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COMPUTER LISTINGS FOR ILLIAC IV VERSION
OF FKCOMB

Ann Kerr, et al

Teledyne Geotech

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FKCOMB

SUBROUTINES

SUMMARY

This is the third report in a series of three published at the Seismic Data Analysis Center in 1974, which describe our studies of and programming experience with the ILLIAC IV computer. The present report is a computer listing of the ILLIAC IV version of a scientific program called FKCOMB. The main program, FKCOMB, and two data-editing and formatting modules, DEM1 and DEM2 were written in Computational Fluid Dynamics Code (CFD); some subroutines were written in ASK code.

The first report in the series, SDAC-TR-74-16, presents an overview of the ILLIAC IV System, describes the suitability of the ILLIAC IV computer as a processor of seismic data, and contains project notes on programming techniques and languages. The second report, SDAC-TR-74-17, is a complete documentation of the preliminary version of the FKCOMB software designed for processing long-period seismic data; it also compares results from the ILLIAC software with those of the original version of FKCOMB.

DEM1

```

C      MAIN DRIVER FOR MOD 1. ENTERED BY GENE WAGENBRETH, APRIL 24, 1974
*PE INTEGER CNTRL(*,6),OUTBUF(*,64,6),PINT1(*),INBUF(*,128),
1      TIME(*),OLDTIM(*),
1      SAVBCT,SAVPTW,OUTPAGE(6),TSTEPS(6),SCANS,
2      OUPTRA(6), OTIMEA(6)
*CU INTEGER ADBUF(8),ARRAY,INPTB,INPTW,SAVADB,ADBOUT(6),OUPTW,
1      BYTS,WORDS,T1,T2,T3,T4,T5,T6, IT,PTIAL,ADRS,
2      WORD, BYTCNT(6),ADBWRD,INBYT,OUTBYT,ORGCOR,PAGE,
3      DEBUG,BCT,ADB,ENDADB
*CU LOGICAL LADDBU(8),LARRAY,LINPTB,LINPTW,LSAVAD,LADROU(6),LOUPTW,
1      LBYTS,LWORDS,LT1,LT2,LT3,LT4,LT5,LT6,LOUBYT,LIT,LPTIA,
2      LADRS,LWORD,LINBYT,LBYTCN(6),LADBWR,LORGCOR,LPAGE
3      ,LDEBUG,LBCT,LADB,LENDADB
*EXTERNAL RDPRM,GETRYT,PUTBYT,CNVTIM
*COMMON/MAIN/CNTRL,OUTBUF,INBUF,PINT1,TIME,OLDTIM,SAVBCT,SAVPTW,
1      TSTEPS,SCANS,OUPTRA,OUTPAGE, OTIMEA
*EQUIVALENCE(1,ADDBUF(1),LADDBU(1)),(9,ARRAY,LARRAY),
1      (10,INPTB,LINPTB),
1      (11,INPTW,LINPTW),(12,SAVADB,LSAVAD),
1      (13,ADBOUT(1),LADROU(1))
2      ,(19,OUPTW,LOUPTW),(20,BYTS,LBYTS),(21,WORDS,LWORDS),
3      (22,T1,LT1),(23,T2,LT2),(24,T3,LT3),(25,T4,LT4),
4      (26,T5,LT5),(27,T6,LT6),(28,OUTBYT,LOUBYT),(29,IT,LIT),
5      (30,PTIAL,LPTIA),(31,ADRS,LADRS),(32,WORD,LWORD),
6      (33,INBYT,LINBYT),(34,BYTCNT(1),LBYTCN(1)),
6      (40,ADBWRD,LADBWR)
7      ,(43,ORGCOR,LORGCOR),
8      (44,PAGE,LPAGE),(45,DEBUG,LDEBUG),(46,BCT,LBCT),
9      (47,ADB,LADB),(48,ENDADB,LENDADB)
*DISK AREA OUTPUT1(20),OUTPUT2(20),OUTPUT3(20),OUTPUT4(20),OUTPUT5(20),
1      OUTPUT6(20),INPUT(100)
      MODE=ON
      ENDADE=-1
      ORGCOR=-8193
A      JUMP AROUNDAREA:
A      DISPA:AREA "DISPA";
A      AROUNDAREA::OPNDISP DISPA:
C      THAT IS USED FOR DISPLAY OUTPUT.
A      DISPLS " ",16,BEGINHEADER,ENDHEADER-1;
A      JUMP ENDHEADER:
A      BLK:
A      BEGINHEADER:::
A      DATA (("*****")8,3338)2,
A      "DATA EDITING MODULE 1 VERSION 1.1",ODDA:16,
A      (("*****")8,3338)2;
A      ENDHEADER:::
*CALL RDPRM
C      SUBROUTINE RDPRM INITIALIZES VALUES TO BE USED BY THIS AND
C      FOLLOWING MODULES.
10 *CALL GETBYT

```

```

C   THE HEADER ID HAS JUST BEEN READ IN. NOW TO LOOK IT UP.
    *DO 20 ARRAY=1,7
    *IF (ARRAY.EQ.7) GO TO 850
C   IF WE GET THAT FAR, THE HEADER ID WAS NOT ON OUR LIST.
    T6=CNTRL(11,ARRAY)
    *IF(T6.EQ.INBYT)GO TO 25
C   THAT MEANT WE FOUND IT.
20 *CONTINUE
25 *CONTINUE
    *IF (DEBUG.LT.1) GO TO 35
    DISPL " ", 16,B1,E1-1:
A   SKIP,E1:
A   B1:DATA "GOT THE HEADER ID SUCCESSFULLY.",ODOA:16:
A   E1:DISPLH "ARRAY:",2:
35 *CONTINUE
40 T6=CNTRL(1,ARRAY)
    *IF (T6.EQ.0)GO TO 45
C   THAT CHECKED TO SEE IF THERE IS TIMING INFO TO GET FROM THE
C   BEGINNING OF THIS RECORD.
    *CALL CNVTIM
C   CNVTIM READS OFF THE TIME AND CONVERTS IT TO DECISECONDS FROM
C   THE BEGINNING OF THE YEAR.
45 *CONTINUE
    OLDTIM(*)=OTIMEA(ARRAY)
C   HALF TO RESTORE THE VALUE LEFT IN OLDTIM WHEN THE LAST RECORD
C   FROM THIS ARRAY WAS PROCESSED.
    T6=CNTRL(4,ARRAY)
    INPTB=INPTB+T6
C   THAT MOVED THE INPUT POINTER TO THE BEGINNING OF A TIME SCAN.
C   START PROCESSING A TIME SCAN.
    SCANS=0
50 *IF (DEBUG.LT.1) GO TO 55
A   DISPLH "T-SCAN",0:
55 T6=CNTRL(5,ARRAY)
    INPTB=INPTB+T6
    T6=CNTRL(1,ARRAY)
    *IF(T6.EQ.1)GO TO 65
C   IF WE GET HERE THERE IS A TIME WORD WITH THIS SCA.
    *CALL CNVTIM
    T6=CNTRL(6,ARRAY)
    INPTB=INPTB+T6
65 *IF (DEBUG.LT.1) GO TO 75
A   DISPLH "TIME",16,TIME,TIME:
A   DISPLH "OLDTIM",16,OLDTIM,OLDTIM:
75 *CONTINUE
C   NOW CHECK TO SEE IF A TIME SCAN IS MISSING.
    *IF(.ANY.((OLDTIM(*).EQ.0)))GO TO 200
    *IF(.ANY.((TIME(*).LE.OLDTIM(*)+15)))GO TO 200
    *IF(.ANY.((TIME(*).GT.OLDTIM(*)+25)))GO TO 150
C   IF WE GET HERE THERE WERE 1 OR 2 TIME SCANS MISSING. WE HAVE TO
C   FILL IN THE MISSING TIME GAP(S) WITH THE LAST TIME GAP, WHICH HAS

```

```

C      BEEN CAREFULLY SAVED IN OUTBUF. WE DO SO A BYTE AT A TIME UNTIL
C      ALL CHANNELS ARE DONE. THIS IS NOT THE FASTEST WAY TO DO THE JOB
C      BUT IS STRAIGHT FORWARD AND EASILY DEBUGGABLE. THE SITUATION IS
C      COMPLICATED A BIT BY THE FACT THAT SOME OF THE BYTES ARE IN
C      ADBOUT(ARRAY).

      SAVADB=ADBOUT(ARRAY)
      SAVBCT=BYTCNT(ARRAY)
      T6=OUPTW-1
      SAVPTW=T6
      T6=CNTRL(3,ARRAY)
      T5=SAVBCT
      BYTS=T6-T5
C      NUMBER OF BYTES TO TRANSFER FROM OUTBUF IS EQUAL TO THE NUMBER OF
C      CHANNELS MINUS THE NUMBER OF BYTES IN ADB.
A      % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
      LWORDS=LBYTS.SHR.2
      LT1=LWORDS.SHL.2
A      % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
      PRTIAL=BYTS-T1
      T6=SAVPTW
      ADDRS=T6-WORDS
C      ADDRESS IN OUTBUF OF PARTIAL WORD.
C      NOW I WOULD LIKE TO HAVE OUTBUF DIMENSIONED "OUTBUF(8192,8)" AND
C      SIMPLY ACCESS "OUTBUF(ADDRS,ARRAY)" BUT CFD FORCES ME TO
C      DIMENSION OUTBUF "OUTBUF(*,64,8)" AND I HAVE TO DO SOME ARITHMETIC
C      HERE TO CALCULATE THE PROPER INDICES.
      T1=ADDRS
A      % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
      LT2=OFF.TURN ON..LAST.6
      LT2=LT2.AND.LT1
      LT1=LT1.SHL.6
A      % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
      IT=OUTRUF(T2,T1,ARRAY)
*IF (DEBUG.LT.1) GO TO 105
A      DISPLH "TIME-GAP",0;
A      DISPLH "SAVADB",16,SAVADB,SAVADB;
A      DISPLH "SAVBCT",16,SAVBCT,SAVBCT;
A      DISPLH "SAVPTW",16,SAVPTW,SAVPTW;
A      DISPLH "BYTS",16,BYTS,BYTS;
A      DISPLH "WORDS",16,WORDS,WORDS;
A      DISPLH "PRTIAL",16,PRTIAL,PRTIAL;
A      DISPLH "ADDRS",16,ADDRS,ADDRS;
A      DISPLH "IT",16,IT,IT;
105 *CONTINUE
C      NOW WE COME TO ANOTHER CFD ABOMINATION. I WANT TO DIVIDE ONE
C      NUMBER IN MEMORY BY 4. I CAN EITHER MOVE IT TO A VECTOR OR
C      FIDDLE WITH THE MODE OR SOMETHING AND DO A STRAIGHT DIVIDE,
C      OR I CAN MOVE IT TO THE CU AND JUST SHIFT IT. I OPT FOR THE LATTER
C      AND CONTINUE TO OPT FOR THAT THRUOUT THE PROGRAM. THIS IS BECAUSE
C      SOMEDAY CFD MAY ALLOW ME TO DO WHAT I WANT OR I CAN PUT IT IN CODE

```

```

C STATEMENTS MYSELF.
A % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
  LPRTIA=LPRTIA.SHL.2
  LIT=LIT.RTR.PRTIAL
A %DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.

  PINTI(*)=TIME(*)-OLDTIM(*)
  T6=PINTI(1)
  *DO 140 T1=1,T6,10
C   ONCE FOR EACH MISSING TIME GAP
C   FIRST DO THE PARTIAL WORD.
  TIME(*)=TIME(*)+10
C   LOUBYT=TIME
A   SLIT(0) =TIME;
A   LOAD(0) SCO;
A   CSHR(0) 16;
A   STL(0) LOUBYT;
  *CALL PUTBYT
A   SLIT(0) TIME;
A   LOAD(0) SCO;
A   LIT(1)=OFFF:16;
A   CAND(0) SC1;
A   STL(0) LOUBYT;
  *CALL PUTBYT
  *DO 110 T2=1,PRTIAL,16
C   ONCE FOR EACH BYTE.
  LIT=LIT .RTL.16
  LOUBYT=OFF.TURN ON..LAST.16
  LOUBYT=LOUBYT.AND.LIT
110 *CALL PUTBYT
C   NOW DO THE FULL WORDS.
  T6=SAVPTW
  *DO 120 T2=ADDRS+1,T6
C   NOW WE HAVE TO DO THE MESSSED UP ADDRESSING BECUASE OF THE CFD
C   RESTRICTION ON DIMENSIONING.
A   % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
  LT3=LT2.SHR.6
  LT4=OFF.TURN ON..LAST.6
  LT4=LT4.AND.LT2
A   % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
  WORD=OUTBUF(T4,T3,ARRAY)
  *DO 120 T5=1,4
  LWORD=LWORD.RTL.16
  LOUBYT=OFF.TURN ON..LAST.16
  LOUBYT=LOUBYT.AND.LWORD
120 *CALL PUTBYT
C   NOW PUT OUT THE BYTES IN SAVADR.
  WORD=SAVADR
  T6=SAVBCT
  *DO 140 T2=1,T6
  LOUBYT=OFF.TURN ON..LAST.16
  LOUBYT=LOUBYT.AND.LWORD
  *CALL PUTBYT

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140 LWORD=LWORD.RTL.16
    *GO TO 250
150 *CONTINUE
C   IF WE GET HERE, THERE WERE A BUNCH OF TIME GAPS MISSING. WE NEED
C   ONLY PUT OUT A DIAGNOSTIC
A   DISPLS " ", 16,BGAPDIAGNOSTIC,EGAPDIAGNOSTIC-1:
A   DISPLH "OLDTIM",16,OLDTIM,OLDTIM:
A   DISPLH "TIME",16,TIME,TIME:
A   JUMP EGAPDIAGNOSTIC:
A   BLK:
A   BGAPDIAGNOSTIC:::
A   DATA (("*****")8,3338)10,"MORE THAN 2 TIME GAPS.",ODOA:16,
A   (("*****")8,3338)10:
A   EGAPDIAGNOSTIC:::
175 *CONTINUE
200 *CONTINUE
C   NOW TO CHECK FOR A TIME REVERSAL.
    *IF(.ANY.((TIME(*).GT.OLDTIM(*)+5)))GO TO 250
C   IF WE GET HERE THERE IS A TIME REVERSAL. IF THERE IS A TIME WORD
C   PER SCAN, THIS SCAN IS THROWN OUT. OTHERWISE, THE WHOLE RECORD
C   IS DISCARDED.
    T6=CNTRL(1,ARRAY)
    *IF (T6.EQ.1)GO TO 210
C   WE HAVE A TIME WORD PER SCAN.
    PINT1(*)=INPTB+CNTRL(6,ARRAY)+CNTRL(7,ARRAY)+CNTRL(3,ARRAY)
    INPTB=PINT1(1)
C   NOW SKIP AROUND PROCESSING OF THIS SCAN.
    *GO TO 410
C   NOW HANDLE THROWING AWAY THE WHOLE RECORD FOR TIME WORD PER
C   RECORD.
210 PINT1(*)=CNTRL(4,ARRAY)+CNTRL(9,ARRAY)*(CNTRL(5,ARRAY)+
    1CNTRL(3,ARRAY)+CNTRL(7,ARRAY))+CNTRL(3,ARRAY)+INPTB
    INPTB=PINT1(1)
    T6=SCANS
    T6=T6+100
    SCANS=T6
    *GO TO 410
C   FINALLY TIME IS ALL TAKEN CARE OF. FIRST WE OUTPUT TIME. THEN ALL
C   THE DATA.
250 *CONTINUE
C   LOUBYT=TIME(1)
A   SLIT(0) TIME:
A   LOAD(0) SCO:
A   CSHR(0) 16:
A   STL(0) LOUBYT:
    *CALL PUTBYT
A   SLIT(0) TIME:
A   LOAD(0) SCO:
A   LIT(1) =OFFFH:16:
A   CAND(0) SCI:

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```

A   STL(0) LOUBYT:
    *CALL PUTBYT
    OLDTIM(*)=TIME(*)
    TIME(*)=TIME(*)+10
    T6=TSSTEPS(ARRAY)
    T6=T6+1
    TSSTEPS(ARRAY)=T6
    T6=CNTRL(3,ARRAY)
    *DO 400 TI=1,T6
C   THATS ONCE FOR EACH CHANNEL.
    *CALL GETBYT
    OUBYT=INBYT
    *CALL PUTBYT
400 *CONTINUE
410 T6=SCANS
    T6=T6+1
    SCANS=T6
    T6=CNTRL(7,ARRAY)
    INPTB=INPTB+T6
    T6=CNTRL(9,ARRAY)
    T5=SCANS
    *IF(T5.GE.T6)GO TO 420
    *GO TO 50
420 T6=CNTRL(8,ARRAY)
    INPTB=INPTB+T6
    OTIMEA(ARRAY)=OLDTIM(1)
    *GO TO 10
850 *CONTINUE
    *IF(INBYT.EQ.0)GO TO 855
A   DISPLH "BADHEAD:",2:
855 *CONTINUE
C   WHEN WE GET HERE ALL THE DATA HAS BEEN PROCESSED. TIME TO EMPTY
C   THE ADB BUFFERS, WRITE OUT THE CORE BUFFERS , PUT THE HEADERS IN
C   THE OUTPUT FILES AND LAY BACK AND QUIT.
C
C   FIRST EMPTY THE ADB BUFFERS.
    *DO 860 ARRAY=1,6
    BCT=4-BYTCNT(ARRAY)
A   % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
    LBCT=LBCT.SHL.4
A   % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
    LADB=LADBOU(ARRAY).SHL.BCT
C   HERE WE HAVE TO DO SOME MORE FANCY ADDRESSING BECAUSE OF THE CFD
C   RESTRICTION ON DIMENSIONS.
    TI=OUPTR
A   % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
    LT2=LT1.SHR.6
    LT6=OFF.TURN ON..LAST.6
    LT1=LT6.AND.LT1
A   % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
    OUTBUF(TI+1,T2+1,ARRAY)=ADB
860 *CONTINUE

```

```
C    NOW WRITE OUT ALL OF THE BUFFERS(6 AT THIS TIME).
      T6=OUPAGE(1)
      *WRITE(64,OUTBUF(1,1,1),OUPUT1(T6),4)
      *WAIT 64
      T6=OUPAGE(2)
      *WRITE(64,OUTBUF(1,1,2),OUPUT2(T6),4)
      *WAIT 64
      T6=OUPAGE(3)
      *WRITE(64,OUTBUF(1,1,3),OUPUT3(T6),4)
      *WAIT 64
      T6=OUPAGE(4)
      *WRITE(64,OUTBUF(1,1,4),OUPUT4(T6),4)
      *WAIT 64
      T6=OUPAGE(5)
      *WRITE(64,OUTBUF(1,1,5),OUPUT5(T6),4)
      *WAIT 64
      T6=OUPAGE(6)
      *WRITE(64,OUTBUF(1,1,1),OUPUT6(T6),4)
      *WAIT 64
C    NOW FOR THE HEADER PAGE. FIRST CLEAR A BUFFER.
      *DO 930 T1=1,16
930  OUTBUF(*,T1,1)=0
C    NOW FILL THEM IN ONE AT A TIME.
      OUTBUF(1,1,1)=CNTRL(11,1)
C    THAT WAS THE HEADER ID.
      OUTBUF(2,1,1)=TSTEPS(1)
      *WRITE(64,OUTBUF(1,1,1),OUPUT1(1),1)
      *WAIT 64
      OUTBUF(1,1,1)=CNTRL(11,2)
      OUTBUF(2,1,1)=TSTEPS(2)
      *WRITE(64,OUTBUF(1,1,1),OUPUT2(1),1)
      *WAIT 64
      OUTBUF(1,1,1)=CNTRL(11,3)
      OUTBUF(2,1,1)=TSTEPS(3)
      *WRITE(64,OUTBUF(1,1,1),OUPUT3(1),1)
      *WAIT 64
      OUTBUF(1,1,1)=CNTRL(11,4)
      OUTBUF(2,1,1)=TSTEPS(4)
      *WRITE(64,OUTBUF(1,1,1),OUPUT4(1),1)
      *WAIT 64
      OUTBUF(1,1,1)=CNTRL(11,5)
      OUTBUF(2,1,1)=TSTEPS(5)
      *WRITE(64,OUTBUF(1,1,1),OUPUT5(1),1)
      *WAIT 64
      OUTBUF(1,1,1)=CNTRL(11,6)
      OUTBUF(2,1,1)=TSTEPS(6)
      *WRITE(64,OUTBUF(1,1,1),OUPUT6(1),1)
      *WAIT 64
A    DISPLS " ", 16,BFINAL,EFINAL-1;
A    JUMP EFINAL;
A    BLK;
```

;<KERR>CFD.DEM1;1 MON 8-JUL-74 8:46AM

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A BFINAL:;
A DATA (("*****")8,3338)10;
A "MOD 1 GOING TO END OF JOB",CDOA:16,(("*****")8,3338)10;
A EFINAL:;;
A CLSDISP DISPA;
*STOP
*END

DEM2

14<

C
C
C
C
C
C

DEM2 - DATA EDITTING MODULE 2
CODED BY GENE WAGENBRETH MAY, 1974. THIS ROUTINE READS IN DATA
FROM ONE SEISMIC ARRAY AND PERFORMS ALL DATA EDITTING UP TO AND
INCLUDING FFT.

```
*PE INTEGER NBUFF1(*,64),FINSN(*),COMP(*),TOTSCN(*),PINT1(*),
1 PINT2(*),TIME(*),OTIME(*),TWTIME(*),PEN(*),CNTRL(*,6)
*PE REAL GLCHFT(*),VARFT(*),BUFF2(*,550,2),BUFF3(*,640),PREAL1(*),
1 PREAL2(*),ALLMSQ(*),TVARFT(*)
*PE INTEGER LOFREQ,HIFREQ,IBUFF1(4096),IBUFF3(*,640),ABUFF2(70400),
1 CHG(X)D(80),SITEGD(80),SITES(80)
*PE REAL CHMSQ(80),RBUFF1(4096),ROWSUM,RBUFF2(70400)
*CU INTEGER ADBBUF(8),COREPT, BYTE,ADBWRD,ARRAY,DEBUG,TWSZ,
1 OVLAP,NCHAN,NSITE,NROWS,DIFFR,DIFFW,NEW,OLD,GAP,TSCANS,
2 INDEX1,INDEX2,INDEX3,INDEX4,T1,T2,T3,T4,T5,T6,CH,IPAGE,
3 OFFSET,INBYT,NGDCH,TWSZR,NGDST,NGDR,F,BF3PE,NGT,OPAGE,T7
*CU LOGICAL LADBBU(8),LCOREP,LAST16,LBYTE,LADBWR,LARRAY,LDEBUG,
1 LTWSZ,LOVLAP,LNCHAN,LNSITE,LNROWS,LDIFFR,LDIFFW,LNEW,
2 LOLD,LGAP,LTSCAN,LT1,LT2,LT3,LT4,LT5,LT6,LCH,LOFFSE,
3 LINBYT,LF,LNGDCH,LTWSZR,LNGDST,LNGDR,LNGT,LT7
*EXTERNAL GTDATA,C16T64,C64T32,ROWSUM,RUNFFT,C32T64
*COMMON/MAIN2/NBUFF1,BUFF2,BUFF3,FINSN,COMP,TOTSCN,PINT1,PINT2,
1 TIME,OTIME,TWTIME,PEN,CNTRL,GLCHFT,VARFT,PREAL1,PREAL2,
2 ALLMSQ,TVARFT,LOFREQ,HIFREQ,SITEGD,SITES,CHMSQ
*EQUIVALENCE (NBUFF1(1,1),RBUFF1(1),IBUFF1(1)),(BUFF2(1,1,1),
1 ABUFF2(1),RBUFF2(1)),(CHG(X)D(1),SITEGD(1)),
2 (BUFF3(1,1),IBUFF3(1,1))
*EQUIVALENCE (1,ADBBUF(1),LADBBU(1)),(9,COREPT,LCOREP),(10,BYTE,
1 LBYTE),(11,ADBWRD,LADBWR),(12,ARRAY,LARRAY),(13,TWSZ,
2 LTWSZ),(14,OVLAP,LOVLAP),(15,NCHAN,LNCHAN),(16,NSITE,
3 LNSITE),(17,NROWS,LNROWS),(18,DIFFR,LDIFFR),(19,DIFFW,
4 LDIFFW),(20,NEW,LNEW),(21,OLD,LOLD),(22,GAP,LGAP),(23,
5 TSCANS,LTSCAN),(24,INDEX1),(25,INDEX2),(26,INDEX3),(27,
6 INDEX4),(28,T1,LT1),(29,T2,LT2),(30,T3,LT3),(31,T4,
7 LT4),(32,T5,LT5),(33,T6,LT6),(34,CH,LCH),(35,OFFSET,
8 LOFFSE),(36,INBYT,LINBYT),(37,F,LF),(38,NGDCH,LNGDCH),
9 (39,TWSZR,LTWSZR),(40,NGDST,LNGDST),(41,NGDR,LNGDR),
0 (42,BF3PE),(43,NGT,LNGT),(44,LAST16),(45,DEBUG,LDEBUG),
1 (46,OPAGE),(47,T7,LT7),(48,IPAGE)
*DISK AREA INDM2(20),OUTDM2(41),CONPRM(1)
MODE=ON
A JUMP PASTAREA;
A DISP2::AREA "DISP2";
A PASTAREA::;
A OPNDISP DISP2;
A DISPLS ,16,BHEAD2,EHEAD2-1;
A JUMP EHEAD2;
A BLK;
A BHEAD2::DATA
A (( "*****" )8,ODOA:16)10,"START EXECUTION DATA EDITING MODULE 2",
```

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A   ODOA:16,"VERSION 2.0",ODOA:16,(("*****")8,ODOA:16)2;
A   EHEAD2:;;
    *READ(64,IBUFF1(1),INDM2(1),1)
    *WAIT 64
    *WRITE(64,IBUFF1(1),OUTDM2(1),1)
    *WAIT 64
    T1=IBUFF1(1)
    *DO 20 ARRAY=1,7
    *IF(ARRAY.EQ.7)GO TO 1105
    T2=CNTRL(1,ARRAY)
    *IF(T1.EQ.T2)GO TO 25
C   THAT MEANT WE FOUND IT.
20 *CONTINUE
25 *CONTINUE
    FINSCN(*)=IBUFF1(2)
    *READ(64,IBUFF1(1),CONPRM(1),1)
    *WAIT 64
    DEBUG=IBUFF1(1)
    TWSZ=IBUFF1(2)
    OVLAP=IBUFF1(3)
    GLCHFT(*)=RBUFF1(4)
    VARFT(*)=RBUFF1(5)
    LOFREQ=IBUFF1(6)
    HIFREQ=IBUFF1(7)
    COMP(*)=IBUFF1(8)
    NCHAN=CNTRL(3,ARRAY)
    NSITE=CNTRL(4,ARRAY)
A   % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
    LTWSZR=LTWSZ.SHR.6
A   % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
    PINT1(*)=NCHAN*TWSZR
    NROWS=PINT1(1)
    DIFFW=TWSZ-OVLAP
A   % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
    LDIFFR=LDIFFW.SHR.6
    LTI=OFF.TURN ON..LAST.6
    LDIFFW=LDIFFW.AND.LTI
A   % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
    LAST16=OFF.TURN ON..LAST.16
    BYTE=4
    ADBWRD=8
    COREPT=4096
    OPAGE=2
    IPAGE=2
    NEW=2
    OLD=1
    GAP=1
    *IF(DEBUG.LT.1)GO TO 30

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A   DISPLH "INIT:",2:
30  *CONTINUE
    *CALL GTDATA
    TIME(*)=INBYT*65536
    *CALL GTDATA
    TIME(*)=TIME(*)+INBYT
100 *CONTINUE
C   100 BEGINS THE LOOP GONE THRU ONCE FOR EACH COMPLETE TIME WINDOW.
    TSCANS=0
    TWTIME(*)=TIME(*)
A   % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
    LTI=OFF.TURN ON..LAST.1
    LNEW=LNEW.AND.LTI
    LOLD=LOLD.AND.LTI
A   % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
    NEW=NEW+1
    OLD=OLD+1
    *IF(DEBUG.LT.1)GO TO 105
A   DISPLH "TWD",0:
    *IF(DEBUG.LT.2)GO TO 105
A   DISPLH ,2:
105 *CONTINUE
C   NOW CHECK TO SEE IF WE DETECTED A TIME GAP LAST TIME.
    *IF(GAP.EQ.1)GO TO 200
C   WE CANT OVERLAP IF THERE WAS A GAP.
    *IF(DEBUG.LT.1)GO TO 115
A   DISPLH "OVLAP",0:
115 *CONTINUE
    TWTIME(*)=TWTIME(*)-OVLAP*10
    PINT1(*)=0
    *IF((PEN(*)).GT.64-DIFFW))PINT1(*)=1
C   PINT1(*) INSURES THAT VALUES ROUTED ACROSS A ROW BOUNDARY GO TO
C   THE PRECEDING ROW.
    TI=NROWS-DIFFR
    *IF(TI.EQ.0)GO TO 140
    *DO 130 INDEX1=1,TI
        INDEX2=INDEX1+DIFFR
        BUFF2(*,INDEX1,NEW)=BUFF2(*+DIFFW,INDEX2+PINT1(*),OLD)
C   THAT MOVED ALL THE DATA WANTED FROM THE OLD TIME WINDOW, PLUS
C   SOME GARBAGE. THE GARBAGE IS OKAY BECAUSE IT WILL BE OVERWRITTEN
C   BY GOOD DATA LATER.
130 *CONTINUE
140 *CONTINUE
    TSCANS=OVLAP
    *IF(DEBUG.LT.1)GO TO 145
A   DISPLH "E OVLAP",0:
    *IF(DEBUG.LT.2)GO TO 145
A   DISPLH "BUFF21",18,BUFF2,BUFF2+255:
A   DISPLH "BUFF22",16,BUFF2+550*64,BUFF2+550*64+255:
145 *CONTINUE
200 *CONTINUE

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C    NOW ITS TIME TO READ IN AND MOVE A TIME STEP.
    *IF(DEBUG.LT.1)GO TO 205
A    DISPLH "TSTEP",0:
205  *CONTINUE
    CH=1
    *DO 280 TI=TSCANS+1,TWSZ
C    THATS ONCE FOR EACH TIMESTEP TO GET FOR THIS TIME WINDOW.
    TOTSCN(*)=TOTSCN(*)+1
    OFFSET=0
    *IF(NEW.EQ.2)OFFSET=35200
C    THAT MAKES ADDRESSING A LITTLE BIT EASIER. WE CAN TREAT BUFF2
C    (ABUFF2) AS 1 DIMENSIONAL. OFFSET ACTS LIKE (NEW,OLD). ITS REALLY
C    BECAUSE CFD WILL NOT ALLOW A 2 DIMENSIONAL ARRAY WITH THE FIRST
C    DIMENSION OTHER THAN 64.
    *DO 240 T2=1,NCHAN
    *CALL GTDATA
    INDEX1=CH+OFFSET
    ABUFF2(INDEX1)=INBYT
    OFFSET=OFFSET+TWSZ
240  *CONTINUE
C    WE JUST DID ONE TIME STEP.
    TSCANS=TSCANS+1
    CH=CH+1
    *IF(DEBUG.LT.2)GO TO 245
A    DISPLH "1-CHAN",0:
245  *CONTINUE
C    NOW WE CHECK FOR A GAP.
    T6=TOTSCN(1)
    *IF(.ANY.((T6.EQ.FINSCN(*))))GO TO 300
C    EOF IS REALLY JUST AN INFINITE GAP.
C    GET THE NEXT TIME WORD AND CHECK FOR A GAP.
    *CALL GTDATA
    T6=TIME(1)
    (TIME(*)=TIME(*)
    TIME(*)=INBYT
    *CALL GTDATA
    TIME(*)=TIME(*)*65536+INBYT
    *IF(DEBUG.LT.2)GO TO 255
A    DISPLH "TIME",16,TIME,TIME:
255  *CONTINUE
    *IF(.ANY.((TIME(*)-T6.GT.15)))GO TO 300
280  *CONTINUE
    GAP=0
    *GO TO 400
300  *CONTINUE
C    IF WE GET HERE WE HAVE A GAP.
    *IF(DEBUG.LT.1)GO TO 315
A    DISPLH "GAP",0:
    *IF(DEBUG.LT.2)GO TO 315
A    DISPLH ,2:
315  *CONTINUE
    *IF(TSCANS.NE.TWSZ)GO TO 325

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C     IF WE GET HERE, THERE IS A GAP, BUT WE DONT NEED ANYMORE DATA
C     SINCE THE TIME WINDOW IS ALREADY FULL. JUST MARK THE FACT THAT WE
C     HAD A GAP.
      GAP=1
      *GO TO 400
325 *CONTINUE
C     IF WE GET HERE , WE NEED TO FILL IN SOME DATA FROM THE LAST TIME
C     WINDOW TO COMPLETE THIS TIME WINDOW. FIRST CHECK TO SEE IF THERE
C     WAS A GAP AT THE END OF THE LAST TIME WINDOW, IN WHICH CASE WE
C     HAVE AN IRRECOVERABLE ERROR.
      *IF(GAP.NE.1)GO TO 335
C     WH(X)PS, AN IRRECOVERABLE ERROR.
A     JUMP EGAPMESSAGE;
A     BLK;
A     BGAPMESSAGE::DATA
A     (("*****")8,ODOA:16)10,
A     "IRRECOVERABLE TIME GAP.",ODOA:16,
A     (("*****")8,ODOA:16)10;
A     EGAPMESSAGE::;
A     DISPLS ,16,BGAPMESSAGE,EGAPMESSAGE-1;
A     DISPLH "TIME:",16,TIME,TIME;
A     DISPLH "OTIME:",16,OTIME,OTIME;
A     DISPLH "TWTIME:",16,TWTIME,TWTIME;
      *IF(DEBUG.LT.1)GO TO 330
A     DISPLH ,2;
330 *CONTINUE
      *GO TO 1000
335 *CONTINUE
C     IF WE GET HERE ITS TIME TO ACTUALLY FILL IN A TIME GAP. FIRST THE
C     CURRENT WINDOW HAS TO BE "SHIFTED FORWARD". THE AMOUNT TO MOVE
C     IS THE NUMBER OF MISSING SCANS=TWSZ-TSCANS.
      GAP=1
      T3=TWSZ-TSCANS
      TWTIME(*)=TWTIME(*)-T3*10
A     %DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
      LT4=LT3.SHR.6
      LT5=OFF.TURN ON..LAST.6
      LT3=LT3.AND.LT5
C     T3 IS THE NUMBER OF WORDS TO ROUTE.
C     T4 IS THE NUMBER OF ROWS TO ROUTE.
      PINTI(*)=0
      *IF((PEN(*).LE.T3))PINTI(*)=1
C     THATS ONE FOR ALL THE PE'S THAT ARE GONNA SEND DATA ACCROSS A ROW
C     BOUNDARY.
      *DO 350 INDEX1=T4+1,NROWS
      INDEX2=INDEX1-T4
      BUFF2(*,INDEX2,NEW)=BUFF2(*-T3,INDEX1-PINTI(*),NEW)
350 *CONTINUE
C     NOW COMES THE DIFFICULT PART. WE HAVE TO MOVE DATA FROM THE LAST
C     TIME WINDOW WITHOUT MOVING ANY GARBAGE, SINCE THIS TIME WE WOULD
C     BE OVERWRITING GOOD DATA. THE ROUTE AMOUNT IS TSCANS. THE NUMBER

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C   OF ITEMS TO BE MOVED(BEFORE WE ALWAYS DID THEM ALL) IS
C   TWSZ-TSCANS.
C   T3=ROUTE AMOUNT(ROWS).
C   T4=ROUTE AMOUNT(WORDS)
C   T5=NUMBER TO DO(ROWS).
C   T6=NUMBER TO DO(WORDS).
A   % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
    LT3=LTSCAN.SHR.6
    LT4=OFF.TURN ON..LAST.6
    LT4=LT4.AND.LTSCAN
    T6=TWSZ-TSCANS
A   % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
    LT5=LT6.SHR.6
    LT7=OFF.TURN ON..LAST.6
    LT6=LT6.AND.LT7
A   % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
    *IF(DEBUG.LT.1)GO TO 355
A   DISPLH "RT3",2:
355 *CONTINUE
C   NOW DO IT ONCE FOR EACH CHANNEL, ONCE FOR EACH FULL ROW, AND
C   THEN ONCE FOR EACH PARTIAL ROW.
    PINT1(*)=0
    *IF((PEN(*).GT.64-T4))PINT1(*)=1
C   NOW WE WOULD LIKE TO DO "DO 370 T1=1,NROWS,TWSZR" BUT CFD INSISTS
C   THAT THE INCREMENT BE A CONSTANT, SO WE WILL CONSTRUCT THE
C   EQUIVALENT LOOP.
    T1=1
    *DO 370 T7=1,NCHAN
    *IF(T5.EQ.0)GO TO 365
C   IMPROPER DO LOOPS MUST BE AVOIDED.
    *DO 360 T2=1,T5
        INDEX1=T2+T1-1
        INDEX2=INDEX1+T3
        BUFF2(*,INDEX1,NEW)=BUFF2(*+T4,INDEX2+PINT1(*),OLD)
360 *CONTINUE
365 *CONTINUE
C   NOW TO DO THE LAST ROW OF THE CHANNEL. IT IS ROW T5+1. GET TO
C   PLAY WITH THE MODE THIS TIME.
    INDEX1=T1+T5
    INDEX2=INDEX1+T3
C   ROUTE AMOUNT IS THE SAME.
    MODE=(PEN(*).LE.T6)
    BUFF2(*,INDEX1,NEW)=BUFF2(*+T4,INDEX2+PINT1(*),OLD)
    MODE=ON
    T1=T1+TWSZR
370 *CONTINUE
C   THATS EVERYTHING. WE NOW HAVE A COMPLETE TIME WINDOW.
    *IF(DEBUG.LT.1)GO TO 375
A   DISPLH "ERBACKUP",2:
    *IF(DEBUG.LT.2)GO TO 375
A   DISPLH "BUFF21",16,BUFF2,BUFF2+255:

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A   DISPLH "BUFF22",16,BUFF2+64*550,BUFF2+64*550+255;
375 *CONTINUE
C   THATS IT. WE ARE BACKED UP.
400 *CONTINUE
C   NOW WE HAVE A TIME WINDOW IN 16 BIT FORMAT IN BUFF2(-,-,NEW). WE
C   WILL LEAVE IT IN NEW AND CAN OVERWRITE THE DATA IN BUFF2(-,-,OLD)
C   SINCE IT WILL NEVER BE USED AGAIN. WE WILL CONVERT TO 64 BIT
C   FLOATING POINT FORMAT AND MOVE FROM BUFF2(NEW,-,-) TO "OLD".ONCE
C   THE DATA IN "OLD" HAS FOUND ITS WAY TO BUFF3, IT WILL BE OVER
C   WRITTEN NEXT TIME AROUND.
      *DO 405 INDEX1=1,550
      BUFF2(*,INDEX1,OLD)=0.0
405 *CONTINUE
      *DO 410 INDEX1=1,NROWS
      *CALL C16T64(BUFF2(*,INDEX1,NEW),BUFF2(*,INDEX1,OLD))
410 *CONTINUE
C   DATA IS NOW IN BUFF2(*,-,OLD). IT WILL NOW BE DEGLITCHED, MEAN
C   SQUARE CALCULATED AND CHECKED AND THEN FFT'ED.
      PINT1(*)=0
      PINT2(*)=0
      *IF((PEN(*).EQ.1))PINT1(*)=1
      *IF((PEN(*).EQ.64))PINT2(*)=1
      ALLMSQ(*)=0.0
      T2=1
C   WE WOULD LIKE TO DO "DO 500 CH=1,NROWS,TWSZR" BUT CFD INSISTS
C   THAT THE INCREMENT BE A CONSTANT, SO WE WILL CONSTRUCT AN
C   EQUIVALENT LOOP.
      CH=1
      *DO 500 T7=1,NCHAN
      *IF(DEBUG.LT.2)GO TO 420
      PINT1(1)=CH
A   DISPLH "CH",16,PINT1,PINT1;
420 *CONTINUE
      *DO 430 T3=0,TWSZR-1
      INDEX1=CH+T3
      PREAL1(*)=ABS(BUFF2(*,INDEX1,OLD)-BUFF2(*-1,INDEX1-PINT1(*),OLD))
      PREAL2(*)=ABS(BUFF2(*-1,INDEX1-PINT1(*),OLD)-BUFF2(*+1,INDEX1+
      PINT2(*),OLD))
      *IF(DEBUG.LT.2)GO TO 422
A   DISPLF "PREAL1",16,PREAL1,PREAL1+63;
A   DISPLF "PREAL2",16,PREAL2,PREAL2+63;
422 *CONTINUE
      PREAL2(*)=PREAL2(*)*GLCHFT(*)
      *IF(T3.EQ.0)MODE=MODE.AND.(PEN(*).NE.1)
      *IF(T3.EQ.TWSZR-1)MODE=MODE.AND.(PEN(*).NE.64)
      *IF((PREAL1(*).GT.PREAL2(*)))BUFF2(*,INDEX1,OLD)=
      1 (BUFF2(*-1,INDEX1-PINT1(*),OLD)+BUFF2(*+1,INDEX1+PINT2(*),OLD))
      2/2.0
      *IF(DEBUG.LT.2)GO TO 430
A   SETC(0) E;
A   DISPLH "MODE",1;
      PREAL1(*)=BUFF2(*,INDEX1,OLD)

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A   DISPLF "BUFF2-",16,PREAL1,PREAL1+63:
430 *CONTINUE
    MODE=ON
C   NOW REMOVE THE BIAS.
    PREAL1(*)=0.0
    *DO 440 T3=0,TWSZR-1
        INDEX1=T3+CH
        PREAL1(*)=PREAL1(*)+ROWSUM(BUFF2(*,INDEX1,OLD))
440 *CONTINUE
    PREAL1(*)=PREAL1(*)/FLOAT(TWSZ)
    *DO 450 T3=0,TWSZR-1
        INDEX1=T3+CH
        BUFF2(*,INDEX1,OLD)=BUFF2(*,INDEX1,OLD)-PREAL1(*)
    *IF(DEBUG.LT.2)GO TO 450
A   DISPLF "BIAS",16,PREAL1,PREAL1+63:
    PREAL1(*)=BUFF2(*,INDEX1,OLD)
A   DISPLF "A-BIAS",16,PREAL1,PREAL1+63:
450 *CONTINUE
C   NOW LETS COMPUTE THE MEAN SQUARE FOR EACH CHANNEL AND FOR THE
C   ENTIRE TIME WINDOW. PREAL1 WILL CONTAIN THE MEAN SQUARE FOR
C   THE PARTICULAR CHANNEL. ALLMSQ WILL CONTAIN THE MEAN SQUARE FOR
C   THE ENTIRE TIME WINDOW. CHMSQ(I) CONTAINS THE MEAN SQUARE FOR
C   CHANNEL NUMBER "I".
    PREAL1(*)=0.0
    *DO 470 T3=0,TWSZR-1
        INDEX1=T3+CH
        PREAL1(*)=PREAL1(*)+ROWSUM(BUFF2(*,INDEX1,OLD)**2)
470 *CONTINUE
    PREAL1(*)=PREAL1(*)/FLOAT(TWSZ)
    CHMSQ(T2)=PREAL1(I)
    T2=T2+1
    ALLMSQ(*)=ALLMSQ(*)+PREAL1(*)
    CH=CH+TWSZR
500 *CONTINUE
C   WE NOW HAVE TO COMPARE THE CHANNEL MEAN SQUARES AGAINST THE TOTAL
C   MEAN SQUARE AND VARFT TO SEE WHICH ONES ARE BAD. WE MAKE OUR
C   CRITERIA EASIER AND EASIER UNTIL AT LEAST HALF THE CHANNELS PASS,
C   WITH A LIMIT OF TEN TIMES ON OUR PATIENCE.
    ALLMSQ(*)=ALLMSQ(*)/FLOAT(NCHAN)
    *IF(DEBUG.LT.2)GO TO 502
A   DISPLF "ALLMSQ",16,ALLMSQ,ALLMSQ+63:
A   DISPLF "CHMSQ",16,CHMSQ,CHMSQ+50:
502 *CONTINUE
    LT3=LNCHAN.SHR.1
    4 DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
C   THATS HALF THE NUMBER OF CHANNELS, THE NUMBER THAT NEED TO PASS.
    TVARFT(*)=VARFT(*)
C   PUT VARFT IN THE PE'S SO WE CAN GET TO IT EASILY.
    *DO 550 T1=1,10
    *IF(DEBUG.LT.2)GO TO 504
A   DISPLH "VARL(XP)",0:

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504 *CONTINUE
    NGDCH=0
    *DO 540 CH=1,NCHAN
        CHG(X)(CH)=0
        PREAL1(*)=CHMSQ(CH)
C        PREAL1(*)=PREAL1(*)/ALLMSQ(*)
C        *IF(.ANY.((PREAL1(*).GT.TVARFT(*))))GO TO 510
C        *IF(.ANY.((PREAL1(*).LT.(1.0/TVARFT(*))))GO TO 510
        CHG(X)(CH)=1
        NGDCH=NGDCH+1
510 *CONTINUE
540 *CONTINUE
    *IF(NGDCH.GT.T3)GO TO 560
    TVARFT(*)=TVARFT(*)*1.25
550 *CONTINUE
560 *CONTINUE
C    NOW WE HAVE MARKED THE RAD CHANNELS. TIME TO COMPUTE MOTION
C    COMPONENTS AND MARK THE USEFUL COMPONENTS. SINCE ALL THE
C    ARRAYS HAVE THE DATA ARRANGED DIFFERENTLY, WE HAVE A SEPARATE
C    SECTION OF CODE FOR EACH ARRAY.
C    LASA=ARRAY 1; ALPA=ARRAY 2; NORSAR=ARRAY 3
    *IF(ARRAY.NE.1)GO TO 600
C    LASA DATA. CHANNELS ARE ARRANGED VVVV...NNNN...EEEE
C    WE NEED ONLY MARK THE UNINTERESTING CHANNELS.
    *IF(.ANY.((COMP(*).NE.0)))GO TO 580
C    0 MEANS VERTICAL.
    *DO 570 CH=NSITE+1,NCHAN
        CHG(X)(CH)=0
570 *CONTINUE
    *GO TO 800
580 *CONTINUE
C    HORIZONTAL MOTION PROCESSED HERE. NOT IMPLEMENTED YET.
A    DISPLH "ARG580",2;
    *GO TO 1100
600 *CONTINUE
    *IF(ARRAY.NE.2)GO TO 650
C    ALPA DATA CHANNELS. CHANNELS ARE AT 120 DEGREE ANGLES AND SOME
C    COMPUTATION MUST BE DONE. ARRANGED 123123123...
    *IF(.ANY.((COMP(*).NE.0)))GO TO 630
C    0 MEANS VERTICAL.
C    INDEX1=1,2,3,4...NSITE (INC 1)
C    INDEX2=1, (INC TWSZR)
C    INDEX3=1, (INC TWSZR*3) 3 COMPONENTS PER SITE.
C    INDEX4=1, (INC 3)
    INDEX2=1
    INDEX3=1
    INDEX4=1
    T1=TWSZR+TWSZR+TWSZR
    *DO 620 INDEX1=1,NSITE
        T2=0
        T6=CHG(X)(INDEX4)

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      *IF(T6.EQ.0)GO TO 610
      T6=CHG00D(INDEX4+1)
      *IF(T6.EQ.0)GO TO 610
      T6=CHG00D(INDEX4+2)
      *IF(T6.EQ.0)GO TO 610
      T2=1
C     ALL THREE COMPONENTS MUST BE GOOD FOR A SITE TO BE GOOD.
      *DO 605 T3=0,TWSZR-1
      T4=INDEX2+T3
      T5=INDEX3+T3
      T6=INDEX3+T3+TWSZR
      T7=INDEX3+TWSZR+TWSZR
      BUFF2(*,T4,OLD)=.57735*(BUFF2(*,T5,NEW)+BUFF2(*,T6,NEW)+
1      BUFF2(*,T7,NEW))
605  *CONTINUE
      INDEX2=INDEX2+TWSZR
610  CHG00D(INDEX1)=T2
      INDEX3=INDEX3+T1
      INDEX4=INDEX4+3
620  *CONTINUE
      *GO TO 800
630  *CONTINUE
C     HORIZONTAL MOTION PROCESSES HERE. NOT IMPLEMENTED YET.
A     DISPLH "ARG630",2:
      *GO TO 1100
650  *CONTINUE
      *IF(ARRAY.NE.3)GO TO 700
C     NORSAR DATA. IT IS ARRANGED VNEVNEVNE... WE DONT HAVE TO DO
C     ANY COMPUTING, JUST REARRANGING.
      *IF(.ANY.((COMP(*).NE.0)))GO TO 690
C     0 MEANS VERTICAL.
C     INDEX1=1,2,3...NSITE (INC 1)
C     INDEX2=1, (INC TWSZR)
C     INDEX3=1, (INC TWSZR*3)
C     INDEX4=1, (INC 3)
      INDEX2=1
      INDEX3=1
      INDEX4=1
      T1=TWSZR+TWSZR+TWSZR
      *DO 680 INDEX1=1,NSITE
      T2=0
      T7=CHG00D(INDEX4)
      *IF(T7.EQ.0)GO TO 670
      T2=1
      *DO 660 T3=0,TWSZR-1
      T4=INDEX2+T3
      T5=INDEX3+T3
      BUFF2(*,T4,OLD)=BUFF2(*,T5,NEW)
660  *CONTINUE
      INDEX2=INDEX2+TWSZR

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670 CHG(XD)(INDEX1)=T2
    INDEX3=INDEX3+1
    INDEX4=INDEX4+3
680 *CONTINUE
    *GO TO 800
690 *CONTINUE
C   HORIZONTAL MOTION. NOT IMPLEMENTED YET.
A   DISPLH "ARG690",2;
    *GO TO 1100
700 *CONTINUE
C   ALL KNOWN ARRAYS HAVE BEEN CHECKED FOR.
A   DISPLH "ARG700",2;
    *GO TO 1100
800 *CONTINUE
C   WE NOW HAVE ALL THE DATA CONVERTED TO 64 BIT FLOATING POINT,
C   DEGLITCHED, BIAS REMOVED, VARIANCE CHECKED, MOTION COMPONENTS
C   RESOLVED AND BAD CHANNELS MARKED.CHG(XD)(-) IS NOW REALLY
C   SITEGD(-). THE FIRST NSITE ENTRIES ARE THE ONLY ONES WE ARE
C   STILL INTERESTED IN.THEY INDICATE WHICH SITES ARE GOOD. WE NOW
C   SET NGDST TO THE NUMBER OF G(XD) SITES, NGDCH TO THE NUMBER
C   OF G(XD) CHANNELS (EQUAL TO NGDST FOR VERTICAL MOTION) AND THE
C   VECTOR SITES(-) WILL BE SET SO THAT SITES(I) INDICATES WHICH
C   PHYSICAL SITE LOGICAL SITE I REALLY IS.
    NGDST=0
    *DO 820 INDEX1=1,NSITE
        T7=SITEGD(INDEX1)
        *IF(T7.EQ.0)GO TO 810
        NGDST=NGDST+1
        SITES(NGDST)=INDEX1
810 *CONTINUE
820 *CONTINUE
    NGDCH=NGDST
    *IF(.ANY.((COMP(*).EQ.1)))LNGDCH=LNGDCH.SHL.1
    *IF(DEBUG.LT.1)GO TO 830
A   DISPLH "SITEGD",18,SITEGD,SITEGD+70;
A   DISPLH "SITES",16,SITES,SITES+30;
330 *CONTINUE
C   NOW ITS TIME FOR FFT. FIRST WE HAVE TO CONVERT TO 32-BIT
C   FLOATING POINT, SINCE THATS HOW FFT EXPECTS THE INPUT.
    PINT1(*)=TWSZR*NGDCH
    NGDR=PINT1(1)
    *DO 850 INDEX1=1,NGDR
        *CALL C64T32(BUFF2(*,INDEX1,OLD))
850 *CONTINUE
C   NOW FFT. NGDCH GIVES THE NUMBER OF FFT'S TO DO.
C   TWSZ GIVES THE SIZE OF EACH FFT.
C   STARTING ADDRESS IS BUFF2(1,1,OLD).
C   ALL THIS IS PASSED IN COMMON TO RUNFFT.
    *CALL RUNFFT
C   NOW TO CONVERT BACK TO 64 BIT FLOATING POINT.
C   *DO 870 INDEX1=1,NGDR

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C      *CALL C32T64(BUFF2(*,INDEX1,OLD))
C870 *CONTINUE
C      NOW WE GO TO BUFF3.
C      FORMAT OF BUFF3 IS (EACH PE):
C      WORD1:          TWTIME          (1 WORD)
C      WORD2:          NGDST           (1 WORD)
C      WORD 3:          SITES(-)       (25 WORDS)
C      WORD 28:         DATA
C      F(LOFREQ)(CH1...CH(NGDST))
C      .
C      .
C      F(HIFREQ)(CH1...CH(NGDST))
C      BF3PE=BF3PE+1
C      IBUFF3(BF3PE,1)=TWTIME(1)
C      IBUFF3(BF3PE,2)=NGDST
C      *DO 920 INDEX1=1,NGDST
C      IBUFF3(BF3PE,INDEX1+2)=SITES(INDEX1)
920 *CONTINUE
C      *IF(TWSZ.EQ.64)T1=6
C      *IF(TWSZ.EQ.128)T1=7
C      *IF(TWSZ.EQ.256)T1=8
C      *IF(TWSZ.EQ.512)T1=9
C      INDEX1=28
C      LNGT=LNGDCH.SHL.T1
C      T2=0
C      *IF(OLD.EQ.2)T2=35200
C      T5=LOFREQ
C      T6=HIFREQ
C      *DO 960 F=T5,T6
C      WE WOULD LIKE TO DO "DO 950 CH=0,NGT-1,TWSZ" BUT CFD INSISTS THAT
C      THE INCREMENT BE CONSTANT SO WE WILL CONSTRUCT AN EQUIVALENT
C      LOOP.
C      CH=0
C      *DO 950 T7=1,NGDCH
C      INDEX2=CH+F+T2
C      BUFF3(BF3PE,INDEX1)=RBUFF2(INDEX2)
C      INDEX1=INDEX1+1
C      *IF(INDEX1.LE.640)GO TO 930
C      BUFF3 IS OVER FLOWING.
A      DISPLH "ARG930",2;
C      *GO TO 1100
930 *CONTINUE
C      CH=CH+TWSZ
950 *CONTINUE
960 *CONTINUE
C      *IF(BF3PE.LT.64)GO TO 1000
C      HAVE TO WRITE OUT BUFF3.
C      BF3PE=0
C      *WRITE(64,BUFF3(1,1),OUTDM2(OPAGE),40)
C      *WAIT 64
C      OPAGE=OPAGE+40
C      *IF(DEBUG.LT.1)GO TO 965

```

```

A   DISPLH"BUFF3",2;
    *IF(DEBUG.LT.2)GO TO 965
A   DISPLH ,16,BUFF3,BUFF3+1023;
965 *CONTINUE
C   ZERO OU BUFF3. NOT REALLY REQUIRED, BUT USEFUL ANYWAY.
    *DO 970 INDEX1=1,640
    BUFF3(*,INDEX1)=0.0

970 *CONTINUE
1000*CONTINUE
    *IF(.ANY.((TOTSCN(*).NE.FINSCN(*))))GO TO 100
1100*CONTINUE
C   GOING TO END OF JOB.FIRST WRITE OUT REMNANTS OF BUFF3.
    *WRITE(64,BUFF3(1,1),OUTDM2(OPAGE),40)
    *WAIT 64
    *IF(DEBUG.LT.2)GO TO 1105
A   DISPLH "EOJ",18,BUFF3,BUFF3+1023;
1105*CONTINUE
A   JUMP EFINALPRINT;
A   BLK;
A   BFINALPRINT::;
A   DATA (("*****")8,ODOA:16)10,"DEM2 GOING TO END OF JOB",
A       (("*****")8,ODOA:16)10;
A   EFINALPRINT::;
A   DISPLS ,16,BFINALPRINT,EFINALPRINT-1;
A   CLSDISP DISP2;
    *CONTINUE
    *STOP
    *END

```

FKCOMB

```

C      FKCOMB
C      WRITTEN FOR ILLIAC BY ANN KERR MAY 1974.
C      PROGRAM READS IN DATA THAT HAS BEEN FFT'D
C      AND ARRANGED WITH ONE TIME WINDOW PER PE AND
C      DETECTS SEISMIC EVENTS BY SEARCHING A THREE DIMENSIONAL
C      SPACE, ONE DIMENSION OF FREQUENCY AND TWO DIMENSIONS
C      OF WAVE NUMBER.
C      DECLARATIONS:
*PE INTEGER INBUF(*,640),CNTRL(*,6),NCHAN(*),PINT1(*),OFFSET(*),
1      LOCATE(*),NPTS(*),COUNT2(*),COUNT3(*),LOC2D(*,25),
2      LOC3D(*,25),TWTIME(*),ADJF(*)
*PE REAL POWER(*,25),FMAX(*,25),FKX(*,25),FKY(*,25),RINBUF(*,640),
1      X(*,25),Y(*,25),FFT(*,612),KERNEL(*,25),
2      XC(X)RD(*),YC(X)RD(*),PREAL1(*),COSK(*),SINK(*),
4      COSDK(*),SINDK(*),BEAMER(*),FPMAX(*),KXMAX(*),
5      KYMAX(*),DELX(*),DELY(*),KXSEP(*),KYSEP(*),KSEP(*),
6      VEL(*),AZ(*),SIGNAL(*),FSTAT(*),SUMSQ(*)
7      TEST(*),K(*),CHANAV(*),TPOWER(*),FREQ(*)
*PE REAL ADKX(4),ADKY(4),YPOINT(50),YMAX(50),DX(500),DY(500)
*PE REAL BEAM(*),TPOW(*),DELTAK(*),P
*PE REAL PREAL2(*),RPOWER(*,25),IPOWER(*,25),RTPOW(*),ITPOW(*)
*PE INTEGER MAX
*CU INTEGER LOFREQ,HIFREQ,DEBUG,SM,T1,T2,ARRAY,PAGE,I,N,MNCHAN,
1      MNPTS,NPOINT,SWITCH,NFREQ,IGO,LINE,LINES,INDEX,IP,
2      TWIN,SAM,IFREQ,J,NFREQ1,REFINE,IND,YTOP
3      YPMI,SIGN,NTIMES,LINEPI
*PE REAL DELTX(3000),DELT(3000),DIST
*PE REAL DELTAX,DELTAY,KX,KY
*CU REAL DKX,LOWER,UPPER,LINEP,HDKX,BORDER,TWOH
*CU REAL DELTAF,RADIUS,ANGLE
*CU LOGICAL MODE3,NMODE
*EXTERNAL MAX,FNGRID,REALE,IMG,GRID,CHECKR,OUTPUT
*COMMON/MAINFK/INBUF,CNTRL,NCHAN,PINT1,OFFSET,LOCATE,NPTS,COUNT2,
1      COUNT3,LOC2D,LOC3D,POWER,FMAX,FKX,FKY,X,Y,KERNEL,
2      XC(X)RD,YC(X)RD,PREAL1,COSK,SINK,BEAM,
3      TPOW,DELTAK,RPOWER,IPOWER,COSDK,SINDK,
4      BEAMER,FPMAX,KXMAX,KYMAX,DELX,DELY,KXSEP,KYSEP,KSEP,
5      TWTIME,TPOWER,VEL,AZ,SIGNAL,FSTAT,SUMSQ,TEST,K,
6      CHANAV,FREQ,ADJF,DX,DY,P,YPOINT,YMAX,ADKX,ADKY,
7      KX,KY,DELTAX,DELTAY
*EQUIVALENCE(INBUF(1,1),RINBUF(1,1)),(INBUF(1,28),FFT(1,1))
*EQUIVALENCE (1,LOFREQ),(2,HIFREQ),(3,DEBUG),(4,SM),(5,T1),(6,T2),
1      (7,ARRAY),(8,PAGE),(9,I),(10,N),(12,MNCHAN),
2      (13,MNPTS),(14,NPOINT),(15,SWITCH),(16,IGO),
3      (17,INDEX),(18,IP),(19,DKX),
4      (20,LOWER),(21,UPPER),(22,LINE),(23,LINES),
5      (24,HDKX),(25,BORDER),(26,TWOH),
6      (27,DELTAF),(28,RADIUS),(29,SIGN),
7      (30,MODE3),(31,NMODE),(32,TWIN),(33,ANGLE),(34,SAM),
8      (35,NFREQ),(36,IFREQ),(37,J),(38,NFREQ1),(39,REFINE),
9      (40,NTIMES),(41,IND),(42,YTOP),(43,YPMI),(44,LINEP),
0      (45,LINEPI)
*DISK AREA CONPRM(1),STCORD(1),FKIN(81)
MODE=ON

```

```

A      OPNDISP FKDISP;
A      JUMP EHEAD;
A      FKDISP:AREA "FKDISP";
A      BHEAD:BLK;
A      DATA (("*****")8,ODOA:16)2,
A      "START EXECUTION FKCOMB",(("*****")8,ODOA:16)2;
A      EHEAD:DISPLS,16,BHEAD,EHEAD-1;
      *READ(64,INBUF(1,1),CONPRM(1),1)
      *WAIT 64
      TWIN=INBUF(2,1)
      DKX=RINBUF(12,1)
      LOFREQ=INBUF(6,1)
      HIFREQ=INBUF(7,1)
      LOWER=RINBUF(13,1)
      UPPER=RINBUF(14,1)
      PREAL1(*)=RINBUF(15,1)*0.0174533
      ANGLE=PREAL1(1)
      REFIN=INBUF(16,1)
      SAM=INBUF(17,1)
      NFREQ=HIFREQ-LOFREQ+1
      NFREQ1=NFREQ-1
      DEBUG=INBUF(1,1)
A      SKIP ,ET;
A      T:WDS 1;
A      ET:SLIT(0) T;
A      STORE(0) TWIN;
A      DISPLH "TWIN",16,T,T;
A      STORE(0) DKX;
A      DISPLF "DKX",16,T,T;
A      STORE(0) LOFREQ;
A      DISPLH "LOFREQ",16,T,T;
A      STORE(0) HIFREQ;
A      DISPLH "HIFREQ",16,T,T;
A      STORE(0) LOWER;
A      DISPLF "LOWER",16,T,T;
A      STORE(0) UPPER;
A      DISPLF "UPPER",16,T,T;
A      STORE(0) ANGLE;
A      DISPLH "ANGLE",16,T,T;
A      STORE(0) REFIN;
A      DISPLH "REFINE",16,T,T;
A      STORE(0) SAM;
A      DISPLH "SAM",16,T,T;
A      STORE(0) NFREQ;
A      DISPLH "NFREQ",16,T,T;
A      STORE(0) DEBUG;
A      DISPLH "DEBUG",16,T,T;
      *READ(64,INBUF(1,1),STCORD(1),1)
      *WAIT 64
      XCOORD(*)=RINBUF(*,1)
      YCOORD(*)=RINBUF(*,2)

```

```

A   DISPLF "XC(X)RD",16,XC(X)RD,XC(X)RD+16;
A   DISPLF "YC(X)RD",16,YC(X)RD,YC(X)RD+16;
    *READ(64,INBUF(1,1),FKIN(1),1)
    *WAIT 64
    T1=INBUF(1,1)
    *DO 10 ARRAY=1,7
    *IF(ARRAY.EQ.7)GO TO 9000
C   THAT MEANS UNKNOWN HEADER
    T2=CNTRL(1,ARRAY)
    *IF(T1.EQ.T2)GO TO 15
C   THAT MEANT WE FOUND IT
10*CONTINUE
15*CONTINUE
A   SLIT(0) T;
A   STORE(0) ARRAY;
A   DISPLF "ARRAY NO",16,T,T;
    PAGE=2
C A BUNCH OF DEBUG PRINT OUT O F INITIAL VALUES
20*CONTINUE
50*CONTINUE
    MODE=ON
    *READ(64,INBUF(1,1),FKIN(PAGE),40)
    *WAIT 64
    PAGE=PAGE+40
    TWTIME(*)=INBUF(*,1)
    NCHAN(*)=INBUF(*,2)
    PINTI(*)=MAX(NCHAN(*))
    MNCHAN=PINTI(1)
    *IF(.ALL.((NCHAN(*).EQ.0))) GO TO 9100
    PINTI(*)=1
    *DO 60 TI=1,25
    MODE=(INBUF(*,PINTI(*)+2).EQ.TI)
    X(*,PINTI(*))=XC(X)RD(TI)
    Y(*,PINTI(*))=YC(X)RD(TI)
    PINTI(*)=PINTI(*)+1
    MODE=ON
60*CONTINUE
    *IF(DEBUG.LT.1)GO TO 70
A   DISPLF "C(X)RDIN",0;
    *IF(DEBUG.LT.2)GO TO 70
A   DISPLF "X-0",16,X,X+3;
A   DISPLF "X-1",16,X+64,X+64+3;
A   DISPLF "X-2",16,X+2*64,X+2*64+3;
A   DISPLF "X-3",16,X+3*64,X+3*64+3;
A   DISPLF "Y-0",16,X,X+3;
A   DISPLF "Y-1",16,Y+64,Y+64+3;
A   DISPLF "Y-2",16,Y+2*64,Y+2*64+3;
A   DISPLF "Y-3",16,Y+3*64,Y+3*64+3;

```

```

A      DISPLH "NCHAN",16,NCHAN,NCHAN+3:
70*CONTINUE
      OFFSET(*)=0
      *DO 1000 IFREQ=LOFREQ,HIFREQ
      SWITCH =1
      *CALL GRID
      TPOWER(*)=0.0
      RTPOW(*)=0.0
      ITPOW(*)=0.0
      LOCATE(*)=1
      *DO 100 N=1,MNCHAN
      MODE=(N.LE.NCHAN(*))
      *CALL REALE(FFT(*,OFFSET(*)+N),PREAL1(*))
      *CALL IMG (FFT(*,OFFSET(*)+N),PREAL2(*))
      KERNEL(*,N)=          +(6.28318530*(DELTX(1)*X(*,N)+DELT(1)*Y(*,N)-
      1))
      COSK(*)=COS(KERNEL(*,N))
      SINK(*)=SIN(KERNEL(*,N))
      RPOWER(*,N)=PREAL1(*)*COSK(*)-PREAL2(*)*SINK(*)
      IPOWER(*,N)=PREAL1(*)*SINK(*)+PREAL2(*)*COSK(*)
      RTPOW(*)=RTPOW(*)+RPOWER(*,N)
      ITPOW(*)=ITPOW(*)+IPOWER(*,N)
100*CONTINUE
      MODE=ON
      TPOWER(*)=ITPOW(*)**2+RTPOW(*)**2
      *IF(DEBUG.LT.2)GO TO 110
A      DISPLF "FIRST",0:
A      DISPLF "RTPOW",16,RTPOW,RTPOW+3:
A      DISPLF "ITPOW",16,ITPOW,ITPOW+3:
A      DISPLF "TPOWER",16,TPOWER,TPOWER+3:
A      DISPLF "DELTX(1)",16,DELTX,DELTX:
A      DISPLF "DELT(1)",16,DELT,DELT:
110 *CONTINUE
C      RESTORE MODE
      T1=NPTS(1)
      *DO 300 NPOINT=2,T1
      RTPOW(*)=0.0
      ITPOW(*)=0.0
      MBIT1=MODE
150 *CONTINUE
      *DO 200 N=1,MNCHAN
      MODE=MODE.AND.(N.LE.NCHAN(*))
      DELTAK(*)=+6.28318530*(DELTX(NPOINT)*X(*,N)+
      1 DELTY(NPOINT)*Y(*,N))
      COSDK(*)=COS(DELTAK(*))
      SINDK(*)=SIN(DELTAK(*))
      PREAL1(*)=RPOWER(*,N)*COSDK(*)-IPOWER(*,N)*SINDK(*)
      IPOWER(*,N)=RPOWER(*,N)*SINDK(*)+IPOWER(*,N)*COSDK(*)
      RPOWER(*,N)=PREAL1(*)
      RTPOW(*)=RTPOW(*)+RPOWER(*,N)
      ITPOW(*)=ITPOW(*)+IPOWER(*,N)

```

```

200*CONTINUE
  MODE=MBITI
  TPOW(*)=RTPOW(*)**2+ITPOW(*)**2
C  RESTORE MODE
  MODE=(TPOW(*).GT.TPOWER(*))
  TPOWER(*)=TPOW(*)
  LOCATE(*)=NPOINT
  MODE=MBITI
300*CONTINUE
  FPMAX(*)=TPOWER(*)
  MODE=ON
  SWITCH=2
  *CALL GRID
  *DO 350 N=1,MNCHAN
    MODE=(N.LE.NCHAN(*))
    *CALL REALE(FFT(*,OFFSET(*)+N),PREAL1(*))
    *CALL IMG (FFT(*,OFFSET(*)+N),PREAL2(*))
    KERNEL(*,N)=          +(6.28318530*(KXMAX(*)*X(*,N)+KYMAX(*)*
1      Y(*,N)))
    COSK(*)=COS(KERNEL(*,N))
    SINK(*)=SIN(KERNEL(*,N))
    RPOWER(*,N)=PREAL1(*)*COSK(*)-PREAL2(*)*SINK(*)
    IPOWER(*,N)=PREAL1(*)*SINK(*)+PREAL2(*)*COSK(*)
350*CONTINUE
  MODE=ON
  *IF(DEBUG.LT.2)GO TO 360
A  DISPLF "COARSE",0:
A  DISPLH "NPTS",16,NPTS,NPTS:
A  DISPLH "LOCATE",16,LOCATE,LOCATE+3:
A  DISPLF "KXMAX",16,KXMAX,KXMAX+3:
A  DISPLF "KYMAX",16,KYMAX,KYMAX+3:
  PREAL1(*)=RPOWER(*,N)
  PREAL2(*)=IPOWER(*,N)
A  DISPLF "RPOWER",16,PREAL1,PREAL1+3:
A  DISPLF "IPOWER",16,PREAL2,PREAL2+3:
A  DISPLF "FPMAX",16,FPMAX,FPMAX+3:
360 *CONTINUE
  *CALL FNGRID
  FMAX(*,IFREQ)=FPMAX(*)
  FKX(*,IFREQ)=KXMAX(*)
  FKY(*,IFREQ)=KYMAX(*)
  OFFSET(*)=OFFSET(*)+NCHAN(*)
1000*CONTINUE
  *CALL CHECKR
C  DISPLAY MAXIMUM AND ASSORTED PARAMETERS
  *CALL OUTPUT
  *GO TO 50
9000*CONTINUE
A  DISPLH "BAD HEAD",0:
9100*CONTINUE
A  JUMP PBANNER:

```

; <KERR>CFD.FKCOMB:53 THU 22-AUG-74 8:24AM

PAGE 1:5

A BANNER:BLK;
A DATA (("*****")8,ODOA:16)2,"FKCOMB EOJ",
A (("*****")8,ODOA:16)2;
A PBANNER:DISPLS ,16,BANNER,PBANNER-1;
A CLSDISP FKDISP;
*STOP
*END

SUBROUTINES

```

*BLOCK DATA
*PE INTEGER INBUF(*,640),CNTRL(*,6),NCHAN(*),PINTI(*),OFFSET(*), -
1      LOCATE(*),NPTS(*),COUNT2(*),COUNT3(*),LOC2D(*,25), -
2      LOC3D(*,25),TWTIME(*),ADJF(*)
*PE REAL POWER(*,25),FMAX(*,25),FKX(*,25),FKY(*,25),RINBUF(*,640), -
1      X(*,25),Y(*,25),FFT(*,612),KERNEL(*,25), -
2      XC(X)RD(*),YC(X)RD(*),PREAL1(*),COSK(*),SINK(*), -
4      COSDK(*),SINDK(*),BEAMER(*),FPMAX(*),KXMAX(*), -
5      KYMAX(*),DELX(*),DELY(*),KXSEP(*),KYSEP(*),KSEP(*), -
6      VEL(*),AZ(*),SIGNAL(*),FSTAT(*),SUMSQ(*), -
7      TEST(*),K(*),CHANAV(*),TPOWER(*),FREQ(*)
*PE REAL ADKX(4),ADKY(4),YPOINT(50),YMAX(50),DX(500),DY(500)
*PE REAL BEAM(*),TPOW(*),DELTAK(*),P
*PE REAL PREAL2(*),RPOWER(*,25),IPOWER(*,25),RTPOW(*),ITPOW(*)
*PE INTEGER MAX
*PE REAL DELTX(3000),DELT(3000),DIST
*PE REAL DELTAX,DELTAY,KX,KY
*COMMON/MAINFK/INBUF,CNTRL,NCHAN,PINTI,OFFSET,LOCATE,NPTS,COUNT2, -
1      COUNT3,LOC2D,LOC3D,POWER,FMAX,FKX,FKY,X,Y,KERNEL, -
2      XC(X)RD,YC(X)RD,PREAL1,COSK,SINK,BEAM, -
3      TPOW,DELTAK,RPOWER,IPOWER,COSDK,SINDK, -
4      BEAMER,FPMAX,KXMAX,KYMAX,DELX,DELY,KXSEP,KYSEP,KSEP, -
5      TWTIME,TPOWER,VEL,AZ,SIGNAL,FSTAT,SUMSQ,TEST,K, -
6      CHANAV,FREQ,ADJF,DX,DY,P,YPOINT,YMAX,ADKX,ADKY, -
7      KX,KY,DELTAX,DELTAY
*EQUIVALENCE(INBUF(1,1),RINBUF(1,1)),(INBUF(1,28),FFT(1,1))
*DATA CNTRL/54227,63*0,49619,63*0,60366,63*0,192*0/
*END

```

```

*BLOCK DATA
*PE INTEGER CNTRL(*,6),OUTBUF(*,64,6),PINTI(*),INBUF(*,128),
1      TIME(*),OLDTIM(*),
1      SAVBCT,SAVPTW,OPAGE(6),TSTEPS(6),SCANS,
2      OOPTWA(6), OTIMEA(6),ORGADR,INBUF1(8192)
*COMMON/MAIN/CNTRL,OUTBUF,INBUF,PINTI,TIME,OLDTIM,SAVBCT,SAVPTW,
1      TSTEPS,SCANS,OOPTWA,OPAGE,OTIMEA,ORGADB
*EQUIVALENCE (INBUF(1,1),INBUF1(1))
*DATA OPAGE/6*2/
*DATA CNTRL/1,1,51,16,1,0,103,446,10,1,54227,53*0,
1      0,2,57,0,0,6,29,95,15,2,49619,53*0,
2      0,1,66,0,1,72,12,0,10,1,59366,53*0,
3      10*0,65536,53*0,10*0,65536,53*0,10*0,65536,53*0/
*END

```

```

*BLOCK DATA
*PE INTEGER NBUFF1(*,64),FINSN(*),COMP(*),TOTSCN(*),PINT1(*), -
1      PINT2(*),TIME(*),OTIME(*),TWTIME(*),PEN(*),CNTRL(*,6) -
*PE REAL GLCHFT(*),VARFT(*),BUFF2(*,550,2),BUFF3(*,640),PREAL1(*), -
1      PREAL2(*),ALLMSQ(*),TVARFT(*)
*PE INTEGER LOFREQ,HIFREQ,IBUFF1(4096),IBUFF3(*,640),ABUFF2(70400), -
1      CHG(X)D(80),SITEGD(80),SITES(80)
*PE REAL CHMSQ(80),RBUFF1(4096),ROWSUM,RBUFF2(70400)
*COMMON/MAIN2/NBUFF1,BUFF2,BUFF3,FINSN,COMP,TOTSCN,PINT1,PINT2, -
1      TIME,OTIME,TWTIME,PEN,CNTRL,GLCHFT,VARFT,PREAL1,PREAL2, -
2      ALLMSQ,TVARFT,LOFREQ,HIFREQ,SITEGD,SITES,CHMSQ
*EQUIVALENCE (NBUFF1(1,1),RBUFF1(1),IBUFF1(1)),(BUFF2(1,1,1), -
1      ABUFF2(1),RBUFF2(1)),(CHG(X)D(1),SITEGD(1)), -
2      (BUFF3(1,1),IBUFF3(1,1))
*DATA PEN/1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20, -
1      21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38, -
2      39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56, -
3      57,58,59,60,61,62,63,64/
*DATA CNTRL/54227,0,51,17,60*0, -
1      49619,0,57,19,60*0, -
2      60366,0,66,22,60*0, -
3      65536,63*0,65536,63*0,65536,63*0/
*END

```

**Best Available
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for page 29**

*SUBROUTINE CHECKR

C PURPOSE: VERIFY TWO AND THREE DIMENSIONAL MAXIMUM TEST EACH
C POWER MAXIMUM FOR EACH FREQUENCY.
C DECLARATIONS:

```

*PE INTEGER INBUF(*,640),CNTRL(*,6),NCHAN(*),PINT1(*),OFFSET(*),
1 LOCATE(*),NPTS(*),COUNT2(*),COUNT3(*),LOC2D(*,25),
2 LOC3D(*,25),TWTIME(*),ADJF(*),INDEX(*)
*PE REAL POWER(*,25),FMAX(*,25),FKX(*,25),FKY(*,25),RINBUF(*,640),
1 X(*,25),Y(*,25),FFT(*,612),KERNEL(*,25),
2 XCOORD(*),YCOORD(*),PREAL1(*),COSK(*),SINK(*),
4 COSDK(*),SINDK(*),BEAMER(*),FPMAX(*),KXMAX(*),
5 KYMAX(*),DELX(*),DELY(*),KXSEP(*),KYSEP(*),KSEP(*),
6 VEL(*),AZ(*),SIGNAL(*),FSTAT(*),SUMSQ(*),
7 TEST(*),K(*),CHANAV(*),TPOWER(*),FREQ(*)
*PE REAL ADKX(4),ADKY(4),YPOINT(50),YMAX(50),DX(500),DY(500)
*PE REAL BEAM(*),TPOW(*),DELTAK(*),CHECK(*,3),P
*PE REAL PREAL2(*),RPOWER(*,25),IPOWER(*,25),RTPOW(*),ITPOW(*)
*PE INTEGER MAX
*CU INTEGER LOFREQ,HIFREQ,DEBUG,SM,T1,T2,ARRAY,PAGE,I,N,MNCHAN,
1 MNPTS,NPOINT,SWITCH,NFREQ,IGO,LINE,LINES,IP,
2 TWIN,SAM,IFREQ,J,NFREQ1,REFINE,IND,YTOP,
3 YPMI,SIGN,NTIMES,LINEP1
*PE REAL DELTX(3000),DELT(3000),DIST
*PE REAL DELTAX,DELTAY,KX,KY
*CU REAL DKX,LOWER,UPPER,LINEP,HDKX,BORDER,TWOH
*CU REAL DELTAF,RADIUS,ANGLE
*CU LOGICAL MODE3,NMODE
*EXTERNAL MAX,FNGRID,REALE,IMG,GRID
*COMMON/MAINFK/INBUF,CNTRL,NCHAN,PINT1,OFFSET,LOCATE,NPTS,COUNT2,
1 COUNT3,LOC2D,LOC3D,POWER,FMAX,FKX,FKY,X,Y,KERNEL,
2 XCOORD,YCOORD,PREAL1,COSK,SINK,BEAM,
3 TPOW,DELTAK,RPOWER,IPOWER,COSDK,SINDK,
4 BEAMER,FPMAX,KXMAX,KYMAX,DELX,DELY,KXSEP,KYSEP,KSEP,
5 TWTIME,TPOWER,VEL,AZ,SIGNAL,FSTAT,SUMSQ,TEST,K,
6 CHANAV,FREQ,ADJF,DX,DY,P,YPOINT,YMAX,ADKX,ADKY,
7 KX,KY
*EQUIVALENCE(INBUF(1,1),RINBUF(1,1)),(INBUF(1,28),FFT(1,1))
*EQUIVALENCE (1,LOFREQ),(2,HIFREQ),(3,DEBUG),(4,SM),(5,T1),(6,T2),
1 (7,ARRAY),(8,PAGE),(9,I),(10,N),(12,MNCHAN),
2 (13,MNPTS),(14,NPOINT),(15,SWITCH),(16,IGO),
3 (18,IP),(19,DKX),
4 (20,LOWER),(21,UPPER),(22,LINE),(23,LINES),
5 (24,HDKX),(25,BORDER),(26,TWOH),
6 (27,DELTAF),(28,RADIUS),(29,SIGN),
7 (30,MODE3),(31,NMODE),(32,TWIN),(33,ANGLE),(34,SAM),
8 (35,NFREQ),(36,IFREQ),(37,J),(38,NFREQ1),(39,REFINE),
9 (40,NTIMES),(41,IND),(42,YTOP),(43,YPMI),(44,LINEP1),
0 (45,LINEP1)
*DISK AREA CONPRM(1),STCORD(1),FKIN(81)
*IF(DEBUG.LT.1)GO TO 10

```

```

A   DISPLH "CHECKR",0;
10 *CONTINUE
    COUNT2(*)=0
    COUNT3(*)=0
    PREAL1(*)=0.5*DKX
    HDKX=PREAL1(1)
    *DO 100 I=LOFREQ+1,HIFREQ-1
        MODE3=(FMAX(*,I).GT.FMAX(*,I-1))
        MBIT1=(FMAX(*,I).GT.FMAX(*,I+1))
        MODE3=MODE3.AND.MBIT1
        MODE=MODE.AND..NOT.MODE3
        *IF((FMAX(*,I-1).GT.FMAX(*,I))) INDEX(*)=I-1
        *IF((FMAX(*,I+1).GT.FMAX(*,I))) INDEX(*)=I+1
        KXSEP(*)=FKX(*,I)-FKX(*,INDEX(*))
        KYSEP(*)=FKY(*,I)-FKY(*,INDEX(*))
        KSEP(*)=SQRT(KXSEP(*)**2+KYSEP(*)**2)
        NMODE=(KSEP(*) .LT. HDKX)
        MODE=MODE.AND..NOT.NMODE
        ADJF(*)=I-1
    *DO 560 J=1,2
        DELY(*)=FKY(*,ADJF(*))-FKY(*,I)
        DELX(*)=FKX(*,ADJF(*))-FKX(*,I)
        MBIT2=MODE
        OFFSET(*)=(ADJF(*)-LOFREQ)*NCHAN(*)
        RTPOW(*)=0.0
        ITPOW(*)=0.0
    *DO 550 N=1,MNCHAN
        MODE=MODE.AND.(N.LE.NCHAN(*))
        *CALL REALE(FFT(*,OFFSET(*)+N),PREAL1(*))
        *CALL IMG (FFT(*,OFFSET(*)+N),PREAL2(*))
        DELTAK(*)=
            + (6.28318530*(FKX(*,ADJF(*))*X(*,N)+
            |   FKY(*,ADJF(*))*Y(*,N)))
        COSK(*)=COS(DELTAK(*))
        SINK(*)=SIN(DELTAK(*))
        RTPOW(*)=PREAL1(*)*COSK(*)-PREAL2(*)*SINK(*)+RTPOW(*)
        ITPOW(*)=PREAL1(*)*SINK(*)+PREAL2(*)*COSK(*)+ITPOW(*)
550 *CONTINUE
    MODE=MBIT2
    CHECK(*,J)=RTPOW(*)**2+ITPOW(*)**2
    ADJF(*)=I+1
560 *CONTINUE
    MODE=ON
    MBIT2=(FMAX(*,I).GT.CHECK(*,1))
    MBIT1=(FMAX(*,I).GT.CHECK(*,2))
    MBIT1=MBIT1.AND.MBIT2
    MBIT1=MBIT1.AND..NOT.NMODE
    MODE3=MODE3.OR.MBIT1
    NMODE=.NOT.MODE3
    MODE=NMODE
    COUNT2(*)=COUNT2(*)+1
    LOC2D(*,COUNT2(*))=I
    MODE=MODE3
    COUNT3(*)=COUNT3(*)+1
    LOC3D(*,COUNT3(*))=I
    MODE=ON

```

; <KERR>CFD.CHECKR:23 THU 22-AUG-74 7:02AM

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```
A      SETC(0) G;
A      SETC(1) H;
A      DISPLH "MODES",1;
A      DISPLF "CHECK1",16,CHECK,CHECK+9;
A      DISPLF "CHECK2",16,CHECK+64,CHECK+73;
100* CONTINUE
      *RETURN
      *END
```

```

*SUBROUTINE C16T64(IN,OUT)
*PE REAL IN(*),OUT(*)
*PE INTEGER NBUFF1(*,64),FINSN(*),COMP(*),TOTSCN(*),PINT1(*),
1 PINT2(*),TIME(*),OTIME(*),TWTIME(*),PEN(*),CNTRL(*,6)
*PE REAL GLCHFT(*),VARFT(*),BUFF2(*,550,2),BUFF3(*,640),PREAL1(*),
1 PREAL2(*),ALLMSQ(*),TVARFT(*)
*PE INTEGER LOFREQ,HIFREQ,IBUFF1(4096),IBUFF3(*,640),ABUFF2(70400),
1 CHGOOD(80),SITEGD(80),SITES(80)
*PE REAL CHMSQ(80),RBUFF1(4096),ROWSUM,RBUFF2(70400)
*CU INTEGER ADBBUF(8),COREPT, BYTE,ADBWRD,ARRAY,DEBUG,TWSZ,
1 OVLAP,NCHAN,NSITE,NROWS,DIFFR,DIFFW,NEW,OLD,GAP,TSCANS,
2 INDEX1,INDEX2,INDEX3,INDEX4,T1,T2,T3,T4,T5,T6,CH,
3 OFFSET,INBYT,NGDCH,TWSZR,NGDST,NGDR,F,BF3PE,NGT,PAGE,T7
*CU LOGICAL LADBBU(8),LCOREP,LAST16,LBYTE,LADBWR,LARRAY,LDEBUG,
1 LTWSZ,LOVLAP,LNCHAN,LNSITE,LNROWS,LDIFFR,LDIFFW,LNEW,
2 LOLD,LGAP,LTSCAN,LT1,LT2,LT3,LT4,LT5,LT6,LCH,LOFFSE,
3 LINBYT,LF,LNGDCH,LTWSZR,LNGDST,LNGDR,LNGT,LT7
*EXTERNAL GTDATA,C64T32,ROWSUM,RUNFFT,C32T64
*COMMON/MAIN2/NBUFF1,BUFF2,BUFF3,FINSN,COMP,TOTSCN,PINT1,PINT2,
1 TIME,OTIME,TWTIME,PEN,CNTRL,GLCHFT,VARFT,PREAL1,PREAL2,
2 ALLMSQ,TVARFT,LOFREQ,HIFREQ,SITEGD,SITES,CHMSQ
*EQUIVALENCE (NBUFF1(1,1),RBUFF1(1),IBUFF1(1)),(BUFF2(1,1,1),
1 ABUFF2(1),RBUFF2(1)),(CHGOOD(1),SITEGD(1)),
2 (BUFF3(1,1),IBUFF3(1,1))
*EQUIVALENCE (1,ADBBUF(1),LADBBU(1)),(9,COREPT,LCOREP),(10,BYTE,
1 LBYTE),(11,ADBWRD,LADBWR),(12,ARRAY,LARRAY),(13,TWSZ,
2 LTWSZ),(14,OVLAP,LOVLAP),(15,NCHAN,LNCHAN),(16,NSITE,
3 LNSITE),(17,NROWS,LNROWS),(18,DIFFR,LDIFFR),(19,DIFFW,
4 LDIFFW),(20,NEW,LNEW),(21,OLD,LOLD),(22,GAP,LGAP),(23,
5 TSCANS,LTSCAN),(24,INDEX1),(25,INDEX2),(26,INDEX3),(27,
6 INDEX4),(28,T1,LT1),(29,T2,LT2),(30,T3,LT3),(31,T4,
7 LT4),(32,T5,LT5),(33,T6,LT6),(34,CH,LCH),(35,OFFSET,
8 LOFFSE),(36,INBYT,LINBYT),(37,F,LF),(38,NGDCH,LNGDCH),
9 (39,TWSZR,LTWSZR),(40,NGDST,LNGDST),(41,NGDR,LNGDR),
0 (42,BF3PE),(43,NGT,LNGT),(44,LAST16),(45,DEBUG,LDEBUG),
1 (46,PAGE),(47,T7,LT7)
*DISK AREA INDM2(20),OUTDM2(40),CONPRM(1)
*IF(DEBUG.LT.1)GO TO 10
A DISPLH "C16T64",0;
*IF(DEBUG.LT.3)GO TO 10
A LDL(0) $D49;
A LDA IN(0);
A DISPLH "IN",32;
10 *CONTINUE
C NOW TO CHECK WHICH ARRAY WE HAVE.
*IF(ARRAY.GT.2)GO TO 100
C LASA AND ALPA HERE. SIMPLE 14 BIT TWOS COMPLEMENT.
A LDL(0) $D49;
A LDA IN(0);
A SHAR =2; % RIGHT JUSTIFY IT.
A AND =3FFF*16; % GOT RID OF ANY GARBAGE BITS.

```

```

A   LDR SA;           % SAVE IT IN $R.
A   % NOW TO TAKE CARE OF THE SIGN.
A   LIT(0) = 0C00E0000000000000:16;
A   % WITH A 1 IN THE HIGH ORDER BIT OF THE
A   % MANTISSA THATS -(2**13) WHICH IS THE
A   % VALUE OF THE SIGN BIT.
A   SHAR = 13;        % ISOLATE THE SIGN BIT.
A   SHAL = 47;        % PUT IT IN THE HIGH ORDER BIT OF THE
A   % MANTISSA.
A   LEX SCO;
A   NORM;             % NOW ITS EITHER -(2**13) OR 0.0 .
A   SAN;
A   LDS SA;           % SAVE SIGN IN $S.
A   LDA SR;           % GET THE ORIGINAL.
A   SHAL = 35;        % SIGN BIT WENT IN EXPONENT SO(XN) TO BE
A   % OVERWRITTEN.
A   LIT(0) = 0400D0000000000000:16;
A   LEX SCO;
A   NORM;             % ABSOLUTE VALUE IS IN FLOATING FORMAT.
A   ADRN $S;          % ADD IN THE SIGN.
A   STA OUT;          % GOT IT.
*GO TO 500
100 *IF (ARRAY.NE.3) GO TO 200
C   NORSAR DATA. 4 BITS OF GAIN CODE AND 12-BIT TWOS COMPLEMENT
C   MANTISSA.
A   LDL(0) $D49;
A   LDA IN(0);
A   LDS SA;           % SAVE IT IN $S.
A   % FIRST LETS DO THE SIGN.
A   AND = 0800:16;
A   SHAL = 36;        % PUT THE SIGN BIT IN THE HIGH ORDER BIT
A   % OF THE MANTISSA.
A   LIT(0) = 0C00C0000000000000:16;
A   LEX SCO;          % NOW ITS EITHER -(2**11) OR 0.0 .
A   NORM;
A   SAN;
A   LDR SA;           % SAVE IT IN $R;
A   LDA $S;           % RESTORE THE ORIGINAL TO DO THE REST
A   % OF THE MANTISSA.
A   AND = 7FF:16;     % LOW ORDER 11 BITS.
A   SHAL = 37;        % LEFT JUSTIFY THEM IN THE MANTISSA.
A   LIT(0) = 0400B0000000000000:16;
A   LEX SCO;
A   NORM;             % THATS THE MANTISSA WITHOUT THE SIGN.
A   ADRN $R;          % THATS THE MANTISSA WITH THE SIGN.
A   LDR SA;           % SAVE IT IN $R.
A   LDA $S;           % RESTORE THE ORIGINAL TO DO GAIN CODE.
A   SHAR = 12;        % ISOLATE THE 4 BITS OF GAIN CODE.
A   SAN;             % MAKE IT NEGATIVE.
A   ADM = 400C:16;    % WE WANT EXPONENT TO BE THAT OF
A   % 2**(10-GAIN). THATS EXPONENT OT 2**10.

```

```
A      SHAL =48;
A      SAB =16;
A      MLRN $R;
A      LDL(0) $D50;
A      STA OUT(0);
      *GO TO 500
200 *CONTINUE
A      DISPLH "ARG200",2;
C      ARRAY WAS OUT OF RANGE.
500 *CONTINUE
      *IF(DEBUG.LT.1)GO TO 510
A      DISPLH "EC16T64",0;
      *IF(DEBUG.LT.3)GO TO 510
A      LDL(0) $D50;
A      STA OUT(0);
510 *CONTINUE
      *RETURN
      *END
```

% THATS GOT THE GAIN CODE.
% MULTIPLY IN THE MANTISSA AND SIGN.

```

*SUBROUTINE C32T64(IN,OUT)
*PE REAL IN(*),OUT(*)
*PE INTEGER NBUFF1(*,64),FINSN(*),COMP(*),TOTSCN(*),PINT1(*), -
1 PINT2(*),TIME(*),OTIME(*),TWTIME(*),PEN(*),CNTRL(*,6)
*PE REAL GLCHFT(*),VARFT(*),BUFF2(*,550,2),BUFF3(*,640),PREAL1(*), -
1 PREAL2(*),ALLMSQ(*),TVARFT(*)
*PE INTEGER LOFREQ,HIFREQ,IBUFF1(4096),IBUFF3(*,640),ABUFF2(70400), -
1 CHGOOD(80),SITEGD(80),SITES(80)
*PE REAL CHMSQ(80),RBUFF1(4096),ROWSUM,RBUFF2(70400)
*CU INTEGER ADRBUF(8),COREPT, BYTE,AD3WRD,ARRAY,DEBUG,TWSZ, -
1 OVLAP,NCHAN,NSITE,NROWS,DIFFR,DIFFW,NEW,OLD,GAP,TSCANS, -
2 INDEX1,INDEX2,INDEX3,INDEX4,T1,T2,T3,T4,T5,T6,CH, -
3 OFFSET,INBYT,NGDCH,TWSZR,NGDST,NGDR,F,BF3PE,NGT,PAGE,T7
*CU LOGICAL LADBBU(8),LCOREP,LAST16,LBYTE,LAD3WR,LARRAY,LDEBUG, -
1 LTWSZ,LOVLAP,LNCHAN,LNSITE,LNROWS,LDIFFR,LDIFFW,LNEW, -
2 LOLD,LGAP,LTSCAN,LT1,LT2,LT3,LT4,LT5,LT6,LCH,LOFFSE, -
3 LINBYT,LF,LNGDCH,LTWSZR,LNGDST,LNGDR,LNGT,LT7
*EXTERNAL GTDATA,C16T64,C64T32,ROWSUM,RUNFFT
*COMMON/MAIN2/NBUFF1,BUFF2,BUFF3,FINSN,COMP,TOTSCN,PINT1,PINT2, -
1 TIME,OTIME,TWTIME,PEN,CNTRL,GLCHFT,VARFT,PREAL1,PREAL2, -
2 ALLMSQ,TVARFT,LOFREQ,HIFREQ,SITEGD,SITES,CHMSQ
*EQUIVALENCE (NBUFF1(1,1),RBUFF1(1),IBUFF1(1)),(BUFF2(1,1,1), -
1 ABUFF2(1),RBUFF2(1)),(CHGOOD(1),SITEGD(1)), -
2 (BUFF3(1,1),IBUFF3(1,1))
*EQUIVALENCE (1,AD3BUF(1),LADBBU(1)),(9,COREPT,LCOREP),(10,BYTE, -
1 LBYTE),(11,AD3WRD,LAD3WR),(12,ARRAY,LARRAY),(13,TWSZ, -
2 LTWSZ),(14,OVLAP,LOVLAP),(15,NCHAN,LNCHAN),(16,NSITE, -
3 LNSITE),(17,NROWS,LNROWS),(18,DIFFR,LDIFFR),(19,DIFFW, -
4 LDIFFW),(20,NEW,LNEW),(21,OLD,LOLD),(22,GAP,LGAP),(23, -
5 TSCANS,LTSCAN),(24,INDEX1),(25,INDEX2),(26,INDEX3),(27, -
6 INDEX4),(28,T1,LT1),(29,T2,LT2),(30,T3,LT3),(31,T4, -
7 LT4),(32,T5,LT5),(33,T6,LT6),(34,CH,LCH),(35,OFFSET, -
8 LOFFSE),(36,INBYT,LINBYT),(37,F,LF),(38,NGDCH,LNGDCH), -
9 (39,TWSZR,LTWSZR),(40,NGDST,LNGDST),(41,NGDR,LNGDR), -
0 (42,BF3PE),(43,NGT,LNGT),(44,LAST16),(45,DEBUG,LDEBUG), -
1 (46,PAGE),(47,T7,LT7)
*DISK AREA INDM2(20),OUTDM2(40),CONPRM(1)
*IF(DEBUG.LT.1)GO TO 10
A DISPLH "C32T64",0:
*IF(DEBUG.LT.3)GO TO 10
A LDL(0) $D49:
A LDA IN(0):
A DISPLH "IN",32:
10 *CONTINUE
A LDL(0) $D49:
A LDA IN(0):
A LDR SA:
A RAB =0:
A % SAVE IT.
A % ELIMINATE THE SIGN SO WE CAN DO THE
A % EXPONENT.
A SHAR =56:
A % ISOLATE THE EXPONENT.
A SBM =40:16:
A % SUBTRACT THE 32 BIT OFFSET.

```

```

A      ADM =4000;16;          % ADD THE 64 BIT OFFSET.
A      SHAL =48;              % PUT IT IN THE 64 BIT EXP. FIELD.
A      LDS $A;                % SAVE IT.
A      LDA $R;                % NOW FOR THE SIGN.
A      SHAR =63;
A      SHAL =63;              % SIGN BIT IS ISOLATED.
A      OR $S;                 % NOW WE HAVE EXPONENT AND SIGN.
A      LDS $A;                % SAVE IT.
A      LDA $R;                % NOW FOR THE MANTISSA.
A      SHAL =40;              % ISOLATE THE MANTISSA.
A      SHAR =16;              % PUT IT IN 64 BIT EXP FIELD.
A      OR $S;                 % DONE.
A      LDL(O) $D50;
A      STA (OUT(O));
A      *IF(DEBUG.LT.1)GO TO 110
A      DISPLH "EC32T64",0;
A      *!F(DEBUG.LT.3)GO TO 110
A      LDL(O) $D50;
A      LDA (OUT(O));
A      DISPLH "OUT",32;
110 *CONTINUE
      *RETURN
      *END

```

```

*SUBROUTINE C64T32(IN)
*PE REAL IN(*)
*PE INTEGER NBUFF1(*,64),FINSN(*),COMP(*),TOTSCN(*),PINT1(*), -
1 PINT2(*),TIME(*),OTIME(*),TWTIME(*),PEN(*),CNTRL(*,6)
*PE REAL GLCHFT(*),VARFT(*),BUFF2(*,550,2),BUFF3(*,640),PREAL1(*), -
1 PREAL2(*),ALLMSQ(*),TVARFT(*)
*PE INTEGER LOFREQ,HIFREQ,IBUFF1(4096),IBUFF3(*,640),ABUFF2(70400), -
1 CHG(X)D(80),SITEGD(80),SITES(80)
*PE REAL CHMSQ(80),RBUFF1(4096),ROWSUM,RBUFF2(70400)
*CU INTEGER ADBBUF(8),COREPT, BYTE,ADBWRD,ARRAY,DEBUG,TWSZ, -
1 OVLAP,NCHAN,NSITE,NROWS,DIFFR,DIFFW,NEW,OLD,GAP,TSCANS, -
2 INDEX1,INDEX2,INDEX3,INDEX4,T1,T2,T3,T4,T5,T6,CH, -
3 OFFSET,INBYT,NGDCH,TWSZR,NGDST,NGDR,F,BF3PE,NGT,PAGE,T7
*CU LOGICAL LADBBU(8),LCOREP,LAST16,LBYTE,LADBWR,LARRAY,LDEBUG, -
1 LTWSZ,LOVLAP,LNCHAN,LNSITE,LNROWS,LDIFFR,LDIFFW,LNEW, -
2 LOLD,LGAP,LTSCAN,LT1,LT2,LT3,LT4,LT5,LT6,LCH,LOFFSE, -
3 LINBYT,LF,LNGDCH,LTWSZR,LNGDST,LNGDR,LNGT,LT7
*EXTERNAL GTDATA,C16T64,ROWSUM,RUNFFT,C32T64
*COMMON/MAIN2/NBUFF1,BUFF2,BUFF3,FINSN,COMP,TOTSCN,PINT1,PINT2, -
1 TIME,OTIME,TWTIME,PEN,CNTRL,GLCHFT,VARFT,PREAL1,PREAL2, -
2 ALLMSQ,TVARFT,LOFREQ,HIFREQ,SITEGD,SITES,CHMSQ
*EQUIVALENCE (NBUFF1(1,1),RBUFF1(1),IBUFF1(1)),(BUFF2(1,1,1), -
1 ABUFF2(1),RBUFF2(1)),(CHG(X)D(1),SITEGD(1)), -
2 (BUFF3(1,1),IBUFF3(1,1))
*EQUIVALENCE (1,ADBBUF(1),LADBBU(1)),(9,COREPT,LCOREP),(10,BYTE, -
1 LBYTE),(11,ADBWRD,LADBWR),(12,ARRAY,LARRAY),(13,TWSZ, -
2 LTWSZ),(14,OVLAP,LOVLAP),(15,NCHAN,LNCHAN),(16,NSITE, -
3 LNSITE),(17,NROWS,LNROWS),(18,DIFFR,LDIFFR),(19,DIFFW, -
4 LDIFFW),(20,NEW,LNEW),(21,OLD,LOLD),(22,GAP,LGAP),(23, -
5 TSCANS,LTSCAN),(24,INDEX1),(25,INDEX2),(26,INDEX3),(27, -
6 INDEX4),(28,T1,LT1),(29,T2,LT2),(30,T3,LT3),(31,T4, -
7 LT4),(32,T5,LT5),(33,T6,LT6),(34,CH,LCH),(35,OFFSET, -
8 LOFFSE),(36,INBYT,LINBYT),(37,F,LF),(38,NGDCH,LNGDCH), -
9 (39,TWSZR,LTWSZR),(40,NGDST,LNGDST),(41,NGDR,LNGDR), -
0 (42,BF3PE),(43,NGT,LNGT),(44,LAST16),(45,DEBUG,LDEBUG), -
1 (46,PAGE),(47,T7,LT7)
*DISK AREA INDM2(20),OUTDM2(40),CONPRM(1)
*IF(DEBUG.LT.1)GO TO 10
A DISPLH "C64T32",0:
*IF(DEBUG.LT.3)GO TO 10
A LDL(0) $D49:
A LDA IN(0):
A DISPLH "IN",32:
A DISPLF ,32:
10 *CONTINUE
A LDL(0) $D49:
A LDA IN(0):
A LDS $A:
A RAB =0:
A SHAR =48:
A SBM =4000:16:
% SAVE IT.
% GET RID OF THE SIGN BIT FOR NOW.
% ISOLATE THE EXPONENT.
% SUBTRACT OUT THE 64-BIT OFFSET.

```

```
A      ADM =40:16:      % ADD IN THE 32-BIT OFFSET.
A      SHAL =56:      % PUT IT IN 32-BIT OUTER EXPONENT FIELD.
A      LDR $A:      % SAVE IT.
A      LDA $S:      % NOW FOR THE SIGN BIT.
A      SHAR =63:
A      SHAL =63:
A      OR $R:      % $A HAS EXPONENT AND SIGN.
A      LDR $A:      % SAVE IT.
A      LDA $S:      % NOW FOR THE MANTISSA.
A      SHAL =16:
A      SHAR =40:      %THE 32-BIT MANTISSA FIELD.
A      OR $R:      % THATS ALL OF IT.
A      LDL(0) $D49:
A      STA IN(0):
A      *IF(DEBUG.LT.1)GO TO 110
A      DISPLH "EC64T32",0:
A      *IF(DEBUG.LT.3)GO TO 110
A      LDL(0) $D49:
A      LDA IN(0):
A      DISPLH "OUT(IN)",32:
110 *CONTINUE
      *RETURN
      *END
```

```

*SUBROUTINE CNVTIM
*PE INTEGER CNTRL(*,6),OUTBUF(*,64,6),PINTI(*),INBUF(*,128),
1      TIME(*),OLDTIM(*),
1      SAVBCT,SAVPWT,OUTPAGE(6),TSTEPS(6),SCANS,
2      OOPTWA(6), OTIMEA(6)
*CU INTEGER ADBBUF(8),ARRAY,INPTB,INPTW,SAVADB,ADBOU(6),OUPTW,
1      BYTS,WORDS,T1,T2,T3,T4,T5,T6, IT,PRTIAL,ADDRS,
2      WORD, BYTCNT(6),ADBWRD,INBYT,OUTBYT,ORGCOR,PAGE,
3      DEBUG,BCT,ADB,ENDADB
*CU LOGICAL LADBBU(8),LARRAY,LINPTB,LINPTW,LSAVAD,LADBOU(6),LOUPTW,
1      LBYTS,LWORDS,LT1,LT2,LT3,LT4,LT5,LT6,LOUBYT,LIT,LPRTIA,
2      LADDRS,LWORD,LINBYT,LBYTCN(6),LADBWR,LORGC(),LPAGE
3      LDEBUG,LBCT,LADB,LENDAD
*EXTERNAL RDPRM,GETBYT,PUTBYT
*COMMON/MAIN/CNTRL,OUTBUF,INBUF,PINTI,TIME,OLDTIM,SAVBCT,SAVPWT,
1      TSTEPS,SCANS,OOPTWA,OUTPAGE, OTIMEA
*EQUIVALENCE(1,ADBBUF(1),LADBBU(1)),(9,ARRAY,LARRAY),
1      (10,INPTB,LINPTB),
1      (11,INPTW,LINPTW),(12,SAVADB,LSAVAD),
1      (13,ADBOU(6),LADBOU(6))
2      (19,OOPTW,LOOPTW),(20,BYTS,LBYTS),(21,WORDS,LWORDS),
3      (22,T1,LT1),(23,T2,LT2),(24,T3,LT3),(25,T4,LT4),
4      (26,T5,LT5),(27,T6,LT6),(28,OUTBYT,LOUBYT),(29,IT,LIT),
5      (30,PRTIAL,LPRTIA),(31,ADDRS,LADDRS),(32,WORD,LWORD),
6      (33,INBYT,LINBYT),(34,BYTCNT(1),LBYTCN(1)),
7      (40,ADBWRD,LADBWR)
8      (43,ORGCOR,LORGC()),
9      (44,PAGE,LPAGE),(45,DEBUG,LDEBUG),(46,BCT,LBCT),
9      (47,ADB,LADB),(48,ENDADB,LENDAD)
*DISK AREA OUPUT1(20),OUPUT2(20),OUPUT3(20),OUPUT4(20),OUPUT5(20),
1      OUPUT6(20),INPUT(50)
*IF(DEBUG.LT.1)GO TO 10
A  DISPLH "CNVTIM:",0:
10 T6=CNTRL(2,ARRAY)
*IF(T6.NE.1)GO TO 100
C  CNTRL(2,ARRAY) EQUALS 1 ONLY IF TIME IS ALREADY IN THE FORM OF
C  DECISECONDS FROM THE BEGINNING OF THE YEAR AS READ FROM THE TAPE.
C  NO CONVERSION IS NECESSARY.
C  WE NEED ONLY TO MOVE IT.
*CALL GETBYT
A  LDL(0) LINBYT:
A  CSHL(0) 16:
A  LDA SCO:
A  STA TIME:
*CALL GETBYT
A  LDL(0) LINBYT:
A  LDA SCO:
A  OR TIME:
A  STA TIME:
*IF(DEBUG.LT.1)GO TO 20
A  DISPLH "FMT#1",0:
*IF(DEBUG.LT.2)GO TO 20

```

```

A   DISPLH "TIME",2:
20  *GO TO 500
100  T6=CNTRL(2,ARRAY)
    *IF(T6.NE.2)GO TO 200
C   TIME IS IN EBCDIC IN THE FORM DDDHHMMSS. GET IT A CHARACTER AT A
C   TIME.
    *CALL GETBYT
    LT6=OFF.TURN ON..LAST.4
    LT1=LINBYT.SHR.12
    LT2=LINBYT.SHR.8
    LT2=LT2.AND.LT6
    LT3=LINBYT.SHR.4
    LT3=LT3.AND.LT6
    LT4=LINBYT.AND.LT6
A   %DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
    TIME(*)=(T1*100+T2*10+T3)*24+T4*10
    *CALL GETBYT
    LT6=OFF.TURN ON..LAST.4
    LT1=LINBYT.SHR.12
    LT2=LINBYT.SHR.8
    LT2=LT2.AND.LT6
    LT3=LINBYT.SHR.4
    LT3=LT3.AND.LT6
    LT4=LINBYT.AND.LT6
A   %DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
    TIME(*)=((TIME(*)+T1)*60+T2*10+T3)*60+T4*10
    *CALL GETBYT
    LT1=LINBYT.SHR.12
A   %DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
    TIME(*)=(TIME(*)+T1)*10
    *IF (DEBUG.LT.1) GO TO 110
A   DISPLH "FMT#2",0:
    *IF(DEBUG.LT.2)GO TO 110
A   DISPLH "TIME:",16,TIME,TIME:
110  *GO TO 500
200  *CONTINUE
C   IF WE GET HERE SOMETHING WIERD IS GOING ON, SINCE IT AINT A VALID
C   FORMAT. PRINT OUT A LITTLE MESSAGE AND SEE WHAT HAPPENS.
A   DISPLH "ARGTIME",2:
500  *CONTINUE
    *IF(DEBUG.LT.1)GO TO 510
A   DISPLH "ECNVTIM:",0:
510  *RETURN
    *END

```

```

*SUBROUTINE FNGRID
C  PURPOSE:ONCE A POWER MAXIMUM HAS BEEN FOUND FOR EACH FREQUENCY
C  ON THE COARSE GRID REFINEMENTS OF THE MAX ARE PERFORMED ON A
C  SQUARE GRID. THE SPACING ON THE SQUARE GRID IS DKX/6.
C  THE SEARCH STARTS IN THE EAST DIRECTION AND PROCEEDS
C  CLOCKWISE. THE DIRECTION OF THE SEARCH IS CHANGED WHEN A
C  MAX IS FOUND IN THE DIRECTION.
C  DECLARATIONS:
*PE INTEGER INBUF(*,640),CNTRL(*,6),NCHAN(*),PINT1(*),OFFSET(*),
1      LOCATE(*),NPTS(*),COUNT2(*),COUNT3(*),LOC2D(*,25),
2      LOC3D(*,25),TWTIME(*),ADJF(*)
*PE REAL POWER(*,25),FMAX(*,25),FKX(*,25),FKY(*,25),RINBUF(*,640),
1      X(*,25),Y(*,25),FFT(*,612),KERNEL(*,25),
2      XCOORD(*),YCOORD(*),PREALI(*),COSK(*),SINK(*),
4      COSDK(*),SINDK(*),BEAMER(*),FPMAX(*),KXMAX(*),
5      KYMAX(*),DELX(*),DELY(*),KXSEP(*),KYSEP(*),KSEP(*),
6      VEL(*),AZ(*),SIGNAL(*),FSTAT(*),SUMSQ(*)
7      TEST(*),K(*),CHANAV(*),TPOWER(*),FREQ(*),TDKX(*)
*PE REAL ADKX(4),ADKY(4),YPOINT(50),YMAX(50),DX(500),DY(500)
*PE REAL BEAM(*),TPOW(*),DELTAK(*),NRPOWER(*,25),NIPWR(*,25),P
*PE REAL PREAL2(*),RPOWER(*,25),IPOWER(*,25),RTPOW(*),ITPOW(*)
*PE INTEGER MAX
*CU INTEGER LOFREQ,HIFREQ,DEBUG,SM,T1,T2,ARRAY,PAGE,I,N,MNCHAN,
1      MNPTS,NPOINT,SWITCH,NFREQ,IGO,LINE,LINES,INDEX,IP,
2      TWIN,SAM,IFREQ,J,NFREQ1,REFINE,IND,YTOP
3      YPMI,SIGN,NTIMES,LINEPI
*PE REAL DELTX(3000),DELT(3000),DIST
*PE REAL DELTAX,DELTAY,KX,KY
*CU REAL DKX,LOWER,UPPER,LINEP,HDKX,BORDER,TWOH
*CU REAL DELTAF,RADIUS,ANGLE
*CU LOGICAL MODE3,NMODE
*EXTERNAL MAX,GRID,REALE,IMG
*COMMON/MAINFK/INBUF,CNTRL,NCHAN,PINT1,OFFSET,LOCATE,NPTS,COUNT2,
1      COUNT3,LOC2D,LOC3D,POWER,FMAX,FKX,FKY,X,Y,KERNEL,
2      XCOORD,YCOORD,PREALI,COSK,SINK,BEAM,
3      TPOW,DELTAK,RPOWER,IPOWER,COSDK,SINDK,
4      BEAMER,FPMAX,KXMAX,KYMAX,DELX,DELY,KXSEP,KYSEP,KSEP,
5      TWTIME,TPOWER,VEL,AZ,SIGNAL,FSTAT,SUMSQ,TEST,K,
6      CHANAV,FREQ,ADJF,DX,DY,P,YPOINT,YMAX,ADKX,ADKY,
7      KX,KY
*EQUIVALENCE(INBUF(1,1),RINBUF(1,1)),(INBUF(1,28),FFT(1,1))
*EQUIVALENCE (1,LOFREQ),(2,HIFREQ),(3,DEBUG),(4,SM),(5,T1),(6,T2),
1      (7,ARRAY),(8,PAGE),(9,I),(10,N),(12,MNCHAN),
2      (13,MNPTS),(14,NPOINT),(15,SWITCH),(16,IGO),
3      (17,INDEX),(18,IP),(19,DKX),
4      (20,LOWER),(21,UPPER),(22,LINE),(23,LINES),
5      (24,HDKX),(25,BORDER),(26,TWOH),
6      (27,DELTAF),(28,RADIUS),(29,SIGN),
7      (30,MODE3),(31,NMODE),(32,TWIN),(33,ANGLE),(34,SAM),
8      (35,NFREQ),(36,IFREQ),(37,J),(38,NFREQ1),(39,REFINE)

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9          ,(40,NTIMES),(41,IND),(42,YTOP),(43,YPMI),(44,LINEP), -
0          (45,LINEPI)
*DISK AREA CONPRM(1),STCORD(1),FKIN(81)
  TDKX(*)=DKX
*DO 500 NTIMES=1,REFINE
  TDKX(*)=TDKX(*)/6.0
  PREAL1(*)=TDKX(*)
  ADKX(1)=PREAL1(1)
  ADKX(2)=0.0
  ADKX(4)=0.0
  ADKY(1)=0.0
  ADKY(3)=0.0
  ADKY(4)=PREAL1(1)
  PREAL1(*)=-PREAL1(*)
  ADKX(3)=PREAL1(1)
  ADKY(2)=PREAL1(1)
*DO 475 I=1,4
  MODE=ON
  DELX(*)=ADKX(I)
  DELY(*)=ADKY(I)
  RTPOW(*)=0.0
  ITPOW(*)=0.0
  MBIT1=MODE
*DO 250 N=1,MNCHAN
  MODE=(N.LE.MNCHAN(*))
  DELTAK(*)=+6.283185307*(DELX(*)*X(*,N)+DELY(*)*X(*,N))
  COSDK(*)=COS(DELTAK(*))
  SINDK(*)=SIN(DELTAK(*))
  NRPOWER(*,N)=RPOWER(*,N)*COSDK(*)-IPOWER(*,N)*SINDK(*)
  NIPOWER(*,N)=RPOWER(*,N)*SINDK(*)+IPOWER(*,N)*COSDK(*)
  RTPOW(*)=RTPOW(*)+NRPOWER(*,N)
  ITPOW(*)=ITPOW(*)+NIPOWER(*,N)
250*CONTINUE
  MODE=MBIT1
  TPOW(*)=RTPOW(*)**2+ITPOW(*)**2
400*CONTINUE
  *IF(DEBUG.LT.2)GO TO 405
A   DISPLH "FINE",0;
  PINTI(1)=1
A   DISPLH "I",16,PINTI,PINTI;
A   DISPLF "DELX",16,DELX,DELX;
A   DISPLF "DELY",16,DELY,DELY;
A   DISPLF "RTPOW",16,RTPOW,RTPOW+3;
A   DISPLF "ITPOW",16,ITPOW,ITPOW+3;
A   DISPLF "TPOW",16,TPOW,TPOW+3;
A   DISPLF "FPMAX",16,FPMAX,FPMAX+3;
405*CONTINUE
  MODE=MODE.AND.(TPOW(*).GT.FPMAX(*))
  *IF(.NOT.ANY.(MODE))GO TO 475
  MBIT1=MODE
*DO 410 J=1,MNCHAN
  RPOWER(*,J)=NRPOWER(*,J)
  IPOWER(*,J)=NIPOWER(*,J)

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```

410*CONTINUE
  MODE=MBIT1
  KXMAX(*)=KXMAX(*)+DELX(*)
  KYMAX(*)=KYMAX(*)+DELY(*)
  FPMAX(*)=TPOW(*)
  TPOW(*)=0.
  RTPOW(*)=0.0
  ITPOW(*)=0.0
  *DO 450 J=1,MNCHAN
    MODE=MODE.AND.(J.LE.NCHAN(*))
    DELTAK(*)=+6.2831853070*(DELX(*)*X(*,J)+DELY(*)*Y(*,J))
    COSDK(*)=COS(DELTAK(*))
    SINDK(*)=SIN(DELTAK(*))
    NRPOWER(*,J)=RPOWER(*,J)*COSDK(*)-IPOWER(*,J)*SINDK(*)
    NIPOWER(*,J)=RPOWER(*,J)*SINDK(*)+IPOWER(*,J)*COSDK(*)
    RTPOW(*)=RTPOW(*)+NRPOWER(*,J)
    ITPOW(*)=ITPOW(*)+NIPOWER(*,J)
450*CONTINUE
  MODE=MBIT1
  TPOW(*)=RTPOW(*)**2+ITPOW(*)**2
  *GO TO 400
475*CONTINUE
  MODE=ON
500*CONTINUE
  *IF(DEBUG.LT.2)GO TO 510
A  DISPLF "EFNGRID",0:
510 *CONTINUE
  *RETURN
  *F

```

```

*SUBROUTINE GETBYT
C   GETBYT IS SUPPLIED A POINTER TO THE BYTE WANTED VIA INPTB. IT
C   FIGURES OUT IF THE BYTE IS IN ADB OR CORE OR ON DISK. IT GETS THE
C   DEMANDED BYTE AND LEAVES IT RIGHT JUSTIFIED IN "INBYT". ALL
C   POINTER START AT ZERO RATHER THAN ONE BECAUSE OF THE SHIFTING,
C   ETC. DONE.
*PE INTEGER CNTRL(*,6),OUTBUF(*,64,6),PINTI(*),INBUF(*,128),
1   TIME(*),OLDTIM(*),
1   SAVBCT,SAVPTW,OUNPAGE(6),TSTEPS(6),SCANS,
2   OOPTWA(6), OTIMEA(6),ORGADB,INBUF1(8192)
*CU INTEGER ADBBUF(8),ARRAY,INPTB,INPTW,SAVADB,ADBOUT(6),OOPTW,
1   BYTS,WORDS,T1,T2,T3,T4,T5,T6, IT,PRTIAL,ADDRS,
2   WORD, BYTCNT(6),ADBWDR,INBYT,OUBYT,ORGCOR,PAGE,
3   DEBUG,BCT,ADB,ENDADB
*CU LOGICAL LADBBU(8),LARRAY,LINPTB,LINPTW,LSAVAD,LADBOU(6),LOOPTW,
1   LBYTS,LWORDS,LT1,LT2,LT3,LT4,LT5,LT6,LOUBYT,LIT,LPRTIA,
2   LADDRS,LWORD,LINBYT,LBYTCN(6),LADBWR,LORGC(),LPAGE
3   ,LDEBUG,LBCT,LADB,LENDAD
*EXTERNAL RDPRM,PUTBYT,CNVTIM
*COMMON/MAN/CNTRL,OUTBUF,INBUF,PINTI,TIME,OLDTIM,SAVBCT,SAVPTW,
1   TSTEPS,SCANS,OOPTWA,OUNPAGE,OTIMEA,ORGADB
*EQUIVALENCE(1,ADBBUF(1),LADBBU(1)),(9,ARRAY,LARRAY),
1   (10,INPTB,LINPTB),
1   (11,INPTW,LINPTW),(12,SAVADB,LSAVAD),
1   (13,ADBOUT(6),LADBOU(6))
2   ,(19,OOPTW,LOOPTW),(20,BYTS,LBYTS),(21,WORDS,LWORDS),
3   (22,T1,LT1),(23,T2,LT2),(24,T3,LT3),(25,T4,LT4),
4   (26,T5,LT5),(27,T6,LT6),(28,OUBYT,LOUBYT),(29,IT,LIT),
5   (30,PRTIAL,LPRTIA),(31,ADDRS,LADDRS),(32,WORD,LWORD),
6   (33,INBYT,LINBYT),(34,BYTCNT(1),LBYTCN(1)),
7   (40,ADBWDR,LADBWR),
8   ,(43,ORGCOR,LORGC()),
9   (44,PAGE,LPAGE),(45,DEBUG,LDEBUG),(46,BCT,LBCT),
9   (47,ADB,LADB),(48,ENDADB,LENDAD)
*EQUIVALENCE (INBUF(1,1),INBUF1(1))
*DISK AREA OUPUT1(20),OUPUT2(20),OUPUT3(20),OUPUT4(20),OUPUT5(20),
1   OUPUT6(20),INPUT(50)
C   *IF(DEBUG.LT.1)GO TO 5
A   DISPLH "GETBYT",0:
A   *IF(DEBUG.LT.3)GO TO 5
A   DISPLH "GETBYT1",2:
5 *CONTINUE
C   FIRST MAKE WORD POINTER=BYTE POINTER/4.
C   LINPTW=LINPTB.SHR.2
A   % DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
C   *IF(INPTW.LT.ENDADB)GO TO 30
C   IF WE GET HERE ADB MUST BE REFILLED.
C   *IF(INPTW.LT.ORGCOR+8192)GO TO 20
C   IF WE GET HERE CORE MUST BE REFILLED.
C   PAGE WANTED IS BYTE POINTER/4096 + 1.
C   LPAGE=LINPTB.SHR.12

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A      %DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
      PAGE=PAGE+1
      *READ(64,INBUF(1,1),INPUT(PAGE),8)
      LORGC0=LINPTB.SHR.12
      LORGC0=LORGC0.SHL.10
A      %DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
C      ORGCOR NOW HAS THE WORD ADDRESS OF THE FIRST BYTE IN INBUF.
      *WAIT 64
C      A BIT OF DEBUG OUTPUT NOW
      *IF(DEBUG.LT.1)GO TO 20
A      DISPLH "REFILLC:",0;
      *IF(DEBUG.LT.3)GO TO 20
A      DISPLH "INBUF:",18,INBUF,INBUF+64*4-1;
20 *CONTINUE
C      AT THIS POINT WE REFILL ADRBUF.
      LT6=LINPTB.SHR.5
      LT6=LT6.SHL.3
A      %DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
      ORGADB=T6
      ENDADB=T6+8
C      ORGADB NOW HAS THE WORD ADDRESS OF THE FIRST BYTE IN ADB.ENDADB
C      HAS THE WORD ADDRESS OF THE BYTE AFTER THE LAST BYTE IN ADB.
      T5=T6-ORGCOR+1
C      THATS THE ADDRESS WITHIN INBUF WE WANT TO RE=ILL ADRBUF FROM.
      *TRANSFER(8) ADRBUF(1)=INBUF(1(T5)
      *IF(DEBUG.LT.1) GO TO 30
A      DISPLH "REFILLA:",2;
30 *CONTINUE
C      WHEN WE GET HERE THE BYTE WANTED IS IN ADRBUF. JUST GOTTA FIGURE
C      OUT WHERE.
      T6=ORGADB
      ADBWRD=INPTW-T6+1
A      % A DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
      LT6=OFF.TURN ON..LAST.2
      LT6=LINPTB.AND.LT6
      LT6=LT6.SHL.4
C      T6 IS USED TO DETERMINE THE AMOUNT TO ROTATE THE WORD IN ADB
C      TO RIGHT JUSTIFY THE BYTE WE WANT. NUMBERING THE BYTES 0,1,2,3.
C      THE BYTE WANTED IS (INPTB MOD 4). TO RIGHT JUSTIFY THAT BYTE WE
C      ROTATE LEFT BY ((INPTB MOD 4)+1)*16 OR (INPTB MOD 4)*16+16.T6
C      HAS JUSTED BEEN ASSIGNED (INPTB MOD 4)*16 SO WE HAVE ONLY TO ADD
C      16.
      LT5=OFF.TURN ON..LAST.16
A      %A DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
      LINBYT=LADBRU(ADBWRD).RTL.T6+16
      LINBYT=LINBYT.AND.LT5
      *IF(DEBUG.LT.1)GO TO 40
A      DISPLH "EGETBYT:",0;
      *IF(DEBUG.LT.3)GO TO 40
A      DISPLH "GETBYT:",2;
40 *CONTINUE
      INPTB=INPTB+1
      *RETURN
      *END

```

```

*SUBROUTINE GRID
C  DECLARATIONS:
*PE INTEGER INBUF(*,640),CNTRL(*,6),NCHAN(*),PINT1(*),OFFSET(*), -
1      LOCATE(*),NPTS(*),COUNT2(*),COUNT3(*),LOC2D(*,25), -
2      LOC3D(*,25),TWTIME(*),ADJF(*)
*PE REAL POWER(*,25),FMAX(*,25),FKX(*,25),FKY(*,25),RINBUF(*,640), -
1      X(*,25),Y(*,25),FFT(*,612),KERNEL(*,25), -
2      XC(XORD(*),YC(XORD(*),PREAL1(*),COSK(*),SINK(*), -
4      COSDK(*),SINDK(*),BEAMER(*),FPMAX(*),KXMAX(*), -
5      KYMAX(*),DELX(*),DELY(*),KXSEP(*),KYSEP(*),KSEP(*), -
6      VEL(*),AZ(*),SIGNAL(*),FSTAT(*),SUMSQ(*) -
7      TEST(*),K(*),CHANAV(*),TPOWER(*),FREQ(*)
*PE REAL ADKX(4),ADKY(4),YPOINT(50),YMAX(50),DX(500),DY(500)
*PE REAL BEAM(*),TPOW(*),DELTAK(*),P
*PE REAL PREAL2(*),RPOWER(*,25),IPOWER(*,25),RTPOW(*),ITPOW(*)
*PE INTEGER MAX
*CU INTEGER LOFREQ,HIFREQ,DEBUG,SM,T1,T2,ARRAY,PAGE,I,N,MNCHAN, -
1      MNPTS,NPOINT,SWITCH,NFREQ,IGO,LINE,LINES,INDEX,IP, -
2      TWIN,SAM,IFREQ,J,NFREQ1,REFINE,IND,YTOP -
3      YPMI,NTIMES,LINEPI
*PE REAL DELTX(3000),DELT(3000),DIST
*PE REAL DELTAX,DELTAY,KX,KY
*CU REAL DKX,LOWER,UPPER,LINEP,HDKX,BORDER,TWOH,SIGN
*CU REAL DELTAF,RADIUS,ANGLE
*CU LOGICAL MODE3,NMODE
*EXTERNAL MAX,FNGRID,REALE,IMG
*COMMON/MAINFK/INBUF,CNTRL,NCHAN,PINT1,OFFSET,LOCATE,NPTS,COUNT2, -
1      COUNT3,LOC2D,LOC3D,POWER,FMAX,FKX,FKY,X,Y,KERNEL, -
2      XC(XORD,YCOORD,PREAL1,COSK,SINK,BEAM, -
3      TPOW,DELTAK,RPOWER,IPOWER,COSDK,SINDK, -
4      BEAMER,FPMAX,KXMAX,KYMAX,DELX,DELY,KXSEP,KYSEP,KSEP, -
5      TWTIME,TPOWER,VEL,AZ,SIGNAL,FSTAT,SUMSQ,TEST,K, -
6      CHANAV,FREQ,ADJF,DX,DY,P,YPOINT,YMAX,ADKX,ADKY, -
7      KX,KY,DELTAX,DELTAY
*EQUIVALENCE(INBUF(1,1),RINBUF(1,1)),(INBUF(1,28),FFT(1,1))
*EQUIVALENCE (1,LOFREQ),(2,HIFREQ),(3,DEBUG),(4,SM),(5,T1),(6,T2), -
1      (7,ARRAY),(8,PAGE),(9,I),(10,N),(12,MNCHAN), -
2      (13,MNPTS),(14,NPOINT),(15,SWITCH),(16,IGO), -
3      (17,INDEX),(18,IP),(19,DKX), -
4      (20,LOWER),(21,UPPER),(22,LINEP),(23,LINES), -
5      (24,HDKX),(25,BORDER),(26,TWOH), -
6      (27,DELTAF),(28,RADIUS),(29,SIGN), -
7      (30,MODE3),(31,NMODE),(32,TWIN),(33,ANGLE),(34,SAM), -
8      (35,NFREQ),(36,IFREQ),(37,J),(38,NFREQ1),(39,REFINE) -
9      (40,NTIMES),(41,IND),(42,YTOP),(43,YPMI),(44,LINEP), -
0      (45,LINEPI)
*DISK AREA CONPRM(1),STCORD(1),FKIN(81)
*IF(SWITCH.EQ.2)GO TO 500
PREAL1(*)=DKX*(SQRT(2.0)/2.0)
BORDER=PREAL1(1)

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```
    PREAL1(*)=FLOAT(SAM)/FLOAT(TWIN)
    DELTAF=PREAL1(1)
    PREAL1(*)=ANGLE
    *IF(.ANY.((ANGLE.GT.0.0)))GO TO 20
    PREAL1(*)=(1.0/LOWER)*FLOAT(IFREQ)*DELTAF+BORDER
    RADIUS=PREAL1(1)
    KY=0.0
    KX=0.0
    *GO TO 30
20  PREAL1(*)=(1.0/LOWER-1.0/UPPER)*0.5*FLOAT(IFREQ)*DELTAF+BORDER
    RADIUS=PREAL1(1)
    PREAL1(*)=RADIUS*SIN(ANGLE)
    KX=PREAL1(1)
    PREAL1(*)=RADIUS*COS(ANGLE)
    KY=PREAL1(1)
30  PREAL1(*)=2.0*SQRT(2.0)*DKX*.75
    DELTAY=PREAL1(1)
    PREAL1(*)=(DKX*SQRT(6.0)/2.0)/2.0
    DELTAX=PREAL1(1)
C  CHANGE IN X IS HALF THE BASE TRIANGLE,CHANGE IN Y IS TWICE
C  THE HEIGHT OF BASE TRIANGLE.
    PINT1(*)=IFIX(RADIUS/DELTAX)-1
    LINE=PINT1(1)
    PREAL1(*)=FLOAT(LINE)*DELTAX
    P=PREAL1(1)
    PINT1(*)=2*LINE+1
    LINES=PINT1(1)
    IG=1
    PINT1(*)=(LINE/2)*2
    TI=PINT1(1)
    *IF(LINE.EQ.TI) IG=0
    *DO 100 INDEX=1,LINE
        PREAL1(*)=SQRT(RADIUS**2-(P-FLOAT( INDEX-1)*DELTAX)**2)
        DIST=PREAL1(1)
        *IF(IG.EQ.0)GO TO 50
        PINT1(*)=IFIX((DIST-DELTAY/2.0)/DELTAY)
        YTOP=PINT1(1)
        PREAL1(*)=2.0*FLOAT(YTOP)+2.0
        YPOINT(INDEX)=PREAL1(1)
        PREAL1(*)=DELTAY/2.0+DELTAY*FLOAT(YTOP)
        YMAX(INDEX)=PREAL1(1)
        IG=0
    *GO TO 70
50  *CONTINUE
    PINT1(*)=IFIX(DIST/DELTAY)
    YTOP=PINT1(1)
    PREAL1(*)=2.0*FLOAT(YTOP)+1.0
    YPOINT(INDEX)=PREAL1(1)
    PREAL1(*)=FLOAT(YTOP)*DELTAY
    YMAX(INDEX)=PREAL1(1)
    IG=1
```

```
70 IND=LINES-INDEX+1
   YPOINT(IND)=YPOINT(INDEX)
   YMAX(IND)=YMAX(INDEX)
100 *CONTINUE
   PREAL1(*)=KX-P
   DELTX(1)=PREAL1(1)
   PREAL1(*)=KY-YMAX(1)
   DELTY(1)=PREAL1(1)
   DX(1)=DELTX(1)
   DY(1)=DELTY(1)
   LINEP1=LINE+1
   PINT1(*)=IFIX(RADIUS/DELTAY)
   YTOP=PINT1(1)
   PREAL1(*)=FLOAT(2*YTOP+1)
   YPOINT(LINEP1)=PREAL1(1)
   PREAL1(*)=FLOAT(YTOP)*DELTAY
   YMAX(LINEP1)=PREAL1(1)
   I=1
   SIGN=1.
   INDEX=0
150 INDEX=INDEX+1
   PINT1(*)=IFIX(YPOINT(INDEX))-1
   YPMI=PINT1(1)
   *DO 160 IND=1,YPMI
     I=I+1
     DELTX(1)=0.0
     PREAL1(*)=SIGN*DELTAY
     DELTY(1)=PREAL1(1)
     PREAL1(*)=DX(I-1)+DELTX(1)
     DX(1)=PREAL1(1)
     PREAL1(*)=DY(I-1)+DELTY(1)
     DY(1)=PREAL1(1)
160 *CONTINUE
   *IF(INDEX.EQ.LINES)GO TO 200
     I=I+1
     DELTX(1)=DELTAX
     PREAL1(*)=(YMAX(INDEX+1)-YMAX(INDEX))*SIGN
     DELTY(1)=PREAL1(1)
     PREAL1(*)=DX(I-1)+DELTX(1)
     DX(1)=PREAL1(1)
     PREAL1(*)=DY(I-1)+DELTY(1)
     DY(1)=PREAL1(1)
     PREAL1(*)=-SIGN
     SIGN=PREAL1(1)
   *GO TO 150
200 *CONTINUE
   NPTS(*)=I
   *GO TO 515
500 *CONTINUE
   *DO 510 T1=1,64
     T2=LOCATE(T1)
     KXMAX(T1)=DX(T2)
     KYMAX(T1)=DY(T2)
```

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510 *CONTINUE
515 *CONTINUE
520 *CONTINUE
*RETURN
*END

```

*SUBROUTINE GTDATA
C   GTDATA GETS ONE 16-BIT BYT FROM THE INPUT FILE. THE BYTES ARE
C   DELIVERED SEQUENTIALLY STARTING AT THE BEGINNING OF THE DISK AREA
C   INDM2. THERE IS A CORE BUFFER (BUUF1(-)) AND AN 8 WORD ADB BUFFER
C   SO ALL MEMORY ACCESSES ARE DONE VIA THE BIN INSTRUCTION. THE BYTE
C   ENDS UP RIGHT JUSTIFIED IN "INBYT".
*PE INTEGER NBUFF1(*,64),FINSN(*),COMP(*),TOTSCN(*),PINT1(*), -
1      PINT2(*),TIME(*),OTIME(*),TWTIME(*),PEN(*),CNTRL(*,6)
*PE REAL GLCHFT(*),VARFT(*),BUFF2(*,550,2),BUFF3(*,640),PREAL1(*), -
1      PREAL2(*),ALLMSQ(*),TVARFT(*)
*PE INTEGER LOFREQ,HIFREQ,IBUFF1(4096),IBUFF3(*,640),ABUFF2(70400), -
1      CHG(X)D(80),SITEGD(80),SITES(80)
*PE REAL CHMSQ(80),RBUFF1(4096),ROWSUM,RBUFF2(70400)
*CU INTEGER ADBBUF(8),COREPT,          BYTE,ADBWRD,ARRAY,DEBUG,TWSZ, -
1      OVLAP,NCHAN,NSITE,NROWS,DIFFR,DIFFW,NEW,OLD,GAP,TSCANS, -
2      INDEX1,INDEX2,INDEX3,INDEX4,T1,T2,T3,T4,T5,T6,CH,IPAGE, -
3      OFFSET,INBYT,NGDCH,TWSZR,NGDST,NGDR,F,BF3PE,NGT,OPAGE,T7
*CU LOGICAL LADBBU(8),LCOREP,LAST16,LBYTE,LADBWR,LARRAY,LDEBUG, -
1      LTWSZ,LOVLAP,LNCHAN,LNSITE,LNROWS,LDIFFR,LDIFFW,LNEW, -
2      LOLD,LGAP,LTSCAN ,LT1,LT2,LT3,LT4,LT5,LT6,LCH,LOFFSE, -
3      LINBYT,LF,LNGDCH,LTWSZR,LNGDST,LNGDR,LNGT,LT7
*EXTERNAL C16T64,C64T32,ROWSUM,RUNFFT,C32T64
*COMMON/MAIN2/NBUFF1,BUFF2,BUFF3,FINSN,COMP,TOTSCN,PINT1,PINT2, -
1      TIME,OTIME,TWTIME,PEN,CNTRL,GLCHFT,VARFT,PREAL1,PREAL2, -
2      ALLMSQ,TVARFT,LOFREQ,HIFREQ,SITEGD,SITES,CHMSQ
*EQUIVALENCE (NBUFF1(1,1),RBUFF1(1),IBUFF1(1)),(BUFF2(1,1,1), -
1      ABUFF2(1),RBUFF2(1)),(CHG(X)D(1),SITEGD(1)), -
2      (BUFF3(1,1),IBUFF3(1,1))
*EQUIVALENCE (1,ADBBUF(1),LADBBU(1)),(9,COREPT,LCOREP),(10,BYTE, -
1      LBYTE),(11,ADBWRD,LADBWR),(12,ARRAY,LARRAY),(13,TWSZ, -
2      LTWSZ),(14,OVLAP,LOVLAP),(15,NCHAN,LNCHAN),(16,NSITE, -
3      LNSITE),(17,NROWS,LNROWS),(18,DIFFR,LDIFFR),(19,DIFFW, -
4      LDIFFW),(20,NEW,LNEW),(21,OLD,LOLD),(22,GAP,LGAP),(23, -
5      TSCANS,LTSCAN),(24,INDEX1),(25,INDEX2),(26,INDEX3),(27, -
6      INDEX4),(28,T1,LT1),(29,T2,LT2),(30,T3,LT3),(31,T4, -
7      LT4),(32,T5,LT5),(33,T6,LT6),(34,CH,LCH),(35,OFFSET, -
8      LOFFSE),(36,INBYT,LINBYT),(37,F,LF),(38,NGDCH,LNGDCH), -
9      (39,TWSZR,LTWSZR),(40,NGDST,LNGDST),(41,NGDR,LNGDR), -
0      (42,BF3PE),(43,NGT,LNGT),(44,LAST16),(45,DEBUG,LDEBUG), -
1      (46,OPAGE),(47,T7,LT7),(48,IPAGE)
*DISK AREA INDM2(20),OUTDM2(40),CONPRM(1)
*IF(DEBUG.LT.1)GO TO 10
A   DISPLH "BGTDATA",0:
*IF(DEBUG.LT.4)GO TO 10
A   DISPLH ,2:
10 *CONTINUE
    BYTE=BYTE+1
*IF(BYTE.LT.5)GO TO 300
C   HAVE TO GO TO NEXT ADB WORD.
    ADBWRD=ADBWRD+1
*IF(ADBWRD.LT.9)GO TO 200

```

```

C   HAVE TO REFILL ADB BUFFER.
    COREPT=COREPT+8
    *IF(COREPT.LT.4097)GO TO 100
C   HAVE TO REFILL BUFF1.
    *READ(64,IBUFF1(1),INDM2(IPAGE),4)
    *WAIT 64
    IPAGE=IPAGE+4
    COREPT=1
    *IF(DEBUG.LT.1)GO TO 20
A   DISPLH "REFILLC",0:
    *IF(DEBUG.LT.2)GO TO 20
A   DISPLH,18,IBUFF1,IBUFF1+255:
20  *CONTINUE
100 *CONTINUE
C   CORE IS OKAY. HAVE TO REFILL ADB BUFFER.
    *TRANSFER(8) ADBBUF(1)=IBUFF1(COREPT)
    ADBWRD=1
    *IF(DEBUG.LT.1)GO TO 110
A   DISPLH "REFILLA",0:
    *IF(DEBUG.LT.2)GO TO 110
A   DISPLH ,2:
110 *CONTINUE
200 *CONTINUE
C   NEW ADB WORD.
    BYTE=1
    *IF(DEBUG.LT.1)GO TO 210
A   DISPLH "NEW WORD",0:
    *IF(DEBUG.LT.2)GO TO 210
A   DISPLH ,2:
210 *CONTINUE
300 *CONTINUE
    LADDBU(ADBWRD)=LADDBU(ADBWRD).RTL.16
    LINBYT=LADDBU(ADBWRD).AND.LAST16
    *IF(DEBUG.LT.1)GO TO 310
A   DISPLH "EGETBYT",0:
    *IF(DEBUG.LT.4)GO TO 310
A   DISPLH ,2:
310 *CONTINUE
    *RETURN
    *END

```

```

*SUBROUTINE IMG(IN,OUT)
*PE REAL IN(*),OUT(*)
*CU INTEGER DEBUG
*EQUIVALENCE (3,DEBUG)
*IF(DEBUG.LT.5)GO TO 10
A  DISPLH "IMG",0:
*IF(DEBUG.LT.5)GO 10
A  LDL(O) $D49:
A  LDA IN(O):
A  DISPLH "IN",32:
10 *CONTINUE
A  LDL(O) $D49:
A  LDA IN(O):
A  LDR $A:                % SAVE IT.
A  SHAL =9:
A  SHAR =57:                % ISOLATE THE EXPONENT.
A  SBM =40:16:            % SUBTRACT THE 32 BIT OFFSET.
A  ADM =4000:16:          % ADD THE 64 BIT OFFSET.
A  SHAL =48:                % PUT IT IN THE 64-BIT EXPONENT FIELD.
A  LDS $A:                % SAVE IT FOR NOW.
A  LDA $R:                % NOW FOR THE SIGN.
A  SHAR =55:                % START ISOLATING THE SIGN.
A  SHAL =63:                % COMPLETE ISOLATION AND PUT IT IN RIGHT SPOT.
A  OR $S:                % NOW WE HAVE EXPONENT AND SIGN.
A  LDS $A:                % SAVE IT.
A  LDA $R:                % RESTORE ORIGINAL TO DO MANTISSA.
A  SHAL =16:                % START ISOLATING.
A  SHAR =40:                % REMOVE OUTER MANTISSA.
A  SHAL =24:                % COMPLETE ISOLATION.
A  OR $S:                % PUT THE THREE PARTS TOGETHER.
A  LDL(O) $D50:
A  STA OUT(O):
*IF(DEBUG.LT.5)GO TO 110
A  LDL(O) $D50:
A  LDA OUT(O):
A  DISPLH "OUT",32:
110 *CONTINUE
*RETURN
*END

```

```

*FUNCTION MAX(I)
*PE INTEGER I(*)
*PE INTEGER MAX
*CU INTEGER DEBUG
*EQUIVALENCE (3,DEBUG)
*IF(DEBUG.LT.5)GO TO 5
A   DISPLH "B MAX",0;
5  *CONTINUE
A   LDL(0) $D49;
A   LDA I(0);
A   LIT(0)=1,6,1;
A   LIT(1) =1;
A   CLC(3);
A   COMP(3);
A   SETC(2) E;
A   LDEEI $C3;
A   RTL $A,0(1);
A   IMG $R;
A   SETE -I.AND.E;
A   SETEI E.OR.E;
A   LDA $R;
A   CSHL(1) 1;
A   TXEFM(0) ,MAXL(X)P;
A   MAXL(X)P:LDEEI $C2;
A   STA MFUNVAL;
*IF(DEBUG.LT.5)GO TO 10
A   LDL(0) $D49;
A   LDA I(0);
A   DISPLH "I",32;
A   DISPLH "MAX",16,MFUNVAL,MFUNVAL+63;
10 *CONTINUE
*RETURN
*END

```

```

C      *SUBROUTINE OUTPUT
C      PURPOSE: COMPLETE CALCULATIONS ON THE POWER MAXIMUMS
C      BEFORE PRINTING OUTPUT.
C      VELOCITY AND AZIMUTH ARE CALCULATED AND SIGNAL TO NOISE
C      RATIO AND FISHER STATISTIC.
C      TWO AND THREE DIMENSIONAL MAXIMUM ARE OUTPUT IN SEPARATE
C      LISTS.
C      DECLARATIONS:
*PE INTEGER INBUF(*,640),CNTRL(*,6),NCHAN(*),PINTI(*),OFFSET(*),
1      LOCATE(*),NPTS(*),COUNT2(*),COUNT3(*),LOC2D(*,25),
2      LOC3D(*,25),TWTIME(*),ADJF(*)
*PE REAL POWER(*,25),FMAX(*,25),FKX(*,25),FKY(*,25),RINBUF(*,640),
1      X(*,25),Y(*,25),FFT(*,612),KERNEL(*,25),
2      XC(XRD(*),YCOORD(*),PREAL1(*),PREAL2(*),COSK(*),SINK(*),
4      COSDK(*),SINDK(*),BEAMER(*),FPMAX(*),KXMAX(*),
5      KYMAX(*),DELX(*),DELY(*),KXSEP(*),KYSEP(*),KSEP(*),
6      VEL(*),AZ(*),SIGNAL(*),FSTAT(*),SUMSQ(*)
7      TEST(*),K(*),CHANAV(*),TPOWER(*),FREQ(*)
*PE REAL GROUP1(*),GROUP2(*),AFREQ(*,20),AK(*,20),AFSTAT(*,20),
1      AAZ(*,20),AVEL(*,20),ACHANA(*,20),AFMAX(*,20),
2      AGRUP1(*,20),AGRUP2(*,20),ASIGNA(*,20)
*PE REAL ADKX(4),ADKY(4),YPOINT(50),YMAX(50),DX(50),DY(50)
*PE REAL BEAM(*),TPOW(*),DELTAK(*),P,RPOWER(*,25),IPOWER(*,25)
*PE INTEGER MAX
*CU INTEGER LOFREQ,HIFREQ,DEBUG,SM,T1,T2,ARRAY,PAGE,I,N,MNCHAN,
1      MNPTS,NPOINT,SWITCH,NFREQ,IGO,LINE,LINES,INDEX,IP,
2      TWIN,ANGLE,SAM,IFREQ,J,NFREQ1,REFINE,IND,YTOP
3      YPMI,SIGN,NTIMES,LINEPI
*PE REAL DELTX(3000),DELTY(3000),DIST
*PE REAL DELTAX,DELTAY,KX,KY
*CU REAL DKX,LOWER,UPPER,LINEP,HDKX,BORDER,TWOH
*CU REAL DELTAF,RADIUS
*CU LOGICAL MODE3,NMODE
*EXTERNAL MAX,FNGRID,GRID,REALE,IMG
*COMMON/MAINFK/INBUF,CNTRL,NCHAN,PINTI,OFFSET,LOCATE,NPTS,COUNT2,
1      COUNT3,LOC2D,LOC3D,POWER,FMAX,FKX,FKY,X,Y,KERNEL,
2      XCOORD,YCOORD,PREAL1,COSK,SINK,BEAM,
3      TPOW,DELTAK,RPOWER,IPOWER,COSDK,SINDK,
4      BEAMER,FPMAX,KXMAX,KYMAX,DELX,DELY,KXSEP,KYSEP,KSEP,
5      TWTIME,TPOWER,VEL,AZ,SIGNAL,FSTAT,SUMSQ,TEST,K,
6      CHANAV,FREQ,ADJF,DX,DY,P,YPOINT,YMAX,ADKX,ADKY,
7      KX,KY
*EQUIVALENCE(INBUF(1,1),RINBUF(1,1)),(INBUF(1,28),FFT(1,1))
*EQUIVALENCE (1,LOFREQ),(2,HIFREQ),(3,DEBUG),(4,SM),(5,T1),(6,T2),
1      (7,ARRAY),(8,PAGE),(9,I),(10,N),      (12,MNCHAN),
2      (13,MNPTS),(14,NPOINT),(15,SWITCH),(16,IGO),
3      (17,INDEX),(18,IP),(19,DKX),
4      (20,LOWER),(21,UPPER),(22,LINE),(23,LINES),
5      (24,HDKX),(25,BORDER),(26,TWOH),
6      (27,DELTAF),(28,RADIUS),      (29,SIGN),
7      (30,MODE3),(31,NMODE),(32,TWIN),(33,ANGLE),(34,SAM),
8      (35,NFREQ),(36,IFREQ),(37,J),(38,NFREQ1),(39,REFINE),
9      (40,NTIMES),(41,IND),(42,YTOP),(43,YPMI),(44,LINEP),
0      (45,LINEPI)
*DISK AREA CONPRM(1),STCORD(1),FKIN(81)
*IF(DEBUG.LT.1)GO TO 10

```

```

A   DISPLH"OUTPUT",0:
    *IF(DEBUG.LT.1)GO TO 10
A   DISPLH "COUNT2",16,COUNT2,COUNT2+10:
A   DISPLH "COUNT3",16,COUNT3,COUNT3+10:
A   DISPLH "LOC2D(1)",16,LOC2D,LOC2D+10:
A   DISPLH "LOC3D(1)",16,LOC3D,LOC3D+10:
10*CONTINUE
C   COMPUTATIONS TO CALCULATE AZIMUTH OFF NORTH AND VELOCITY
C   IN KM PER SECOND.
    MODE=0N
    PINT1(*)=MAX(COUNT2(*))
    T1=PINT1(1)
    *DO 200 I=1,T1
      MODE=MODE.AND.(1.LE.COUNT2(*))
      MBIT2=MODE
      PINT1(*)=LOC2D(*,I)
      FMAX(*,PINT1(*))=FMAX(*,PINT1(*)/FLOAT(NCHAN(*)*TWIN)**2
      AZ(*)=ATAN(FKX(*,PINT1(*)/FKY(*,PINT1(*)))
      MBIT1=(FKY(*,PINT1(*)).LT.0.0)
      MODE=MODE.AND.MBIT1
      AZ(*)=AZ(*)+3.14159265
      MODE=MBIT2
      AZ(*)=AZ(*)*57.3
C   RADIANS TO DEGREES.
    *IF((AZ(*).LT.0.0))AZ(*)=AZ(*)+360.0
    K(*)=SQRT(FKX(*,PINT1(*)**2+FKY(*,PINT1(*)**2)
    VEL(*)=FLOAT(PINT1(*)-1)*DELTA F/K(*)
    CHANAV(*)=0.0
    OFFSET(*)=(PINT1(*)-LOFREQ)*NCHAN(*)
    MBIT1=MODE
    *DO 100 T2=1,MNCHAN
      MODE=MODE.AND.(T2.LE.NCHAN(*))
      *CALL REALE(FFT(*,OFFSET(*)+T2),PREAL1(*))
      *CALL IMG(FFT(*,OFFSET(*)+T2),PREAL2(*))
      CHANAV(*)=CHANAV(*)+PREAL1(*)**2+PREAL2(*)**2
100*CONTINUE
    MODE=MBIT1
    CHANAV(*)=CHANAV(*)/FLOAT(NCHAN(*)*TWIN*TWIN)
    SIGNAL(*)=FMAX(*,PINT1(*)/(CHANAV(*)-FMAX(*,PINT1(*)))
    FSTAT(*)=(FLOAT(NCHAN(*)-1.0)*SIGNAL(*)
    GROUP1(*)=SQRT((FKX(*,PINT1(*)-FKX(*,PINT1(*)-1))**2+
    (FKY(*,PINT1(*)-FKY(*,PINT1(*)-1))**2)
1   GROUP1(*)=DELTA F/GROUP1(*)
    GROUP2(*)=SQRT((FKX(*,PINT1(*)-FKX(*,PINT1(*)+1))**2+
    (FKY(*,PINT1(*)-FKY(*,PINT1(*)+1))**2)
1   GROUP2(*)=DELTA F/GROUP2(*)
    AFREQ(*,I)=FLOAT(PINT1(*))
    AK(*,I)=K(*)
    AFSTAT(*,I)=FSTAT(*)
    AAZ(*,I)=AZ(*)
    AVEL(*,I)=VEL(*)
    ACHANA(*,I)=CHANAV(*)
    AFMAX(*,I)=FMAX(*,PINT1(*))
    AGRUP1(*,I)=GROUP1(*)
    AGRUP2(*,I)=GROUP2(*)
    ASIGNA(*,I)=SIGNAL(*)
    *IF(DEBUG.LT.1)GO TO 200

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A      DISPLH "2-D MAX",0:
A      SETC(0) E:
A      DISPLH "MODE",1:
A      DISPLH "FREQ",16,PINT1,PINT1+63:
A      DISPLF "K",16,K,K+63:
A      DISPLF "FSTAT",16,FSTAT,FSTAT+63:
A      DISPLF "AZ",16,AZ,AZ+63:
A      DISPLF "VEL",16,VEL,VEL+63:
A      DISPLF "CHANAV",16,CHANAV,CHANAV+63:
A      DISPLF "SIGNAL",16,SIGNAL,SIGNAL+63:
A      PREAL1(*)=FMAX(*,PINT1(*))
A      DISPLF "FMAX",16,PREAL1,PREAL1+63:
200*CONTINUE
      MODE=ON
      *DO 250 I=1,64
        TI=NCHAN(I)
      *IF(TI.LT.1)GO TO 245
        TI=COUNT2(I)
      *IF(TI.LT.1)GO TO 245
        PINT1(1)=TWTIME(I)
A      DISPLH "TWTIME",16,PINT1,PINT1:
      *DO 240 J=1,TI
        PREAL1(1)=AFREQ(I,J)
        PREAL1(2)=AK(I,J)
        PREAL1(3)=AFSTAT(I,J)
        PREAL1(4)=AAZ(I,J)
        PREAL1(5)=AVEL(I,J)
        PREAL1(6)=ACHANA(I,J)
        PREAL1(7)=AFMAX(I,J)
        PREAL1(8)=AGRUP1(I,J)
        PREAL1(9)=AGRUP2(I,J)
        PREAL1(10)=ASIGNA(I,J)
A      SKIP ,E2D1:
A      B2D1:DATA
A      "FREQ          K          FSTAT          AZ":
A      E2D1:::
A      DISPLS ,16,B2D1,E2D1-1:
A      DISPLF ,16,PREAL1,PREAL1+3:
A      SKIP ,E2D2:
A      B2D2:DATA
A      "VEL          CHANAV          FMAX":
A      E2D2:::
A      DISPLS ,16,B2D2,E2D2-1:
A      DISPLF ,16,PREAL1+4,PREAL1+6:
A      SKIP ,E2D3:
A      B2D3:DATA
A      "GROUP1          GROUP2          SIGNAL/NOISE":
A      E2D3:::
A      DISPLS ,16,B2D3,E2D3-1:
A      DISPLF ,16,PREAL1+7,PREAL1+9:
240 *CONTINUE

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```

245 *CONTINUE
250 *CONTINUE
    PINTI(*)=MAX(COUNT3(*))
    TI=PINTI(1)
    *DO 400 I=1,TI
        MODE=MODE.AND.(I.LE.COUNT3(*))
        MBIT2=MODE
        PINTI(*)=LOC3D(*,I)
        FMAX(*,PINTI(*))=FMAX(*,PINTI(*))/FLOAT(NCHAN(*)*TWIN)**2
        AZ(*)=ATAN(FKX(*,PINTI(*))/FKY(*,PINTI(*)))
        MBIT1=(FKY(*,PINTI(*)).LT.0.0)
        MODE=MODE.AND.MBIT1
        AZ(*)=AZ(*)+3.14159265
        MODE=MBIT2
        AZ(*)=AZ(*)*57.3
    C    RADIANS TO DEGREES.
    *IF((AZ(*).LT.0.0))AZ(*)=AZ(*)+360.0
    K(*)=SORT(FKX(*,PINTI(*))**2+FKY(*,PINTI(*))**2)
    VEL(*)=FLOAT(PINTI(*)-1)*DELTA F/K(*)
    CHANAV(*)=0.0
    OFFSET(*)=(PINTI(*)-LOFREQ)*NCHAN(*)
    MBIT1=MODE
    *DO 300 T2=1,MNCHAN
        MODE=MODE.AND.(T2.LE.NCHAN(*))
        *CALL REALE(FFT(*,OFFSET(*)+T2),PREAL1(*))
        *CALL IMG(FFT(*,OFFSET(*)+T2),PREAL2(*))
        CHANAV(*)=CHANAV(*)+PREAL1(*)**2+PREAL2(*)**2
300*CONTINUE
    MODE=MBIT1
    CHANAV(*)=CHANAV(*)/FLOAT(NCHAN(*)*TWIN*TWIN)
    SIGNAL(*)=FMAX(*,PINTI(*)/(CHANAV(*)-FMAX(*,PINTI(*)))
    FSTAT(*)=(FLOAT(NCHAN(*)-1.0)*SIGNAL(*)
    GROUP1(*)=SORT((FKX(*,PINTI(*))-FKX(*,PINTI(*)-1))**2+
    I      (FKY(*,PINTI(*))-FKY(*,PINTI(*)-1))**2)
    GROUP1(*)=DELTA F/GROUP1(*)
    GROUP2(*)=SORT((FKX(*,PINTI(*))-FKX(*,PINTI(*)+1))**2+
    I      (FKY(*,PINTI(*))-FKY(*,PINTI(*)+1))**2)
    GROUP2(*)=DELTA F/GROUP2(*)
    AFREQ(*,I)=FLOAT(PINTI(*))
    AK(*,I)=K(*)
    AFSTAT(*,I)=FSTAT(*)
    AAZ(*,I)=AZ(*)
    AVEL(*,I)=VEL(*)
    ACHANA(*,I)=CHANAV(*)
    AFMAX(*,I)=FMAX(*,PINTI(*))
    AGRUP1(*,I)=GROUP1(*)
    AGRUP2(*,I)=GROUP2(*)
    ASIGNA(*,I)=SIGNAL(*)
    A    DISPLH "3-D MAX",0;
    A    SETC(0) E;
    A    DISPLH "MODE",1;

```

```
A   DISPLH "FREQ",16,PINT1,PINT1+63;
A   DISPLF "K",16,K,K+63;
A   DISPLF "FSTAT",16,FSTAT,FSTAT+63;
A   DISPLF "AZ",16,AZ,AZ+63;
A   DISPLF "VEL",16,VEL,VEL+63;
A   DISPLF "CHANAV",16,CHANAV,CHANAV+63;
A   DISPLF "SIGNAL",16,SIGNAL,SIGNAL+63;
A   PREAL1(*)=FMAX(*,PINT1(*))
A   DISPLF "FMAX",16,PREAL1,PREAL1+63;
A   DISPLF "SIGNAL",16,SIGNAL,SIGNAL+63;
400*CONTINUE
    MODE=ON
    *DO 450 I=1,64
        TI=NCHAN(I)
        *IF(TI.LT.1)GO TO 445
        TI=COUNT3(I)
        *IF(TI.LT.1)GO TO 445
        PINT1(I)=TWTIME(I)
A   DISPLH "TWTIME",16,PINT1,PINT1;
    *DO 440 J=1,TI
        PREAL1(1)=AFREQ(I,J)
        PREAL1(2)=AK(I,J)
        PREAL1(3)=AFSTAT(I,J)
        PREAL1(4)=AAZ(I,J)
        PREAL1(5)=AVEL(I,J)
        PREAL1(6)=ACHANA(I,J)
        PREAL1(7)=AFMAX(I,J)
        PREAL1(8)=AGRUP1(I,J)
        PREAL1(9)=AGRUP2(I,J)
        PREAL1(10)=ASIGNA(I,J)
A   DISPLS ,16,B2D1,E2D1-1;
A   DISPLF ,16,PREAL1,PREAL1+3;
A   DISPLS ,16,B2D2,E2D2-1;
A   DISPLF ,16,PREAL1+4,PREAL1+6;
A   DISPLS ,16,B2D3,E2D3-1;
A   DISPLF ,16,PREAL1+7,PREAL1+9;
440 *CONTINUE
445 *CONTINUE
450 *CONTINUE
    *RETURN
    *END
```

*SUBROUTINE PUTBYT

C PUTBYT TAKES THE RIGHT HAND 16 BITS OF "OUBYT" AND OUTPUTS THEM
C TO ONE OF THE FILES OUPUT1-OUPUT5 DEPENDING ON THE VALUE OF THE
C VARIABLE "ARRAY". THE BYTE GOES THRU A BUFFER IN ADB AND A BUFFER
C IN CORE ON ITS WAY TO DISK.

PE INTEGER CNTRL(,6),OUTBUF(*,64,6),PINTI(*),INBUF(*,128),
1 TIME(*),OLDTIM(*),
1 SAVBCT,SAVPTW,OUPAGE(6),TSTEPS(6),SCANS,
2 OUPWA(6), OTIMEA(6)
*CU INTEGER ADBBUF(8),ARRAY,INPTB,INPTW,SAVADB,ADBOUT(6),OUPTW,
1 BYTS,WORDS,T1,T2,T3,T4,T5,T6, IT,PRTIAL,ADDRS,
2 WORD, BYTCNT(6),ADBWRD,INBYT,OUBYT,ORGCOR,PAGE,
3 DEBUG,BCT,ADB,ENDADB
*CU LOGICAL LADBBU(8),LARRAY,LINPTB,LINPTW,LSAVAD,LADBOU(6),LOUPTW,
1 LBYTS,LWORDS,LT1,LT2,LT3,LT4,LT5,LT6,LOUBYT,LIT,LPRTIA,
2 LADDRS,LWORD,LINBYT,LBYTCN(6),LADBWR,LORGC0,LPAGE
3 ,LDEBUG,LBCT,LADB,LENDAD
*EXTERNAL RDPRM,GETBYT,CNVTIM
*COMMON/MAIN/CNTRL,OUTBUF,INBUF,PINTI,TIME,OLDTIM,SAVBCT,SAVPTW,
1 TSTEPS,SCANS,OUPWA,OUPAGE, OTIMEA
*EQUIVALENCE(1,ADBBUF(1),LADBBU(1)),(9,ARRAY,LARRAY),
1 (10,INPTB,LINPTB),
1 (11,INPTW,LINPTW),(12,SAVADB,LSAVAD),
1 (13,ADBOUT(1),LADBOU(1))
2 (19,OUPTW,LOUPTW),(20,BYTS,LBYTS),(21,WORDS,LWORDS),
3 (22,T1,LT1),(23,T2,LT2),(24,T3,LT3),(25,T4,LT4),
4 (26,T5,LT5),(27,T6,LT6),(28,OUBYT,LOUBYT),(29,IT,LIT),
5 (30,PRTIAL,LPRTIA),(31,ADDRS,LADDRS),(32,WORD,LWORD),
6 (33,INBYT,LINBYT),(34,BYTCNT(1),LBYTCN(1)),
6 (40,ADBWRD,LADBWR)
7 (43,ORGCOR,LORGC0),
8 (44,PAGE,LPAGE),(45,DEBUG,LDEBUG),(46,BCT,LBCT),
9 (47,ADB,LADB),(48,ENDADB,LENDAD)
*DISK AREA OUPUT1(20),OUPUT2(20),OUPUT3(20),OUPUT4(20),OUPUT5(20),
1 OUPUT6(20),INPUT(50)
*IF(DEBUG.LT.1)GO TO 5
A DISPLH "PUTBYT",0;
*IF(DEBUG.LT.3)GO TO 5
A DISPLH "PUTBYT:",2;
5 *CONTINUE
C FIRST WE ROTATE ADBOUT(ARRAY) LEFT 16 AND STICK IN OUBYT AND BUMP
C BYTCNT(ARRAY) BY 1.
C LADBOU(ARRAY)=LADBOU(ARRAY).RTL.16
C LADBOU(ARRAY)=LADBOU(ARRAY).OR.LOUBYT
A %DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
BYTCNT(ARRAY)=BYTCNT(ARRAY)+1
*IF(DEBUG.LT.3)GO TO 15
A DISPLH "PUTBYT1",2;
15 *CONTINUE
*IF (BYTCNT(ARRAY).LT.4)GO TO 100

```

C   ADB WORD IS FULL.
    OUPTW=OUPWA(ARRAY)
C   AGAIN WE RUN INTO THE CFD RESTRICTION ON DIMENSIONING. EXCUSE THE
C   DELAY.
    LT6=LOUPTW.SHR.6
    LT5=OFF.TURN ON..LAST.6
A   %DUMMY ASK STATEMENT TO FORCE DEALLOCATION OF REGISTERS.
    LT5=LT5.AND.LOUPTW
    OUTBUF(T5+1,T6+1,ARRAY)=ADBOUT(ARRAY)
    BYTCNT(ARRAY)=0
    ADBOUT(ARRAY)=0
    T6=OUPTW+1
    OUPWA(ARRAY)=T6
    *IF(OUPTW+1.LT.4096)GO TO 100
C   OUTBUF(ARRAY) IS FULL.
    *IF(DEBUG.LT.1)GO TO 25
A   DISPLH "COREFULL",0;
    *IF(DEBUG.LT.3)GO TO 25
A   DISPLH " ", 2;
25 *CONTINUE
    T6=OUPAGE(ARRAY)
    *IF(ARRAY.EQ.1)WRITE(64,OUTBUF(1,1,1),OUTPUT1(T6),3)
    *IF(ARRAY.EQ.2)WRITE(64,OUTBUF(1,1,2),OUTPUT2(T6),3)
    *IF(ARRAY.EQ.3)WRITE(64,OUTBUF(1,1,3),OUTPUT3(T6),3)
    *IF(ARRAY.EQ.4)WRITE(64,OUTBUF(1,1,4),OUTPUT4(T6),3)
    *IF(ARRAY.EQ.5)WRITE(64,OUTBUF(1,1,5),OUTPUT5(T6),3)
    *IF(ARRAY.EQ.6)WRITE(64,OUTBUF(1,1,6),OUTPUT6(T6),3)
    *WAIT 64
    T6=OUPAGE(ARRAY)
    T6=T6+3
    OUPAGE(ARRAY)=T6
C   WE WROTE OUT EVERYTHING BUT THE LAST PAGE OF THE BUFFER. SAVE
C   THAT AT THE TOP OF THE BUFFER FOR FUTURE USE.
    *DO 40 T6=1,16
40  OUTBUF(*,T6,ARRAY)=OUTBUF(*,T6+48,ARRAY)
    OUPWA(ARRAY)=1024
C   THE REST OF THE BUFFER REALLY DOESNT HAVE TO BE ZEROED OUT,
C   BUT IT EXECUTES SUPER FAST AND MIGHT SAVE SOME CONFUSION
C   SOME DAY.
    *DO 50 T6=17,64
50  OUTBUF(*,T6,ARRAY)=0
100 *CONTINUE
    *IF(DEBUG.LT.1) GO TO 105
A   DISPLH "EPUTBYT:",0;
    *IF(DEBUG.LT.3)GO TO 105
A   DISPLH " ", 2;
105 *CONTINUE
    *RETURN
    *END

```

```

*SUBROUTINE RDPRM
*PE INTEGER CNTRL(*,6),OUTBUF(*,64,6),PINTI(*),INBUF(*,128),
1      TIME(*),OLDTIM(*),
1      SAVBCT,SAVPBW,OUPTWA(6),TSTEPS(6),SCANS,
2      OUPTWA(6), OTIMEA(6),ORGADB,INBUFI(8192)
*CU INTEGER ADBBUF(8),ARRAY,INPTB,INPTW,SAVADB,ADBOUT(6),OUPTW,
1      BYTS,WORDS,T1,T2,T3,T4,T5,T6, IT,PRTIAL,ADDRS,
2      WORD, BYTCNT(6),ADBWRD,INBYT,OURBYT,ORGCOR,PAGE,
3      DEBUG,BCT,ADB,ENDADB
*CU LOGICAL LADBRU(8),LARRAY,LINPTB,LINPTW,LSAVAD,LADBOU(6),LOUPTW,
1      LBYTS,LWORDS,LT1,LT2,LT3,LT4,LT5,LT6,LOUBYT,LIT,LPRTIA,
2      LADDRS,LWORD,LINBYT,LBYTCN(6),LADBWR,LORGC0,LPAGE
3      ,LDEBUG,LBCT,LADB,LENDAD
*EXTERNAL GETBYT,PUTBYT,CNVTIM
*COMMON/MAIN/CNTRL,OUTBUF,INBUF,PINTI,TIME,OLDTIM,SAVBCT,SAVPBW,
1      TSTEPS,SCANS,OUPTWA,OUPTWA,OTIMEA,ORGADB
*EQUIVALENCE(1,ADBBUF(1),LADBRU(1)),(9,ARRAY,LARRAY),
1      (10,INPTB,LINPTB),
1      (11,INPTW,LINPTW),(12,SAVADB,LSAVAD),
1      (13,ADBOUT(6),LADBOU(6))
2      (19,OUPTW ,LOUPTW),(20,BYTS,LBYTS),(21,WORDS,LWORDS),
3      (22,T1,LT1),(23,T2,LT2),(24,T3,LT3),(25,T4,LT4),
4      (26,T5,LT5),(27,T6,LT6),(28,OURBYT,LOUBYT),(29,IT,LIT),
5      (30,PRTIAL,LPRTIA),(31,ADDRS,LADDRS),(32,WORD,LWORD),
6      (33,INBYT,LINBYT),(34,BYTCNT(1),LBYTCN(1)),
6      (40,ADBWRD,LADBWR)
7
8      (44,PAGE,LPAGE),(45,DEBUG,LDEBUG),(46,BCT,LBCT),
9      (47,ADB,LADB),(48,ENDADB,LENDAD)
*EQUIVALENCE (INBUF(1,1),INBUFI(1))
*DISK AREA OUPUT1(20),OUPUT2(20),OUPUT3(20),OUPUT4(20),OUPUT5(20),
1      OUPUT6(20),INPUT(50)
      DEBUG=0
*IF (DEBUG.LT.1) GO TO 10
A      DISPLH"RDPRM",0;
A      DISPLH "DEBUG",2;
10 *CONTINUE
*RETURN
*END

```

```

*SUBROUTINE REALE(IN,OUT)
*PE REAL IN(*),OUT(*)
*CU INTEGER DEBUG
*EQUIVALENCE (3,DEBUG)
*IF(DEBUG.LT.5)GO TO 10
A  DISPLH "REALE",0;
*IF(DEBUG.LT.5)GO TO 10
A  LDL(O) $D49;
A  LDA IN(O);
A  DISPLH "IN",32;
10 *CONTINUE
A  LDL(O) $D49;
A  LDA IN(O);
A  LDR $A;
A  RAB =0;
A  SHAR =56;
A  SBM =40:16;
A  ADM =4000:16;
A  SHAL =48;
A  LDS $A;
A  LDA $R;
A  SHAR =63;
A  SHAL =63;
A  OR $S;
A  LDS $A;
A  LDA $R;
A  SHAL =40;
A  SHAR =16;
A  OR $S;
A  LDL(O) $D50;
A  STA OUT(O);
A  *IF(DEBUG.LT.5)GO TO 110
A  DISPLH "EREALE",0;
A  *IF(DEBUG.LT.5)GO TO 110
A  LDL(O) $D50;
A  LDA OUT(O);
A  DISPLH "OUT",32;
110 *CONTINUE
*RETURN
*END

```

% SAVE IT.
% ELIMINATE THE SIGN SO WE CAN DO THE
% EXPONENT.
% ISOLATE THE EXPONENT.
% SUBTRACT THE 32 BIT OFFSET.
% ADD THE 64 BIT OFFSET.
% PUT IT IN THE 64 BIT EXP. FIELD.
% SAVE IT.
% NOW FOR THE SIGN.

% SIGN BIT IS ISOLATED.
% NOW WE HAVE EXPONENT AND SIGN.
% SAVE IT.
% NOW FOR THE MANTISSA.
% ISOLATE THE MANTISSA.
% PUT IT IN 64 BIT EXP FIELD.
% DONE.

```
*FUNCTION ROWSUM(R)
*PE REAL R,ROWSUM
*CU INTEGER DEBUG
*EQUIVALENCE (45,DEBUG)
*CONTINUE
A   LDL(0) $D49:
A   LDA R(0):
A   LIT(0) 1,6,1:
A   LIT(1) =1:
A   ROWSUMLOOP:
A   RTL SA,0(1):
A   ADRN SR:
A   CSHL(1) 1:
A   TXEFM(0) ,ROWSUMLOOP:
A   STA RFUNVAL:
A   *IF(DEBUG.LT.1)GO TO 20
A   DISPLH "EROWSUM",0:
A   *IF(DEBUG.LT.2)GO TO 20
A   DISPLH "ROWSUM",16,RFUNVAL,RFUNVAL+63:
A   LDL(0) $D49:
A   LDA R(0):
A   DISPLH "R",32:
20 *CONTINUE
*RETURN
*END
```

```

*SUBROUTINE RUNFFT
C   THIS SUBROUTINE CALLS THE UNIVERSITY OF ILLINOIS (JIM STEVENS)
C   FFT ROUTINE AFTER SETTING UP THE PROPER PARAMETERS. THE DATA
C   TO BE FFT'ED IS IN BUFF2. IT STARTS AT EITHER BUFF2+0 OR BUFF2
C   +35200 DEPENDING ON THE VALUE OF "NEW". THE NUMBER OF TIMEWINDOWS
C   IS "NGDCH" AND THE TIME WINDOW SIZE IS IN "TWSZ".
*PE INTEGER NBUFF1(*,64),FINSN(*),COMP(*),TOTSCN(*),PINT1(*), -
1   PINT2(*),TIME(*),OTIME(*),TWTIME(*),PEN(*),CNTRL(*,6)
*PE REAL SAVE(*)
*PE REAL GLCHFT(*),VARFT(*),BUFF2(*,550,2),BUFF3(*,640),PREAL1(*), -
1   PREAL2(*),ALLMSQ(*),TVARFT(*)
*PE INTEGER LOFREQ,HIFREQ,IBUFF1(4096),IBUFF3(*,640),ABUFF2(70400), -
1   CHG(X)D(80),SITEGD(80),SITES(80)
*PE REAL CHMSQ(80),RBUFF1(4096),ROWSUM,RBUFF2(70400)
*CU REAL RADBBU(8)
*CU INTEGER ADBBUF(8),COREPT,          BYTE,ADBWRD,ARRAY,DEBUG,TWSZ, -
1   OVLAP,NCHAN,NSITE,NROWS,DIFFR,DIFFW,NEW,OLD,GAP,TSCANS, -
2   INDEX1,INDEX2,INDEX3,INDEX4,T1,T2,T3,T4,T5,T6,CH, -
3   OFFSET,INBYT,NGDCH,TWSZR,NGDST,NGDR,F,BF3PE,NGT,PAGE,T7
*CU LOGICAL LADBBU(8),LCOREP,LASTI6,LBYTE,LADBWR,LARRAY,LDEBUG, -
1   LTWSZ,LOVLAP,LNCHAN,LNSITE,LNROWS,LDIFFR,LDIFFW,LNEW, -
2   LOLD,LGAP,LTSCAN,LT1,LT2,LT3,LT4,LT5,LT6,LCH,LOFFSE, -
3   LINBYT,LF,LNGDCH,LTWSZR,LNGDST,LNGDR,LNGT,LT7
*EXTERNAL GTDATA,C16T64,C64T32,ROWSUM,C32T64
*COMMON/MAIN2/NBUFF1,BUFF2,BUFF3,FINSN,COMP,TOTSCN,PINT1,PINT2, -
1   TIME,OTIME,TWTIME,PEN,CNTRL,GLCHFT,VARFT,PREAL1,PREAL2, -
2   ALLMSQ,TVARFT,LOFREQ,HIFREQ,SITEGD,SITES,CHMSQ
*EQUIVALENCE (NBUFF1(1,1),RBUFF1(1),IBUFF1(1)),(BUFF2(1,1,1), -
1   ABUFF2(1),RBUFF2(1)),(CHG(X)D(1),SITEGD(1)), -
2   (BUFF3(1,1),IBUFF3(1,1))
*EQUIVALENCE(1,RADBBU(1))
*EQUIVALENCE (1,ADBBUF(1),LADBBU(1)),(9,COREPT,LCOREP),(10,BYTE, -
1   LBYTE),(11,ADBWRD,LADBWR),(12,ARRAY,LARRAY),(13,TWSZ, -
2   LTWSZ),(14,OVLAP,LOVLAP),(15,NCHAN,LNCHAN),(16,NSITE, -
3   LNSITE),(17,NROWS,LNROWS),(18,DIFFR,LDIFFR),(19,DIFFW, -
4   LDIFFW),(20,NEW,LNEW),(21,OLD,LOLD),(22,GAP,LGAP),(23, -
5   TSCANS,LTSCAN),(24,INDEX1),(25,INDEX2),(26,INDEX3),(27, -
6   INDEX4),(28,T1,LT1),(29,T2,LT2),(30,T3,LT3),(31,T4, -
7   LT4),(32,T5,LT5),(33,T6,LT6),(34,CH,LCH),(35,OFFSET, -
8   LOFFSE),(36,INBYT,LINBYT),(37,F,LF),(38,NGDCH,LNGDCH), -
9   (39,TWSZR,LTWSZR),(40,NGDST,LNGDST),(41,NGDR,LNGDR), -
0   (42,BF3PE),(43,NGT,LNGT),(44,LASTI6),(45,DEBUG,LDEBUG), -
1   (46,PAGE),(47,T7,LT7)
*DISK AREA INDM2(20),OUTDM2(40),CONPRM(1)
*IF(DEBUG.LT.1)GO TO 10
A   DISPLH "RUNFFT",0
*IF(DEBUG.LT.2)GO TO 10
A   DISPLH ,2
A   DISPLH "ERUNFFT",0
10 *CONTINUE
*TRANSFER(8) SAVE(1)=RADBBU(1)

```

```

C      SAVE THE ADB LOCATIONS DESTROYED BY FFT ROUTINE.
A      SLIT(0) SIZE:
A      LDL(1) TWSZ:
A      STORE(0) $C1:
A      SLIT(0) NUMBER:
A      LDL(1) NGDCH:
A      STORE(0) $C1:
A      SLIT(0) ARGLIST+2:
A      SLIT(1) BUFF2:
A      LDL(2) OLD:
A      ALIT(2) -1:
A      ZERXT(2) ,1:
A      ALIT(1) 35200:
A      STORE(0) $C1:
A      EXTERNAL FFT:
A      *IF(DEBUG.LT.2)GO TO 20
A      SLIT(1) ARGLIST+2:
A      LOAD(1) $C1:
A      CSHR(1) 6:
A      LDA 0(1):
A      SLIT(3) ARGLIST:
A      LOAD(3) $C0:
A      LOAD(0) $C0:
A      ALIT(3) 1:
A      LOAD(3) $C1:
A      LOAD(1) $C1:
A      ALIT(3) 1:
A      LOAD(3) $C2:
A      DISPLH "B4 FFT:",33:
20 *CONTINUE
A      CLC(3):
A      SLIT(3) FFT:
A      SLIT(2) ARGLIST:
A      EXCHL(3) $ICR:
A      CACRB 10:
A      *IF(DEBUG.LT.2)GO TO 30
A      SLIT(1) ARGLIST+2:
A      LOAD(1) $C1:
A      CSHR(1) 6:
A      LDA 0(1):
A      DISPLH "AFTER:",33:
30 *CONTINUE
A      SKIP ,EARGLIST:
A      ARGLIST:
A      DATA SIZE,NUMBER,0:
A      SIZE:NDS 1:
A      NUMBER:NDS 1:
A      EARGLIST:
A      *TRANSFER(8) HADBBU(1)=SAVE(1)
110 *CONTINUE
A      *RETURN
A      *END

```