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                   I                            I
                  I   JADE COMPUTER NOTE NR. 34    I
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  *                                                                  *
  *      JADE GRAPHICS PROGRAM           VERSION FROM   3.09.1982    *
  *                                                                  *
  ********************************************************************
                                                  J.OLSSON  L.O'NEILL

              (THE CHANGED PARTS FROM LAST VERSION ARE MARKED BY A *)
                              (LAST VERSION WAS DATED 14.08.81)



   TO START A SESSION AT THE IBM TSO-GRAPHICS TERMINALS:
     (IF YOU ARE NOT ABLE TO LOGON, READ THE YELLOW TSOIPS FILE BEFORE
      CALLING FOR HELP...)
   FIRST LOGON UNDER TSO BY ENTERING:

                   LOGON IDENTIFIER SIZE(834)
                   KEYWORD

   OBS... THE SIZE PARAMETER IS NECESSARY, SINCE THE JADE GRAPHICS
          MODULE IS TOO BIG FOR THE DEFAULT TSO REGION (ABOUT 600K).
          IF YOU LEAVE THE SIZE PARAMETER OUT, YOUR SESSION WILL
          SOON ABEND WITH AN ERROR CODE 80A

   TO  ENTER THE GRAPHICS PROGRAM, NOW PROCEED WITH

                   IPS LIBRARYNAME(MODULENAME)

              EXAMPLE:    IPS 'F11LHO.GRAPHL(JADEZ)'
              OR          IPS GRAPHL(JADEZ)       IF YOU ARE F11LHO
   OBS.... THE LIBRARY F11LHO.GRAPHL IS KEPT AS STANDARD LIBRARY FOR
           GRAPHICS MODULES. IT IS FREQUENTLY UPDATED TO ACCOUNT FOR
           RECENT CHANGES AND IMPROVEMENTS.
           THE "STANDARD MODULE" HAS THE NAME  JADEZ

   AFTER PRINTING SOME GREETINGS AND OTHER GENERAL INFORMATION,
   THE GRAPHICS PROGRAM NOW REQUESTS THE NAME OF A CATALOGUED DATA SET.
   THIS HAS TO BE ENTERED WITH FULL IDENTIFIER, E.G. F22ELS.TPMH735C ;
   THE DATA SET MOREOVER HAS TO BE "ON DISK", OR IN MASS STORAGE, MSS.

*  IF THE DATA SET DOES NOT EXIST (NAME MISTYPED) OR IS NOT ACCESSIBLE
*  FOR OTHER REASONS (HMS MIGRATION NOT AVAILABLE OR MSS JAMMED) THE
*  PROGRAM GIVES AN ERROR MESSAGE. YOU CAN GIVE IN ANOTHER NAME OR END
*  THE SESSION BY THE EMERGENCY EXIT:
*
*                      CONTROL+G (PRESSED SIMULTANEOUSLY)

*  IF THE DATA SET HAS BEEN SUCCESFULLY ALLOCATED, THE PROGRAM GOES ON
*  TO ALLOCATE THE CALIBRATION FILE:          F11LHO.AUPDAT1
*  THIS CALIBRATION FILE IS DEFAULT, BUT IF YOU WANT THE LARGER FILES
*  F11LHO.BUPDAT0, BUPDAT1 (WHICH ARE NEEDED, IF YOU ARE CALIBRATING
*  THE LEAD GLASS, E.G. IN REFORM DATA), YOU CAN GET THEM ALLOCATED BY
*  PRESSING ANY CHARACTER INSTEAD OF THE BLANK RETURN, AT THE PROGRAMS
*  REQUEST.

*  IF YOU ARE HAPPY WITH THE AUPDAT1 FILE, JUST PRESS RETURN TO DISPLAY
*  THE FIRST EVENT.

*  THE PROGRAM IS BY DEFAULT STOPPING AT THE USER LEVELS 2 AND 6. THESE
*  DEFAULT VALUES CAN BE CHANGED AT ANY TIME BY THE COMMAND "CSTL" (SEE
*  BELOW).    FURTHERMORE, THE PROGRAM BY DEFAULT SHOWS THE "RB" VIEW,
*  INNER DETECTOR + LEAD GLASS, SEE BELOW. THIS CAN ALSO BE CHANGED AT
*  ANY TIME, BY DISPLAYING OTHER VIEWS AND "FREEZING" THEM TO STANDARD
*  VIEWS BY THE COMMAND "CSTV 1".
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*     COMMENT ON USER LEVELS:
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*     THE USER LEVELS CORRESPOND TO DIFFERENT ANALYSIS LEVELS IN THE
*     SUPERVISOR PROGRAM. THUS THE SCANNER CAN LOOK AT ANALYSIS RESULTS
*     OF A PARTICULAR PROGRAM BY STOPPING AT A CORRESPONDING LEVEL (OR
*     FURTHER DOWN); E.G. PATTERN RECOGNITION RESULTS CAN BE INSPECTED
*     AT LEVEL 5 ONWARDS. DATA WHICH HAVE ALREADY BEEN THROUGH THE FIRST
*     REDUCTION STEP (REDUC1) HAVE ALL ANALYSIS DONE UP TO AND INCLUDING
*     PATTERN RECOGNITION. IN THIS CASE STOPPING AT LEVEL 2 IS ENOUGH;
*     LEVEL 6 IF CLUSTER ANALYSIS OF THE LEAD GLASS DATA IS WANTED.

      THE USER LEVELS ARE:

              1   CALLED AT THE BEGINNING OF EACH NEW RUN.
*                 (THIS IS NOT A MEANINGFUL LEVEL FOR GRAPHICS).
              2   CALLED IMMEDIATELY AFTER EVENT IS READ INTO /BCS/.
              3   LEAD GLASS ENERGIES HAVE BEEN COMPUTED, CALIBRATION;
*                 (I.E. RAW PULSE HEIGHTS CONVERTED INTO ENERGY).
              4   FAST Z VERTEX RECONSTRUCTION HAS BEEN DONE.
              5   INNER DETECTOR PATTERN RECOGNITION HAS BEEN RUN.
              6   ENERGY CLUSTERS IN THE LEAD GLASS HAVE BEEN FOUND.
*                 (NECESSARY FOR PHOTON DISPLAY)
              7   UNUSED.
              8   MUON CHAMBER TRACKING HAS BEEN DONE.
*             9   ALREADY EXISTING MUON RESULTS ARE OVERWRITTEN BY A
*                 NEW CALL TO THE MUON ANALYSIS PROGRAM.
             10   UNUSED.

*   DEFAULT LEVELS ARE 2 AND 6, I.E. THE EVENTS ARE FIRST DISPLAYED AT
*   LEVEL 2. TO PROCEED TO LEVEL 6, USE THE COMMAND "C". TO GET TO THE
*   NEXT EVENT, AGAIN AT LEVEL 2, USE THE COMMAND "N".

*  IN EARLIER VERSIONS OF THE GRAPHICS PROGRAM, AN OUTPUT DATA FILE FOR
*  WRITING SELECTED OR EDITED EVENTS HAD TO BE ALLOCATED AT THE START OF
*  THE SESSION. IT WILL NOW BE ALLOCATED AT THE FIRST COMMAND "WRIT".
*  SIMILARLY, A BACKUP DATA SET IN EDITING WILL ONLY BE REQUESTED AT THE
*  FIRST "SAVE" ATTEMPT.

      THE FIRST EVENT ON THE FILE WILL NOW APPEAR ON THE SCREEN AND ALL
      COMMANDS LISTED BELOW ARE AVAILABLE TO THE SCANNER.

      EXPLANATION OF THE VARIOUS COMMANDS
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      MENU:   DISPLAYS LIST OF AVAILABLE COMMANDS WITH SHORT EXPLANATIONS.

      HELP:   DISPLAYS MORE DETAILED INFORMATION ON ANY COMMAND WHICH IS
              GIVEN IN UPON PROMPTING.
*             THIS COMMAND IS HIGHLY RUDIMENTARY; PRESENTLY HELP IS ONLY
*             AVAILABLE FOR THE MUPT AND AX COMMANDS.

      NEWS:   DISPLAYS NEWS OF RECENT CHANGES TO THE GRAPHICS.

------------ THE STANDARD VIEWS:

       RA:   DISPLAY EVENT IN R-PHI VIEW. ONLY INNER DETECTOR.

       RB:   DISPLAY EVENT IN R-PHI VIEW. INNER DETECTOR AND LEAD GLASS.

       RC:   DISPLAY EVENT IN R-PHI VIEW. INNER DETECTOR, LEAD GLASS AND
                                          MUON FILTER.

      ZXA:   DISPLAY EVENT IN Z-X VIEW. ONLY INNER DETECTOR.

      ZXB:   DISPLAY EVENT IN Z-X VIEW. INNER DETECTOR AND LEAD GLASS.

      ZXC:   DISPLAY EVENT IN Z-X VIEW. INNER DETECTOR, LEAD GLASS AND
                                        MUON FILTER.

      ZXD:   DISPLAY EVENT IN Z-X VIEW. INNER DETECTOR, LEAD GLASS, MUON
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                                        FILTER AND FORWARD DETECTOR.

     ZYA:   DISPLAY EVENT IN Z-Y VIEW. ONLY INNER DETECTOR.

     ZYB:   DISPLAY EVENT IN Z-Y VIEW. INNER DETECTOR AND LEAD GLASS.

     ZYC:   DISPLAY EVENT IN Z-Y VIEW. INNER DETECTOR, LEAD GLASS AND
                                        MUON FILTER.

     ZYD:   DISPLAY EVENT IN Z-Y VIEW. INNER DETECTOR, LEAD GLASS, MUON
                                        FILTER AND FORWARD DETECTOR.

  OBS... THE ZX AND ZY VIEWS SHOW AS DEFAULT A ROTATED PROJECTION OF
         CHAMBER HITS. THIS IS TO SHOW CORRELATION WITH THE LEAD GLASS
         ENERGIES, WHICH ARE ALWAYS SHOWN IN THIS FASHION. THE TRUE
         PROJECTIONS OF CHAMBER HITS CAN BE OBTAINED IF DISPLAY DETAIL 900018400
         IS FLIPPED,  COMMAND "CDTL 9".
         THE ACTUAL MODE, PROJECT MODE OR ROTATE MODE, IS WRITTEN AT THE
         TOP OF THE PICTURE.

* OBS... IN THE ZX AND ZY VIEWS INNER DETECTOR HITS ARE SHOWN WITH
*       MIRRORS ONLY IN THE TRUE PROJECTIONS. IN THE ROTATED VIEWS ONLY
*       THE POSITION OF THE CORRESPONDING WIRE POSITION, I.E. THE MEAN
*       OF THE RIGHT AND LEFT HIT POSITION, IS SHOWN. THIS IS TO AVOID
*       CONFUSION IN THE ROTATED VIEWS.

      FW:   DISPLAY OVERALL VIEW OF THE FORWARD DETECTOR.
            LEAD GLASS BLOCK ENERGIES ARE DISPLAYED WITH THE SAME CODE
            AS IN THE FOLLOWING VIEW, RU.

      RU:   DISPLAY EVENT IN A ROLLED OUT VIEW OF ALL LEAD GLASS BLOCKS,
            INCLUDING ENDCAPS AND FORWARD DETECTOR. THE PULSE HEIGHTS
            ARE DISPLAYED WITH A NUMBER AND LETTER CODE AS FOLLOWS:
                 0:  LESS THAN 10 MEV
                 1:  BETWEEN 10 AND 20 MEV
                  .........
                 A:  BETWEEN 100 AND 200 MEV
                  .........
                 J:  BETWEEN 1000 AND 2000 MEV
                  .........
                 S:  BETWEEN 10000 AND 20000 MEV

            THE CODE IS AVAILABLE AT THE SCREEN VIA COMMAND "BL 6"
            IN MAGNIFIED VIEWS, THE PULSE HEIGHTS ARE WRITTEN OUT IN MEV

**    EC:   DISPLAYS LEADGLASS ENDCAP PULSE HEIGHTS ONTO RFI VIEWS. THE
**          CORRESPONDING HARDWARE DISPLAY IS DET 1.

**    FC:   DISPLAYS TAGGING COUNTER PULSE HEIGHTS ONTO RFI VIEWS. THE
**          CORRESPONDING HARDWARE DISPLAY IS DET 2.

     CYL:   DISPLAYS EVENT IN A PERSPECTIVE VIEW, INCLUDING INNER DETEC-
            TOR HITS AND LEAD GLASS HITS IN THE MAIN CYLINDER.

    FWMU:   DISPLAYS FORWARD MUON COUNTERS ONLY

---------- END OF STANDARD VIEWS

     STVW:  DISPLAYS EVENT IN THE STANDARD VIEW.
            THIS COMMAND IS USEFUL, IF A MAGNIFIED VIEW HAS BEEN CHOSEN
            AS STANDARD VIEW. THIS IS POSSIBLE BY THE COMMAND CSTV 1.

      DET:  DRAWS THE DETECTOR ONTO THE CURRENT EVENT DISPLAY.
**          THE OPTIONS DET 1, DET 2, DET 3 WILL DRAW THE HARDWARE OF
**          LEAD GLASS ENDCAPS AND FORWARD TAGGING ONTO RFI VIEWS.

      PRO:  DRAWS PROJECTIONS OF Z-X AND Z-Y VIEWS IN SMALLER SCALE ONTO
            R-FI VIEWS. AVAILABLE IN VIEWS RA,RB,RC AND CYL.
            IF DISPLAY DETAIL FLAG 17 IS .TRUE. PROJECTIONS APPEAR AUTO-
            MATICALLY. THIS IS OBTAINED WITH COMMAND 'CDTL 17'
            IF THE COMMAND IS GIVEN IN A MAGNIFIED R-FI VIEW, ONLY THOSE
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            HITS WHICH HAVE THEIR R-FI COORDINATES INSIDE THE MAGNIFIED
            VIEW, APPEAR IN THE PROJECTIONS.
            THESE VIEWS ARE TRUE PROJECTIONS, NOT R - Z VIEWS.
            SWITCHING CDTL 9 WILL CAUSE THE R-Z MODE TO APPEAR IN THE
            PROJECTIONS.

       BW:  WRITES THE CONTENTS OF A SPECIFIED BANK ONTO THE SCREEN.
            THE BANK NAME IS PROMPTED FOR.
            EACH PAGE CAN BE SUBMITTED FOR HARDCOPY.
            THE STANDARD PRINT FORMAT IS INT*2 ; HOWEVER, MANY BANKS
            ARE NOW PRINTED WITH TAILOR MADE FORMATS
            IF SEVERAL BANKS WITH THE SAME NAME EXIST, THE SCANNER IS
            PROMPTED TO GIVE THE BOS BANK NUMBER.
            IF A BANK DISPLAY EXTENDS OVER SEVERAL PAGES, THE SCANNER
            IS GIVEN THE POSSIBILITY TO STOP AFTER EACH PAGE.
            IF A NEGATIVE TRAILING NUMBER, E.G. "BW -1" IS ENTERED, A
            LIST OF ALL BANKS IN THE EVENT IS DISPLAYED.

*   STOP,END,EXIT:
            THIS IS THE NORMAL WAY TO END A SESSION.
            THE "PANIC BUTTON" TO ABORT A SESSION:   CONTROL+G

       C:   CONTINUE. THE ANALYSIS PROGRAM CONTINUES TO THE NEXT LEVEL
            FLAG SET BY THE SCANNER. IF ONLY ONE FLAG WAS SET, THE NEXT
            EVENT IS READ.
            IF AN OUTPUT FILE HAS BEEN ALLOCATED, THIS COMMAND LEADS TO
            A WRITING OUT OF THE EVENT, WHEN GOING TO THE NEXT ONE.

     JUMP:  A USER LEVEL INDEX IS REQUESTED. THE ANALYSIS PROGRAM THEN
            PROCEEDS TO THE SPECIFIED LEVEL.
            THE LEVEL CAN BE ENTERED AS A TRAILING NUMBER, E.G. JUMP 6

       N:   READ NEXT EVENT. A TRAILING NUMBER CAN BE ENTERED TO SKIP
            SEVERAL EVENTS. EXAMPLE: IF THE PRESENT EVENT IS 16, THE
            COMMAND N 3 CAUSES THE READING OF EVENT 19, N -3 EVENT 13.

     JOYS:  THE JOYSTICK IS ACTIVATED, VISIBLE AS A HAIR CROSS ON SCREEN
            THE JOYSTICK INPUT IS GIVEN BY:       CONTROL + E
            THE COMMAND IS USED TO ENLARGE A PARTICULAR AREA OF THE PIC-
            TURE. TWO MODES ARE AVAILABLE:
            JOYS WITH A TRAILING NUMBER: ONE JOYSTICK INPUT; POSITION
                 WILL BE CENTER OF MAGNIFIED VIEW, TRAILING NUMBER GIVES
                 THE DEGREE OF MAGNIFICATION.
            JOYS WITHOUT TRAILING NUMBER: TWO JOYSTICK INPUTS SPECIFY
                 OPPOSITE CORNERS OF NEW VIEW; THIS AUTOMATICALLY GIVES
                 THE MAGNIFICATION.

       RS:  RESETTING THE SCALE, IF CHANGED BY COMMAND JOYS.

        H:  HARDCOPY OF THE PRESENT VIEW IS GENERATED ON GOULD PLOTTER
            AFTER SOME WAITING TIME A MESSAGE APPEAR: DATA SUBMITTED TO
            PLOTTER QUEUE.
            A TRAILING NUMBER (E.G. H 3) GENERATES SEVERAL IDENTICAL
            HARDCOPIES. MAXIMUM IS 4, HOWEVER.
*       HX:  SAME AS HARDCOPY COMMAND "H", BUT THE PICTURE APPEARS ON THE
*            EXTERNAL PLOTTER. SHOULD ONLY BE USED FOR URGENT PICTURES.

            IF SEVERAL COMMANDS HAVE BEEN GIVEN, LIKE COM,RES,PRO,ETC..
            AND THE END OF PAGE IS REACHED, ONE CAN CONTINUE ON NEXT
            PAGE; THE HARDCOPY WILL STILL HAVE ALL THE DRAWN INFORMA-
            TION. THE PICTURE IS CLOSED BY HARDCOPY REQUEST, OR BY THE
            SOFTWARE "CALL ERASE", E.G. WHEN GIVING ONE OF THE STANDARD
            VIEW COMMANDS.

*   WRIT:   WRITE THE CURRENT EVENT AND READ NEXT EVENT. AT THE FIRST
*           CALL TO THIS COMMAND, THE OUTPUT DATA SET WILL BE ALLOCATED
*           AND THE PROGRAM ASKS FOR THE NAME, IN THE SAME WAY AS FOR
*           THE INPUT DATA SET. THE OUTPUT DATA SET MUST BE A CATALOGED
*           DATA SET. IT MAY BE EMPTY, HOWEVER.
*           THE WRITE MODE IS "BOS S", I.E. ONE EVENT/RECORD. IT CANNOT
*           BE CHANGED. THE LENGTHY SAFETY CHECKS IN EARLIER VERSIONS OF
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*           THE GRAPHICS PROGRAM HAVE NOW BEEN SKIPPED, SINCE /BCS/ HAS
*           BEEN MADE LARGER AND THE RISK TO LOOSE EVENTS SHOULD BE GONE

     COM:   GIVES THE SCANNER POSSIBILITY TO ADD HIS OWN COMMENTS TO THE
            PICTURE, IN ANY PLACE. THE COMMENTS APPEAR ON THE HARDCOPY.
            POSITION (BY JOYSTICK) AND COMMENT IS PROMPTED FOR.

    BDLS:   DELETE A BANK. THE NAME IS PROMPTED FOR AS WELL AS THE BOS
            BANK NUMBER IF MORE THAN ONE BANK WITH THE SAME NAME EXIST.
            IF THE BANK 'JETC' IS DELETED, A RENUMBERING OF THE RAW
            DATA BANK 'JETC' IS DONE, SO THAT PASSING LEVEL 4 WILL LEAD
            TO A PROPER RECALIBRATION. FOR THIS TO BE USEFUL, ONE SHOULD
            OF COURSE GIVE THE COMMAND AT LEVEL 2 OR 3

    CSTL:   COMMAND TO CHANGE THE USER-LEVEL FLAGS IN ANALYSIS PROGRAM.

    CSTV:   COMMAND TO CHANGE OPTIONS IN THE STANDARD VIEW.THE FOLLOWING
            CHANGES ARE AVAILABLE:
                        1 FREEZE STANDARD VIEW.
                          THE CURRENT VIEW WILL APPEAR AS STANDARD VIEW
                          IN THE NEXT EVENT, OR AT NEXT LEVEL ENTERED.
                        2 TURN ON/OFF AUTOMATIC DISPLAY OF NEW EVENT.
                        3 TURN ON/OFF DETECTOR WITH STANDARD VIEW.

            CSTV CAN BE ENTERED WITH A TRAILING NUMBER.

    CDTL:   COMMAND TO CHANGE DETAILS IN THE VARIOUS DISPLAY VIEWS. THE
            FOLLOWING CHANGES ARE AVAILABLE:
                  1 TURN ON/OFF DISPLAY OF INNER DETECTOR.
                  2 TURN ON/OFF DISPLAY OF LEAD GLASS.
                  3 TURN ON/OFF DISPLAY OF MUON FILTER.
                  4 TURN ON/OFF DISPLAY OF CHAMBER WALLS.
                  5 TURN ON/OFF DISPLAY OF CHAMBER WIRES.
                  6 TURN ON/OFF CROSSES FOR INNER DET. HITS.
                  7 TURN ON/OFF HISTOGRAMS OF LEAD GLASS ENERGY.
*                 8 TURN ON/OFF MUON HIT SYMBOLS.
                  9 TURN ON/OFF Z-RADIUS DISPLAY OF TRACKS.
                 10 TURN ON/OFF MIRROR HITS IN Z-RADIUS MODE.
                 11 TURN ON/OFF T2 TRIGGER DISPLAY.
                 12 TURN ON/OFF TRACK NUMBERS IN RESULT DISPLAY OF ID.
                 13 TURN ON/OFF TRACK BANK WRITING IN RESULT DISPLAYS.
                 14 TURN ON/OFF SINGLE TRACK DISPLAY IN COMMAND RES.
                 15 TURN ON/OFF DASH LINE DRAWING OF LEAD GLASS
                                AVAILABLE IN VIEWS CYL AND RU
                 16 TURN ON/OFF RESULT (TRACK FIT) DISPLAY.
                 17 TURN ON/OFF Z-X AND Z-Y PROJECTIONS.
                 18 TURN ON/OFF T3 TRIGGER DISPLAY
                 19 TURN ON/OFF FITTED TRACK DISPLAY FROM CLOSEST
                                APPROACH TO ORIGIN.
                 20 TURN ON/OFF HIT DISPLAY IN PROJECTIONS.
                 21 TURN ON/OFF HIT DISPLAY IN INNER DETECTOR
                 22 TURN ON/OFF MU-HIT NUMBER DISPLAY
                 23 TURN ON/OFF PROJECTION OF FITTED TRACKS TO LEAD
                                GLASS LIMIT.
                 24 TURN ON/OFF MU DISPLAY OF "OUT OF PLANE" HITS
                 25 TURN ON/OFF OVERLAP OF SCINTILLATORS IN FORWARD
                                DETECTOR DISPLAY  (COMMAND FW)
                 26 TURN ON/OFF SUPPRESSION OF ODD LAYER HITS IN JETC.
    (THIS IS USEFUL TO SPEED UP THE DISPLAY, AT SLOW RESPONSE TIME)
                 27 TURN ON/OFF DISPLAY OF MAIN VERTEX
                 28 TURN ON/OFF DISPLAY OF PHOTONS TOGETHER WITH
                                CHARGED TRACKS (COMM. RES,TR,VRES)
                 29 TURN ON/OFF DISPLAY OF PHOTONS WITHOUT CHARGED
                                TRACKS (COMMAND RES,TR,VRES)
                 30 TURN ON/OFF DISPLAY OF FORWARD MUON CNTR TOF VALUES
                 31 TURN ON/OFF DISPLAY OF TRACK NR IN TR DISPLAY
                 32 TURN ON/OFF DISPLAY OF TRACK NR IN VRES DISPLAY
                 33 TURN ON/OFF DISPLAY OF TOF NUMBERS, COUNTER NUMBERS
                 34 TURN ON/OFF DISPLAY OF SPINNING 1-BLOCK PHOTONS
                 35 TURN ON/OFF DISPLAY OF PHOTONS BELOW 200 MEV
*                36 TURN ON/OFF DISPLAY OF MUON MIRROR HITS, IN CASE
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*                                AMBIGUITIES HAVE BEEN RESOLVED.
*                37 TURN ON/OFF DISPLAY ONLY OF MUON HITS BELONGING TO
*                                GOOD MUONS.
*                38 TURN ON/OFF DISPLAY OF TRACK NUMBERS IN COMMAND MUPT
*                39 TURN ON/OFF DISPLAY OF MUON CHAMBER NUMBERS AND RAW
*                                MUON HIT NUMBERS.

            CDTL CAN BE ENTERED WITH A TRAILING NUMBER.

*           DEFAULT VALUES: GENERALLY THESE FLAGS ARE OFF. THE FOLLOWING
*                   ARE ON, HOWEVER:  1,2,3,5,6,9,14,28 AND 38.


     CPAR:  COMMAND TO CHANGE PARAMETERS IN MONTE CARLO EVENTS.

     TRUE:  DISPLAYS THE "TRUE" TRACKS IN A MONTE CARLO EVENT. THE
            FOLLOWING TRAILING NUMBER OPTIONS ARE AVAILABLE:
                        0 ONLY CHARGED TRACKS ARE DISPLAYED.
                        1 ONLY PHOTONS ARE DISPLAYED.
                        2 BOTH CHARGED TRACKS AND PHOTONS ARE DISPLAYED.
                        3 THE PARTICLE CHARGES, ORIGIN COORDINATES AND
                          MOMENTUM VECTORS ARE WRITTEN TO THE SCREEN.
                          A HARD COPY CAN THEN BE MADE.
            THIS COMMAND IS UNFORTUNATELY ONLY WORKING IN MC EVENTS.

     CLUS:  DISPLAY THE RESULTS OF THE LEAD GLASS CLUSTER ROUTINES.
             THE COMMAND CAN BE GIVEN WITH THE FOLLOWING TRAILING
             NUMBERS:
                    NONE OR 0: DISPLAY CLUSTER STRUCTURE IN BARREL AND
                                 END CAPS.
                            1: DISPLAY CLUSTER STRUCTURE AND GAMMA
                                 DIRECTIONS DERIVED BY CLUSTER ANALYSIS
                                 ROUTINES.
                            2: WRITE TO SCREEN THE NUMERICAL RESULTS
                                 OF CLUSTER ANALYSIS.
                            3: EXECUTE CLUSTER ANALYSIS, E.G. IF THE
                                 SUPERVISOR HAS NOT YET CALLED IT. IF
                                 THE CLUSTER ANALYSIS BANK DOES EXIST
                                 IT IS DELETED AND REPLACED. NOTHING IS
                                 DISPLAYED FOLLOWING THIS COMMAND.

       ZV:  DISPLAY THE RESULTS OF THE Z-VERTEX ROUTINE.
                  A SMALL COMMAND (BY NUMBERS) MENU IS AVAILABLE

     MUPT:  DISPLAY THE RESULT OF PATTERN RECOGNITION IN THE MUON FILTER
             THE COMMAND CAN BE GIVEN WITH THE FOLLOWING TRAILING
             NUMBERS:
                    NONE OR 0: DISPLAY THE FITTED TRACKS FOUND BY MUON
                                 PATTERN RECOGNITION.
                           -N: REANALYSIS OF MUON PATTERN RECOGNITION
                                 AND DISPLAY OF ALL TRACKS.
                            N: DISPLAY OF TRACK NR N ONLY.
*                               1 < N < 100
*                         100: DRAW ONLY GOOD MUON TRACKS
*                              QUALITY BETWEEN 1 AND 99
*                         200: DRAW ALL MUONS WITH QUALITY 100 OR LARGER
*                              TRACKS ARE PROBABLY PENETRATING HADRONS
*                         300: DRAW ALL MUONS WITH QUALITY 0 AND WITH AN
*                              ASSOCIATED HIT OUTSIDE OF YOKE.
*                        1000: DRAW ONLY GOOD MUON TRACKS,AS IN MUPT 10000042700
*                              A MOMENTUM CUT AT 1.4 GEV IS PERFORMED.

*           MORE DETAILS IN JADE COMPUTER NOTES 22 AND 52.

      RES:  DISPLAY ANALYSIS RESULTS. PRESENTLY AVAILABLE FOR PATREC
            AND LEAD GLASS CLUSTER ANALYSIS RESULTS. THE BANK BOS NUMBER
            (FOR BANK PATR) CAN BE ENTERED AS A TRAILING NUMBER.
            IF NOT GIVEN, THE LOWEST BANK NUMBER IS LOOKED FOR.
              IF DISPLAY DETAIL 14 IS SET, SINGLE TRACK DISPLAY IS
                 AVAILABLE. THE WANTED TRACK IS SPECIFIED BY A TRAILING
                 NUMBER.
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IF DISPLAY DETAIL 17 IS SET, THE FITTED TRACKS ALSO APPEAR IN THE PROJECTIONS.
IF DISPLAY DETAIL 28 OR 29 IS SET, PHOTONS ARE DISPLAYED AS HATCHED LINES. THE NUMBERS CORRESPOND TO THE TRUE PHOTON NUMBER, I.E. PHOTON NR 3 IS THE THIRD LEAD GLASS CLUSTER THAT IS NOT ASSOCIATED WITH A CHARGED TRACK. A LIST OF CLUSTER INFORMATION IS ALSO PRINTED, WITH INFORMATION ON THE PHOTON NUMBER OR ASSOCIATED CHARGED TRACK NUMBER. SEE ALSO CDTL 34,35.

IN THE VIEW RU (ROLLED OUT LEAD GLASS VIEW), THE IMPACT POINTS OF THE CHARGED TRACKS ARE DISPLAYED TOGETHER WITH THE NEUTRAL CLUSTERS. A LIST OF CLUSTER INFORMATION IS PROVIDED.

TR: COMMAND TO DISPLAY PATTERN RECOGNITION RESULTS AS STORED IN THE HIT LABEL ARRAY 'JHTL'.
THE BOS BANK NUMBER CAN BE ENTERED AS A TRAILING NUMBER. IF NO NUMBER IS ENTERED, THE LOWEST IS TAKEN.
THE SCANNER IS ASKED TO ENTER ONE OF THE FOLLOWING OPTIONS:
CODE 0 : CODE LIST
CODE 1 : DISPLAY ALL HITS ASSOCIATED WITH TRACKS
CODE 2 : DISPLAY ALL HITS NOT ASSOCIATED WITH TRACKS
CODE 3 : DISPLAY ALL HITS ASSOCIATED WITH TRACKS, MARKING SELECTED ONES
CODE 4 : DISPLAY ALL HITS,MARKING TRACK-ASSOCIATED ONES
CODE 5 : DISPLAY RAW EVENT, MARKING SELECTED TRACKS.

IF A TRAILING NR 1 TO 5 IS ENTERED, IT IS INTERPRETED AS THE CORRESPONDING VIEW OPTION, WITH THE LOWEST NUMBER JHTL AND PATR BANKS.
THIS COMMAND ENABLES THE SCANNER TO DISPLAY ID HITS WITH SUPRESSION OF MIRROR HITS.

MASS: COMMAND TO COMPUTE INVARIANT MASS OF A GIVEN SYSTEM OF PARTICLES. PARTICLE NUMBERS AND TYPES ARE PROMPTED FOR. THE COMMAND CAN BE USED FOR CHARGED TRACKS AS WELL AS FOR GAMMAS AND TRACK ASSOCIATED CLUSTERS. IF MORE THAN ONE CHARGED TRACK IS ENTERED, A VERTEX FIT IS PERFORMED, AND 4-VECTORS ARE TAKEN WITH RESPECT TO THE FOUND VERTEX. A LIST OF THE VARIOUS RESULTS IS WRITTEN ON THE SCREEN.

TRG2: COMMAND TO DISPLAY TRIGGER 2 INFORMATION ONTO THE INNER DETECTOR.

* TRLG: COMMAND TO DISPLAY VARIOUS LEAD GLASS TRIGGERS IN 1982 AND
* LATER DATA.

VX: DISPLAY THE RESULT OF THE VERTEX PROGRAM. SEVERAL OPTIONS ARE AVAILABLE, TO BE ENTERED AS TRAILING NUMBERS:
0 : MAIN VERTEX IS DISPLAYED AS A CROSS
1 : ALL VERTICES ARE DISPLAYED AS CROSSES, WITH THE NUMBERS WRITTEN CLOSE BY. A LIST OF VERTEX INFORMATION IS ALSO WRITTEN OUT AND APPEARS ON THE HARDCOPY.
2 : ALL E+E- (PHOTON CONVERSION) VERTICES ARE DISPLAYED.
3 : CREATE THE BANK 'GVTX' WITH THE RESULTS FROM THE VERTEX PROGRAM.
4 : SHOW THE RUN VERTEX POSITION IN RFI VIEWS.
SEE ALSO UNDER COMMAND CDTL FOR AUTOMATIC VERTEX DISPLAY.
FOR MORE INFORMATION, SEE JADE COMPUTER NOTE 32.

DEDX: DISPLAY THE RESULT OF THE DEDX PROGRAM. SEVERAL OPTIONS ARE AVAILABLE, TO BE ENTERED AS TRAILING NUMBERS:
0 : DEDX RESULTS FOR ALL CHARGED TRACKS ARE WRITTEN ON THE SCREEN (NOT ON HARDCOPY).
ITR : DEDX RESULT FOR TRACK ITR IS WRITTEN ON THE SCREEN (NOT ON THE HARDCOPY)
-1 : THE BANK 'DEDX' IS CREATED WITH DEDX RESULTS AND CAN BE INSPECTED WITH THE COMMAND BW. AT PRESENT, THE CONTENT OF BANK 'DEDX' CORRESPONDS EXACTLY TO THE CONTENT OF BANK 'TPTR'
-2 : A GRAPH DEDX VS MOMENTUM IS DRAWN, WITH ENTRIES FOR EACH TRACK. THE THEORETICAL CURVES USED IN ASSIGNING CHISQUARES FOR PARTICLE IDENTIFICATION ARE ALSO DRAWN.
* -4 : SAME GRAPH AS IN OPTION -2, BUT DRAWN IN THE
* LOWER LEFT CORNER OF THE CURRENT VIEW.

TOF: DISPLAY THE RESULT OF THE TOF PROGRAM. SEVERAL OPTIONS ARE AVAILABLE, TO BE ENTERED AS TRAILING NUMBERS:
0 : TOF RESULTS FOR ALL CHARGED TRACKS ARE WRITTEN ON THE SCREEN (NOT ON HARDCOPY).
ITR : TOF RESULTS FOR TRACK ITR IS WRITTEN ON THE SCREEN (NOT ON THE HARDCOPY)
-1 : THE BANK 'TOFR' IS CREATED AND CAN BE INSPECTED WITH THE COMMAND BW. THE FORMAT IS DESCRIBED IN JADE COMPUTER NOTE 20.
-2 : A GRAPH BETA VS MOMENTUM IS DRAWN, WITH ENTRIES FOR EACH TRACK. THE THEORETICAL CURVES USED IN ASSIGNING CHISQUARES FOR PARTICLE IDENTIFICATION ARE ALSO DRAWN.
* -3 : TOF INFORMATION FROM THE LEAD GLASS. ONLY
* AVAILABLE IN 1982 AND LATER DATA.
* -4 : SAME GRAPH AS IN OPTION -2, BUT DRAWN IN THE
* LOWER RIGHT CORNER OF THE CURRENT VIEW.

QP: THE Q-PLOT ANALYSIS PROGRAM OF KOBAYASHI IS CALLED UP.
SEVERAL DISPLAY OPTIONS EXIST, AS TRAILING NUMBERS:
1 : 3-VECTORS OF CHARGED TRACKS AND PHOTONS ARE DISPLAYED IN TWO DIFFERENT PLANES OF THE MOMENTUM ELLIPSOID. LEAD GLASS ENERGIES ARE SHOWN IN HISTOGRAM FASHION.
2 : 3-VECTORS OF CHARGED TRACKS AND PHOTONS ARE DISPLAYED IN THREE DIFFERENT PLANES OF THE MOMENTUM ELLIPSOID.
3 : THE TRIANGULAR Q-PLOT IS DRAWN, WITH THE POSITION OF THE EVENT MARKED. THIS Q-PLOT IS ALSO DRAWN IN OPTIONS 1 AND 2 ABOVE.

BL: THIS COMMAND CONTAINS SOME OPTIONS USEFUL IN LEAD GLASS ANALYSIS. THE CURRENT VIEW MUST BE 'RU OR FW'.
THE OPTIONS (CAN BE ENTERED AS TRAILING NUMBERS) ARE:
1 : DISPLAY LIST OF OPTIONS
2 : WRITE BLOCK NUMBERS FOR ALL BLOCKS THAT CONTAIN ENERGY. MAGNIFICATION IS NEEDED.
3 : SHOW ALL BLOCKS THAT WERE KILLED IN THE 'BAD LEADGLASS ANALYSIS', I.E. BLOCKS PRESENT IN BANK 'ALGL' BUT NOT IN BANK 'ALGN'.THE CORRESPONDING BLOCKS ARE MARKED WITH A CROSS.
4 : SHOW WHICH OF CURRENTLY HIT BLOCKS ARE KNOWN AS 'SPINNERS'.MARKING IS DONE BY A HEAVY BOX.
5 : SHOW CURRENT DEAD BLOCKS, I.E. BLOCKS WHICH WERE SWITCHED OFF IN THIS PERIOD.THE MARKING IS HERE DONE WITH A HEAVY CIRCLE.
6 : WRITE OUT THE CODE INFORMATION FOR DISPLAY OF PULSEHEIGHTS IN NON-MAGNIFIED VIEWS.
7 : PRINT CLUSTER NUMBERS FOR KNOWN SPINNING BLOCKS. AVAILABLE IN ALL VIEWS.

VRES: THIS COMMAND IS A VARIANT OF THE RES COMMAND. IT USES INFORMATION FROM THE VERTEX PROGRAM (COMMAND VX) AND DISPLAYS CHARGED TRACKS FROM THE CORRESPONDING VERTEX. PHOTONS ARE TAKEN TO COME FROM THE MAIN VERTEX. THE OPTIONS, ENTERED AS TRAILING NUMBERS, ARE:
0 : DISPLAY ALL TRACKS FROM THEIR VERTICES.
-N : DISPLAY ALL TRACKS FROM VERTEX NR N ONLY.
N : DISPLAY TRACK NR N ONLY. THIS IS ACTIVE ONLY IF CDTL 14 HAS BEEN ACTIVATED.

FIND: THIS COMMAND ENABLES THE SCANNER TO FIND A PARTICULAR EVENT. IF NOT ENTERED AS TRAILING NUMBERS (FIND NRUN NEVENT), THE

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          RUN AND EVENT NUMBERS ARE PROMPTED FOR. THE PROGRAM PROCEEDS
          TO SEARCH FOR THE DESIRED EVENT AND DISPLAYS IT EVENTUALLY.

    SPVA:  USER DEVOTED COMMAND. THIS COMMAND CAUSES A CALL TO SUB-
           ROUTINE SPARE, WHICH CAN BE SUPPLIED BY THE USER IN A
           PRIVATE GRAPHICS MODULE. IN THE STANDARD MODULE THIS IS A
           DUMMY COMMAND. MORE ABOUT PRIVATE MODULES IN THE GENERAL
           COMMENTS BELOW.

---------- EDITING COMMANDS -----

    EDIT:  COMMAND TO EDIT RESULTS OF PATTERN RECOGNITION IN INNER
           DETECTOR.
           THIS COMMAND ENTERS THE SCANNER INTO A DISPLAY ROUTINE WITH
           A NUMBER OF SUBCOMMANDS. THESE AND EDITING IN GENERAL ARE
           DESCRIBED IN A SEPARATE NOTE (JADE COMPUTER NOTE 28)

     RET:  THIS COMMAND (RETURN) IS TO BE USED IF THE SCANNER CALLS THE
           GRAPHICS DISPLAY PROGRAM FROM THE EDITING PROGRAM (SEE THE
           DESCRIPTION OF EDITING IN JADE COMPUTER NOTE NR 28). THE
           COMMAND HAS NO EFFECT "OUTSIDE EDITING".

    SAVE:  COMMAND TO WRITE THE CONTENT OF COMMON /CWORK/ OUT TO A
           SCRATCH FILE, TOGETHER WITH HEAD BANK INFORMATION. THIS
           COMMAND IS HEAVILY USED IN EDITING. A CATALOGUED SCRATCH
           FILE MUST HAVE BEEN ALLOCATED AT SESSION BEGIN, OF COURSE.

-------- END EDITING COMMANDS ---

     LIM:  COMMAND TO CHANGE COMMON /CPATLM/, WHICH HOLDS ALL LIMITS
           THAT ARE USED IN PATREC ROUTINES.
           THE COMMON /CJDRCH/ CAN ALSO BE CHANGED BY THIS COMMAND
           THE TWO OPTIONS ARE PROMPTED FOR OR CAN BE OBTAINED AUTOMA-
           TICALLY BY A TRAILING NUMBER:
                        1 :    /CPATLM/
                        2 :    /CJDRCH/
           THIS COMMAND CAN OF COURSE ALSO BE USED FOR RESETTING TO
           DEFAULT VALUES OR SIMPLY TO INSPECT CURRENT VALUES.

*    DRAW:  COMMAND TO DRAW THE POSITION OF A POINT, LINE, CIRCLE ETC.
*           USEFUL IN DETAILED STUDIES OF EVENTS, COMPARISON WITH BATCH
*           PRINT OUT, ETC. THE OPTIONS AVAILABLE ARE:
*                       1 :    OPTION LIST
*                       2 :    DRAW POINT X,Y ON SCREEN
*                       3 :    DRAW CIRCLE WITH RADIUS RAD, CENTER X,Y
*                       4 :    DRAW LINE BETWEEN X1,Y1 AND X2,Y2
*           THE POINTS AND RADII ARE PROMPTED. THE OPTION CAN BE ENTERED
*           AS A TRAILING NUMBER IN THE COMMAND, E.G. DRAW 2

*      AX:  COMMAND TO DISPLAY THE RESULTS OF GODDARDS JET-AXIS PROGRAM.
*           THE FOLLOWING OPTIONS ARE AVAILABLE:
*                       1 :    SPHERICITY AXIS
*                       2 :    2-JET ANALYSIS, AXIS DISPLAY
*                       3 :    3-JET ANALYSIS, AXIS DISPLAY
*                       4 :    4-JET ANALYSIS, AXIS DISPLAY
*                     K L :    K-JET ANALYSIS AND DISPLAY OF TRACKS IN
*                              THE JET L ONLY
*                    K -1 :    K-JET ANALYSIS AND THRUST AXIS DISPLAY.
*           THE OPTION CAN BE ENTERED AS TRAILING NUMBERS, E.G. AX 2 1

*    FADC:  COMMAND TO DISPLAY THE FLASH ADC INFORMATION ON THE ID WIRES
*           WHICH HAVE BEEN SO EQUIPPED.

*    GVTX:  COMMAND TO MAKE A VERTEX FIT OF SELECTED CHARGED TRACKS. THE
*           DITTMANN VERTEX PROGRAM IS USED.
*           THE TRACK NUMBERS ARE PROMPTED FOR. THE RESULT OF THE FIT IS
*           DISPLAYED: VERTEX POSITION IS DRAWN AND VERTEX INFORMATION
*           IS WRITTEN ON SCREEN.
**         IF THE COMMAND GVTX IS FOLLOWED BY ANY TRAILING NR (NOT 0),
**         A PHOTON CONVERSION FIT WILL BE ATTEMPTED IF TWO TRACKS ARE
**         ENTERED IN THE INPUT.
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**  PATR:  COMMAND TO SELECT PATR BANK NR, FOR USE IN VARIOUS COMMANDS.
**         THUS IF PATR BANKS 9 AND 10 BOTH ARE PRESENT, THE COMMAND
**         PATR 10 WILL CAUSE BANK NR 10 TO BE USED INSTEAD OF NR 9,
**         WHICH IS OTHERWISE DEFAULT, BEING THE LOWEST NR BANK.
**         AFFECTED ARE THE FOLLOWING COMMANDS (ALL INVOLVING VERTEX
**         FITS):  VRES, VX, GVTX, MASS.

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                        GENERAL COMMENTS:
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  TRAILING NUMBERS:     ANY VIEW COMMAND FOLLOWED BY A TRAILING NUMBER
                        (EXCEPT 0) WILL CAUSE THE CORRESPONDING DETECTOR
                        TO APPEAR WITH THE EVENT DISPLAY.

                        COMMANDS WITH VARIOUS OPTIONS CAN NORMALLY BE
                        GIVEN WITH THE OPTION AS TRAILING NUMBER.

  FAST DISPLAY:         THE DISPLAY OF A COMPLICATED EVENT CAN BE RATHER
                        SLOW AT HIGH OCCUPANCY TIME. FOR PURE SCANNING
                        PURPOSES, THE DISPLAY CAN BE SPEEDED UP BY:
                                    CDTL 6
                                    CDTL 26

* SLOW DISPLAY:         SOME TIMES THE GRAPHICS INTERFACE TO IBM (NOVA)
*                       IS GETTING DISTURBED. AS A RESULT THE PROGRAM
*                       IS HANGING AND NOTHING HAPPENS. YOU MAY THEN TRY
*                       RESETTING THE INTERFACE BY THE FOLLOWING COMMANDS
*                         CONTROL + SHIFT + K     (ALL THREE AT SAME TIME)
*                         RS     (RETURN)
*                         GO     (RETURN)
*                       IF IT DOES NOT WORK, COMPLAIN TO THE R2-GROUP OR
*                       TO THE OPERATORS.
*                       SEVERAL CONTROL/SHIFT/K COMMANDS WILL DESTROY THE
*                       CONNECTION TO IBM. HOWEVER, IBM STILL THINKS YOU
*                       ARE LOGGED ON. YOU HAVE TO ASK THE OPERATORS TO
*                       CANCEL YOUR SESSION. DO NOT DO IT TOO OFTEN..

  ANSWER YES OR NO:     IN ANSWERING QUESTIONS, WITH YES OR NO, THE
                        FOLLOWING ANSWERS ARE ACCEPTED AS POSITIVE:

                          YES,YE,Y   JA,JAWOHL,J    HAI,HA,H

                        ANYTHING ELSE, INCLUDING A SIMPLE RETURN, IS A
                        NEGATIVE ANSWER.

  REPEAT LAST COMMAND:  IF A SIMPLE RETURN IS GIVEN AS COMMAND, IT WILL
                        BE INTERPRETED IN THE SAME WAY AS THE LAST
                        COMMAND, I.E. IF THE LAST COMMAND GIVEN WAS N,
                        THEN A RETURN WILL AGAIN LEAD TO READING THE NEXT
                        EVENT. THIS SAVES SOME EFFORT IN SCANNING.

  PRIVATE MODULES:      THE GRAPHIC DISPLAY IS OFTEN A CONVENIENT WAY
                        TO INVESTIGATE THE DETAILED WORKING OF A PROGRAM.
                        FOR THIS PURPOSE, THE USER WILL OFTEN WISH TO
                        USE SPECIAL DISPLAY OPTIONS OR COMMUNICATE IN
                        SPECIAL WAYS WITH HIS PROGRAM. THIS CAN BE DONE
                        IN CREATING A PRIVATE MODULE WITH THE SPECIAL
                        CODE LINKED IN. THE PROTOTYPE JOB FOR DOING THIS
                        IS THE MEMBER JBOVER ON  F11LHO.JADEGS ; THIS
                        MEMBER CONTAINS THE RELEVANT OVERLAY STRUCTURE.
                        WHEN YOU USE IT, BE SURE TO CHANGE FILE NAMES
                        CORRESPONDINGLY. FOR MORE INFORMATION ON PRIVATE
                        MODULES, CONTACT J.OLSSON OR G.PEARCE.

                        THE GRAPHICS PROGRAM IS STILL BEING IMPROVED
                        AND CHANGES ARE SOMETIMES DONE.
                        UNFORESEEN RESULTS MAY OCCUR AND SHOULD BE
                        BROUGHT TO THE ATTENTION OF J.OLSSON.
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ALSO SUGGESTIONS OF IMPROVEMENT ARE WELCOME...

A COPY OF THIS INFORMATION CAN BE OBTAINED BY
SUBMITTING THE JOB JBJCN34 ON THE LIBRARY
JADEPR.TEXT