

MANUFACTURING EQUIPMENT PURCHASE SPECIFICATION DELPHI SAGINAW STEERING SYSTEMS

TITLE: Label Error Proofing Requirements for New Assembly Systems

NUMBER: SD-1022

ISSUED BY: Brian Braman

DATE: 09/30/2003

APPROVED BY: See Below

REVISION: Brian Braman

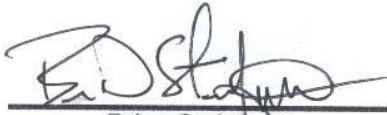
DATE: 05/23/05

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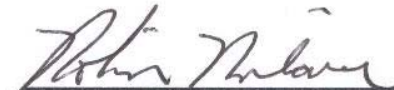
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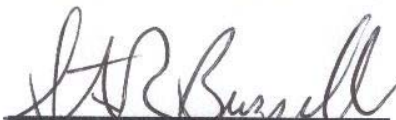
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1. Scope

This Specification defines Delphi Steering Systems (Delphi S) minimum requirements for the quotation and purchase of label error proofing systems for new assembly operations. It applies to the generation and verification of customer required bar code labels applied during the assembly process. The intent of this specification is to convey the minimum system requirements to prevent mixed or mislabeled containers from being shipped to customers.

2. Requirements of the Label Error Proofing Process

- 2.1 The purpose of this section is to describe the basic philosophy of error proofing to prevent mixed or mislabeled containers. A visual representation of process is provided at the end of the section.
- 2.2 Part Label Generation – Part labels are defined as the label, typically required by the product print, that is placed on each part manufactured. To ensure proper label error proofing:
 - 2.2.1 Part Labels shall be printed one at a time as demanded by the process.
 - 2.2.2 Each label shall be serialized / unique to ensure it is traceable throughout the process, unless specific customer requirements prevent serialization.
 - 2.2.3 The label should be applied at or before the first operation where proliferated components are introduced to the assembly process. This allows the part label to be used throughout the process to ensure the proper part number is being assembled. Where customer or process design requirements do not allow the label placement location to be prior to introduction of proliferated components, then other methods of tracking components and part status should be utilized. (i.e. Automatic tracking of pallet and/or part status.)
 - 2.2.4 There shall be a change over verification procedure to ensure proper label quality.
- 2.3 Part Label Verification
 - 2.3.1 The label should be scanned, as necessary, throughout the process to ensure assembly operations are correct.
 - 2.3.2 The label shall be scanned at the final assembly station, before the part is packed to the finished part container. The assembly station shall alert the operator to an incorrect scan, and require the operator to acknowledge the improper scan. It is best to design a system to prevent the operator from packing the part (such as not releasing the part from the fixture).
- 2.4 Final Standard Pack Verification
 - 2.4.1 The system shall count finished parts as they are scanned at the final operation.
 - 2.4.2 The system shall acknowledge a full standard pack quantity and interface with the Delphi S mainframe system to automatically generate a

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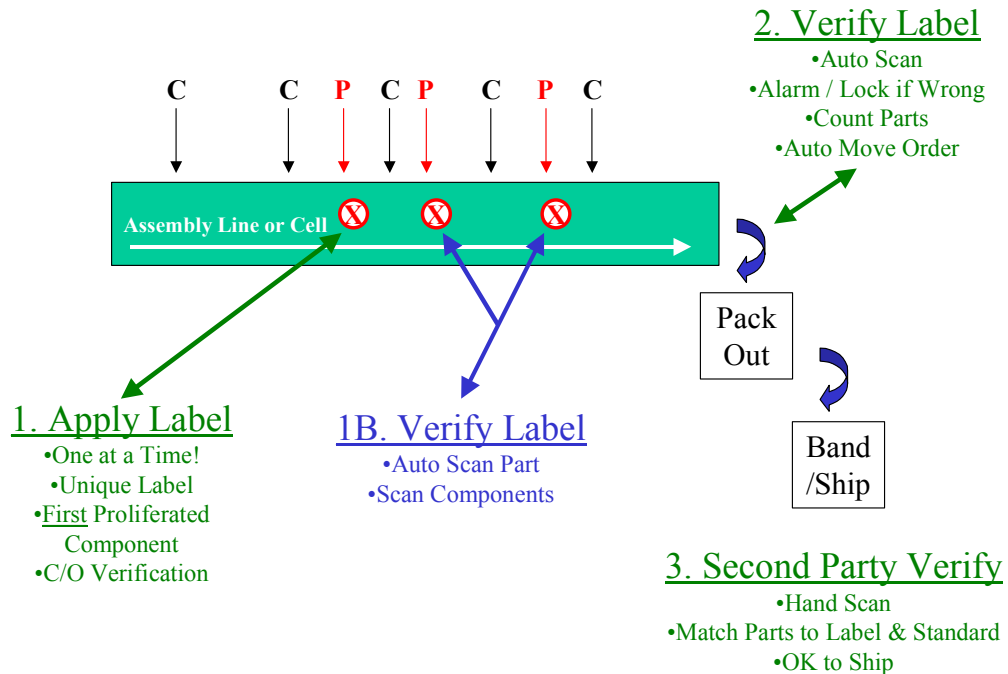
manufacturing label. (See section 4 for detailed instructions for interfacing with the Delphi S mainframe system.)

- 2.4.3 The system shall provide a provision for a second party to verify that the parts in the container match the label attached to the container. This is typically done by scanning a selected number of parts in the container, the shipping label, and a standard to ensure all match.

2.5 Partial Container Handling

- 2.5.1 The system shall be capable of producing an identification tag for a partially filled container. Typically called a "parking ticket", this tag will identify the part with a bar code and include the number of pieces in the container.
- 2.5.2 When the partial container is returned to the assembly system, the system shall be capable of reading the barcode and beginning the production count in mid pack.

Label Error Proofing Philosophy



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3. Relationship of the Label Error Proofing System to the Assembly Control System

- 3.1 Nearly all of today's assembly machinery involves the use of a Programmable Logic Controller (PLC) as the heart of their control system. Label error proofing systems on the other hand tend to be personal computer (PC) based allowing for flexibility in choice of application programming language, device communication, data collection and storage. This leads to a natural delineation of tasks and device connections. The purpose of establishing the communication channel between the devices is to enable the passing of data between the two systems. Such information could include the model of part being operated on, piece counts, pass/fail results of functional tests, bar code etc. To operate efficiently and accurately there needs to be a fast and reliable means of exchanging information between the label error proofing PC and the assembly line PLC. The interface between the PC and the PLC can use any of the following methodologies:
- 3.1.1 Ethernet (Preferred)
 - 3.1.2 Proprietary RS485 Network, i.e. Modbus Plus (Second Choice)
 - 3.1.3 Serial RS232C (Third Choice)
- 3.2 The interfacing of devices such as barcode readers and label printers is generally more easily accomplished with personal computers. The use of add-in boards may be required for the PC to connect to the PLC (multi-port serial RS232C, Ethernet network interface card, or proprietary RS485 Network). The serial communications capabilities do exist for the PLC but tend to be more expensive and require knowledge of the advanced programming functions of the PLC.
- 3.3 In most cases the use of serial and Ethernet communication methods involve the use of the PLC manufacturer's proprietary protocol. Commercially available communication drivers can be purchased to facilitate the exchange of data between the PC and the PLC. The PLC manufacturer must certify third party software drivers that utilize its proprietary protocol. This communication driver is to be OPC 2.0 compliant.
- 3.4 The reliability of the communication channel between PLC and PC must be maintained to verify the accuracy and status of the interface. In the case of discrete signals there needs to be checks performed to detect failed (on or off) signal lines as well as some method of error checking of data transmitted and received.
- 3.5 Delphi S Machinery and Equipment Specifications require that there be an open communication port for connection of a troubleshooting device (typically a PC) at the control enclosure. This means that any implementation for the communication of the label error proofing system PC with the PLC must provide an open port. Disconnection of a cable from a PLC port is not acceptable to meet this requirement.

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3.6 Recommended PC Equipment for interface:

Item	Model	Notes
Factory Floor Terminal	Dell GX-280 SFF	Required
PC to house Error Proofing system	Dell GX-280	Preferred Enclosure required
Wedge to communicate with FFT and PC	Welch Allyn 2000 w/keyboard cable	Required
Multiport Serial Controller board	RocketPort 94100-2 16 port RS232 to DB25 Female	Preferred depending on communications options
Corded Scanner	Symbol Keyless	Preferred
Wireless Scanner	Symbol Keyless	Preferred
6x4 Label Printing (mainframe)	Zebra 170XiIII or newer	Required
Part Label Printing	Zebra 90XiIII or 140XiIII or newer	Required

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4. Manufacturing Label Generation

- 4.1 The cell error proofing solution connects to the Delphi S Kiosk PC through a wedge to gain access to the legacy system (Delphi S MRP mainframe IMS system).
- 4.2 When the legacy system displays the initial security screen, the cell error proofing solution populates the security information (user and password). The legacy system displays this screen upon initial entry of the system or if the system automatically logs a session out due to inactivity.

```
EEEEEEEE DDDDDDDD SSSSSSSS NNN      NNN EEEEEEEE TTTTTTTTTTTT
EEEEEEEE DDDDDDDD SSSSSSSS NNNN     NNN EEEEEEEE TTTTTTTTTTTT
EEE      DDD      DDD SSS      NNNNN  NNN EEE      TTT
EEEEEEEE DDD      DDD SSSSSSSS NNN NN  NNN EEEEEEEE TTT
EEEEEEEE DDD      DDD SSSSSSSS NNN NN  NNN EEEEEEEE TTT
EEE      DDD      DDD SSS      NNN  NNNN EEE      TTT
EEEEEEEE DDDDDDDD SSSSSSSS NNN      NNN EEEEEEEE TTT
EEEEEEEE DDDDDDDD SSSSSSSS NNN      NNN EEEEEEEE TTT
```

```
      ELECTRONIC DATA SYSTEMS CORPORATION      DALLAS, TEXAS
Use of the network is restricted to authorized users. User activity is moni-
tored and recorded by system personnel. Anyone using the Network expressly
consents to such monitoring and recording. BE ADVISED: if possible criminal
activity is detected, system records, along with certain personal information,
may be provided to law enforcement officials.
*****
*   LOGON-ID:      NETWORK-ID: CLIPC1      DATE:      03/22/05      *
*   PASSWORD:      HOST:      CLGNN1A      TPIN:      49455715      *
*   NEW PASSWORD:  TERMINAL-ID: TCL0B4DO  SECURITY  972-605-3720  *
*                  CDRM:      MCL063      HELP:      704-549-5400  *
*****
ENTER OPTIONAL INITIAL SELECTION BELOW, PF1 FOR HELP, OR 'LOGOFF'.

SELECTION=>
```

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- 4.3 When the legacy system displays the legacy menu, the cell error proofing solution populates the menu option information; the option labeled "01 DCIMPA DCIPC1C IMS PROD". In this example, the preferred entry would be DCIMPA.

```
TERM:   TCL0B4DO  DATE: 03/22/05  HELP: 704-549-5400  NETWORK-ID: CLIPC1
LOGMODE: D4C32782  TPIN: 49455715  SEC: 972-605-3720  HOST:      CLGNN1A
NO..MNEMONIC..SITE....APPLICATION/DESCRIPTION.....HOURS.....
01  DCIMPA      DCIPC1C  IMS  PROD              SYS A   SA10  0000/2400
02  DCIMTA      DCIPC1C  IMS  TEST              SYS A   SA10  0000/2400
03  DCT10       DCIPC1C  TSO                    SYS A   SA10  0000/2400
04  GMTKSK1     PLIPC1A  GMTKS  PRODUCTION          0000/2400
05
06
07
08
09
10
11
12
13
14
15
16
17
*****                               SELECTION SCREEN                               *****
PLEASE ENTER SELECTION BELOW, PF1 FOR HELP OR PF3 TO LOGOFF          PAGE=ONLY
M63: LAST LOGON 03/11/05 AT 15:51:21 ON TERMINAL TCL0B43J
SELECTION=>   DCIPMA
```

- 4.4 If the system displays the screen below, the cell error proofing system provides security information (user and password) -- this information is the same as the previous security information. This screen is displayed upon initial entry of the IMS system or can be called up with this command "/for sign".

```
ENTER LOGONID      PASSWORD

DFS3649A /SIGN COMMAND REQUIRED FOR IMS IMS2; NODE NAME: VA2T3136
*****
*
*
*          WELCOME TO IMS ON-LINE SYSTEM          *
*
*
*****
```

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- 4.5 When the system displays the blank screen below, the cell error proofing system generates and transmits the command: “/for is076s” as shown below. This command initiates the legacy system screens that actually generate the manufacturing label.

```
/for is076s  
  
DFS3650I SIGNON COMMAND COMPLETED FOR USER
```


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- 4.6 After the command “/for is076s”, the system displays the following menu. The cell error proofing system should enter and transmit **17** to initiate option **17 CREATE CREDIT BAR CODE LABEL (IS016S)**. Users can use **PF3** to page forward, as shown below, but the cell error proofing system has no need to use **PF3**.

```
MOVE ORDER DATA STATION MENU      PAGE: 1      IIS076S1
SELECT FUNCTION:  17
01 CREATE CREDIT MOVE ORDER          (IS070S)
02 CREATE NO-CREDIT MOVE ORDER        (IS071S)
03 CREATE SPECIAL MOVE ORDER          (IS072S)
04 PRINT MOVE ORDER TICKET            (IS077S)
05 DISPLAY MOVE ORDER HISTORY          (IS074S)
06 PRINT/DELETE UNPRINTED DOCUMENTS   (IS073S)
07 REVISE FINAL DESTINATION PDG       (IS067S)
08 INITIATE DMT                       (IS062S)
09 REVISE DMT                         (IS063S)
10 DMT COMMENTS                       (IS065S)
11 PRINT DMT                         (IS064S)
12 DELETE DMT                        (IS066S)
13 RECEIVE DMT                       (IS058S)
14 RECEIVE INDIVIDUAL INTERPLANT      (IS057S)
15 INTRANSIT MATERIAL DISPLAY         (IS078S)
16 DMT HISTORY                       (IS079S)

PF3=PAGE2  PF5=EXIT
```

PF3 Takes the user to the second page of the menu, as depicted below, but is not required to run menu option 17.

```
MOVE ORDER DATA STATION MENU      PAGE: 2      IIS076S1
SELECT FUNCTION:
17 CREATE CREDIT BAR CODE LABEL       (IS016S)
18 CREATE NO CREDIT BAR CODE LABEL    (IS017S)
19 REPRINT BAR CODE LABEL             (IS018S)
20 CONSUME BAR CODE PULL SIGNAL        (IS052S)
21 PRELOAD REQUIRED BAR CODE DATA     (IS053S)
22 CREATE ERROR PROOFED BAR CODE      (IS022S)

PF2=PAGE1  PF5=EXIT
```

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- 4.7 Once the IS016S1 screen displays, there are several options. When entering just the part number without a version, a list of valid versions will display on the screen as depicted below.

PSWD:	GENERATE CREDIT BAR CODE LABEL	UIS016S1
PART: <u>26051353</u>	ENTER ONLY PART NUMBER TO SEE ALL VALID VERSIONS	
VER:		
STARTING OPER:	THE FOLLOWING ARE VALID VERSIONS FOR THIS PART:	
FREEFORM:	MA MB	
PF1=NO-CREDIT-BC PF4=SELECT PF5=EXIT PF6=IS025S		

The cell error proofing system shall enter a valid **part number** and **version**, as shown below, the system displays a second screen for user input, as shown on the following page.

PSWD:	GENERATE CREDIT BAR CODE LABEL	UIS016S1
PART: <u>26049918</u>	ENTER ONLY PART NUMBER TO SEE ALL VALID VERSIONS	
VER: <u>ma</u>		
STARTING OPER:		
FREEFORM:		
PF1=NO-CREDIT-BC PF4=SELECT PF5=EXIT PF6=IS025S		

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- 4.8 The cell error proofing system enters the **QUANTITY** and selects ("**x**") the desired **Line** for the corresponding **TO-PDG**. The shift is modifiable and is defaulted to current shift.

PSWD:	PLANT 05	GENERATE CREDIT BAR CODE	PAGE 01LP	UIS016S1
DOCUMENT:	002907		DATE WRITTEN:	05/29/97
PART VER:	26049918	MA HALFSHAFT ASM	U/M: PCS	REVN: 039
QUANTITY	SMPL CNT	PC WGT	GROSS	NET
				TARE
<u>100</u>				
	SHIFT: <u>A</u>	SIGN:		
ENTER CHARACTER TO SELECT	OPRN	EQUIV		
LN OPR	FROM-PDG	TO-PDG	VR OPR	OPER DESCRIPTION
030 L	05-039-01	30-094-01		REPAIR AXLE ASSEMBL
030 L	05-039-01	05-004-02		REPAIR AXLE ASSEMBL
030 L	05-039-01	32-094-01		REPAIR AXLE ASSEMBL
<u>x</u> 030 L	05-039-01	17-004-02		REPAIR AXLE ASSEMBL
NEXT PART:	VER:	OPER:		FREEFORM:
PFK1=REPEAT		PFK2=MENU	PFK3=NEXT	PFK4=SLCT
			PFK5=EXIT	

By pressing **<Enter>**, after all of the required information is on the screen, a determination of what type of label is printed. If the record selected is not a move to the plant's shipping dock, a manufacturing bar code label is automatically printed. After the bar code label is printed, the user is taken back to the **MOVE ORDER DATA STATION MENU**.

- 4.9 Common IMS or Delphi S commands used to navigate.

- | | | |
|-------|-----------|--|
| 4.9.1 | clear key | This key wipes the screen clean and gets it ready for other commands |
| 4.9.2 | "/exit" | Exits from any application in IMS |
| 4.9.3 | PF5 | Quit key for all Delphi S applications |
| 4.9.4 | "/for " | Displayed after the PF5 key. Use the clear key to clear screen. |
| 4.9.5 | "/rcI" | Logs user off IMS and back to EDSNET/TELNET screen |