Group Option Records

Read this section carefully. The program only performs the actions you ask for. That is, there are no default actions.

The Group Option records all have the same format, with the first keyword identifying which 'group' of options is being referred to. Basically a group corresponds to a subdetector but the options for refitting, charged track processing and overall event analysis are incorporated into their own groups. All the options for a particular group must be given on one record. The format is:

group { *option_keyword* } { *option_keyword* } { *option_keyword* } ...

with different *option_keywords* appearing any number of times (including zero), separated by at least one blank. For example:

```
MUON    ANALYSE   IFNOTDONE   TP   DELETE
```

where MUON is the *group* and ANALYSE, IFNOTDONE, TP and DELETE are *option_keywords*. The allowed values of *group* are:

JETC VTXC TRACK TOF LG REFIT MUON TAGG DEDX CALCS

which are self-explanatory except possibly REFIT (which deals with a refit of the Jet Chamber), TRACK (which summarises the latest PATR bank) and CALCS (which deals with global event calculations like sphericity and thrust plus event reduction).

The allowed values of *option_keyword* depend to some extent on the *group* but the basic list (common to almost all the groups) is:

ANALYSE	perform the relevant reconstruction task
IFNOTDONE	qualifier to ANALYSE; prevents re-analysis
TP	perform the summary; create or modify the TP banks
DELETE	delete detector results banks after summarising

The exact action for each group is specified later in the note. The important point to emphasise again is that the absence of these *option_keywords* implies that the corresponding actions are NOT done. In addition, please note that qualifiers, like IFNOTDONE, are meaningless without their associated verbs.[4]

[4]The qualifiers can appear anywhere in the record but it is good practice to place them immediately after the relevant verb.

A summary of all the legal *option_keywords* now follows. Note that a few of them are mutually exclusive.

```
JETC   RFICAL IFNORFICAL ZCAL OLDDEL ANALYSE IFNOTDONE ZVTX
VTXC   ANALYSE  COMFIT
REFIT  RFI IFNORFI STRONGVTX WEAKVTX ZS IFNOZS COMMONZVTX OLDPATR
TRACK  TP  VPROCESS  DELETE
DEDX   ANALYSE  TP
TOF    ANALYSE  IFNOTDONE  TP  DELETE
LG     LGCAL  IFNOLGCAL  ANALYSE  IFNOTDONE  TRACKMATCH  TP DELETE
MUON   ANALYSE  IFNOTDONE  TP  DELETE  FULL
TAGG   ANALYSE  IFNOTDONE  TP  DELETE
CALCS  SPHERICITY  THRUST  REDUCTION
```

4. What TP9 Does In Detail

The first action performed, after an event is read in, is the deletion of all existing TP banks followed by the creation of the TPEV/1 bank. Next the program performs (if requested) the following tasks, in the order given below:

- jet chamber basic processing including 'calibration'
- jet chamber track refitting (Spitzer routines)
- vertex chamber processing and combined fit with jet chamber
- copying charged tracks from lowest the PATR bank into TPTR banks
- primary vertex finding, the creation of the TPVX/1 bank and the adjustment of the direction cosines in the TPTR banks for tracks from the primary vertex
- deletion of some or all PATR banks
- TOF analysis, summary of results in TPTR banks and deletion of the TOFR bank
- LG 'calibration', analysis and cluster-track matching
- creation of photon summary TPTR banks and addition of cluster information to charged track TPTR banks
- deletion of LGCL bank

- muon filter analysis, addition of muon information to TPTR banks and MUR2 bank deletion
- tagging system analysis, creation of new TPTR banks and deletion of tagging results banks
- dE/dx analysis and addition of results to TPTR banks
- identification of particles in TPTR banks
- finding of charged decays, V^0's and converted photons, and creation of new TPVX and TPTR banks
- compilation of event statistics and copying them into the TPEV/1 bank
- computation of visible energies, sphericity and thrust, and histogramming them and other quantities
- flagging events that fail the reduction cuts
- writing out the event to the relevant dataset

4.1 Jet Chamber Processing

The actions performed are: calibration in $r\phi$ and z, deletion of all existing PATR banks,[5] PATRCO analysis and a fast z vertex search. All of these actions are optional with the option group name being JETC.

RFICAL	do $r\phi$ calibration of the Jet Chamber
IFNOFICAL	qualifier to RFICAL; prevents recalibration
ZCAL	do z calibration of Jet Chamber (no qualifier)
ANALYSE	call PATRCO to perform pattern recognition
IFNOTDONE	qualifier to ANALYSE; prevents re-analysis if a PATR exists
OLDDEL	qualifier to ANALYSE; delete existing PATR banks[5] first
ZVTX	do fast z vertex search

Note that RFICAL IFNORFICAL is a sensible choice if ANALYSE is specified.

[5] Except PATR/12

4.2 Charged Track Refitting

The actions performed are: Spitzer $r\phi$ and Spitzer zs refitting. All of the actions are optional with the option group name being REFIT. As always, the default actions are no actions, i.e. no vertex constraints are used in fits unless asked for explicitly. See Jade Computer Notes 94 and 95 for details about the refitting programs.

RFI	perform an $r\phi$ refit (defaults: *unconstrained* and *create new* PATR *bank*)
IFNORFI	qualifier to RFI; prevents refitting
STRONGVTX	qualifier to RFI; with *strong* vertex constraint
WEAKVTX	qualifier to RFI; with *weak* vertex constraint, i.e. vertex errors multiplied by 100
ZS	perform zs refit (defaults: *no common z vertex constraint* and *create new* PATR *bank*)
IFNOZS	qualifier to ZS; prevents refitting
COMMONZVTX	qualifier to ZS; with *common z vertex constraint*
OLDPATR	qualifier to RFI and ZS; *overwrite* existing PATR bank

4.3 Vertex Chamber Processing

The actions performed are; vertex chamber analysis (using the latest PATR bank, possibly created in the JETC or REFIT steps) followed by a combined fit with the jet chamber (COMFIT). Standard routines VTXCSF and VTXCSV are used. Both of these actions are optional with the option group name being VTXC.

ANALYSE	do vertex chamber analysis
COMFIT	perform a combined fit with jet chamber to make HWDS bank

4.4 Charged Track Summarising

The actions performed are: TP track summarising using the PATR bank with the lowest number to create a TPTR bank for every track found, vertex processing of every TPTR bank and the deletion of all PATR banks.[6] All of these actions are optional

[6]Not implemented in version 9.1

with the option group name being TRACK. The vertex processing action results in the PATR bank being analysed to find the primary vertex. A TPVX bank 1 is then created. The corresponding TPTR track numbers are added to the TPVX bank and the starting positions and direction cosine information in the TPTR banks are set accordingly. No correction for energy loss for each track is made, at present. All later vertex related tasks, such as decay finding, V^0 searches and converted photon searches are also dependent on the VPROCESS option in this section.

TP	perform a summary of the PATR bank with the lowest number; create TPTR banks as explained above
VPROCESS	perform vertex processing as explained above
DELETE	delete all PATR banks[7] after summarising (except PATR/12)

4.5 TOF Processing

The actions performed are: TOFINT analysis, summarising the results into the charged track TPTR banks (if present) and deletion of the TOFR bank. All of these actions are optional with the option group name being TOF.

ANALYSE	perform the TOF analysis (TOFINT)
IFNOTDONE	qualifier to ANALYSE; prevents re-analysis
TP	perform the summary; modify TPTR banks for charged tracks (if any)
DELETE	delete TOFR bank after summarising

4.6 LG Processing

The actions performed are: LG calibration (LGCALB), cluster finding (LGANAL), track-to-cluster matching by position (LGCDIR) and TP summarising which modifies some charged track TPTR banks and creates new neutral particle TPTR banks. All these actions are optional with the option group name being LG.

LGCAL	calibrate the LG system (LGCALB)
IFNOLGCAL	qualifier to LGCAL; prevents recalibration

[7]Not implemented in version 9.1

ANALYSE	perform the LG cluster finding analysis (LGANAL)
IFNOTDONE	qualifier to ANALYSE; prevents re-analysis
TRACKMATCH	join tracks and clusters (LGCDIR)
TP	perform the summary; modify TPTR banks for charged tracks (if any) and create new TPTR banks for neutrals
DELETE	delete the LGCL bank[8]

4.7 Muon Filter Processing

The actions performed are: muon analysis[9] (MUANA), TP summarising which modifies charged track TPTR banks and two levels of muon results bank deletion. All these actions are optional with the option group name being MUON.

ANALYSE	perform the muon filter calibration and analysis (MUANA)
IFNOTDONE	qualifier to ANALYSE; prevents recalibration and re-analysis
TP	perform the summary; modify TPTR banks for charged tracks (if any)
DELETE	delete MUR2 banks 5 and 6 at end
FULL	qualifier to DELETE; delete banks 2, 3 and 4 as well

4.8 Tagging System Processing

The actions performed are: tagging analysis (TAGAN), TP summarising which creates new TPTR banks and deletion of the ATAG and TAGG banks after summarising. All these actions are optional. The option group name is TAGG.

ANALYSE	perform the tagging system calibration and analysis (TAGAN)
IFNOTDONE	qualifier to ANALYSE; prevents recalibration and re-analysis
TP	perform the summary; create new TPTR banks
DELETE	delete ATAG and TAGG banks

[8]Not implemented in version 9.1
[9]Including (re)calibration

4.9 dE/dx Processing

The actions performed are: dE/dx analysis and TP summarising which modifies the TPTR banks of charged tracks. Since there is no DEDX bank, both actions must be performed or neither of them. The option group name is DEDX.

ANALYSE	perform the dE/dx analysis of Jet Chamber tracks (DEDXBN)
TP	perform the summary; modify TPTR banks for charged tracks

4.10 Particle Identification

An attempt is made to identify the particles in the event using information determined from the muon filter, LG detector, Jet Chamber (dE/dx) and the TOF counters. Searches for V^0 particles, converted photons and tracks with kinks are also performed, depending on the VPROCESS keyword specified as part of the TRACK group of options. The TPEV and TPTR banks are updated and new TPTR and TPVX banks created when new particles are found.

4.11 Event Analysis

Two actions occur that are not optional. They are the calculation of visible energy (charged and neutral) from the TPTR banks (which is written into the TPEV/1 bank and the histogramming of certain quantities.

The optional actions (grouped together under the name CALCS) are the calculations of sphericity and thrust and determining whether an event is to be accepted or rejected. This reduction process depends on the code incorporated into the reduction routine. The default code is for multihadronic event selection (MCREDU).

SPHERICITY	calculate sphericity (SPHERI)
THRUST	calculate thrust (THRUST)
REDUCTION	perform the desired reduction

5. Warning and Error Messages

At present the messages printed by the TP routines[10] are rather terse and give only a short traceback from the routine that detected the error or generated the warning. This is often enough to determine the cause of the problem. However this should be improved in later versions when experience provides information on why the errors occur. Since there are some routines from version 8 linked in, there may be error messages printed in the old TP8 style.

Please report occurrences of errors and warnings so that the program can be changed to remove unnecessary messages or provide more user-friendly ones.

6. Running the Program

At DESY, a standard job exists to run the program which only requires the addition of the option records ('cards'). As stated before, these can be added by hand or by using the output from the interactive options generator. The standard JCL member is called `#RUNTP9` and lives on `F22BOW.TP9.S`, the source library for TP9. Another member, `#RUNTP9C`, includes a tape-to-disk copy step before the TP step. The Siemens FORTRAN77 load library is called `F22BOW.TP9.L` and there is also an IBM FORTVS load library called `F22BOW.TP9.VSL`.

Note that there is a problem with FORTVS `BLOCK DATA` linking so members `TPDICT` and `TPBD01` should be explicitly `INCLUDE`d in the link step if the FORTVS library is used.

Running TP9 at RAL will involve using copied FORTVS load modules from DESY. When the program is ready an announcement will be made. Note, a VAX version of the interactive options program exists and can be used in conjuction with remote job submission to RAL from the Manchester and Lancaster VAXes. Usage at Heidelberg is still to be decided. Please ask for the latest information.

Finally, as always, be aware that future improvements might entail larger region sizes or library changes so always check the standard JCL members before submitting long production jobs.

[10] With the exception of the options handling routines