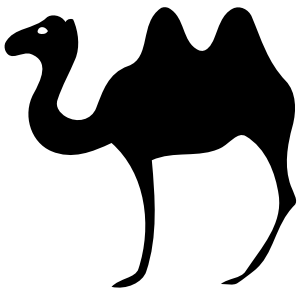
NOMAD
EVENT GENERATOR
OFF-LINE MANUAL
DRAFT*
Version 5.04



This document may be obtained by printing the NEG504 PS file
located on your group disk.

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Contents

1 The Nomad Event generator LIBrary

1.1 Introduction

The event generator is a package based on the LEPTO physics simulation program and the GBEAM neutrino beam simulation. It offers all needed flexibility to generate neutrino interactions in the context of the NOMAD detector. You may coose by datacards, the type of incoming neutrino, the beam energy window, the decay channels for the tau, the hitted detector part,.... The geometry of the NOMAD detector used in GENOMlib (NOMAD GEANT simulation package) is used in order to generate the vertex position according to the material density distribution along the beam axis.

After a brief status report of the present event generator version, you will find some informations on the NEGlib flow diagrams, on how to install the library, on the FFREAD datacardds and on the generated ZEBRA banks.

1.2 Release notes for neglib version 5.0

Since version 5.00, the NOMAD generator has been upgraded to include new desirable features. The most important of these are listed below:

- interface to LEPTO 6.1
- interface to KORALZ
- interface to GBPLUS

The NEGLIB will keep evolving with these products. Added features include:

- generation of events in the dummy target
- GEANT GRNDM random number generator for all products (INITSEED is the RNDM sequence or the seeds)
- single LEPTO61R1 CMZ file that contains customized versions of LEPTO 6.1 and KORALZ 2.02
- default PDFLIB MRSD-' nucleon structure functions and choice of other structure functions by datacard
- hooks for user code

Known bugs:

- for neutrino energies less than 10 GeV, the fragmentation of some events fails due to phase-space problems. This is solved by setting the ELEPTCUT card to a higher value.

1.3 Release notes for neglib version 5.04

The possibility to generate elastic scattering events and resonance productions at low $Q**2$, $W**2$.

2 The NEGlib flow diagrams

This section gives you some informations on the NEGlib flow diagrams. For details about LEPTO and JETSET you should consult the LUND manual.

The following symbols are used in the flow diagrams :

- * : external procedure
- > : sub-tree node, expanded below
- ? : module is in IF clause
- do : start of DO loop
- end do : end of DO loop

Node name: MAIN (main routine)

```
MAIN
  !
  !----- TIMEST * : Initialize timing routine
  !
  !----- HLIMIT * : Initialize histogram space for HBOOK4
  !
  !----- GLMAIN : Main routine of Event Generator
  !       !
  !       !----- INIGLU > : event generator initialization
  !       !
  !       !?---- NZEBRA: Zebra package and bank initialization
  !       !
  !       !?---- BKHIST: Book histograms
  !       !
  !       do: start event loop
  !       !
  !       !----- VTXGEN > : Generate the vertex position and
  !       !                  neutrino energy
  !       !
  !       !----- TARGET: choose the hitted nucleus according to material
  !       !
  !       !?---- FERMI : Add Fermi momentum spread of hitted nucleus
  !       !
  !       !----- LEPTO * : generate the event
  !       !
  !       !?---- TAU3PI: select only tau to 3pi decay
  !       !
  !       !----- DECOD : Translate to GEANT particle table
```

```
!       !       !
!       !       !----- DALSEARCH: Search for Dalitz decays to do
!       !       !                  correctly the decay according to
!       !       !                  matrix element and not to
!       !       !                  phase space.
!       !       !
!       !       !?---- MAKEDAL : Force Dalitz decays if none
!       !       !
!       !       !----- COPIE   : Write the LUND stable particles in
!       !                         the GKIN GEANT common block
!       !
!       !?---- GLWOUT : write the event banks and to output file
!       !
!       !----- LUEDIT * : Keep only stable particle in LUJET common
!       !
!       !?---- LULIST * : print created  particule list
!       !
!       !?---- EVANAL : do a short analysis
!       !
!       !?---- UEVANAL : user analysis
!       !
!       !?---- BKFILL : fill histograms
!       !
!       end do: end of event loop
!       !
!       !?---- UEVEND   : user termination routine
!       !
!       !?---- MZWIPE * : clear ZEBRA banks for next event
!       !
!       !?---- HISTDO * : print histograms
!       !
!       !?---- FZENDO * : close the ZEBRA output file
```

Node name: INIGLU (initialization)

```
INIGLU
 !
 !----- NOMINIT: define logical units and standard constants
 !
 !----- NOMHEAD: write the job header
 !
 !----- NEGIMAT: initialize COMTAR common with standard materials
 !
 !----- FFINIT * : FFREAD package initialization
 !
 !----- FFSET * : define logical units for FFREAD
 !
 !----- FFKEY * : define the event generator FFREAD datacards
 !
 !----- NOMMVOL : define the default drift chambers geometry parameters
 !
 !----- UGINDCH : initialize the drift chamber geomtry
 !
 !----- UGFFDCH : define the DCH datacards
 !
 !----- UGINMIC : define the default geometry parameters of the magnet
 !
 !----- UGINVET : initialize the VETO parameters
 !
 !----- UGDEVET : define the default geometry parameters
 !                 of the veto (to get upstream magnet I's)
 !
 !----- UGDUMTAR : define dummy target geometry parameters
 !
 !----- UEINIT1 : user extension initialization 1
 !
 !----- FFGO * : read the FFREAD datacards
 !
 !----- UCHKDCH: Check defined drift chamber datacards
 !
 !----- TARMAT: define the additional target materials in COMMAT
 !
 !----- LWEITS : intgeral of QCD matrix elements calculation
 !
 !----- LINIT *: LUND initialization
 !
 !----- INITT : Target initialization
 !
```

```
 !----- UEINIT2 : user extension initialization 2
 !
```

Node name: VTXGEN (vertex generation)

```
VTXGEN
 !
 !----- GBEAM *: Generate the X,Y and neutrinno energy
 !
 !----- ZREFGO : rotate from GEAM ref. to NOMAD ref.
 !
 !?---- MGCVTX : Special selection for vertex in magnet iron and coil
 !
 !----- decide whether should generate in chambers or dummy target
 !
 !----- generate in Z dummy target
 !or
 !----- generate Z vertex using the beam chamber geometry
```

3 How to install the NEGlib

The Neglib is available under cmz or car files on axnd02.cern.ch . To install it on your local machine your should first transfer the cmz or car file to your local machine and then install it as defined in the CMZ manual (cmz -install neglib on unix). A the installation a neg_vvv (vvv=500 for version 5.00) script (only on unix) will be installed in the $NOMAD_JOBS/run directory. This srcipt is an example on how to run with neglib.

please do not forget to install also this documentation file on your local machine.

4 The NEGlib datacards

This section gives the definitions of existing FFREAD datacard ddriving the NEGlib running. Some datacard common to GENOMlib and NEGlib used fro the drict chamber layout are also documented. Plaes note that we adopted a DATACARD key size of 8 characters.

4.1 Datacards specific to NEGlib

4.1.1 Run datacards

Key name	Filled	Type	Comments
RUNRANGE	IRUNNB(1)	(I)	First run number to process (*)
	IRUNNB(2)	(I)	Last run number to process (*) Filled common : RUNCON
TRIGGERS	ITRIG1	(I)	First trigger to process (*)
	ITRIG2	(I)	Last trigger to process (*) Filled common : RUNCON
INITSEED	ISEED(2)	(2I)	GRNDM SEED at start of job If $1 \leq ISEED \leq 215$, then the sequence ISEED is initialized; otherwise, a seed is expected Filled common : RUNDOM
DRIVSEED	I1SEED	(I)	Switch on/off (=1/=0) the SEED initialization at start of job using the value read from unit KUNRDS. The last is saved at the end of the job in the file KUNWRS.
	I2SEED	(I)	Switch on/off (=1/=0) then writing of SEED value at start of each event to a file on logical unit 42.
	I3SEED	(I)	Switch on/off (=1/=0) the reading of SEED at start of event generation form a file defined on logical unit 41. This file has to be obtained previously by I2SEED=1. Keys RUNRANGE and TRIGGERS are not taken into account when I3SEED=1. Filled common : RUNDOM
OUTPUT	IFLNOUT	(I)	Switch on/off (=1/=0) the writing of generated events to an output file on logical unit KUNOUT (=13; see NOMINIT routine) Filled common : RUNCON

4.1.2 Particle decays datacards

These cards define some decay modes of particles.

These cards are filled in the common : DALITZ

Key name	Filled	Type	Comments
MAKTAUEL	ITAUEL	(I)	Switch on/off (=1/=0) the exclusive $\tau \to e\nu_e\nu_\tau$ decay.
MAKTAUMU	ITAUMU	(I)	Switch on/off (=1/=0) the exclusive $\tau \to \mu\nu_\mu\nu_\tau$ decay.
MAKTAUPI1	ITAUPI1	(I)	Switch on/off (=1/=0) the exclusive $\tau \to \pi\nu_\tau$ decay.
MAKTAURHO	ITAURHO	(I)	Switch on/off (=1/=0) the exclusive $\tau \to \rho\nu_\tau$ decay.
MAKTAUA1	ITAUA1	(I)	Switch on/off (=1/=0) the exclusive $\tau \to a_1\nu_\tau$ decay.
MAKTAUK1	ITAUK1	(I)	Switch on/off (=1/=0) the exclusive $\tau \to K\nu_\tau$ decay.
MAKTAUKS	ITAUKS	(I)	Switch on/off (=1/=0) the exclusive $\tau \to K^*\nu_\tau$ decay.
MAKEPAIR	MKPAIR	(I)	Switch on/off (=1/=0) the gamma conversion
MAKDALIT	MAKDAL	(I)	Switch for the π^0,η^0 Dalitz decay. $= -1$ remove all Dalitz decays $= 0$(default) normal Dalitz decays $= 1$ force a Dalitz decay
MAKDALAS	IDALAS	(I)	Switch on/off (=1/=0) the π^0,η^0 asymmetric decay with imposed positron energy EDALAS.
	EDALAS	(R)	forced value of positron energy.

4.1.3 Beam datacards

These cards are filled in the common : BEACON.

Key name	Filled	Type	Comments
BEAMTYPE	IFLAV	(I)	Used to impose the energy and profile distribution type : =1 $\rightarrow \nu_\mu$ profile =2 $\rightarrow \bar{\nu}_\mu$ profile =3 $\rightarrow \nu_e$ profile =4 $\rightarrow \bar{\nu}_e$ profile This card does not need tobe used (The IFLAV value is tabulated for the type of incoming lepton defined by the LEPTON card).
BEAMEXTN	IBEXT	(I)	Used to artificially extend the radial beam profile beyond the 3m radius for which data is available. =1 $\rightarrow$ extend profile assuming a flat distribution equal to that at 3m radius for a given energy. =0 $\rightarrow$ no extension
XFIDUCUT	XBFIDU	(R)	Fiducial cut in the X direction (100. cm by default) (in target local frame)
YFIDUCUT	YBFIDU	(R)	Fiducial cut in the Y direction (100. cm by default) (in target local frame)
RFIDUCUT	RBFIDU	(R)	Fiducial cut in the radial direction. (SQRT(XBFIDU**2+YBFIDU**2) by default) (in target local frame)
ZFIDUMIN	ZFIDMI	(R)	Fiducial cut in the Z direction (mini) (=0. cm by default) (in target local frame)
ZFIDUMAX	ZFIDMA	(R)	Fiducial cut in the Z direction (maxi) (404.8 cm by default) (in target local frame)
DCHDUMTAR	IDUMTAR	(I)	Number of DC modules in basket (D=0, means no dummy target) Modules are installed closest to TRD

Key name	Filled	Type	Comments
HITINMGC	IFLMGC()	(5I)	Flag used to switch on the vertex generation into the magnet C's ,coil and I's (=0 off;=1 on) Only one of these may be non-zero IFLMGC(1) → Magnet C's IFLMGC(2) → Magnet coil (forward region) IFLMGC(3) → Magnet I's (solid Fe/Air mix as in MIC def) IFLMGC(4) → Magnet I's (Fe plates as in VET def) IFLMGC(5) → not used (kept for backward compatibility) Filled common : RUNCON

4.1.4 LEPTO generator datacards

These cards are filled in the common : RUNCON.

Key name	Filled	Type	Comments
LEPTON	LEPIN	(I)	Incoming lepton type : 12 for ν_e, 14 for ν_μ, 16 for ν_τ
INTERACT	INTER	(I)	Interaction type (see LEPTO definition)
ELEPTCUT	ELPCUT()	(3R)	Minimum and maximum incoming neutrino energy cutoff (D=10.0,450.0)
PLEPTON	PLXYZ()	(3R)	Maximum incoming lepton momentum for the 3 components (only used if HARDSCAT> 0)
PNUCLEON	PPXYZ()	(3R)	Maximum target nucleus momentum for the 3 components (only used if HARDSCAT> 0)
HARDSCAT	IHARDS	(I)	Switch for the QCD hard scattering processes generation. (see LEPTO manual)
STRUCF	ISTRUCF	(2I)	Type of structure function used for the proton and the neutron (D = 13034, 2 ,i.e. MRSD-') (see below)

The data format of the structure function data card (STRUCF) is the following:

- STRUCF $< i > 1$
  - uses internal LEPTO structure function $< i >$ (refer to LEPTO manual)
- STRUCF $ijkkk$ 2
  - uses PDFLIB structure functions (refer to PDFLIB manual for complete list of functions) where
    i = nptype

j = ngroup
kkkk = nset

4.1.5 Debugging/printing datacards

These cards are filled in the common : RUNCON.

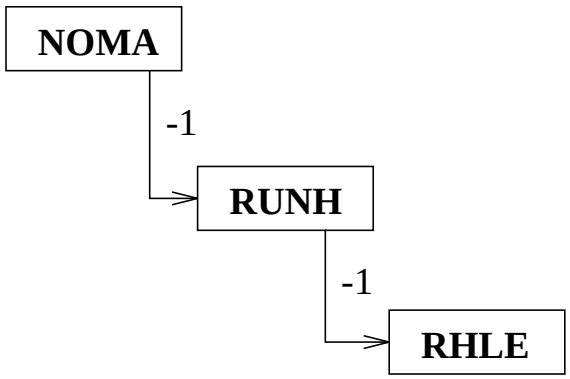
Key name	Filled	Type	Comments
PRINTING	LPRINT	(I)	Printing flag.The quantity of printed information increase with LPRINT value.
BKHISTOS	IFLNHIS	(I)	Switch on/off (=1/=0) the histogram booking,filling and printing Remark: HBOOK4 histo. are booked in the BKHIST routine.

4.2 Datacard from GENOMlib usable in NEGlib

DCHTARDC define the drift chamber positions in the target region.

```
(I) NDMODUL    = number of chamber modules in the target region
(R) TDCMODU(1) = X position of center of module 1 in global frame
(R) TDCMODU(2) = Y position of center of module 1 in global frame
(R) TDCMODU(3) = Z start of module 1 in global frame
(R) TDCMODU(4) = number of drift chamber in the first module
     .
     .            let IPT = 4*(NDMODUL-1)
     .
(R)  . (IPT+1) = X position of center of last module in glob. frame
(R)  . (IPT+2) = Y position of center of last module in glob. frame
(R)  . (IPT+3) = Z start of last module in global frame
(R)  . (IPT+4) = number of drift chamber in the last module
```

NEGLIB Run Header Zebra bank structure

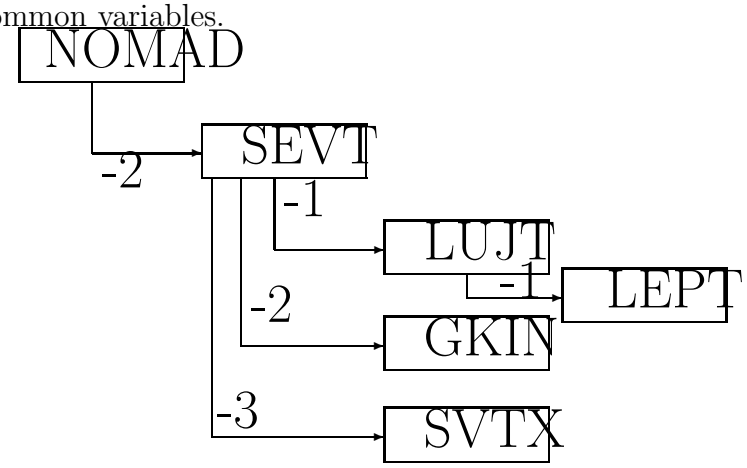


5 The NEGlib ZEBRA banks

The official NOMAD ZEBRA event structure has been updated in version 4.00 of the NEGlib in order to separate the run header banks from the event banks. There is no compatibility with earlier version of code. This means you should use the version 4.00 of the Nomad Event Generator (NEGlib) to produce (see below) readable event for the GENOM400 library.

5.1 Global event structure

The run header bank (RUNH and below banks) linked at -1 of the NOMA bank are only present for the first event of a run. This mean that LQ(RUNH) is equal to 0 for all other events. Therefore the needed parameter located in the run header banks are copied to common variables.



5.2 General GEANT NOMAD bank description

Bank : NOMA	Master NOMAD bank

Format : 10I
Up : 0
Origin : 0
Next : 0

Structure : Total Number of Links : 10
Number of stru. Links : 10
Number of data Words : 10

-1 : Link to run header bank RUNH
-2 : Link to LEPTO event bank SEVT
-3 : (Link to reconstructed event)
-4 : (Link to raw data bank)
-5 : Link to unpacked raw and simulated data

Data : +1 : Type of event (1=LEPTO, 2=GEANT)
+2 : Type of overlapped event
0 → not a LEPTO event
1 → single LEPTO event
2 → 2 overlapped LEPTO events
3 → 1 LEPTO event overlapped with
- a cosmic ray
+3 : Run number (first lepto event one)
+4 : Event number (first lepto event one)
+5 : burst number (=0 for GENOMLIB)
+6 : idate (=0 for GENOMLIB)
+7 : itime (=0 for GENOMLIB)
+8 : version number of online program
+9 : free word
+10 : free word

Bank : RUNH	Master RUN Header bank

Format	:	10I
Up	:	LNOMAD
Origin	:	LQ(LNOMAD-1)
Next	:	0

Structure	:	Total Number of Links : 10 Number of stru. Links : 10 Number of data Words : 10 -1 : Link to LEPTO run header bank RHLE -2 : Link to GEANT run header bank RHGE

Data	:	+1 : ICURUN → Run number +2 : free for the moment +3 : free for the moment +4 : free for the moment +5 : free for the moment +6 : free for the moment +7 : free for the moment +8 : free for the moment +9 : free for the moment +10 : free for the moment

Bank : RHLE	LEPTO RUN Header bank

Format	:	20I 20F
Up	:	LRUNH
Origin	:	LQ(LRUNH-1)
Next	:	0

Structure	:	Total Number of Links : 0 Number of stru. Links : 0 Number of data Words : 69

Data	:	+1 : ISEEDD(1) → start of run seed
Integer	:	+2 : ISEEDD(2)
Part	:	+3 : free word
		+4 : free word
		+5 : IHARDS → hard QCD processes flag
		+6 : LEPIN → Type of incoming lepton
		+7 : IFLAV → Type of beam profile used
		+8 : INTER → type of interaction (CC,NC)
		+9: ITAUEL forced $\tau \rightarrow e\nu\nu$ decay
		+10: MKPAIR → force a gamma conversion (if > 0)
		+11: MAKDAL → force a Dalitz decay (if > 0)
		+12: IDALMX → force the most energetic π^0 to Dalitz decay (if > 0)
		+13: IDALAS → force an asymmetric Dalitz decay with a positron energy fixed to EDALAS
		+14: ITAUMU forced $\tau \rightarrow \mu\nu\nu$ decay
		+15: ITAUPI1 forced $\tau \rightarrow \pi\nu$ decay
		+16: ITAURHO forced $\tau \rightarrow \rho\nu$ decay
		+17: ITAUA1 forced $\tau \rightarrow a_1\nu$ decay
		+18: ITAUK1 forced $\tau \rightarrow K\nu$ decay
		+19: ITAUKS forced $\tau \rightarrow K^*\nu$ decay
		+20: free word

RHLE	:	
(contin.)	:	
Data	:	+21: EDALAS → forced positron energy if IDALAS > 0
Floating	:	+22: PLXYZ(1) → Lepton momentum used to
Part	:	+23: PLXYZ(2) → calculate the WEITS of
		+24: PLXYZ(3) → first order QCD (IHARDS=1)
		+25: PPXYZ(1) → Nucleus momentum used to
		+26: PPXYZ(2) → calculate the WEITS of
		+27: PPXYZ(3) → first order QCD (IHARDS=1)
		+28: ELPCUT(1) → minimal E of incoming lepton
		+29: ELPCUT(2) → maximal E of incoming lepton
		+30: XBFIDU → beam fiducial cut in X
		+31: YBFIDU → beam fiducial cut in Y
		+32: RBFIDU → beam fiducial cut in R
		+33: ZFIDMI → beam fiducial cut in Z (min)
		+34: ZFIDMA → beam fiducial cut in Z (max)
		+35: free word
		+36: free word
		+37: free word
		+38: free word
		+39: free word
		+40: free word
		+41: LST(8) QCD switched (detailed)
		+42: LST(9) choice of scale
		+43: LST(10) numerical integration used
		+44: LST(11) longitudinal structure function
		+45: LST(12) max flavor insea structure
		+46: LST(13) heaviest quark flavor in g-fusion
		+47: LST(14) target remnant
		+48: LST(15) choice for internal structure function
		+49: LST(16) choice of structure function
		+50-64: CUT(I) I=1,14 (see LEPTO)
		+65: PARL(3) primordial kt width
		+66: PARL(8) ycut minimum
		+67: PARL(9) mij minimum
		+68: PARL(14) width in kt for non trivial target remnant
		+69: PARL(19) scale k**2 for higher twist

Bank : SEVT	Simulated event bank

Format	:	12I 3F
Up	:	LNOMAD
Origin	:	LQ(LNOMAD-2)
Next	:	LQ(LSEVT)

Structure	:	Total Number of Links : 4
		Number of stru. Links : 3
		Number of data Words : 15

Data	:	+1 : ISDEVT(1) → seed at start of event(LEPTO)
Integer	:	+2 : ISDEVT(2)
part	:	+3 : RNDM(1) → start of event GEANT seed 1
		+4 : RNDM(2) → start of event GEANT seed 2
		+5 : reserved for post or redigit. seed 1
		+6 : reserved for post or redigit. seed 2
		+7 : ITRIGG → trigger counter (local to run)
		+8 : CHVTYP → type of vertex
		'TARG','DUMT','MAGC','COIL','MAGI'
		+9 : NGKINE → number of particles in GKIN bank
		+10: NCHARM → number of charmed particles
		+11: NTREAL → total number of tracks in STRK
		+12: Free word
Data	:	+13: ELEPTO → energy of the incoming lepton
Floating	:	+14: Free word
Part	:	+15: Free word

Bank : LUJT	LUJETS LEPTO common copy

Format : 5I / 2I 5F
Up : LSEVT
Origin : LQ(LSEVT-1)
Next : 0

Structure :
Total Number of Links : 0
Number of stru. Links : 0
Number of data Words : LQ(LLUJT+1)

Header :
+1 : Total number of data (header included)
+2 : Number of words in the header
+3 : Number of words per track
+4 : N → Number of tracks
+5 : Free word

for track I :
IPT=LLUJT+IQ(LGKIN+2)+(I-1)*IQ(LGKIN+4)

IPT+1: K(I,1)*10000+K(I,3) >
IPT+2: K(I,2) >
IPT+3: P(I,1) >
IPT+4: P(I,2) > > See LUND manual
IPT+5: P(I,3) >
IPT+6: P(I,4) >
IPT+7: P(I,5) >
IPT+8: V(I,1) >
IPT+9: V(I,2) >
IPT+10: V(I,3) >
IPT+11: V(I,5) >

Bank : GKIN	GEANT cinematic bank

Format	:	5I / 4F 1I 1F 2I
Up	:	LSEVT
Origin	:	LQ(LSEVT-2)
Next	:	0

Structure	:	Total Number of Links : 0 Number of stru. Links : 0 Number of data Words : LQ(LGKIN+1)

Header	:	+1 : Total number of data (header included) +2 : Number of words in the header +3 : Number of words per track +4 : Number of tracks +5 : Free word
Data	:	for track IT: IPT=LGKIN+IQ(LGKIN+2)+(IT-1)*IQ(LGKIN+4) IPT+1: X component of the particle momentum IPT+2: Y component of the particle momentum IPT+3: Z component of the particle momentum IPT+4: particle energy IPT+5: GEANT particle id IPT+6: particle mass 1 to 6 are copied inside XNGKIN IPT+7: flag for charmed particles and tau decay (see vers. 45 of LEPTO) copied inside NGMNAT IPT+8: Position in the LUJET common

Bank : SVTX	Simulated vertex bank

Format	:	1I 3F
Up	:	LSEVT
Origin	:	LQ(LSEVT-3)
Next	:	LQ(LSEVT)
Structure	:	Total Number of Links : 1 Number of stru. Links : 1 Number of data Words : 4 -1 : Link to first track below this vertex
Data	:	+1 : Number of track below this vertex / / / / / (=0 if end vertex) +2 : X position of the vertex +3 : Y position of the vertex +4 : Z position of the vertex

Bank : LEPT	LEPTO event

Format	:	10I 10F
Up	:	LLUJT
Origin	:	LQ(LLUJT-1)
Next	:	0

Structure	:	Total Number of Links : 0
		Number of stru. Links : 0
		Number of data Words : 15

Data	:	+1 +1 LST(21) error
	:	+2 LST(22) chosen target (1=p,2=n)
	:	+3 LST(23) process simulated
	:	+4 LST(24) QCD order
	:	+5 LST(25) flavor struct
	:	+6 LST(27) split of non-trivial remnant
	:	+7 0 free
	:	+8 0 free
	:	+9 0 free
	:	+10 PARL(25) α_s in current event
	:	+11 PARL(26) Λ used in last PDF call
	:	+12 PARL(27) present value of ycut for first order qcd
	:	+13 X x-bjorken
	:	+14 Y y
	:	+15 W2 W**2
	:	+16 Q2 Q**2
	:	+17 U energy transfer nu
	:	+18 0.0 free
	:	+19 0.0 free
	:	+20 0.0 free

6 How to install the LEPTO6 and KORALZ libraries

The LEPTO6 and the KORALZ libraries are needed in order to use the NEGLIB. You will find below the instruction to install these. For the moment, only UNIX machines (in fact ALPHA, HP and SUNs) are supported.

This installation is not necessary for end users. Ask your system manager to see if the libraries are available.

6.1 To install the LEPTO/KORALZ libraries (only for special users)

The LEPTO 6.1 and the KORALZ generators have been customized for the NOMAD experiment and have been placed in a single library. To install it, just type the following command (r1 means the NOMAD release 1 of LEPTO and KORALZ):

```
cmz -install lepto61r1
```

This will install the library in your directory creating and compiling it:

```
 axnd05.cern.ch> cmz -install lepto61r1.cmz

 **** CMZ Code Manager version  1.45/19  (14/03/94) ****

 Installation on UNIX machine

 Number of DECKS   written:            1
 Number of RECORDS written:           20

 Number of DECKS   written:            1
 Number of RECORDS written:           24
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%% Run do_install.csh to set up environment variables %%%%%
%%%%% and continue installation %%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
 All connected CMZ files are now released

 **** CMZ normal termination ****
```

To finish the installation, use the following command:

```
do_install.csh
```

This script will compile and link your specific copy of the library.

7 How to install the NEG50X library

As an example you will find below the copy of the sript made by the installation procedure and existing into the NEG500.CMZ file in PATCH $HELP deck EXUNIX. If you have any such script to run on none UNIX platforme please send it to me in order to incorporate it for next release.

7.1 To install the library (only for special users)

To install the library, just type the following command:

```
cmz -install $NOMAD_NEWCMZ/neg501
```

This will extract two files (if operating on UNIX machines):

```
do_install.csh - the script that runs the creation of the library
set_env_neglib.csh - the script that sets environment variables
```

Running the first script installs the library in your directory by creating and compiling it (the output is libneg501.a). It also extracts a new file:

```
make_neg501 - the script that compile and runs neglib
```

Note that the corrections files to neglib are not used when making the library but rather when compiling the actual neglib program, such that the do_install.csh step does not need to be repeated frequently.

7.2 Compiling and running the neglib

To compile the latest corrections and run the generator, use the following command:

```
make_neg501
```

This script will compile and link your specific copy of the generator (using the standard library and any official or personnal corrections). The program is run automatically.

7.3 Running the official neglib

To run the official neglib stored in the $NOMAD_BIN directory, one should use the script run_neg_501 found in the $NOMAD_RUN directory typing the following command:

```
$NOMAD_RUN/run_neg501
```

This script will create a standard set of datacards if they do not already exist in your directory and will run the official neglib. Note that this way of running cannot guarantee that the latest corrections (provided by correction cradles) are included in the program.

7.4 Standard datacards

If the file neg501.datacard does not exist, it will be created with standard datacard when the run_neg501 script is run. If the file already exists, it is untouched to preserve your personal corrections. An example of datacards is shown below:

```
LIST
C +-------------------------------------------------------------------+
C +                                                                   +
C +             DATACARD TO RUN THE NEGLIB CMZ LIBARY +
C +                                                                   +
C +-------------------------------------------------------------------+
C
RUNRANGE 100010 100010
TRIGGERS 1 1000
C the GRNDMQ sequence
INITSEED 1
OUTPUT 1
C
C
C  >>> DECAY DATACARDS
C
C ......................... list of numerous of neutrinos
C               12 = NUe
C               14 = NUmu
C               16 = NUtau
C
LEPTON   16
INTERACT 2
C ............ Tau decay modes :
C ............ Electron
C MAKTAUEL 1
C ............ Muon
MAKTAUMU 1
C............. Pion
C MAKTAUPI1 1
C............. Rho
C MAKTAURHO 1
C............. a1
C MAKTAUA1 1
C............. K1
C MAKTAUK1 1
C............. Ks
C MAKTAUKS 1
C.....................................
C MAKDALIT 1
C MAKDALMX 1
```

```
C MAKDALAS 1 0.20
C
C
C  >>> GENERATOR DATACARDS
C
HARDSCAT 0
C ELEPTCUT 10. 50.
ELEPTCUT 6.5 450.
C INITSEED 12345
C
C  >>> BEAM DATACARDS
C
XFIDUCUT 140.
YFIDUCUT 140.
RFIDUCUT 282.8
BEAMEXTN 0
C
C ..................... HIT THE MAGNET (COIL, C'S and/or I's)
C
C      1= hit in magnet C's
C      2= hit in magnet coil forward region
C      3= hit in magnet I's (Fe/Air mixture as in MIC)
C      4= hit in magnet I's (Fe plates as in VET)
C      5= not used (kept for backward compatibility)
C
HITINMGC 0 0 0 0 0
C
C  >>> DEBUG
C
PRINTING 3
BKHISTOS 9
EOF
```