```
CHANNEL 1 SUBSYSTEM AND SWAPPER (CHNSYS,20)  3/15/73

ASC=IOT 51
DSC=IOT 50
EEM=IOT 4074
ESM=IOT 55
FBC=IOT 2015
ISB=IOT 52
LEM=IOT 74
LSM=IOT 54
RCK=IOT 32
RNM=IOT 66
RRI=IOT 37
RRO=IOT 17

IOPTSU=106                /SYMBOLS COMMON IN CORES 0,4,15,17
TTBL=156224
FTBL=156232
BITTB1=6400               4BTTB1=64
BITTB2=6500
BITTB3=6600
BITTB4=6700
FRELST=157000


I I I/    OFFSET DCH

/RE INITIALIZE THE EXECUTIVE
          EEM
          LAC I DCORE
          SAR 2S
          IOR B1
          DCH (ADD JDA .+1)
          RNM
          CLC
          DAC ONTRACK
          LAC (XCT 27)
          DAC I DSWAPX
          LAC (210000)    /START HERE FIRST TIME (30012)
          DIP NDONC2 1
          LIO (30000 NDONC2)       /RE-INITIALIZE FRELST TABLE
          JSP DGO         /READ AND WAIT FOR COMPLETION
          JMP I INIT

CH1,      RRI             /IS CHANNEL ABNORMAL
          SPI
          JMP I ABNORMAL
CH1+3,    LIO CHNFLG      /RESET FLAGS
          LFI
          JMP I CH1X      /RETURN
CH1X,     SWAP
CH1XE,    -0
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/START THE CHANNEL ROUTINE
.GO,        LIO 15SET       /ANY CHANNEL 15 ACTIVITY?
            SNI I
            JMP 15GO
GO,         DAC CH1X
            LIO I CH1X
GO1,        IDX CH1X
GO1+1,      DZM CH1XE       /SET POSSIBILITY OF ERROR INSTRUCTION
            RRO 5ØØ
            JSP 1HLT
            IDX NUMRRO      /USED BY 1 SEC CLOCK IF FASTRAND HUNG
CHANX,      LIF
            DIO CHNFLG
            JMP I CH1BRK
NUMRRO,     Ø

/JSP WAIT1  JSP WAIT2
/ADDR OF COMMANDS JUST ASSEMBLED
/ADDR OF PLACE TO PUT JUMP
/IN WAIT2 FLAG 6=Ø=START CHANNEL

WAIT2,      SZF I 6         /DO WE WANT TO JUST START THE CHANNEL
            JMP WAIT16      /YES
WAIT1,      DAC WAIT11
            LIO I WAIT11
            IDX WAIT11
            LAC I WAIT11
            DAC WAIT12
            LAC BØ          /PLACE JUMP INSTRUCTION
            IAI
            DAC I WAIT12
            IDX WAIT11
WAIT14,     DIO WAIT12
            RRI             /HOW IS CHANNEL
            RIR 5S
            SPI
            JMP WAIT13
            JSP WAIT15      /REMOVE SEQUENCE BREAK
            LAC WAIT11
            DAC CH1X
            LIO WAIT12      /RESTART THE CHANNEL
            JMP GO1+1
/NORMAL EXIT IF CHANNEL IS BUSY
WAIT,       RRI
            RIR 5S
            SPI I
WAIT15,     ISB 1ØØ
WAIT13,     DAC CH1X
            JMP CHANX

WAIT16,     DAC CH1X
            LIO I CH1X
            IDX CH1X
            JMP GO1         /GO START THE CHANNEL

WAIT11,     Ø
WAIT12,     Ø
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CHNFLG, 0
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/CHANNEL 1 SWAPPER
/DCONT=Ø←PREVIOUSLY NOT BUSY
/DCONT>Ø←HELD BY FASTRAND
/DCONT<Ø←HELD BY MTCU

SWAP:
SWAPE1,   CLL"U"SCF
          LAC (177777)    /PICK UP NEEDED MASK
          LIO DCONT       /IS THERE ANYONE TO FREE
          SNI
          JMP SWAPE3      /NO-GO GET SOMEONE
          SPI
          JMP I SWAPE2    /HELD BY MTCU
          AND CONTR1      /FASTRAND WANTS TO FREE A GUY
          ADD THREE
          SAD (FTBL 146)
          LAC (FTBL)
          SAS END1
          IOR B1
          DAC CONTR1
          JMP I SWAPE7

DCONT,    Ø

SWAPE5,   LAC (SWAP)      /RESET THE CH1 SWAPPER
          DAC CH1X
          CLC
          DAC SCORE
          DAC CH1XE
          DAC OVERFLOW
          DZM DCONT
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SWAPE3,   LAC I CONTR2
          SPA
          JMP SWAPE4      /YES
          LIO CONTR1      /NO-DOES FASTRAND WANT CHANNEL
          SPI I
          JMP I CH1BRK    /NO-ONE WANTS ANYTHING
          DAC DCONT       /MARK AS HELD (KNOW AC STRICTLY POSITIVE)
          JSP GETUSER     /GET USER INTO CORE
FUSER,    Ø
          LIO I CONTR1    /CHECK MODE OF ENTRY
          SPI
          JMP I SWAPE6    /METHOD 1
FSTRLS,   LIO SWPFLG      /LOAD FLAGS
          LFI
          DZM APRFLG      /RESET APR FLAG
          DZM PATFLG      /RESET PATIENT IDENTIFIER FLAG
          LAC FPAR
SWAPE9,   JMP .
SWAPE6,   Ø

/MTCU WANTS DATA CHANNEL
SWAPE4,   DAC DCONT       /SET HELD(KNOW AC STRICTLY NEGATIVE)
          JSP GETUSER
TUSER,    Ø
          LAC I FTAPE1
          DAP SWAP1Ø
          LAC I SWAP1Ø    /DO EXTRA LEVEL OF INDIRECT
          DAP SWAP1Ø
          CLI
          RCL 6S
          LFI
          JSP WAIT4       /ALL TAPE ROUTINES WISH USER IN CORE IMMEDIATELY
          JMP I SWAP1Ø
SWAP1Ø,   DCH I .

GETUSER,  DAC GETUX
          LAC I GETUX     /GET USER NO.
CSUB,     SUB MSTAT
          DAP 1STAT
          LAC I 1STAT     /CHANGE IOP WANTS AND HUNG BITS
          XOR CSUB        /UPPER 6 BITS=42
          DIP I 1STAT
          ISB 17ØØ        /TELL SWAPPER
CDZMI,    DZM I HOTFLG
GETU2,    IDX GETUX
          JMP I GETUX

GETUX,    Ø
1STAT,    DCH .
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/CHANNEL 4

4CHAN,     LIO CONTR1
           SPI
           JMP I 4CHAN1
           RIL 1S
           SPI I           /IS FASTRAND CPU BUSY
           JMP I 4CHAN1
           RRI 1ØØ         /YES-IS FASTRAND PHYSICALLY BUSY
           SPI
           JMP I 4CHAN1    /YES - WE'LL COME BACK LATER
4CHAN2,    JMP FTRACK

/START FASTRAND ROUTINE
FGO,       Ø               /ENTER WITH POINTER TO HALF TRACK TABLE
           DAP 4CHAN2      /RESET RETURN
           LAC FGO         /CALCULATE TRACK WANTED
           DAC ONTRACK     /RESET TRACK POINTER
           SUB (FRELST
           SAR 2S
           IOR C4ØØ
           LIA
           RRO 1ØØ         /MOVE THE BOOM
           JSP FHLT
           JMP I 4CHAN1
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/CHANNEL 4 BOOM HANDLER
FTRACK,   LAW RING        /SET TO GO TO CHANNEL 15 TO FIND BEST GUY
          DAP CH15B
          JSP 4DP15
          LSM             /DO WE WANT TO USE CHANNEL 1
          LIO DCONT
          SNI
          JMP FTRK3       /YES
          ESM
          LAC HTR
FTRK2,    XCT .
          JMP METHØ       /GO TO DATA CHANNEL BY METHOD Ø
          JMP FSTRLS      /GO TO CHANNEL RESTORE TO METHOD Ø
/TABLE FOR CHANNEL 4 DISPATCH
FTRK5,    JDA 4RD         /MOVE BOOM FOR READ
          JMP 4WT         /MOVE BOOM FOR WRITE
          JDA 4RW         /MOVE BOOM FOR REWRITE
CNOP,     NOP             /NOP FOR FIXED HEADS ETC.
          JMP 4HW         /MOVE BOOM FOR HELD WRITES

/TABLE FOR CHANNEL 1 DISPATCH
FTRK6,    JDA READ
          JSP WRITE
          JDA REWRITE
          NOP
          JSP 1HW
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/CHANNEL 15 ROUTINES TO FIND BEST GUY
RING,     LAC B5          /SET TO LOWEST QUEUE
          DAC RNGQUE
          LAC CONTR1
          DAC FTRK1       /GET POINTER TO TOP GUY
RING1,    DAP RNGPTR      /RESET POINTER TO GUY WE'RE LOOKING AT
          LAW 177
          AND I RNGPTR    /GET GUY'S PROGRAM NUMBER
          ADD C200        /GET STAT TABLE POINTER FOR HIM
          DAP RING2
          LIO I RING2
          CLA
          RCL 6S
          SAS C40
          CLI
          RIR 6S
          LAI
          SUB RNGQUE      /COMPARE WITH BEST QUEUE SO FAR
          SMA
          JMP RING3       /NOT BETTER GUY
          DIO RNGQUE      /BETTER GUY : RESET BEST QUEUE
          LAC RNGPTR      /SAVE POINTER TO BEST GUY
          DAC RNGFST
RING3,    LAW 3           /INCREMENT TO LOOK AT NEXT GUY
          ADD RNGPTR
          SAD (FTBL+146)
          LAC (FTBL)
          SAS END1        /ARE WE DONE
          JMP RING1       /NO : LOOP

          CLA             /DECODE BEST GUY
          LIO I RNGFST
          RCL 6S
          ADD (FTRK5)
          DAP FTRK2
          ADD (FTRK6-FTRK5)
          DAP FTRK4
          RIR 6S
          DIO FUSER
          LAC I FTRK1
          DAC I RNGFST
          IDX RNGFST
          IDX FTRK1
          LAC I RNGFST    /DECODE SECOND WORD
          DAC FPAR
          AND C777
          CMA
          DAC FBLOCK
          LAW I 777
          AND FPAR
          RAR 9S
          ADD (FRELST)
          DAC HTR
          AND (-177)
          DAC THIRD
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            LAC I FTRK1
            DAC I RNGFST
            IDX RNGFST
            IDX FTRK1
            LAC I RNGFST
            DAP SWAPE9
            DCH (CMI SWPFLG)
            LAC I FTRK1
            DAC I RNGFST
            JMP CH15BE

SWPFLG,     Ø
RNGPTR,     DCH I .
RING2,      DCH .
RNGQUE,     Ø
RNGFST,     Ø
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/VARIABLES FOR BOOM
FBLOCK,   Ø              /-NO. OF BLOCKS WANTED
HTRACK,   Ø
THIRD,    Ø              /THIRD OF DRUM WANTED
FTRK1,    Ø              /POINTER TO RETURN ADDRESS
ONTRACK,  -Ø             /HALF TRACK WE ARE ON
TRACKA,   -Ø             /HALF TRACK FOR WRITE EACH THIRD
TRACKB,   -Ø
TRACKC,   -Ø
TRACKD,   -Ø             /REWRITE LOCATION
FPAR,     Ø

/INITALLY DO WE WANT TO USE CHANNEL 1
FTRK3,    ESM
          JSP METH1      /GO TO CHANNEL 1
          LAC HTR
FTRK4,    XCT .
          JMP FSTRLS

/GETTING TO CHANNEL 1
METH1,    DAC SWAPE6     /SAVE RETURN
          LAC BØ
          IOR I CONTR1
          DAC I CONTR1
METHØ,    LAC (55ØØØØ    /SET WANT DATA & CHANNEL BIT
          LSM
          DIP CONTR1
          LAC DCONT      /IS CHANNEL NOW BUSY
          SZA I
          ISB 1ØØ
          ESM
          LAW FTRACK
          DAP 4CHAN2     /RESET RETURN
          JMP I 4CHAN1
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/CHANNEL 15 ROUTINES
/TO START D.C. AND GO TO CHANNEL 15

15GO,     DAC 15GOX
          ISB 1500        /GO TO CHANNEL 15 WHEN DEBREAK
          DZM 15TEL       /SET POINTER TO SAY STARTING
          DZM 15SET       /RESET SWITCH
          LAC I 15GOX     /GET PLACE TO START THE CHANNEL
          DAC .+2
          JSP GO
          30000 .         /.+2
          LIO 15TEL
          IDX 15TEL       /TELL 15 THAT 1 IS DONE
          IDX 15GOX       /RESET RETURN
          SNI I           /IS CHANNEL 15 DONE
          JMP I 15GOX     /YES-EXIT
          DAC CH1X
          JMP CHANX       /NO-GO WAIT FOR SEQUNCE BREAK
15GOX,    0
15TEL,    0
15SET,    0

/DROP FROM 1 TO 15
15DRP,    DAC 15GOX
          ISB 1500        /ACTIVATE CHANNEL 15
          DAC 15TEL       /MARK 1 AS DONE
          DZM 15SET
          JSP WAIT13
          JMP I 15GOX

/CHANNEL 15 SERVICE ROUTINE

CH15A,    JSP CH15B       /DAP'ED INTO BY HIGHER ROUTINES
CH15AE,   LAW CH15B
          DAP CH15A       /RESET STARTING ADDRESS
          CLA
          LSM
          SAS 15TEL
          ISB 100
          IDX 15TEL       /MARK 15 AS DONE
          ESM
CH15B,    JSP CH15C
CH15BE,   LAW CH15C
          DAP CH15B       /RESET STARTING ADDRESS
          LSM
          LAC CDZMI       /SET BUSY BIT (CDZMI UPPER 6 BITS =35)
          DIP CONTR1      /ASSUME POINTS TO CORE 15
          ESM
          ISB 400         /REACTIVATE CHANNEL 4
CH15C,    JMP I CH15BK
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/CHANNEL 4 ROUTINE TO MOVE BOOM AND GO TO 15
/USE FACT THAT TOP 6 BITS OF "FRELST"=15

4GO15,    Ø
          DAC 4GOX
          LAC (FRELST)    /REMOVE THE BUSY BIT SO WONT' DO ANYTHING
          DIP CONTR1
          ISB 15ØØ
          LAC 4GO15       /GO MOVE THE BOOM
          JDA FGO
          JMP I 4GOX      /DON'T COME BACK TILL ACTIVATE BIT SET
4GOX,     Ø

/CHANNEL 4 ROUTINE TO DROP TO 15

4DP15,    DAP 4CHAN2
          ISB 15ØØ
          LAC (FRELST)    /REMOVE THE BUSY BIT
          DIP CONTR1
          JMP I 4CHAN1
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/FASTRAND WAITING LIST
/WORD Ø: BIT Ø=1-METHOD 1 OF D.C. ACCESS
/BIT 1-5 ARE FUNCTION
/BITS 11-17 ARE PROGRAM NUMBER
/WORD 1: Ø-7 ARE HALF TRACK
/BITS 11-17 ARE NO OF BLOCKS WANTED
/OR BITS Ø-1 ARE THIRD
/BITS 2-1Ø ARE 9 BIT USER CODE
/BITS 11-17 ARE NO. OF BLOCKS WANTED
/WORD 3 ARE FLAGS AND RETURN ADDRESS
/ONLYC CHANNEL 16 ADDS TO THIS LIST
/CAN NOT OVERFLOW TABLE

TRACK,    Ø
          DAC TAPE3
          JSP RELEASE
          LAC END1        /GET END OF LIST VALUE
          DAC TAPE1
          LAC 16USER      /GET USER NO,
          IOR I TAPE3     /BITS SET UP PROPERLY ALREADY FOR FUNCTION
          DAC I TAPE1
          IDX TAPE1
          LAC TRACK       /GET DATA WORD
          DAC I TAPE1
          IDX TAPE1
          LIF"U"SCF       /GET FLAGS
          RCR 6S
          DIP I TAPE1
          IDX TAPE3       /GET RETURN ADDRESS
          DAP I TAPE1
          IDX TAPE1
          SAD (FTBL 146
          LAC (FTBL
          LIA
          LSM
          LAC CONTR1      /ARE WE BUSY
          SAD END1
          ISB 4ØØ
          IOR B1          /SET CPU BUSY BIT (MUST BE AN OR )
          DAC CONTR1
          DIO END1
          ESM
          JMP I RØ

16USER,   Ø

TAPE3,    Ø
TAPE1,    Ø
16STAT,   DCH .
CONTR1,   FTBL
END1,     FTBL
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/CHANNEL 17 ROUTINES

/CHANNEL 17 NORMAL RETURN (REAL CORE IN AC)
17SWAP,   LIO I (IOR 5Ø) /SAVE UP THE USER
          DIO I AC
          LIO I (IOR 51)
          DIO I IO
          LIO I (IOR 52)
          DIO I FLAGS
          RCK
          DIO TIME
          IOR (6ØØØØØ
          LSM
          DAC SCORE
          CLI"U"CMI"U"CLA
          SAS 17TEL
          JMP 17SWP2
          DIO 17TEL
          ISB 1ØØ
17SWP2,   ESM
          JMP I SWORG

/WAIT FOR CORE ROUTINE
WAIT4,    DAC CH1X
          LAC SCORE       /IS THE CORE AROUND
          SAS MZERO
          JMP I CH1X      /SOMETHING HAS ALREADY HAPPENED
          DZM 17TEL       /NO-TELL ME WHEN IT COMES
          JMP CHANX

SCORE,    -Ø
17TEL,    -Ø

RELEASE,  DAC RELX
          LAC BØ
          LSM
          IOR I 16STAT
          DAC I 16STAT
          ESM
          ISB 17ØØ
          DZM I HOTFLG
          JMP I RELX
RELX,     Ø

TIME,     Ø

START XX-JMP
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