN	9	R
LINE OF SIGHT		JLOS	10	YD,RM,HL,RF,ST,DR,WI
COVER		JCOV	11	R
ROOM ACCESS		JRMACC	12	I
CONTAINING FLOOR		JFLOOR	13	FL
HALL	HL			
XCOORD		JXCO	1	R
YCOORD		JYCO	2	R
ZCOORD		JZCO	3	R
CONTENTS		JCONTS	4	PN,VE,WP,EQ,AD
SENSORS		JSENS	5	SN
NEIGHBORS		JNBRS	6	DR,WI,ST
ENVIRONMENT (XYZ)		JENVIR	7	I
XLEN		JXLEN	8	R
YLEN		JYLEN	9	R
LINE OF SIGHT		JLOS	10	YD,RM,HL,RF,ST,DR,WI
COVER		JCOV	11	R
ROOM ACCESS		JRMACC	12	I
CONTAINING FLOOR		JFLOOR	13	FL
ROOF	RF			
XCOORD		JXCO	1	R
YCOORD		JYCO	2	R
ZCOORD		JZCO	3	R
CONTENTS		JCONTS	4	PN,VE,WP,EQ
SENSORS		JSENS	5	SN
NEIGHBORS		JNBRS	6	DR,WI,ST,YD,RF
ENVIRONMENT (XYZ)		JENVIR	7	I
XLEN		JXLEN	8	R
YLEN		JYLEN	9	R
LINE OF SIGHT		JLOS	10	YD,RM,HL,RF,ST,DR,WI
PENETRABILITY		JPEN	11	I

EXHIBIT 8-1: EXAMPLE RECDESCRIP FILE (Part 5 of 10)

```
*
STAIRS                  ST
   XCOORD                         JXCO       1      R
   YCOORD                         JYCO       2      R
   ZCOORD                         JZCO       3      R
   CONTENTS                       JCONTS     4      PN,VE,WP,EQ
   SENSORS                        JSENS      5      SN
   NEIGHBORS                      JNBRS      6      DR,WI,ST,RM,HL,YD,RF
   ENVIRONMENT  (XYZ)             JENVIR     7      I
   STAIRS                         JSTAIR     8      ST
   INCIDIENT FLOOR                JINFLR     9      FL
   LINE OF SIGHT                  JLOS       10     YD,RM,HL,RF,ST,DR,WI
*
***   PORTALS
*
DOOR                    DR
   XCOORD                         JXCO       1      R
   YCOORD                         JYCO       2      R
   ZCOORD                         JZCO       3      R
   CONTENTS                       JCONTS     4      PN,VE,WP,EQ
   SENSORS                        JSENS      5      SN
   NEIGHBORS                      JNBRS      6      YD,RM,HL,RF,ST,DR,WI
   ENVIRONMENT  (XYZ)             JENVIR     7      I
   STATUS                         JSTAT      8      I
      DESTROYED                   KDESTR     1
      OPEN                        KOPEN      2
      CLOSED                      KCLOSD     3
      LOCKED                      KLOCKD     4
      SECURED                     KSECUR     5
   LOCKABILITY                    JLOCK      9      I
      NOT LOCKABLE                KNLOCK     1
      LOCKABLE WITH KEY           KKEYLK     2
      LOCKABLE WITHOUT KEY        KNKYLK     3
   LINE OF SIGHT                  JLOS       10     YD,RM,HL,RF,ST,DR,WI
   PENETRABILITY                  JPEN       11     I
      FREE AIR                    KAIR       1
      1 CM GLASS                  KGLASS     2
      .5 CM WIRE                  KWIRE      3
      3 CM WOOD                   KWOOD      4
      2 CM STEEL BARS             KBARS      5
      10 CM INSIDE WALL           KWALL      6
      16 CM MASONRY               KBRICK     7
      4 CM STEEL                  KSTEEL     8
      4 CM STEEL + BRICK          KLAMIN     9
   VISIBILITY                     JVIS       12     I
      PERMANENTLY OPAQUE          KPOPAQ     1
      TEMPORARILY OPAQUE          KTOPAQ     2
      TRANSPARENT                 KTRANP     3
   DOOR ACCESS                    JDRACC     13     I
   HORIZONTAL                     JHORIZ     14     R
   VERTICAL                       JVERT      15     R
   PORTAL                         JPORT      16     DR
   BARRIER CONTAINED IN           JBARIN     17     BR
```

EXHIBIT 8-1: EXAMPLE RECDESCRIP FILE (Part 6 of 10)

```
WINDOW               WI
   XCOORD                      JXCO       1     R
   YCOORD                      JYCO       2     R
   ZCOORD                      JZCO       3     R
   CONTENTS                    JCONTS     4     PN,VE,WP,EQ
   SENSORS                     JSENS      5     SN
   NEIGHBORS                   JNBRS      6     YD,RM,HL,RF,ST,DR,WI
   ENVIRONMENT  (XYZ)          JENVIR     7     I
   STATUS                      JSTAT      8     I
   LOCKABILITY                 JLOCK      9     I
   LINE OF SIGHT               JLOS       10    YD,RM,HL,RF,ST,DR,WI
   PENETRABILITY               JPEN       11    I
   VISIBILITY                  JVIS       12    I
   DOOR ACCESS                 JDRACC     13    I
   HORIZONTAL                  JHORIZ     14    R
   VERTICAL                    JVERT      15    R
   PORTAL                      JPORT      16    DR
*
*  PHYSICAL OBJECTS
*
WEAPON               WP
   TYPE                        JTYPE      1     I
      PISTOL                   KPISTL     1
      RIFLE                    KRIFLE     2
      MACHINE GUN              KMCGUN     3
      LAW                      KLAW       4
      GRENADE                  KGRNAD     5
      TEAR GAS                 KTRGAS     6
      NERVE GAS                KNVGAS     7
   AMMO OR EXPLOSIVE AMOUNT    JAMT       2     I
EQUIPMENT            EQ
   TYPE                        JTYPE      1     I
      KEY                      KKEY       1
      SCALING EQUIP            KSCALR     2
      SNM                      KSNM       3
      BULLET PROOF VEST        KVEST      4
      GAS MASK                 KGMASK     5
   PARAMETER                   JPAR       2     I
```

EXHIBIT 8-1: EXAMPLE RECDESCRIP FILE (Part 7 of 10)

```
VEHICLE              VE
   TYPE                              JTYPE      1    I
      CAR                            KCAR       1
      TRUCK                          KTRUCK     2
      APC                            KAPC       3
      HELICOPTER                     KHEL       4
   PHYSICAL STATUS                   JPSTAT     2    I
      DESTROYED                      KDESTR     1
      IMMOBILIZED                    KIMMOB     2
      OPERATIONAL                    KOPERL     3
   LOCATION                          JLOCN      3    LC
   CONTENTS                          JCONTS     4    PN,WP,EQ
   OWNER                             JOWNER     5    I
      SECURITY FORCE                 KSFE       1
      ADVERSARY                      KAFE       2
   VELOCITY                          JVEL       6    R
   DRIVER                            JDRIVR     7    PN
PERSON               PN
   TYPE                              JTYPE      1    I
      WORKER                         KWORKR     1
      SENSOR MONITOR                 KSNMON     2
      COMBATANT                      KCOMBT     3
   PHYSICAL STATUS                   JPSTAT     2    I
      DEAD                           KDEAD      1
      CAPTURED                       KCAPTR     2
      WOUNDED                        KWOUND     3
      WHOLE                          KWHOLE     4
   LOCATION                          JLOCN      3    LC
   ALLEGIANCE                        JALLEG     4    I
      SECURITY FORCE ELEMENT         KSFE       1
      ADVERSARY                      KAFE       2
   CREDENTIALS                       JCRED      5    I
      AFE WITH FORGED CRED           KCRED1     1
      SFE WORKER OR GUARD            KCRED2     2
      ACCESS TO RESTR AREAS          KCRED3     3
   SITUATION                         JSITN      6    I
*   FOR AFE:
      PRE-INTRUSION                  KSITN1     1
      SELF UNDISCOVERED              KSITN2     2
      NOT YET ACTIVE ENGAG           KSITN3     3
      ENGAGEMENT                     KSITN4     4
*   FOR SFE:
      NO KNOWN PROBLEM               KSITN1     1
      ALERT, UNRESOLVED              KSITN2     2
      NOT INVOLV IN ENGAG            KSITN3     3
      ENGAGED                        KSITN4     4
   SUPPRESSION                       JSUPRN     7    R
   POSTURE                           JPOSTR     8    R
   WEAPONS & EQUIPMENT               JWEAPS     9    WP,EQ
   LEADER                            JLEADR     10   PN
```

EXHIBIT 8-1: EXAMPLE RECDESCRIP FILE (Part 8 of 10)

```
   SUBORDINATES                 JSUBS     11   PN
   COMMO NETS                   JCMNTS    12   CN
   PERCEPTIONS                  JPRCPS    13   PC
   ACTIVITY TIME REQUIREMENT    JTREQ     14   R
   ACTIVITY                     JACTIV    15   AC,RM
   PLANS                        JPLANS    16   AC,RM
   SOPS                         JSOPS     17   RM,AC
   FORCE BELONG TO              JFORCE    18   FR
*    (PREVIOUSLY FIELD WAS "JACSON")
*
SENSOR              SN
   TYPE OF SENSOR               JTYPE     1    I
      EXPLOSIVE SENSOR          KXPLSN    1
      METAL SENSOR              KMETSN    2
      RADIOACTIVITY SENSOR      KSNMSN    3
      PORTAL STATUS SENSOR      KPORSN    4
      PERSON, VEHICLE SENS1     KPV1SN    5
      PERSON, VEHICLE SENS2     KPV2SN    6
      CREDENTIALS SENSOR        KCRDSN    7
   PHYSICAL STATUS              JPSTAT    2    I
      DESTROYED                 KDESTR    1
      TRIPPED                   KTRIPD    2
      OPERATIONAL               KOPERL    3
   LOCATION                     JLOCN     3    LC
   COVERAGE                     JCOVRG    4    YD,RM,HL,RF,ST,DE,MI
   IN COMMUNICATION WITH        JINCOM    5    RM
   TYPE OF REPORT               JRTYPE    6    I
      BINARY, FLEETING          KBINFL    1
      BINARY, RECORDING         KBINRC    2
      PICTURE, FLEETING         KPICFL    3
      PICTURE, RECORDING        KPICRC    4
ACTIVATED DELAY     AD
   TYPE                         JTYPE     1    I
      DOOR LOCKER               KLOCKR    1
      SENSOR ACTIVATOR          KSENAC    2
   PHYSICAL STATUS              JPSTAT    2    I
      DESTROYED                 KDESTR    1
      OPERATIONAL               KOPERL    3
   LOCATION                     JLOCN     3    LC
   COVERAGE                     JCOVRG    4    DE,SN
```

EXHIBIT 8-1: EXAMPLE RECDESCRIP FILE (Part 9 of 10)

```
*
COMNET              CN
   TYPE                              JTYPE      1     I
      PHONE                          KPHONE     1
      CB RADIO                       KRADIO     2
      CB RADIO2                      KRADO2     3
      FREE VOICE                     KVOICE     4
      VISUAL SIGNALS                 KSIGNL     5
      ALARM OR SIREN                 KALARM     6
      LOUDSPEAKER                    KLSPKR     7
   RECIPIENTS                        JRCVRS     2     PN
   MESSAGES                          JMESS      3     MS
*
*
*  INTANGIBLE CONSTRUCTS
*
PERCEPT             PC
   IDENTIFICATION                    JID        1     PN,VE,SN,
   CURRENT VIEW                      JVIEW      2     PN,VE,SN,
   HISTORY                           JHIST      3     MS
   TIME UPDATED                      JTIME      4     R
MESSAGE             MS
   SOURCE                            JSOURC     1     PN,SN
   SUBJECT                           JSUBJ      2     PN,VE,SN,
   ATTRIBUTE                         JATTR      3     I
   TIME                              JTIME      4     R
   CONTENT                           JCONT      5     -
ACTION              AC
   TYPE                              JTYPE      1     I
   PAR1                              JPAR1      2     -
   PAR2                              JPAR2      3     -
   PAR3                              JPAR3      4     -
   MODIFIERS                         JMODS      5     RN
   DOER                              JDOER      6     PN,VE,SN,EF
RELATION            RN
   TYPE                              JTYPE      1     I
   PAR1                              JPAR1      2     -
   PAR2                              JPAR2      3     -
*
GROUP               GP
   TYPE                              JTYPE      1     I
   NUMBER                            JNUM       2     I
   ELEMENTS                          JELEMS     3     RC
   PROPERTIES                        JPROPS     4     RC
```

EXHIBIT 8-1: EXAMPLE RECDESCRIP FILE (Part 10 of 10)

```
*
GOAL NODE                GL
   IDENTIFICATION                  JID        1    RM,YD,RF,HL
   SUCCESSORS                      JSUCRS     2    GL
   TIME OF CONTROL REQT            JTIMRQ     3    R
   TIME OF CONTROL SO FAR          JTIM       4    R
   EQUIPMENT REQUIREMENTS          JEQPRQ     5    EQ
   ADVERSARY REQUIREMENTS          JADVRQ     6    I
*
NODE-OF-IMPACT           NI
   NODE ID                         JID        1    RM,HL,YD,RF,ST,DR,NI
   PARAMETER 1                     JPAR1      2    R
   PARAMETER 2                     JPAR2      3    R
   PLAYER ID AT NODE               JCONTS     4    PN,VE,EQ,WP
   NOISE GENERATED                 JNSGEN     5    I
      QUIET                        KQUIET     1
      MODERATE                     KMODNS     2
      NOISY                        KNOISY     3
FORCE                    FR
   TYPE                            JTYPE      1    I
      FIRST ECHELON                KECH1      1
      SECOND ECHELON               KECH2      2
      THIRD ECHELON                KECH3      3
   ALLEGIANCE                      JFALFG     2    I
   LEADER                          JFLDR      3    PN
   CONTENTS                        JCONTS     4    PN,VE
   STATUS                          JFSTAT     5    R
*     (FRACTION EFFECTIVE PERSONNEL)
   SITUATION                       JSITN      6    I
*   FOR AFE:
      PRE-INTRUSION                KSITN1     1
      FORCE UNDETECTED             KSITN2     2
*     FORCE DETECTED:
      *   NOT YET ENGAGED          KSITN3     3
      *   ENGAGED                  KSITN4     4
      MAIN GOAL REACHED            KSITN5     5
*   FOR SFE:
      NO KNOWN THREAT              KSITN1     1
*     ALERTED, RESOLVING BY:
      *  ANOTHER FORCE             KSITN2     2
      *  SELF                      KSITN3     3
*     AFE DETECTED:
      *  SELF UNENGAGED            KSITN4     4
      *  SELF ENGAGED              KSITN5     5
   PLANS                           JFPLNS     7    AC,PN
   SOPS                            JFSOPS     8    AC,PN
```

EXHIBIT 8-2: SAMPLE EXCERPTS FROM THE RECDATA FILE (Part 1 of 3)

(I4,2X,3(F6.2,2X),3(A2,I4,2X),I5,5X,2(A2,I4,2X),5(F6.2,2X))

YARD ID	XCOORD	YCOORD	ZCOORD	CONTENT	SENSOR	HEIGHT	ENVIRON	BARRIER	LOS	COVER	QUAD1	QUAD2	QUAD3	QUAD4
1	199.5	159.0	0.0			YD 2		BR 15		0.1	0.1	0.1	0.1	0.1
2	193.5	163.5	0.0	# 38		# 39		BR 15		0.1	0.1	0.1	0.1	0.1
4	30.0	150.0	0.0			# 40				0.1	0.1	0.1	0.1	0.1
5	60.0	150.0	0.0			# 41				0.1	0.1	0.1	0.1	0.1
6	90.0	150.0	0.0			# 42				0.1	0.1	0.1	0.1	0.1
7	120.0	150.0	0.0			# 43				0.1	0.1	0.1	0.1	0.1
8	150.0	150.0	0.0			# 44				0.1	0.1	0.1	0.1	0.1
9	180.0	150.0	0.0			# 45				0.1	0.1	0.1	0.1	0.1
10	30.0	120.0	0.0			# 46				0.1	0.1	0.1	0.1	0.1
11	60.0	120.0	0.0			# 47				0.1	0.1	0.1	0.1	0.1
12	90.0	120.0	0.0			# 48				0.1	0.1	0.1	0.1	0.1
13	110.4	117.0	0.0			# 49		BR 14		0.1	0.1	0.1	0.1	0.1
14	122.1	117.0	0.0			# 50		BR 14		0.1	0.1	0.1	0.1	0.1
15	150.0	120.0	0.0			# 51				0.1	0.1	0.1	0.1	0.1
16	180.0	120.0	0.0			# 52				0.1	0.1	0.1	0.1	0.1
17	94.5	94.5	0.0			# 53		BR 8		0.1	0.1	0.1	0.1	0.1
18	94.5	97.5	0.0			# 54		# 82		0.1	0.1	0.1	0.1	0.1
19	97.5	97.5	0.0			# 55		BR 7		0.1	0.1	0.1	0.1	0.1
20	136.5	97.5	0.0			# 56		BR 7		0.1	0.1	0.1	0.1	0.1
21	139.5	97.5	0.0			# 57		# 83		0.1	0.1	0.1	0.1	0.1
22	139.5	94.5	0.0			# 58		BR 6		0.1	0.1	0.1	0.1	0.1
23	60.0	90.0	0.0			# 59				0.1	0.1	0.1	0.1	0.1
24	150.0	90.0	0.0			# 60				0.1	0.1	0.1	0.1	0.1
25	180.0	90.0	0.0			# 61				0.1	0.1	0.1	0.1	0.1
26	94.5	79.5	0.0			# 62		BR 8		0.1	0.1	0.1	0.1	0.1
27	94.5	76.5	0.0			# 63		# 84		0.1	0.1	0.1	0.1	0.1
28	97.5	76.5	0.0			# 64		BR 5		0.1	0.1	0.1	0.1	0.1
29	136.5	76.5	0.0	PN 4		# 65		BR 5		0.1	0.1	0.1	0.1	0.1
30	139.5	76.5	0.0			# 66		# 85		0.1	0.1	0.1	0.1	0.1
31	139.5	79.5	0.0			# 67		BR 6		0.1	0.1	0.1	0.1	0.1
32	30.0	60.0	0.0			# 68				0.1	0.1	0.1	0.1	0.1
33	60.0	60.0	0.0			# 69				0.1	0.1	0.1	0.1	0.1
34	95.4	64.0	0.0			# 70		BR 13		0.1	0.1	0.1	0.1	0.1
35	120.6	60.0	0.0			# 71		BR 13		0.1	0.1	0.1	0.1	0.1
36	150.0	60.0	0.0			# 72				0.1	0.1	0.1	0.1	0.1
37	180.0	60.0	0.0			# 73				0.1	0.1	0.1	0.1	0.1
38	30.0	30.0	0.0			# 74				0.1	0.1	0.1	0.1	0.1
39	60.0	30.0	0.0	PN 3		# 75				0.1	0.1	0.1	0.1	0.1
40	90.0	30.0	0.0			# 76				0.1	0.1	0.1	0.1	0.1
41	120.0	30.0	0.0			# 77				0.1	0.1	0.1	0.1	0.1
42	150.0	30.0	0.0			# 78				0.1	0.1	0.1	0.1	0.1
43	180.0	30.0	0.0			# 79				0.1	0.1	0.1	0.1	0.1
44	43.5	25.5	0.0			# 80		# 86		0.1	0.1	0.1	0.1	0.1
45	63.5	16.5	0.0			# 81		# 87		0.1	0.1	0.1	0.1	0.1
46	48.0	6.0	0.0			DR 2				0.1	0.1	0.1	0.1	0.1

EXHIBIT 8-2: SAMPLE EXCERPTS FROM THE RECDATA FILE (Part 2 of 3)

```
PERSON      (I4,2X,2(I3,5X),A2,I4,2X,3(I3,5X),2(F6.2,2X),5(A2,I4,2X),F6.2,2X,4(A2,I4,2X))
 ID   TYPE    STATUS  LOCN    ALLEG   CREDEN  SITN    SUPPRS  POSTURE EQUIP    LEADER  SUBORD  NETS     PCPTS    TIME
  ACTION  PLANS    SOPS     SUBJ TO
   1    2       4     LC    1     1       3         1                       #  101             #  109  CN    1  #  111
            AC    1
   2    3       4     LC    2     1       2         1                       #  102   PN    1            CN    1  #  112
            AC    2
   3    3       4     LC    3     1       2         1                       #  103   PN    1            CN    1  #  113
            AC    3
   4    3       4     LC    4     1       2         1                       #  104   PN    1            CN    1  #  114
            AC    4
   5    3       4     LC    5     2                 1                       #  105             #  110  CN    2  #  115
            AC    5
   6    3       4     LC    6     2                 1                       #  106   PN    5            CN    2  #  116
            AC    6
   7    3       4     LC    7     2                 1                       #  107   PN    5            CN    2  #  117
            #   263
   8    3       4     LC    8     2                 1                       #  108   PN    5            CN    2  #  118
            #   264

LIST NOD    (I4,2X,14(A2,I4,2X))
 ID   ELEM1    ELEM2    ELEM3    ELEM4    ELEM5    ELEM6    ELEM7    ELEM8    ELEM9    ELEM10   ELEM11   ELEM12   ELEM13   ELEM14
  88  DR    3  DR    4
  89  DR    5  DR    6
  90  DR    7  DR    8
  91  DR    9  DR   10
  92  DR   11  DR   12
  93  WI    1  WI    2
  95  AD    2  EQ    9  EQ   10
  96  PN    1  AD    1  AD    3  PN    2
  97  WI    2  DR    9  DR   19
  98  DR   20  DR   21
  99  DR   11  DR   22
 101  WP    1  EQ    1
 102  WP    2  EQ    2
 103  WP    3  EQ    3  EQ   11
 104  WP    4  EQ    4  EQ   12
 105  WP    5  EQ    5
 106  WP    6  EQ    6
 107  WP    7  EQ    7
 108  WP    8  WP    ?  EQ    7
 109  PN    2  PN    3  PN    4  PN    1
 110  PN    6  PN    7  PN    8  PN    5
 111  PC    1  PC    2  PC    3  PC    4
 112  PC    5  PC    6  PC    7  PC    8
 113  PC    9  PC   10  PC   11  PC   12
 114  PC   13  PC   14  PC   15  PC   16
```

EXHIBIT 8-2: SAMPLE EXCERPTS FROM THE RECDATA FILE (Part 3 of 3)

```
*
*   PLAYER DESCRIPTIONS AND ASSOCIATED RECORDS CONSTITUTING PLAYER PERCEPTIONS
PERSON      (I4,2X,2(I3,5X),A2,I4,2X,3(I3,5X),2(F6.2,2X),5(A2,I4,2X),F6.2,2X,4(A2,I4,2X))
 ID   TYPE     STATUS  LOCN     ALLEG   CREDEN  SITN     SUPPRS  POSTURE EQUIP   LEADER  SUBORD  NETS     PCPTS   TIME
  ACTION  PLANS    BOPS    SUBJ TO
  41     2        4      LC  41     1       3       1                     # 125                    CN  1

  42     2        4      LC  42     1       3       1                     # 126                    CN  1

  43     2        4      LC  43     1       3       1                     # 127                    CN  1

  12     2        4      LC  12     1       3       1                     # 128                    CN  1

  13     3        4      LC  13     1       2       1                     # 129                    CN  1

  14     3        4      LC  14     1       2       1                     # 130                    CN  1

  15     3        4      LC  15     1       2       1                     # 131                    CN  1

  16     3        4      LC  16     1       2       1                     # 132                    CN  1

  17     3        4      LC  17     1       2       1                     # 133                    CN  1

  18     3        4      LC  18     1       2       1                     # 134                    CN  1

  19     3        4      LC  19     1       2       1                     # 135                    CN  1

  20     3        4      LC  20     1       2       1                     # 136                    CN  1

  21     3        4      LC  21     1       2       1                     # 137                    CN  1

  22     3        4      LC  22     1       2       1                     # 138                    CN  1

  23     3        4      LC  23     1       2       1                     # 139                    CN  1

  24     3        4      LC  24     1       2       1                     # 140                    CN  1

  25     3        4      LC  25     2               1                     # 141                    CN  2

  26     3        4      LC  26     2               1                     # 142                    CN  2

  27     3        4      LC  27     2               1                     # 143                    CN  2

  28     3        4      LC  28     2               1                     # 144                    CN  2

  29     3        4      LC  29     2               1                     # 145                    CN  2
```

EXHIBIT 8-3: SAMPLE EXCERPTS FROM THE RFDATA FILE (Part 1 of 2)

```
SITE        (I3,3X,6(A2,I4,2X),I3,5X,3(F6.2,2X))
 ID   BLDGS    YARDS    BARRIER GUARDS  ADVER    VHCLES   ENVIRON XLEN     YLEN     ZLEN
 2                              # 232                             700.0    560.0    0.0

LIST MOD    (I4,2X,14(A2,I4,2X))
 ID   ELEM1    ELEM2    ELEM3    ELEM4    ELEM5    ELEM6    ELEM7    ELEM8    ELEM9    ELEM10   ELEM11   ELEM12   ELEM13   ELEM14
 232  PN   9   PN  10   PN  11

PERSON      (I4,2X,2(I3,5X),A2,I4,2X,3(I3,5X),2(F6.2,2X),5(A2,I4,2X),F6.2,2X,4(A2,I4,2X))
 ID   TYPE     STATUS LOCN      ALLEG    CREDEN   SITN     SUPPRS  POSTURE EQUIP    LEADER   SUBORD   WEPS     PCPTS    TIME
  ACTION  PLANS    SOPS     SUBJ TO
   9    2        4    LC   9     1        2        1                        # 233             # 234    # 235    # 236

  10    3        4    LC  10     1        2        1                        # 237    PN   9            # 238    # 239

  11    3        4    LC  11     1        2        1                        # 240    PN   9            # 241    # 242


LIST MOD    (I4,2X,14(A2,I4,2X))
 ID   ELEM1    ELEM2    ELEM3    ELEM4    ELEM5    ELEM6    ELEM7    ELEM8    ELEM9    ELEM10   ELEM11   ELEM12   ELEM13   ELEM14
 233  WP  10
 234  PN  10   PN  11   PN   9
 235  CN   1   CN   3
 236  PC  33   PC  34   PC  35
 237  WP  11   WP  12
 238  CN   1   CN   3
 239  PC  36   PC  37   PC  38
 240  WP  13   WP  14
 241  CN   1   CN   3
 242  PC  39   PC  40   PC  41

LOCATION    (I4,2X,2(A2,I4,2X),F6.2,2X,A2,I4)
 ID   SOURCE   SINK     FRAC     PLACE
   9  DR   1   DR   1   0.0      DR   1
  10  DR   1   DR   1   0.00     DR   1
  11  DR   1   DR   1   0.00     DR   1

COMNET      (I4,2X,I3,5X,2(A2,I4,2X))
 ID   TYPE     RCVRS    MSG
   3    2      # 243

WEAPON      (I4,2X,2(I3,5X))
 ID   TYPE     AMMO
  10    1       32
  11    1       32
  12    2       32
  13    1       32
  14    2       40
```

EXHIBIT 8-3: SAMPLE EXCERPTS FROM THE RFDATA FILE (Part 2 of 2)

```
*
*   PLAYER DESCRIPTIONS AND ASSOCIATED RECORDS CONSTITUTING PLAYER PERCEPTIONS
PERSON      (I4,2X,2(I3,5X),A2,I4,2X,3(I3,5X),2(F6.2,2X),5(A2,I4,2X),F5.2,2X,6(A2,I4,2X))
  ID   TYPE     STATUS  LOCN     ALLEG    CREDEN  SITN     SUPPRS  POSTURE EQUIP   LEADER  SUBORD  NETS     RCPTS    TIME
   ACTION  PLANS    SOPS     SUPJ TO
   44     2        4      LC  44    1        2       1                        # 245                     # 246

   45     2        4      LC  45    1        2       1                        # 247                     # 248

   46     2        4      LC  46    1        2       1                        # 249                     # 250

   47     2        4      LC  47    1        2       1                        # 251                     # 252

   48     3        4      LC  48    1        2       1                        # 253                     # 254

   49     3        4      LC  49    1        2       1                        # 255                     # 256

   50     3        4      LC  50    1        2       1                        # 257                     # 258

   51     3        4      LC  51    1        2       1                        # 259                     # 260

   52     3        4      LC  52    1        2       1                        # 261                     # 262

LOCATION     (I4,2X,2(A2,I4,2X),F6.2,2X,A2,I4)
  ID    SOURCE   SINK      FRAC     PLACE
   44   DR    1  DR    1  0.0      DR    1
   45   DR    1  DR    1  0.0      DR    1
   46   DR    1  DR    1  0.0      DR    1
   47   DR    1  DR    1  0.0      DR    1
   48   DR    1  DR    1  0.0      DR    1
   49   DR    1  DR    1  0.0      DR    1
   50   DR    1  DR    1  0.0      DR    1
   51   DR    1  DR    1  0.0      DR    1
   52   DR    1  DR    1  0.0      DR    1

LIST NOD     (I4,2X,14(A2,I4,2X))
  ID    ELEM1    ELEM2    ELEM3    ELEM4    ELEM5    ELEM6    ELEM7    ELEM8    ELEM9    ELEM10   ELEM11   ELEM12   ELEM13   ELEM14
  255   WP   10
  256   CN    1  CN    3
  257   WP   10
  258   CN    1  CN    3
  259   WP   10
  260   CN    1  CN    3
  261   WP   11  WP   12
  262   CN    1  CN    3
  263   WP   11  WP   12
```

8.2 Data Preprocessor

This subsection displays an example input file listing for the Data Preprocessor. The listing is displayed in its entirety in exhibit 8-4 on the following pages. These records do not purport to represent or partially represent any existing site and/or scenario. Nor are there validity claims for any of the values in the performance data.

The reader may wish to scan exhibit 8-4 while opening to chapter 5 in volume I of this manual. That chapter presents variable definitions and cross-references.

EXHIBIT 8-4: SAMPLE INPUT FILE FOR THE DATA PREPROCESSOR (Part 1 of 6)

```
ACTRAT    25          19          (10F9.0)
0.45      1.25      3.50      0.45      9.00      19.00     0.50      4.00      8.00      30.00
3.00      2.00      5.00      5.00      1.5       3.0       3.0       30.0      60.0
AREA      25                          (10F8.0)
0.015     0.1       0.3       0.09      0.01      0.01      0.01      0.001     0.1       0.5
0.25      0.06      7.0       10.0      12.0      15.0      1.0       0.05      0.35      0.05
0.05      0.05      0.05      0.05      0.05
BASLOD     7  2          5  14       (5F8.0)
26.0      60.0      100.0     2.0       4.0
COMPLA     7                          (10F9.0)
5.0       0.1       0.2       0.05      0.08      3.0       8.0
DEGVIL     7  2          5  2        (5F9.0)
0.7       0.5       0.3       0.0       0.5
0.0       0.0       0.0       0.0       0.0
DETANG     8                          (8F8.0)
0.247     0.211     0.125     0.039     0.003     0.039     0.125     0.211
DETPHI                                (F9.0)
0.32175
DETRAT     3                          (3F8.0)
1.0       2.0       2.0
DETSEN    17  7                       (17F5.0)
0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
0.5  0.5  0.5  0.5  0.5  0.5  0.5  0.5  0.5  0.5  0.0  0.0  0.5  0.5  0.5  0.5  0.0
0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.5  0.0  0.0  0.0  0.0  0.0  0.0  0.0
0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  1.0  1.0  1.0  0.0  1.0
0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.0  0.1  0.1  0.1  0.1  1.0  1.0  1.0  1.0  1.0
0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  1.0  1.0  1.0  1.0  1.0
0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  1.0
DNGDET     2  2                       (9F8.0)
0.5       0.5       0.5       0.5       0.5       0.5       0.5       0.5       0.5
0.8       0.7       0.8       0.8       0.8       0.8       0.8       0.8       0.8
DNGWEP     5  8                       (5F8.0)
0.3       0.3       0.3       0.3       0.5
0.7       0.7       0.7       0.7       0.7
0.8       0.9       0.8       0.8       0.7
0.3       0.3       0.3       0.3       0.2
0.3       0.3       0.3       0.3       0.6
0.0
0.0
```

EXHIBIT 8-4: SAMPLE INPUT FILE FOR THE DATA PREPROCESSOR (Part 2 of 6)

```
0.2      0.2      0.2      0.2      0.1
DTPLAN                             (F9.0)
1.0
DTSEC                              (F9.0)
10.0
EVALN    60                        (10F8.0)
   -50.0    -20.0     10.0    -50.0    -50.0      0.0      0.0      0.0      0.0      0.0
    60.0     40.0     40.0     60.0      0.0     40.0      0.0      0.0      0.0    100.0
    60.0     50.0     50.0     40.0     30.0     10.0      0.0     20.0      0.0    100.0
     0.0     10.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
    10.0     10.0     10.0     10.0     10.0     10.0     10.0     10.0     10.0     10.0
    30.0     20.0    100.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
HELINE     5  2                    (5F8.0)
8.0     20.0      4.0      1.0      25.0
8.0      0.0      4.0      1.0      25.0
IACTTP    25          10           (10(I3,5X))
  1        1        1        1        1        1        2        2        2        2
  2        2        2        2        2        2        2        2        2
IARMTP     4                       (10(I3,5X))
  2        2        1        2
ICOMPO     2   5  25  8            (10(I3,5X))
IFIRTP     7          5            (5(I3,5X))
  1        1        1        1        2
IRNKWP     2   2      5   7        (5(I3,5X))
  0        0        2        1        0
  3        2        1        4        5
  2        1        3        0        4
  2        1        3        0        0
  1        2        0        0        3
  1        2        0        3        4
  0        0        0        1        0
ISECAC    25          10           (10(I3,5X))
  2        2        2        2        2        1        2        2        2        1
  1        1        1        1        2        2        2        2        1
ISECPO     4  2                    (4(I3,5X))
  2        1        1        1
  2        2        1        1
LABEL     25                       (10A9)
PISTOL   RIFLE    M-60     LAW      GRENADE  NOTUSED  NOTUSED  KEY      ROPES    SVM
VEST     MASK     SEDAN    TRUCK    APC      UH-1     PERSON   SENSOR1  SENSOR2  SENSOR3
SENSOR   TV       M-WAVE   SENSOR5  LOCKER
```

EXHIBIT 8-4: SAMPLE INPUT FILE FOR THE DATA PREPROCESSOR (Part 3 of 6)

```
MINPLP    2                            (2(I3,5X))
  2       2
NORN      5                            (5(I3,5X))
  6       6        6        1          2
NOTSEC    25            19             (10(I3,5X))
  5       5        5        5          5        5        5        5        5        5
  3       3        3        3          8        9        8        0        5
PK          7  7            7  5       (7F8.0)
0.0       0.05     0.10     0.75       0.75     0.55     0.05
0.0       0.08     0.15     0.85       0.85     0.65     0.15
0.05      0.1      0.15     0.85       0.85     0.65     0.15
0.25      0.8      0.75     0.9        0.9      0.8      0.75
0.05      0.09     0.15     0.75       0.25     0.10     0.0
PORATT    31                           (7F8.0,/,2(9F8.0,/),6F8.0)
0.9       0.3      0.9      0.0        1.0      0.3      0.0
0.2       0.5      0.9      0.9        0.6      0.9      0.5      0.5      0.9
0.0       0.0      0.0      0.0        0.0      0.95     0.0      0.0      0.5
0.9       0.2      0.95     0.95       0.0      0.0
PORSPN      2  2   7        2  2  5    (4F8.0)
0.6       0.9      0.8      0.6
0.75      1.0      1.0      0.75
0.6       0.7      0.7      0.6
0.6       0.9      0.9      0.6
0.9       0.7      0.7      0.9
PORSEN      2                          (2F8.0)
0.2       0.5
PCRVEH      2  2                       (4F8.0)
0.5       0.8      0.8      0.5
POSTUR     25           19             (10F8.0)
0.5       1.0      1.0      0.5        1.0      1.0      1.0      1.0      1.0      1.0
0.2       0.2      0.6      0.2        0.2      0.2      0.2      1.0      1.0
PSIG        9  7   7        8  7  5    (8F8.0)
0.125     0.20     0.38     0.6        0.125    0.20     0.45     1.0
0.125     0.20     0.39     0.6        0.125    0.20     0.45     1.0
0.125     0.20     0.39     0.6        0.125    0.20     0.45     1.0
0.125     0.20     0.35     0.6        0.125    0.20     0.45     1.0
0.125     0.20     0.39     0.6        0.125    0.20     0.45     1.0
0.125     0.20     0.38     0.6        0.125    0.20     0.45     1.0
0.125     0.20     0.39     0.6        0.125    0.20     0.45     1.0
0.02      0.05     0.10     0.30       0.02     0.75     0.15     0.45
```

EXHIBIT 8-4: SAMPLE INPUT FILE FOR THE DATA PREPROCESSOR (Part 4 of 6)

```
0.02    0.05    0.10    0.30    0.02    0.75    0.15    0.45
0.02    0.05    0.10    0.30    0.02    0.75    0.15    0.45
0.02    0.05    0.10    0.30    0.02    0.75    0.15    0.45
0.02    0.05    0.10    0.30    0.02    0.75    0.15    0.45
0.02    0.05    0.10    0.30    0.02    0.75    0.15    0.45
0.02    0.05    0.10    0.30    0.02    0.75    0.15    0.45
0.02    0.15    0.30    1.0     0.02    0.20    0.45    1.5
0.02    0.15    0.30    1.0     0.02    0.20    0.45    1.5
0.02    0.15    0.30    1.0     0.02    0.20    0.45    1.5
0.02    0.15    0.30    1.0     0.02    0.20    0.45    1.5
0.02    0.15    0.30    1.0     0.02    0.20    0.45    1.5
0.02    0.15    0.30    1.0     0.02    0.20    0.45    1.5
0.02    0.15    0.30    1.0     0.02    0.20    0.45    1.5
1.0     1.2     1.5     1.9     1.5     1.8     2.0     2.6
1.0     1.2     1.5     1.9     1.5     1.8     2.0     2.6
1.0     1.2     1.5     1.9     1.5     1.8     2.0     2.6
1.0     1.2     1.5     1.9     1.5     1.8     2.0     2.6
1.0     1.2     1.5     1.9     1.5     1.8     2.0     2.6
1.0     1.2     1.5     1.9     1.5     1.8     2.0     2.6
1.0     1.2     1.5     1.9     1.5     1.8     2.0     2.6
1.0     2.0     4.0     7.0     1.0     2.0     5.0     9.0
1.0     2.0     4.0     7.0     1.0     2.0     5.0     9.0
1.0     2.0     4.0     7.0     1.0     2.0     5.0     9.0
1.0     2.0     4.0     7.0     1.0     2.0     5.0     9.0
1.0     2.0     4.0     7.0     1.0     2.0     5.0     9.0
1.0     2.0     4.0     7.0     1.0     2.0     5.0     9.0
1.0     2.0     4.0     7.0     1.0     2.0     5.0     9.0
PWDIMIN  7   -        -  5       (7F8.0)
0.01    0.15    0.80    0.95    0.95    0.95    0.10
0.02    0.20    0.85    0.98    0.95    0.85    0.15
0.10    0.25    0.95    0.99    0.95    0.85    0.15
```

EXHIBIT 8-4: SAMPLE INPUT FILE FOR THE DATA PREPROCESSOR (Part 5 of 6)

```
0.[illegible]5  0.85    0.99    0.9[illegible]  0.99    0.95    0.90
0.10    0.20    0.85    0.95    0.75    0.50    0.19
RESFIR   50          11         (10F8.0)
0.8     0.9     0.8     0.8     0.5     0.5     0.5     0.5     0.8     0.8
0.8
RESMOV   50          11         (10F8.0)
0.5     0.5     0.5     0.5     0.5     0.5     0.5     0.5     0.5     0.5
0.5
RESOBS   50          11         (10F8.0)
0.2     0.2     0.2     0.2     0.1     0.1     0.1     0.1     0.2     0.2
0.2
RESPLN   50            14       (F8.0)
-0.2
RESSUP   50          11         (10F8.0)
0.1     0.1     0.1     0.1     0.05    0.05    0 05    0.05    0.1     0.1
0.1
RESPTM                          (F8.0)
20.0
RESWND   50            14       (F8.0)
0.2
RISK      5  2                  (4F8.0)
0.[illegible]   0.7     0.9     0.9
0.6     0.9     0.[illegible]   1.0
ENGLET    7                     (10F8.0)
0.      0.      0.      0.      10.     30.     30.
ENGMAX    7                     (7F8.0)
[illegible]5.0  1[illegible]5.0  250.0   70.0    40.0    40.0    40.0
ENGMIN    7                     (7F8.0)
0.0     5.0     25.0    25.0    10.0    10.0    10.0
```

EXHIBIT 8-4: SAMPLE INPUT FILE FOR THE DATA PREPROCESSOR (Part 6 of 6)

```
SENRNG   7                               (7F8.0)
0.5      0.5      0.5      0.1           50.0      5.0      0.1
SKILL    4   2 50      4   2 11          (8F8.0)
1.0      1.0      1.0      1.0      0.8       1.2      1.2      0.9
1.0      1.0      1.0      1.0      0.9       1.1      1.1      0.9
1.0      1.0      1.0      0.8      0.7       1.3      1.3      0.8
1.0      1.0      1.2      1.0      0.8       1.2      1.5      0.5
1.0      1.0      1.0      1.0      0.9       1.2      1.2      0.9
1.0      1.0      1.0      1.0      0.9       1.1      1.1      0.8
1.0      1.0      1.0      0.8      0.7       1.3      1.3      0.8
1.0      1.0      1.2      1.0      0.8       1.2      1.5      0.5
1.0      1.0      1.0      1.0      0.8       1.2      1.2      0.9
1.0      1.0      1.0      1.0      0.8       1.2      1.2      0.9
1.0      1.0      1.0      0.8      0.7       1.3      1.3      0.8
SUPDEC   2                                (2F8.0)
0.2      0.25
SUPEIP   2                                (2F8.0)
0.4      0.4
SUPNOV   2                                (2F8.0)
0.4      0.4
SUPDEF   2                                (2F8.0)
1.0      1.0
TEIN                                      (F8.0)
 5.0
TSTALE                                    (F8.0)
10.0
WIDTH    5                                (5F8.0)
2.0      2.1      2.5      20.0      0.25
ENDBLK
ENDFIL
```

779,780

9.0 EXAMPLE OUTPUT FILE LISTINGS

This chapter presents example output file listings for the Plex Preprocessor, the Data Preprocessor, and the Fixed Site Neutralization Model. The chapter is organized into three sections corresponding to these respective programs. Some output files from the preprocessors are binary -- i.e., consisting entirely of zeros and ones. The displays of such outputs are uninformative and are, therefore, omitted. All other output files are shown.

9.1 Plex Preprocessor

This section displays example output file listings generated by the Plex Preprocessor. There are four output files, located on logical devices numbered 6 through 9. The binary file on logical device numbered 6 is the principal output, containing the plex data structure input to the FSNM: it is not displayed due to its binary form. Error messages are on logical device number 7; excerpts from such a file are displayed in exhibit 9-1. The alphanumeric form of the plex data structure is on logical device number 8; excerpts from such a file are displayed in exhibit 9-2. Maps of the site and its buildings are on logical device number 9; excerpts from such a file are displayed in exhibit 9-3. The excerpts do not purport to represent an existing site and/or scenario, and are for illustrative purposes only.

EXHIBIT 9-1: EXCERPTS FROM PLEX PREPROCESSOR OUTPUTS ON LOGICAL DEVICE NUMBER 7 (Part 1 of 2)

```
 ***** ERROR   9 IN ROUTINE INPLEX
TIME=  0.0   SIDE=SFE   LAST REFERENCED PLAYER=  1
A RECORD INDEX USED TO REFER TO DATATYPE: ROOF
IS A DUPLICATE. THE INDEX IS:   6 RECORD IGNORED


 ***** ERROR  14 IN ROUTINE IVALRF
TIME=  0.0   SIDE=SFE   LAST REFERENCED PLAYER=  1
LIST 125 REFERENCED IN RECORD 1060130001 AFTER BEING DEFINED
REFERENCE ALLOWED, BUT MAY BE IN ERROR


 ***** ERROR  14 IN ROUTINE IVALRF
TIME=  0.0   SIDE=SFE   LAST REFERENCED PLAYER=  1
LIST 126 REFERENCED IN RECORD 1060110001 AFTER BEING DEFINED
REFERENCE ALLOWED, BUT MAY BE IN ERROR


 ***** ERROR  14 IN ROUTINE IVALRF
TIME=  0.0   SIDE=SFE   LAST REFERENCED PLAYER=  1
LIST 127 REFERENCED IN RECORD 1060110002 AFTER BEING DEFINED
REFERENCE ALLOWED, BUT MAY BE IN ERROR


 ***** ERROR  15 IN ROUTINE INPLEX
TIME=  0.0   SIDE=SFE   LAST REFERENCED PLAYER=  1
DATATYPE LIST NOD RECORD  2 REFERENCED BUT NOT DEFINED


 ***** ERROR  15 IN ROUTINE INPLEX
TIME=  0.0   SIDE=SFE   LAST REFERENCED PLAYER=  1
DATATYPE LIST NOD RECORD  4 REFERENCED BUT NOT DEFINED


 ***** ERROR  15 IN ROUTINE INPLEX
TIME=  0.0   SIDE=SFE   LAST REFERENCED PLAYER=  1
DATATYPE LIST NOD RECORD  5 REFERENCED BUT NOT DEFINED


 ***** ERROR  15 IN ROUTINE INPLEX
TIME=  0.0   SIDE=SFE   LAST REFERENCED PLAYER=  1
DATATYPE LIST NOD RECORD 103 REFERENCED BUT NOT DEFINED
```

EXHIBIT 9-1: EXCERPTS FROM PLEX PREPROCESSOR OUTPUTS ON LOGICAL DEVICE NUMBER 7 (Part 2 of 2)

```
***** ERROR  16 IN ROUTINE INPLEX
TIME=  0.0   SIDE=SFE   LAST REFERENCED PLAYER=  1
DATATYPE DOOR       RECORD  61 SKIPPED ON INPUT


***** ERROR  16 IN ROUTINE INPLEX
TIME=  0.0   SIDE=SFE   LAST REFERENCED PLAYER=  1
DATATYPE DOOR       RECORD  62 SKIPPED ON INPUT


***** ERROR  16 IN ROUTINE INPLEX
TIME=  0.0   SIDE=SFE   LAST REFERENCED PLAYER=  1
DATATYPE DOOR       RECORD  63 SKIPPED ON INPUT


***** ERROR  16 IN ROUTINE INPLEX
TIME=  0.0   SIDE=SFE   LAST REFERENCED PLAYER=  1
DATATYPE DOOR       RECORD  64 SKIPPED ON INPUT


***** ERROR  16 IN ROUTINE INPLEX
TIME=  0.0   SIDE=SFE   LAST REFERENCED PLAYER=  1
DATATYPE DOOR       RECORD  65 SKIPPED ON INPUT


***** ERROR  16 IN ROUTINE INPLEX
TIME=  0.0   SIDE=SFE   LAST REFERENCED PLAYER=  1
DATATYPE DOOR       RECORD  66 SKIPPED ON INPUT


***** ERROR  16 IN ROUTINE INPLEX
TIME=  0.0   SIDE=SFE   LAST REFERENCED PLAYER=  1
DATATYPE DOOR       RECORD  67 SKIPPED ON INPUT


***** ERROR  16 IN ROUTINE INPLEX
TIME=  0.0   SIDE=SFE   LAST REFERENCED PLAYER=  1
DATATYPE DOOR       RECORD  68 SKIPPED ON INPUT


***** ERROR  16 IN ROUTINE INPLEX
TIME=  0.0   SIDE=SFE   LAST REFERENCED PLAYER=  1
DATATYPE DOOR       RECORD  69 SKIPPED ON INPUT
```

EXHIBIT 9-2: EXCERPTS FROM PLEX PREPROCESSOR OUTPUTS ON LOGICAL DEVICE NUMBER 8 (Part 1 of 3)

```
>SITE
>       BLDGS   YARDS    BARRIER GUARDS  ADVER    VHICLES  ENVIRON XLEN     YLEN      ZLEN
>  1  #    1             #    3                                    310.00   168.00     0.0

>LIST NOD
>   1  BD    1  BD    2  BD    3  BD    4  BD    5  BD    6
>   3  BR    1  BR    2  BR    3  BR    4  BR    5  BR    6  BR    7  BR    8  BR    9  BR   10  BR   11  BR   12  BR   13  BR   14
>   3  BR   15  BR   16  BR   17  BR   18  BR   19  BR   20  BR   21  BR   22  BR   23  BR   24  BR   25  BR   26  BR   27  BR   28
>   3  BR   29  BR   30  BR   31  BR   32  BR   33

>BUILDING
>       XCOORD   YCOORD   ZCOORD   FLOORS   WALLS    ROOFS    ENVIRON XLEN     YLEN      ZLEN
>  1  110.00    88.00     0.0    #    6  #    7  RF    1              24.00     8.00      8.00
>  2  114.00    76.00     0.0    FL   3  #    8  RF    2              44.00     8.00      4.00
>  3  138.00    74.00     0.0    FL   4  #    9  RF    3               4.00     4.00      4.00
>  4  113.00    82.00     0.0    FL   5  #   10  RF    4               2.00     4.00      4.00
>  5  193.00    92.00     0.0    FL   6  #   11  RF    5               6.00     8.00      4.00
>  6  106.00    83.00     0.0    FL   7  #   12  RF    6               4.00     2.00      4.00

>LIST NOD
>    6  FL    1  FL    2
>    7  BR    5  BR    6  BR    7  BR    8
>    8  BR    9  BR   10  BR   11  BR   12
>    9  BR   13  BR   14  BR   15
>   10  BR   33  BR   34
>   11  BR   17  BR   18  BR   19  BR   20
>   12  BR   30  BR   31  BR   32

>FLOOR
>       XCOORD   YCOORD   ZCOORD   ROOMS    HALLS    STAIRS   ENVIRON XLEN     YLEN      ZLEN     PENET    CONT IN
>  1  112.00    88.00     0.0    #  474            ST    1              24.00     8.00      4.00    800      BD    1
>  2  112.00    88.00     4.00   RM    3            ST    2              12.00     8.00      4.00    800      BD    1
>  3  114.00    76.00     0.0             #  475                         44.00     8.00      4.00    800      BD    2
>  4  138.00    74.00     0.0    RM    8                                  4.00     4.00      4.00    800      BD    3
>  5  113.00    82.00     0.0    RM    6                                  2.00     4.00      4.00    800      BD    4
>  6  106.00    83.00     0.0    RM    5                                  4.00     2.00      4.00    800      BD    6
>  7  193.00    92.00     0.0    #  476                                   6.00     8.00      4.00             BD    5

>LIST NOD
> 474  RM    1  RM    2  RM    4
> 475  HL    1  HL    2
> 476  RM    9  RM   10
```

EXHIBIT 9-2: EXCERPTS FROM PLEX PREPROCESSOR OUTPUTS ON LOGICAL DEVICE NUMBER 8 (Part 2 of 3)

>YARD

YARD	XCOORD	YCOORD	ZCOORD	CONTENT	SENSOR	NEIGHB	ENVIRON	BARRIER	LOS	COVER	QUAD1	QUAD2	QUAD3	QUAD4
5	60.00	150.00	0.0			# 223				0.10	0.10	0.10	0.10	0.10
6	90.00	150.00	0.0			# 224				0.10	0.10	0.10	0.10	0.10
7	120.00	150.00	0.0			# 225				0.10	0.10	0.10	0.10	0.10
8	150.00	150.00	0.0			# 226				0.10	0.10	0.10	0.10	0.10
9	180.00	150.00	0.0			# 227				0.10	0.10	0.10	0.10	0.10
10	30.00	120.00	0.0			# 228				0.10	0.10	0.10	0.10	0.10
11	60.00	120.00	0.0			# 229				0.10	0.10	0.10	0.10	0.10
12	90.00	120.00	0.0			# 230				0.10	0.10	0.10	0.10	0.10
13	120.00	120.00	0.0			# 231				0.10	0.10	0.10	0.10	0.10
15	120.00	150.00	0.0			# 232				0.10	0.10	0.10	0.10	0.10
16	180.00	120.00	0.0			# 233				0.10	0.10	0.10	0.10	0.10
18	95.50	96.50	0.0			# 250		# 251		0.10	0.10	0.10	0.10	1.00
21	126.50	96.50	0.0			# 252		# 253		0.10	0.10	0.10	1.00	0.10
23	60.00	90.00	0.0			# 235				0.10	0.10	0.10	0.10	0.10
24	150.00	90.00	0.0			# 236				0.10	0.10	0.10	0.10	0.10
25	180.00	90.00	0.0			# 237				0.10	0.10	0.10	0.10	0.10
26	91.50	80.50	0.0			# 254				0.10	0.10	0.10	0.10	1.00
27	91.50	71.50	0.0			# 256		# 257		0.10	1.00	0.10	0.10	0.10
29	136.50	80.50	0.0			# 262		# 263		0.10	0.10	0.10	1.00	0.10
30	140.50	76.50	0.0			# 260		# 261		0.10	0.10	0.10	1.00	0.10
31	140.50	71.50	0.0			# 258		# 259		0.10	0.10	1.00	0.10	0.10
32	30.00	60.00	0.0			# 238				0.10	0.10	0.10	0.10	0.10

EXHIBIT 9-2: EXCERPTS FROM PLEX PREPROCESSOR OUTPUTS ON LOGICAL DEVICE NUMBER 8 (Part 3 of 3)

```
>HALL
>       XCOORD   YCOORD   ZCOORD   CONTENT SENSOR  NEIGHB   ENVIRON XLEN     YLEN     LOS      COVER    ACCESS   CONT IN
>  1    113.00   74.00     0.0                     #  485            42.00    2.00              0.0              FL   3
>  2    135.00   74.00     0.0                     #  490             2.00    8.00              0.0              FL   3

>LIST NOD
> 485   DR   24   DR   21   DR   18   DR   26   HL    2
> 490   HL    1   DR   15   DR   12

>ROOF
>       XCOORD   YCOORD   ZCOORD   CONTENT SENSOR  NEIGHB   ENVIRON XLEN     YLEN     LOS      PENT
>  1    110.00   88.00     8.00                                      24.00    8.00              8
>  2    114.00   74.00     4.00                                      44.00    8.00              8
>  3    138.00   74.00     4.00                                       4.00    4.00              8
>  4    113.00   82.00     4.00                                       2.00    4.00              8
>  5    193.00   92.00     4.00                                       6.00    8.00              8

>STAIRS
>       XCOORD   YCOORD   ZCOORD   CNTNTS  SENSRS  NDRS     ENVIR   STAIRS   IN FLR   LOS
>  1    111.00   84.50     0.0                     #  481            ST   2   FL   1
>  2    107.00   84.50     4.00                    RM   3            ST   1   FL   2

>LIST NOD
> 481   DR   27   RM    1   DR   34   DR   41

>DOOR
>       XCOORD   YCOORD   ZCOORD   CONTENT SENSORS NEIGHB   ENVIRON STATUS   LOCKBL   LOS      PENET    VISIBL   ACCESS   WIDTH
> HEIGHT   PORTAL   CONT IN
>  1    195.85   98.00     0.0                     DR   4              4        2                 3        3                 4.00
>   2.40   DR    2   DR   22
>  2    196.15   98.00     0.0                     DR   6              4        2                 3        3                 4.00
>   2.40   DR    1
>  3    191.85   98.00     0.0                     #  149              4        2                 3        3                 4.00
>   2.40   DR    4   DR    2
>  4    192.15   98.00     0.0                     DR   1              4        2                 3        3                 4.00
>   2.40   DR    3   DR    2
>  5    195.85   89.00     0.0                     DR   8              4        2                 8        2                 1.50
>   2.00   DR    6   DR   18
>  6    196.15   89.00     0.0                     DR   2              4        2                 8        2                 1.50
>   2.00   DR    5   DR   18
>008   100015   88.00     0.0  #  151             DR   5    2         4        42       1        34       1150
>   2.00   DR   10   DR   20
> 10    190.15   93.00     0.0                     #  152              3        2                 4        3                 1.50
>   2.00   DR    9   DR   20
> 11    135.00   80.15     0.0                     #  153              3        2                 3        3                 1.50
>   2.00   DR   12
> 12    135.00   79.85     0.0                     HL   2              3        2                 4        3                 1.50
>   2.00   DR   11   DR   11
```

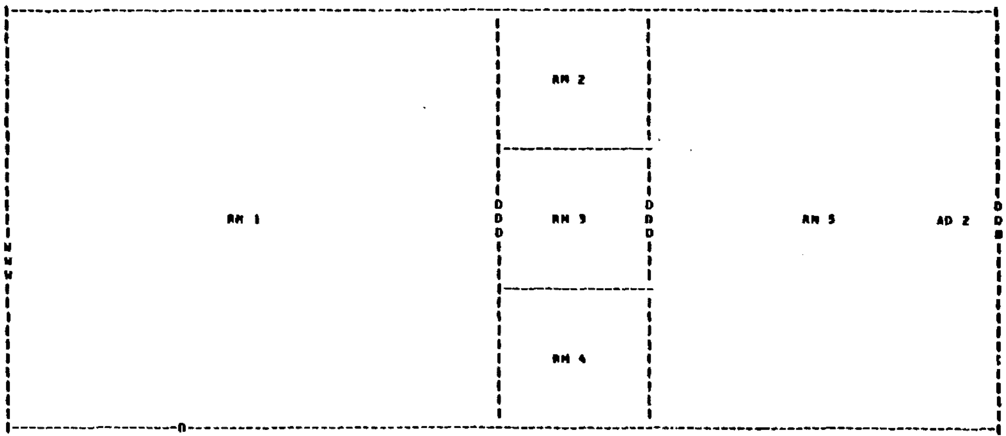
EXHIBIT 9-3: EXCERPTS FROM PLEX PREPROCESSOR OUTPUTS ON LOGICAL DEVICE NUMBER 9 (Part 1 of 2)

```
-------------------------------------------------------------------------------------I
                                                                          YD 2       I
                                                                             *       I
                                         PN 8                                YD 1    I
*************************DD*PN PNPN 7*************************************      **   I
                                                                         *        *  I
         YD 6             YD 7             YD 8             YD 9         *           I
                                                                         *           I
                                                                         *           I
                                                                         *           I
                                                                         *           I
                                                                         *           I
                                                                         *           I
                                                                         *           I
                                                                         *           I
                                                                         *           I
         YD 12                             YD 15            YD 16        *           I
                     YD 13DYD 14                                         *           I
                                                                         *           I
                                                                         *           I
                                                                         *           I
                                                                         *           I
                                                                         *           I
                                                                         *           I
          YDYD 19                YDYD 21                                 *           I
          YD 17--------------------YD 22                                 *           I
             I                       I                                   *           I
             I                       I     YD 24            YD 25        D           I
             W           BD 1        D                                   *           I
             I                       I                                   *           I
          YD 26                    YD 31                                 *           I
          YDYD 28DD---------------YDYD 30                                *           I
                                PN 4                                     *           I
                                                                         *           I
```

EXHIBIT 9-3: EXCERPTS FROM PLEX PREPROCESSOR OUTPUTS ON LOGICAL DEVICE NUMBER 9 (Part 2 of 2)

MAP OF BUILDING 1

FLOOR 1 OF BUILDING 1



9.2 Data Preprocessor

This section displays example output file listings generated by the Data Preprocessor. There are two output files, located on logical devices numbered 6 and 7. The binary file on logical device number 6 is the principal output, containing essentially the performance data that is input to the FSNM; it is not displayed due to its binary form. An echo of all header records is produced on logical device number 7; a complete example of such a file is shown in exhibit 9-4.

EXHIBIT 9-4: EXAMPLE DATA PREPROCESSOR OUTPUT ON LOGICAL DEVICE NUMBER 7 (Part 1 of 2)

0	ACTRAT	25	0	0	19	0	0	(10F8.0)
25	AREA	25	0	0	0	0	0	(10F8.0)
50	BASLOD	7	2	0	5	1#	0	(5F8.0)
64	COMDLA	7	0	0	0	0	0	(10F8.0)
71	DEGVUL	7	2	0	5	2	0	(5F8.0)
85	DETANG	8	0	0	0	0	0	(8F8.0)
93	DETPHI	0	0	0	0	0	0	(F8.0)
94	DETRAT	3	0	0	0	0	0	(3F8.0)
97	DETSEN	17	7	0	0	0	0	(17F5.0)
216	DNGDET	9	2	0	0	0	0	(9F8.0)
234	DNGWEP	5	8	0	0	0	0	(5F8.0)
274	DTPLAN	0	0	0	0	0	0	(F8.0)
275	DTSEC	0	0	0	0	0	0	(F8.0)
276	EVALN	60	0	0	0	0	0	(10F8.0)
336	HFLIMS	5	2	0	0	0	0	(5F8.0)
346	IACTTP	25	0	0	19	0	0	(10(I3,5X))
371	IARMTP	4	0	0	0	0	0	(10(I3,5X))
375	ICOMRQ	2	5	25 *	0	0	0	(10(I3,5X))
625	IFIRTP	7	0	0	5	0	0	(5(I3,5X))
632	IRNKWP	7	7	0	5	7	0	(5(I3,5X))
681	ISECAC	25	0	0	19	0	0	(10(I3,5X))
706	ISECRQ	4	2	0	0	0	0	(4(I3,5X))
714	LABEL	25	0	0	0	0	0	(10A8)
739	MINPLR	2	0	0	0	0	0	(2(I3,5X))
741	MPEN	5	0	0	0	0	0	(5(I3,5X))
746	NDTSEC	25	0	0	19	0	0	(10(I3,5X))
771	PK	7	7	0	7	5	0	(7F8.0)
820	POBATT	31	0	0	0	0	0	(7F8.0,/,2(9F8.0,/),6F8.0)

EXHIBIT 9-4: EXAMPLE DATA PREPROCESSOR OUTPUT ON LOGICAL DEVICE NUMBER 7 (Part 2 of 2)

851	POBSPN	2	2	7	2	2	5	(4F8.0)
879	POBSEN	2	0	0	0	0	0	(2F8.0)
881	POBVEH	2	2	0	0	0	0	(4F8.0)
885	POSTUR	25	0	0	19	0	0	(10F8.0)
910	PSIG	8	7	7	8	7	5	(8F8.0)
1302	PWOUND	7	7	0	7	5	0	(7F8.0)
1351	RESFIR	50	0	0	11	0	0	(10F8.0)
1401	RESMOV	50	0	0	11	0	0	(10F8.0)
1451	RESOBS	50	0	0	11	0	0	(10F8.0)
1501	RESPLN	50	0	0	1#	0	0	(F8.0)
1551	RESSUR	50	0	0	11	0	0	(10F8.0)
1601	RESPTM	0	0	0	0	0	0	(FB.0)
1602	RESWND	50	0	0	1#	0	0	(F8.0)
1652	RISK	4	2	0	0	0	0	(4F8.0)
1660	RNGLET	7	0	0	0	0	0	(10F8.0)
1667	RNGMAX	7	0	0	0	0	0	(7F8.0)
1674	RNGMIN	7	0	0	0	0	0	(7F8.0)
1681	SENRNG	7	0	0	0	0	0	(7F8.0)
1688	SKILL	4	2	50	4	2	11	(8F8.0)
2088	SUPDEC	2	0	0	0	0	0	(2F8.0)
2090	SUPFIR	2	0	0	0	0	0	(2F8.0)
2092	SUPMOV	2	0	0	0	0	0	(2F8.0)
2094	SUPOBS	2	0	0	0	0	0	(2F8.0)
2096	TFIN	0	0	0	0	0	0	(F8.0)
2097	TSTALE	0	0	0	0	0	0	(F8.0)
2098	WIDTH	5	0	0	0	0	0	(5F8.0)
2103	ENDBLK	0	0	0	0	0	0	
0	ENDFIL	0	0	0	0	0	0	

9.3 *Fixed Site Neutralization Model*

This section displays example output file listings generated by the Fixed Site Neutralization Model. There are three output files, located on logical devices numbered 6 through 8.

The "change file" on logical device number 6 is typically quite voluminous. It is very useful for debugging purposes, after program changes or to investigate possible errors; on production runs it may be written on a temporary file (name beginning with the character '-') for efficiency. The CHGFLD, CHGLST, and CHGVAR subroutines write in this file when values in the plex structure change, when the compositions of lists change, or when variables stored in the data arrays change. Excerpts from the change file are shown in exhibit 9-5.

The "report file" is on logical device numbered 7. At the end of every time interval--whose duration is under user control,--it records the locations, activities, and observations of all people on the site. Any error messages are also written on this file. Also, a summary is printed there every time the garbage-collecting subroutine is invoked; for efficiency on subsequent runs, the programmer may wish to reallocate in the BLOCKDATA subroutine so that such calls are minimized. Excerpts from the report file are shown in exhibit 9-6.

The "final file" is on logical device number 8. It records the final contents of the plex data structure. Excerpts from the final file are shown in exhibit 9-7.

All excerpts shown are illustrative only; they do not purport to be consistent with any existing site and/or scenario.

EXHIBIT 9-5: EXCERPTS FROM THE FSNM OUTPUTS ON LOGICAL DEVICE NUMBER 6 (Part 1 of 3)

```
*** INITIALIZATIONS
TMIN                =        0.0
NMSTAT              =        1
FORCES( 1, 1)       =        0.0
FORCES( 2, 1)       =        0.0
FORCES( 3, 1)       =        0.0
FORCES( 4, 1)       =        4.00
FORCES( 1, 2)       =        0.0
FORCES( 2, 2)       =        0.0
FORCES( 3, 2)       =        0.0
FORCES( 4, 2)       =        4.00
IGOALS              =    -9999
RECORD GL      1 QUEUED  ON LIST IGOALS

*** LEADER PLANNING
FIELD FRAC      OF FR    1 CHANGED FROM          1.0 TO         1.0
FIELD IDENT     OF PC   42 CHANGED FROM              TO FR       1
FIELD VIEW      OF PC   42 CHANGED FROM              TO FR       4
FIELD CONTENT   OF FR    4 CHANGED FROM              TO PN       1
FIELD CONTENT   OF FR    4 CHANGED FROM PN       1   TO #      645
FIELD CONTENT   OF FR    4 CHANGED FROM #      645   TO #      646
FIELD CONTENT   OF FR    4 CHANGED FROM #      646   TO #      647
FIELD FRAC      OF FR    4 CHANGED FROM    -9999.0 TO          1.0
FIELD SITN      OF FR    4 CHANGED FROM      -9999 TO            1
FIELD FRAC      OF FR    2 CHANGED FROM        1.0 TO          1.0
FIELD SITN      OF FR    2 CHANGED FROM          2 TO            1
FIELD IDENT     OF PC   43 CHANGED FROM              TO FR       2
FIELD VIEW      OF PC   43 CHANGED FROM              TO FR       5
```

EXHIBIT 9-5: EXCERPTS FROM THE FSNM OUTPUTS ON LOGICAL DEVICE NUMBER 6 (Part 2 of 3)

```
NEW MESSAGE RECORD:
      SOURCE  SUBJECT ATTRIBUTTIME    CONTENT
  87  PN   2  PN   6    2        1.33    3
RECORD IS    87 STACKED ON LIST LASMNT
FORCES( 3, 2)    =        0.0
FORCES( 1, 2)    =        1.00
IPLAYR           =        1
IPLAYR           =        2
IPLAYR           =        5
IPLAYR           =        7
IPLAYR           =        8

*** DETECT OBJECTS
ISIDE            =        1
IPLAYR           =        1
NRSMLT           =    -9999
IPLAYR           =        2
ISIDE            =        2
IPLAYR           =        5
IPLAYR           =        6
IPLAYR           =        7
IPLAYR           =        8

*** PROCESS OBSVNS
ISIDE            =        1
IPLAYR           =        1
FIELD UPDATED  OF PC   45 CHANGED FROM      1.2 TO      1.3
FIELD UPDATED  OF PC   46 CHANGED FROM      1.2 TO      1.3
FIELD UPDATED  OF PC   47 CHANGED FROM      1.2 TO      1.3
FIELD UPDATED  OF PC   48 CHANGED FROM      1.2 TO      1.3
FIELD UPDATED  OF PC   49 CHANGED FROM      1.2 TO      1.3
FIELD UPDATED  OF PC   51 CHANGED FROM      1.2 TO      1.3

NEW MESSAGE RECORD:
      SOURCE  SUBJECT ATTRIBUTTIME    CONTENT
  86  PN   1  PN   1    9        1.33   * 1033
FIELD UPDATED  OF PC    1 CHANGED FROM      1.2 TO      1.3
FIELD MSG      OF CN    1 CHANGED FROM *  1131  TO *  1092
IOBSV ( 1)       =    -9999
IPLAYR           =        2
FIELD UPDATED  OF PC   62 CHANGED FROM      1.2 TO      1.3

NEW MESSAGE RECORD:
      SOURCE  SUBJECT ATTRIBUTTIME    CONTENT
  85  PN   2  PN   2    6        1.33    4
```

EXHIBIT 9-5: EXCERPTS FROM THE FSNM OUTPUTS ON LOGICAL DEVICE NUMBER 6 (Part 3 of 3)

```
*** NEW TIMESLICE
TMIN              =        2.50

*** CHECK FOR RESPONSE FORCE ARRIVAL
     RESPONSE FORCE DOES NOT ARRIVE

*** CHECK FOR END
     SIMULATION CONTINUES

*** LEADER PLANNING
FIELD FRAC     OF FR    1 CHANGED FROM       0.5 TO       0.5
FIELD FRAC     OF FR    6 CHANGED FROM       0.5 TO       0.5
FIELD FRAC     OF FR    4 CHANGED FROM       1.0 TO       1.0
FIELD FRAC     OF FR    2 CHANGED FROM       0.5 TO       0.5
FIELD FRAC     OF FR    7 CHANGED FROM       0.7 TO       0.7
FIELD FRAC     OF FR    5 CHANGED FROM       1.0 TO       1.0

*** PERSON DECISIONS
ISIDE             =        1
IPLAYR            =        1
FIELD ACTION   OF PN    1 CHANGED FROM              TO AC     1
IPLAYR            =        2

NEW ACTION     RECORD:
      TYPE     PAR1     PAR2     PAR3     MODIFIERDOER
 154     3      0.25                             PN    2
FIELD ACTION   OF PN    2 CHANGED FROM              TO AC   154
ISIDE             =        2
IPLAYR            =        5

NEW ACTION     RECORD:
      TYPE     PAR1     PAR2     PAR3     MODIFIERDOER
 156     3      3.14                             PN    5
FIELD ACTION   OF PN    5 CHANGED FROM              TO AC   156
IPLAYR            =        8

NEW ACTION     RECORD:
      TYPE     PAR1     PAR2     PAR3     MODIFIERDOER
 158     3      1.57                             PN    8
FIELD ACTION   OF PN    8 CHANGED FROM              TO AC   158
```

EXHIBIT 9-6: EXCERPTS FROM THE FSNM OUTPUTS ON LOGICAL DEVICE NUMBER 7 (Part 1 of 3)

```
REPORT AT TIME:    1.17
PN  1 (RM  6) OBSERVING
PN  2 (DR 19) MOVING TO RM   5          TRIPS ALARM  4 AT DR  9
 SEES:  PN   4
PN  3 (DR  9) MOVING TO RM   5          TRIPS ALARM  4 AT DR  9
 SEES:  PN   2  PN   4
PN  4 (RM  3) MOVING TO RM   5
PN  5 (DR 12) OBSERVING
 SEES:  PN   6
PN  6 (DR 12) OBSERVING
 SEES:  PN   5
PN  7 (YD 29) MOVING TO RM   5
 SEES:  PN   5  PN   6  PN   8
PN  8 (DR 12) MOVING TO RM   5
 SEES:  PN   5  PN   6


 *****  ERROR  32 IN ROUTINE CAPDET
TIME=  1.17  SIDE=AFE   LAST REFERENCED PLAYER=  8
PLAYER   1000190008 CAPTURED PLAYER   1000190004 AT LOCATION   1000100005
```

EXHIBIT 9-6: EXCERPTS FROM THE FSNM OUTPUTS ON LOGICAL DEVICE NUMBER 7 (Part 2 of 3)

```
REPORT AT TIME:    1.67
PN   1 (RM   6) OBSERVING
PN   2 (RM   5) OBSERVING
PN   2 (RM   5) CAPTURING PN   8
 SEES:  PN    4  PN    5  PN    6  PN    8
PN   3 (RM   5) MOVING TO RM   5                                      KILLED
PN   4 (RM   5) OBSERVING                                             KILLED
PN   5 (DR 12) FIRING AT PN   4
 SEES:  PN    2  PN    3  PN    4  PN    6  PN    8
PN   6 (DR 12) FIRING AT PN   3
 SEES:  PN    2  PN    3  PN    4  PN    5  PN    8
PN   7 (DR 19) MOVING TO RM   5
PN   8 (RM   5) SURRENDURING TO PN   2


 *****  ERROR  32 IN ROUTINE CAPDET
TIME=  1.67  SIDE=AFE   LAST REFERENCED PLAYER=  7
PLAYER    1000190007 CAPTURED PLAYER    1000190002 AT LOCATION  1000140022


 *****  ERROR   2 IN ROUTINE PARSRF
TIME=  1.67  SIDE=AFE   LAST REFERENCED PLAYER=  8
A PARAMETER WHICH IS SUPPOSED TO BE A FIELD OR RECORD
REFERENCE HAD THE VALUE -9999 AND HENCE IS INCORRECT.


 *****  ERROR   2 IN ROUTINE PARSRF
TIME=  1.67  SIDE=AFE   LAST REFERENCED PLAYER=  9
A PARAMETER WHICH IS SUPPOSED TO BE A FIELD OR RECORD
REFERENCE HAD THE VALUE -9999 AND HENCE IS INCORRECT.
```

EXHIBIT 9-6: EXCERPTS FROM THE FSNM OUTPUTS ON LOGICAL DEVICE NUMBER 7 (Part 3 of 3)

```
REPORT AT TIME:    1.83
PN  1 (RN  6) OBSERVING
PN  2 (RN  5) FIRING AT PN  6
PN  2 (RN  5) SURRENDERING TO PN  7                                  KILLED
 SEES:  PN   5  PN   6  PN   8
PN  5 (RN 12) FIRING AT PN  2
 SEES:  PN   7  PN   2  PN   6  PN   8
PN  6 (RN 12) FIRING AT PN  2                                        KILLED
PN  7 (RN  5) MOVING TO RN  5
PN  7 (RN  5) CAPTURING PN  2
 SEES:  PN   5
PN  8 (RN  5) SUPPRESSED
SIMULATION ENDS AT TIME=    1.83
 APE  HAS THE WINNER.


GARBAGE COLLECTOR CALLED AT TIME      1.83
                                   COLLECTION RESULTS:
RECORD TYPE:                  8   LC   CN   SI   RD   FL   BR   YD   RN   NL   NF   ST   DR   WI   WP   RQ   VE
NUMBER COLLECTED:         0 1726  441    0    0    0    0    0    8    0    0    0    0    0    0    0    0    0
TOTAL NUMBER RECORDS:     1 4000  800  200    6    8   12   30   60   40   12   10   20  120  100  600  720   36
NUMBER NEVER ALLOCATED:  -1 1592  296  196    0    2    6   11   13   30    8    4   16   94   94  582  704   32
RECORD TYPE:             PN   SN   AD   CN   PC   RS   AC   RN   OP   GL   WE   FR
NUMBER COLLECTED:       232    0    0    0   31  143  104    0    0    0   84    0
TOTAL NUMBER RECORDS:   350  720   20   20  400  300  500  300   10   10  120    2
NUMBER NEVER ALLOCATED:  65  710   11   13  823  131  356  288    6    5   28   11
```

EXHIBIT 9-7: EXCERPTS FROM THE FSNM OUTPUTS ON LOGICAL DEVICE NUMBER 8 (Part 1 of 2)

```
ROOM
      XCOORD   YCOORD   ZCOORD  CONTENT SENSOR  NEIGHB   ENVIRON XLEN    YLEN    LOS      COVER   ACCESS  CONT IN
  1  106.50    87.00    0.0                     #  390           21.00   18.00             0.20           FL   1
  2  120.00    93.00    0.0                                       6.00    6.00             0.20           FL   1
  3  120.00    87.00    0.0                     #  391            6.00    6.00             0.20           FL   1
  4  120.00    81.00    0.0     #  535                            6.00    6.00             0.20           FL   1
  5  130.50    87.00    0.0     # 2361          #  393           15.00   18.00             0.20           FL   1
  6   36.00    21.00    0.0     #  394          DR  13           12.00    6.00             0.20           FL   2

LIST NOD
 390  WI   2  DN   9  DR  19
 391  DR  20  DR  21
 535  SN   6  SN   5  SN   4  SN   3  SN   2  SN   1
2361  PN   7  PN   3  PN   2  PN   8  PN   4  AD   2  EQ   9  EQ  10
 393  DR  11  DR  22
 394  PN   1  AD   1  AD   3

ROOF
      XCOORD   YCOORD   ZCOORD  CONTENT SENSOR  NEIGHB   ENVIRON XLEN    YLEN    LOS      PENT
  1  117.00    87.00    3.60                                     42.00   18.00             5
  2   36.00    21.00    3.60                                     12.00    6.00             5

DOOR
      XCOORD   YCOORD   ZCOORD  CONTENT SENSORS NEIGHB   ENVIRON STATUS  LOCKDL  LOS      PENET   VISIDL  ACCESS  WIDTH
 HEIGHT  PORTAL   CONT IN
  1   48.00    12.15    0.0                     #  108            4       2                3       3       1       6.00
   2.40  DR   2  DR   1
  2   48.00    11.85    0.0                     YD  46            4       2                3       3       1       6.00
   2.40  DR   1  DR   1
  3  191.85    90.00    0.0             SN   1  #  109            5       1                3       3               0.90
```

EXHIBIT 9-7: EXCERPTS FROM THE FSNM OUTPUTS ON LOGICAL DEVICE NUMBER 8 (Part 2 of 2)

RELATION

	TYPE	PAR1	PAR2
1	12		
2	12		
3	3		
4	3		
5	3		
6	3		
7	3		
8	12		

GOAL NOD

	REGION		SUBORD	MIN REQ	CONTROL	EQUIP	MEN REQ
1	RM	5		2.00			2

NODE-OF-

	NODE ID		PAR1	PAR2	PLAYER		NOISE
85	DR	20	1.67		PN	7	
86	RM	3	1.70		PN	7	
87	DR	21	1.72		PN	7	
88	DR	22	1.79		PN	7	

FORCE

	TYPE	ALLEG	LEADER		CONTENT	FRAC	SITN	PLANS	SOPS
1	1	1	PN	1	# 477	0.50	5		
2	1	2	PN	5	# 478	1.00	4		
3	1	1	PN	9	# 525	1.00	1		
4	1	1	PN	1	# 647	1.00	4		
5	1	2	PN	5	# 652	1.00	4		
6	1	2			# 1118	1.00	3		
7	1	1			# 1947	0.67	4		

LIST NOD

477	PN	1	PN	2	PN	3	PN	4
478	PN	5	PN	6	PN	7	PN	8

INDEX TO VOLUME II

This index includes all programs, subroutines, functions, input files, and output files covered in volume II of the program maintenance manual. The order of presentation is alphabetical, with the decimal numbers considered to be at the end of the alphabet.