DELPHI PACKARD ELECTRIC SYSTEMS
WARREN, OHIO 44486

DWG STATUS					ZONE	REVISION HISTORY	AUTH	DR	CK	APVD
DATE	STG	REV	N/P	CHG						
28MR13	R	D6	--	--		ADDED SHEET 3 SHEET 2 OF 2: WAS SHT 1 OF 2: ALL PARTS - DWG UPDATED TO LATEST PRINT. REVISE NOTES & CHART	SESHEN	LB	LB	IM

NOTES:

1. REF FRAMATOME CONNECTORS - DLAT & RIE"Z P/N SEE CHART

2. DELPHI PACKARD ELECTRIC SYSTEMS IS NOT RESPONSIBLE FOR DESIGN CONTROL OF PURCHASED "OFF SHELF" COMPONENTS.

3. SUPPLIER SHOULD COMPLY WITH DELPHI SPECIFICATION <SHEET 3>

PART NO.	REV	N/P	STATUS	SUP FRAMATOME CONNECTORS-DLAT & RIETZ P/N
15488627	01	AC	ACTIVE	54200231
15488626	01	AC	ACTIVE	54200230
13580059	01	AB	ACTIVE	F130500
13583635	01	AC	ACTIVE	54200220N

DWG TYPE: PART DRAWING
STYLE: N/A
DISTR CODE: D
VOLUME (CM3): N/A
AutoCAD

DELPHI

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WARREN, OH

THIS DRAWING IS NOT A PROPRIETARY DESIGN OF DELPHI AUTOMOTIVE SYSTEM

		DATE
DR:	BONILLA, LILIANA	20MR13
APV1:	BONILLA, LILIANA	20MR13
APV2:	MRIMHI, SAI VARSHK	21MR13
APV3:		
APV4:		
APV5:		

SUBSTANCES UP CONCERN AND RECYCLED CONTENT PER DELPHI -A -2049001

MATERIAL: SEE DWG

DRAWING NAME: TAXI CONN 2 F 28 APEX

DRAWING NUMBER: 13535828

SIZE:	SCALE:	FRAME NO:	SHEET NO:	STG:	REV:	N/P:
A0	NONE	1 OF 1	1 OF 3	R	D6	--

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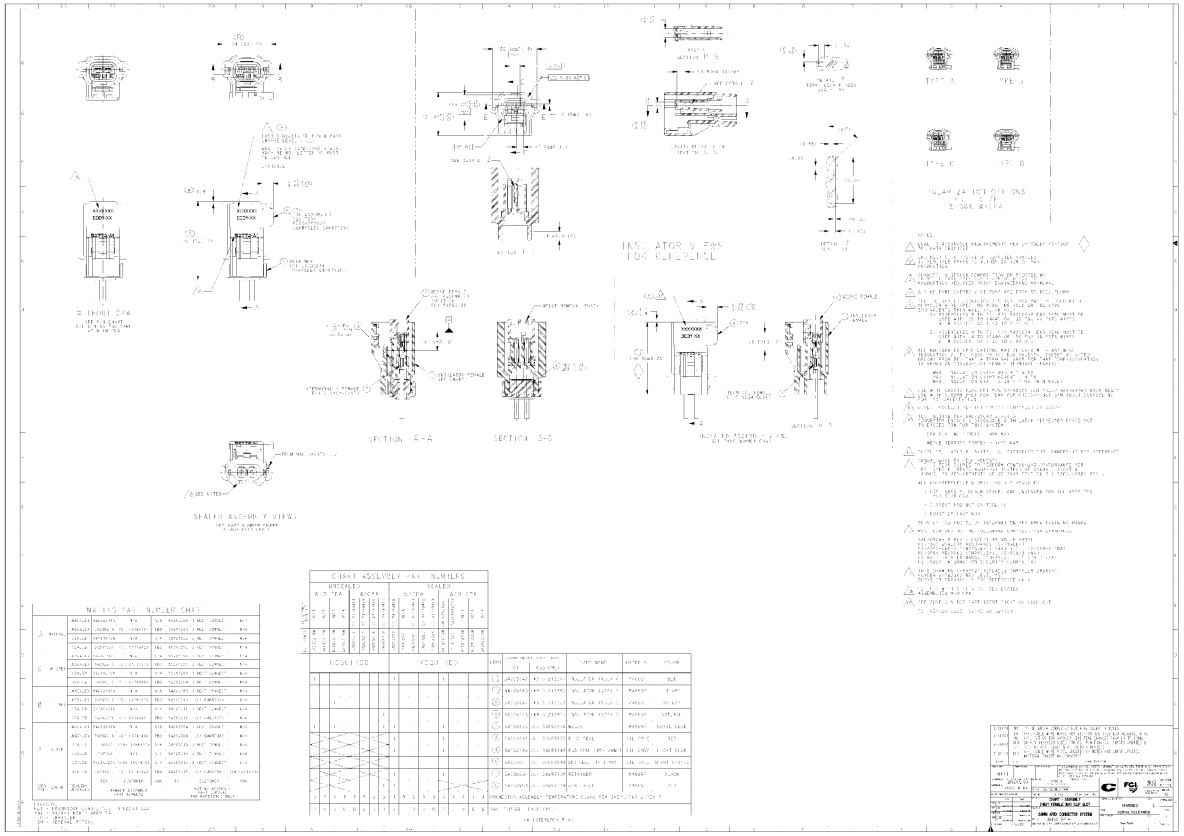
DWG STATUS DATE	B	CORE/ NP	ZONE	REVISION HISTORY	AUTH	DR	CK	APVD
15JUL05	B	01	--	ALL PARTS - RELEASED	270640	JFC	JFC	ER
08JAN13	B	02	--	13863838 - RELEASED	315941	JJB	JJB	DH
08JAN13	B	03	--	"SHT 1 OF 2" WAS "SHT 1 OF 1"; ALL PARTS - BWG UPDATED TO LATEST PRINT; REVISED NOTES & CHART; REVISED TITLE BLOCK	315300	JJB	JJB	JDP
22DEC13	B	04	--	13896025 - RELEASED	319380	ABD	ABD	DT
17MAR14	B	05	--	ALL PARTS - BWG UPDATED TO LATEST PRINT.	320370	LB	JJB	EO
20MAY15	B	06	--	ADDED SHEET 3 "SHT 2 OF 2" WAS "SHT 1 OF 1"; ALL PARTS - BWG UPDATED TO LATEST PRINT; REVISED NOTES & CHART	325424	LB	LB	DH



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DELPHI SUPPLIER MUST MEET DELPHI MANUFACTURABILITY
SPECIFICATIONS FOR CONNECTION SYSTEM

DWG STATUS						REVISION HISTORY	AUTH	DR	CK	APVD
DATE	STG/REV	N/P	P/CHG		ZONE					
08JAN1	R	E3	--	--		ADDED SHEET 2	31E30J	J.D	J.B	JEP
6FEB1	R	E4	--	--		13596959 - RELEASED	31F36J	ABD	ABD	JT
11MA1	R	E5	--	--		ALL PARTS - DWG UPDATED TO LATEST PRINT	32G17G	LB	J.B	CD
23MR12	R	E6	--	--		ADDED SHEET 3 TBM 37 WIRE TBM 21 ALL TOOTS - DWG UPDATED TO LATEST PRINT, REVISE NOTES & CHART	32S42M	LB	LB	SM

Delphi. Manufacturability Specifications for Connections Systems

Spec NO.	Category	Specification Description	Acceptance Criteria	Usual 2 or over specification
1a	Terminal-Connector	Terminal insertion force to Connector	For terminals with 1.8mm wire, the engagement force to fully seat and lock the terminal shall be 13N max. Neither the conductor nor the terminal may buckle during the test. The Forward stop must withstand a force greater than the force required to insert the terminal into its cavity.	S.4.1.3
2a	Terminal-Connector		For terminals with 1.8mm wire, the engagement force to fully seat and lock the terminal shall be 20N max. Neither the conductor nor the terminal may buckle during the test. The Forward stop must withstand a force greater than the force required to insert the terminal into its cavity.	S.4.1.3
3a	Terminal-Connector		For terminals with 31.8mm wire, the engagement force to fully seat and lock the terminal shall be 20N max. Neither the conductor nor the terminal may buckle during the test. The Forward stop must withstand a force greater than the force required to insert the terminal into its cavity.	S.4.1.3
10a	Terminal-Connector	Terminal insertion force on Connector	Terminal Size / Primary Lock only (No Mat) / With Secondary lock (N Mte)	
	Terminal-Connector		050 / 20 / 30	Delphi
11a	Terminal-Connector		064 / 30 / 50	S.4.1.4
12a	Terminal-Connector		110 / 45 / 70	S.4.1.4
13a	Terminal-Connector		162 / 60 / 100	S.4.1.4
14a	Terminal-Connector		448 / 80 / 130	S.4.1.4
15a	Terminal-Connector		48.2 / 80 / 120	S.4.1.4
16a	Terminal-Connector		**38.5 / 100 / 150**	S.4.1.4
17a	Terminal-Connector		**49.5 / 130 / 200**	S.4.1.4
20a	Terminal-Connector	Terminal/Cavity Polarization (do not allow incorrect orientation of terminal on the connector)	For any Non-symmetrical design Terminals inserted or any incorrect orientation shall not be allowed beyond the location wings (pins) in cavity and at a force 1.5 times the normal insertion force, 10N, or the volume strength of the largest applicable wire size, whichever is greater	S.4.10
21a	Terminal-Connector	Terminal- Connector Cavity Fit	**Terminal should not move or rotate excessively inside the connector cavity so that damage could occur when Mating connectors.** **Example: Female terminals should NOT bend or damage male blade/pin remain.**	Delphi
22a	Terminal-Connector	Unsealed Terminals	Design connectors with a feature to detect and/or correct partially seated terminals (Re-PLR).	USCAR 12, S.10
40a	**Terminal-Connector**	**Terminal should not damage Connector seal (Mat seal)**	**Terminal insertion into connector:** **1.- Should not cut or damage the mat seal** **2.- Should not left any Mat seal material on terminal or connector.**	USCAR 12, B.12 Delphi
1g	**Terminal**	**Terminal Crimp Validation**	**Production crimps shall be tested, validated and approved per SAE/USCAR-21 Performance Specification for Crimp-to-Terminal Electrical Crimps based on wire size, stranding, and insulation wall thickness.**	S.1.6
2g	**Terminal**	**Terminal contact protection**	**Design the female terminal with hoods, shrouts, or sleeves to protect the electrical contacts.**	USCAR 12, Revision 7B
3g	**Terminal**	**Male terminals blades should have cutting**	**Coining to ease insertion efforts and or minize the possibility of scuffing. The flat on the tip of the male terminal should not exceed 60% of the material or effective blade thickness.**	USCAR 12, P.4
4h	**Terminal-Cable Seal**	**Cable /Seal retention on terminal crimp**	**Design the terminal and seals to prevent individual cuts back from moving along the wire and away from the terminal during assembly and/or during the molding (Seal must stay within the crimp).**	USCAR 12, C.4
1b	Connector	Connector with mixed terminal designs	Terminal and connector cavity design of sold and cavity to insert an terminal (will in the same Connector). Any incorrect terminal insertion shall not fit or not into a connector cavity beyond the insulation wings (pins) or at a force 1.5 times the normal insertion force, 10N, or the volume strength of the largest applicable wire size, whichever is greater.	Delphi
2b	Connector	Connector Family designs defeating	Cavity/color Family design should have an index to differentiate physically between each connector part number within Connector family or series.	Delphi
3b	Connector	Open access for wire/terminal assembly	Connector should have open access for Terminal/wire assembly. Example: Lance should not be interfering terminal/wire shipping area.	Delphi
4b	**Connector**	**Peripheral Seal retention on Connector**	**Design connectors with a shroud to completely protect leads and connector seal surfaces. Design connectors with a seal retaining feature so it prevents "Re-seating" rollover or connector movement of the peripheral seal during mating, unmating connectors and connection handling overall.**	USCAR 12, C.5 & 6
5b	**Connector**	**Retention of Blocked cavities on Connector**	**Blocked cavities on connector should support 30N into applied directly to the cavity. No damage or plastic removal should occur.**	Delphi
10b	Connector	Connector to Connector mating force (with all contacts installed)	**75 N Max or Acceptance criteria defined on USCAR25 Table 4.1**	Usual 25
11b	Connector	Connector to Connector Un-mating force	110 N Min with tools (hand) and/or manual CPA	S.4.2
12b	Connector	Connector (or Housing) to Connector Miss-mated Prevention seal	**The connection system must withstand either a minimum mis-mating force of 150 N or 5 times the normal connector to connector mating force (with all contacts installed)**	S.4.4
20b	Connector	Cavities Terminal insertion direction	Provide all cavities in the same direction of terminals insertion. If not, terminal and connector cavity should avoid attempt to plug or any incorrect orientation.	Delphi
21b	Connector	Terminal Forward Stop	Must provide a terminal forward stop that supports a force of 30N minimum or the biggest wire size bundle.	S.4.1
22b	Connector	Assure for Unsealed Use	Provide assure for the terminals for an continuity probe in the connector housing assembly. Access must locate consistently, position and orientation of terminals in connector cavity. If there is particular requirement for electrical field affine connection, supplier field provider at receive information to Delphi.	USCAR 12, S.11
30b	Connector	Housing inserting force	34N Max	Honda HES D-0217-99A
31b	Connector	Housing Retention force	40N Min	Honda HES D-0217-99A

				USCAR 12, C.2 Delphi
40b	Connector	Connector Cavity identification	Our vendor should have cavities identified (molding and end point of cavity tool)	
1c	Cavity Plug	Connector Cavity Plug insertion	Cavity Plug should be assembled with a force of 20N Max (by hand or with a manual tool)	Delphi
1d	**Locks**	PLR detect/correct Unsealed Terminals	**The TPA/PLR or Secondary Lock must not seat in its final position with an unsealed terminal(s).** **Note: Class PLR/TPA or Secondary Lock by adding 40 Newton to the maximum force required to seat the device when all the terminals are located properly.** **The minimum force is 60 Newton for 1.5 Terminal size and 80 Newton for > 1.5 terminal size as apply.**	S.4.5
2d	**Locks**	**Cavity damage susceptibility (after closing secondary lock with unseated terminal)**	**Terminal extraction force with secondary lock should not Delphi specifications** **After attempting to close a secondary lock with unseated terminal(s).** **Note: Remove the force applied to secondary lock on test Or and seat the terminal in its normal position, seat the secondary lock and verify that terminal retention meets the specifications. Re-time file.**	S.4.9
10d	Locks	PLR/TPA Insertion force (from pre-stage to lock)	60N Max with terminals installed	S.4.5.4
11d	Locks		110N Min without terminals installed	S.4.5.4
12d	Locks	**TPA Insertion force (from insert to lock)**	60N Max with all terminals installed	S.4.5.4
13d	Locks	PLR/TPA Insertion force (terminal form pre-stage)	110N Min	S.4.5.4
14d	Locks	PLR/TPA extraction force (from lock to pre-stage)	80N Max (with terminals installed in all available cavities) **10N Min**	S.4.5.4
15d	Locks		10N Min (after most recent terminal)	S.4.5.4
20d	Locks	Insertion force PLR/TPA with one or more incorrectly oriented terminals assembled	**The TPA/PLR or Secondary Lock must not seat in its final position with an unexpected terminal(s).** **Note: Class PLR/TPA or Secondary Lock by adding 40 Newton to the maximum force required to seat the device when all the terminals are located properly.** **The minimum force is 60 Newton for 1.5 Terminal size and 80 Newton for > 1.5 terminal size as apply.**	S.4.9
30d	Locks	CPA insertion force (insert to lock position)	60N Min (without terminals installed) 20N max w/connectors installed (based on CPA)	S.4.5.4
31d	Locks	CPA insertion force (pre-stage to lock position)	40N Min (without terminals installed) 20N max w/connectors installed	S.4.5.4
32d	Locks	CPA extraction force (lock to pre-stage position)	10N Min - 30N Max	S.4.5.4
33d	Locks	CPA extraction force (from pre-stage position)	40N Min.	S.4.5.4
40d	Locks	Lever retention force on pre-stage (shipping position)	Press to maximum on pre-stage (shipping) position. 50N Min	S.4.5.4
41d	Locks	Lever insertion force from pre stage (shipping) to final stage (lock)	If this Minimum Assembly Force is Then the Minimum Contact Area must be at least Typical Operator Hand Posture During Assembly:	Usual 25
			≤22N None minimum requirement One-finger press	Usual 25
42d	Locks		>48N 10mm x 20mm thumb/2 or more fingers press	Usual 25
43d	Locks		<75N 10mm x 35mm Two thumbs or palm/heel of hand press	Usual 25
50d	Locks	Secondary Lock (TPA, PLR, etc.) shouldnot overlaps with terminal when terminal is at final assembled position into Connector	Should not overlap	Delphi
1e	General	Components (with positive retention forces, like Connector Clips, Cover, etc.)	60N Max	S.4.5.4
2e	General	Components (with positive retention forces, like Connector Clips, Cover, etc.) Retention force	110N Min	S.4.5.4
3e	General	Connection drop test	Test 10 connection system, 3 times each one with parts except cable and terminals. Drop from a 1m distance the connector to a concrete surface, change orientation between all parts. The device under functionality. This test evaluates the ability of the connection to withstand incidental accidentally on a hard surface.	3-4.8
4e	General	Components attached to connector should have a Contrasting color	Attached parts to connector (Connector seal, secondary locks, PLR, CPA, Mat seal, Cable seal, etc.) should have a contrasting color to the connector	USCAR 12, E.F
5e	General	All connection systems parts should be free from defects.	Mechanical Performance Exterior Shall be free from deformation, cracking, split, pits, flaw, deformation, flash and/or other defects, the color and during usage	Delphi
6e	General	Service or Repair	Connection systems components should be serviceable and repairable without functional damage	Delphi
7e	General	Components requiring assembly to Connector, incorrect orientation prevention test	All components requiring assembly to connector (Ex: Cover, TPA, Clip, CPA), Lever, Housing, etc. should not be incorrectly assembled (incorrect orientation) by hand **or minimum mis-mating force of 150 N or 5 times the normal assembly force.** **This is NOT applicable for symmetrical designs.**	Delphi
1f	Testing	Equipment capability of providing a constant Voltage	5V±mV/mV	Delphi
2f	Testing	Accuracy of measurement	±0.05%	Delphi
3f	Testing	Tolerance for all tests	± 10%	Delphi

Mat seal

Red & Bold font denotes changes compared with previous Revision Date
USCAR cass was used as reference on how to perform each test.
SAE / USCAR 2 Revisions 3 November 2001
SAE / USCAR 12
SAE/USCAR 25 Revision 1 September 2005
Honda HES D-0217-99A Rev 2

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		DATE
DR:	DIAZ, JUAN J	28JN11
APVD:	DIAZ, JUAN J	28JN11
APVD2:	ENRIQUEZ PUENTES, JORGE	28JN11
APVD3:		
APVD4:		
APVD5:		

SUBSTANCES OF CONCERN AND RECYCLED CONTENT PER DELPHI -A 10749081

DWG TYPE: PART DRAWING
STYLE: N/A
VOLUME (CM3): N/A
DISTR CODE: D
AutoCAD

MATERIAL: SEE DWG
DRAWING NAME: TAXI CONN 2 F 2.8 APEX
DRAWING NUMBER: 13535828

SIZE:	SCALE:	FRAME NO:	SHEET NO	STG:	REV:	N/P:
A0	NONE	1 OF 1	3 OF 3	R	06	--