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DSN F22ELS.DL.REDUC2.G1244.G1273

R-FI SECTION

BEAM 17.500 GEV   FIELD -4.842 KG   TALC C879   DATE 12/01/87   TIME 12.25.00
T1A 0802 T1P 4101 T2C 8089   CAMAC TIME 45.40.19   19/ 2/1986

24228 274 68
IDHITS 258
ELGTOT 32714
MUHITS 5
LGCYL 32714
LGCAPS 0 0
FWCAPS 240 0

JADE

BANK PATR 10   NR OF TRACKS 2

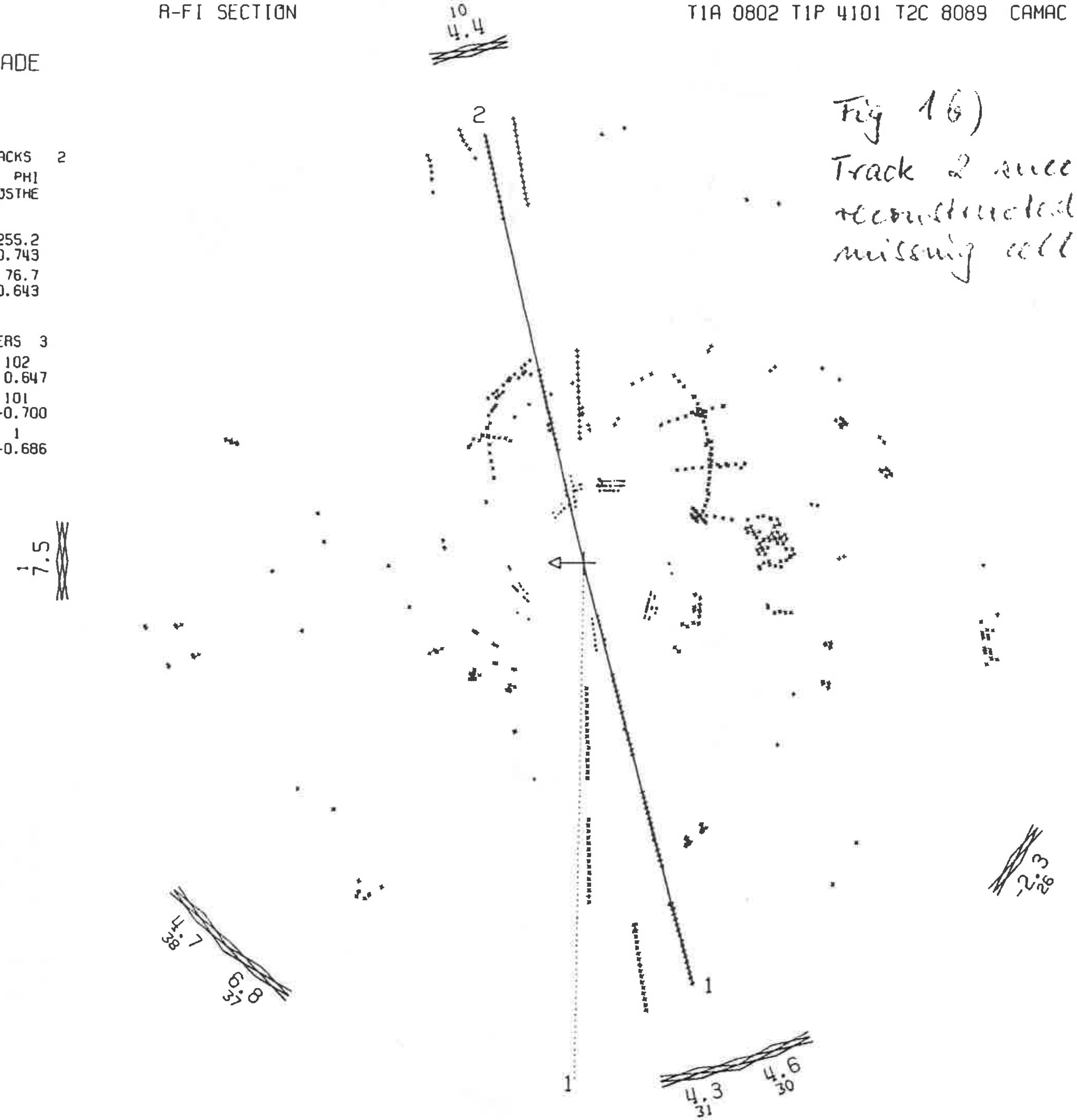
NR +-	AMSRFI	AMSRZ/HIT	PHI
PTOT	PLONG	PTRANS	COSTHE
1 +	0.59/47	39.1/32	255.2
72.785	-54.112	48.677	-0.743
2 +	0.29/30	38.1/26	76.7
13.034	8.385	9.979	0.643

BANK LGCL 1 NR OF CLUSTERS 3

NR 1 BARREL CHARGE 102
E 17.682 FI 76.7 COST 0.647
NR 2 BARREL CHARGE 101
E 18.207 FI 255.0 COST-0.700
NR 3 BARREL PHOTON 1
E 0.928 FI 270.9 COST-0.686

Fig 1(b)

Track 2 successfully reconstructed across missing cell in ring 2.



SUMS (GEV) ***   PTOT 85.819   PTRANS 58.656   PLONG 2.497   CHARGE 2
TOTAL CLUSTER ENERGY 36.818   PHOTON ENERGY 0.928   NR OF PHOTONS 1

to extrapolate over a length of $20cm$ and usually fails to connect the two pieces of a track that have been reconstructed in ring 1 and 3. The picture included (Fig 1a) shows an example of how the pattern recognition program failed to link the two tracks seen in a bhabha event. However, when the missing cell is declared a dead cell for the pattern recognition program, it requires a less stringent match between tracks in ring 1 and 3 and the two pieces a properly connected (Fig 1b).

Missing cells in ring 2 do occur with an appreciable frequency only for the first period. The table below summarizes the rates of missing cells in ring 2 normalized to all events on a REDUCONE tape:

First Run	Last Run	Missing cell in ring 2 [%]
24200	24371	6.5
24372	28364	0.1

A second effect of the missing cells is a reduction of the number of hits included for a track, which may affect selection programs that place a stringent cut. For these selections the following section shows, how such events may be identified and how the numbers of hits counted for a track may be modified accordingly.

Identification of Events with Missing Cells Since the 'missing cells' were, in fact, alive they generated the T2 hardware signals read out and stored in bank TRIG, 2. A rather save indication for a missing cell is thus a cell with no hits in the JETC bank but with the associated T2 track trigger bit set. Therefore the already existing

Logical Function DEADCL(ICell, Nrun)

has been modified on the standard library 'F11GOD.PATRECSR' to give a value $.TRUE.$ for cells that fulfill the above criterion. This function is automatically used inside the pattern recognition programs (and the new version was used to produce Fig 1b) but may of course also be used by each user to identify events that have to be treated in a special way depending on the selection or the analysis.

Note that the new DEADCL has not been called for the REDUC1- and REDUC2 steps of 1986 data. It is therefore up to each user to take appropriate action for his selection.

called.
The best values for the 1986 z-calibration have now been derived by using Dittmanns procedure adapted to the modifications required for the flash ADC system. For pragmatic reasons and also, since they give the better resolution, these numbers were converted to equivalent numbers for the JTPL calibration block. Therefore, the JTPL and ZCAL numbers are truly equivalent for 1986 and do not only carry the same name. Note, however, that this procedure has been tried for the first time. Effective wire length and pedestals are somewhat correlated and it was observed that the JTPL numbers for pedestal were systematically higher than the ZCAL numbers. This effect is compensated by a correspondingly smaller effective wire length.

Bias for the 1986 REDUC1 at Rutherford Lab

The losses encountered due to inadvertent use of incorrect or not yet final calibration files, and a program bug are determined by reprocessing a few REFORM tapes with the correct calibration, as it is known today, and by comparing the output with the output obtained from the REDUC1 tapes from Rutherford. The physics channel which is probably most affected is the two prong class, which is not backed up by a leadglass energy selection (μ-pairs, low energy 2-photon 2-prongs). We normalize the losses to the number of accepted 2-prong events after a second, more stringent reduction REDUC2 and a visual scan of the events. The numbers are given in the table below. Note, however, that also 3- and 4-prongs were found among the lost events.

Losses of good two prong events from one calibration to the other

Fraction of two prong Events lost	Run <26372	Run ≥26372
for Rutherford REDUC1	14.8%	0.5%
REDUC1 with new calibration	0.5%	0.5%

The loss of good events in the period before end of May 1986 is severe. The loss for the second period of 1986 seems to be at the level that will be encountered with any new set of Jet chamber calibration constants, since the z-cut is not placed far away from the tail of the good events. Note, that for all previous years, the final calibration was only made available after REDUC1 had been performed. Inspection of the events shows, that in all cases the loss is due to the z-calibration, which affects the z-vertex calculation (cuts at ±300 mm) as well as the rz-fits of individual tracks (cut on z-intercept at ±300 mm). The loss in spring 1986 is due to the nonzero z-pedestal (from 1983). The T0 error affects resolution but is not essential for the track cuts in r-phi in REDUC1 (rmin<50mm). The error in the leadglass calibration causes some events with energy close to threshold (and cut values in REDUC1) to be treated as track rather than energy triggers.

Comment on Selection of Earlier Years

Due to the various problems mentioned above the data selections and analyses of earlier years may be affected. Here the points are summarized again:

Global T0 not applied in JETCAL	since 1980
z-calibration for PATREC not updated	since 1983
Leadglass gains and pedestals not updated	since 1983.

Jet Chamber Constants 1986

Before starting the 1986 REDUC1 the calibration constants for the Jet chamber were estimated. The biggest change was expected for the z-calibration, namely the ADC pedestals, which used to be around 50 for the DL8s and are 0 for the FADCs. Also, the relative gains in the system had no relation to the previous values (the corresponding electronics had been replaced), so that the relative gains were set to 1 and the pedestals to 0. These constants were implemented on the F11LHO.BUPDAT1 calibration file in the beginning of 1986. However, they were not copied to F11LHO.AUPDAT1 and F11LHO.KALWRK0, where they should have been in effect for the REDUC1 job in Rutherford. Instead, up to end of May 86 (run number is indicated in the table), the constants of the last update, namely the 1983 calibration were used. With the update of KALWRK0 end of May 86 the estimates of the Jet chamber parameters finally came into effect. At the same time the relative T0s changed from the values of 1983 to the values of 1984.
The global T0 was changed to the new values for the FADCs at about the same time, a shift of two DL8 clock counts. However, it showed up only now, that, due to a program bug, none of the global T0 applied since 1980, had any effect on the data. Instead of the correct value an undefined variable was used in subroutine JETCAL, the standard JETC calibration routine called by the supervisor routine. The subroutine JRECAL, which performs REcalibration of an existing Jet chamber bank, always used the correct code. This routine may optionally be called by the user, e.g. in the TP step. As a result, probably no global T0 correction was applied for REDUC1 or any recalibration using the standard SUPERV routine, since, most likely, unitialised variables are set to zero. In fact if the variable had been largely different from zero complete failure of pattern recognition would be expected.
The table below summarizes the parameters used for the two 1986 periods together with best values as they are known now after a more careful calibration. The additional change not yet mentioned is an increase in the parameter for the effective wire length by 4%. The numbers in parentheses indicate the year for which the constants were determined.

Jet Chamber Calibration Constants used for REDUC1 in Rutherford Lab

Parameter	< run 26372	≥run 26372	Best Values	Units
Global T0	? probably 0	? probably 0	4	DL8 clock cnts.
Gain	1 (1983)	1 (1986)	1	rel. units
Pedestal	50 (1983)	0 (1986)	0	DL8 ADC cnts.
rel. T0	0 (1983)	0 (1984)	0	DL8 clock cnts.
Eff. Wire length	1 (1983)	1 (1983)	1.04	rel. units

Leadglass Constants 1986

Together with the Jet chamber constants the leadglass gains and pedestals were left at the 1983 values for the first period and at the 1984 values for the second period in 1986. Since in 1984 the gains of the leadglass system were changed to account for the higher beam energy, the 1983 numbers still might be a better approximation of the 1986 values than the values from 1984. The final numbers for 1986 will not be known before an expert from Tokyo deals with the task of determining them.

Determination of Jet Chamber Constants 1986

For historical reasons, the JADE calibration scheme allows two versions of the z-constants to appear in the calibration blocks. Effective wire length, relative gain and two pedestals were originally regularly determined for each wire from a pulser calibration run and stored in the calibration block JTPL (together with a relative T0). The pulser calibration has been carried out for the last time in 1983 and since then all expert knowledge has disappeared. Still, these parameters will always be used when the standard pattern recognition is performed, especially in REDUC1.

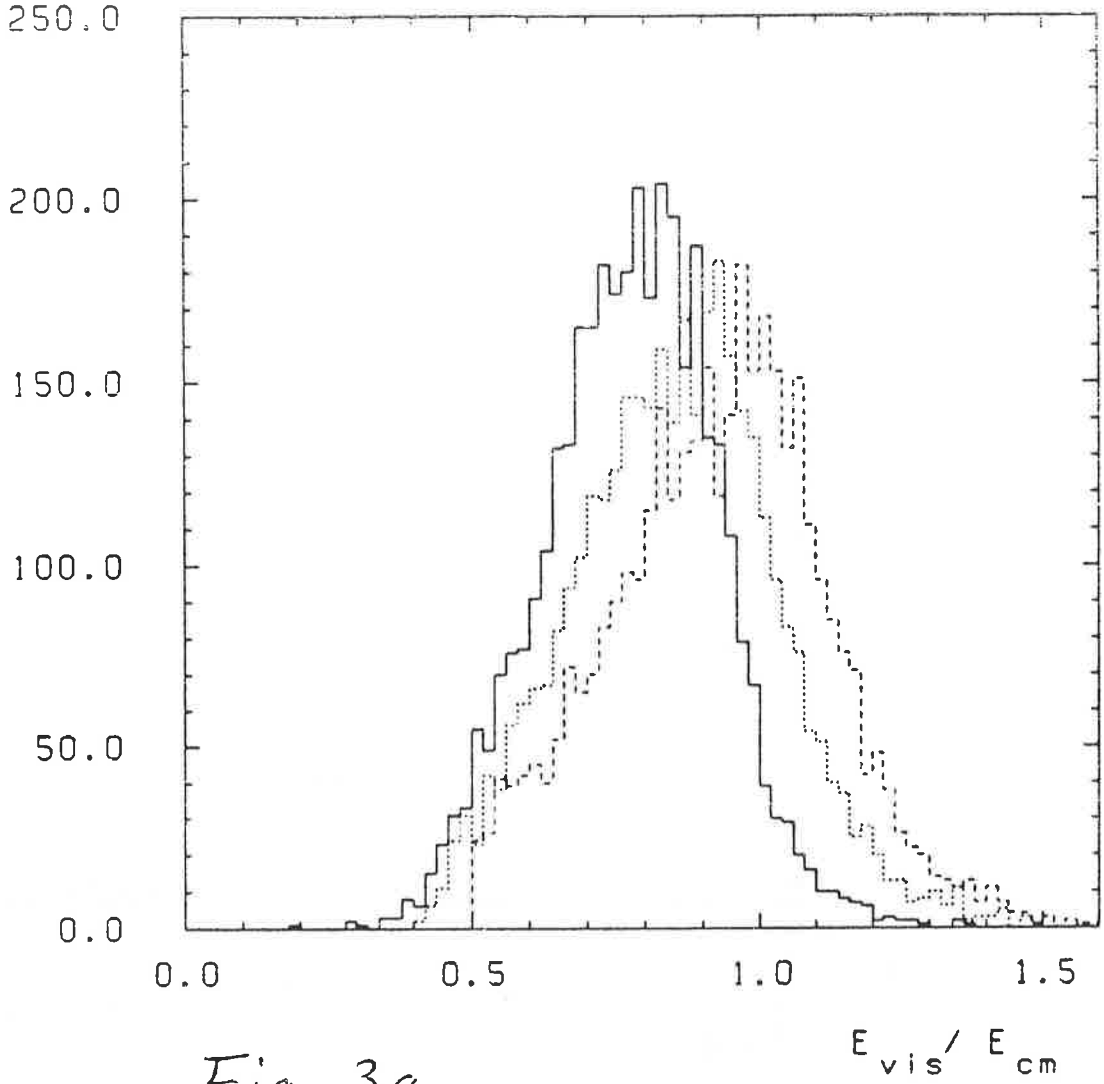


Fig. 3a

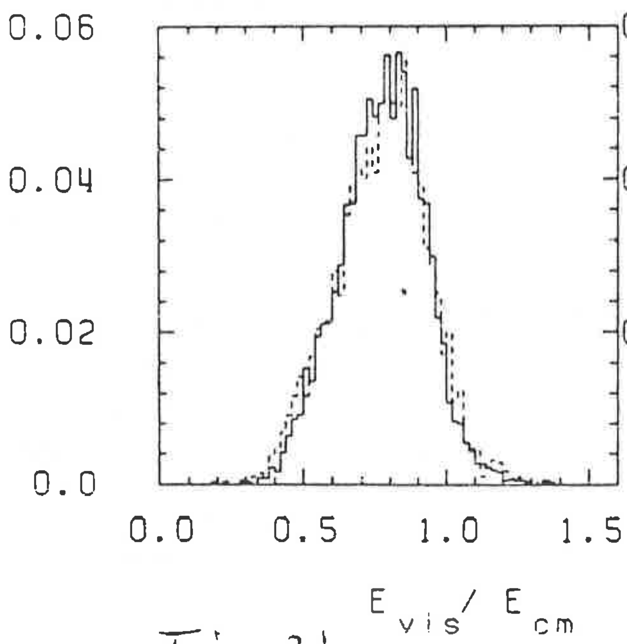


Fig. 3b

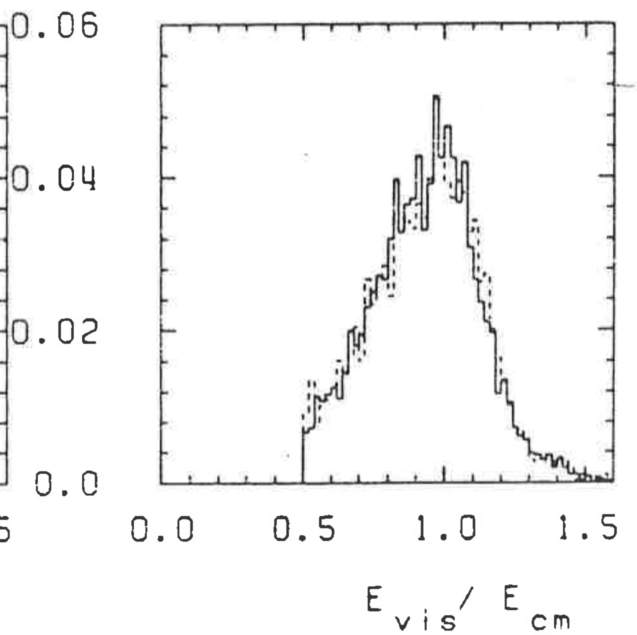


Fig. 3c

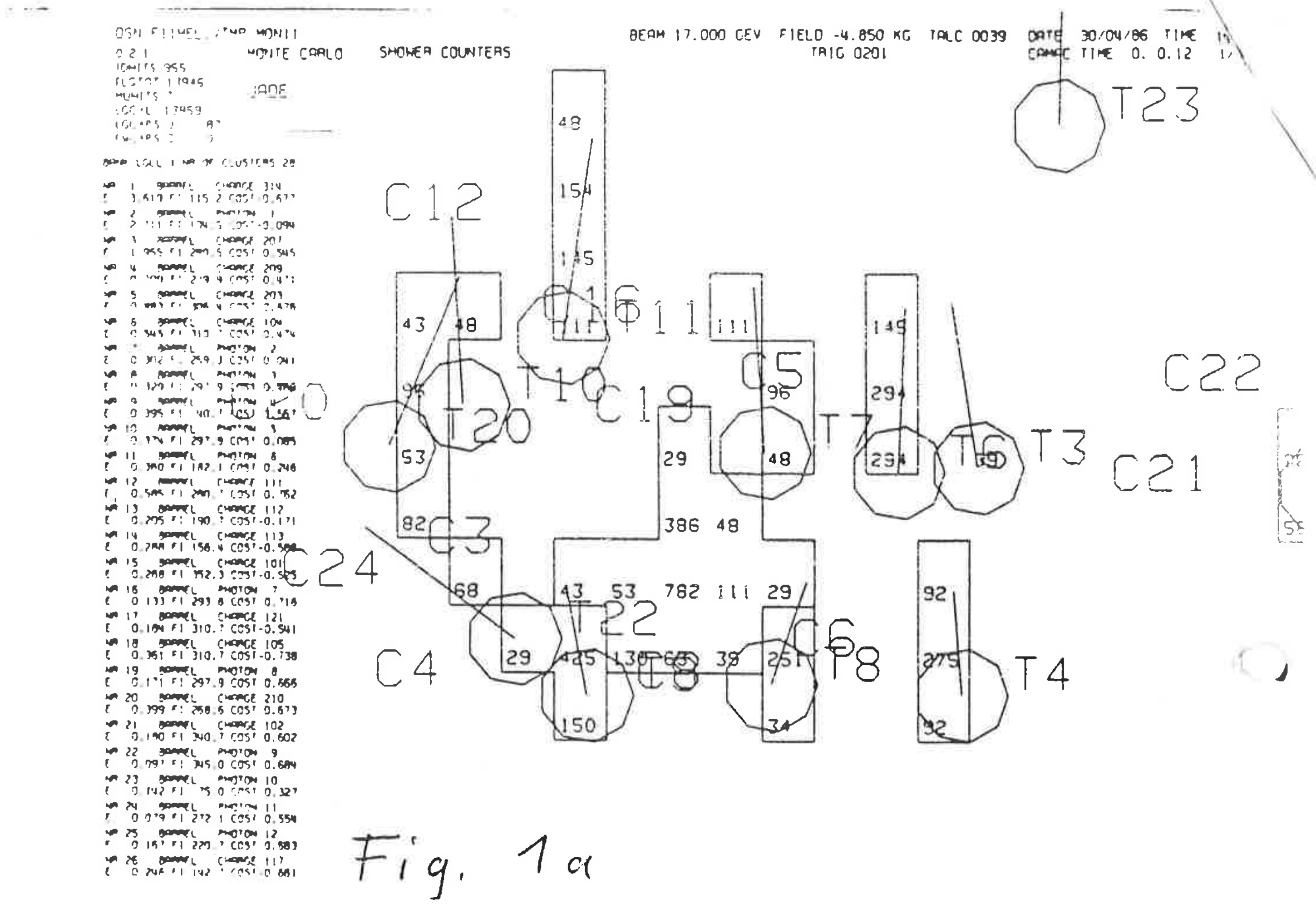


Fig. 1a

TOTAL CLUSTER ENERGY 15.913 PHOTON ENERGY 5.377 NR OF PHOTONS 13

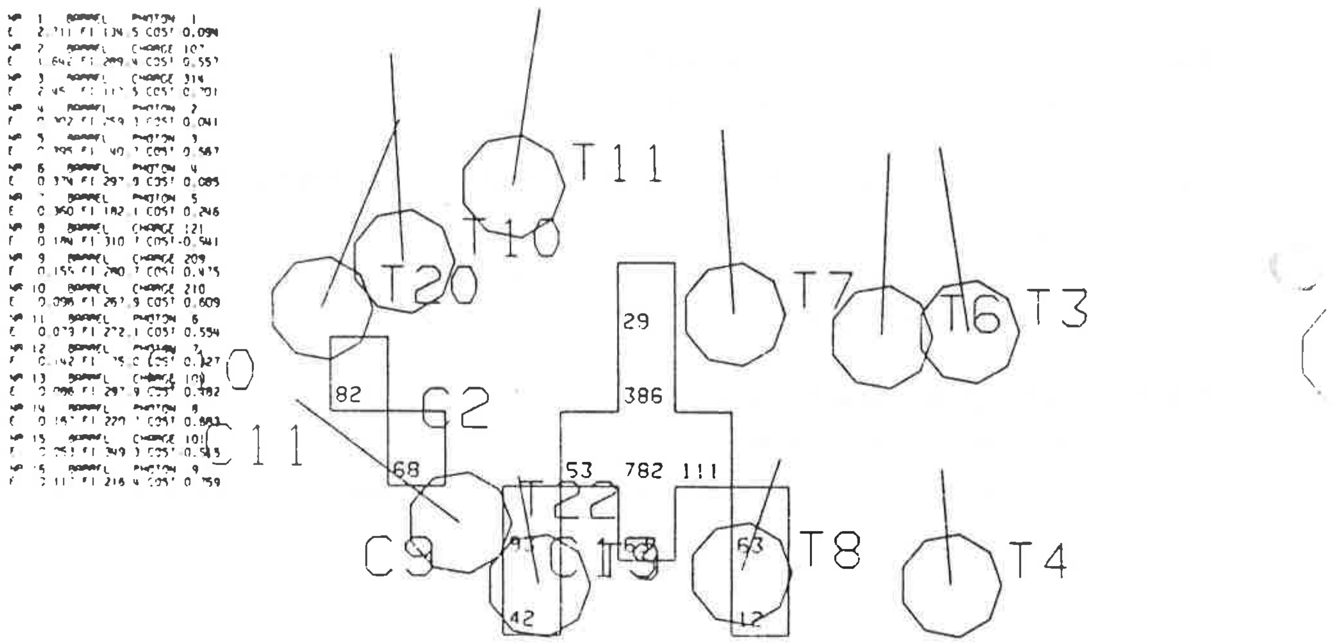


Fig. 1b

TOTAL CLUSTER ENERGY 9.320 PHOTON ENERGY 4.848 NR OF PHOTONS 9 are considered, this means if they satisfy $|cos\ \vartheta| \leq 0.8$ or $0.87 \leq |cos\ \vartheta| \leq 0.93$.

$$E_e = \sum E_\gamma + \sum E_n + \sum E_k$$

E_γ is taken from the 'VECT' banks. Problems arise for neutrons and K^0's, because it is not known, how much energy they deposited in the lead glass. So the energies in the blocks hit by a neutron or a K^0 are taken. This may be too big in some cases, where the cluster of a neutron or a K^0 overlaps with a cluster of a photon or a charged track. In Fig. 2a E_2 (full line) and E_1 (total cluster energy from 'LGCL',1 bank, dotted line) are compared to E_e (dashed line). Mean values and widths of the distributions are listed in table 1. Perfect agreement is found between E_2 and E_e, whereas E_1 is much bigger than E_e. Energy deposited by charged tracks in the lead glass accounts for this difference. Fig. 2b and 2c show a comparison between Monte Carlo ($E_{cm} = 34\,GeV$) and data ($E_{cm} = 34\,GeV$ from 1981) for E_2 and E_1 respectively. The results for E_{vis}/E_{cm} are plotted in Fig. 3. You have to distinguish between the three quantities $E_{vis}^{(1)}/E_{cm}$, $E_{vis}^{(2)}/E_{cm}$ and $E_{vis}^{(3)}/E_{cm}$. For $E_{vis}^{(1)}/E_{cm}$ and $E_{vis}^{(2)}/E_{cm}$ cluster energies are taken from the 'LGCL',1 bank and the 'LGCL',2 bank respectively. In the case of $E_{vis}^{(3)}/E_{cm}$ cluster energies are taken from the 'LGCL',1 bank, but 300 MeV are subtracted for each charged track connected to a cluster. The fact that E_1 is much bigger than E_2 is reflected in $E_{vis}^{(1)}/E_{cm}$ and $E_{vis}^{(2)}/E_{cm}$. $E_{vis}^{(3)}/E_{cm}$ is about halfway between. Again in Fig. 3b and 3c a comparison between Monte Carlo and data is shown.

Deleting the lead glass energy caused by charged tracks affects not only the visible energy but other quantities as well, for instance thrust, sphericity, or the axes of these quantities. As an example I have studied the influence on the transverse mass which is defined as

$$M_T = \frac{E_{cm}}{E_{vis}} \sum_i |p_{\perp i}^{out}|$$

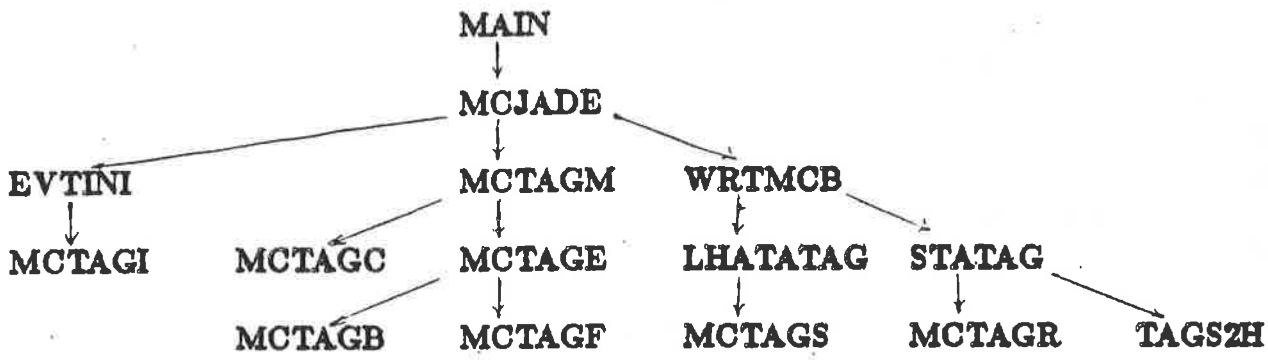
Numbers can be found in table 1.

1981 and 1982 data with 'ALGN',2 and 'LGCL',2 banks are available on tapes F11HEL.ELSEL.TPM... . The entire list can be found in my catalog. TPM... corresponds to the list in computer note 83 where you can find RUN numbers and beam energies. Monte Carlos are available as well. Input were our standard MC data sets F11BET.MHTP34.LND52.MUMLGCBP.A01 - A08. Events after applying MCREDU are on my tapes F11HEL.ELSEL32.A01 - A08.

Results from 'ALGN',2 and 'LGCL',2 can be obtained in a graphics session in the view RU with command RES after deletion of 'ALGN',1 and/or 'LGCL',1 bank(s).

The program is on my library F11HEL.TEPOS(PBENPH). No LOAD version exists. It is possible to improve almist everything. Suggestions are welcome.

Appendix 1 : Structure chart.



NOTE: LHATAG is an entry point in STATAG

Appendix 2 : Commons.

The following commons are used:-

COMMON	USED BY:
TODAY	MAIN(?) MCTAGI STATAG
CWORK	STATAG TAGS2H
CMCTAG	MCTAGI MCTAGM MCTAGR MCTAGS STATAG LHATAG

Appendix 3 : Method of simulation.

For electromagnetic showering particles, that strike the face of the tagger within certain minimum and maximum theta angles, the distance to the shower maximum in z is calculated. The transverse spread of the shower is then simulated using a simple Monte Carlo integration of functions whose parameters have been adjusted to fit the data. All energies are smeared. For all events in which at least one shower has been produced, the fluctuating pedestals that are seen in the data are also reproduced.

Providing the values are correctly set for the simulation you require , before MCJADE is called , then all will be well. For every event, the initialisation routine MCTAGI is called and sets the value of MARKMC using the values in HDATE, and for the first event prints out a small message, to tell you what has happened. If an illegal date is found it will print a warning and use the default date of 1/7/1982 (MARKMC = 3).

When data is written out, the routine STATAG sets the value of the lower 16 bits of the ATAG bank descriptor to have the value MARK . This ensures that TAGAN knows which simulation has been done and can act accordingly. (This scheme is thus identical to that used to mark the real data ATAG banks, except that the upper 16 bits are used in that case.) Unfortunately , for events where there is no ATAG bank, the graphics routines do not know what hardware to draw for the tagging system. To overcome this, STATAG also copies the value of words 4-6 of HDATE, into words 93-95 of the HEAD bank. TAGAN also prints out a message, which should agree with the one from the simulation program. For more details of this see J.C.N 74. Note that the user should also ensure that the smearing date for the TP step is set to agree with the tagging system date. For details of this see J.C.N 66.

N.B. Data that has been generated using the old FWDDET/STATAG routines will be (correctly) treated as 1979/80 M.C. data.

Installing the programs.

The following changes are neccesarry in order to use the new package:

In M C J A D E

Replace call to FWDDET with call to MCTAGM and remove reference to IFWHIT as in following code fragment:

```
1011      CALL EVTINI
          IJETCP = 0
C         IFWHIT = 0            this variable no longer used
C

                          . . .

C                               FWD TRACKING
C                   CALL FWDDET( PV, R0, IFWHIT )
C
                    CALL MCTAGM( PV, R0 )
C
C                               BRANCH ACCORDING
C                               TO CHARGE OF PARTICLE .
```

In E V T I N I

Insert call to MCTAGI as in following code fragment.

```
C         COMMON / CGGRAW / HGG(192)        this common no
C                                           longer used
C         EQUIVALENCE (HGG(1),IGG(1))
```

This change is not done in MCTAG.S.

JADE COMPUTER NOTE 85/D

JADEZ
THE JADE GRAPHICS PROGRAM

C. Bowdery, J. Olsson
21/10/86

ABSTRACT. This revised note describes how to use the JADE Graphics Program and is especially suited to beginners. Changed sections are marked in the margin.

1. What is the JADE Graphics Program?

The JADE Graphics Program is a tool to view JADE events and perform certain analysis operations on them if required. It drives Tektronix storage tube graphics terminals (and compatible types) allowing 2D monochrome graphics display. It is currently implemented on the DESY IBM computers, on several computers in the UK (MAGA, RLGB, RLIB), in Tokyo and in Maryland. Please note that the operating instructions given here apply to the DESY version of the program.

2. What preparation is needed before a graphics session?

The dataset with the events[1] to be viewed must be on an HSM-controlled volume or on MSS.[2] Tape datasets cannot be read. Thus if your selected events reside on tape, you must first copy them to a disk or MSS dataset. As a rule, multi-hadronic events occupy about 2 disk tracks and simpler events are somewhat shorter. Thus if you want to look at a large number of events, then space on the VTMP MSS volumes may be your best bet.

Assuming that your events are on a usable volume, you could either read this note all the way through first or go to a graphics terminal and follow the instructions as you go along. Remember, allow at least 15 minutes for a graphics session, since reading the calibration files can take some time. You will probably need a notebook and a pen, as well as this note, if you intend to scan events (rather than just casually looking). Finally, have you written down the name of the dataset which contains the events?

3. How is a graphics session started?

The recommended method of running the Graphics Program is with the so-called Graphical Attachment (GA) mode. This involves linking a graphics terminal to a TSO session. This allows the interactive dialogue with the program to take place at a TSO terminal and the graphical output to be sent to a (normally adjacent) graphics terminal. The alternative mode of usage is referred to here as Direct mode which only needs a graphics terminal.

[1] The events must have BOS format.

[2] See the DESY Computer Center User's Guide.

32	ON	Display of track numbers with the VRES command
33	OFF	Suppression of TOF values and TOF counter numbers
34	OFF	Suppression of spinning 1-block photons
35	OFF	Suppression of photons with energies less than 200 MeV
36	OFF	Suppression of muon mirror hits if the ambiguity has been resolved
37	OFF	Display of only those muon hits assigned to muon candidate tracks
38	ON	Display of muon track numbers with commands MUPT and MUONS
39	OFF	Display of muon chamber numbers and raw muon hit numbers
40	OFF	Suppression of the bottom right projection
41	ON	Display of the Z chamber if appropriate
42	OFF	Forced display of the Z chamber (not normally needed)
43	ON	Display of the Vertex Chamber / Beam Pipe Counters
44	OFF	Forced display of the Vertex Chamber (not normally needed)
45	ON	Hatched area display of the beam pipe and pressure tank
46	OFF	Suppression of the picture caption text
47	OFF	Suppression of the origin marker
48	OFF	Suppression of the coordinate axes
49	ON	Display of detailed dE/dx plot for single tracks with DEDX n

In addition to the above drawing flags, there are 2 more which are frequently needed in macros. Because of this, no printout occurs when they are changed. They control the display of an event that has just been read in. The first, flipped by CSTV 2 (or CS 2), determines whether or not the program will display the event (default value: YES) and the second, flipped by CSTV 3 (or CS 3), determines whether the detector will be automatically added (default value: NO).

Appendix 2 : USER Levels in the Graphics Program

1 New event of a new run has just been read in. Not very useful in graphics.

2 First opportunity to see a new event in general.

3 LG calibration has been done if not previously done.

4 JETC calibration & Fast Z vertex finding has been done if not previously done.

5 Pattern recognition has been done if not previously done.

6 LG analysis has been done if not previously done.

mirror hits and suppress noise hits (with the TR1 command), use the CYL view when possible, draw tracks and photons using VRES and draw good muons using MUONS. Caption text might be worth suppressing too. The output should be sent to the laser printer with command LASER.

Useful OPT's to flip: 5, 13, 15, 23, 31 to 38, 46 to 48

h) All the true views (not displays like dE/dx or TOF) can be magnified or demagnified using the ZOOM command. If no argument is specified, then you must define a rectangular box on the screen which will become the new view. This is done by defining any 2 opposite corners with the cross-hairs controlled by the joystick.[1] Press CONTROL+E *on the graphics terminal keyboard* to have the coordinates read.[2] The picture will then be redrawn. Alternatively, specify a (de)magnification as an argument to ZOOM and use the cross-hairs to define the new view centre. Press CONTROL+E to get the picture redrawn. Changing views or typing RS resets the magnification. Typing CSTV1 will make the magnified picture become the standard view for drawing new events.

i) You may notice that sometimes in multiple command lines a screen erase can occur before picture drawing has been completed. This results in the next picture beginning with the undrawn parts of the previous one. This can be seen with N;TR1 which gets the next event, draws it and then redraws it with mirror hits suppressed. Unfortunately this is a problem with the DESY IPS system. It can be avoided in this case by using CSTV2 which switches off/on the automatic drawing of a new event: CSTV2;N;TR1;CSTV2.

j) If you view REFORM data, remember it has not been analysed. If you wish to calibrate and analyse it with the graphics program, remember to allocate the BUPDAT calibration datasets at the beginning.

k) Private graphics modules can be linked for special purposes. See one of the authors for details. The SPVA command exists to allow interaction with your own routines.

l) If anything this note says is in conflict with what is stated in the graphics HELP system, then the latter should be treated as the definitive guide. This reflects the fact that the program is subject to frequent (minor) change.

Appendix 1 : The Drawing Flags (OPT's and CSTV's)

The program has many drawing flags which used to be known as CDTL's since the CDTL command can be used to flip them. However, the synonym OPT is preferred since it is easier to remember than CDTL. The definitive list of flags and their status can be found with the STAT command, also known as CDST. The following list reflects the current meanings and the default settings.

1 ON Display of the Jet Chamber

[1] Or Rolling Ball or Graphics Tablet; whatever is available.
[2] Press one of the mouse keys if using a Graphics Tablet, etc.

and on an HSM-controlled volume or MSS.) No further analysis is done, a direct jump to level 11 is made, the event is written out and then the next event fetched. Please note that at present, events cannot be appended to a dataset.

7. What are macros and how are they used?

Whenever the program outputs its arrow prompt (→), you can type in a command or a 1-line sequence of commands separated by semi-colons, e.g.

`N;VRES;MUONS;DEDX-4;TOF-4`

By pressing just ENTER, the last command line will be re-executed. This can save much typing but if you want to type another command before repeating the multiple command line, then you would have to retype the long line again. This can be avoided if you save that multiple command line as a macro. This can be easily done using command '`MACRO`' which prompts for a macro name (up to 8 letters long) and then for the definition. Executing the macro is also easy, just type the macro name and the whole sequence of commands will be executed. Up to 30 macros can be defined at one time and these can be edited, renamed or deleted as necessary. In addition macros can call other macros to a depth of 9 which should be more than enough.

Macros can also be pre-defined before a graphics session and stored in a 'Profile' dataset. This must have the name `yourid`.GRAPHICS.PROFILE.MACROS so that the graphics program will read in the macros at the start. They will then be immediately available for use. The format of the Profile must be repeated pairs of lines as follows:

macro_name

macro_definition

e.g.

```
CLEAN
CSTV2;N;TR1;RESULTS;CSTV2
RESULTS
VRES;MUONS;DEDX-4;TOF-4
SETUP
OPT 5; OPT 31; OPT 32; OPT 40
etc.
```

The easiest way to create such a Profile dataset is with the following procedure:

1) type the Profile contents into an unnumbered NEWLIB member,
2) create a new sequential dataset using the ALLOC command, giving it DCB=CARDS and FILENAME=COPY,
3) copy the member into the dataset with the command: COPY member

— C O N T R O L —

`N`	Goes to next event WITHOUT writing out the current one (`NN`).
`LEVELS`	Changes the 'stop flag' settings in USER (`CSTL`).
`CSTV`	Changes the standard view and the automatic display of event and detector (`CS`).
`OPT`	Flips any one of the many drawing flags. See Appendix 1. (`CDTL`).
`STAT`	Displays status of the drawing flags (`CDST`).
`WRIT`	Writes out the current event and fetches the next. Output dsname prompted for.
`MORE`	Switches to a new input dataset. The dsname is prompted for (`NEW`).
`STOP`	Stops the program (`EXIT`, `END`, `QUIT`).
`FIND`	Fetches an event by Run Number and Event Number. Numbers are prompted for.
`ZOOM`	Changes scale and/or origin of current view. CONTROL+E ends input (`JOYS`).
`RESET`	Returns to the standard scale and origin after `ZOOM` (`RS`).
`PATR`	Selects the number of the PATR bank to be used.
`JETC`	Selects the number of the JETC bank to be used.
`VTXC`	Selects the number of the VTXC bank to be used.
`C`	Continues to the next USER level with 'stop flag' set.
`JUMP`	Causes a jump to the specified SUPERVISOR level.

— M A C R O S —

`MACRO`	Creates a macro command sequence.
`EDITMAC`	Edits a user-defined macro.
`DELMAC`	Deletes a user-defined macro.
`RENAMAC`	Renames a user-defined macro.

— O T H E R S —

`H`	Generates a Hard Copy of the display (`Q`).
`HX`	Generates an External Hard Copy (`QX`).
`LASER`	Generates a publication-quality Hard Copy on the laser printer (`HLP`).
`MASS`	Computes the effective mass of a group of particles. All input is prompted for.

If a non-zero argument is given with any view command, the detector outline is also drawn, e.g. `RA1` or `CYL 1`. Spaces between command and argument are ignored.

shown in brackets at the end of the command description. Detailed information about all the commands can be found using the graphics interactive HELP system.

GA Mode

a) Find a free graphics terminal with a free TSO terminal next to it. If none is available, you can try later or use Direct mode.

b) Select GA mode using the graphics terminal keyboard. This is done by pressing the ESCAPE key (or CONTROL+ESCAPE or CONTROL+SHIFT+K)[1] once or twice until the DESYNET menu appears. Then type the number it says to get Graphic Attachment mode. At present it is 2.

c) Read the 3-hexadecimal-digit IBM-UNIT number written on the graphics screen.

d) Logon using the TSO terminal and start a normal NEWLIB session.

e) If your source library has the JADE CLIST library[2] allocated, use the TSO terminal keyboard and simply type:

   `JADEZ hhh` where `hhh` is the IBM-UNIT number.

   If `hhh` is not given, it will be prompted for. The JADEZ CLIST asks you to confirm that the correct IBM-UNIT number has been given and press ENTER to continue. If it is not correct, press PA1 to abort the CLIST and repeat this step.

f) If your source library does NOT have the JADE CLIST library allocated, then, using the TSO terminal keyboard, type:

   `IPS 'F11LHO.GRAPHL(JADEZ)' GA(hhh)` where `hhh` is the IBM-UNIT number.

g) The Graphics Program should now have started.[3]

Direct mode

If you elect to run the program in Direct mode, only a graphics terminal is needed and the dialogue and graphics will appear on the same screen.

a) Find a free graphics terminal.

b) Select TSO IBM mode using the graphics terminal keyboard. This is done by pressing the ESCAPE key (or CONTROL+ESCAPE or CONTROL+SHIFT+K)[1] once or twice until the DESYNET menu appears. Then type the number it says to get TSO IBM mode. At present it is 1.

c) Type: `LOGON userid` where `userid` is a valid TSO identifier.

d) The TSO LOGON screen will then appear. Type in the appropriate password for the identifier. If all goes well, a TSO session will begin and the `READY` prompt should soon appear.

e) Type: `IPS 'F11LHO.GRAPHL(JADEZ)'`

f) The Graphics Program should now have started.[3]

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[1] If the terminal still won't respond, try pressing ENTER before moving to another terminal.

[2] `ALLOC F(CLIST) D('F22BOW.JADE.CLISTS')` is required in the `#START` member.

[3] If it hasn't then you may have mistyped the IPS command.

Offline rejection in REDUC 1

Offline filtering is first carried out in the REDUC1 program, which also provides calibration of lead glass and chambers, as well as pattern recognition for the jet-chamber. Details can be found in JADE Computer Notes 27 and 38. Since no "5%" events are kept here, the only way to study rejection losses is to subject Monte Carlo events to the REDUC1 program. Although this is in principle easy, some care has to be exercised in order to apply the appropriate version: The REDUC1 program is dependent on trigger bank structure and early data (1979—1981) cannot be passed through the current version for 1982 and subsequent data. Moreover, the JCL of the REDUC1 job is hidden in a C-list, and some editing is needed to produce a version for Monte Carlo data. Note also that some constants used in applying cuts have changed over the years, notably the Z-vertex limit.

Offline rejection in REDUC 2

There are several second reduction step programs in use, either of general application or specialised for particular physics. The program from the TOKYO group (no written description is provided) and the program described in JADE Computer Note 43 are in general use. As in the case of REDUC1, the only way to study possible losses is to pass Monte Carlo events through the programs. A forthcoming supplement to JCN 43 will give details of the various versions and changing rejection criteria for that program.

General remarks

An important thing to note in case one has to consider corrections for rejection in Nord–50 or MIPROC–16 is that the count-down for the 5% or 16th events starts fresh with each new run. In particular for the Nord–50 with its many filtering algorithms, some filtering may be of low statistics, meaning that the 5% event is never reached, since by tradition it is the last 5% that is kept.

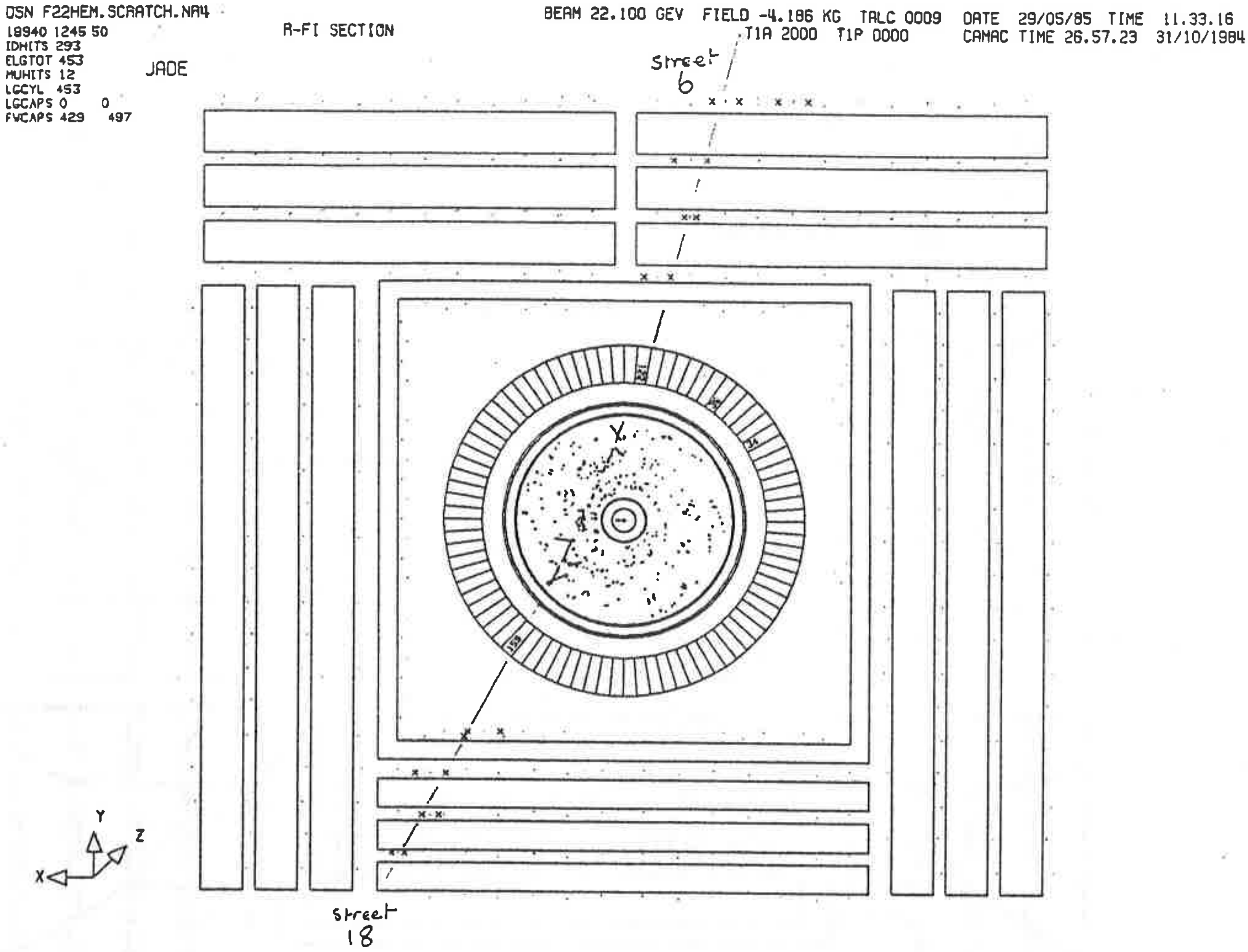
Another important thing: If you have found a good event with a reject flag set in one of the above-mentioned action words, **there is no need for panic**. Several of the online rejection algorithms were implemented as test versions and running for quite a while, marking events for rejection but without this particular rejection being enabled. This is true in particular for the Nord–50 filtering. For details, consult Supplement 1 to JADE Note 78 (which contains dates and run numbers for the activation of rejection algorithms), the Log-books, the program author and other online experts.

There exists a model job for selecting MIPROC–16, Nord–50 and FAMP reject event candidates (the 5% that are kept):—

F22HEM.N50RED.S(JBREJ)

This job will also make some plots about rejection statistics. It is well commented and it should be easy to extract the relevant code if one wishes to modify an already existing selection program.

INPUT TAPES	FIRST- LAST RUN NUMBER	EVENTS	ECM	DSNAME TPED DATA
1979-1980 DATA				
F22ELS.TAPE.TPMH612	2307- 2520	314	12	F11HEL.URZ.TPMH612
F22ELS.TAPE.TPMH622	1083- 1162	21	22	F11HEL.URZ.TPMH622
F22ELS.TAPE.TPMH630	540- 3605	1363	27-31	F11HEL.URZ.TPMH630
1980-1981 DATA				
F22PWA.MERGORD.TPMH714	7969- 8629	3467	14	F11HEL.URZ.TPMH714
F22PWA.MERGORD.TPMH722A	7181- 7962	3098	22-25	F11HEL.URZ.TPMH722A
F22PWA.MERGORD.TPMH734A	6196- 7588	6199	30-34	F11HEL.URZ.TPMH734A
F22PWA.MERGORD.TPMH735A	2750- 5665	4605	33-36	F11HEL.URZ.TPMH735A
F22PWA.MERGORD.TPMH735F	8716- 9724	9479	35	F11HEL.URZ.TPMH735F
1982 DATA				
F22PWA.MERGORD.TPMA735G	10055-10601	4776	35	F11HEL.URZ.TPMA735G
F22PWA.MERGORD.TPMA735L	10602-10973	4827	35	F11HEL.URZ.TPMA735L
F22PWA.MERGORD.TPMA735Q	11039-11656	5888	35	F11HEL.URZ.TPMA735Q
F22PWA.MERGORD.TPMA735W	11656-12518	6496	35	F11HEL.URZ.TPMA735W
F22ELS.TAPE.TPMA717A	12446-12462	50	17	F11HEL.URZ.TPMA717A
F22ELS.TAPE.TPMB738A	12560-12948	1216	36-39	F11HEL.URZ.TPMB738A
1983 DATA				
F22ELS.TAPE.TPMD840A	12950-13581	1000	40	F11HEL.URZ.TPMD840A
F22ELS.TAPE.TPMD840B	13581-13879	1000	:	F11HEL.URZ.TPMD840B
F22ELS.TAPE.TPMD840C	13879-14225	1000	:	F11HEL.URZ.TPMD840C
F22ELS.TAPE.TPMD840D	14228-14582	994	:	F11HEL.URZ.TPMD840D
F22ELS.TAPE.TPMD844A	14611-15046	820	:	F11HEL.URZ.TPMD844A
F22ELS.TAPE.TPMD844B	15047-15688	1269	45	F11HEL.URZ.TPMD844B
1984 DATA				
F22ELS.TAPE.TPME846A	15699-16736	1865	46	F11HEL.URZ.TPME846A
F22ELS.TAPE.TPME844A	16806-17549	1804	44	F11HEL.URZ.TPME844A
F22ELS.TAPE.TPME844B	17550-17962	1090	44	F11HEL.URZ.TPME844B
>>>>> FROM RUN 17990 ON NO VALID DE/DX CALIBRATION <<<<<				
F22ELS.TAPE.TPME844C	17963-18275	684	44	F11HEL.URZ.TPME844C
F22RAM.TAPE. REDUCONE.G892T904	18276-18433	323	44	F11HEL.URZ.G892T904
F22RAM.TAPE. REDUCONE.G905T956	18434-19018	1528	44	F11HEL.URZ.G905T956



Barrel Streets (1-20)																				Endwalls -Z (21-28)								Endwalls +Z (29-36)								Groups
1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	2
1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5 (ignored)

Position 6
Quality 1
(4/4)

Position 18
Quality 2
(3/4)

Figure 3

18|6|80

T3 TRIGGER BARREL STREETMAP

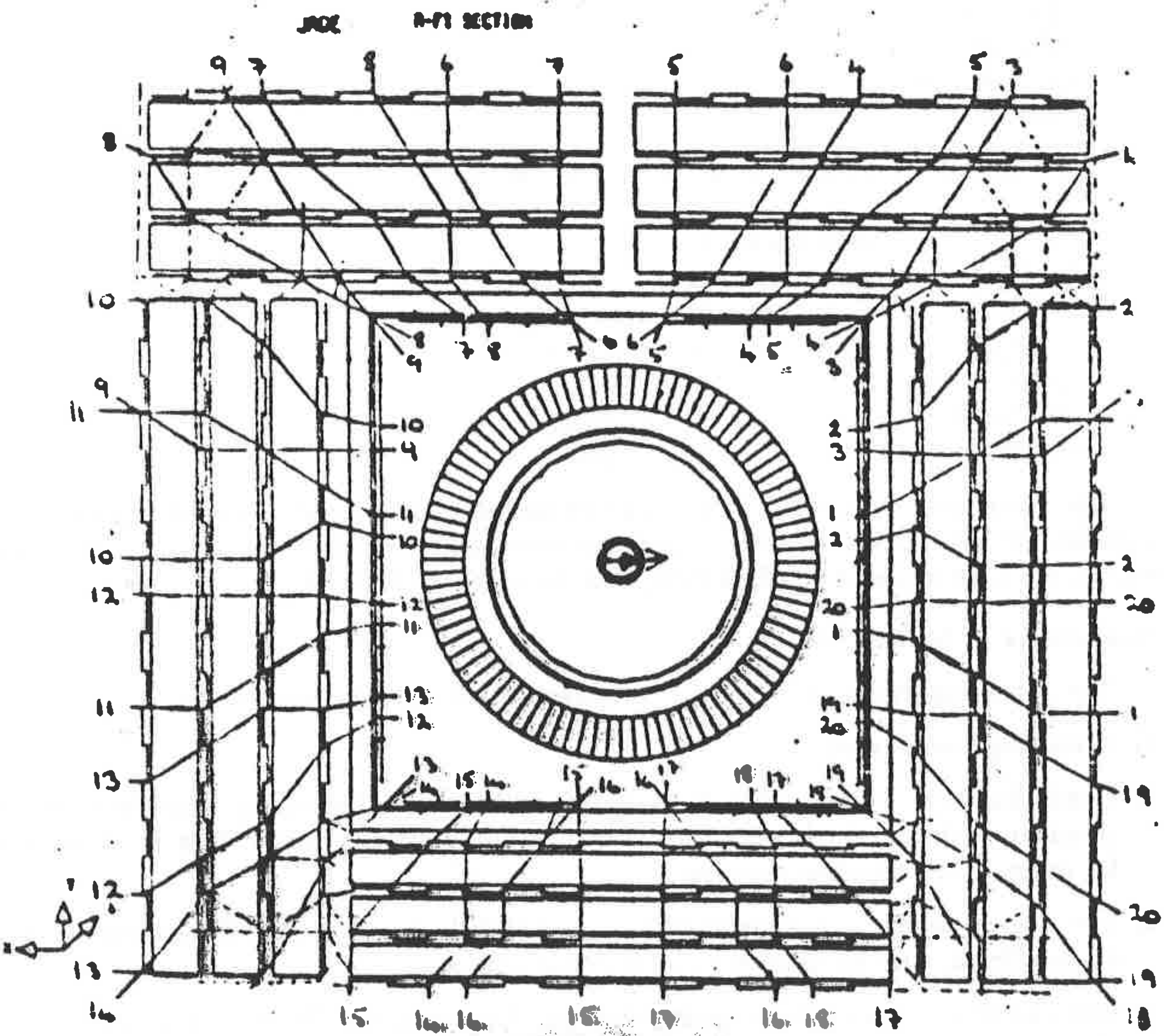


Figure 1

we wish to filter out) the T3 trigger is inefficient — which again is reasonable for a hardware trigger.

The Current Algorithm.

It was decided to use chamber hits to reconstruct the T3 level trigger information and then search for tracks. This avoids the problems mentioned above. Block data statements supplied by Austin Ball specify which group(s) and street each chamber belongs to.

For each track found the street position is recorded (1—20 in the barrel; 21—28 and 29—36 in the endwalls). The track quality is also recorded:—

1	clean track	4/4 efficiency	
2	clean track	3/4 efficiency	
11	slant track	4/4 efficiency	not for endwalls
12	slant track	3/4 efficiency	

Figure 3 shows an event caused by the "J.O." trigger together with the MUTANA results. The algorithm is fairly simple and does not require significant computer resources.

Use of MUTANA Online.

MUTANA is applied to each event by the Nord-50 analysis program. The N50S bank (see supplement 1 to JADE Computer Note 78) contains the total number of muon tracks, the number in the barrel and up to five track position/quality pairs. MUTANA is currently used for online event filtering for three trigger sources. The complete online event filtering scheme is described elsewhere[1]. If the low energy neutral "J.O." trigger (T1 accept bit 13 — installed from run 10493) is set, and no other trigger bit, then if MUTANA has found a track the event will be a candidate for rejection. Around 85% of events caused by this trigger are rejected online. It is realised that a cosmic particle passing through the detector at the same time as a genuine 2-photon event could cause that event to be rejected. This is acceptable to the physicist since it occurs at a low rate and can be corrected for. The online filtering has been active since run 13762 on 16/6/1983. From run 20000 onwards (1985 data) it was changed to filter events only if a track was found in the muon filter barrel (ignore endwalls due to worries about extra hits there faking tracks and hence rejecting genuine events). The change in rejection percentage was negligible.

The same algorithm is applied to the "Zorn" trigger (T1 accept bit 14) since run 14953 on 21/10/1983.

The new T2 accept "J.O.2" trigger (T1 postpone bit 10), if it is the sole cause of a T2 accept event, is cleaned up by MUTANA in the same way. This was active as soon as the trigger was installed (run 20300 onwards on 18/4/1985).

Use of MUTANA offline.

Often there is a requirement to find which events in a sample contain a muon candidate. For data since May 1983 one can use the stored results in the N50S bank. For other data it is possible to run MUTANA on the DESY IBM computer. Assuming the program has the BOS common, the MUEV bank must be located, the chamber data converted into Nord-50 format, then to T3 trigger format and then analysed thus:—

F11LHO.JDATA16.REFORM . G0xxxV00 (1986)			
Raw Data (Reform)	Lumi and Random Tape	Run nr.	Nr. of events
xxx = 001 – 020	F110LS.LUMI16 . T001T020	25873 – 26031	59781
xxx = 021 – 035	F110LS.LUMI16 . T021T035	26032 – 26144	55295
xxx = 036 – 050	F110LS.LUMI16 . T036T050	26145 – 26254	50472
xxx = 051 – 065	F110LS.LUMI16 . T051T065	26255 – 26371	61822
xxx = 066 – 080	F110LS.LUMI16 . T066T080	26372 – 26494	60128
xxx = 081 – 095	F110LS.LUMI16 . T081T095	26495 – 26617	51295
xxx = 096 – 110	F110LS.LUMI16 . T096T110	26618 – 26739	64718
xxx = 111 – 125	F110LS.LUMI16 . T111T125	26740 – 26933	48901
xxx = 126 – 140	F110LS.LUMI16 . T126T140	26934 – 27158	56963
xxx = 141 – 160	F110LS.LUMI16 . T141T160	26608 – 27314	59979
xxx = 161 – 185	F110LS.LUMI16 . T161T185	27315 – 27533	62481
xxx = 181 – 200	F110LS.LUMI16 . T181T200	27534 – 27688	62563
xxx = 201 – 220	F110LS.LUMI16 . T201T220	27647 – 27853	60379
xxx = 221 – 240	F110LS.LUMI16 . T221T240	27854 – 28042	51986
xxx = 241 – 255	F110LS.LUMI16 . T241T255	28043 – 28110	42826

F11LHO.JDATA17.REFORM . G0xxxV00 (1986)			
Raw Data (Reform)	Lumi and Random Tape	Run nr.	Nr. of events
xxx = 001 – 015	F110LS.LUMI17 . T001T015	28111 – 28245	58378
xxx = 016 – 035	F110LS.LUMI17 . T016T035	28246 – 28371	53910
xxx = 036 – 055	F110LS.LUMI17 . T036T055	28372 – 28523	55626
xxx = 056 – 075	F110LS.LUMI17 . T056T075	28524 – 28654	56328
xxx = 076 – 115	F110LS.LUMI17 . T076T115	28655 – 28973	63202
xxx = 116 – 135	F110LS.LUMI17 . T116T135	28974 – 29112	52398
xxx = 136 – 155	F110LS.LUMI17 . T136T155	29113 – 29259	57472
xxx = 156 – 180	F110LS.LUMI17 . T156T180	29260 – 29413	56448
xxx = 181 – 200	F110LS.LUMI17 . T181T200	29414 – 29582	53850
xxx = 201 – 230	F110LS.LUMI17 . T201T230	29583 – 29774	65804
xxx = 231 – 248	F110LS.LUMI17 . T231T248	29775 – 29899	50270

F11LHO.JDATA18.REFORM . G0xxxV00 (1986)			
Raw Data (Reform)	Lumi and Random Tape	Run nr.	Nr. of events
xxx = 001 – 025	F110LS.LUMI18 . T001T025	29900 – 30073	56207
xxx = 026 – 045	F110LS.LUMI18 . T026T045	30074 – 30228	56669
xxx = 046 – 071	F110LS.LUMI18 . T046T071	30229 – 30397	47486

F11LHO.JDATA12.REFORM . GOxxxV00 (1984 -- 1985)			
Raw Data (Reform)	Lumi and Random Tape	Run nr.	Nr. of events
xxx = 001 – 010	F11OLS.LUMI12 . T001T010	17563 – 17632	31122
xxx = 011 – 020	F11OLS.LUMI12 . T011T020	17633 – 17697	28339
xxx = 021 – 030	F11OLS.LUMI12 . T021T030	17698 – 17771	35042
xxx = 031 – 050	F11OLS.LUMI12 . T031T050	17772 – 17962	42293
xxx = 051 – 060	F11OLS.LUMI12 . T051T060	17963 – 18048	36111
xxx = 061 – 080	F11OLS.LUMI12 . T061T080	18049 – 18216	33600
xxx = 081 – 095	F11OLS.LUMI12 . T081T095	18217 – 18351	35819
xxx = 096 – 110	F11OLS.LUMI12 . T096T110	18352 – 18462	35990
xxx = 111 – 125	F11OLS.LUMI12 . T111T125	18463 – 18606	33263
xxx = 126 – 140	F11OLS.LUMI12 . T126T140	18569 – 18712	33575
xxx = 141 – 155	F11OLS.LUMI12 . T141T155	18713 – 18796	32002
xxx = 156 – 170	F11OLS.LUMI12 . T156T170	18797 – 18890	33793
xxx = 171 – 185	F11OLS.LUMI12 . T171T185	18891 – 18969	31566
xxx = 186 – 198	F11OLS.LUMI12 . T186T198	18970 – 20028	28690
xxx = 199 – 221	F11OLS.LUMI12 . T199T221	20029 – 20210	39778
xxx = 222 – 245	F11OLS.LUMI12 . T222T245	20211 – 20408	24489
xxx = 246 – 251	F11OLS.LUMI12 . T246T251	20409 – 20456	8829

F11LHO.JDATA13.REFORM . GOxxxV00 (1985)			
Raw Data (Reform)	Lumi and Random Tape	Run nr.	Nr. of events
xxx = 001 – 025	F11OLS.LUMI13 . T001T025	20457 – 20694	45369
xxx = 026 – 050	F11OLS.LUMI13 . T026T050	20695 – 20911	41395
xxx = 051 – 075	F11OLS.LUMI13 . T051T075	20912 – 21122	41718
xxx = 076 – 100	F11OLS.LUMI13 . T076T100	21123 – 21330	41284
xxx = 101 – 125	F11OLS.LUMI13 . T101T125	21331 – 21484	33119
xxx = 126 – 145	F11OLS.LUMI13 . T126T145	21485 – 21646	34695
xxx = 146 – 170	F11OLS.LUMI13 . T146T170	21647 – 21861	40417
xxx = 171 – 195	F11OLS.LUMI13 . T171T195	21862 – 22074	38109
xxx = 196 – 202	F11OLS.LUMI13 . T196T202	22075 – 22123	9824

The summaries of LUMI and RANDOM event collection are given below for the various Reform generation groups, together with Run nr. intervals and Nr. of events. This information can also be found in the member

JADEPR.TEXT(LUMSUM)

F11LHO.JDATA07.REFORM . G0xxxV00 (1982)			
Raw Data (Reform)	Lumi and Random Tape	Run nr.	Nr. of events
xxx = 001 – 020	F11OLS.LUMI07 . T001T020	10477 – 10584	47127
xxx = 021 – 045	F11OLS.LUMI07 . T021T045	10554 – 10699	51827
xxx = 046 – 065	F11OLS.LUMI07 . T046T065	10688 – 10813	53512
xxx = 066 – 090	F11OLS.LUMI07 . T066T090	10814 – 10900	45722
xxx = 091 – 115	F11OLS.LUMI07 . T091T115	10901 – 11080	47383
xxx = 116 – 140	F11OLS.LUMI07 . T116T140	11081 – 11213	48043
xxx = 141 – 160	F11OLS.LUMI07 . T141T160	11214 – 11350	50698
xxx = 161 – 185	F11OLS.LUMI07 . T161T185	11351 – 11530	53008
xxx = 186 – 205	F11OLS.LUMI07 . T186T205	11531 – 11649	49110
xxx = 206 – 225	F11OLS.LUMI07 . T206T225	11650 – 11803	48997
xxx = 226 – 250	F11OLS.LUMI07 . T226T250	11742 – 11966	42711

F11LHO.JDATA08.REFORM . G0xxxV00 (1982 -- 1983)			
Raw Data (Reform)	Lumi and Random Tape	Run nr.	Nr. of events
xxx = 001 – 020	F11OLS.LUMI08 . T001T020	11967 – 12125	43144
xxx = 021 – 040	F11OLS.LUMI08 . T021T040	12126 – 12250	38841
xxx = 041 – 060	F11OLS.LUMI08 . T041T060	12251 – 12357	38641
xxx = 061 – 080	F11OLS.LUMI08 . T061T080	12183 – 12439	23687
xxx = 081 – 100	F11OLS.LUMI08 . T081T100	12440 – 12608	24600
xxx = 101 – 140	F11OLS.LUMI08 . T101T140	12609 – 12950	51082
xxx = 141 – 160	F11OLS.LUMI08 . T141T160	12959 – 13229	54232
xxx = 161 – 195	F11OLS.LUMI08 . T161T195	13230 – 13418	41922
xxx = 196 – 246	F11OLS.LUMI08 . T196T246	13385 – 13597	46385