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                   I                            I
                  I   JADE COMPUTER NOTE NR. 27    I
                   I                            I
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*                                                               *
*                  JADE DATA REDUCTION,  STEP 1                 *
*                                                               *
*****************************************************************
                                M.GODDARD  J.OLSSON  P.STEFFEN
                                                  05.10.197900003600
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GENERAL INFORMATION (BOOK-KEEPING):
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   THE START POINT FOR DATA REDUCTION ARE THE DATA TAPES FROM THE
REFORMATING STEP. THESE ARE FOUND IN THE DATA GENERATION GROUP

                                F11LHO.JDATA01.REFORM.G0NNNV00

CURRENT STATUS OF THESE TAPES IS FOUND IN THE MEMBER

                                JADEPR.YENLHO.S(RUNLST)

   BEFORE STARTING THE REDUCTION STEP, AN UPDATING OF "BAD LEAD GLASS"
INFORMATION HAS TO BE PERFORMED. BOOK-KEEPING OF THIS STEP IS FOUND IN

                                F22WAT.BADCHS(BADCH)

   DATA REDUCTION STEP 1 HAS TWO SERIES OF OUTPUT TAPES. DUE TO TIME
REASONS, TEMPORARY TAPES WITH THE NAMES
                                JADEPR.TNNNA
                                JADEPR.TNNNB  ETC.,
ARE FIRST CREATED, NORMALLY 3-4 PER REFORM-TAPE (WITH NUMBER NNN)
   THESE TEMPORARY TAPES ARE THEN GROUPED TOGETHER INTO PERMANENT
TAPES IN THE GENERATION GROUP
                                JADEPR.REDUC1.G00MMV00

   THE NUMBER MM HAS NO RELATION TO THE PREVIOUS NUMBER NNN OF THE
REFORMATING STEP. THE BOOK-KEEPING OF THIS STEP IS FOUND IN

                                JADEPR.JADESR(REDUC)

   IF POSSIBLE, THE GROUPING TO REDUC1 TAPES FOLLOWS THE VARIOUS
CM-ENERGIES.

THE DATA REDUCTION CUTS:
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   LEAD GLASS PULSER EVENTS ARE REJECTED (NORMALLY 13 EVENTS / RUN)

   AFTER THE EVENT IS READ AND BEFORE IT GOES ON TO ZVERTEX CALCULATION
AND PATTERN RECOGNITION, SEVERAL FLAGS ARE SET:

   1. OVERFLOW FLAG IFLW, 0 OR 1  (SHORTER OR LONGER THAN 3000 WORDS)
   2. TAGGING FLAG IFTG        BY CALLING SUBR. TAGFLG(IFTG), WHICH
         SETS FLAG FOR ENERGY IN FORWARD TAGGING BLOCKS
         IFTG = 0      NO ENERGY
         IFTG = 11     ENERGY ABOVE LIMIT IN NEG. FW ARM
         IFTG = 12     ENERGY ABOVE LIMIT IN POS. FW ARM
         IFTG = 113    ENERGY ABOVE LIMIT IN BOTH FW ARMS  (LUMI)
   3. TOKYO LEAD GLASS LABEL, IAC
         IAC = 0 IF ETOT < 7 GEV AND ECYL < 3.5 GEV
         IAC = 0 IF LGCALB GIVES ERROR RETURN
         IAC = 0 IF ETOT IS CONTAINED (>95%) IN ONE ENDCAP BLOCK
                 (THIS IS CHECKED ONLY IF ETOT > 6 GEV)
         IAC = 1 OTHERWISE

THESE THREE FLAGS ARE COMBINED INTO ONE WRITE FLAG, IWRT :
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   IWRT = 1
   IF(IAC.EQ.0.AND.IFLW.EQ.0.AND.(IFTG.EQ.0.OR.ETOT.LT.300.)) IWRT=0

  THE LAST ETOT LIMIT SERVES TO REJECT PURE LUMI TRIGGERS
**********
OBS OBS
  THE WRITE FLAG IS USED TO SAVE THE EVENT IF IT WOULD OTHERWISE BE
REJECTED IN ONE OF THE FOLLOWING ZVERTEX OR PATREC STEPS.
**********

  EVENTS WITH NO INNER DETECTOR HITS ARE NOW REJECTED IF IWRT = 0
  EVENTS WITH NO INNER DETECTOR HITS ARE NOW WRITTEN  IF IWRT = 1

-----> Z-VERTEX CALCULATION

  EVENTS WITH NO Z-VERTEX (ZVTX) FOUND   ARE REJECTED IF IWRT = 0
  EVENTS WITH ABS(ZVTX) > 450. MM        ARE REJECTED IF IWRT = 0
  ALL OTHER EVENTS PROCEED TO PATTERN RECOGNITION

-----> PATTERN RECOGNITION

  EVENTS WITH NO 'PATR' BANK        ARE REJECTED  (PATHOLOGIC)
  NOTE: A RESULT BANK 'PATR' WITH MINIMUM LENGTH OF 8 I*4 WORDS IS
        ALWAYS CREATED, EVEN IF NO TRACK IS FOUND. THE ONLY EXCEPTION
        TO THIS IS WHEN COMMON /BCS/ HAS NOT ENOUGH FREE SPACE EVEN
        FOR THIS SHORT BANK. PRESENT SIZE OF /BCS/ IS 20000 I*4 WORDS
        ( MINUS ADMINISTRATIVE SPACE FOR "BOS")
  EVENTS WITH NO TRACKS (NTR = 0)   ARE REJECTED IF IWRT = 0
  EVENTS WITH NO TRACKS (NTR = 0)   ARE WRITTEN  IF IWRT = 1

THE REMAINING EVENTS WITH TRACKS (NTR > 0) ARE NOW SEPARATED INTO
TAGGED AND NONTAGGED EVENTS (IFTG > 0  AND  IFTG = 0). THEY ARE
TREATED DIFFERENTLY:

 TAGGED EVENTS:

  SEARCH FOR TRACKS WITH > 12 HITS AND PTRANS > 200 MEV
  EVENTS WITH AT LEAST ONE SUCH TRACK ARE WRITTEN
  EVENTS WITHOUT SUCH TRACKS          ARE REJECTED

 NOTAGGED EVENTS:

  THESE EVENTS ARE DIVIDED INTO THREE DIFFERENT CLASSES, ACCORDING TO
QUALITY OF TRACKS:
    ISTAR=0 MEANS ALL TRACKS SHORT  ( < 12 HITS IN THE R-Z FIT)
    ISTAR=1 MEANS AT LEAST ONE LONG HIGH PTRANS TRACK   ( > 600 MEV)
    ISTAR=2 MEANS AT LEAST ONE LONG TRACK BUT NOT HIGH PTRANS

 ISTAR = 0 EVENTS:

  EVENTS ARE WRITTEN  IF IWRT = 1
  IF IWRT = 0  THE EVENTS UNDERGO A FURTHER CHECK:
     EVENTS ARE WRITTEN IF THEY HAVE AT LEAST ONE LONG ( > 20 HITS)
                                    TRACK IN THE R-FI FIT

     EVENTS ARE REJECTED IF THEY DO NOT HAVE SUCH A TRACK

 ISTAR = 2 EVENTS:
     EVENTS ARE REJECTED IF IWRT = 0
     EVENTS ARE WRITTEN  IF IWRT = 1

 ISTAR = 1 EVENTS:
     EVENTS ARE WRITTEN  IF IWRT = 1
     IF IWRT = 0 THEN THE QUANTITY ZMIN IS CALCULATED:
      ZMIN IS THE SMALLEST Z-AXIS INTERCEPT OF ALL THE LONG TRACKS
     EVENTS ARE REJECTED IF  ZMIN > 450 MM
     IF ZMIN IS < 450 MM  THEN THE QUANTITY RMIN IS CALCULATED
      RMIN IS THE SMALLEST DISTANCE TO THE Z-AXIS OF ALL LONG TRACKS
     EVENTS ARE REJECTED IF    RMIN > 60 MM
     EVENTS ARE WRITTEN  IF    RMIN < 60 MM
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REDUCTION STATISTICS

BELOW IS GIVEN THE TYPICAL STATISTICS FOR A DATA REDUCTION STEP 1 ACCORDING TO THE CUTS DESCRIBED ABOVE. PERCENTAGES GIVEN REFER TO THE TOTAL NUMBER OF READ EVENTS (- PULSER EVENTS) IN CASE OF REJECTS AND TO THE TOTAL NUMBER OF WRITTEN EVENTS IN CASE OF WRITTEN EVENTS.

```
     ++++++++   STATISTICS FOR RUN      0    ++++++++++
EVENTS READ       7000           PULSER EVENTS         13
OVERFLOW EVENTS    9       LGCALB ERROR RETURNS        0
6798 EVENTS FAILED LGLASS CUT      97.29%
 189 EVENTS PASSED LGLASS CUT       2.71%
  95 EVENTS HAD BAD LGLASS BLOCKS       1.36%    (E-CAP SPINNERS)
5966 EVENTS HAVE NO TAG TRIGGER     85.39%
1021 EVENTS HAVE TAG TRIGGER        14.61%
 149 EVENTS WITH TAG TRIGGER AND ETOT >  300. MEV      2.13%
6650 EVENTS WITH COMBINED WRITE FLAG OFF   95.18%
 337 EVENTS WITH COMBINED WRITE FLAG ON     4.82%
 110 EVENTS HAD NO ID HITS AND WRITE FLAG OFF      1.57%          (REJ)
   0 EVENTS HAD NO ID HITS AND WRITE FLAG ON      0.0 %          (WRI)
6877 EVENTS ENTERED ZVERTEX ROUTINE      98.43%
 821 EVENTS FAILED TO FIND Z VERTEX & HAD WRITE FLAG OFF  11.75% (REJ)
 122 EVENTS FAILED TO FIND Z VERTEX BUT HAD WRITE FLAG ON  1.75% (WRI)
3045 EVENTS HAD ZVTX > 450 AND WRITE FLAG OFF     43.58%         (REJ)
3011 EVENTS THROUGH PATREC      43.09%
  87 EVENTS WERE 0 PRONGS        1.25%
   6 EVENTS WERE 0 PRONGS AND HADE NO WRITE FLAG      0.09%      (REJ)
  81 EVENTS WERE 0 PRONGS AND HAD WRITE FLAG ON      6.61%       (WRI)
2924 EVENTS HAD AT LEAST ONE TRACK       41.85%
 222 EVENTS WITH TRACKS AND TAG FLAG       3.18%
  40 EVENTS WITH TRACKS AND TAG FLAG, LOW MOMENTUM       0.57%   (REJ)
 182 EVENTS WITH TRACKS AND TAG FLAG, HIGH MOMENTUM      14.86%  (WRI)
 103 EVENTS WERE ISTAR=0       1.47%
  46 EVENTS WERE ISTAR=0 AND HAD WRITE FLAG ON      3.76%        (WRI)
  11 EVENTS WERE ISTAR=0 BUT HAD LONG TRACK IN RFI  0.90%        (WRI)
  46 EVENTS WERE ISTAR=0 AND HAD NO LONG TRACK IN RFI      0.66% (REJ)
 990 EVENTS WERE ISTAR=2      14.17%
  30 EVENTS WERE ISTAR=2 AND HAD WRITE FLAG ON      2.45%        (WRI)
 960 EVENTS WERE ISTAR=2 AND HAD WRITE FLAG OFF     13.74%       (REJ)
1609 EVENTS WERE ISTAR=1      23.03%
 213 EVENTS HAD ZMIN > 450 AND HAD NO WRITE FLAG      3.05%       (REJ)
   5 EVENTS HAD ZMIN > 450 BUT HAD WRITE FLAG ON      0.41%       (WRI)
  36 EVENTS HAD ZMIN < 450 AND WRITE FLAG ON      2.94%          (WRI)
1355 EVENTS WENT INTO RMIN CUT     19.39%
 521 EVENTS REJECTED BY RMIN CUT       7.46%                     (REJ)
 834 EVENTS PASSED RMIN CUT AND ZMIN       68.08%                (WRI)

6987 EVENTS WERE READ AND A TOTAL OF  1225  EVENTS WERE WRITTEN
       REDUCTION FACTOR :     17.53%
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REDUCTION STEP 1 FOR DATA FROM SUMMER 1979

THE STATISTICS GIVEN ABOVE IS TYPICAL FOR DATA TAKEN IN AUTUMN 79. DATA FROM THE PRECEDING RUN IN SUMMER 79 IS MUCH DIRTIER, DUE TO WORSE BEAM CONDITIONS. THUS THE PROPORTION OF COSMIC EVENTS IN THE AUTUMN DATA IS MUCH HIGHER; THIS IS MIRRORED IN THE VERY DIFFERENT FRACTIONS OF EVENTS THAT PROCEED TO PATTERN RECOGNITION, AS WELL AS IN THE VERY DIFFERENT OVERALL REDUCTION FACTORS. BELOW IS GIVEN THE SAME SUMMARY AS ABOVE, BUT FOR A TYPICAL SUMMER RUN.

```
     ++++++++   STATISTICS FOR RUN      0    ++++++++++
EVENTS READ       9011           PULSER EVENTS         12
OVERFLOW EVENTS    6       LGCALB ERROR RETURNS        0
8906 EVENTS FAILED LGLASS CUT     98.97%
  93 EVENTS PASSED LGLASS CUT      1.03%
  71 EVENTS HAD BAD LGLASS BLOCKS       0.79%    (E-CAP SPINNERS)
5724 EVENTS HAVE NO TAG TRIGGER     63.61%
3275 EVENTS HAVE TAG TRIGGER        36.39%
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 115 EVENTS WITH TAG TRIGGER AND ETOT >  300. MEV      1.28%
8787 EVENTS WITH COMBINED WRITE FLAG OFF   97.64%
 212 EVENTS WITH COMBINED WRITE FLAG ON     2.36%
 140 EVENTS HAD NO ID HITS AND WRITE FLAG OFF      1.56%          (REJ)
   0 EVENTS HAD NO ID HITS AND WRITE FLAG ON      0.0 %          (WRI)
8859 EVENTS ENTERED ZVERTEX ROUTINE      98.44%
4633 EVENTS FAILED TO FIND Z VERTEX & HAD WRITE FLAG OFF  51.48% (REJ)
  93 EVENTS FAILED TO FIND Z VERTEX BUT HAD WRITE FLAG ON  1.03% (WRI)
2566 EVENTS HAD ZVTX > 450 AND WRITE FLAG OFF     28.51%         (REJ)
1660 EVENTS THROUGH PATREC      18.45%
 129 EVENTS WERE 0 PRONGS        1.43%
  60 EVENTS WERE 0 PRONGS AND HADE NO WRITE FLAG      0.67%      (REJ)
  69 EVENTS WERE 0 PRONGS AND HAD WRITE FLAG ON     19.44%       (WRI)
1531 EVENTS HAD AT LEAST ONE TRACK       17.01%
 158 EVENTS WITH TRACKS AND TAG FLAG       1.76%
 104 EVENTS WITH TRACKS AND TAG FLAG, LOW MOMENTUM       1.16%   (REJ)
  54 EVENTS WITH TRACKS AND TAG FLAG, HIGH MOMENTUM      15.21%  (WRI)
 227 EVENTS WERE ISTAR=0       2.52%
  33 EVENTS WERE ISTAR=0 AND HAD WRITE FLAG ON      9.30%        (WRI)
   0 EVENTS WERE ISTAR=0 BUT HAD LONG TRACK IN RFI   0.0%        (WRI)
 194 EVENTS WERE ISTAR=0 AND HAD NO LONG TRACK IN RFI      2.16% (REJ)
 708 EVENTS WERE ISTAR=2       7.87%
  15 EVENTS WERE ISTAR=2 AND HAD WRITE FLAG ON      4.23%        (WRI)
 693 EVENTS WERE ISTAR=2 AND HAD WRITE FLAG OFF     7.70%        (REJ)
 438 EVENTS WERE ISTAR=1       4.87%
 167 EVENTS HAD ZMIN > 450 AND HAD NO WRITE FLAG      1.86%       (REJ)
   3 EVENTS HAD ZMIN > 450 BUT HAD WRITE FLAG ON      0.85%       (WRI)
  19 EVENTS HAD ZMIN < 450 AND WRITE FLAG ON      5.35%          (WRI)
 249 EVENTS WENT INTO RMIN CUT      2.77%
  87 EVENTS REJECTED BY RMIN CUT       0.97%                     (REJ)
 162 EVENTS PASSED RMIN CUT AND ZMIN       45.63%                (WRI)

8999 EVENTS WERE READ AND A TOTAL OF   355  EVENTS WERE WRITTEN
       REDUCTION FACTOR :      3.94%
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THE DIFFERENT BEAM CONDITIONS ARE ALSO MIRRORED IN THE DEMAND ON CPU-TIME FOR THE REDUCTION STEP. FOR AUTUMN DATA THE TOTAL TIME SPENT IN PATTERN RECOGNITION IS C:A 50 % OF THE TOTAL JOBTIME AND AVERAGE CPU-TIME DEMAND IS 80 - 100 MSEC / EVENT. THIS MEANS THAT WITH AN L-JOB (15 MIN.) 9 - 10000 EVENTS CAN BE PROCESSED. THIS SHOULD BE COMPARED WITH 20 - 22000 EVENTS / L-JOB FOR THE SUMMER RUN.

PROGRAM CHANGES

THE DATA REDUCTION PROGRAM (SUBROUTINE USREDUC1 ON LIB JADEPR.JADESR) HAS CHANGED FROM THE VERSION USED IN THE SUMMER RUN, BOTH BECAUSE SOME OF THE CALLED PROGRAMS HAVE CHANGED (LEAD GLASS CALIBRATION, PATTERN RECOGNITION) AND BECAUSE OF THE INTRODUCTION OF NEW CONDITIONS. THESE NEW CONDITIONS ARE MAINLY THAT TAGGED EVENTS ARE NOW GIVEN SPECIAL ATTENTION AND THAT A RMIN-CUT IS PERFORMED. TEST RUNS OF THE OLD AND THE NEW PROGRAMS ON SUMMER DATA SHOW ONLY SMALL VARIATIONS, DUE TO THE FACT THAT THE INCLUSION OF TAGGED EVENTS IS BALANCED BY THE REJECTION BY THE RMIN CUT.

A COPY OF THIS INFORMATION CAN BE OBTAINED BY SUBMITTING THE JOB JBMEMRD1 ON THE LIBRARY JADEPR.JADESR