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Appendix A
Train Door Database Design Documents

A1 Database Design Notes and Tools for in-Depth Analysis

A database is a set of related tables in which the data is stored. For the traindoors.com database, the tables reflect the data collection forms used to survey the information on detailed door systems: types of door failures, failure causes, components, operating procedures, environmental conditions and so on, which were collected from the responding transit agencies and stored in these tables.

The tables for the database were created in MySQL for PHP for reasons noted above.

As also shown above, traindoors.com will provide two pre-formatted data output sets:

- Display selected or complete results for a single transit agency.
- Display selected results for equivalent items across *all* transit agencies.

The Train Door team encourages in-depth analysis of data from the traindoors.com website. Accordingly, the website provides tools for users who want to explore more complex data relationships. This is important, because it is not practical to pre-select all useful combinations of selected variables from separate tables. Presently there are approximately 191 different data items embedded in 28 separate tables.

For the user who wants to probe deeper into the available data, or to view it in a different form, the traindoors.com website permits the user to download selected tables from a drop-down list into an Excel file. This file or files can be used for manipulation as a spreadsheet or flat file for sorting, graphing etc., or in turn be exported to Access or other database applications for the conditional extraction of data. As shown above, traindoors.com makes two key design provisions:

- At www.traindoors.com/database.html, a user can find the complete structure of the MySQL database tables, as well as introductory material describing the database structure. For reference when selecting a table from the drop-down list, field and table names are listed and defined in this set of data dictionaries which is listed:
    1. By survey response field, organized by survey headings,
    2. By field name and table where it appears
    3. By table name, and the fields (field name) within the table.
- At www.traindoors.com/export.html, a user can export the contents of some or all of the database tables to an Excel-compatible spreadsheet format.

With these two resources, a user can take data sets, generate new queries and combinations of data, and create reports with many different analytic purposes.

Because the Train Door team wanted to give the user the option to make use of the tables directly by downloading a selected table or a set of specific tables the data into Excel (or Access or other file management application),

a. The tables are not normalized. Normalized data tables are organized to eliminate or minimize redundancy in stored data. This makes for more dependable data maintenance, but it makes individual tables hard to read. For example, the information about transit agency and car class appears in many data tables in the Train Door database, making it easier to see what the table is describing.
b. Data in the tables is already formatted for display, and
c. Embedded foreign keys are not used. With normalized data tables, a foreign key links from one table to data in another. In the Train Door database, each table holds all the entries needed to respond to a question.

Thus, the technical user who downloads a table or a set of tables can manipulate or extract the data as it appears in the file as is, when exported to Excel.

A2 Database Design Documents

The documents in this section are the design documents for the Train Door database. Table A2-1 is an overview of the Train Door database structure, which lists the principal design documents and database tables. Following documents are as cited in Table A2-1.

Table A2-1
Train Door Database Design Documents and Database Tables

Table	Contents
Tables Index	List of tables in Traindoors database, showing function, table name, reference to survey, and category (transit agency or car class).
Data Dictionary	I. Listed by survey response fields II. Listed by field and table name in database. III. Listed by database table name
Transit Agency tables	transitprop Field Questionnaire tpcontact Field Questionnaire fleet Fleet Survey (repeated under fleet tables below)
Failure Tables (for the Seven Door Failures Questionnaire)	fcause Door Questionnaire Read-Only ftype Door Questionnaire Read-Only idfcause Door Questionnaire Read-Only convertseq Door Questionnaire Read-Only failures Door Questionnaire
Fleet (Transit Agency) Tables	fleet I Fleet Survey Q1 tpoperating I Fleet Survey Q3, Q4, Q5 tpdelays III Operations Q1, Q2, Q3, Q5 tpseasons III Operations Q6
Car Class Tables	ccdelays III Operations Q4, Q5 ccincidents III Operations Q7, Q8 ccops III Operations Q9 ccdrops II Equipment Q1 cclinks II Equipment Q2 ccpanels II Equipment Q3 cchangers II Equipment Q4 ccrelays II Equipment Q5 ccmpdoor II Equipment Q6 ccmpcar II Equipment Q7 ccwire II Equipment Q8 ccedges II Equipment Q9 ccelectric II Equipment Q10 ccplates II Equipment Q11 ccbotts II Equipment Q12 ccdoors read-only look-up table Read-Only
Appendix Populated Read-Only tables.	Fcause Ftype idcause convertseq ccdoors

T A B L E S 7/14/2005
Train Door Database

Table*	Tablename	Questionaire, Survey	Ref	remarks
Main Transit Property	transitprop	Field questionaire	tp	
Transit Property Contact	tpcontact	Field questionaire	tp	
Fleet	fleet		tp,fl	describes car classes in a tp's fleet
Failure Cause	fcause	Door Questionaire	tp	storage for failure cause descriptions
Failure Type Decription	ftype	Door Questionaire	tp	storage for failure type descriptions
Fail type freq by failure cause	idfcause	Door Questionaire	tp	Read-Only, for reference
Conversion Sequence Lookup	convertseq	Door Questionaire	tp	Read-Only, internal use
Failures	failures	Door Questionaire	tp	storage for failure results
Identify Failure Cause	idcause			auxillary table for lookup
Conversion Sequence Lookup	convertseq			auxillary table for lookup
Delays by Car Class	ccdelays	III Operations, Q 4, 5	cc	
Incidents by Car Class	ccincidents	III Operations, Q 7, 8.	cc	
Events Affecting Operations	ccops	III Operations, Q 9	cc	
Delays- Transit Property	tpdelays	III Operations, Q 1, 2, 3	tp	data - delay reporting structure
Environentals	seasons	III Operations, Q 6	tp	data - seasional, environmental factors
Fleet op, repair, config	tpoperating	I, Q 3, 4, 5	tp	op and repair policy, train configuration.
Door operators	ccdrops	II Equipment, Q1	cc	
Door mechanical linkages	cclinks	II Equipment, Q2	cc	
Door panels	ccpanels	II Equipment, Q3	cc	
Door hangers	cchangers	II Equipment, Q4	cc	
Door relays	ccrelays	II Equipment, Q5	cc	
Microprocessors, door level	ccmpdoor	II Equipment, Q6	cc	
Microprocessors, car level	ccmpcar	II Equipment, Q7	cc	
Wire	ccwire	II Equipment, Q8	cc	
Door sensors, sensitive edges	ccedges	II Equipment, Q9	cc	
Electric couplers/train lines	ccelectric	II Equipmen, Q10	cc	
Threshold plates	ccplates	II Equipment, Q11	cc	
Bottom door guides	ccbotts	II Equipment, Q12	cc	
Door component description	ccdoors	II Equipment	cc	read-only, component and corresp table

*in order of appearance on pages

legend
tp = transit property
cc = car class

TraindoorDB 7-21-05.xls: Index Page 1 of 1

D A T A D I C T I O N A R Y I
by survey response category

9/6/2005

Field	response format	located in table:	Variable	Related to:
Transit property Identifier, "TPn" where "n" is assigned	4 characters	All tables	tpid	
Transit Property				
Transit property name associated with TP identifier.	24 characters	transitprop	tpname	Trans. Prop.
Used to name table for fleet data, Not used	7 characters	transitprop	fleet	Trans. Prop.
name of failure table for transit property*. Not used	9 characters	transitprop	failure	Trans. Prop.
Transit Property Contact Info				
name of contact for transit property	36 characters	tpcontact	contact1	Trans. Prop.
contact person's phone	(xxx) xxx-xxxx	tpcontact	phone1	Trans. Prop.
contact person's mail address	24 characters	tpcontact	email1	Trans. Prop.
date of response to survey	mm/dd/yy	tpcontact	date	Trans. Prop.
alternate contact person	36 characters	tpcontact	contact2	Trans. Prop.
alternate phone contact	(xxx) xxx-xxxx	tpcontact	phone2	Trans. Prop.
alternate email	24 characters	tpcontact	email2	Trans. Prop.
Fleet (car class) Description & Data				
car class in transit property's fleet	12 characters	fleet, all car class	carclass	Trans. Prop.
number of cars in this car class	integer, <127	fleet	numcars,	Trans. Prop.
average no of years in service for this cars in this fleet	mm.nn	fleet	serviceyrs	Trans. Prop.
average annual mileage for this car class	mm.nn	fleet	amiles	Trans. Prop.
average annual hours operated per year for this car class	integer	fleet	ahours	Trans. Prop.
average speed (computed from miles, hours)	integer	fleet	avgmph	Trans. Prop.
Fleet Operations - delays				
not null is tran delay is defined by time value	1 character	tpdelays	timeval	Trans. Prop.
narrative- if delay is not defined by time value	127 characters	tpdelays	otherdef	Trans. Prop.
minutes before before Level 2 triggered.	text	tpdelays	mins2	Trans. Prop.
minutes before before Level 3 triggered.	text	tpdelays	mins3	Trans. Prop.
narrative - basis for calcuating MFBF or MTBF	<256 characters	tpdelays	mtbfcalc	Trans. Prop.
fleet wide system lost train intervals as pct of all LTI.	mm.nn%	tpdelays	pctlostti	Trans. Prop.
fleet wide door system delays as a pct of all train delays	mm.nn%	tpdelays	pctdstd	Trans. Prop.
Fleet Operations - seasonal variations				
door incident rates in Spring	H, M, or L	Seasons	spring	Trans. Prop.
door incident rates in Summer	H, M, or L	Seasons	summer	Trans. Prop.
door incident rates in Fall	H, M, or L	Seasons	fall	Trans. Prop.
door incident rates in Winter	H, M, or L	Seasons	winter	Trans. Prop.
causal environ. factor in door incident rates - high temp	x or blank	Seasons	hightemp	Trans. Prop.
causal environ. factor in door incident rates - low temp	x or blank	Seasons	lowtemp	Trans. Prop.
causal environ. factor in door incident rates - dampness	x or blank	Seasons	damp	Trans. Prop.
causal environ. factor in door incident rates - snow	x or blank	Seasons	snow	Trans. Prop.
causal environ. factor in door incident rates - wind	x or blank	Seasons	wind	Trans. Prop.
causal environ. factor in door incident rates - sun	x or blank	Seasons	sun	Trans. Prop.
comments on enviromental factors, if any.	text	Seasons	otherss	Trans. Prop.
Operating Policy when door incident occurs				
pct of door incidents leading to cut out door stay in service	mm.nn%	tpoperating	pctcutout	Trans. Prop.
pct of door incidents leading to cancel train	mm.nn%	tpoperating	pctcancel	Trans. Prop.
pct of door incidents leading to other scenarios	mm.nn%	tpoperating	pctother	Trans. Prop.
description other scenario	<256 characters	tpoperating	otherdesc	Trans. Prop.
pct of door failures repaired in yard	mm.nn%	tpoperating	pctyard	Trans. Prop.
pct of door failures repaired in shop	mm.nn%	tpoperating	pctshop	Trans. Prop.

D A T A D I C T I O N A R Y I
by survey response category

9/6/2005

Field	response format	located in table:	Variable	Related to:
pct of door failures repaired in service	mm.nn%	tpoperating	pctservice	Trans. Prop.
train configuration is single cars	"Yes", "No" or "N/A"	tpoperating	trainconfigsc	Trans. Prop.
train configuration is married pairs	"Yes", "No" or "N/A"	tpoperating	trainconfigmp	Trans. Prop.
train configuration is multicar consists	"Yes", "No" or "N/A"	tpoperating	trainconfigmc	Trans. Prop.
min no of cars in consist	integer	tpoperating	minconsist	Trans. Prop.
max no of cars in consist	integer	tpoperating	maxconsist	Trans. Prop.
Operations, For EACH car class,				
Train Delays attributed to door incidents				
percent system delays attributed to door system incidents	mm.nn%	ccdelays	pctsysdelay	car class
percent door system lost traini intervals	mm.nn%	ccdelays	pctsyslti	car class
pct opening enroute	mm.nn%	ccincidents	pctopen	car class
pct phantom operation	mm.nn%	ccincidents	pctphan	car class
pct sticking.jammimg	mm.nn%	ccincidents	pctstick	car class
pct loss of train operator indication	mm.nn%	ccincidents	pctlossto	car class
pct no motion	mm.nn%	ccincidents	pctnomo	car class
ccincidother	text	ccincidents	other	car class
pct of door incidents resulting in injuries to passsengers	mm.nn%	ccincidents	pctinj	car class
pct environment	mm.nn%	ccops	pctenviron	car class
pct passenger use	mm.nn%	ccops	pctpassguse	car class
pct employee ops	mm.nn%	ccops	pctemployops	car class
pct design	mm.nn%	ccops	pctdesign	car class
pct maintenance	mm.nn%	ccops	pctmaint	car class
ccopsother	text	ccops	ccopsother	car class
Equipment, for EACH car class				
Door operators				
door operator location -"overhead", "wall/waist mounted"	20 character	ccdrops	location	car class
door operator power - "pneumatic", "electrical", or descript	20 character	ccdrops	powercheck	car class
door operator drive - screw", "lever", "piston", "belt", "cable"	20 character	ccdrops	drive	car class
door operator manufacturer	48 characters	ccdrops	drmaker	car class
door manufacturer's model	48 characters	ccdrops	drmodel	car class
door operator original equipment ? ("yes" or "no")	"Yes", "No" or "N/A"	ccdrops	droem	car class
door operator retrofit or replacement equipment?	"Yes", "No" or "N/A"	ccdrops	drretrofit	car class
door operator retrofit, implemented in original equipment?	"Yes", "No" or "N/A"	ccdrops	drorig	car class
door operator config changed, why	text	ccdrops	doorwhy	car class
door operator config changed, specific change	text	ccdrops	doorwhat	car class
mechanical linkages				
door mechanical linkages type	64 characters	cclinks	linktype	car class
door mechanical linkages -manufacturer	48 characters	cclinks	linkmaker	car class
door mechanical linkages - manufacturer's model	48 characters	cclinks	linkmodel	car class
door linkage - original equipment? ("yes" or "no")	"Yes", "No" or "N/A"	cclinks	linkoem	car class
door linkage -retrofit or replacement equipment?	"Yes", "No" or "N/A"	cclinks	linkretrofit	car class
door linkage mplemented in original equipment?	"Yes", "No" or "N/A"	cclinks	linkorig	car class
door linkage if config changed, why	text	cclinks	linkwhy	car class
door linkage if config changed, specific change(s).	text	cclinks	linkwhat	car class
door panels				
door panel type "plug", "bi-fold", "sliding" or descript if Other.	64 characters	ccpanels	pantype	car class
door panel manufacturer	48 characters	ccpanels	panmaker	car class

DATA DICTIONARY I 9/6/2005
by survey response category

Field	response format	located in table:	Variable	Related to:
door panel model	48 characters	ccpanels	panmodel	car class
door panel original equipment?	"Yes", "No" or "N/A"	ccpanels	panoem	car class
door panel retrofit or replacement equipment?	"Yes", "No" or "N/A"	ccpanels	panretrofit	car class
door panel retrofit implemented in original equipment?	"Yes", "No" or "N/A"	ccpanels	panorig	car class
door panel if config changed, why	text	ccpanels	panwhy	car class
door panel if onfig changed, what specifically was changed	text	ccpanels	panwhat	car class
door hangers				
door hangers - type "ball track" or descript if Other	32 characters	cchangers	hangtype	car class
door hanger manufacturer	48 characters	cchangers	hangmaker	car class
door hangers model	48 characters	cchangers	hangmodel	car class
door hanger original equipment? ("yes" or "no")	"Yes", "No" or "N/A"	cchangers	hangoem	car class
door hanger etrofit or replacement equipment ("yes" or "no")	"Yes", "No" or "N/A"	cchangers	hangretrofit	car class
door hanger changes mplemented in original equipment?	"Yes", "No" or "N/A"	cchangers	hangorig	car class
door hanger if config changed, why	text	cchangers	hangwhy	car class
door hanger if config changed, specific change(s)	text	cchangers	hangwhat	car class
door relays				
door relay manufacturer	48 characters	ccrelays	relaymaker	car class
door relay model	48 characters	ccrelays	relaymodel	car class
door relay original equipment ("yes" or "no")	"Yes", "No" or "N/A"	ccrelays	relayoem	car class
door relay retrofit or replacement equipment ("yes" or "no")	"Yes", "No" or "N/A"	ccrelays	relayretrofit	car class
door relay retrofit implemented in original equipment?	"Yes", "No" or "N/A"	ccrelays	relayorig	car class
door relay retrofit why?	text	ccrelays	relaywhy	car class
door relay retrofit what changed?	text	ccrelays	relaywhat	car class
microprocessor use at door level				
door level use of microprocessor?	"Yes", "No" or "N/A"	ccmpdoor	doormp	car class
door level microprocessor - original equipment?	"Yes", "No" or "N/A"	ccmpdoor	doormpoem	car class
door level microprocessor retrofit or replacement equipment?	"Yes", "No" or "N/A"	ccmpdoor	doormpreplac	car class
door level microprocessor If retrofit, Implemented in original confi	"Yes", "No" or "N/A"	ccmpdoor	doormporig	car class
microprocessor use at car level				
car level micropocessor used ? (y or n)	"Yes", "No" or "N/A"	ccmpcar	carmp	car class
car level microprocessor manufacturer	48 characters	ccmpcar	carmanufact	car class
car level microprocessor model	48 characters	ccmpcar	carmpmodel	car class
car level microprocessors original equipment?	"Yes", "No" or "N/A"	ccmpcar	carmpoem	car class
car level microprocessor retrofit or replacement?	"Yes", "No" or "N/A"	ccmpcar	carmpretro	car class
car level microprocessor - if changed, in original config?	"Yes", "No" or "N/A"	ccmpcar	carmporig	car class
car level micropeocessor if retrofit or config changed, why	text	ccmpcar	carmpwhy	car class
car level mircoprocessor if changed, specific change(s)	text	ccmpcar	carmpwhat	car class
wiring				
Wiring - wire gauge used	12 characters	ccwire	ccwiregauge	car class
wire insulation material	36 characters	ccwire	ccwireinsulat	car class
wiring Original equipment? ("yes" or "no")	"Yes", "No" or "N/A"	ccwire	ccwireoem	car class
wiring retrofit or replacement equipment? ("yes" or "no")	"Yes", "No" or "N/A"	ccwire	ccwireretro	car class
wiring if retrofit, Implemented in original config?	"Yes", "No" or "N/A"	ccwire	ccwireinoem	car class
wiring if retrofit or config changed changed, why	text	ccwire	ccwirewhy	car class
wiring if retrofit, and config changed, specifically change(s).	text	ccwire	ccwirewhat	car class
door sensors				
door sensor type - "sensitive edges", "mechanical leaf"	text	ccedges	edgetype	car class

D A T A D I C T I O N A R Y I
by survey response category

9/6/2005

Field	response format	located in table:	Variable	Related to:
door sensor manufacturer	text	ccedges	edgemaker	car class
door sensor model model	text	ccedges	edgemodel	car class
door sensor original equipment?	"Yes", "No" or "N/A"	ccedges	edgeoem	car class
door sensor retrofit or replacement equipment ("yes" or "no")	"Yes", "No" or "N/A"	ccedges	edgeretrofit	car class
door sensor changes implemented in original equipment?	"Yes", "No" or "N/A"	ccedges	edgeorig	car class
door sensor- if config changed, why	text	ccedges	edgewhy	car class
door sensor - if config changed, what changes	text	ccedges	edgewhat	car class
electric couplers				
electric coupler type. "through coupler", hardwired",	32 characters	ccelectric	ectype	car class
electric coupler manufacturer	48 characters	ccelectric	ecmaker	car class
electric coupler model	48 characters	ccelectric	ecmodel	car class
electric coupler original equipment ("yes" or "no")	"Yes", "No" or "N/A"	ccelectric	ecoem	car class
electric coupler retrofit or replacement equipment?	"Yes", "No" or "N/A"	ccelectric	ecretrofit	car class
electric coupler implemented in original equipment?	"Yes", "No" or "N/A"	ccelectric	ecorig	car class
electric coupler - if config changed, why	text	ccelectric	ecwhy	car class
electric coupler -i f config changed, specific change(s)	text	ccelectric	ecwhat	car class
electric coupler voltage drop issues? ("yes"or "no")	"yes" or "no"	ccelectric	ecvolt	car class
electric coupler -descript voltage drop issues	127 characters	ccelectric	ecvoltmore	car class
threshold plates				
threshold plates -type.	64 characters	ccplates	platetype	car class
threshold plates - manufacturer	48 characters	ccplates	platemaker	car class
threshold plates - material composition	48 characters	ccplates	platemat	car class
threshold plates -original equipment?	"Yes", "No" or "N/A"	ccplates	plateoem	car class
threshold plates - retrofit or replacement equipment?	"Yes", "No" or "N/A"	ccplates	plateretrofit	car class
threshold plates - implemented in original equipment?	"Yes", "No" or "N/A"	ccplates	plateorig	car class
threshold plates -if config changed, why	text	ccplates	platewhy	car class
threshold plates - if config changed, specific change(s)	text	ccplates	platewhat	car class
bottom door panel guides				
bottom door panels- type. "blade", "roller" or describe other	64 characters	ccbotts	botttype	car class
bottom door panel manufacturer	48 characters	ccbotts	bottmaker	car class
bottom door panel material composition	64 characters	ccbotts	bottmat	car class
bottom door panel original equipment?	"Yes", "No" or "N/A"	ccbotts	bottoem	car class
bottom door panel -retrofit or replacement equipment?	"Yes", "No" or "N/A"	ccbotts	bottretrofit	car class
bottom door panel -if retrofit, onoriginal equipment?	"Yes", "No" or "N/A"	ccbotts	bottorig	car class
bottom door panel if config changed, why	text	ccbotts	bottwhy	car class
bottom door panel if config changed, what changes	text	ccbotts	bottwhat	car class
door components - read-only table				
door component description "relays," "wiring", etc.	32 characters	ccdoors	drcomponent	car class
door component tablename where description appears	11 characters	ccdoors	drtable	car class
door failure related				
freq for failure cause FC1, trainline	integer, 1-5	failures	fc1r	Trans. Prop.
freq for failure cause FC2, door push buttons	integer, 1-5	failures	fc2r	Trans. Prop.
freq for failure cause FC3, interlock failure	integer, 1-5	failures	fc3r	Trans. Prop.
freq for failure cause FC4, car network	integer, 1-5	failures	fc4r	Trans. Prop.
freq for failure cause FC5, door operator motor	integer, 1-5	failures	fc5r	Trans. Prop.
freq for failure cause FC6, local door controller	integer, 1-5	failures	fc6r	Trans. Prop.
freq for failure cause FC7, unlock mechanism	integer, 1-5	failures	fc7r	Trans. Prop.

D A T A D I C T I O N A R Y I
by survey response category

9/6/2005

Field	response format	located in table:	Variable	Related to:
freq for failure cause FC8, electrial coupler	integer, 1-5	failures	fc8r	Trans. Prop.
freq for failure cause FC9, threshold or bottom door guide	integer, 1-5	failures	fc9r	Trans. Prop.
freq for failure cause FC10, door panel	integer, 1-5	failures	fc10r	Trans. Prop.
freq for failure cause FC11, short or open circuit	integer, 1-5	failures	fc11r	Trans. Prop.
freq for failure cause FC12, switch/sensor	integer, 1-5	failures	fc12r	Trans. Prop.
freq for failure cause FC13, train takes power w/o correct door status		failures	fc13r	Trans. Prop.
freq for failure cause FC14, failures to take power w/o correct door status		failures	fc14r	Trans. Prop.
freq for failure cause FC15 Interlock/unautor door interlock (operator error)		failures	fc15r	Trans. Prop.
freq for failure cause FC16, other interlock fails (no motion)	integer, 1-5	failures	fc16r	Trans. Prop.
req for failure cause FC17, local door panel	integer, 1-5	failures	fc17r	Trans. Prop.
freq for failure cause FC18, opening control (button.switch) location issue		failures	fc18r	Trans. Prop.
freq for failure cause FC19, wayside failure	integer, 1-5	failures	fc19r	Trans. Prop.
freq for failure cause FC20, door edge	integer, 1-5	failures	fc20r	Trans. Prop.
freq for failure cause FC21, design problem reqiring mod	integer, 1-5	failures	fc21r	Trans. Prop.
freq for failure cause FC22, "other"	integer, 1-5	failures	fc22r	Trans. Prop.
descript of failure under "other"	127 characters	failures	fc23r	Trans. Prop.
descript of action taken or ops change	127 characters	failures	fc24r	Trans. Prop.
Failure Cause FCnn referred to in fc24r change	varchar(4)	failures	fc24id	Trans. Prop.
door failure - read-only tables (constants & identifiers)				
failure Id eg "FC1"	4 characters	Fcause	fcid	Trans. Prop.
failure cause (description)	to 56 characters	Fcause	failcause	Trans. Prop.
failure type ID	integer	Ftype	ftid	Trans. Prop.
failure type description	to 65 characters	Ftype	failuretype	Trans. Prop.
frequency rank for a failure type	integer	idfcause	freq	Trans. Prop.
failure Id eg "FC1" related to failure type frequency	integer	idfcause	fcid	Trans. Prop.

D A T A D I C T I O N A R Y II
by field name

9/6/2005

Field	in table:	Definition	Related to:
ahours	fleet	average annual hours operated per year for this car class	Trans. Prop.
amiles	fleet	average annual mileage for this car class	Trans. Prop.
avgmph	fleet	average speed (computed from miles, hours)	Trans. Prop.
bottmaker	ccbotts	bottom door panel manufacturer	car class
bottmat	ccbotts	bottom door panel material composition	car class
bottoem	ccbotts	bottom door panel original equipment?	car class
bottorig	ccbotts	bottom door panel -if retrofit, onoriginal equipment?	car class
bottretrofit	ccbotts	bottom door panel -retrofit or replacement equipment?	car class
botttype	ccbotts	bottom door panels- type. "blade", "roller" or describe other	car class
bottwhat	ccbotts	bottom door panel if config changed, what changes	car class
bottwhy	ccbotts	bottom door panel if config changed, why	car class
carclass	fleet, all car class	car class in transit property's fleet	Trans. Prop.
carmanufact	ccmpcar	car level microprocessor manufacturer	car class
carmp	ccmpcar	car level micropocessor used ? (y or n)	car class
carmpmodel	ccmpcar	car level microprocessor model	car class
carmpoem	ccmpcar	car level microprocessors original equipment?	car class
carmporig	ccmpcar	car level microprocessor - if changed, in original config?	car class
carmpretro	ccmpcar	car level microprocessor retrofit or replacement?	car class
carmpwhat	ccmpcar	car level mircoprocessor if changed, specific change(s)	car class
carmpwhy	ccmpcar	car level micropeocessor if retrofit or config changed, why	car class
ccincidother	ccincidents	other	car class
ccopsother	ccops	other factors	car class
ccwiregauge	ccwire	Wiring - wire gauge used	car class
ccwireinoem	ccwire	wiring if retrofit, Implemented in original config?	car class
ccwireinsulat	ccwire	wire insulation material	car class
ccwireoem	ccwire	wiring Original equipment? ("yes" or "no")	car class
ccwireretro	ccwire	wiring retrofit or replacement equipment? ("yes" or "no")	car class
ccwirewhat	ccwire	wiring if retrofit, and config changed, specifically change(s).	car class
ccwirewhy	ccwire	wiring if retrofit or config changed changed, why	car class
contact1	tpcontact	name of contact for transit property	Trans. Prop.
contact2	tpcontact	alternate contact person	Trans. Prop.
damp	Seasons	causal environ. factor in door incident rates - dampness	Trans. Prop.
date	tpcontact	date of response to survey	Trans. Prop.
doormp	ccmpdoor	door level use of microprocessor?	car class
doormpoem	ccmpdoor	door level microprocessor - original equipment?	car class
doormporig	ccmpdoor	door level microprocessor If retrofit, done in original config?	car class
doormpreplace	ccmpdoor	door level microprocessor retrofit or replacement equipment?	car class
doorwhat	ccdrops	door operator config changed, specific change	car class
doorwhy	ccdrops	door operator config changed, why	car class
drcomponent	ccdoors	door component description "relays," "wiring", etc.	car class
drcomponent	ccdoors	door component description "relays," "wiring", etc.	car class
drive	ccdrops	door operator drive - screw", "lever", "piston", "belt", "cable"	car class
drmaker	ccdrops	door operator manufacturer	car class
drmodel	ccdrops	door manufacturer's model	car class
droem	ccdrops	door operator original equipment ? ("yes" or "no")	car class
drorig	ccdrops	door operator retrofit, implemented in original equipment?	car class
drretrofit	ccdrops	door operator retrofit or replacement equipment?	car class

D A T A D I C T I O N A R Y II 9/6/2005
by field name

Field	in table:	Definition	Related to:
drtable	ccdoors	door component tablename where description appears	car class
drtable	ccdoors	door component tablename where description appears	car class
ecmaker	ccelectric	electric coupler manufacturer	car class
ecmodel	ccelectric	electric coupler model	car class
ecoem	ccelectric	electric coupler original equipment ("yes" or "no")	car class
ecorig	ccelectric	electric coupler implemented in original equipment?	car class
ecretrofit	ccelectric	electric coupler retrofit or replacement equipment?	car class
ectype	ccelectric	electric coupler type. "through coupler", hardwired",	car class
ecvolt	ccelectric	electric coupler voltage drop issues? ("yes"or "no")	car class
ecvoltmore	ccelectric	electric coupler -descript voltage drop issues	car class
ecwhat	ccelectric	electric coupler -i f config changed, specific change(s)	car class
ecwhy	ccelectric	electric coupler - if config changed, why	car class
edgemaker	ccedges	door sensor manufacturer	car class
edgemodel	ccedges	door sensor model model	car class
edgeoem	ccedges	door sensor original equipment?	car class
edgeorig	ccedges	door sensor changesimplemented in original equipment?	car class
edgeretrofit	ccedges	door sensor retrofit or replacement equipment ("yes" or "no")	car class
edgetype	ccedges	door sensor type - "sensitive edges", "mechanical leaf"	car class
edgewhat	ccedges	door sensor - if config changed, what changes	car class
edgewhy	ccedges	door sensor- if config changed, why	car class
email1	tpcontact	contact person's mail address	Trans. Prop.
email2	tpcontact	alternate email	Trans. Prop.
failure	transitprop	name of failure table for transit property*. Not used	Trans. Prop.
fall	Seasons	door incident rates in Fall	Trans. Prop.
fc10r	failures	freq rank for failure cause FC10, door panel	Trans. Prop.
fc11r	failures	freq rank for failure cause FC11, short or open circuit	Trans. Prop.
fc12r	failures	freq rank for failure cause FC12, switch/sensor	Trans. Prop.
fc13r	failures	freq rank for failure cause FC13, train takes power w/o correct door status	Trans. Prop.
fc14r	failures	freq rank for failure cause FC14, failures to take power w/o correct door status	Trans. Prop.
fc15r	failures	freq rank for failure cause FC15 Interlock/unautor door interlock (operator error)	Trans. Prop.
fc16r	failures	freq rank for failure cause FC16, other interlock failures (no motion)	Trans. Prop.
fc17r	failures	freq rank for failure cause FC17, local door panel	Trans. Prop.
fc18r	failures	freq rank for failure cause FC18, opening control (button.switch) location issue	Trans. Prop.
fc19r	failures	freq tank for failure cause FC19, wayside failure	Trans. Prop.
fc1r	failures	freq rank for failure cause FC1, trainline	Trans. Prop.
fc20r	failures	freq rank for failure cause FC20, door edge	Trans. Prop.
fc21r	failures	freq rank for failure cause FC21, design problem reqiring modification	Trans. Prop.
fc22r	failures	freq rank for failure cause FC22, "other"	Trans. Prop.
fc23r	failures	descript of failure under "other"	Trans. Prop.
fc24id	failures	// Failure Cause FCnn referred to in fc24r, for which action taken or ops changed	
fc24r	failures	descript of action taken or ops change	Trans. Prop.
fc2r	failures	freq rank for failure cause FC2, door push buttons	Trans. Prop.
fc3r	failures	freq rank for failure cause FC3, interlock failure	Trans. Prop.
fc4r	failures	freq rank for failure cause FC4, car network	Trans. Prop.
fc5r	failures	freq rank for failure cause FC5, door operator motor	Trans. Prop.
fc6r	failures	freq rank for failure cause FC6, local door controller	Trans. Prop.
fc7r	failures	freq rank for failure cause FC7, unlock mechanism	Trans. Prop.

D A T A D I C T I O N A R Y II
by field name

9/6/2005

Field	in table:	Definition	Related to:
fc8r	failures	freq frank for failure cause FC8, electrial coupler	Trans. Prop.
fc9r	failures	freq rank for failure cause FC9, threshold or bottom door guide	Trans. Prop.
fleet	transitprop	Used to name table for fleet data, Not used	Trans. Prop.
hangmaker	cchangers	door hanger manufacturer	car class
hangmodel	cchangers	door hangers model	car class
hangoem	cchangers	door hanger original equipment? ("yes" or "no")	car class
hangorig	cchangers	door hanger changes mplemented in original equipment?	car class
hangretrofit	cchangers	door hanger etrofit or replacement equipment ("yes" or "no")	car class
hangtype	cchangers	door hangers - type "ball track" or descript if Other	car class
hangwhat	cchangers	door hanger if config changed, specific change(s)	car class
hangwhy	cchangers	door hanger if config changed, why	car class
hightemp	Seasons	causal environ. factor in door incident rates - high temp	Trans. Prop.
linkmaker	cclinks	door mechanical linkages -manufacturer	car class
linkmodel	cclinks	door mechanical linkages - manufacturer's model	car class
linkoem	cclinks	door linkage - original equipment? ("yes" or "no")	car class
linkorig	cclinks	door linkage mplemented in original equipment?	car class
linkretrofit	cclinks	door linkage -retrofit or replacement equipment?	car class
linktype	cclinks	door mechanical linkages type	car class
linkwhat	cclinks	door linkage if config changed, specific change(s).	car class
linkwhy	cclinks	door linkage if config changed, why	car class
location	ccdrops	door operator location -"overhead", "wall/waist mounted"	car class
lowtemp	Seasons	causal environ. factor in door incident rates - low temp	Trans. Prop.
maxconsist	tpoperating	max no of cars in consist	Trans. Prop.
minconsist	tpoperating	min no of cars in consist	Trans. Prop.
mins2	tpdelays	mins before before Level 2 triggered.	Trans. Prop.
mins3	tpdelays	mins before before Level 3 triggered.	Trans. Prop.
mtbfcalc	tpdelays	narrative - basis for calcuating MFBF or MTBF	Trans. Prop.
numcars,	fleet	number of cars in this car class	Trans. Prop.
otherdef	tpdelays	narrative- if delay is not defined by time value	Trans. Prop.
otherdesc	tpoperating	description other scenario	Trans. Prop.
panmaker	ccpanels	door panel manufacturer	car class
panmodel	ccpanels	door panel model	car class
panoem	ccpanels	door panel original equipment?	car class
panorig	ccpanels	door panel retrofit implemented in original equipment?	car class
panretrofit	ccpanels	door panel retrofit or replacement equipment?	car class
pantype	ccpanels	door panel type "plug", "bi-fold", "sliding" or descript if Other.	car class
panwhat	ccpanels	door panel if onfig changed, what specifically was changed	car class
panwhy	ccpanels	door panel if config changed, why	car class
pctcancel	tpoperating	pct of door incidents leading to cancel train	Trans. Prop.
pctcutout	tpoperating	pct of door incidents leading to cut out door stay in service	Trans. Prop.
pctdesign	ccops	pct design	car class
pctemployops	ccops	pct employee ops	car class
pctenviron	ccops	pct environment	car class
pctinj	ccincidents	pct of door incidents resulting in injuries to passsengers	car class
pctlossto	ccincidents	pct loss of train operator indication	car class
pctlostti	tpdelays	fleet wide system lost train intervals as pct of all LTI.	Trans. Prop.
pctmaint	ccops	pct maintenance	car class

D A T A D I C T I O N A R Y II 9/6/2005
by field name

Field	in table:	Definition	Related to:
pctnomo	ccincidents	pct no motion	car class
pctopen	ccincidents	pct opening enroute	car class
pctother	tpoperating	pct of door incidents leading to other scenarios	Trans. Prop.
pctpassguse	ccops	pct passenger use	car class
pctphan	ccincidents	pct phantom operation	car class
pctservice	tpoperating	pct of door failures repaired in service	Trans. Prop.
pctshop	tpoperating	pct of door failures repaired in shop	Trans. Prop.
pctstick	ccincidents	pct sticking.jammimg	car class
pctsysdelay	ccdelays	percent system delays attributed to door system incidents	car class
pctsyslti	ccdelays	percent door system lost traini intervals	car class
pctyard	tpoperating	pct of door failures repaired in yard	Trans. Prop.
phone1	tpcontact	contact person's phone	Trans. Prop.
phone2	tpcontact	alternate phone contact	Trans. Prop.
platemaker	ccplates	threshold plates - manufacturer	car class
platemat	ccplates	threshold plates - material composition	car class
plateoem	ccplates	threshold plates -original equipment?	car class
plateorig	ccplates	threshold plates - implemented in original equipment?	car class
plateretrofit	ccplates	threshold plates - retrofit or replacement equipment?	car class
platetype	ccplates	threshold plates -type.	car class
platewhat	ccplates	threshold plates - if config changed, specific change(s)	car class
platewhy	ccplates	threshold plates -if config changed, why	car class
powercheck	ccdrops	door operator power - "pneumatic", "electrical", or descript	car class
relaymaker	ccrelays	door relay manufacturer	car class
relaymodel	ccrelays	door relay model	car class
relayoem	ccrelays	door relay original equipment ("yes" or "no")	car class
relayorig	ccrelays	door hanger retrofit implemented in original equipment?	car class
relayretrofit	ccrelays	door relay retrofit or replacement equipment ("yes" or "no")	car class
relaywhy	ccrelays	door relay retrofit why?	car class
relaywhat	ccrelays	door relay retrofit what changed?	car class
serviceyrs	fleet	average no of years in service for this cars in this fleet	Trans. Prop.
snow	Seasons	causal environ. factor in door incident rates - snow	Trans. Prop.
spring	Seasons	door incident rates in Spring	Trans. Prop.
ssother	Seasons	comments on enviromental factors, if any.	Trans. Prop.
summer	Seasons	door incident rates in Summer	Trans. Prop.
sun	Seasons	causal environ. factor in door incident rates - sun	Trans. Prop.
timeval	tpdelays	not null is tran delay is defined by time value	Trans. Prop.
tpid	All tables	Transit property Identifier, "TPn" where "n" is assigned	
tpname	transitprop	Transit property name associated with TP identifier.	Trans. Prop.
trainconfigmc	tpoperating	train configuration is multicar consists	Trans. Prop.
trainconfigmp	tpoperating	train configuration is married pairs	Trans. Prop.
trainconfigsc	tpoperating	train configuration is single cars	Trans. Prop.
wind	Seasons	causal environ. factor in door incident rates - wind	Trans. Prop.
winter	Seasons	door incident rates in Winter	Trans. Prop.

D A T A D I C T I O N A R Y II
by field name

9/6/2005

Field	in table:	Definition	Related to:
Constants from read-only tables:			
failcause	Fcause	failure cause (description), identified by fcid (failure cause id)	Trans. Prop.
fcid	Fcause, idfcause	failure cause id	Trans. Prop.
fcid = FC1		trainline (wiring/pin)	Trans. Prop.
fcid = FC2		door push buttons	Trans. Prop.
fcid = FC3		interlock failure	Trans. Prop.
fcid = FC4		car network	Trans. Prop.
fcid = FC5		door operator motor	Trans. Prop.
fcid = FC6		local door controller	Trans. Prop.
fcid = FC7		unlock mechanism	Trans. Prop.
fcid = FC8		elecrical coupler	Trans. Prop.
fcid = FC9		threshold or bottom door guide	Trans. Prop.
fcid = FC10		door panel	Trans. Prop.
fcid = FC11		short or open circuit	Trans. Prop.
fcid = FC12		switch/sensor	Trans. Prop.
fcid = FC13		train takes power w/o correct door status (door open)	Trans. Prop.
fcid = FC14		fails to take power w correct door status	Trans. Prop.
fcid = FC15		interlock/unauthor door interlock bypass (operator error)	Trans. Prop.
fcid = FC16		other interlock failures (no motion)	Trans. Prop.
fcid = FC17		local door panel	Trans. Prop.
fcid = FC18		opening control (button/switch) location issue	Trans. Prop.
fcid = FC19		wayside failure	Trans. Prop.
fcid = FC20		door edge	Trans. Prop.
fcid = FC21		design problem requiring modification	Trans. Prop.
fcid = FC22		Other	Trans. Prop.
fcid = FC23		descript - other failure	Trans. Prop.
fcid = FC24		Action taken	Trans. Prop.
ftid	Ftype	failure type description, identified by ftid (fail type ID)	Trans. Prop.
ftid = FT1		Door failed to Open or Close when commanded from Operator Console	Trans. Prop.
ftid = FT2		Door Status Interlock Failure	Trans. Prop.
ftid = FT3		Incorrect Door Opening - Door Open in Motion	Trans. Prop.
ftid = FT4		Incorrecr Door Operaton (Operation/Wayside Error)	Trans. Prop.
ftrid = FT5		Obstruction Detection Failures / Drags	Trans. Prop.
ftid = FT6		Freewheeling Door Panel	Trans. Prop.
ftid = FT7		Doors Fail to completely Close and Lock and indicate Closed and Lock	Trans. Prop.
fcid	idfcause	failure Id eg "FC1" related to failure type frequency	Trans. Prop.
freq	idfcause	frequency rank for a failure type	Trans. Prop.
ftid	Ftype	failure type ID	Trans. Prop.

D A T A D I C T I O N A R Y III
by table name

9/6/2005

table name	Field	Variable	response format	Related to:
transitprop	Transit property name associated with TP identifier.	tpname	24 characters	Trans. Prop.
transitprop	Used to name table for fleet data, Not used	fleet	7 characters	Trans. Prop.
transitprop	name of failure table for transit property*. Not used	failure	9 characters	Trans. Prop.
tpcontact	name of contact for transit property	contact1	36 characters	Trans. Prop.
tpcontact	contact person's phone	phone1	(xxx) xxx-xxxx	Trans. Prop.
tpcontact	contact person's mail address	email1	24 characters	Trans. Prop.
tpcontact	date of response to survey	date	mm/dd/yy	Trans. Prop.
tpcontact	alternate contact person	contact2	36 characters	Trans. Prop.
tpcontact	alternate phone contact	phone2	(xxx) xxx-xxxx	Trans. Prop.
tpcontact	alternate email	email2	24 characters	Trans. Prop.
fleet	number of cars in this car class	numcars,	integer, <127	Trans. Prop.
fleet	average no of years in service for this cars in this fleet	serviceyrs	mm.nn	Trans. Prop.
fleet	average annual mileage for this car class	amiles	mm.nn	Trans. Prop.
fleet	average annual hours operated per year for this car class	ahours	integer	Trans. Prop.
fleet	average speed (computed from miles, hours)	avgmph	integer	Trans. Prop.
tpdelays	not null is tran delay is defined by time value	timeval	1 character	Trans. Prop.
tpdelays	narrative- if delay is not defined by time value	otherdef	127 characters	Trans. Prop.
tpdelays	minutes before before Level 2 triggered.	mins2	text	Trans. Prop.
tpdelays	minutes before before Level 3 triggered.	mins3	text	Trans. Prop.
tpdelays	narrative - basis for calcuating MFBF or MTBF	mtbfcalc	<256 characters	Trans. Prop.
tpdelays	fleet wide system lost train intervals as pct of all LTI.	pctlostti	mm.nn%	Trans. Prop.
Seasons	door incident rates in Spring	spring	H, M, or L	Trans. Prop.
Seasons	door incident rates in Summer	summer	H, M, or L	Trans. Prop.
Seasons	door incident rates in Fall	fall	H, M, or L	Trans. Prop.
Seasons	door incident rates in Winter	winter	H, M, or L	Trans. Prop.
Seasons	causal environ. factor in door incident rates - high temp	hightemp	x or blank	Trans. Prop.
Seasons	causal environ. factor in door incident rates - low temp	lowtemp	x or blank	Trans. Prop.
Seasons	causal environ. factor in door incident rates - dampness	damp	x or blank	Trans. Prop.
Seasons	causal environ. factor in door incident rates - snow	snow	x or blank	Trans. Prop.
Seasons	causal environ. factor in door incident rates - wind	wind	x or blank	Trans. Prop.
Seasons	causal environ. factor in door incident rates - sun	sun	x or blank	Trans. Prop.
Seasons	comments on enviromental factors, if any.	otherss	text	Trans. Prop.
tpoperating	pct of door incidents leading to cut out door stay in service	pctcutout	mm.nn%	Trans. Prop.
tpoperating	pct of door incidents leading to cancel train	pctcancel	mm.nn%	Trans. Prop.
tpoperating	pct of door incidents leading to other scenarios	pctother	mm.nn%	Trans. Prop.
tpoperating	description other scenario	otherdesc	127 characters	Trans. Prop.
tpoperating	pct of door failures repaired in yard	pctyard	mm.nn%	Trans. Prop.
tpoperating	pct of door failures repaired in shop	pctshop	mm.nn%	Trans. Prop.
tpoperating	pct of door failures repaired in service	pctservice	mm.nn%	Trans. Prop.
tpoperating	Singles cars, married cars, or mulitcar consists	trainconfig	"SC", "MP" or "MC"	Trans. Prop.
tpoperating	min no of cars in consist	minconsist	integer	Trans. Prop.
tpoperating	max no of cars in consist	maxconsist	integer	Trans. Prop.
ccdelays	percent system delays attributed to door system incidents	pctsysdelay	mm.nn%	car class
ccdelays	percent door system lost traini intervals	pctsyslti	mm.nn%	car class

D A T A D I C T I O N A R Y III
by table name

9/6/2005

table name	Field	Variable	response format	Related to:
ccincidents	pct opening enroute	pctopen	mm.nn%	car class
ccincidents	pct phantom operation	pctphan	mm.nn%	car class
ccincidents	pct sticking.jammimg	pctstick	mm.nn%	car class
ccincidents	pct loss of train operator indication	pctlossto	mm.nn%	car class
ccincidents	pct no motion	pctnomo	mm.nn%	car class
ccincidents	ccincidother	other	text	car class
ccincidents	pct of door incidents resulting in injuries to passsengers	pctinj	mm.nn%	car class
ccops	pct environment	pctenviron	mm.nn%	car class
ccops	pct passenger use	pctpassguse	mm.nn%	car class
ccops	pct employee ops	pctemployops	mm.nn%	car class
ccops	pct design	pctdesign	mm.nn%	car class
ccops	pct maintenance	pctmaint	mm.nn%	car class
ccops	ccopsother	ccopsother	text	car class
ccdrops	door operator location -"overhead", "wall/waist mounted"	location	20 character	car class
ccdrops	door operator power - "pneumatic", "electrical", or descript	powercheck	20 character	car class
ccdrops	door operator drive - screw", "lever", "piston", "belt", "cable"	drive	20 character	car class
ccdrops	door operator manufacturer	drmaker	48 characters	car class
ccdrops	door manufacturer's model	drmodel	48 characters	car class
ccdrops	door operator original equipment ? ("yes" or "no")	droem	"yes", "no" or "n/a"	car class
ccdrops	door operator retrofit or replacement equipment?	drretrofit	"yes", "no" or "n/a"	car class
ccdrops	door operator retrofit, implemented in original equipment?	drorig	"yes", "no" or "n/a"	car class
ccdrops	door operator config changed, why	doorwhy	text	car class
ccdrops	door operator config changed, specific change	doorwhat	text	car class
cclinks	door mechanical linkages type	linktype	64 characters	car class
cclinks	door mechanical linkages -manufacturer	linkmaker	48 characters	car class
cclinks	door mechanical linkages - manufacturer's model	linkmodel	48 characters	car class
cclinks	door linkage - original equipment? ("yes" or "no")	linkoem	"yes", "no" or "n/a"	car class
cclinks	door linkage -retrofit or replacement equipment?	linkretrofit	"yes", "no" or "n/a"	car class
cclinks	door linkage mplemented in original equipment?	linkorig	"yes", "no" or "n/a"	car class
cclinks	door linkage if config changed, why	linkwhy	text	car class
cclinks	door linkage if config changed, specific change(s).	linkwhat	text	car class
ccpanels	door panel type "plug", "bi-fold", "sliding" or descript if Other.	pantype	64 characters	car class
ccpanels	door panel manufacturer	panmaker	48 characters	car class
ccpanels	door panel model	panmodel	48 characters	car class
ccpanels	door panel original equipment?	panoem	"yes", "no" or "n/a"	car class
ccpanels	door panel retrofit or replacement equipment?	panretrofit	"yes", "no" or "n/a"	car class
ccpanels	door panel retrofit implemented in original equipment?	panorig	"yes", "no" or "n/a"	car class
ccpanels	door panel if config changed, why	panwhy	text	car class
ccpanels	door panel if onfig changed, what specifically was changed	panwhat	text	car class
cchangers	door hangers - type "ball track" or descript if Other	hangtype	32 characters	car class
cchangers	door hanger manufacturer	hangmaker	48 characters	car class
cchangers	door hangers model	hangmodel	48 characters	car class
cchangers	door hanger original equipment? ("yes" or "no")	hangoem	"yes", "no" or "n/a"	car class
cchangers	door hanger etrofit or replacement equipment ("yes" or "no")	hangretrofit	"yes", "no" or "n/a"	car class
cchangers	door hanger changes mplemented in original equipment?	hangorig	"yes", "no" or "n/a"	car class
cchangers	door hanger if config changed, specific change(s)	hangwhat	text	car class

D A T A D I C T I O N A R Y III
by table name

9/6/2005

table name	Field	Variable	response format	Related to:
ccrelays	door relay manufacturer	relaymaker	48 characters	car class
ccrelays	door relay model	relaymodel	48 characters	car class
ccrelays	door relay original equipment ("yes" or "no")	relayoem	"yes", "no" or "n/a"	car class
ccrelays	door relay retrofit or replacement equipment ("yes" or "no")	relayretrofit	"yes", "no" or "n/a"	car class
ccrelays	door hanger retrofit implemented in original equipment?	relayorig	"yes", "no" or "n/a"	car class
ccrelays	door relay retrofit why?	relaywhy	text	car class
ccrelays	door relay retrofit what changed?	relaywhat	text	car class
ccmpdoor	door level use of microprocessor?	doormp	"yes", "no" or "n/a"	car class
ccmpdoor	door level microprocessor - original equipment?	doormpoem	"yes", "no" or "n/a"	car class
ccmpdoor	door level microprocessor retrofit or replacement equipment?	doormpreplace	"yes", "no" or "n/a"	car class
ccmpdoor	door level microprocessor If retrofit, Implemented in original confi	doormporig	"yes", "no" or "n/a"	car class
ccmpcar	car level micropocessor used ? (y or n)	carmp	"yes", "no" or "n/a"	car class
ccmpcar	car level microprocessor manufacturer	carmanufact	48 characters	car class
ccmpcar	car level microprocessor model	carmpmodel	48 characters	car class
ccmpcar	car level microprocessors original equipment?	carmpoem	"yes", "no" or "n/a"	car class
ccmpcar	car level microprocessor retrofit or replacement?	carmpretro	"yes", "no" or "n/a"	car class
ccmpcar	car level microprocessor - if changed, in original config?	carmporig	"yes", "no" or "n/a"	car class
ccmpcar	car level micropeocessor if retrofit or config changed, why	carmpwhy	text	car class
ccmpcar	car level mircoprocessor if changed, specific change(s)	carmpwhat	text	car class
ccwire	Wiring - wire gauge used	ccwiregauge	12 characters	car class
ccwire	wire insulation material	ccwireinsulat	48 characters	car class
ccwire	wiring Original equipment? ("yes" or "no")	ccwireoem	"yes", "no" or "n/a"	car class
ccwire	wiring retrofit or replacement equipment? ("yes" or "no")	ccwireretro	"yes", "no" or "n/a"	car class
ccwire	wiring if retrofit, Implemented in original config?	ccwireinoem	"yes", "no" or "n/a"	car class
ccwire	wiring if retrofit or config changed changed, why	ccwirewhy	text	car class
ccwire	wiring if retrofit, and config changed, specifically change(s).	ccwirewhat	text	car class
ccedges	door sensor type - "sensitive edges", "mechanical leaf"	edgetype	text	car class
ccedges	door sensor manufacturer	edgemaker	text	car class
ccedges	door sensor model model	edgemodel	text	car class
ccedges	door sensor original equipment?	edgeoem	"yes", "no" or "n/a"	car class
ccedges	door sensor retrofit or replacement equipment ("yes" or "no")	edgeretrofit	"yes", "no" or "n/a"	car class
ccedges	door sensor changesimplemented in original equipment?	edgeorig	"yes", "no" or "n/a"	car class
ccedges	door sensor- if config changed, why	edgewhy	text	car class
ccedges	door sensor - if config changed, what changes	edgewhat	text	car class
ccelectric	electric coupler type. "through coupler", hardwired",	ectype	32 characters	car class
ccelectric	electric coupler manufacturer	ecmaker	48 characters	car class
ccelectric	electric coupler model	ecmodel	48 characters	car class
ccelectric	electric coupler original equipment ("yes" or "no")	ecoem	"yes", "no" or "n/a"	car class
ccelectric	electric coupler retrofit or replacement equipment?	ecretrofit	"yes", "no" or "n/a"	car class
ccelectric	electric coupler implemented in original equipment?	ecorig	"yes", "no" or "n/a"	car class
ccelectric	electric coupler - if config changed, why	ecwhy	127 characters	car class
ccelectric	electric coupler -i f config changed, specific change(s)	ecwhat	127 characters	car class
ccelectric	electric coupler voltage drop issues? ("yes"or "no")	ecvolt	"yes" or "no"	car class
ccelectric	electric coupler -descript voltage drop issues	ecvoltmore	127 characters	car class
ccplates	threshold plates -type.	platetype	64 characters	car class
ccplates	threshold plates - manufacturer	platemaker	48 characters	car class

D A T A D I C T I O N A R Y III
by table name

9/6/2005

table name	Field	Variable	response format	Related to:
ccplates	threshold plates - material composition	platemat	48 characters	car class
ccplates	threshold plates -original equipment?	plateoem	"yes", "no" or "n/a"	car class
ccplates	threshold plates - retrofit or replacement equipment?	plateretrofit	"yes", "no" or "n/a"	car class
ccplates	threshold plates - implemented in original equipment?	plateorig	"yes", "no" or "n/a"	car class
ccplates	threshold plates -if config changed, why	platewhy	text	car class
ccplates	threshold plates - if config changed, specific change(s)	platewhat	text	car class
ccbotts	bottom door panels- type. "blade", "roller" or describe other	botttype	64 characters	car class
ccbotts	bottom door panel manufacturer	bottmaker	48 characters	car class
ccbotts	bottom door panel material composition	bottmat	64 characters	car class
ccbotts	bottom door panel original equipment?	bottoem	"yes", "no" or "n/a"	car class
ccbotts	bottom door panel -retrofit or replacement equipment?	bottretrofit	"yes", "no" or "n/a"	car class
ccbotts	bottom door panel -if retrofit, onoriginal equipment?	bottorig	"yes", "no" or "n/a"	car class
ccbotts	bottom door panel if config changed, why	bottwhy	text	car class
ccbotts	bottom door panel if config changed, what changes	bottwhat	text	car class
ccdoors	door component description "relays," "wiring", etc.	drcomponent	32 characters	car class
ccdoors	door component tablename where description appears	drtable	11 characters	car class
Fcause	failure Id eg "FC1"	fcid	4 characters	Trans. Prop.
Fcause	failure cause (description)	failcause	to 56 characters	Trans. Prop.
Ftype	failure type ID	ftid	integer	Trans. Prop.
Ftype	failure type description	failuretype	to 65 characters	Trans. Prop.
idfcause	frequency rank for a failure type	freq	integer	Trans. Prop.
idfcause	failure Id eg "FC1" related to failure type frequency	fcid	integer	Trans. Prop.

I. TRANSIT PROPERTY TABLES 4/11/2005
Train Door Database

Main Transit Property Table

Contains Transit Property ID with TP name and name of Fleet table reference

```
transitprop(                                                    // Transit Property table
  -> id          smallint not null primary_key auto_increment,          // rec seq #
  -> tpid        varchar(4),                                    // transit property id  (99 TPs max)
  -> tpname      varchar(24),                                    // transit property name
  -> fleet       varchar(7),                                    // fleet. Used to name table for fleet data
  -> failure     varchar(9),                                    // name of failure table for transit property*.
  -> spare       varchar(16)                                    // unused.
  -> );
```

Transit PropertyContact Table

Contains contact information for each Transit Property TPn

```
tpcontact(                                                      // Transit Property Contact table
  -> id          smallint not null primary_key auto_increment,          // rec seq #
  -> tpid        varchar(4),                                    //  transit property id
  -> contact1    varchar (36),                                  // contact name
  -> phone1      varchar(14),                                   // contact phone
  -> email1      varchar(24),                                   // contact email
  -> date        date,                                          // date (of response date to questionaire)
  -> contact2    varchar (36),                                  // alternate contact name
  -> phone2      varchar(14),                                   // alternate phone
  -> email2      varchar(24),                                   // alternate email
  -> spare       varchar(16),
  -> );
```

Fleet data for Transit Property TPn -describes carclasses in this transit property's fleet.

```
fleet(                                  // Fleet (car class) Data table for a Transit Property
  -> id          tinyint not null primary_key auto_increment,           // rec seq #
  -> tpid        varchar(4),                                    //  transit property id
  -> carclass    varchar(12),                                   // car class
  -> numcars,    smallint,                                      // number of cars in this car class
  -> serviceyrs  smallint,                                      // avg years in service
  -> amiles      smallint,                                      // average annual mileage
  -> ahours      smallint,                                      // average annual hours operated per year
  -> avgmph      smallint,                                      // average speed (computed from miles, hrs)
  -> spare       varchar(16),                                   // spare - not used
  -> );
```

II. DOOR FAILURE TABLES 4/25/2005
Train Door Database

Failure Cause Description Table, read only.
Table fcause provides a text description of failure causes, used for output display.
Table is populated with fcid set to "FC"+failure cause number.

```
fcause(                                                    // Failure Cause Description
    -> id          tinyint not null primary key auto_increment,   // seq#
    -> fcid        varchar(4),                             // failure cause ID, = FC1, FC2, FC3,...FC22
    -> failcause   varchar(60),                            // failure cause description
    -> );
```

Failure Type Table, read only.
Provides text description of failure types for output. Corresponds to questionaire
Table is populated with failure type ID (ftid) set to "FT"+ questionaire number: FT1, FT2, FT3...FT7.
Both tables fcause and ftype are read-only and should be initialised as shown in appendix A.

```
ftype(                                                     // Failure Type Description
    -> id          tinyint not null auto_increment,        // seq #
    -> ftid        varchar(4),                             // failure type ID (FT1, FT2, FT3.....FT7)
    -> failuretype varchar(80),                            // failure type description
    ->  );
```

Table to look up failure cause for freq rank in Table FailureN
Identifies a failure cause (fcnr) for a frequency rank in failure table (failures).
Read only table. See Appendix A for initialising values, based on questionaire questions and answers..

```
idfcause(                                                  //  table to identify failure cause with frequency
    ->  id         tinyint not null  primary key auto_increment,   // id   record number
    ->  freq       varchar(5),                             // column name for freq in table idcause
    ->  fcid       varchar(4),                             // failure cause ID (FC1, FC2, FC3...FC23)
    ->  spare      char(12),
    -> );
```

Conversion Sequence Table, used to convert the failure sequence number in the questionaire to the failure cause ID.
For data entry, the failure cause (fcseqno) as shown on the questionaire is input. MySQL would look up the corresponding failure cause id (fcid), using the sequence number (fcseqno) for the failure type (FTn) question.

Unfortunately the survey was not designed with automated processsing in mind, in that the possible causes for a specific type of failure was not coded but instead is identified by a sequential number to indicate its place in the list. This table is used to get the unique identifier assigned to each failure cause which may be common to more than one type of door failure.

A read only table used to convert the sequence number for a failure cause to the ID for a failure cause.
Refer to Appendix A for initialising values in tables.

```
convertseq(                                                // conversion seq to failure ID table.
    -> id          tinyint not null  primary key auto_increment,   // id   record number
    -> ftid        varchar(4) not null,                    // failure type,  value FTn = Question n, n=1, 2, ..7
    -> fcseqno     tinyint not null,                       // sequence on questionaire
    -> fcid        varchar(6)  not null,                   // failure id, look up in table Fcause
    -> );
```

II. DOOR FAILURE TABLES 4/25/2005
Train Door Database

Contains failure frequency or rank for type of failure in each transit property.

```
    failures(
->   id      smallint not null  primary key auto_increment,                  // rec seq #
->   tpid    varchar(4), // transit property ID. Transit Property n is TPn
->   ftid    varchar(4),   //  failure type ID. Questionaire n is FTn
->   fc1r    smallint,     //  freq for failure cause FC1 (rank 1-5 or 0 for N/A)          trainline (wiring.pin)
->   fc2r    smallint,     //  freq for failure cause FC2 (rank 1-5)                      door push  buttons
->   fc3r    smallint,     //  freq for failure cause FC3 (rank 1-5)                      interlock failure
->   fc4r    smallint,     //  freq for failure cause FC4 (rank 1-5)                      car network
->   fc5r    smallint,     //  freq for failure cause FC5 (rank 1-5)                      door operator motor
->   fc6r    smallint,     //  freq for failure cause FC6 (rank 1-5)                      local door controller
->   fc7r    smallint,     //  freq for failure cause FC7 (rank 1-5)                      unlock mechanism
->   fc8r    smallint,     //  freq for failure cause FC8 (rank 1-5)                      electrical coupler
->   fc9r    smallint,     //  freq for failure cause FC9 (rank 1-5)                      threshold or bottom door guide
->   fc10r   smallint,     //  freq for failure cause FC10 (rank 1-5)                     door  panel
->   fc11r   smallint,     //  freq for failure cause FC11 (rank 1-5)                     short or open circuit
->   fc12r   smallint,     //  freq for failure cause FC12 (rank 1-5)                     switch/sensor
->   fc13r   smallint,     //  freq for failure cause FC13 (rank 1-5)                     train takes power w/o correct door status
->   fc14r   smallint,     //  freq for failure cause FC14 (rank 1-5)                     fails to take power w/o correct door status
->   fc15r   smallint,     //  freq for failure cause FC15 (rank 1-5)                     inerlock/unauthor door interlock (operator error)
->   fc16r   smallint,     //  freq for failure cause FC16 (rank 1-5)                     other interlock  failures (no motion)
->   fc17r   smallint,     //  freq for failure cause FC17 (rank 1-5)                     local door  panel
->   fc18r   smallint,     //  freq for failure cause FC18 (rank 1-5)                     opening control (button/swirch) location issue
->   fc19r   smallint,     //  freq for failure cause FC19 (rank 1-5)                     wayside failure
->   fc20r   smallint,     //  freq for failure cause FC20 (rank 1-5)                     door edge
->   fc21r   smallint,     //  freq for failure cause FC21 (rank 1-5)                     design problem requiring modification
->   fc22r   smallint,     //  freq for failure cause FC22 (rank 1-5)                     Other
->   fc23r   tinytext,     // descript of failure under "other"                          description  - for Other
->   fc24r   tinytext,     // descript of action taken or ops change                     Action taken
->  fc24id   varchar(4),   // Failure Cause FCnn referred to in fc24r,  for which action taken or ops changed
-> );
```

TraindoorDB 7-21-05.xls: Failures Failure tables: (3 of 15)

III. FLEET RELATED TABLES 7/25/2005
Train Door Database

Fleet table identifying the fleet(s) or car classe(s) for each transit property
Data describes car classes in a transit property

```
fleet(                                          // Fleet Data table for a Transit Property
-> id           smallint not null primary_key auto_increment,   // rec seq #
-> tpid         varchar(4),                     // transit property id  (99 TPs max)
-> carclass     varchar(12),                    // car class
-> numcars,     smallint,                       // number of cars in this car class
-> serviceyrs   float(5.2),                     // avg years in service
-> amiles       medint,                         // average annual mileage
-> ahours       medint,                         // average annual hours operated per year
-> avgmph       smallint,                       // average speed (computed from miles, hours)
-> spare        varchar(16),
-> );
```

Delays by fleet in a transit property -Table tpdelays
Contains data from Part III Operations question #1, 2,3 and fleet portion of #5

```
tpdelays(                                       // Delay reporting for transit property or fleet
-> id           smallint not null primary_key auto_increment,   // id    record number
-> tpid         varchar(4),                     // transit property id  (99 TPs max)
-> timeval      varchar(1),                     // not null is tran delay is defined by time value
-> otherdef     varchar (128),                  // narrative-  if delay is not defined by time value
-> mins2        text,                           // mins before before Level 2 triggered.
-> mins3        text,                           // mins before before Level 3 triggered.
-> mtbfcalc     varchar(256),                   // narrative - basis for calcuating MFBF or MTBF
-> pctlostti     float(5,2),                     // fleet wide system lost train intervals as pct of all LTI.
-> pctdstd      float(5,2),                     // fleet wide door system delays as a pct of all train delays
-> );
```

Effect of seasonal/environmental variations on door incident rates
Data from Survey Part III Operations, Question #6

```
Seasons(                                        //
-> id           smallint not null primary_key auto_increment,   // id    record number
-> tpid         varchar(4),                     // transit property id  (99 TPs max)
-> spring       varchar(1),                     //  response High, Medium or Low (H,M, or L)
-> summer       varchar(1),                     //  response High, Medium or Low (H,M, or L)
-> fall         varchar(1),                     //  response High, Medium or Low (H,M, or L)
-> winter       varchar(1),                     //  response High, Medium or Low (H,M, or L)
-> hightemp     varchar(1),                     // causal environ. factor in door incident rates - high temp
-> lowtemp      varchar(1),                     // causal environ. factor in door incident rates - low temp
-> damp         varchar(1),                     // causal environ. factor in door incident rates - dampness
-> snow         varchar(1),                     // causal environ. factor in door incident rates - snow
-> wind         varchar(1),                     // causal environ. factor in door incident rates - wind
-> sun          varchar(1),                     // causal environ. factor in door incident rates - sun
-> otherss      mediumtext,                     // comments on enviromental factors, if any.
-> );
```

III. FLEET RELATED TABLES 7/25/2005
Train Door Database

Operating Policy, Repair Policy and Train Configuration
Data from Survey Part I Fleet, Question 3, 4, 5

```
tpoperating
-> id              smallint not null primary_key auto_increment,   // id    record number
-> tpid            varchar(4),
-> pctcutout       float(5,2),                                     //  pct cut out door stay in service
-> pctcancel       float(5,2),                                     //  pct cancel train
-> pctother        float(5,2),                                     //  pct other scenario
-> otherdesc       text,                                           //  description other scenario
-> pctyard         float(5,2),                                     //  pct repair in yard
-> pctshop         float(5,2),                                     //  pct repair in yard
-> pctservice      float(5,2),                                     //  pct repair in service
-> trainconfigsc   varchar(1),                                     //  Singles cars, "y" or "n"
-> trainconfigm    varchar(1),                                     //   married pairs, "y" or "n"
-> trainconfigm    varchar(1),                                     //  multicar .consists, "y" or "n"
-> minconsist      integer,                                        // min no of cars in consist
-> maxconsist      integer,                                        // max no of cars in consist
-> );
```

IV. CAR CLASS-RELATED TABLES 7/25/2005
Train Door Database

To display survey questions on car class related data for Part III Operations, you will need to display a row for each car class, for the responding transit property. (SELECT carclass FROM fleetn)

For reference, the Fleet Table description is shown below (fleet1, for transit Property1):
table fleetn(id, carclass, numcars, serviceyrs, amiles, ahours, avgmph, spare)

Delays by car class table -Table ccdelays **Data from Part III Operations question #4 & #5**

```
ccdelays(
        -> id          smallint not null primary_key auto_increment,    // seq no
        -> tpid        varchar(4),          // transit prop no
        -> carclass    varchar(12),         // carclass
        -> pctsysdelay float(5,2),          // percent system delays
        -> pctsyslti   float(5,2),          // percent door system lost traini intervals
        -> );
```

Types of Incidents by Car Class - Table ccincidents **Data from Part III Operations question #7 & #8**

```
ccincidents(
        -> id          smallint not null primary_key auto_increment,    // seq no
        -> tpid        varchar(4),          // transit prop no
        -> carclass    varchar(12),         // carclass
        -> pctopen     float(5,2),          //pct opening enroute
        -> pctphan     float(5,2),          // pct phantom operation
        -> pctstick    float(5,2),          //pct sticking.jammimg
        -> pctlossto   float(5,2),          //pct loss of train operator indication
        -> pctnomo     float(5,2),          //pct no motion
        -> ccincidother medium text,        // other
        -> pctinj      float(5,2),          // pct of door incidents resulting in injuries to passsengers
        -> );
```

Events affecting operations and reliablity -Table ccops **Data from Part III Operations question #9**

```
ccops(
        -> id          smallint not null primary_key auto_increment,    // seq no
        -> tpid        varchar(4),          // transit prop no
        -> carclass    varchar(12),         // carclass
        -> pctenviron  float(5,2),          //pct environment
        -> pctpassguse float(5,2),          // pct passenger use
        -> pctemployops float(5,2),         //pct employee ops
        -> pctdesign   float(5,2),          //pct design
        -> pctmaint    float(5,2),          //pct maintenance
        -> cccopsother medium text,         // other factors
        -> );
```

IV Car Class tables: (1 of 6)

TraindoorDB.xls: CarClass

IV. CAR CLASS-RELATED TABLES 7/25/2005
Train Door Database

Door operators, for a car class **Data from Part II Equipment Survey Question #2**

```
ccdrops(
        -> id          smallint not null primary_key auto_increment,    // seq no
        -> tpid        varchar(4),          // transit prop no
        -> carclass    varchar(12),         // carclass
        -> location    varchar(20),         //  "overhead", "wall/waist mounted" or "under seat floor"
        -> powercheck  varchar(20),         //  "pneumatic", "electrical", or descript to 20 characters
        -> drive       varchar(20),         //  "screw", "lever", "piston", "belt", "cable" or "other"
        -> drmaker     varchar(48),         // door manufacturer
        -> drmodel     varchar(32),         //  model
        -> droem       varchar(3),          // A original equipment ("yes" or "no")
        -> drretrofit  varchar(3),          // B retrofit or replacement equipment ("yes" or "no")
        -> drorig      varchar(3),          // B1 implemented in original equipment ("yes" or "no" or "N/A")
        -> doorwhy     medium text,         // B2 if config changed, why
        -> doorwhat    medium text,         // B2 if config changed, what specifically was changed
        -> );
```

Door mechanical linkages, for a car class **Data from Part II Equipment Survey Question #2**

```
cclinks(
        -> id          smallint not null primary_key auto_increment,    // seq no
        -> tpid        varchar(4),          // transit prop no
        -> carclass    varchar(12),         // carclass
        -> linktype    varchar(64),         //  mechanical linkages - type
        -> linkmaker   varchar(48),         //  mechanical linkages -manufacturer
        -> linkmodel   varchar(32),         //  mechanical linkages - model
        -> linkoem     varchar(3),          // A original equipment ("yes" or "no")
        -> linkretrofit varchar(3),         // B. retrofit or replacement equipment ("yes" or "no")
        -> linkorig    varchar(3),          // B1 implemented in original equipment ("yes" or "no" or "N/A")
        -> linkwhy     medium text,         // B2 if config changed, why
        -> linkwhat    medium text,         // B2 if config changed, what specifically was changed
        -> );
```

Door panels, for a car class **Data from Part II Equipment Survey Question #3**

```
ccpanels(
        -> id          smallint not null primary_key auto_increment,    // seq no
        -> tpid        varchar(4),          // transit prop no
        -> carclass    varchar(12),         // carclass
        -> pantype     varchar(64),         //  panel type "plug", "bi-fold", "sliding" or descript if Other.
        -> panmaker    varchar(48),         //  door panel manufacturer
        -> panmodel    varchar(32),         //  door panel model
        -> panoem      varchar(3),          // A original equipment ("yes" or "no")
        -> panretrofit varchar(3),          // B. retrofit or replacement equipment ("yes" or "no")
        -> panorig     varchar(3),          // B1 implemented in original equipment ("yes" or "no" or "N/A")
        -> panwhy      medium text,         // B2 if config changed, why
        -> panwhat     medium text,         // B2 if config changed, what specifically was changed
        -> );
```

IV. CAR CLASS-RELATED TABLES 7/25/2005
Train Door Database

Door hangers, for a car class **Data from Part II Equipment Survey Question #4**

```
cchangers(
        -> id           smallint not null primary_key auto_increment,           // seq no
        -> tpid         varchar(4),             // transit prop no
        -> carclass     varchar(12),            // carclass
        -> hangtype     varchar(32),            //  door hangers - type  "ball track" or descript if Other
        -> hangmaker    varchar(48),            //  door hanger manufacturer
        -> hangmodel    varchar(32),            //  door hangers model
        -> hangoem      varchar(3),             // A original equipment ("yes" or "no")
        -> hangretrofit varchar(3),             // B. retrofit or replacement equipment ("yes" or "no")
        -> hangorig     varchar(3),             // B1 implemented in original equipment ("yes" or "no" or "N/A")
        -> hangwhy      medium text,            // B2 if config changed, why
        -> hangwhat     medium text,            // B2 if config changed, what specifically was changed
        -> );
```

Door relays, for a car class **Data from Part II Equipment Survey Question #5**

```
ccrelays(
        -> id           smallint not null primary_key auto_increment,
        -> tpid         varchar(4),             // transit prop no
        -> carclass     varchar(12),            // carclass
        -> relaymaker   varchar(48),            //  relay manufacturer
        -> relaymodel   varchar(32),            //  door relay model
        -> relayoem     varchar(3),             // A original equipment ("yes" or "no")
        -> relayretrofit varchar(3),            // B. retrofit or replacement equipment ("yes" or "no")
        -> relayorig    varchar(3),             // B1 implemented in original equipment ("yes" or "no" or "N/A")
        -> relaywhy     medium text,            // B2  why changed
        -> relaywhat    medium text,            // B3  what was changed
        -> );
```

Microprocessor/Electronics Equip (door level) **Data from Part II Equipment Survey Question #6**

```
ccmpdoor(
        -> id           smallint not null primary_key auto_increment,           // seq no
        -> tpid         varchar(4),             // transit prop no
        -> carclass     varchar(12),            // carclass
        -> doormp       varchar(3),             //  micropocessor used at door level?  ("yes" or "no")
        -> doormpoem    varchar(3),             // A.  Original equipment?  ("yes" or "no")
        -> doormpreplace varchar(3),            // B. retrofit or replacement equipment ("yes" or "no")
        -> doormporig   varchar(3),             // B1 implemented in original equipment ("yes" or "no" or "N/A")
        -> );
```

Microprocessor/Electronics Equip (car level) **Data from Part II Equipment Survey Question #7**

```
ccmpcar(
        -> id           smallint not null primary_key auto_increment,           // seq no
        -> tpid         varchar(4),             // transit prop no
        -> carclass     varchar(12),            // carclass
        -> carmp        varchar(1),             //  micropocessor used at car level? Yes or No (y or n)
        -> carmanufact  varchar(48),            //  Manufacturer
        -> carmpmodel   varchar(48),            // Model
        -> carmpoem     varchar(3),             // A.  Original equipment?  ("yes" or "no")
        -> carmpretro   varchar(3),             // B. retrofit or replacement equipment ("yes" or "no")
        -> carmporig    varchar(3),             // B1 implemented in original equipment ("yes" or "no" or "N/A")
        -> carmpwhy     medium text,            // B2. If retrofit, and config changed changed, why
        -> carmpwhat    medium text,            // If retrofit, and config changed changed, what was specifically changed
        -> );
```

IV Car Class tables: (3 of 6)

TraindoorDB.xls: CarClass

IV. CAR CLASS-RELATED TABLES 7/25/2005
Train Door Database

Wiring **Data from Part II Equipment Survey Question #8**

```
ccwire(
        -> id           smallint not null primary_key auto_increment,   // seq no
        -> tpid         varchar(4),             // transit prop no
        -> carclass     varchar(12),            // carclass
        -> ccwiregauge  varchar(12),            // wire gauge
        -> ccwireinsulat varchar(36),           // wire insulation material
        -> ccwireoem    varchar(3),             // A.  Original equipment?  ("yes" or "no")
        -> ccwireretro  varchar(3),             // B. retrofit or replacement equipment?  ("yes" or "no")
        -> ccwireinoem  varchar(3),             // B1. If retrofit, Implemented in original config?  ("yes" or "no" or "N/A")
        -> ccwirewhy    medium text,            // B2. If retrofit, and config changed changed, why
        -> ccwirewhat   medium text,            // If retrofit, and config changed, what was specifically changed
        -> );
```

Door sensors, sensitive edges **Data from Part II Equipment Survey Question #9**

```
ccedges(
        -> id           smallint not null primary_key auto_increment,   // seq no
        -> tpid         varchar(4),             // transit prop no
        -> carclass     varchar(12),            // carclass
        -> edgetype     varchar(32),            // type. "sensitive edges", "mechanical leaf", or descript if Other
        -> edgemaker    varchar(48),            //  manufacturer
        -> edgemodel    varchar(32),            //   model
        -> edgeoem      varchar(3),             // A original equipment ("yes" or "no")
        -> edgeretrofit varchar(3),             // B. retrofit or replacement equipment ("yes" or "no")
        -> edgeorig     varchar(3),             // B1 implemented in original equipment ("yes" or "no" or "N/A")
        -> edgewhy      varchar(128),           // B2 if config changed, why
        -> edgewhat     varchar(128),           // B2 if config changed, what specifically was changed
        -> );
```

Electric couplers/ train lines **Data from Part II Equipment Survey Question #10**

```
ccelectric(
        -> id           smallint not null primary_key auto_increment,   // seq no
        -> tpid         varchar(4),             // transit prop no
        -> carclass     varchar(12),            // carclass
        -> ectype       varchar(32),            // type. "through coupler", hardwired", or descript if Other
        -> ecmaker      varchar(48),            //  manufacturer
        -> ecmodel      varchar(32),            //   model
        -> ecoem        varchar(3),             //  A original equipment ("yes" or "no")
        -> ecretrofit   varchar(3),             //  B. retrofit or replacement equipment ("yes" or "no")
        -> ecorig       varchar(3),             // B1 implemented in original equipment ("yes" or "no" or "N/A")
        -> ecwhy        varchar(128),           //  B2 if config changed, why
        -> ecwhat       varchar(128),           //  B2 if config changed, what specifically was changed
        -> ecvolt       varchar(3),             //  C  voltage drop issues ("yes"or "no")
        -> ecvoltmore   varchar(128),           //  C1  vdescript voltage drop issues
        -> );
```

IV Car Class tables: (4 of 6)

TraindoorDB.xls: CarClass

IV. CAR CLASS-RELATED TABLES 7/25/2005
Train Door Database

Threshold plates **Data from Part II Equipment Survey Question #11**

```
ccplates(
        -> id           smallint not null primary_key auto_increment,   // seq no
        -> tpid         varchar(4),             // transit prop no
        -> carclass     varchar(12),            // carclass
        -> platetype    varchar(64),            // type.
        -> platemaker   varchar(48),            //  manufacturer
        -> platemat     varchar(32),            //  material composition
        -> plateoem     varchar(3),             //  A original equipment ("yes" or "no")
        -> plateretrofit varchar(3),            //  B. retrofit or replacement equipment ("yes" or "no")
        -> plateorig    varchar(3),             // B1 implemented in original equipment ("yes" or "no" or "N/A")
        -> platewhy     text,                   //  B2 if config changed, why
        -> platewhat    text,                   //  B2 if config changed, what specifically was changed
        -> );
```

Bottom door panel guides **Data from Part II Equipment Survey Question #12**

```
ccbotts(
        -> id           smallint not null primary_key auto_increment,   // seq no
        -> tpid         varchar(4),             // transit prop no
        -> carclass     varchar(12),            // carclass
        -> botttype     varchar(64),            // type. "blade", "roller" or descript if Other.
        -> bottmaker    varchar(48),            //  manufacturer
        -> bottmat      varchar(64),            //  material composition
        -> bottoem      varchar(3),             //  A original equipment ("yes" or "no")
        -> bottretrofit varchar(3),             //  B. retrofit or replacement equipment ("yes" or "no")
        -> bottorig     varchar(3),             // B1 implemented in original equipment ("yes" or "no" or "N/A")
        -> bottwhy      text,                   //  B2 if config changed, why
        -> bottwhat     text,                   //  B2 if config changed, what specifically was changed
        -> );
```

IV Car Class tables: (5 of 6)

TraindoorDB.xls: CarClass

IV. CAR CLASS-RELATED TABLES 7/25/2005
Train Door Database

…..more next page

Equipment type description table
Read-only table, lists door component equipment and corresponding table
See Appendix for populated table. Also shown below for convenience

```
ccdoors(
        -> id           tinyint not null primary_key,
        -> drcomponent  varchar(32),        // component description
        -> drtable      varchar(11),        // table for component data
        -> );
```

Contents of populated Read-Only table ccdoors, shown for convencience.
Door equipment component description, populated.
used to get component description for drop-down list in query
tablename - ccdoors

id	drcomponent	drtable
1	Door Operators	ccdrops
2	Mechanical Linkages	cclinks
3	Door Panels	ccpanels
4	Door Hangers	cchangers
5	Relays	ccrelays
6	Microprocessor (door level)	ccmpdoor
7	Microprocessor (car level)	ccmpcar
8	Wiring	ccwire
9	Sensitive Edges / Door Sensors	ccedges
10	Electric Couplers / Train LInes	ccelectric
11	Threshold Plates	ccplates
12	Bottom Door Panel Guides	ccbotts

IV Car Class tables: (6 of 6)

TraindoorDB.xls: CarClass

D E S C R I P T I O N L O O K - U P T A B L E S

3/24/2005

Train Door database

These values for intialising the look-up tables
When populated these read-only tables are used to look up descriptions for output display.

Failure cause table

tablename = Fcause

id	fcid	failcause
1	FC1	trainline (wiring/pin)
2	FC2	door push buttons
3	FC3	interlock failure
4	FC4	car network
5	FC5	door operator motor
6	FC6	local door controller
7	FC7	unlock mechanism
8	FC8	elecrical coupler
9	FC9	threshold or bottom door guide
10	FC10	door panel
11	FC11	short or open circuit
12	FC12	switch/sensor
13	FC13	train takes power w/o correct door status (door open)
14	FC14	fails to take power w correct door status
15	FC15	interlock/unauthor door interlock bypass (operator error)
16	FC16	other interlock failures (no motion)
17	FC17	local door panel
18	FC18	opening control (button/switch) location issue
19	FC19	wayside failure
20	FC20	door edge
21	FC21	design problem requiring modification
22	FC22	Other
22	FC23	descript - other failure
23	FC24	Action taken

Failure Type Table

tablename = Ftype

id	ftid	failuretype
1	FT1	Door failed to Open or Close when commanded from Operator Console
2	FT2	Door Status Interlock Failure
3	FT3	Incorrect Door Opening - Door Open in Motion
4	FT4	Incorrecr Door Operaton (Operation/Wayside Error)
5	FT5	Obstruction Detection Failures / Drags
6	FT6	Freewheeling Door Panel
7	FT7	Doors Fail to completely Close and Lock and indicate Closed and Lock

D E S C R I P T I O N L O O K - U P T A B L E S

3/24/2005

Train Door database

Failure cause/failure frequency id table

Used to identify failure cause for a freq rank

tablename = idfcause

id	freq	fcid	spare
1	fc1r	FC1	
2	fc2r	FC2	
3	fc3r	FC3	
4	fc4r	FC4	
5	fc5r	FC5	
6	fc6r	FC6	
7	fc7r	FC7	
8	fc8r	FC8	
9	fc9r	FC9	
10	fc10r	FC10	
11	fc11r	FC11	
12	fc12r	FC12	
13	fc13r	FC13	
14	fc14r	FC14	
15	fc15r	FC15	
16	fc16r	FC16	
17	fc17r	FC17	
18	fc18r	FC18	
19	fc19r	FC19	
20	fc20r	FC20	
21	fc21r	FC21	
22	fc22r	FC22	
23	fc23r	FC23	
24	fc24r	FC24	

D E S C R I P T I O N L O O K - U P T A B L E S

Train Door database

3/24/2005

Table convertseq is used to get the failure cause ID (fcid) from the sequence number (fcseqno) used in the Failure Type Questionaire (ftid = FT1, FT2, FT3,..FT7)
e.g., on Questionaire 2, (failure Type 2 or FT2) ifthe failure cause is the third in the sequence of posssible causes (fcseqno), look up the failure cause ID(fcid) : (general SQL below)

SELECT fcid FROM convertseq WHERE ftid = FT2 AND fcseqno = 3 **(get actual failure cause id)**
INSERT INTO failures max id+1, fyid, fc2r **(insert into failures table)**
(fc2r contains the frequency or rank for failure cause in a type 2 failure. Set other fcnr cols to blank)

tablename = convertseq

id	ftid	fcseqno	fcid
1	FT1	1	FC1
2	FT1	2	FC2
3	FT1	3	FC3
4	FT1	4	FC4
5	FT1	5	FC5
6	FT1	6	FC6
7	FT1	7	FC7
8	FT1	8	FC8
9	FT1	9	FC9
10	FT1	10	FC10
11	FT1	11	FC11
12	FT1	12	FC12
13	FT1	13	FC21
14	FT1	14	FC22
15	FT2	1	FC1
16	FT2	2	FC2
17	FT2	3	FC4
18	FT2	4	FC8
19	FT2	5	FC10
20	FT2	6	FC11
21	FT2	7	FC17
22	FT2	8	F14
23	FT2	9	FC15
24	FT2	10	FC16
25	FT2	11	FC17
26	FT2	12	FC21
27	FT2	13	FC22
28	FT3	1	FC1
29	FT3	2	FC2
30	FT3	3	FC3
31	FT3	4	FC4
32	FT3	5	FC5
33	FT3	6	FC6
34	FT3	7	FC7
35	FT3	8	FC8
36	FT3	9	FC9
37	FT3	10	FC10
38	FT3	11	FC11
39	FT3	12	FC12
40	FT3	13	FC21
41	FT3	14	FC22
42	FT4	1	FC18

continued

id	ftid	fcseq	fcid
43	FT4	2	FC19
44	FT4	3	FC3
45	FT4	4	FC4
46	FT5	1	FC1
47	FT5	2	FC2
48	FT5	3	FC3
49	FT5	4	FC4
50	FT5	5	FC5
51	FT5	6	FC6
52	FT5	7	FC7
53	FT5	8	FC8
54	FT5	9	FC9
55	FT5	10	FC10
56	FT5	11	FC11
57	FT5	12	FC12
58	FT5	13	FC20
59	FT5	14	FC21
60	FT5	15	FC22
61	FT6	1	FC1
62	FT6	2	FC3
63	FT6	3	FC4
64	FT6	4	FC5
65	FT6	5	FC6
66	FT6	6	FC7
67	FT6	7	FC10
68	FT6	8	FC11
69	FT6	9	FC21
70	FT6	10	FC22
71	FT7	1	FC1
72	FT7	2	FC2
73	FT7	3	FC3
74	FT7	4	FC4
75	FT7	5	FC5
76	FT7	6	FC6
77	FT7	7	FC7
78	FT7	8	FC8
79	FT7	9	FC9
80	FT7	10	FC10
81	FT7	11	FC11
82	FT7	12	FC12
83	FT7	13	FC21
85	FT7	14	FC22

continued

id	ftid	fcseqno	fcid
85	FT1	15	FC23
86	FT1	16	FC24
87	FT2	14	FC23
88	FT2	15	FC24
89	FT3	15	FC23
90	FT3	16	FC24
91	FT4	5	FC23
92	FT4	6	FC24
93	FT5	16	FC23
94	FT5	17	FC24
95	FT6	11	FC23
96	FT6	12	FC24
97	FT7	15	FC23
98	FT7	16	FC24

D E S C R I P T I O N L O O K - U P T A B L E S

3/24/2005

Train Door database

Door equipment component

used to get component description for drop-down list in query

tablename - ccdoors

id	drcomponent	drtable
1	Door Operators	ccdrops
2	Mechanical Linkages	cclinks
3	Door Panels	ccpanels
4	Door Hangers	cchangers
5	Relays	ccrelays
6	Sensitive Edges / Door Sensors	ccedges
7	Electric Couplers / Train LInes	ccelectric
8	Threshold Plates	ccplates
9	Bottom Door Panel Guides	ccbotts

Appendix B
Design Information on traindoors.com

The data of traindoors.com is stored in a MySQL database described in Appendix A. The database is hosted on a PC running the Linux operating system. The traindoors.com website is hosted on an Apache HTTP Server. The web application is developed in PHP and Smarty, and styled with XHTML / CSS.

The developers chose to develop traindoors.com to the greatest extent possible using open-source software, for reasons of stability, broad availability, security, community support, and cost-effectiveness.

MySQL is a multithreaded, multi-user, SQL (Structured Query Language) relational database server (RDBMS) with an estimated five million installations. MySQL is open source software available under the GNU General Public License (GPL). (www.mysql.com)

Linux is a computer operating system and kernel. It is free software in open-source development: unlike other major operating systems (such as Windows or Mac OS), all of its underlying source code is available to the public and anyone can freely use, modify, and redistribute it. The term Linux strictly refers to the Linux kernel, but is commonly used to describe entire Unix-like operating systems (also known as GNU/Linux) that are based on the Linux kernel combined with libraries and tools from the GNU project.

Apache HTTP Server is an open source HTTP web server for Unix-like systems including Linux, Microsoft Windows, and other platforms. Apache features DBMS-based authentication databases, highly configurable error messages, and content negotiation. It is supported by several graphical user interfaces (GUIs) which permit easier, more intuitive configuration of the server. The Apache HTTP Server is developed and maintained by an open community of developers under the auspices of the Apache Software Foundation.

PHP is a popular open-source, reflective, programming language used mainly for developing server-side applications and dynamic web content, and more recently, other software. The name is a recursive acronym for "PHP: Hypertext Preprocessor". (www.php.net)

XHTML, or Extensible Hypertext Markup Language, is a markup language broadly used for creation of web pages and browser-viewable information. XHMTL denotes certain text as headings, paragraphs, lists and so on -- and can be used to define the semantics of a document. XHTML, an application of XML, has the same expressive possibilities as HTML but a stricter syntax. Because XHMTL documents must be syntactically correct XML documents, they permit automated processing using a standard XML library, unlike HTML. CSS, or Cascading Style Sheets, is a stylesheet language used to describe the presentation of a document written in a markup language. Its most common application is to style web pages written in HTML and XHTML. XHTML, CSS, XML, and HTML are international standards maintained by the World Wide Web Consortium (W3C). (www.w3c.org)

Smarty is a Template/Presentation Framework which provides the programmer and template designer with tools to automate tasks commonly dealt with at the presentation layer of an application. Smarty facilitates separation of the application code containing the business logic from the presentation templates, so that changes in website appearance cannot interact with the logic performed by the application code. (www.smarty.php.net)

Appendix C
Getting Train Door Information from and into traindoors.com

C1 Traindoors.com Results Presentation

To get data from the Train Door database, a user chooses the See Results tab on the home page, shown in Figure 3.

From the See Results tab, the user has several choices. Each choice is a sub-tab under the 'See Results' tab:

- **One At A Time**: This tab displays selected or complete results for a single transit agency. Here a user can examine complete survey results by transit agency, to look at the details of the selected transit agency's replies to questions on door failures, failure causes for each of failure, narrative descriptions and definitions such as door MTBF, failure rate and impact, the presentation of operational data, details of door components and equipment, and fleet descriptions within a transit agency. Figure 3 shows the page for choosing these outputs.

- **Compare Data**: This tab displays selected results for equivalent items across *all* transit agencies. For example, asking for a display of causal environmental factors as indicated by each transit agency will display the responses for the selected variable by all transit agencies in table form. For a question about door equipment, the table will give the responses for each car class at each transit agency.

- **Export Data to Excel**: This tab provides data tables for further off-line analysis and processing by the user. The user can import the data into a relational database and make combinational queries, bring the data into a spreadsheet and plot distribution histograms, or undertake any analysis which uses the base data.

C1.1 Single Transit Agency Results

Figure C1-1, repeated from section 4, shows the screen from which a user can choose to see selected or complete results for a single transit agency.

By clicking on the "View Individual Pages" link, the user is brought to the screen in Figure C1-2. On this screen, the user has the choice of any of the questions asked in the two questionnaires.

Figure C1-3 shows typical results for a selected question for a single car class on a single transit agency. In this case, it is the CTA Class 2200 car Door Operator.

Figure C1-1
Single Transit Agency Results Selection

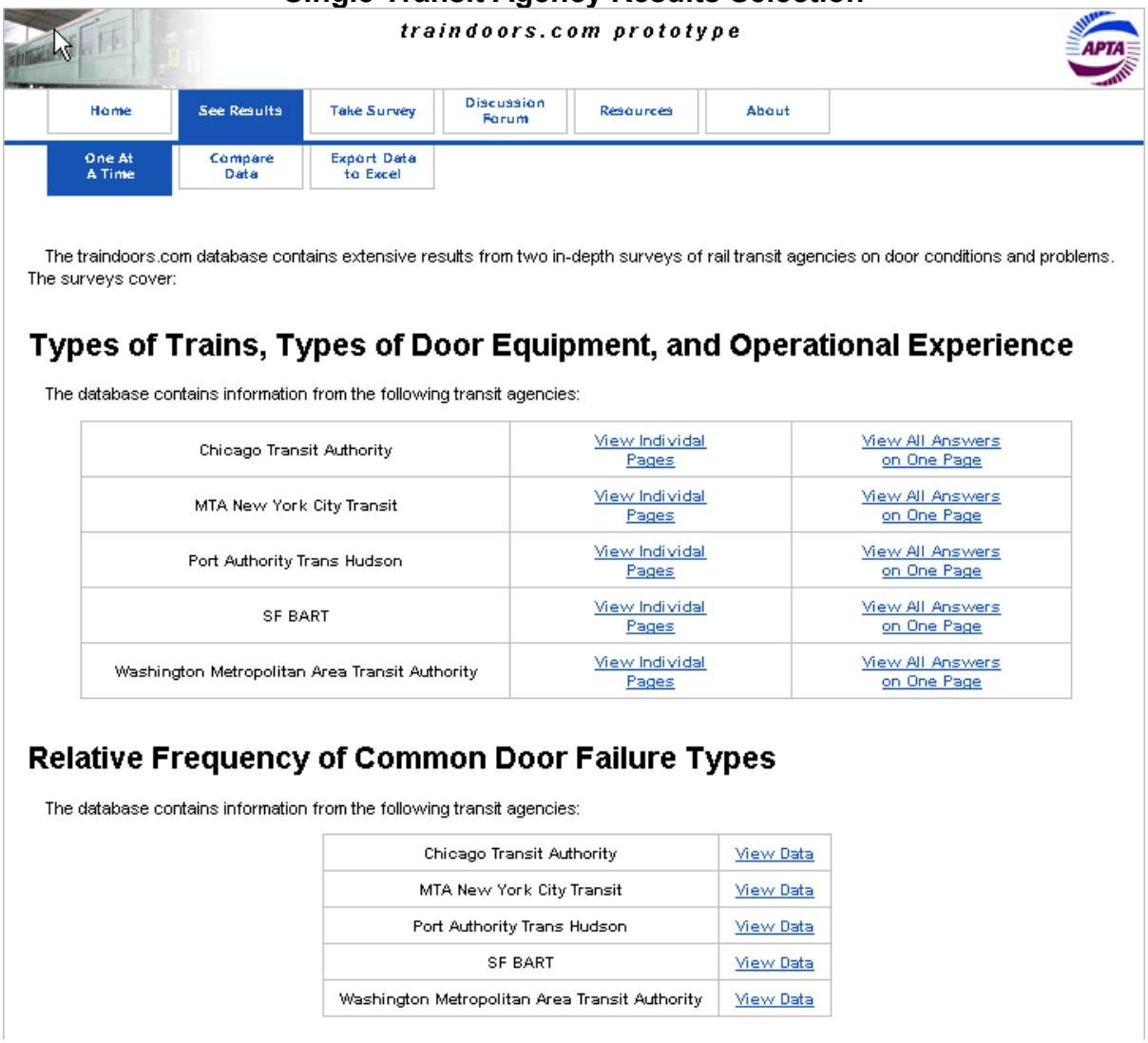


Figure C1-2
Choosing a Question - Single Transit Agency Results

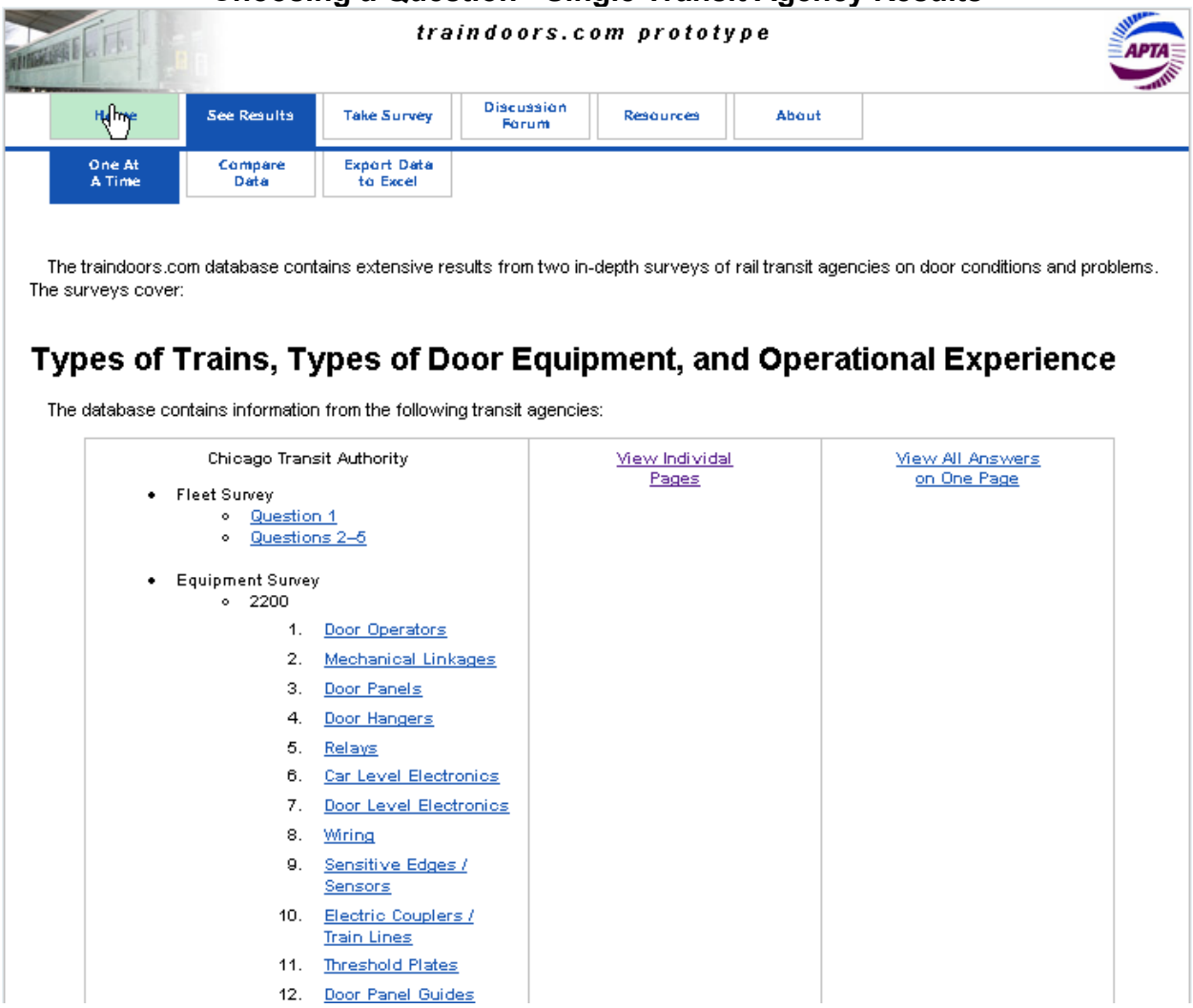
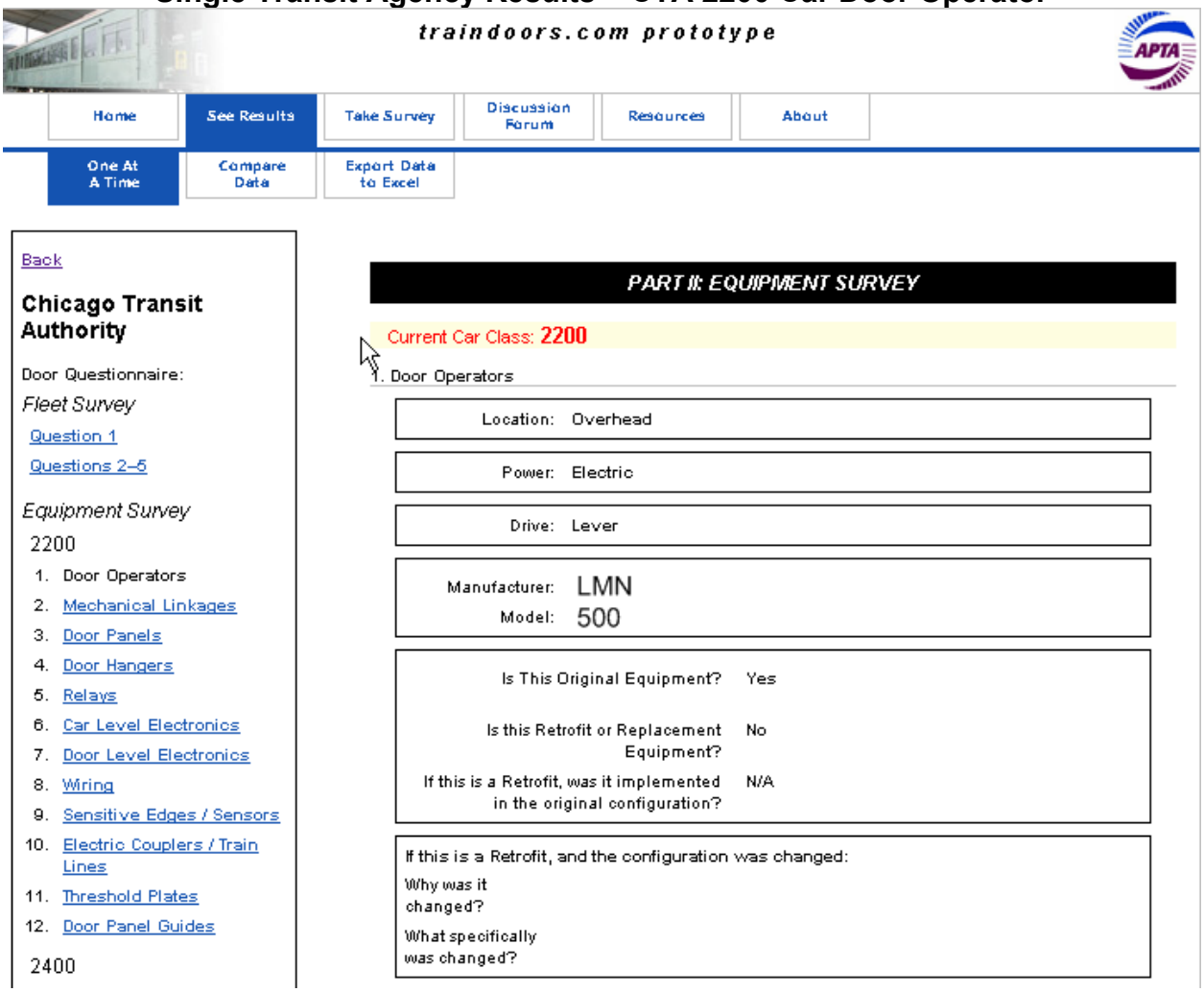


Figure C1-3
Single Transit Agency Results – CTA 2200 Car Door Operator



C1.2 Comparison Results for All Transit Agencies

Figure C1-4 shows the screen from which a user can choose to compare selected items across all participating transit agencies.

Figure C1-5 shows typical results for a selected question for all car classes on all transit agencies. In this case, the question concerns sensitive door edges.

Figure C1-4
Transit Agency Comparison Results Selection

View Comparative Data for All Transit Properties

Choose a question to view data for:

Part I: Fleet Survey

1. General Fleet Information
3–5. Operating / Repair Policy and Train Configuration

Part II: Equipment Survey

1. Door Operators
2. Mechanical Linkages
3. Door Panels
4. Door Hangers
5. Relays
6. Microprocessor / Electronics At Door Level
7. Microprocessor / Electronics At Car Level
8. Wiring
9. Sensitive Edges / Door Sensors
10. Couplers / Train Lines
11. Threshold Plates
12. Bottom Door Panel Guides

Part III: Operations

1–3. Train Delays (Fleet Wide)
4–5. Train Delays (Per Class)
6. Effect of seasonal variations on door incident rates
7–8. What types of incidents have been experienced?
9. Factors Affecting Satisfactory Operations and Reliability

Relative Frequency of Common Door Failure Types

1. Door failed to Open or Close When Commanded From Operator Console
2. Door Status Interlock Failure
3. Incorrect Door Opening - Door Open in Motion
4. Incorrect Door Operaton (Operation/Wayside Error)
5. Obstruction Detection Failures / Drags
6. Freewheeling Door Panel
7. Doors Fail to Completely Close and Lock and Indicate Closed and Lock

Figure C1-5
Transit Agency Comparison Results

traindoors.com prototype

Home | See Results | Take Survey | Discussion Forum | Resources | About

One At A Time | Compare Data | Export Data to Excel

Back

Sensitive Edges / Door Sensors

Click a column heading to sort by that column.
To view more detailed data for a given question, click the "More" links.

Property	Car Class	Type	Manufacturer	Model	Original?	Retrofit?	In Orig. Config?	If retrofit, why was it changed?	If retrofit, what was changed?
A	1	Sensitive Edges	ABC	100		Yes		Original car ddsign did not include door... More	Panel sensors added.
A	2	Proximity Switch	ABC	100	Yes	Yes		Original design did not include door pan... More	Panel sensors added.
A	3	Mechanical Leaf	DEF	200		Yes		Changes to make them interchangeable wit... More	Additional circuits added to wiring harn... More
A	4	Mechanical Leaf	DEF	200					
B	1	Sensitive Edges	DEF	210	Yes	No			
B	2	Sensitive Edges	DEF	210	Yes	No	Yes		
B	3	Sensitive Edges	DEF	220	No	Yes	Yes		
B	4	Sensitive Edges	DEF	220	Yes	No			
C	1	Interlocking grooves with current and po... More							
C	2	Interlocking groove edges with current a... More	DEF						
D	1	Limit Switch	GHI	300	No	Yes	No	Integral to door assembly	Door operator assy
D	2	Limit switch	GHI	300	No	Yes	No	Integral to door operator assembly	Door operator assy
D	3	Limit Switch	GHI	300	No	Yes	No	Integral to door assembly	Door operator assy
D	4	Limit Switch	GHI	300	No	Yes	No	Integral to door assembly	Door assy
D	5	Limit Switch	DEF	230	Yes	No			
D	6	Limit Switch	GHI	300	Yes	No			
E	1	Sensitive Edges							
E	2	Sensitive Edges	GHI	unknown	Yes	No		Reliability problem/ operating issue	Nothing was specifically changed - it wa... More
E	3	Sensitive Edges	GHI	unknown	Yes	No		Reliability problem / operating issue	Nothing was specifically changed - it wa... More
E	4	Sensitive Edges	GHI	unkown	Yes	No		Reliability problem / operating issue	Nothing was specificially changed - it w... More
E	5	Sensitive Edges	GHI	310	Yes	No	Yes		Nothing was specifically changed - It wa... More

C1.3 Data Tables for Off-line Analysis

Figure C1-6 shows the screen from which a user can choose to export selected information for off-line data analysis and processing, for a selected item across all participating transit agencies.

Figure C1-6
Transit Agency Export Results Selection

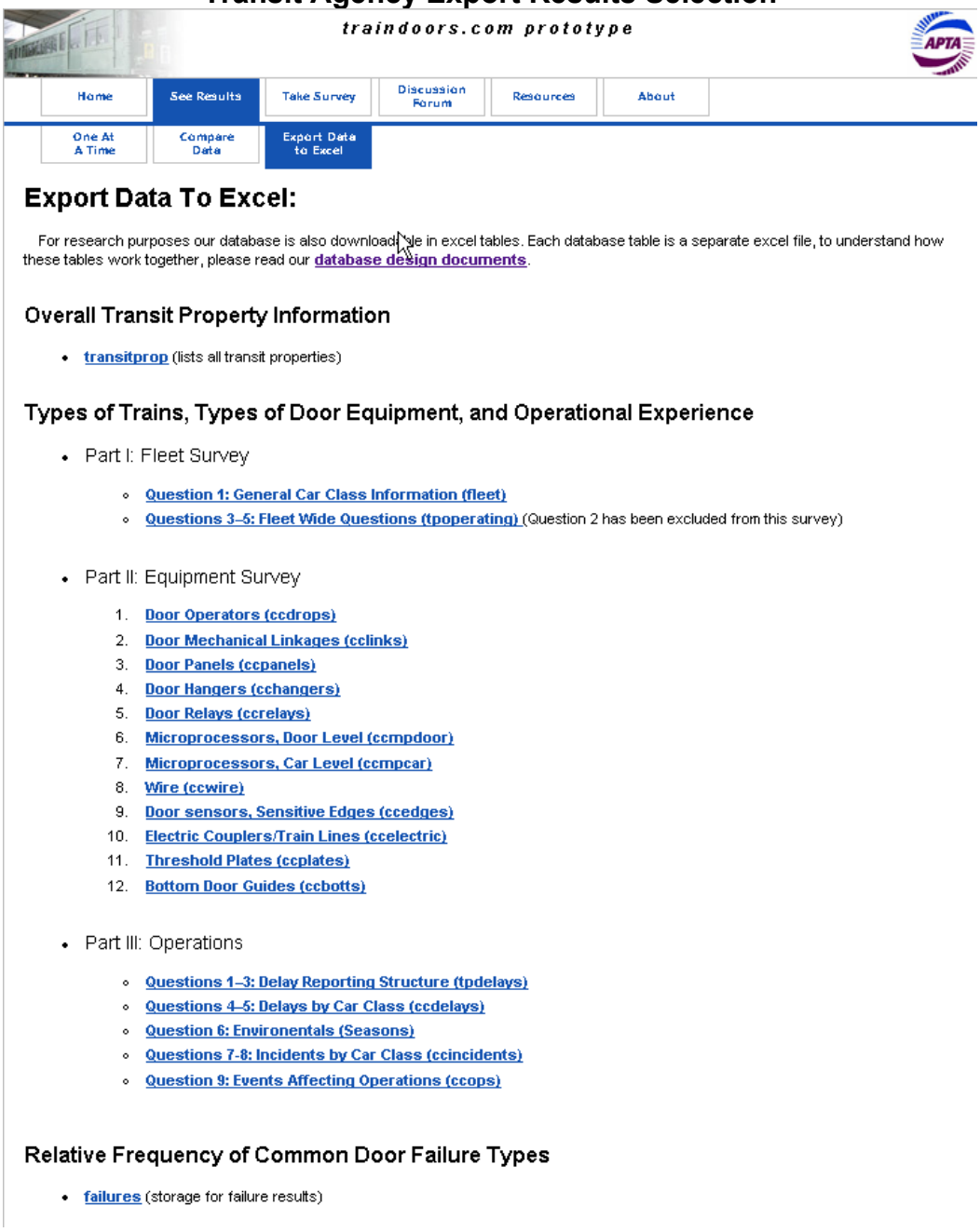


Figure C1-7 shows typical exported results for a selected question for all car classes on all transit agencies. In this case, the question concerns sensitive door edges. Database design documents provided on the website provide the keys and structured information needed for the user to interpret and analyze the data in tabular format.

Figure C1-7
Export Comparison Results – Sensitive Door Edges

id	tpid	carclass	edgetype	edgemaker	edgemodel	edgeoem	edgeretrofi	edgeorig	edgewhy	edgewhat
7	TP1	1	Sensitive Edges	DEF	200	Yes	No	N/A		
47	TP3	1	Interlocking groove e	DEF		N/A	N/A	N/A		
48	TP3	2	Interlocking grooves with current and position s			N/A	N/A	N/A		
8	TP1	2	Sensitive Edges	DEF	200	Yes	No	Yes		
9	TP1	3	Sensitive Edges	DEF	200	No	Yes	Yes		
10	TP1	4	Sensitive Edges	DEF	200	Yes	No	N/A		
13	TP2	1	Limit Switch	GHI	300	No	Yes	No	Integral to (	Door operator assy
23	TP2	2	Limit switch	GHI	300	No	Yes	No	Integral to (	Door operator assy
24	TP2	3	Limit Switch	GHI	300	No	Yes	No	Integral to (	Door operator assy
25	TP2	4	Limit Switch	GHI	300	No	Yes	No	Integral to (	Door assy
28	TP2	5	Limit Switch	ABC	100	Yes	No	N/A		
29	TP2	6	Limit Switch	GHI	300	Yes	No	N/A		
36	TP4	1	Sensitive Edges			N/A	N/A	N/A		
37	TP4	2	Sensitive Edges	GHI	unknown	Yes	No	N/A	Reliability p	Nothing was specifically changed - it
38	TP4	3	Sensitive Edges	GHI	unknown	Yes	No	N/A	Reliability p	Nothing was specifically changed - it
39	TP4	4	Sensitive Edges	GHI	unkown	Yes	No	N/A	Reliability p	Nothing was specificially changed - it
40	TP4	5	Sensitive Edges	GHI	300	Yes	No	Yes		Nothing was specifically changed - It
41	TP5	1	Mechanical Leaf	DEF	200	N/A	Yes	N/A	Changes to	Additional circuits added to wiring har
43	TP5	2	Mechanical Leaf	DEF	200	N/A	N/A	N/A		
45	TP5	3	Sensitive Edges	ABC	100	N/A	Yes	N/A	Original ca	Panel sensors added.
46	TP5	4	Proximity Switch	ABC	100	Yes	Yes	N/A	Original de	Panel sensors added.

C2 Entering New Data for a Car Class or Transit Agency

Traindoors.com makes it easy to enter new data for a new car class or a new transit agency. The steps in the process are:

1. Go from the traindoors.com home page to the 'Take Survey' tab. See Figure C2-1.

2. For a new user who does not have an account, the next step is to click the highlighted link. This will bring up a window to send an email to the traindoors.com administrator.

3. The administrator will set up an account and issue a passcode to the user.

4. Once the user has the passcode, the user enters it in the box shown on the right in Figure C2-1.

5. This brings the user to the NYCT example screen shown in Figure C2-2. On this screen, the user can choose which question to answer.

Figure C2-1
Take Survey – First Step

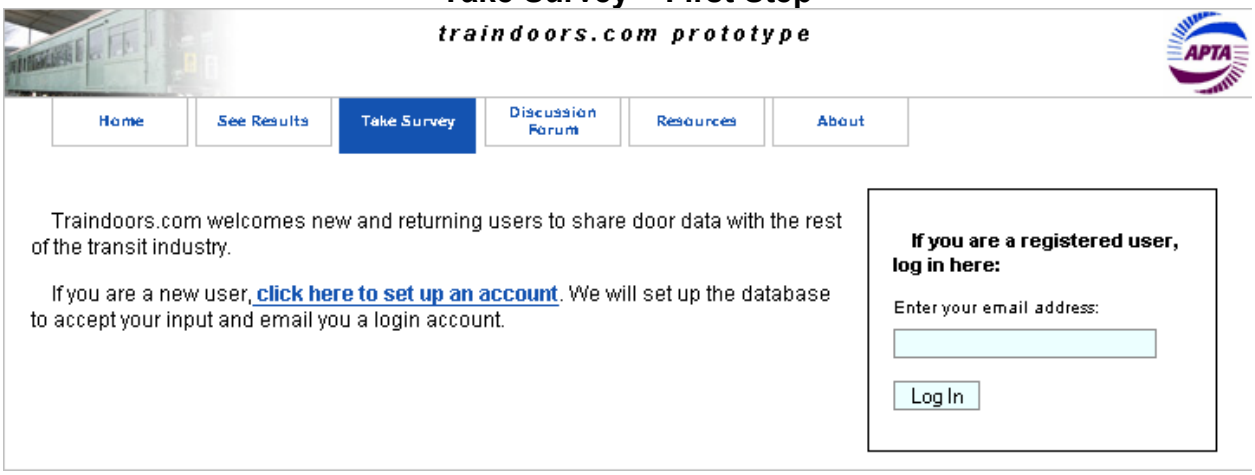
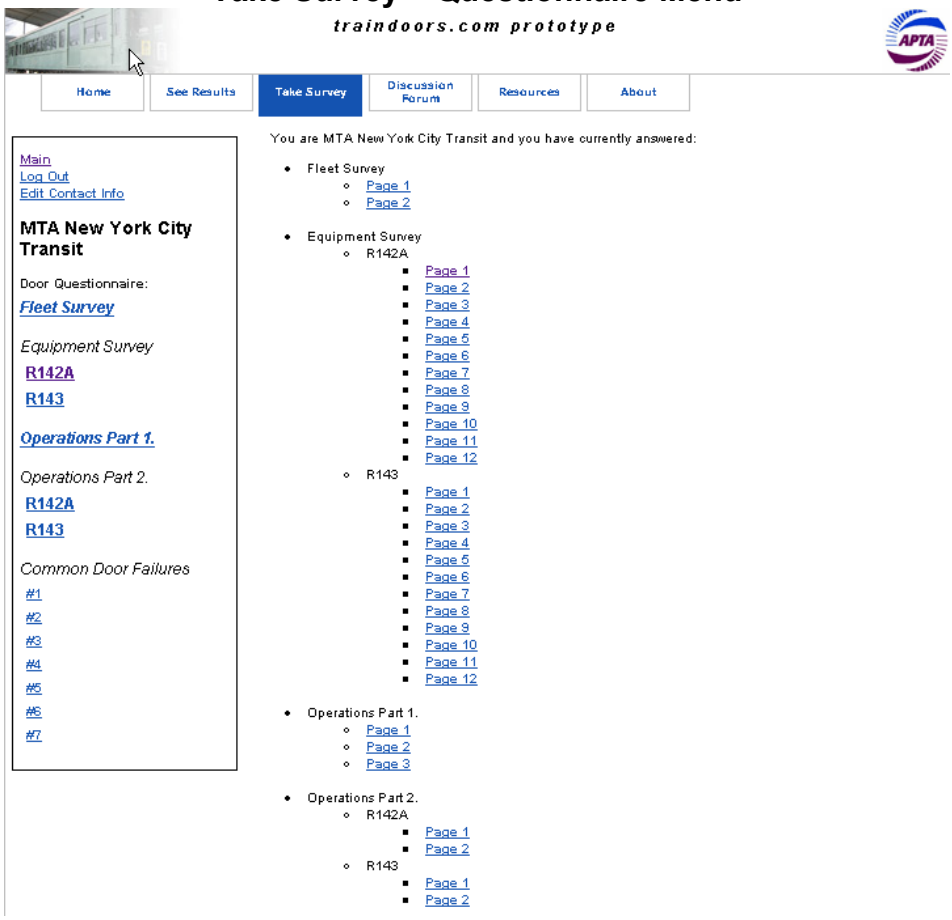
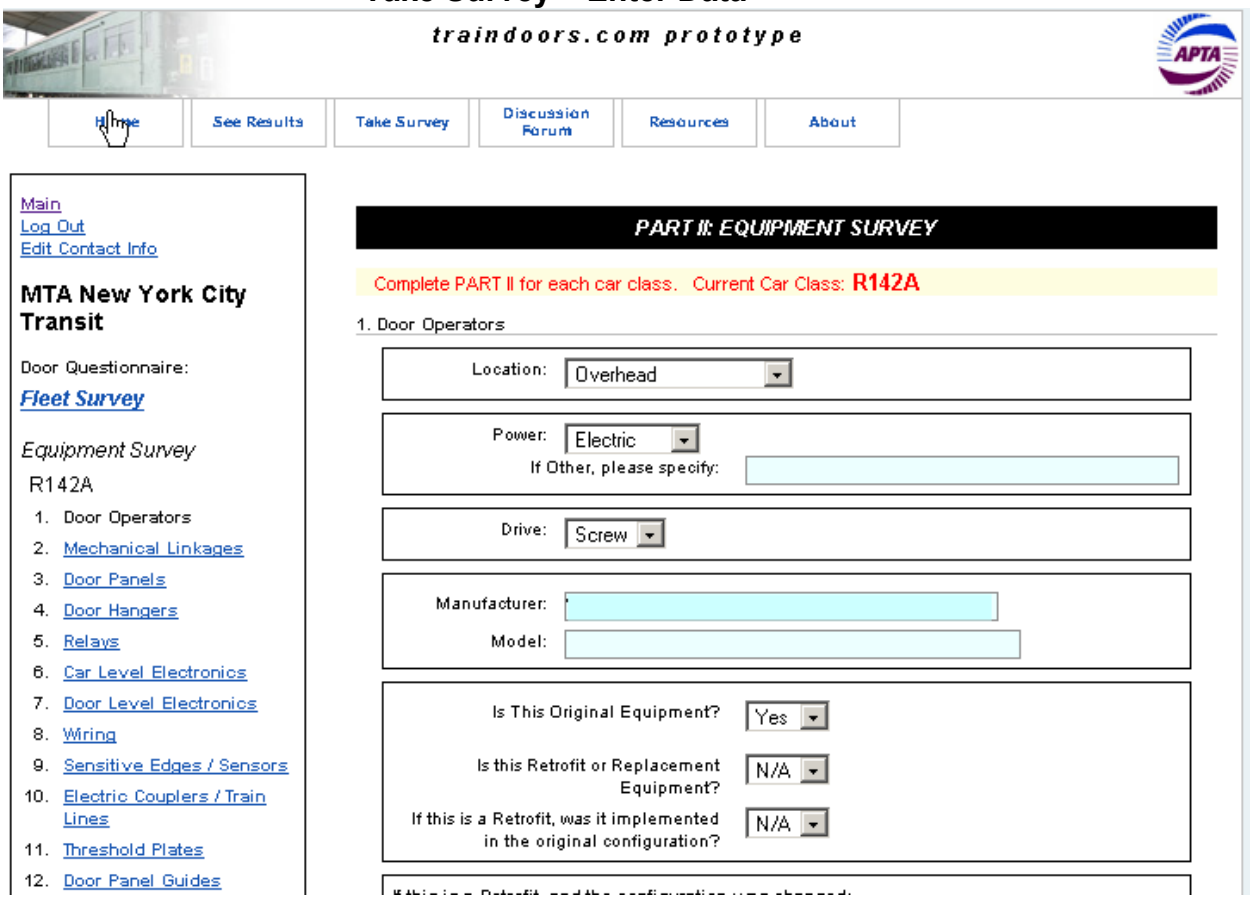


Figure C2-2
Take Survey – Questionnaire Menu



6. When the user clicks on a question, it brings up the complete text of the question, and lets the user answer using data selection and entry tools including radio button choices, drop down lists, and text entry fields. See Figure C2-3, repeated from section 4.

Figure C2-3
Take Survey – Enter Data



C3 Other traindoors.com Features

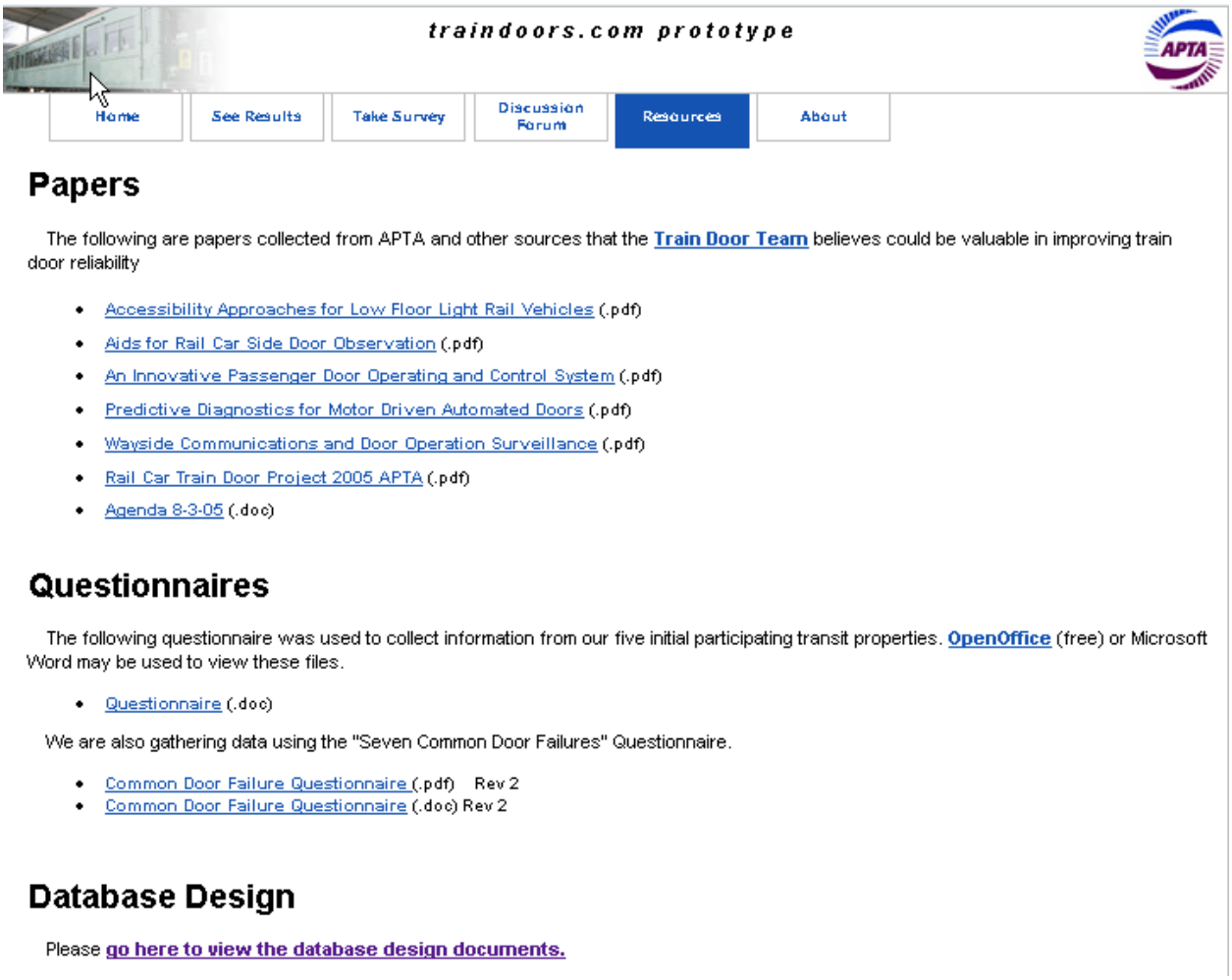
C3.1 Train Door Papers and Other Resources

Traindoors.com contains a Papers section in the Resources section. This section actively collects and posts all available and known public papers and presentations on Train Doors. Figure C3-1 shows a screen shot of the Papers section, which includes papers from APTA's library.

The Train Door team is actively soliciting papers and presentations to increase the value of this "knowledge base." Traindoors.com will only post papers and presentations that have been provided with appropriate permission.

The website will also provide links to other papers and presentations at other websites. However, experience has shown that websites often change their links and the effort to maintain and find revised links difficult. Accordingly, we prefer to actually post the original document, whenever possible.

Figure C3-1
Train Door Resources



C3.2 Discussion Forum

Traindoors.com hosts a Discussion Forum on train door systems. Discussion forums, sometimes known as 'chat rooms,' have grown explosively on the web, because they provide a platform for self-selecting community interaction. Traindoors.com seeks to provide this community function for members of the rail transit community: door maintainers, door designers, car builders, and researchers. The traindoors.com Discussion Forum can serve as a common ground where anyone can ask questions and share tips and experience.

Traindoors.com uses an advanced, flexible, and sophisticated discussion forum software tool called phpBB. This open-source discussion forum software tool was customized to establish the appropriate topics for the train door community. It is easy for any user to create a new topic. By clicking on a specific topic of interest, the user is taken to the discussion thread. There the user can follow the detailed comments on this topic, and add another comment as appropriate.

The Train Door team discovered that information about train door design problems quickly flows from transit operator to railcar manufacturer, but the information does not flow so well to the train door equipment or component manufacturer. The intent of the Discussion Forum is to enable a better flow and sharing of information among all interested parties.

Appendix D
RSETF Train Door Project History

D1 Mission and Goals

In 2002, the Chair of the APTA Rolling Stock Equipment Technical Forum (RSETF) made an assessment of the Forum's direction. Throughout the year, he worked with a select team to establish a new direction, and a sense of dynamism for the Forum. Ultimately, it was decided to make the Forum a more proactive group that would actively investigate field issues. To that end, the Mission and Goals Statements were reviewed, and a New Direction Strategy was developed.

D1.1 Mission Statement

- To assist the rail transportation industry in resolving issues related to the design, procurement, maintenance and operation of passenger rail transportation vehicles;
- To enhance communication, the sharing of experiences, knowledge and ideas among rail transit professionals in the industry through conferences and publication.

D1.2 Goals

- To identify and document a number of rail vehicle related issues of interest to the vast majority of rail transit agencies throughout the U.S. and Canada.
- To rank the rail vehicle issues identified above in terms of importance and urgency.
- To facilitate resolution of the above issues by establishing workshops and forums, through the auspices of APTA, which purpose will be to heighten awareness and solicit resolution of said issues.
- To serve as a technical and informational resource on rail equipment, addressing issues related to safety, ADA compliance, rail car equipment design standards and advanced technologies.
- To foster cooperation with sister committees, agencies and organizations in an effort to realize the mission and goals expressed herein.

D1.3 New Direction Strategy

- Highlight problems that industry professionals consider most critical to their operations and the industry in general.
- Focus upon one (or two) particular problems.
- Develop a project that will assist managers in the resolution of the problem/s.

D2 The Birth of an Idea - A Rail Car Door System Analysis Project

The RSETF team canvassed managers from several rapid transit, commuter, and light rail transit agencies to discuss problems that affected overall rail car performance in the field. Car body structures, doors, propulsion and dynamic braking, air braking, trucks and suspension, wheels and axles, HVAC, couplers and draft gears, communications, lighting, and train control were all considered. The failure of door systems and their related components, sub-components, and hardware were cited as having the largest negative effect upon rail car reliability. This was particularly the case concerning heavy rail rapid transit systems. Utilizing this information, the Chair invited Forum members to embark upon a special project that would study rail car door system problems. A meeting was held in December, 2002 at NYCT headquarters. During this meeting the foundations for a Rail Car Door System Analysis Project were established.

Five specific goals were chosen for the project:

1. Develop greater insights into rail car door performance. Highlight critical areas where rail car door designs, maintenance practices, operations procedures, and normal wear-and-tear affect door systems and their related components and hardware.
2. Improve operation and maintenance practices for rail cars. Enhance communications and information exchanges among transit operating professionals within the industry. Communications will enable transit operators experiencing operational, maintenance, and safety problems on similar components and subcomponents to learn about the solutions developed by other transit agencies throughout the industry.
3. Enhance safety. Pinpoint critical areas where rail car door designs, and maintenance and operational practices have had a detrimental effect upon passenger safety. Communicate findings to door equipment manufacturers, car builders, and transit agencies so that improved designs, and changes in maintenance and operational practices can ultimately result in door safety enhancement.

4. Provide financial benefits for the industry.
   - Develop maintenance operations that are more cost effective. This may enable transit agencies to realize savings over time.
   - Reduce passenger injuries and liability claims that are rail car door-related.
5. Improved future rail car designs. Develop active communications among rail car builders, door manufacturers, consultants, and transit operators. Ultimately, through information exchange and a lessons learned approach, vehicle design improvements can be achieved.

During the 2003 Rail Transit Conference in San Jose, California, the RSETF Chair was invited by the Rail Transit Committee to give a presentation at the CEO's meeting to discuss the Forum's activities. During the presentation, the Chair discussed the idea of a Rail Car Door System Analysis Project. The project was well received by the executives, and the Chair was encouraged to move forward with the project.

The door project was then discussed at the Forum's semi-annual meeting. Several important steps were taken to move forward. A Train Door team was created. Several meeting attendees immediately joined, while others decided to recruit qualified individuals at their respective organizations. It was decided that team members would communicate through bi-weekly conference telephone calls. The Secretary of the Forum offered conference call services through the courtesy of Booz, Allen and Hamilton, and a telephone communications link was established for the calls.

The team membership grew to include 30 participants. These included rail car manufacturers-Alstom, and Kawasaki Rail Car, door equipment manufacturer Faiveley Rail Corporation; engineering consulting firms Booz, Allen Hamilton, LTK Engineering, Interfleet Technologies, Transportation Systems Design, and Turner Engineering Company; and transit agencies Bay Area Rapid Transit (BART), Chicago Transit Authority (CTA), Delaware Area Port Authority (DRPA), New York City Transit (NYCT), Port Authority Trans Hudson (PATH), and the Washington Metropolitan Area Transportation Authority (WMATA).

D3 Project Focus - Five Major Heavy Rail Rapid Transit Systems

From June through December, 2003 a great deal was accomplished by the team through bi-weekly conference calls. During this period of time a Process Flow Chart was developed and a Door Field Questionnaire was created. Because of the large scope of work involved in such a project, the team decided to limit the initial field study to five heavy rail rapid transit organizations. The intent was to eventually expand the project to include other heavy rail systems, and eventually include commuter rail and light rail equipment in the study.

Several variables were considered during the selection process of the five heavy rail systems:

Door system population. Include heavy rail systems that have large diversified fleets. This will provide the largest selection of door system components and sub-component types, manufacturers, models for the study.

Location. Choose operators in different regions of the country.

Weather. Consider the variable of weather related problems.

Considering these variables, the team decided to conduct the initial field study at BART, CTA, NYCT, PATH and WMATA.

D4 The Development of a Research Methodology

Train Door team members realized that this was going to be a large undertaking, and that many variables would require consideration. Five project goals had been established. How could they be achieved? What were the steps that needed to be taken to get this project moving? Utilizing a Process Flow Chart, the team developed a sense of direction, and listed several steps that would be taken toward the accomplishment of their goals.

STEP 1 - Identify Door Population.
- a. Identify rail car equipment suppliers.
- b. Identify end users.
- c. Identify car fleets.

STEP 2 - Define Segment of Study.
- a. Door system components, sub-components, and related hardware.
- b. Technology- older relay and cam controls, new microprocessor and electronics equipment.
- c. Specifics to investigate- designs, operations, maintenance.

STEP 3- Define Strategy for Field Investigation.
- a. Create a valid questionnaire that can be utilized for field research. This document must address all study segments.
- b. Interview focus segment.
- c. Document findings.

STEP 4- Manage Collected Information.
- a. Create database.
- b. Analyse data.

STEP 5- Formulate Problem Solving Actions.
- a. Investigate problems.
- b. Corrective actions taken, lessons learned.

STEP 6- Communicate Findings to Transit Community.
- a. Prepare technical paper.
- b. Hold a technical session at APTA Conference.
- c. Develop a website to facilitate continuing communications.

D5 Door Field Questionnaire Creation

Early during the project development stage, team members realized that this would require an effort to actively accumulate vital statistics and other information from the field. A research tool had to be developed to effectively and accurately gather critical information about rail car fleets, door system component equipment, operations, and maintenance. This information would then have to be processed and analyzed.

The team decided early on during the inception of the Rail Car Door System Analysis Project that their efforts would produce a "product" for the industry, the enhancement of door system operations. The Door Field Questionnaire was the foundation upon which the project would be built. Therefore it had to be a valid instrument that captured all of the necessary information. Most importantly, the information had to be depicted in such a manner that it could be processed, analyzed, and ultimately utilized to focus upon critical areas that affected door operations at the five participating transit agencies. While developing a preliminary draft of the questionnaire, team members pondered several important questions-

1. What type of information concerning door systems was to be collected?
2. What would be done with the information once it was collected?
3. How would the information be processed so that it could be effectively analyzed?
4. How would this questionnaire be utilized as a tool toward the accomplishment of the five project goals?

D5.1 Part I: Fleet Survey

Researchers decided that fleet statistics concerning the various car classes in the study would be an important component for the creation of a database. Particularly important would be a door equipment survey that provided technical details for each of the car classes. Once collected and placed into a database, this information would be available for quick reference, and would be the foundation of a relational database. This information could be utilized as the team studied door problems on particular classes and their associated door equipment, and would assist in future trends analyses.

Initially, researchers wanted to gather information concerning the population of particular car classes that were being operated at the five participating transit agencies. The questionnaire included entries for the different models of car classes in service at a particular transit agency, number of cars per class, average years of service for each class, and annual miles of operation. In addition, information regarding train consist configuration was requested.

Because the combined car class populations in the study totaled 32 models, researchers decided that a pictorial view of each class would provide a good visual perspective of door opening and door operator locations. Therefore, door schematics were provided depicting plan and elevation views of cars with two, three, and four door openings per side, and under-seat, wall pocket, and overhead operator locations.

D5.2 Part II: Equipment Survey

Critical to the project was a detailed survey of the technical specifications for door system components, sub-components and associated hardware on each of the car classes. The team dedicated a great deal of effort into the creation of this part of the questionnaire. Several door equipment manufacturers and maintenance personnel at each of the transit agencies were asked to assist with the equipment surveys on their particular car classes. Details concerning the locations, types, manufacturers, models and present designations for equipment, (i.e.- original equipment, retrofit), were included for each of the following- door operators and master door controllers, relays, cams, micro switches, wiring; mechanical linkages; door panels, sensitive edges, hangers, threshold plates, bottom door panel guides; microprocessor / electronics equipment (at door level, and at car level); and inter car communications, train line wiring, electric couplers and electric portions.

D5.3 Part III: Operations

Team members worked to develop a part of the questionnaire that would provide an in-depth view of train operations within each of the participating transit agencies. Although the transit agencies in this study were classified as heavy rail rapid transit systems, the researchers realized that each system operated according to its own book of rules and standard operating procedures. In addition, preliminary canvassing revealed that several factors concerning train operations and door related failures were defined and calculated differently.

Particularly important to the study was the understanding of how the different transit agencies defined and calculated train delays. Car performance reliability was surveyed. Each operator's basis for calculating the Mean Distance Between Failures (MDBF) or Mean Time Between Failures (MTBF) was also canvassed.

Of critical importance to this study were the operational failures that affected door system performance on each car class within a particular transit agency. Therefore, several questions addressed operational failures on a car class basis. Researchers wanted to collect this information in such a way that it could be utilized to create a database for future analysis. The types of operational failures experienced, factors affecting satisfactory operations and reliability, and incidents leading to passenger injuries, were rated on a percentile basis for each, totaling 100%.

D5.4 Part IV: Maintenance

During the development stage of this project, Train Door team members realized that maintenance issues were key factors in their research efforts. Whenever a train experienced door troubles during road operations, it inevitably moved to a maintenance facility for inspection and repair.

Field research was the primary focus of the Rail Car Door Systems Analysis Project. Train Door team members were selected to visit maintenance facilities at each transit agency to question key door experts concerning their particular equipment problems. It was their intent to literally go "into the trenches", so to speak, and interview line personnel who experienced problems first hand, and issues relating to their particular car classes. To effectively perform this task, it was imperative that they were equipped with a questionnaire that addressed every aspect of door system maintenance on each car class operating within the five participating transit agencies.

This part consisted of questions that addressed the in-car system components- master door controllers, door operators, mechanical linkages, door panels, door panel sensitive edges, door hangers, micro switches, relays, microprocessor, electronics equipment, wiring, threshold plates and door guides, and coupler electric portions and pins. Researchers wanted to collect this information in such a way that it could be utilized to create a database for future analysis. Therefore, several of the questions were rated on a percentile basis for each, totaling 100%.

To ensure that the following questions were accurately completed, team members worked with respondents at each of the transit agencies to gather pertinent information about each of the car classes.

1. What Is The Repair Reporting Method?
2. What Are The Preventive Maintenance (PM) Intervals?
3. Average Time Spent On Door Equipment During Each PM?
4. In What Percentage Do In-Car System Components Contribute To Door Incidents?
5. What Are The Most Common Types Of Failure Associated With Each Door Component?
6. In What Percentage Do Train Line Components Contribute To Door Incidents?
7. Are There Car Body / Door Component Interfacing Problems Attributing To Incidents? If So, What Are The Details And Which Of The Following Have Been Affected?

D6 Field Interview Process

In November, 2003, a final version the Door Field Questionnaire was approved by all members of the team. The next stage of the door project would be the collection of the information from the five participating transit agencies. During the months of December, 2003 through January, 2004, team members discussed how they could most effectively utilize their new document as an information collection tool for the project. A strategy was developed for their field research. This included the creation of two important groups of people- contact persons within the agencies to be surveyed, and volunteers that would conduct the field interviews. With the assistance of the Forum's APTA Staff Advisor, a letter was sent to the CEOs of each of the target transit agencies. The letter referred to the RSTEF Rail Car Door System Analysis Project, elicited their support, and requested the names of key operations, door maintenance and engineering personnel who could be contacted to assist in the completion of the questionnaires. The Train Door team then assembled five volunteer groups that were assigned to conduct field interviews at the five participating transit agencies.

During the period of February through April, 2004, the five groups visited contact personnel at BART, CTA, NYCT, PATH, and WMATA, interviewed operations, maintenance, and engineering professionals, and assisted in the completion of the questionnaires. The comprehensive nature of the Door Field Questionnaire required repeated field visits to several of the transit agencies by the groups to ensure that the information was complete and accurate.

D7 Information Analysis – The Creation of a Database

In April 2004, the questionnaires were completed and returned to the Train Door team members for review. Several conference calls were held to discuss the information. At this stage in the project, the members realized that the voluminous quantity of door system information gathered would have to be placed into a manageable format. This would have to be accomplished before the information could be effectively analyzed. Only through a thorough analysis of the information could the team understand specific door problem causes, pinpoint critical areas where operational mishaps and equipment failures adversely affect door system performance, and learn how some of the problems were corrected. Analysis efforts would assist the team as they formulated problem-solving actions and communicated their findings and proposed solutions to industry colleagues.

The development of a database was performed by an Information Systems (IS) expert in the team. Utilizing the format of the Door Field Questionnaire, the gathered information was placed into cells in the database. The IS expert also created a website for the project, traindoors.com, and began development of the web basis for the database. By May 2004, the data was collected. Train Door team members familiarized themselves with the data, and utilized it to review the database.

D8 Communication to the Industry – The "Hold That Door" Technical Session

The Train Door team had accomplished a great deal of work during the course of the year. They had reached an important step in the Rail Car Door System Analysis Project. It was now time to communicate with professionals within the Transportation Industry, updating them on the progress that had been achieved up to this point, and the proposed future direction of the project. The RSETF Chair worked with the APTA Staff Advisor to schedule a special session at the 2004 Rail Transit Conference.

In April 2004, the team realized that it would be impossible to complete an accurate analysis of the information that had been collected in time for the June "Hold That Door" session. It was decided that the door session would introduce industry colleagues to the project, elicit their support, and ask for their input concerning the future direction of the project. The agenda of the session included an overview of the project - its purpose, the five project goals, selection of five transit agencies, and the development of a research methodology.

The Train Door team selected among its members, four panelists for the session. Each represented a transit operator, car manufacturer, door system manufacturer, and industry consultant. Each panelist gave a brief presentation, discussing his / her particular perspective of the project. A question and answer period ensued, and the audience was invited to express their opinions and comments.

The "Hold That Door" session accomplished three major goals:

1. Garnered interest within the industry: There was a lively question and answer period after presentations were completed. Executives from several heavy rail transit, light rail, and commuter rail transit agencies expressed an interest in becoming involved in the Rail Car Door System Analysis Project. Representatives of Railway Age Magazine attended the RSETF meeting during the Rail Transit Conference, and prepared an article about the project in the July, 2004 edition of the magazine. This prompted an interest in the project by professionals from other rail transit agencies who had not attended the Rail Transit Conference.

2. Assisted the team in their future focus for the project: Through the question and answer period, session participants provided the Train Door team with their ideas about particular door related problems, and particular areas where a future focus was required.

3. Initiated the involvement of the Transit Cooperative Research Program (TCRP). Following the session, the RSETP and the Train Door team developed the work plan for TCRP Project J-6, Task 62, "Rail Car Door System Analysis," which enabled the project to develop a database for the Train Door information.

D9 The New Initiative – The Transportation Cooperative Research Program

In 2005, the Rail Car Door System Analysis Project has entered a new phase. During the initial planning phase of this project, members of the RSETF decided that their work on this project would ultimately produce a "product" for the industry, the enhancement of door system operations. The Train Door team has made a concerted effort to follow the strategy that was first established during the developmental stage of the project. Over the course of the past two years, they have moved closer to the accomplishment of the five goals that were established. Today, we realize that this entails a long-term effort requiring the participation of engineering and maintenance personnel from rail transit agencies, door equipment manufacturers, car builders, and consultants. Communication among all of these professionals is key to the successful outcome of this project.

The foundations for this success have been established. The RSETF moved forward with a new initiative.

1. Research was initiated for TCRP Project J-6, Task 62, "Rail Car Door System Analysis." The objective of this project was to build on the work of the APTA Rolling Stock Equipment Technical Forum Rail Car Team by (1) developing and implementing a user-friendly, searchable Relational Database Management System (RDBMS) for rail car doors and (2) analyzing available data to identify initial findings regarding rail car door performance and improvement opportunities. This project will improve the availability and exchange of information on rail car door systems of rapid transit vehicles.

2. The Train Door team moved forward with the problems analysis stage of the project. Learning from the information that was gathered utilizing the Door Field Questionnaire, the team pinpointed seven specific critical areas that adversely affect door performance.

1. Doors on Train / Car / Fail to Open or Close When Commanded from Operator Locations.
2. Door Status Interlock Failures.
3. Incorrect Door Opening – Door Open In Motion.
4. Incorrect Door Operation - Crew Error.
5. Obstruction Detection Failures / Drags.
6. Freewheeling Door Panel.
7. Doors Fail to Completely Close and Lock and Indicate a Closed and Locked Position.

The Questionnaire on Common Door Failures was used to gather very specific information that addresses the causes each of these problems, and any solutions that each of the transit agencies has initiated to solve these problems. These include maintenance procedure changes, operational changes, and / or equipment design changes.

3. The Train Door team acquired a strong partner as they moved forward with the project. Transportation System Design, Inc. (TSD) was retained through TCRP Project J-6, Task 62, "Rail Car Door System Analysis" to establish an effective communication link with the industry. TSD developed a website for the project, and is now expanding the site so it transit professionals can use it to communicate about door issues quickly and broadly across the industry:

- Automated access to the Traindoors database results.
- Tools to permit investigative access to results in the Traindoors database.
- Tools to let other transit agencies post their Train door data in a form that is both easy to use and fully consistent with the existing data.
- Project contacts posted. This includes the names, office and cell phone numbers, and e-mail addresses for Train Door team members.
- The agendas and minutes for Rail Car Door System Analysis Project meetings and conference calls are now posted for review.
- A link will enable industry professionals to leave comments, suggestions, and other feedback for team members.
- A "chat room" will be established for door maintenance personnel, engineers, and other professionals. This will become a vital communications link for industry professionals as the project moves forward. This will be prove to be especially critical as additional transit agencies are added to the research project, and the research work expands to include commuter and light rail operators.

4. The web-based database planned for traindoors.com resulted from completion of five basic tasks in the TCRP project:

Task 1. Develop a web-based data entry system for the Relational Database Management System (RDBMS). Review the existing Field Questionnaire and make appropriate modifications. Revise the Questionnaire to facilitate data entry and analysis based upon an all electronic web-based form.

Task 2. Build on the work of APTA's Rolling Stock Equipment Technical Forum and design a user-friendly, searchable RDBMS. Integrate the revised Questionnaire into the RDBMS.

Task 3. Implement the RDBMS.

Task 4. Analyze available data on rail car doors and identify findings and conclusions regarding rail car door operations, performance, and opportunities for improvements.

Task 5. Prepare a brief report documenting the activities of this project and introduce the rail car RDBMS and the associated website to the public transportation industry. The report and presentation should include initial findings and conclusions regarding rail car door operations, performance, and opportunities for improvements.

D10 Advantages of a Website

D10.1 Objectives and Approach

Key objectives of the train door project are to collect and broadly disseminate valuable information to the transit industry. The nuts and bolts of how data is collected, processed and distributed dramatically affect the success of the project in reaching those objectives. This section describes www.traindoors.com, the tool built by the project to enable and enhance information sharing.

The first versions of the door questionnaires required users to enter data using a standard word processor or entering data by hand. From review of data provided by five transit agencies entered in this way, several problems were revealed:

- Answers were not always complete, were not always in the requested format, and were not always directly responsive to the questions. This reflected the fact that the questionnaires included open-ended "why" type questions.

- Transcribing the answers from the word processor document into a spreadsheet database so that it could be compared and reported upon was highly labor intensive. Accordingly, using a word processor and manual post-processing is not well suited to be 'scaled-up' and used broadly in the transit industry.

The solution to these problems was to create a revised questionnaire and an automated means for data collection and processing. This solution is now implemented at traindoors.com.

D10.2 Improved Data Collection Process

A modern web-based data entry form and on-line–accessible database contained in traindoors.com was developed, which had many advantages:

- This approach eliminates manual post-processing. The originator of the data at the transit agency directly enters it into the database.
- This approach ensures that the data entries are in the parallel format, for reasonable comparison.
- Data originators enter data using standard web-based database entry techniques (such as multiple choice "radio buttons" and drop down type menu selection). The interface is familiar to anyone who has bought a product on the Web - simply answer the questions, make the entries, and then hit a SUBMIT button.
- Management of an on-line database is greatly simplified.

The traindoors.com web-based database opens the benefits of the Team's work to the 'world community' of train door experts and others interested in improving train door systems.