

MOFIA 2.0 Manual

<http://e614slow.triumf.ca/e614>

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Namelists

- Namelist definition & commands
 - A collection of variables that can be referenced by the group name.
 - Define groups referring to a set of cuts or settings for a detector subsystem, etc.
 - Example:
 - `Namelist /DCset/ FirstPlaneDC, LastPlaneDC`
 - `READ(*,NML = DCset)`
 - `WRITE(*,NML=DCset)`
- `source/mainf90/namelist_mod.f90`
 - Contains namelist definitions
 - Code to read them in
 - Code to print out their values and descriptions
- To access the namelists from a given subroutine/module
 - `USE namelists_mod.f90`
 - Values for the namelist variables can be assigned from the MOFIA command line or read in from a command file (*.kcm file).

Namelists Description

MOFIA> show namelist

NAMELIST DESCRIPTION

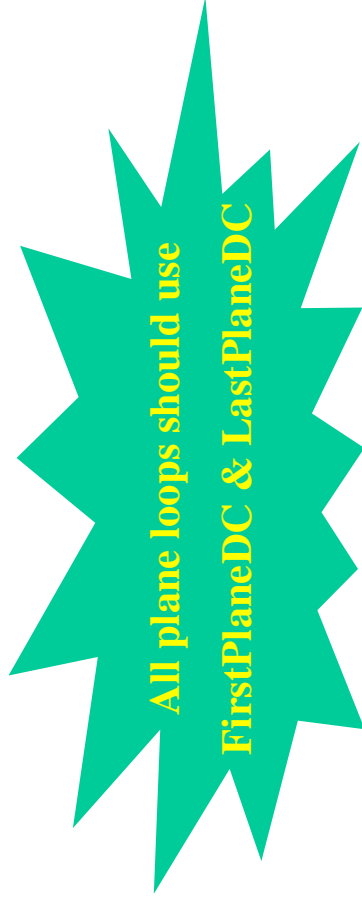
BATCH	BATCH LOG control parameters	SCFLAGS	SCintillator FLAGS
HCUTS	DPLOT user cuts	KFLAGS	MOFIA execution control flags
DCSET	Drift Chamber SETings	PRCNTL	Print control flags
PCSET	Proportional Chamber SETings	GLOBAL	GLOBAL settings
HIST	HISTogramming parameters	QOD	QOD Monitor params
PHOTO	PHOTO flags	STRSET	STR SETings
DCCFLAGS	Drift Chamber Calibration FLAGS	KalmanCuts	Kalman Tracking Cuts
SCSET	SCintillator SETings	Alignment	Alignment parameters
SCCUTS	SCintillator CUTS	FirstGuess	First Guess parameters
RFCUTS	RF CUTS	HelixFit	HelixFit parameters
DCCUTS	Drift Chamber CUTS	TimeZero	Time zero fit settings
PCCUTS	Proportional Chamber CUTS	Efficiency	Efficiency settings
KPUNIT	MOFIA print units	REZS	REZolutionS controls

Namelists Contents & Assignment

- **Displaying contents:**
MOFIA> show name DCSET

NameList DCSET: Drift Chamber
SETings

FirstPlaneDC = 1 (dflt = 1): First
DC plane
LastPlaneDC = 44 (dflt = 44): Last
DC plane



- **Making assignments:**
MOFIA> namelist DCset
Enter Drift Chamber SETings:

&NLDCSET
FirstPlaneDC = 1,
LastPlaneDC = 44,
/
LastPlaneDC = 22
&
MOFIA>
- **Making assignments:**
MOFIA> namelist DCset
Enter Drift Chamber SETings:

LastPlaneDC = 22
&
MOFIA>
- **Making assignments:**
MOFIA> namelist Dcset LastPlaneDC = 22
MOFIA>

MOFIA Commands

- **Assigning the input file:**
MOFIA> MTIN "argument"
 - **Assign the input file/device to argument.**
 - **Example: MTIN "/twist/data3/datalinks/2100/run02121.ybs**
- **Analyzing data:**
MOFIA> analyze "argument"
 - **Start the analysis process. The number of events to be analyzed may be used as an argument**
 - **Example analyze 1000 analyzes 1000**
 - **If no argument, analyzes the entire file**
- **Analyzing a specific event:**
MOFIA> event "argument"
 - **Move FORWARD to the event specified by "argument" and analyze it.**
 - **Example event 237 moves forward to event 237 and analyzes it.**
- **Displaying information:**
MOFIA> show "argument"
 - **Shows the current contents of "argument".**
 - **Examples: show MTIN**
 - **If no argument is provided, a listing of possible arguments is displayed.**
- **Exiting MOFIA:**
MOFIA> exit: Exit MOFIA
- **Help:**
MOFIA> help
 - **Run the MOFIA help facility.**

Namelists Contents Description

MOFIA> show name hist

NameList HIST: HISTogramming parameters

nEVtprocessed = -1 (dflt = -1,OFF): Write hists every nEVtprocessed events
FillRawHist = T (dflt = T) : Fill raw histograms
FillHist = T (dflt = T) : Fill histograms after initial filtering
FillTrackHist = T (dflt = T) : Fill tracking histograms
FillPatternHist = T (dflt = T) : Fill pattern recognition histograms
PulsHistToggle = T (dflt = F) : Fill histograms with random pulser data(T) or normal triggers(F)
FillPhysicsHist = T (dflt = T) : Fill physics histograms
FillFirstGuessHist = F (dflt = T) : Fill helix first guess histograms
FillXtalkHist = T (dflt = T) : Fill cross talk histograms
PlaneHists = T (dflt = T) : Generate individual plane histograms
Globalmem_toggle = T (dflt = T) : Turn Global Memory Section on (T) /off (F)
TDC_MIN = 0. (dflt = 0.) : Lower limit on TDC spectra
TDC_MAX = 6000. (dflt = 6000.) : Upper limit on TDC spectra
Raw_XMI_tdcslot = 0. (dflt = 0.) : Lower limit on RAW TDC plots
Raw_XMA_tdcslot = 30000. (dflt = 30000.) : Upper limit on RAW TDC plots
Raw_NX_tdcslot = 3 (dflt = 3) : Number of RAW x Channels for TDC plots

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MOFIA> show name DCSET

NameList DCSET: Drift Chamber SETtings

FirstPlaneDC = 1 (dflt = 1): First DC plane

LastPlaneDC = 44 (dflt = 44): Last DC plane

MOFIA> show name PCSET

NameList PCSET: Proportional Chamber SETtings

FirstPlanePC = 1 (dflt = 1): First PC plane

LastPlanePC = 12 (dflt = 12): Last PC plane

MOFIA> show name DCCFLAGS

NameList DCCFLAGS: Drift Chamber Calibration FLAGS

FindPlanePos = F (dflt = F) : Find plane positions

FindWirePos = F (dflt = F) : Find wire positions

FindPlaneRot = F (dflt = F) : Find plane rotations

FindTDC0 = F (dflt = F) : Find TDC time zero

FindResolution = F (dflt = F) : Find drift chamber resolution

FindbeamAngle =

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MOFIA> show name dccuts

NameList DCCUTS: Drift Chamber CUTS

DC_MAXTDC_CUT = 6000.00 (dflt = -1, OFF): Max TDC channel cut
DC_MINTDC_CUT = 0.00 (dflt = -1, OFF): Min TDC channel cut
DC_MAXWTDC_CUT = 150.00 (dflt = -1, OFF): Max TDC width cut
DC_MINWTDC_CUT = -1.00 (dflt = -1, OFF): Min TDC width cut
DC_MAX_HITS_IN_PLANE = -1 (dflt = -1, OFF): Max hit wires in plane cut
DC_MIN_PLANES = -1 (dflt = -1, OFF): Min planes cut
DC_XTALK_WCUT = -1.00 (dflt = -1, OFF): Min cross talk TDC width cut
DC_NOISE_WCUT = -1.00 (dflt = -1, OFF): Min noise TDC width cut

MOFIA> show name pccuts

NameList PCCUTS: Proportional Chamber CUTS

PC_MAXTDC_CUT = 6000.00 (dflt = -1, OFF): Max TDC channel cut
PC_MINTDC_CUT = 0.00 (dflt = -1, OFF): Min TDC channel cut
PC_MAXWTDC_CUT = 150.00 (dflt = -1, OFF): Max TDC width cut
PC_MINWTDC_CUT = -1.00 (dflt = -1, OFF): Min TDC width cut
PC_MAX_HITS_IN_PLANE = -1 (dflt = -1, OFF): Max hit wires in plane cut
PC_MIN_PLANES = -1 (dflt = -1, OFF): Min planes cut
PC_XTALK_WCUT = -1.00 (dflt = -1, OFF): Min cross talk TDC width cut
PC_NOISE_WCUT = -1.00 (dflt = -1, OFF): Min noise TDC width cut

MOFIA> show name scset

NameList SCSET: SCintillator SETTINGS

S1_PEAK = 1000.00 (dflt = 1000) : Scintillator 1 peak position
S2_PEAK = 1000.00 (dflt = 1000) : Scintillator 2 peak position
S3_PEAK = 1000.00 (dflt = 1000) : Scintillator 3 peak position

MOFIA> show name sccuts

NameList SCCUTS: SCintillator CUTS

S1_MAX_NHITS = -1 (dflt = -1, OFF): Scint 1 max number of hits cut
S2_MAX_NHITS = -1 (dflt = -1, OFF): Scint 2 max number of hits cut
S3_MAX_NHITS = -1 (dflt = -1, OFF): Scint 3 max number of hits cut
S1_WIDTH_CUT = -1.00 (dflt = -1, OFF): Scint 1 peak width cut
S2_WIDTH_CUT = -1.00 (dflt = -1, OFF): Scint 2 peak width cut
S3_WIDTH_CUT = -1.00 (dflt = -1, OFF): Scint 2 peak width cut
S1_MAX_TDC = *** (dflt = -1, OFF): Scint 3 peak width cut**
S2_MAX_TDC = *** (dflt = -1, OFF): Scint 1 max TDC channel cut**
S3_MAX_TDC = 2500.00 (dflt = -1, OFF): Scint 2 max TDC channel cut
S1_MIN_TDC = -1.00 (dflt = -1, OFF): Scint 1 min TDC channel cut
S2_MIN_TDC = -1.00 (dflt = -1, OFF): Scint 2 min TDC channel cut
S3_MIN_TDC = -1.00 (dflt = -1, OFF): Scint 2 min TDC channel cut
S1_MAX_ADC = 5000.00 (dflt = -1, OFF): Scint 1 max ADC channel cut
S2_MAX_ADC = 5000.00 (dflt = -1, OFF): Scint 2 max ADC channel cut
S1_MIN_ADC = -1.00 (dflt = -1, OFF): Scint 1 min ADC channel cut
S2_MIN_ADC = -1.00 (dflt = -1, OFF): Scint 2 min ADC channel cut

MOFIA> show name scflags

NameList SCFLAGS: SCintillator FLAGS

S1_signal = T (dflt = TRUE) : Require a signal in S1

S2_signal = T (dflt = TRUE) : Require a signal in S2

S3_signal = T (dflt = TRUE) : Require a signal in S3

MOFIA> show name kalmancuts

NameList KalmanCuts: Kalman tracking cuts

ChiDiffCluster (def = 1.E-02) = 0.10E-01 Chi2 convergence level for cluster iteration

ChiDiffTime (def = 1.E-04) = 0.10E-03 Chi2 convergence level for timing iteration

Chi2sCutCluster (def = 1.E05) = 0.10E+06 Chi2 cut for cluster iteration

Chi2sCutTime (def = 1.E05) = 0.10E+06 Chi2 cut for timing iteration

MaxIterateCluster (def = 50) = 50 Maximum number of iterations for cluster fit

MaxIterateTime (def = 50) = 50 Maximum number of iterations for timing fit

EnableKalman (def = TRUE) = T Execute Kalman filtering code

SwitchLR = (def = TRUE) = T Attempt reducing the value of Chi2 by switching left and right

NoiseExcludeMax (def = 2) =

MOFIA> show name strset

use_cos_increments (def= T) T

str_angle_inc (def= 0.05) 5.000000E-02

str_upper_angle_limit (def= 85. degrees) 85.0000

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MOFIA> show name scflags

NameList SCFLAGS: SCintillator FLAGS

S1_signal = T (dflt = TRUE) : Require a signal in S1

S2_signal = T (dflt = TRUE) : Require a signal in S2

S3_signal = T (dflt = TRUE) : Require a signal in S3

MOFIA> show name efficiency

NameList Efficiency: Efficiency calculation parameters

RadiusCutDense = 5.000 (dflt = 15 cm): DC dense stack radius cut

RadiusCutSparse = 15.000 (dflt = 15 cm): DC sparse stack radius cut

CellCut = 2 (dflt = 2): Max number of adjacent cells to investigate on each side of the cell expected to have a hit

CellCut = 10 (dflt = 10): Minimum number of hit planes

FindEff = F (dflt = .FALSE.): Calculate chamber efficiency

MOFIA> show name rfcuts

NameList RFCUTS: RF CUTS

RF_MIN_TDC = -1.00 (dflt = -1, OFF) : RF min TDC cut

RF_MAX_TDC = -1.00 (dflt = -1, OFF) : RF max TDC cut

MOFIA> show name global

BField (def = 0.) 0.000000

UnpackMC = F

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MOFIA> show name rezs

NamesList REZS: Resolutions

nEventsMax = 5000 (dflt = 5000): # Events per Resolution Iteration.
MinHistFitEntries = 1000 (dflt = 1000): # histogram entries necessary to do fit.
nResidualBins = 300 (dflt = 300): # Bins in residual histograms.
MinResidualValue = 0.30 (dflt = -0.3): Min histogram channel (cm).
MaxResidualValue = 0.00 (dflt = 0.3): Max histogram channel (cm).
calcResidualMethod = ***** (dflt = 3): Residual calculation method.**
1=> Gaussian Fit to residual histograms.
2=> SquaredSum calculation.
3=> FWHM calculation.
peakTOL =

MOFIA> show name alignment

NamesList Alignment: Alignment parameters

nEventsPlane (def = 10000) = 10000 Total number of events per iteration for calculating plane positions
nEventsWire(def = 100000) = 100000 Total number of events per iteration for calculating wire positions
AlignAngleU (def = 0.0) = 0.000 Angle of the U planes transverse-alignment line with respect to the beam
AlignAngleV (def = 0.0) = 0.000 Angle of the V planes transverse-alignment line with respect to the beam
FixPlanes (def = FALSE) = F Choose a line for transverse alignment defined by any 2 U and 2 V planes
FixedPlane1 (def = 1) = 1 Plane number for one of the four fixed planes used to define the alignment line
FixedPlane1 (def = 1) = 2 Plane number for one of the four fixed planes used to define the alignment line
FixedPlane1 (def = 1) = 7 Plane number for one of the four fixed planes used to define the alignment line
FixedPlane1 (def = 1) = 8 Plane number for one of the four fixed planes used to define the alignment line

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MOFIA Functions

MOFIA> fun

Description of FUNC:

- 1 Turn ON printing for list of wire HITS
- 2 Turn OFF printing " "
- 3 Turn ON printing for TDCUNP debugging
- 4 Turn OFF printing " "
- 5 Write HBOOK histograms to disk
- 6 Print geometry files
- 7 Print mapped variables for current event
- 9 Reset all histograms
- 10 Initialize cross talk counters
- 11 Print cross talk counters
- 12 Print efficiency counters
- 13 Print residuals
- 14 Initialize efficiency counters
- 20 Determine and output t_0

Example: MOFIA> fun 12

Command Files

- **Mofia> @filename**
 - Execute the command file specified by filename.
 - Command files may include any MOFIA command that may otherwise be issued at the MOFIA command line.
 - If the file extension is not specified, the extension .kcm is assumed. Command files may also be nested (so that a command file may call another) up to 10 layers deep
- To keep a record of cuts/settings in mofialog.dat
 - show namelist “name”
 - make assignments to namelist variables
 - show namelist “name”

Calibration File Manager

- CFM allows the user to associate run numbers with calibration files.
- CFM> show types

1:DC_PPC	Plane Position Corrections	10:DC_WZC	DC Wire Z position Corrections
2:DC_WPC	Wire Position Corrections	11:DC_WRC	DC Wire Rotation Corrections
3:DC_RES	DC Resolution	12:DC_STR	DC Space Time Relations
4:DC_PRC	Plane Rotation Corrections	13:PC_T0	PC Time Zero
5:DT_GEO	Detector Geometry	14:DC_T0	DC Time Zero
6:FBC1_MAP	Fast Bus Map, Crate 1	15:SC_T0	SC Time Zero
7:FBC2_MAP	Fast Bus Map, Crate 2	16:PC_ADC	PC ADC Calibrations
8:FBC3_MAP	Fast Bus Map, Crate 3	17:SC_ADC	SC ADC Calibrations
9:DC_PZC	DC Z Position Corrections		

Calibration File Manager (CFM)

CFM>show runs

Runs	Total	CFD Set
1 :	4	1
5 :	2	2
7 :	14	3
21 :	479	--
500 :	800	4
801 :	922	5
923 :	924	6
925 :	932	7
933 :	955	8
956	1	9
957 :	1311	8
1312 :	1500	12
1501 :	1693	--
1694 :	2501	13
2502 :	2658	14
2659 :	3158	15
3159 :	3226	16
3227 :	3231	5
3232 :	5000	1769
18		

CFM>show set 17

 CFD Set Run Total Run Range

 17 5 3227: 3231

CFD Names:

DC_PPC.00003 DC_STR.00010
 DC_WZC.00003 FBC2_MAP.00018
 PC_T0.00004 DC_PRC.00003
 DC_T0.00006 DT_GEO.00024
 FBC3_MAP SC_ADC.00001
 DC_PZC.00003 DC_WPC.00003
 FBC1_MAP.00018 PC_ADC.00001
 SC_T0.0001 DC_RES.00004
 DC_WRC.00003

- All CFM files sit in the directory defined by \$CAL_DB
 - cd \$CAL_DB
- All files are in ascii
 - ls dc_ppc.00003

Over-riding CFM

- MOFIA will use the calibration files associated with a run number as specified in CFM
- To over ride CFM (i.e.use a different calibration file) at the MOFIA command line enter

MOFIA> use dc pcc “testfile.dat”

- As usual, can do this in the command file as well

Example of a command file

```
use dc str "/home/e614/e614soft/caldb/caldb_ascii/dc_str.00010"
use pc t0 "/home/e614/e614soft/caldb/caldb_ascii/pc_t0.00004"
use dc ppc "dc_ppc.fall"
use dc res "dc_res.fall"

set dc/cuts on
set pc/cuts off
set sc/cuts off
show flags

namelist DCCFLAGS
FindResolution = .FALSE.
FindPlanePos = .FALSE.
FindWirePos = .FALSE.
FindPlaneRot = .FALSE.
FindTDC0 = .FALSE.
&
show name DCCFLAGS

namelist hist
NEVTPROCESSED = 10000
TDC_MIN = -100
TDC_MAX = 900
PlaneHists = .TRUE.
FillRawHist = .TRUE.
FillHist = .TRUE.
FillPatternHist = .TRUE.
FillFirstGuessHist = .TRUE.
FillTrackHist = .TRUE.
FillPhysicsHist = .TRUE.
FillXtalkHist = .TRUE.
&
show name hist

name dcuts
DC_MAXTDC_CUT = 800.
DC_MINTDC_CUT = 0.
DC_MAXWTDC_CUT = -1.
DC_MINWTDC_CUT = -1.
DC_MAX_HITS_IN_PLANE = 1
DC_MIN_PLANES = 14
DC_XTALK_WCUT = 100.
DC_NOISE_WCUT = 100.
&
show name dcuts

!PC_MAXTDC_CUT = 100000.
!PC_MINTDC_CUT = -100000.

name pccuts
PC_MAXWTDC_CUT = -1.
PC_MINWTDC_CUT = -1.
PC_MAX_HITS_IN_PLANE = 3
PC_MIN_PLANES = 2
PC_XTALK_WCUT = 0.
PC_NOISE_WCUT = 0.
&
show name pccuts

name dcset
FirstPlaneDC = 23
LastPlaneDC = 44
&
show name dcset
```