CDF/DOC/CDF/CDFR/5404
Version 1.0
October 8, 2000

List of 'Banks' in the PAD Format

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Abstract

We propose the list of banks for the PADs in Run II, to be considered by the Physics Groups. We also list banks that were included in Run I but will *not* be present in Run II.

1 The Model of Data Access

Fast, reliable, and reproducible access to datasets is essential to extracting good physics from our data. The different physics groups face different problems; however we all need access to a large amount of the data to calibrate and align the detector, and to develop new techniques. We describe the proposed model of access to the data[1].

The model is described by the following assumptions:

1. As agreed in 1998-9, all PAD datasets contain the same banks and have identical structure.

2. The goal for the PAD size is smaller than 50 kbytes/event.

3. Each Physics group is free to define its smaller format, derived from the PADs, to make more tractable datasets for analysis. (Cooperation among groups isn't discouraged, however.)[2]

4. The variables that are to be stored in the smaller SDF format are accessible from the PADs by standard methods supported by the collaboration. These can be variables or methods inside the PAD objects, or, in many cases, are supplied by standard routines that will be in the appropriate libraries.

5. There will not be duplicated information in the PADS for the purpose of writing out SDF datasets. The SDF information, written out in either EDM-based SDF (example: mini-PADs) or not EDM-based SDF (example: Root Ntuple), is the responsibility of the Physics Groups and/or the individual users (this implies an extra coding responsibility on the Physics Groups). It will be the responsibility of the Physics Groups to maintain the SDF datasets, while it will be the responsibility of the offline group to provide and maintain accessors or global functions at the PAD level. The production PAD format is expected to be stable, and adding variables to be accessed is expected to happen only at the SDF level.

6. The Trigger Working Group is responsible for allocations resources for the creation and storage of group datasets.

[1]This document will evolve as we start using PADs. Treat it as a 'living document'.

[2]We will generically call these smaller formats secondary data formats (SDF) here for brevity.

2 List of 'Banks' in the Run II PAD Format:

Table1 lists the planned format of the PAD datasets. This is still evolving; please help us fill it in. In particular we need to know the size of each object, both for $b\bar{b}$ events (the majority of our events will be two-track triggers), and for $t\bar{t}$ events, which are representative of high-p_T events.

Raw Data Bank(s)	PAD Object	Status	Bbbar Bytes	Ttbar Bytes	Creator	Comment
Headers						
LRIH	LRIH_StorableBank	Exists	142	142		LRID
EVCL	EVCL_StorableBank	Exists	118	118		EVCL
BFLD	BFLD_StorableBank				Lewis	B-field
Compressed Corrected Data						
QTOW	CalData	Exists			Savard	Compressed TOWE
CESD	CESQ	Exists			Riveline	Central strips
PESD	PESQ	Exists			Tannenbaum	Plug strips
CPRD	CPRQ	Almost			Moulik	Preradiator
CCRD	?				ANL???	Crack chambers
SIXD	SiClusterSet	Exists			Boudreau	Si clusters
COTD	COTQ	Almost		23K	Tamburello	Compressed COTD
TOFD	TOFD_StorableBank	Exists	240		Paus	Time of flight
CLCD	CLCQ	Exist			Song	Luminosity (A&T)
LUMD	CLLD	Exists			Song	Inst. Luminosity
CMUD	CMUD_StorableBank	Exists			Dagenhart	CMUD
CMPD	CMPD_StorableBank	Exists			Dagenhart	compressed CMPD
CSPD	CSPD_StorableBank	Exists			Dagenhart	CMP scint.
CMXD	CMXD_StorableBank	Exists			Dagenhart	compressed CMXD
CSXD	CSXD_StorableBank	Exists			Dagenhart	CMX scint.
BMUD	BMUD_StorableBank	Exists			Dagenhart	IMU barrel chambers
BSUD	BSUD_StorableBank	Exists			Dagenhart	IMU barrel scint.
TSUD	TSUD_StorableBank	Exists			Dagenhart	IMU toroid scint.
TFRD	TFRD_StorableBank	Exists			Rolli	FRED summary
TL1D	TL1D_StorableBank	Exists			Rolli	L1 scalers
TL2D	TL2D_StorableBank	Exists			Rolli	L2
TL3D	TL3D_StorableBank	Exists			McFarland	L3 bits
TAGQ	TL3B_StorableBank	Exists			Chung	Trigger names
Compressed Reconstructed Objects						
VTXQ	VertexColl				Wenzel/Stadie	Vertices
TRKQ	CdfTrackColl	Exists			Tamburello	Tracks
JETS	CdfJetColl	Exists			Savard	R=0.4;0.7
ELES	CdfEmObjectColl	Exists			Wagner	Electrons
MUOS	CdfMuonColl				Bloom	Muons
TAUS	CdfTauColl	Exists			Fedor/Pasha	Taus
TAGS	?				Yao/Petar	B-tags
METS	CdfMet	Exists			Savard	Missing Et

Table 1: List of reconstructed banks in PADS for Run II. The column labelled 'Raw Data Banks' is intended to help convey functionality, and is not to be taken literally: in a few cases (e.g. calorimeters) it refers to many raw data banks, and a single word has been used (e.g. QTOW) to describe multiple banks.

3 High Level Objects Inside the Pads

The notion of a High Level Object (HLO) has evolved in the past year. The present, and we hope final, conclusion is that there will not be another layer of objects inside the pads beyond the standard electron (CdfEMObject), muon, (CdfMuon), etc. objects. Instead, these objects will serve as the HLO's. The basic information will be encoded in these objects, and the detailed information we want to have access to, such as the fit parameters of the tracks, and even hits on or near the track, photomultiplier energies, etc., will be available through pointers to other objects. To ensure quality, there will be standard access routines to get this other information when working on PADs. These routines will be used by the Physics groups to make their BeyondPaddatasets to use for analysis.

This solution has the advantage that variables are not duplicated in the PADs, which are made for all datasets, and consequently should be kept short. It has the additional advantage that a large number of the variables we will want will be accessible; the limit is set only by having the access routines, not the inherent unavailability of the data in the dataset (a large fraction of the data are in the PADs). Lastly, it is flexible; one does not have to change the PAD format for the whole experiment to add a variable. The disadvantage are that to utilize the EDM in the BeyondPad world one has to create PAD style objects using the routines, although this would have to be done if the objects were to live inside the PADs.

As examples of how this looks, we include two of the specifications of quantities to be accessed in the electron and muon objects. Other examples are available on the HLO subpage of the Trigger Working Group, at http://www-cdf.fnal.gov/internal/upgrades/daq_trig/twg/hlo/hlo_home.html.

The first table, Global EET Electron/Photon Quantities, lists the variables related specifically to electrons (both high-Et and low-Et). The next table, Global Track Quantities, lists the quantities available for any track. A pointer in the electron quantities allows access to these for the electron track. The subsequent tables give the quantities that are accessible in each of the subsystems in turn as the particle moves radially out from the beamline. We remind the reader that these quantities are accessible at the PAD level; to store them in the BeyondPad formats they need to be accessed and written out.

3.1 Specification of the Electron Object as an Example

3.2 Global EET Electron/Photon Quantities

Transient Representation	Source	Trans. Size	Comment
Corrected E_T of the cluster Best-fit COT/ISL/SVX $\mathrm{p_T}$ E/p Ehad/Eem Lshr Chi-square of strip profile Chi-square of wire profile Calibrated $\mathrm{E_T}$ from strip profile Calibrated $\mathrm{E_T}$ from wire profile Track-strip Δz Track-strip Δx Track-Vertex matching: Δz Bit map of SVX/ISL/COT layer hits			
TOWE address of seed tower Region number (0 for CEM, 1 for Wplug, 2 for Eplug?) CES/PES Cluster Xlocal Centroid CES/PES Cluster Zlocal Centroid Cluster Eta (detector coordinates, Cal fit centroid) Cluster Phi Cluster Eta (event coordinates, Cal fit centroid) z-vertex used in calculating E_T (allows recalculating E_T)			
Et in cone with R = 0.4 (corrected for leakage, mult. int.) Et in cone with R = 0.7 (corrected for leakage, mult. int.) Number of tracks extrapolating to this cluster Number of tracks with ϕ_0, η_0 extrapolating to this cluster Track $\mathrm{p_T}$ in cone with R = 0.4 Track $\mathrm{p_T}$ in cone with R = 0.7 Track $\mathrm{p_T}$ pointing at em cluster $\mathrm{p_T}$ of 2nd highest track in cluster $\mathrm{E_T}$ of 2nd highest CES/PES cluster			
E_T in each of the 3(2) CEM cluster towers E_T in each of the 3(2) CHA cluster towers E_T in each of the 12(7) CEM border towers Corrected Pulse height in each of 6 (4) CEM cluster phototubes Corrected Pulse height in each of the 12(7) CEM border towers Lateral leakage iso correction Multiple interaction iso correction			
HTDC times			
Pointer to jet (cone = 0.4) containing EM cluster Pointer to jet (cone = 0.7) containing EM cluster			
Pointer to tracklist for highest $\mathrm{p_T}$ track Pointer to tracklist for 2nd highest $\mathrm{p_T}$ track Pointer to strip/wire list for highest $\mathrm{E_T}$ cluster Pointer to strip/wire list for 2nd highest $\mathrm{E_T}$ cluster Pointer to strip/wire list for closest $\mathrm{E_T}$ cluster Pointer to strip/wire list for 2nd closest $\mathrm{E_T}$ cluster			
FIDELE status Conversion status Cosmic filter status			
Uncorrected E_T of the cluster COT-only $\mathrm{p_T}$ COT-only x_0, y_0, z_0 COT-only Impact Parameter d_0			

3.3 Global Track Quantities

For each track *either* extrapolating to this cluster, or with ϕ_0, η_0 extrapolating to this cluster, we need the following:

Variable	Source	Size	Comment
XTRP track-list number			
Offline track-list number			
Best-fit Algorithm Identifier			
P_x, P_y, P_z, best-fit $\mathrm{p_T}$,P, best-fit			
x_0, y_0, z_0, best-fit			
ϕ_0,η_0^{event}, best-fit			
Charge, best-fit			
z_0, d_0(impact parameter), best-fit			
χ^2, DOF, best-fit			
Covariance matrix for Pt, d_0, ϕ best-fit			
SVX/ISL/COT bitmap of hits used in best-fit			
Residuals (axial and stereo) from best-fit			
P_x, P_y, P_z, COT-only			
$\mathrm{p_T}$,P, COT-only			
ϕ,η_{event}, COT-only			
Charge, COT-only			
z_0, d_0(impact parameter), ϕ_0, COT-only			
x_0, y_0, z_0, COT-only			
χ^2, DOF, COT-only			
Covariance matrix for Pt, d_0, ϕ COT-only			
SVX/ISL/COT bitmap of hits used in COT-only fit			
Residuals (axial and stereo) from COT-only			
Extrapolated $x_{local}, z_{local}, y_{local}, x_{slope}, z_{slope}, y_{slope}$ at COT outer SL			
Hits in $\pm 3°$ around track in SVX			
Hits in $\pm 3°$ around track in ISL			
Hits in $\pm$ 2 segments around track in COT			
Occupancy (hits/expected) in COT,ISL, and SVT			
number of COT axial superlayers hit by track; bitmaps			
number of COT stereo superlayers; bitmaps			
number of SVX, ISL hits; bit maps			
dE/dx truncated means, # of points, in SVX+ISL,COT			
Pointers to best CES strip/wire cluster matches to track (2)			
Pointers to 2nd best CES strip/wire cluster matches to track (2)			
Pointers to best CPR strip/wire cluster matches to track (2)			
Pointers to 2nd best CPR strip/wire cluster matches to track (2)			
Pointers to CMU/CMX/CMP stubs with best match to track (3)			
Pointers to CMU/CMX/CMP stubs with 2nd best match to track (3)			
Pointer to closest vertex in vertex list			
Pointer to 2nd closest vertex in vertex list			
$\mathrm{p_T}$ attached to closest vertex			
$\mathrm{p_T}$ attached to 2nd closest vertex			
# of tracks attached to closest vertex			
# of tracks attached to 2nd closest vertex			
$z_0 - z_{vertex}$, closest vertex			
$z_0 - z_{vertex}$, 2nd closest vertex			
Class of closest vertex			
Class of 2nd closest vertex			

3.4 SVX System Quantities

Transient Representation	Source	Trans. Size	Comment
SVX barrel, wedge, channel identifier			
Extrapolated xlocal, zlocal, xslope, zslope at each layer	Function Call		
Bit map of layer use			
Hits used in track in each layer			
Residuals $(r - z, \phi)$ from best-fit			
Hits in $\pm 5(?)^{\circ}$ around the track in each layer			
Closest SVX/ISL Stub			
2nd Closest SVX/ISL Stub			
3rd Closest SVX/ISL Stub			
dE/dx layer-by-layer			

3.5 ISL System Quantities

Transient Representation	Source	Trans. Size	Comment
ISL barrel, wedge, channel identifier			
Extrapolated xlocal, zlocal, xslope, zslope at each layer	Function Call		
Bit map of layer use			
Hits used in track in each layer			
Residuals from best-fit			
Hits in $\pm 5(?)^{\circ}$ around the track in each layer			
Closest SVX/ISL Stub			
2nd Closest SVX/ISL Stub			
3rd Closest SVX/ISL Stub			
dE/dx layer-by-layer			

3.6 COT System Quantities

Transient Representation	Source	Trans. Size	Comment
Extrapolated xlocal, zlocal, xslope, zslope at each layer	Function Call		
Bit map of layer use			
Hits used in track in each layer			
Hits in $\pm 5(?)^{\circ}$ around the track in each layer			
dE/dx layer-by-layer			

3.7 TOF quantities

Transient Representation	Source	Trans. Size	Comment
For the (each) counter struck by the track:			
TOF Counter Identifier			
Corrected Pulse Heights (2)			
Corrected Times (2)			
Corrected t_0 from TOF 2-tube average			
Corrected z_{tof} from TOF 2-tube diff			
Particle velocity β			
Uncertainty on β $\Delta\beta$			
Distance to the low-phi edge of the counter			
Extrapolated track xlocal, zlocal, xslope, zslope at TOF			

3.8 CPR quantities in CEM cluster

Transient Representation	Source	Trans. Size	Comment
Number of clusters in strip chambers in cluster towers			
For up to N (could be all) clusters: Energy of strip cluster Z position of cluster from strip chambers Chi-square of strip profile Number of strips above threshold in cluster Number of clusters in wire chambers For up to M (could be all) clusters: Energy of wire cluster Phi position of cluster from wire chambers Chi-square of wire profile Number of wires above threshold in cluster			
Extrapolated track xlocal, zlocal, xslope, zslope at CES/PES Strip PH's in $\pm$ 5 strips (11 total) around the track Wire PH's in $\pm$ 5 wires (11 total) around the track	Function Call		

3.9 CEM/CHA System Track-Seeded Quantities

Transient Representation	Source	Trans. Size	Comment
Extrapolated xlocal, zlocal, xslope, zslope at CEM Extrapolated xlocal, zlocal, xslope, zslope at CHA TOWE address of tower where track 'entered' calorimeter TOWE address of tower where track 'exited' calorimeter (CMU radius) path length in each of the CEM towers traversed by track path length in each of the CHA towers traversed by track z position of vertex used in calculating $\mathrm{p_T}, \mathrm{E_T}$ (allows recalculating)	Function Call Function Call		
pointer to jet (cone = 0.4) containing track pointer to jet (cone = 0.7) containing track pointer to electron/photon containing track			
E_T in each of the CEM towers traversed by track E_T in each of the CHA towers traversed by track E_T in each of the CEM towers bordering the cluster E_T in each of the CHA towers bordering the cluster			
EM Et in cone with R = 0.4 (corrected for leakage, mult. int.) HaD Et in cone with R = 0.4 (corrected for leakage, mult. int.) EM Et in cone with R = 0.7 (corrected for leakage, mult. int.) Had Et in cone with R = 0.7 (corrected for leakage, mult. int.) "Electron" Et in ELES cluster Mult. int. corrections (0.4,0.7) Leakage corrections (0.4,0.7)			
HTDC times			

3.10 CES System Quantities in CEM cluster

Seed-Tower Seeded Quantities			
Transient Representation	Source	Trans. Size	Comment
Number of clusters in strip chambers inside cluster towers			
For up to N (could be all) clusters: E-weighted Centroid z position of cluster from strip chambers 'Raw' E of strip cluster Fitted z position of cluster from strip chambers Fit E of strip cluster Fit Cluster Width Fit Chi-square 11 strip pulse-heights in cluster Number of strips above threshold in cluster			
Number of clusters in wire chambers			
For up to M (could be all) clusters: E-weighted Centroid ϕ position of cluster 'Raw' E of wire cluster Fitted ϕ position of cluster Fit E of wire cluster Fit Cluster Width Fit Chi-square 11 strip pulse-heights in cluster Number of strips above threshold in cluster			
Track-Seeded Quantities			
Extrapolated track xlocal, zlocal, xslope, zslope at CES/PES Strip PH's in ± 5 strips (11 total) around the track Wire PH's in ± 5 wires (11 total) around the track	Function Call		

3.11 Crack Chamber quantitites

If a track extrapolates to or near a crack-chamber, we need the following:

Transient Representation	Source	Trans. Size	Comment
Extrapolated xlocal, zlocal, xslope, zslope at CCS CCS Chamber Identifier Corrected CCS Pulse Height	Function Call		

3.12 Trigger quantities for ELE object

Transient Representation	Source	Trans. Size	Comment
L1 triggers passed by event L2 triggers passed by event L3 triggers passed by event			
Pointer to cluster in TL2D Cluster Block Pointer to isolation cluster in Isolation Cluster Block Pointer to track in XFT Track-list L2 # of towers L2 seed tower η L2 seed tower ϕ L2 Cluster EM Et L2 Cluster HAD Et L1 Pt L2 Pt (may be different if SVT)	TL2D bank TL2D bank TL2D bank TL2D bank Cluster Block TL2D bank Cluster Block TL2D bank TL2D bank TL2D bank XTRP block TL2D bank SVT block		
L3 Et L3 Pt			
SVT Pt SVT d0 SVT phi			

3.13 Filter Status Variables: Fiducial, Conversion, Cosmic, and Other Filters

Note: we will use electrons to calibrate losses due to the cosmic filter and muons for losses due to the conversion filter. We will want to know losses for other objects as well (such as τ's). We consequently want the outputs of standard filter modules available for all objects.

Transient Representation	Source	Trans. Size	Comment
FIDELE status: bit mask			
FIDCMU status: bit mask			
Cosmic filter: bit mask			
Cosmic filter: $\Delta\phi$ to btb track			
Cosmic filter: $\Delta\eta$ to btb track			
Cosmic filter: best-fit d_0			
Cosmic filter: best-fit t_0			
Cosmic filter: 'backwards' track η, ϕ, P_T			
Cosmic filter: 'backwards' track β			
Cosmic filter: 'backwards' track TOWE extrapolation			
Cosmic filter: 'backwards' track TOWE extrapolation $\mathrm{E_T}$			
Cosmic filter: HTDC times			
Pointer to closest vertex			
$z_0 - z_{vertex}$, closest vertex			
Conversion filter: Bit mask			
Conversion filter: Separation			
Conversion filter: Delta cotan-theta			
Conversion filter: Conversion r			
Conversion filter: Conversion phi			
Conversion filter: Conversion z			
Conversion filter: Charges of 2 tracks			
Conversion filter: Mass of 2 tracks			
Conversion filter: Pointer to 2nd track			
Conversion filter: CES $\mathrm{E_T}$ of 2nd track			
Conversion filter: CPR $\mathrm{E_T}$ of 2nd track			
Conversion filter: CEM cluster $\mathrm{E_T}$ of 2nd track			

3.14 Specification of the Muon Object as an Example

3.15 Global Muon Quantities

Transient Representation	Source	Trans. Size	Comment
p_T (best-fit)			
P_x, P_y, P_z (best-fit)			
Charge (best-fit)			
Event Eta (best-fit)			
Phi (best-fit)			
Detector Eta (best-fit)			
CMU/CMX/CMP bit map identifier			
Subsystem identifier in CMU			
Subsystem identifier in CMP			
Subsystem identifier in CMX			
Bit map of CMU/CMP/CMX layer hits			
Pointer to muon track			
Track x_0, y_0, z_0 (best-fit)			
Track z_0, d_0, ϕ_0 (best-fit)			
Track χ^2, DOF (best-fit)			
Track Covariance matrix for p_T, d_0, ϕ_0 (best-fit)			
Extrapolated x_{local}, z_{local}, xslope, zslope at CMU,CMX,CMP	Function Call		
Bit map of SVX/COT layer hits			
Track-Vertex matching: $\lvert\Delta z\rvert$			
Pointer to 2nd best trk			
Pointer to best CMU or CMX stub			
Pointer to second best CMU or CMX stub			
Pointer to best CMP stub			
Pointer to second best CMP stub			
Track-CMU/CMX $\lvert\Delta x\rvert$			
Track-CMU/CMX $\lvert\Delta z\rvert$			
Track-CMUP $\lvert\Delta x\rvert$			
Track-CMUP $\lvert\Delta z\rvert$			
Track-CMU/CMX $\lvert\Delta\theta_x\rvert$			
Track-CMU/CMX $\lvert\Delta\theta_z\rvert$			
Track-CMUP $\lvert\Delta\theta_x\rvert$			
Track-CMUP $\lvert\Delta\theta_z\rvert$			
Track-CMU/CMX $\chi^2(x, \theta_x)$			
Track-CMU/CMX $\chi^2(z, \theta_z)$			
Track-CMP $\chi^2(x, \theta_x)$			
Track-CMP $\chi^2(z, \theta_z)$			
Track-CMU/CMX/CMP Global Fit $\chi^2(x, \theta_x, z, \theta_z)$			
Track-CMU/CMX/CMP Global Fit Covariance Matrix			
TOWE address of tower where muon track entered calorimeter			
TOWE address of tower where muon exited calorimeter (CMU radius)			
Sum E_T^{em} in the EM towers traversed by muon			
Sum E_T^{had} in the HAD towers traversed by muon			
Et in cone with R = 0.4 (corrected for leakage, mult. int.)			
Et in cone with R = 0.7 (corrected for leakage, mult. int.)			
Track p_T in cone with R = 0.4			
Track p_T in cone with R = 0.7			
HTDC times			
TOF time			
CMS time			
Pointer to jet (cone = 0.4) containing track			
Pointer to jet (cone = 0.7) containing track			
Fiducial status			
Conversion status			
Cosmic filter status			
COT-only p_T			
COT-only x_0, y_0, z_0			
COT-only Impact Parameter d_0			

3.16 Global Track Quantities

For the high-p_T muon track, we need the following:

Variable	Source	Size	Comment
XTRP track-list number Offline track-list number Best-fit Algorithm Identifier			
P_x, P_y, P_z, best-fit p_T,P, best-fit x_0, y_0, z_0, best-fit ϕ_0,η_0^{event}, best-fit Charge, best-fit z_0, d_0(impact parameter), best-fit χ^2, DOF, best-fit Covariance matrix for Pt, d_0, ϕ best-fit SVX/ISL/COT bitmap of hits used in best-fit Residuals (axial and stereo) from best-fit			
P_x, P_y, P_z, COT-only p_T,P, COT-only ϕ,η_{event}, COT-only Charge, COT-only z_0, d_0(impact parameter), ϕ_0, COT-only x_0, y_0, z_0, COT-only χ^2, DOF, COT-only Covariance matrix for Pt, d_0, ϕ COT-only SVX/ISL/COT bitmap of hits used in COT-only fit Residuals (axial and stereo) from COT-only			
Extrapolated $x_{local}, z_{local}, y_{local}, x_{slope}, z_{slope}, y_{slope}$ at COT outer SL			
Hits in $\pm 3°$ around track in SVX Hits in $\pm 3°$ around track in ISL Hits in $\pm$ 2 segments around track in COT			
Occupancy (hits/expected) in COT,ISL, and SVT number of COT axial superlayers hit by track; bitmaps number of COT stereo superlayers; bitmaps number of SVX, ISL hits; bit maps			
dE/dx truncated means, # of points, in SVX+ISL,COT			
Pointers to best CES strip/wire cluster matches to track (2) Pointers to 2nd best CES strip/wire cluster matches to track (2) Pointers to best CPR strip/wire cluster matches to track (2) Pointers to 2nd best CPR strip/wire cluster matches to track (2) Pointers to CMU/CMX/CMP stubs with best match to track (3) Pointers to CMU/CMX/CMP stubs with 2nd best match to track (3)			
Pointer to closest vertex in vertex list Pointer to 2nd closest vertex in vertex list p_T attached to closest vertex p_T attached to 2nd closest vertex # of tracks attached to closest vertex # of tracks attached to 2nd closest vertex $z_0 - z_{vertex}$, closest vertex $z_0 - z_{vertex}$, 2nd closest vertex Class of closest vertex Class of 2nd closest vertex			

3.17 SVX System Quantities

Transient Representation	Source	Trans. Size	Comment
SVX barrel, wedge, channel identifier			
Extrapolated xlocal, zlocal, xslope, zslope at each layer	Function Call		
Bit map of layer use			
Hits used in track in each layer			
Residuals $(r - z, \phi)$ from best-fit			
Hits in $\pm 5(?)^\circ$ around the track in each layer			
Closest SVX/ISL Stub			
2nd Closest SVX/ISL Stub			
3rd Closest SVX/ISL Stub			
dE/dx layer-by-layer			

3.18 ISL System Quantities

Transient Representation	Source	Trans. Size	Comment
ISL barrel, wedge, channel identifier			
Extrapolated xlocal, zlocal, xslope, zslope at each layer	Function Call		
Bit map of layer use			
Hits used in track in each layer			
Residuals from best-fit			
Hits in $\pm 5(?)^\circ$ around the track in each layer			
Closest SVX/ISL Stub			
2nd Closest SVX/ISL Stub			
3rd Closest SVX/ISL Stub			
dE/dx layer-by-layer			

3.19 COT System Quantities

Transient Representation	Source	Trans. Size	Comment
Extrapolated xlocal, zlocal, xslope, zslope at each layer	Function Call		
Bit map of layer use			
Hits used in track in each layer			
Hits in $\pm 5(?)^\circ$ around the track in each layer			
dE/dx layer-by-layer			

3.20 TOF System Quantities

Transient Representation	Source	Trans. Size	Comment
For the (each) counter struck by the track:			
TOF Counter Identifier			
Corrected Pulse Heights (2)			
Corrected Times (2)			
Corrected t_0 from TOF 2-tube average			
Corrected z_{tof} from TOF 2-tube diff			
Particle velocity β			
Uncertainty on β $\Delta\beta$			
Distance to the low-phi edge of the counter			
Extrapolated track xlocal, zlocal, xslope, zslope at TOF			

3.21 CPR quantities

Transient Representation	Source	Trans. Size	Comment
Number of clusters in strip chambers in cluster towers			
For up to N (could be all) clusters: Energy of strip cluster Z position of cluster from strip chambers Chi-square of strip profile Number of strips above threshold in cluster Number of clusters in wire chambers For up to M (could be all) clusters: Energy of wire cluster Phi position of cluster from wire chambers Chi-square of wire profile Number of wires above threshold in cluster			
Extrapolated track xlocal, zlocal, xslope, zslope at CES/PES Strip PH's in $\pm$ 5 strips (11 total) around the track Wire PH's in $\pm$ 5 wires (11 total) around the track	Function Call		

3.22 Track-Seeded Calorimeter System quantities

Transient Representation	Source	Trans. Size	Comment
Extrapolated xlocal, zlocal, xslope, zslope at CEM Extrapolated xlocal, zlocal, xslope, zslope at CHA TOWE address of tower where track 'entered' calorimeter TOWE address of tower where track 'exited' calorimeter (CMU radius) path length in each of the CEM towers traversed by track path length in each of the CHA towers traversed by track z position of vertex used in calculating $\mathrm{p_T}, \mathrm{E_T}$ (allows recalculating)	Function Call Function Call		
pointer to jet (cone = 0.4) containing track pointer to jet (cone = 0.7) containing track pointer to electron/photon containing track			
E_T in each of the CEM towers traversed by track E_T in each of the CHA towers traversed by track E_T in each of the CEM towers bordering the cluster E_T in each of the CHA towers bordering the cluster			
EM Et in cone with R = 0.4 (corrected for leakage, mult. int.) HaD Et in cone with R = 0.4 (corrected for leakage, mult. int.) EM Et in cone with R = 0.7 (corrected for leakage, mult. int.) Had Et in cone with R = 0.7 (corrected for leakage, mult. int.) "Electron" Et in ELES cluster Mult. int. corrections (0.4,0.7) Leakage corrections (0.4,0.7)			
HTDC times			

3.23 Crack Chamber System Quantities

If a track extrapolates to or near a crack-chamber, we need the following: If a track extrapolates to or near a crack-chamber, we need the following:

Transient Representation	Source	Trans. Size	Comment
Extrapolated xlocal, zlocal, xslope, zslope at CCS CCS Chamber Identifier Corrected CCS Pulse Height	Function Call		

3.24 Muon System Quantities

Transient Representation	Source	Trans. Size	Comment
Wedge in CMU Subsystem identifier in CMP Subsystem identifier in CMX FIDCMU status Extrapolated CMU Subsystem identifier Extrapolated CMP Subsystem identifier			
Number of stubs in CMU/CMX wedge Number of stubs in CMP subunit			
Pointer to best CMU or CMX stub Pointer to second best CMU or CMX stub For best and second best stubs,: Bit map of hits in CMU/CMX/CMP $(x, y, z)_{local}$ in CMU/CMX/CMP ($(x, y, z)_{CDF}$ in CMU/CMX/CMP Slopes$_{local}$ in CMU/CMX/CMP (Slopes$_{CDF}$ in CMU/CMX/CMP			
Hits in CMU/CMX/CMP within 5° of muon			
CSP time CSX time			
Number of ADC hits in CMUS(CMU only) Number of TDC hits in CMUS(CMU) Number of TDC hits in CMUS(CMP) Number of TDC hits in CMUS(CMX) Total TDC hits in Wedge (CMU) Total TDC hits in Wedge (CMX)			

3.25 Trigger Quantities

Transient Representation	Source	Trans. Size	Comment
L1 triggers passed by event			
L2 triggers passed by event			
L3 triggers passed by event			
Pointer to cluster in TL2D Cluster Block	TL2D bank		
Pointer to isolation cluster in Isolation Cluster Block	TL2D bank		
Pointer to track in XFT Track-list			
L2 # of towers	TL2D bank		
L2 seed tower η	TL2D bank Cluster Block		
L2 seed tower ϕ	TL2D bank Cluster Block		
L2 Cluster EM Et	TL2D bank		
L2 Cluster HAD Et	TL2D bank		
L1 Pt	TL2D bank XTRP block		
L2 Pt (may be different if SVT)	TL2D bank SVT block		
L3 Et			
L3 Pt			
SVT Pt			
SVT d0			
SVT phi			

3.26 Filter Status Variables: Fiducial, Conversion, Cosmic, and Other Filters

Note: we will use electrons to calibrate losses due to the cosmic filter and muons for losses due to the conversion filter. We will want to know losses for other objects as well (such as τ's). We consequently want the outputs of standard filter modules available for all objects.

Transient Representation	Source	Trans. Size	Comment
FIDELE status: bit mask			
FIDCMU status: bit mask			
Cosmic filter: bit mask			
Cosmic filter: $\Delta\phi$ to btb track			
Cosmic filter: $\Delta\eta$ to btb track			
Cosmic filter: best-fit d_0			
Cosmic filter: best-fit t_0			
Cosmic filter: 'backwards' track η, ϕ, P_T			
Cosmic filter: 'backwards' track β			
Cosmic filter: 'backwards' track TOWE extrapolation			
Cosmic filter: 'backwards' track TOWE extrapolation E_T			
Cosmic filter: HTDC times			
Pointer to closest vertex			
$z_0 - z_{vertex}$, closest vertex			
Conversion filter: Bit mask			
Conversion filter: Separation			
Conversion filter: Delta cotan-theta			
Conversion filter: Conversion r			
Conversion filter: Conversion phi			
Conversion filter: Conversion z			
Conversion filter: Charges of 2 tracks			
Conversion filter: Mass of 2 tracks			
Conversion filter: Pointer to 2nd track			
Conversion filter: CES E_T of 2nd track			
Conversion filter: CPR E_T of 2nd track			
Conversion filter: CEM cluster E_T of 2nd track			

4 Appendix A: Quantities presently in CMUO Bank

We should be able to reproduce the run1 muon analysis with the run 2 data. We will need some of the 'old' variables to do this. (note: I've put a ? for some that I don't understand- help is needed). Some of these are duplicated in the subsections below, which are organized by subsystem where possible.

CMUD (Run I) Quantity	Comment
Pointer to best cmu or cmx stub	
Pointer to second best cmu stub	
Pointer to best trk	
CMU tower of the segment	
CMP tower of the segment (?)	
CMX tower of the segment (?)	
Number of ADC hits in CMUS(CMU only)	
Number of TDC hits in CMUS(CMU)	
Number of TDC hits in CMUS(CMP)	
Number of TDC hits in CMUS(CMX)	
Total TDC hits in Wedge (CMU)	
Total TDC hits in Wedge (CMX)	
Calorimeter tower of the muon	
Pointer to CES/CPR information	
Cosmic-Ray filter status	
Fidicial mask	
Px (Momentum-x) (at present beam-constrained unless fit fails)	
Py (Momentum-y)	
Pz (Momentum-z)	
E	
Transverse momentum	
X-zero (?)	
Y-zero (?)	
Z-zero (?)	
CMUS ADC fit chi**2 (CMU)	
CMUS TDC fit chi**2 (CMU)	
CMUS TDC fit chi**2 (CMP)	
CMUS TDC fit chi**2 (CMX)	
Fit chi**2 of CTC–CMU ADC match, position and slope	
Fit chi**2 of CTC–CMU TDC match, position and slope	
Fit chi**2 of CTC–CMP TDC match, position and slope	
Fit chi**2 of CTC–CMX Z match, position and slope	
Fit chi**2 of CTC–CMX TDC match, position and slope	
Fit chi**2 of CTC–CMU ADC match, position ONLY	
Fit chi**2 of CTC–CMU TDC match, position ONLY	
Fit chi**2 of CTC–CMP TDC match, position ONLY	
Fit chi**2 of CTC–CMX Z match, position ONLY	
Fit chi**2 of CTC–CMX TDC match, position ONLY	
CMU FIDCMU status	
CMP FIDCMU status	
CMX FIDCMU status	

Appendix A: Quantities presently in CMUO Bank- continued...

CMUD (Run I) Quantity	Comment
Diff. phi angle, CTC-CMU	
Diff. r-phi position, CTC-CMU	
Diff. theta angle, CTC-CMU	
Diff. z position, CTC-CMU	
Diff. phi angle, CTC-CMP	
Diff. r-phi position, CTC-CMP	
Diff. phi angle, CTC-CMX	
Diff. r-phi position, CTC-CMX	
Diff. theta angle, CTC-CMX	
Diff. z position, CTC-CMX	
Hadron TDC for tower with muon	
Energy deposited in CEM in the muon calorimeter tower	
Energy deposited in CHA in the muon calorimeter tower	
Et deposited in a cone of 0.4 minus transverse energy in the muon tower	
EM Fraction for above	
Et deposited in a cone of 0.7 minus transverse energy in the muon tower	
EM Fraction for above	
Transverse Energy deposited in surrounding towers to muon tower	
EM Fraction for above	
Number EM towers in MOcemE (??)	
Number HAD towers in MOchaE (??)	

5 acknowledgments

We thank Marjorie Shapiro, Carla Pilcher and Liz Sexton-Kennedy for helpful comments and suggestions.

6 Appendix A: List of Run I DST Banks NOT included:

Please look carefully at this and see that we're not losing anything you'll need.

Bank Name	Size	Comment
$DSQ		Datsqz
$PHY		HLO dump control (Pekka?)
$SCF		Cal scale factors
$SVD		SVX recon- Rick Snider
BBLD		BBC latches
BBCQ		BBC ADC/TDCs
EVTX		Event vertex
CLSL		CALS links
JETS		Jets > 1GeV, 3 cones
DETS		Jet reconstruction
ELEC		Copy of TOWE for ELES banks
ELCE		Strip info for ELES banks
CATL		Track/cal links
CMIO		Central min ion object
CMUO		Replaced by MUOS?
CMUD		Replaced by CMUQ?
CMPD		Replaced by CMPQ?
CMXD		Replaced by CMXQ?
CSPD		Replaced by CSPQ?
CSXD		Replaced by CSXD?
CMCR		Cosmic Ray filter CMCRFL (Schlabach)
FMCE		Forward muon
FMTE		Forward muon
DEDX		Can be reconstructed
QMET		Packed METS bank
TBMQ		Trigger Block Mover Map (Badgett)
TCMQ		Muon trigger data (Schlabach/Martin)
CFWQ		CFT Track List (Badgett)
PEAQ		Plug anode energies
PHWQ		Plug wire energies
FHXQ		Forward wire energies
FEAQ		Forward anode energies
PEMO		L3 PEMFLT result (Einsweiler)
CMUX		Compressed CMUO bank (Schlabach)
MET3		Level 3
ELE3		Level 3
JET3		Level 3
CLS3		Level 3
TPXQ		TUPD+TEXD (CMP trigger) (Krasberg)
FMUO		Forward muon objects
FMSX		Forw muon copy of FMSE
FMUX		Forw muon copy of FMUE
CCSL		Strip chamber links to CALS
PENX		L3 ELES variables (A. Gordon)
SVXK		SVX strip failures

Table 2: List of Run I banks NOT in PADS for Run II

7 Appendix B: Questions and Comments

This section is for keeping questions and comments so that they don't get forgotten. It's clearly time-dependent.

Questions:

:

1. Do we keep the magnetic field per event? Where? What needs to be stored?
2. We propose dropping the L3 banks. Were they used in analyses? If so, how much of the info was used?

Comments: