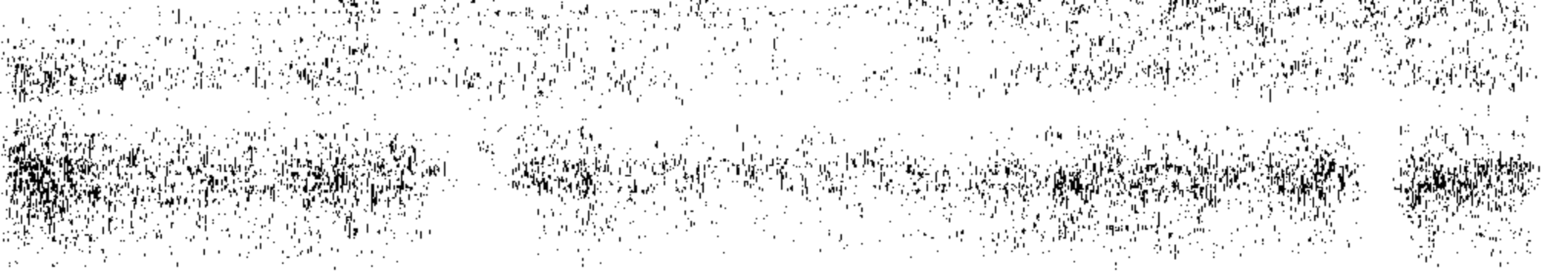


ENGINEERING SPECIFICATION

PART NAME: VALVE ASSY-PROPORTIONING W/DISABLER

PART NUMBER: ▽ES-E7SC-2B091-AA

LET.																		
FR.																		
LET.																		
FR.																		

DATE	LET.	FR.	REVISIONS	[illegible]	[illegible]
[illegible]			RELEASED C5G2-[illegible]	[illegible]	[illegible]

REFERENCE

PREPARED/APPROVED BY [illegible signature]

CHECKED BY [illegible signature] | [illegible] BY [illegible signature]

CONCURRENCE/APPROVAL [illegible]

PRINCIPAL DESIGN ENGINEER

[illegible] [illegible signature]

[illegible] MATERIAL ENGINEERING

RELIABILITY [illegible] [illegible signature]

MANUFACTURING [illegible]

QUALITY CONTROL/[illegible] [illegible signature]

PURCHASING

▽ES E7SC-2B091-AA

FRAME / OF 25 REV

TI-NHTSA 000002

[illegible] 3947-[illegible] (Previous editions may not be used)

RESTRICTIONS TO HELP SAFEGUARD HEALTH, SAFETY AND THE ENVIRONMENT APPLY TO SUBSTANCES USED IN THE ITEM(S) ADDRESSED BY THIS DOCUMENT.
ENGINEERING MATERIAL SPECIFICATION WSS-M99P9999-A/ APPLIES

▽ES E7SC-2B09-AA

I. GENERAL

The valve assembly controls hydraulic pressure to the rear brakes. After reaching a predetermined pressure (split-point) the valve maintains a constant ratio of rear to front braking pressure. This function optimizes overall braking performance.

This engineering specification is a supplement to the released drawing on the above part, and all requirements herein must be met in addition to all other requirements of the part drawing. Minimum measures necessary for demonstrating compliance to these requirements are given in each section.

The engineering tests, sample size, and test frequencies contained within this engineering specification reflect the minimum requirements established to provide a regular evaluation of conformance to design intent. This engineering test program is intended as a supplement to normal material inspections, dimensional checking, and in-process controls, and should in no way adversely influence other inspection operations. QA suppliers may implement different test sample sizes and frequencies providing these changes have been included in an alternate Control Plan approved by the design responsible Product Engineering Office and concurred in by SQA.

II. PRODUCTION VALIDATION AND IN-PROCESS TESTS

Production Validation (PV) tests must be completed satisfactorily with parts from production tooling (and processes where possible) before ISIR approval and authorization for shipment of production parts can be effected. Parts must be re-validated completely, or per Section V whenever any change is made which could possibly affect part function or performance.

In-Process Test Phase 1 (IP-1) - IP-1 tests are used to demonstrate process capability and must be completed using initial production parts from production tooling and processes prior to first production shipment approval. IP-1 tests are to continued in effect until process capability is demonstrated.

In-Process Tests Phase 2 (IP-2) - IP-2 test program may be implemented only after process capability has been established. Tests must be completed with production parts on a sampling basis. Samples for these tests must be selected on a random basis to represent the entire production population as much as possible. In the event that any portion of these tests are not met, Ford Q-101 Section III, E, 3 "GS Test Performance Requirements" shall be invoked.

▽CONTROL ITEM — AFFECTS GOVERNMENT REGULATION COMPLIANCE OR CRITICAL VEHICLE FUNCTION AND MUST COMPLY WITH APPLICABLE REQUIREMENTS OF FORD Q-101 OR MANUFACTURING PRACTICE 102 — AREAS MARKED ▽ ARE CONTROL ITEM CHARACTERISTICS — CHANGE IN DESIGN, COMPOSITION OR PROCESSING FROM THE PART PREVIOUSLY APPROVED FOR PRODUCTION REQUIRES PRIOR PRODUCT ENGINEERING APPROVAL.

Test Name	Test Number	Minimum Sample Size	Statistical Test Acceptance Criteria	In-Process IP-1 Minimum Sample Size and Frequency	In-Process IP-1 Statistical Test Acceptance Criteria	In-Process IP-2 Minimum Sample Size and Frequency	In-Process IP-2 Statistical Test Acceptance Criteria
Functional Audit							
Vacuum Pull-Down	E	See Functional Tests for PF Requirements		12/Mo.	All must pass	8/3 Mo.	All must pass
Low Pressure Leakage	F			12/Mo.	All must pass	8/3 Mo.	All must pass
Medium Pressure Leakage	G			12/Mo.	All must pass	8/3 Mo.	All must pass
High Pressure Leakage	H			12/Mo.	All must pass	8/3 Mo.	All must pass
Medium Pressure Leak-Failed Primary	I			12/Mo.	All must pass	8/3 Mo.	All must pass
High Pressure Leak-Failed Primary	J			12/Mo.	All must pass	8/3 Mo.	All must pass
Input/Output Characteristics	K			12/Mo.	All must pass	8/3 Mo.	All must pass
Strength Test	L			3/Mo.	All must pass	2/3 Mo.	All must pass
Structural Test	M			3/Mo.	All must pass	2/3 Mo.	All must pass
Tube Seat Leakage	N			3/Mo.	All must pass	2/3 Mo.	All must pass
Internal Cleanliness	O			2/Day	All must pass	2/Day	All must pass
Encryption Test	P			[illegible]	All must pass	2/3 Mo.	All must pass
Pressure Switch Calibration	Q			[illegible]	All must pass	8/3 Mo.	All must pass
Functional - 100%							
High Pressure Leakage (Failed Primary) by Fast-(Failed Primary)	IV.A	All	All Tests	100%	All must pass	100%	All must pass
	IV.B	"	All Pass	100%	All must pass	100%	All must pass
Low Pressure Leakage	IV.C	"	All Must Pass	100%	All must pass	100%	All must pass
High Pressure Leakage	IV.D	"	" " "	100%	All must pass	100%	All must pass
Input/Output Characteristics	IV.E	"	" " "	100%	All must pass	100%	All must pass
Functional-1st Control							

Note:

TABLE OF CONTENTS

		PRODUCTION VALIDATION		IN-PROCESS 10-1		IN-PROCESS 12-2	
Test Name	Test Number	Minimum Sample Size	Statistical Test Acceptance Criteria*	Minimum Sample Size and Frequency	Statistical Test Acceptance Criteria*	Minimum Sample Size and Frequency	Statistical Test Acceptance Criteria
Functional Tests							
Vacuum Pull-Down	E	24	P.90-.91	12	P.90-.84	N.R.	N.R.
Low Pressure Leakage	F	24	P.90-.91	12	P.90-.84	"	"
Medium Pressure Leakage	G	24	P.90-.91	12	P.90-.84	"	"
High Pressure Leakage	H	24	P.90-.91	12	P.90-.84	"	"
Medium Pressure Lock-Failed Primary	I	24	P.90-.91	12	P.90-.84	"	"
High Pressure Lock-Failed Primary	J	24	P.90-.91	12	P.90-.84	"	"
Input/Output Characteristics	K	24	P.90-.91	12	P.90-.84	"	"
Strength Test	L	6	P.90-.72	3	P.90-.36	"	"
Structural Test	M	6	P.90-.72	3	P.90-.36	"	"
Tube Seat Leakage	N	6	P.90-.72	3	P.90-.36	"	"
Internal Cleanliness	O	6	P.90-.72	3	P.90-.36	"	"
Corrosion Test	P	6	P.90-.72	3	P.90-.36	"	"
Pressure Switch Calibration	Q	24	P.90-.91	12	P.90-.84	"	"

TABLE OF CONTENTS

Test Name	Test Number	PRODUCTION VALIDATION Minimum Sample Size	PRODUCTION VALIDATION Statistical Test Acceptance Criteria	IN-PROCESS IP-1 Minimum Sample Size and Frequency	IN-PROCESS IP-1 Statistical Test Acceptance Criteria	IN-PROCESS IP-2 Minimum Sample Size and Frequency	IN-PROCESS IP-2 Statistical Test Acceptance Criteria
Durability Tests							
Life Cycle	A	6	P.90-.72	3	P.90-.56	N.R.	N.R.
Low Temp. Cycling	B	6	P.90-.72	3	P.90-.56	"	"
High Temp. Cycling	C	6	P.90-.72	3	P.90-.56	"	"
Spike Test	D	6	P.90-.72	3	P.90-.56	"	"
Durability-Process Audit							
Life Cycle	A	N.R.	--	3/Mo.	All must pass	2/3 Mo.	All must pass
Low Temp Cycling	B	"	--	3/Mo.	All must pass	2/3 Mo.	All must pass
High Temp Cycling	C	"	--	3/Mo.	All must pass	2/3 Mo.	All must pass
Spike Test	D	"	--	3/Mo.	All must pass	2/3 Mo.	All must pass

Durability-Lot Control

Note:

name61983.1

III. TEST PROCEDURES AND REQUIREMENTS

A. Life Cycle

1. Test Requirements

a. The pressure control valve shall be cycled by an external pressure source. The external pressure source is required to increase the valve inlet pressure at a rate of 10,340 ± 1380 kPa per second. Time cycle below 170 kPa must not be less than 0.25 seconds.

b. The valve shall be cycled from 0 to 10,340 ± 1380 kPa at a maximum rate of 2500 per hour.

c. After 500,000 cycles, test valve per test requirements of Section III.F., G., H., K., and Q.

2. Acceptance Requirements

a. External fluid leakage from the valve shall not exceed 2.5 cc.

b. Must conform with acceptance requirements of Section III.F., G., H., and Q.

c. The input-output characteristics of the valve shall not deviate by more than 1% from the acceptance requirements of Section III.K.

d. No audible noise detected during application or release of hydraulic fluid pressure.

B. Low Temperature Cycling

1. Test Requirements (See Figure 2)

a. The fluid ambient temperature is to be maintained at -40° -45°C.

b. The pressure control valve shall be cycled by an external pressure source capable of increasing the valve inlet pressure to 4140 ± 350 kPa.

c. The hydraulic circuit is from the pressure source to a shut-off valve (A) to a second shut-off valve (B) to shut-off valve (C).

d. A means to determine the pressure differential in the circuit is between valve (A) to valve (B) to valve (C).

e. The hydraulic circuit volume from valve (A) to valve (B) must equal the circuit volume from valve (B) to valve (C) within 0.30 cc.

III. TEST PROCEDURES AND REQUIREMENTS (Continued)

A. Low Temperature Cycling (Continued)

1. Test Requirements (Continued)

f. Install valve in the cold chamber and release hydraulic pressure in the system. Soak for 16 ± 0.5 hours with the cold chamber at temperature.

g. Cycle the valve at temperature on the following schedule:

1. Pressurize the valve inlet port to 1825 ± 70 kPa and hold for 15 seconds. Allow pressure to drop to 0 kPa. Repeat this procedure six times at approximately 60 second intervals.

2. Repeat Section III.A.1.e.1 with a hydraulic pressure of 4140 ± 350 kPa.

h. After cycling, test valve at temperature per test requirements of Section III.E.

i. Allow valve to soak for a minimum of 4 hours at room temperature.

j. After room temperature soak period, test valve per test requirements of Section III.E., and G.

2. Acceptance Requirements

a. Leakage from the valve for Section III.A.1.g.1 shall not exceed an amount indicated by a [illegible] differential pressure across valve assembly of 69 kPa.

b. Leakage from the valve for Section III.A.1.g.2. shall not exceed an amount indicated by a [illegible] differential pressure across valve assembly of 690 kPa.

c. For Section III.A.1.h. and i., [illegible] characteristics of the valve shall not [illegible] by more than 15% from the acceptance requirements [illegible] Section III.E.

d. No audible noise detected during [illegible] or release of hydraulic fluid pressure.

III. TEST PROCEDURES AND REQUIREMENTS (Continued)

G. High Temperature Cycling

1. Test Requirements

a. The fluid and ambient temperature is to be maintained at 116° - 121°C.

b. The pressure control valve shall be cycled by an external pressure source capable of increasing the valve inlet pressure to 6895 ± 150 kPa.

c. The external pressure source can be located inside or outside of the heat chamber. If the pressure source is located outside of the heat chamber is must be connected with sufficient tubing to the valve in the chamber to prevent fluid temperature change in the valve during cycling.

d. Install valve in the heat chamber and release hydraulic pressure in the system. Soak for 5 ± 0.25 hours with heat chamber at temperature.

e. Cycle valve from 0 to 6895 ± 150 kPa at a rate of 1500 ± 150 cycles per hours at temperature.

f. After 70 hours, test valve at temperature per test requirements of Section III.E.

g. Allow the valve to cool for 20 hours minimum at room temperature.

h. After cooling period, test valve per test requirements of Section III.C., E. F., and Q.

I. Disassemble valve noting residual wear products or other evidence of excessive wear.

2. Acceptance Requirements

a. External fluid leakage from the valve shall not exceed 0.4 cm.

b. Must confirm with acceptance requirements of Section III.C., E., and Q.

c. For Section III.C.1.f. and h., the input-output characteristics of the valve shall not deviate by more than 15% from the acceptance requirements of Section III.E.

III. TEST PROCEDURES AND REQUIREMENTS (Continued)

G. High Temperature Cycling (Continued)

2. Acceptance Requirements (Continued)

c. There shall be no cracked, broken or loose parts.

d. No audible noise detected during application or release of hydraulic fluid pressure.

D. Spike Test

1. Test Requirements

a. The pressure control valve shall be cycled by an external pressure source. The external pressure source must be capable of increasing the valve inlet pressure to 7000 kPa.

b. The valve inlet port shall be connected to a relief valve set at 6900 ± 100 kPa and the relief valve outlet shall be connected to the reservoir of the external pressure source.

c. The valve inlet pressure shall be increased to 690 kPa min. in the first 0.10 second max. of the stroke and up to 6900 kPa min. in the first 0.14 second max. of the stroke.

d. The valve shall be cycled at a rate of 1500 ± 500 cycles per hour.

e. Test to be run in two modes: a) Full system, b) failed primary.

f. After 200 ± 2 cycles, test valve per test requirements of Section III.G., H., I and Q.

g. Disassemble valve noting residual wear products or other evidence of excessive wear.

2. Acceptance Requirements

a. Must conform with acceptance requirements of Section III.G., H., I, and Q.

b. The input-output characteristics of the valve shall not deviate by more than 15% from the acceptance requirements of Section III.E.

c. There shall be no cracked, broken or loose parts.

d. No audible noise detected during application or release of hydraulic fluid pressure.

III. TEST REQUIREMENTS AND PROCEDURES (Continued)

E. Vacuum Fall-Down

1. Test Requirements

a. Mount the brake valve assembly in a test fixture as shown in Figure 1. Valve test fixture should contain vacuum transducers common to inlet ports (A) and (B) and at each outlet ports (D) and (C). Shut-off valves should be located at inlet ports (A) and (B). Transducers and shut-off valves shall be be located as close as possible to test valve in order to keep system volume to a minimum. Vacuum supply pump shall be capable of evacuating at a rate of 500 l/min. min.

b. With all valves closed, record time to reach 2 mm Hg at vacuum transducer 1.

c. Open ports (B) and (C) and record time to reach 2 mm Hg.

d. Close ports (B) and (C). Open ports A, B, and E and record time to reach 2 mm Hg.

e. To obtain true evacuation time, subtract time obtained in Section III.E.1.c and III.E.1.d from time obtained in Section III.E.1.b.

2. Acceptance Requirement

a. Using true evacuation times for front and rear sections, the vacuum level must reach 2 mm Hg in 15 sec. at transducers 2 and 3.

F. Low Pressure Leakage

1. Test Requirements

a. Pressurize the pressure control valve inlet ports to 10 ± 2 kPa and allow a minimum of 120 cc of brake fluid to bleed through the valve at this pressure.

b. Seal off the valve outlet port.

c. Hold valve inlet pressure at 10 ± 2 kPa for 24 ± 0.5 hours.

III. TEST REQUIREMENTS AND PROCEDURE (Continued)

F. Low Pressure Leakage (continued)

2. Acceptance Requirements

a. External fluid leakage from the valve shall not exceed 0.5 cc.

G. Medium Pressure Leakage

1. Test Requirements

a. Seal off the pressure control valve outlet port.

b. Pressurize the valve inlet ports to 1035 ± 7 kPa.

c. Allow 5 to 10 seconds for pressure stabilization.

d. Close off the pressure source sealing pressure inside the valve for a minimum of 10 seconds.

2. Acceptance Requirements

a. Leakage from the valve shall not exceed an amount indicated by a pressure drop of 7 kPa in 10 seconds.

H. High Pressure Leakage

1. Test Requirements

a. Seal off the pressure control valve outlet port.

b. Pressurize the valve inlet ports 13800 ± 700 kPa.

c. Allow 5 to 10 seconds for pressure stabilization.

d. Close off the pressure source sealing pressure inside the valve for a minimum of 10 seconds.

2. Acceptance Requirements

a. Leakage from the valve shall not exceed an amount indicated by a pressure drop of 170 kPa in 10 seconds.

III. TEST REQUIREMENTS AND PROCEDURE (Continued)

1. Medium Pressure Leakage (Failed Primary)

1. Test Requirements

a. Seal off the pressure control valve outlet port.

b. Pressurize the valve inlet port S to 1724 ± 7 kPa.

c. Allow 5 to 10 seconds for pressure stabilization.

d. Close off the pressure source sealing pressure inside the valve for a minimum of 10 seconds.

2. Acceptance Requirements

a. Leakage from the valve shall not exceed an amount indicated by a pressure drop of 7 kPa in 10 seconds.

b. Pressure at outlet port (E) must be equal to inlet pressure.

J. High Pressure Leakage (Failed Primary)

1. Production Validation and In-Process Test

a. Test Requirements

1. Seal off the pressure control valve outlet port.

2. Pressure the valve inlet port S to 12000 ± 700 kPa.

3. Allow 5 to 10 seconds for pressure stabilization.

4. Close off the pressure source sealing pressure inside the valve for a minimum of 10 seconds.

b. Acceptance Requirements

1. Leakage from the valve shall not exceed an amount indicated by a pressure drop of 170 kPa in 10 seconds.

2. Pressure at outlet port (E) must be equal to inlet pressure.

ES ETSC-28091-AA

III. TEST PROCEDURES AND REQUIREMENTS (Continued)

K. Input/Output Characteristics

1. Test Requirements

a. The pressure control valve shall be cycled by an external pressure source. The external pressure source must be capable of applying and releasing pressure to the inlet side of the valve at a rate of 3280 ± 345 kPa per second.

b. The valve outlet ports shall be connected to rear brake assemblies which will simulate nominal fluid transfer through the valve.

c. Pressurize the valve inlet ports to 1448 kPa greater than the split point specified on the valve assembly drawing and hold for 10 sec.

d. Increase the valve inlet pressure to 13800 kPa and hold for 10 sec.

2. Acceptance Requirements

a. Pressure at the valve outlet ports (2) must be within the limits specified on the valve assembly drawing at the low and high pressure check points specified in Section III.K.1.c. and d.

L. Strength Test

1. Test Requirements

a. Seal off the pressure control valve outlet ports.

b. Pressurize the valve inlet ports to 34500 ± 350 kPa at a rate of 3450 ± 700 kPa per second.

c. Allow 5 to 10 seconds for pressure stabilization.

d. Close off the pressure source sealing pressure inside the valve for a minimum of 10 seconds.

e. After a minimum of 10 seconds at pressure, test valve per test requirements of Section III.G., H., I., and Q.

NOTE: After completion of Section III.E., the valve assembly must be thoroughly identified so as to prevent its reuse.

III. TEST PROCEDURE AND REQUIREMENTS (Continued)

2. Acceptance Requirements

a. No visible leakage of fluid from the valve.

b. Must conform with acceptance requirements of Section III.G., H., and Q.

c. The input-output characteristics of the valve shall not deviate by more than 15% from the acceptance requirements of Section III.K.

K. Structural Test - Valve Body to Bracket (Housing)

1. Test Requirements

a. With valve body restrained by any suitable means, apply a load of 300 lbs. as shown in Fig. 4 to the mounting bracket.

2. Acceptance Requirements

a. Housing must still be attached to valve body with no perceptible looseness.

L. Tube Nut Leakage

1. Test Requirements

a. Install the current tube end and tube nut in the pressure control valve inlet and outlet ports.

b. Torque tube nut to 13.7 ± 1 N-m.

c. Pressurize the valve inlet ports to 20700 kPa and hold for a minimum of 30 seconds.

2. Acceptance Requirements

a. Leakage from the valve shall not exceed an amount indicated by a pressure drop of 140 kPa in 30 seconds.

b. No visible leakage of fluid at fitting.

III. TEST PROCEDURES AND REQUIREMENTS (Continued)

G. Internal Cleanliness

1. Test Requirements

a. Wash exterior of pressure control valve and discard residue.

b. Disassemble valve.

c. Wash all component parts with 1000 ± 10 cc of clean previously filtered (5 micron filter) isopropyl-alcohol. Collect alcohol into clean container.

d. Flush inside of valve body with a total of 2000 ± 10 cc of clean, previously filtered (5 micron filter) isopropyl alcohol. Alcohol is to be forced into inlets and outlets and collected from open bore end. Average flow rate through each path to be no less than 25 cc per second, until 500 ± 25 cc have passed through each set of ports. Collect alcohol into clean container.

e. Thoroughly wash 3 micron filter with isopropyl-alcohol. Bake washed filter at 90 ± 10°C for a minimum of 10 minutes.

f. Filter alcohol used in Section III.G.1.c. and d through 3 filter.

g. Place filter in heat chamber and bake at 90 ± 10°C for minimum of 10 minutes.

h. Remove filter from heat chamber and weigh.

i. Examine filter under microscope with measuring device for the largest metal particle and largest non-metal particle (size indicated by measurement of length and width). Identify particle material.

2. Acceptance Requirements

a. Total residue must not exceed 5 milligrams per assembly.

b. Residue particles must be in accordance with the following:

1. 75 microns or less in width, 4500 maximum microns in length.
2. 75 to 150 microns in width, 1500 maximum microns in length.
3. 150 to 300 microns in width, 3000 maximum microns in length.
4. When a sample contains residue particles exceeding requirements of Section III.H.2.b.(2.) it is permissible to check four additional samples. If these samples do not exceed the requirements of Section III.H.2.b.(2.) the production made in the 8-hour shift will be considered acceptable.

ES ETSC-2809-A

III. TEST PROCEDURES AND REQUIREMENTS (Continued)

P. Corrosion Test

1. Test Requirements

a. Seal off the pressure control valve inlet and outlet ports.

b. Test valve per ASTM B117 for 48 hours.

c. After 48 hours, test valve per test requirements of Section III.K., and Q.

d. Disassemble valve and inspect for rust on the internal surfaces of the valve.

2. Acceptance Requirements

a. Must conform with acceptance requirements of Section III.K. and Q.

b. No visible rust on any of the internal parts.

Q. Pressure Switch Calibration

1. Test Requirements

a. Switch calibration is to be checked at room temperature (16°C-25°C) using ambient air, brake fluid or equivalent. Calibration settings shall be as specified on the part drawing with settings checked after ten or more pressure cycles. Pressure cycle range is to be determined by the switch manufacturer to insure switch calibration stability. The cut-out and differential set points are to be measured while conducting 5-10 milliamperes with 13.0 ± 1.0 volts D.C. applied. The cut-in point is to be checked with increasing pressure.

b. The cut-out point is to be checked with decreasing pressure, and the differential set point is to be calculated using the cut-out pressure.

2. Acceptance Requirements

a. Switch cut-in, cut-out, and differential must be within the tolerance limits specified on the part drawing.

ES E7SC-2B091-AA

11/16 - 25

IV. [illegible] TEST PROCEDURES AND REQUIREMENTS

The following tests should be performed at room temperature using dry filtered [illegible]

B. [illegible] Pressure Leakage (Failed Primary)

1. [illegible] Requirements

Pressurize the valve inlet port A to 1724 ± 70 kPa.

Allow 5 to 20 seconds for pressure stabilization.

Close off the pressure source sealing pressure inside the valve for a minimum of 5 seconds.

2. [illegible] Requirements

a. Leakage from the valve shall not exceed an amount indicated by a pressure drop of 7 kPa in 5 seconds.

b. Pressure at outlet port (B) must be equal to inlet pressure.

C. [illegible] Test (Failed Primary)

1. Test Requirements

a. Pressurize the valve inlet port A to a test pressure 1379 kPa greater than the specified split point.

2. [illegible] Requirements

a. Pressure at outlet ports (B) must be equal to [illegible] pressure.

D. Low Pressure Leakage (Full System)

1. Test Requirements

a. Pressurize the valve inlet ports A and B to [illegible] kPa.

b. Close off the pressure source sealing pressure inside the valve for a minimum of 5 seconds.

2. Acceptance Requirements

a. Leakage from the valve shall not exceed an amount indicated by a pressure drop of.069 kPa.

b. Pressure at outlet ports must be equal to pressure applied within 2 seconds.

IV. PRODUCTION TEST PROCEDURES AND REQUIREMENTS (continued)

B. High Pressure Leakage (Full System)

1. Test Requirements

a. Pressurize the valve inlet ports A and B to 1724 ± 69 kPa.

b. Close off the pressure source sealing pressure inside the valve for a minimum of 5 seconds.

2. Acceptance Requirements

a. Leakage from the valve shall not exceed an amount indicated by a pressure drop of 7 kPa in 5 seconds.

3. Input - Output Characteristics

1. Test Requirements

a. Pressurize the control valve inlet ports A and B to 1380 kPa greater than the split point specified on the valve assembly drawing and hold for 5 seconds.

2. Acceptance Requirements

b. Pressure at the valve outlet port (E) must be within the limits specified on the valve assembly drawing.

V. STATISTICAL ANALYSIS METHODS

Following are the methods for reducing the test data to compute the statistical value.

A. P.80a.01, P.80a.04, P.80a.11 and P.80a.14

1. Test the number of samples specified in Section II per the requirements in Section III.

2. If a failure occurs, stop the test; part fails to meet the statistical acceptance criterion.

3. If no failures occur, the statistical acceptance criterion is met.

B. Q-101

1. Test the number of samples specified in Section II per the requirements in Section III.

2. If a failure occurs, the procedure outlined in Q-101 Section III. E. shall be followed.

VI. REVALIDATION REQUIREMENTS

No change to processing, material, or supplier may be allowed without prior engineering approval.

The following revalidation is required for a change in processing or material, new supplier qualification (new material source), or subsequent years production. The "test numbers" entered in the "ES Test Required" column refer to the ES test number in the table in Section II.

REQUIRED CHANGE REVALIDATION

Component	Specific Process Change	ES Test Required	Material Change	New Supplier
Housing	Threads, Bore(s)	IIIA,B,C,E,H, I,J,K,L	III A,B,C,E, H,I,J,K, L,M	IIIA,B,C,E, H,I,J,K, L,M
Adapter	Threads Machining Hole	IIIA,B,C,E,H, I,J,K,L	IIIA,B,C,E, H,I,J,K, L,M,N	IIIA,B,C,E, H,I,J,L, M,N
	Any	IIIA,B,C,E,H, I	IIIA,B,C,E, H,I	IIIA,B,C,H, H,I
Springs	Finish	IIIA,E,F,G,H, I,O	IIIA,E,F,G, H,I	IIIA,E,F,G,H, I
Seals	Any	IIIJ,O	IIIJ,O	IIIJ,O
Pistons	O.D., Sealing Surfaces, Machining Finish	IIIA,B,C	IIIA,B,C,D, H,I,N	IIIA,B,C,D, H,I
O'Rings	Any	IIIA,B,C,D, E,F,G,H,I	IIIA,B,C,E, E,F,G,H	IIIA,B,C,D, E,F,G,H,I

VI. QUALIFICATION REQUIREMENTS (Continued)

REQUIRED TEST QUALIFICATIONS

Carryover Design XII A, B, C, E, F, G, K; N, Q.

VII. LOT DEFINITION
A lot is defined as one shifts' production.

VIII. RECORD RETENTION
Recording and Record retention shall conform to Para Q-101, Sections 7.11 and 8.11.1.

Test reports of all production validation and in-process tests, except 100% production tests, will be sent to FCPSD, Brake Department, within 10 days of test completion. A monthly summary of 100% production tests will be sent to FCPSD, Brake Department, within 10 days of last day of month.

IX. INSTRUCTIONS AND NOTES

For the purpose of this specification "brake fluid" shall refer to Ford Motor Company currently released brake fluid (for [illegible] approved source - see Engineering Release).

All valve assemblies must be void of entrapped [illegible] during testing brake fluid.

During testing, the valve assembly is to be [illegible] the in-service condition, unless otherwise specified.

All production validation and audit tests will be [illegible] temperature using brake fluid, unless otherwise specified.

The valve outlet ports shall be directly connected to [illegible] pressure gage will be the terminal point in the hydraulic circuit, unless otherwise specified.

All valve assemblies used for production validation and in-process tests must have passed the 100% production tests..

Test signatory metal volume cannot exceed 100 cc for 100% production test and 120 cc for production validation and in-process tests.

Test Section III.Q to be omited for valve assemblies not requiring a pressure switch.

The tests defined in Section III shall be performed in the sequence defined below.

ES ETSC-2B009-AA

IX. INSTRUCTIONS AND NOTES (continued)

A. Production Validation

1. Thirty six (36) pressure control valve assemblies shall be tested per the following Sections (6 assemblies per section) III.L.,M.,N.,O.. and P.

2. Twenty-four (24) pressure control valve assemblies shall be tested per Section.E.,F.,G.,H.,I.,J., K and Q. These valve assemblies will then be divided into four (4) groups of six (6) and tested on Section III.A.,B.,C., and D.

B. In-Process XR-1

1. Eighteen (18) pressure control valve assemblies shall be tested per the following sections (3 assemblies per section) III.L.,M., N.,O., and P.

2. Twelve (12) pressure control valve assemblies shall be tested per Section III.E.,F.,G.,H.,I.,J., K and Q. The valve assemblies will then be divided into four (4) groups of three (3) and tested to Sections III.A.,B.,C., and D.

C. In-Process XR-2

1. Nine (9) pressure control valve assemblies shall be tested per the following sections (2 assemblies per section) III.L.,M.,N., O.,and P.

2. Eight (8) pressure control valve assemblies shall be tested per Section III.E.,F.,G.,H.,I.,J., K and Q. These valve assemblies will then be divided into four (4) groups of two (2) and tested to Sections III.A., B.,C., and D.

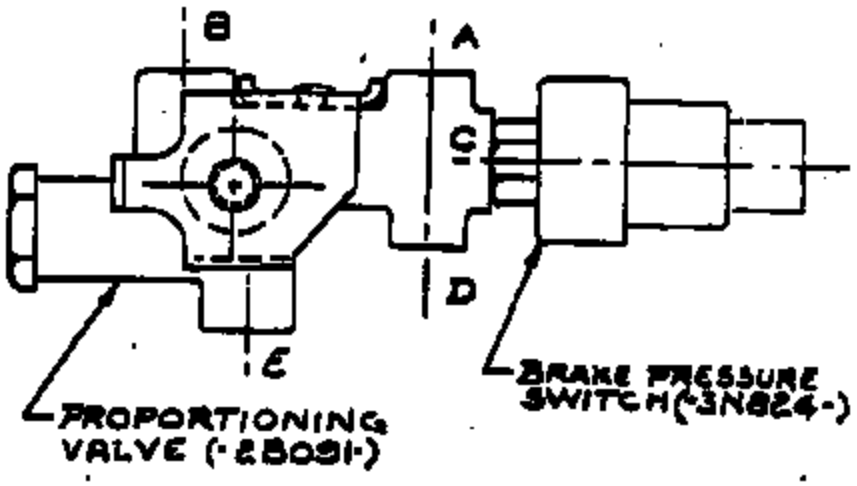
3. One (1) pressure control valve assembly will be tested per Section III.D daily.

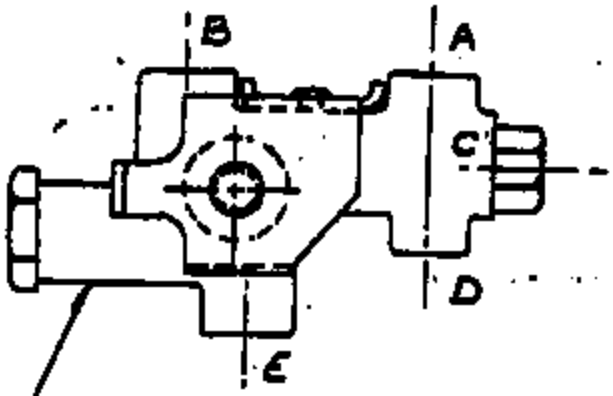
X. COMPILATION OF REFERENCE DOCUMENTS

A. Quality Control Specification
Q-101 Revised June, 1983 Edition

pvm1983

FIGURE 1





ES E7SC-2B091-AA

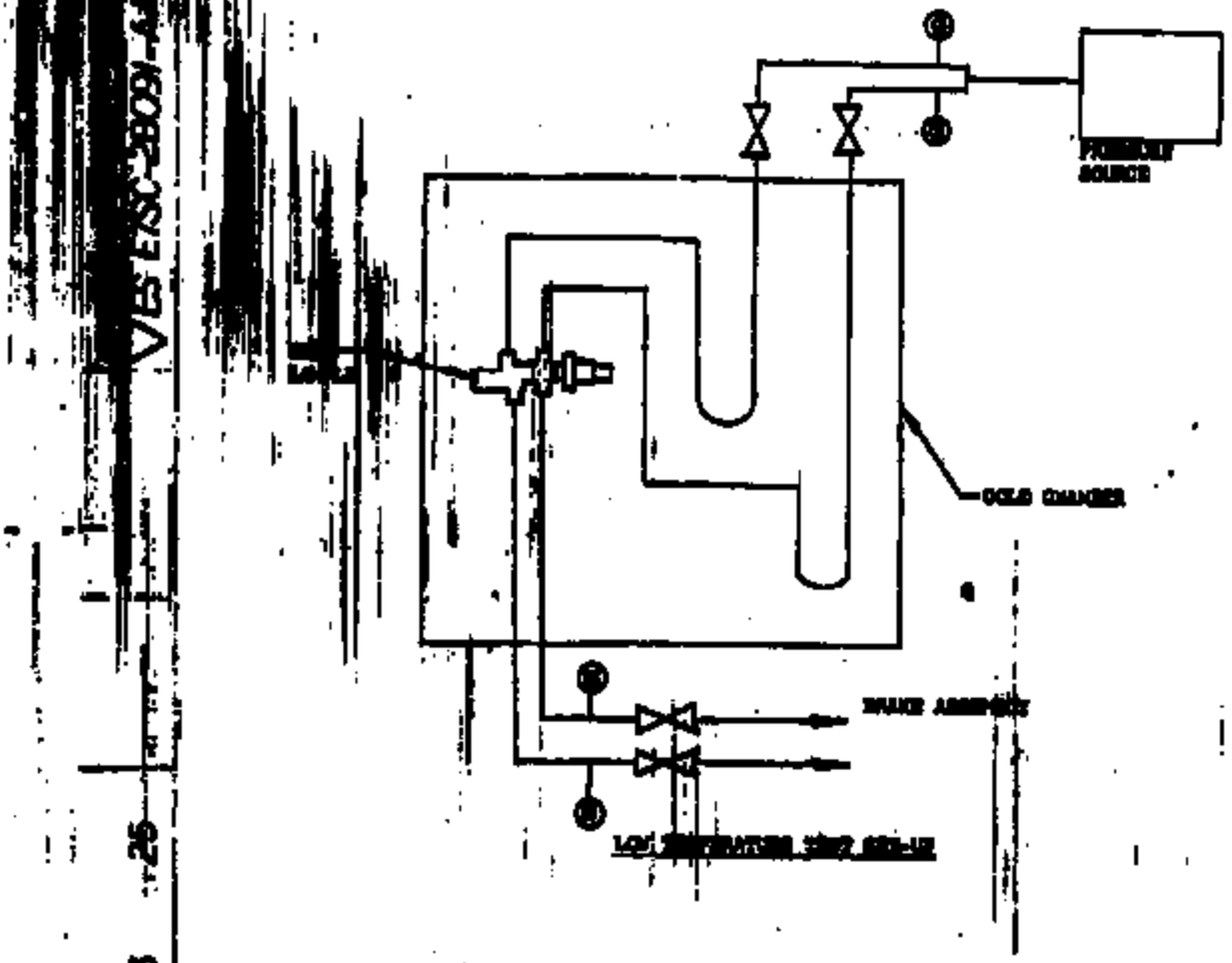
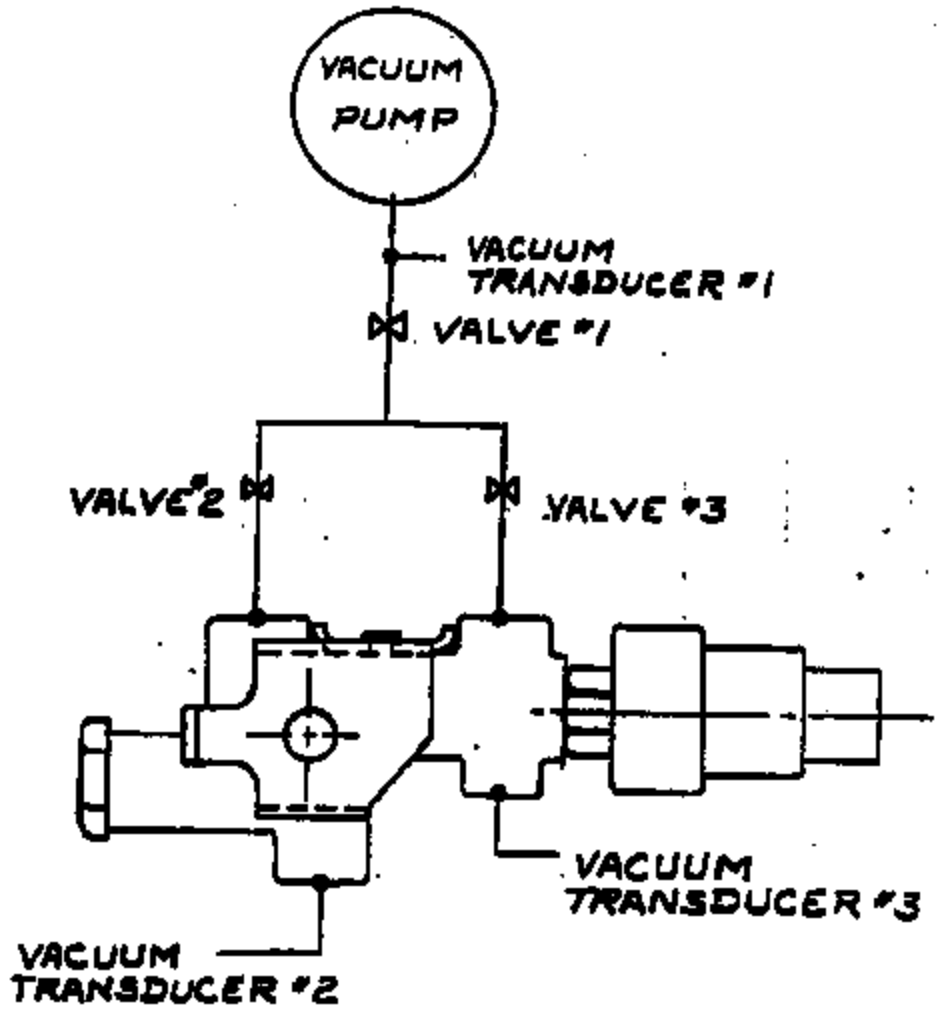
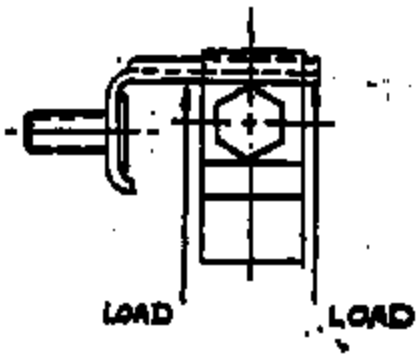


FIGURE 1



ES ETSC-28091-AA

FORD ESC-28091-AA



T

ENGINEERING SPECIFICATION

PART NAME	PART NUMBER
SWITCH ASSY-BRAKE PRESSURE SHOCK ABSORBER CONTROL	ES-E75C-2C283-AA

DATE	LET.	FR.	REVISIONS	DR.	CK.
			RELEASED		
6-23-87			CSH2-1A3950-C5		

REFERENCE: ES-E53C-3N824-AA

PREPARED/APPROVED BY

CHECKED BY

DETAILED BY

CONCURRENCE/APPROVAL SIGNATURES

PRINCIPAL DESIGN ENGINEER

DESIGN ENGINEERING SUPV.

PRODUCT/TRIAL ENGINEERING

FOR RELIABILITY ENGRG.

MANUFACTURING ENGRG.

QUALITY CONTROL/SQA

PURCHASING

NUMBER: ES-E75C-2C283-1A

REV

FRAME 1 OF 13

EXHIBIT NO. 57

3947-a1 (Previous editions may not be used)

SWITCH ASSEMBLY - BRAKE PRESSURE SHOCK ABSORBER CONTROL

I. GENERAL

This specification covers the test requirements for the brake pressure switch (2C283) used in the automatically adjustable shock system. Design changes on the switch assembly or its components shall not be made without compliance to Section V of this specification and written approval from the releasing Production Engineering Office.

This engineering specification is a supplement to the released drawing on the above part, and all requirements herein must be met in addition to all other requirements of the part drawing. Minimum measures necessary for demonstrating compliance to these requirements are given in each section.

The engineering tests, sample sizes, and test frequencies contained within this engineering specification reflect the minimum requirements established to provide a regular evaluation of conformance to design intent. The engineering test program is intended as a supplement to normal material inspections, dimensional checking and in-process controls, and should in no way adversely influence other inspection operations.

Q1 suppliers may implement different test sample sizes and frequencies providing these changes have been included in an Alternate Control Plan approved by the design responsible Product Engineering Office and concurred in by SQA.

II. PRODUCTION VALIDATION AND IN-PROCESS TESTS

- Production Validation (PV) Tests must be completed satisfactorily with parts from production tooling (and processes where possible) before ISIR approval and authorization for shipment of production parts can be effected. Parts must be revalidated completely, or per Section V whenever any change is made which could possibly affect part function or performance.

- In-Process Test Phase 1 (IP-1) - IP-1 tests are used to demonstrate process capability and must be completed using initial production parts from production tooling and processes prior to first production shipment approval. IP-1 tests are to continue in effect until process capability is demonstrated.

- In-Process Tests Phase 2 (IP-2) - IP-2 test program may be implemented only after process capability has been established. Tests must be completed with production parts on a continuing basis. Samples for these tests must be selected on a random basis to represent the entire production population as much as possible. In the event that any of the requirements in these tests is not met, the reaction plan specified in Ford Q101 Section III.E.3, "ES Test Performance Requirements" shall be invoked.

Tests Required for DV Test?

Sample Size?

TABLE OF CONTENTS

Test Name / Functional Tests	Production Validation Minimum Sample Size	Production Validation Statistical Test Acceptance Criteria	In-Process IP-1 Minimum Sample Size	In-Process IP-1 Statistical Test Acceptance Criteria	In-Process IP-2 Minimum Sample Size	In-Process IP-2 Statistical Test Acceptance Criteria
Calibration	64	P90-.96	100%	All Must Pass	100%	All Must Pass
Voltage Drop	64	P90-.96	12/Mo.	P90-.84	4/Lot	- - -
Current Leakge	22	P90-.98	3/Mo.	P90-.56	4/Lot	- - -
Proof Test	64	P90-.96	12/Mo.	P90-.84	4/Lot	- - -
Burst	6	P90-.72	3/Mo.	P90-.56	4/Lot	- - -
Vibration	6	P90-.72	3/Mo.	P90-.56	10/6 Mo.	P90-.98
Terminal Strength	12	P90-.84	6/Mo.	P90-.72	4/Lot	All Must Pass
Vacuum	6	P90-.72	3/Mo.	P90-.56	6/6 Mos.	P90-.72
Temperature Cycle	6	P90-.72	3/Mo.	P90-.56	6/6 Mos.	P90-.72
Creep Check	64	P90-.96	12/Mo.	P90-.84	4/Lot	All Must Pass
Durability Tests						
Impulse	22	P90-.98	12/Mo.	P90-.84	3/3 Mo.	P90-.56
Humidity	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
Salt Spray	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72

avail1885.1

ENGINEERING SPECIFICATION

TI-NHTSA 000028

ESTSC-2C283-44

III. TEST PROCEDURES AND REQUIREMENTS

A. Calibration

1. Test Requirements

a. Switch calibration is to be checked at room temperature (16°C-35°C) using ambient air or equivalent.

b. Calibration settings shall be specified on the part drawing with the settings checked after 2 or more pressure cycles with ambient air, or equivalent. Pressure cycle range is to be determined by the manufacturer to insure switch calibration stability. The cut-in and differential set points are to be measured while conducting ~~0.25~~ milliamperes while 13.0 ± 1.0 volts D.C. is applied. The cut-in point is to be checked with increasing pressure. ~750 mA

c. The cut-out point is to be checked with decreasing pressure, and the differential set point is to be calculated using the cut-in pressure minus the cut-out pressure.

2. Assurance Requirements

a. Nonconformance is defined as any switch point which falls outside the tolerance band specified on the part drawing.

ACTUATION : 750 ± 50 psi
RELEASE : 100 psi min

B. Voltage Drop

1. Test Requirements

a. Voltage drop is to be measured after 2 or more cycles with ambient air or equivalent from 0 to 10,000 ± 171 KPa while conducting ~~0.25~~ milliamps and 13.0 ± 1.0 volts D.C. is applied to the switch. Under these conditions with the switch closed the voltage drop is to be measured. Millivolt connection interface at terminals to be less than 10 millivolts.

750 mA

2. Assurance Requirements

a. Nonconformance is defined as a voltage drop in excess of 200 millivolts.

C. Current Leakage

1. Test Requirements

a. Current leakage is to be checked with 500 volts, 60 Hz alternating current.

b. Current Leakage is to be checked:

(1) Between the switch leads with the contacts open.

(2) Between the lead and the switch housing with contacts open.

(3) Between either lead and switch housing with the contacts closed.

? Is 13 ± 1 V representative of typical Engine Voltage ?

III. TEST PROCEDURES AND REQUIREMENTS (continued)

C. Current Leakage

2. Acceptance Requirements

a. Nonconformance is defined as any leakage current in excess of one (1) milliampere.

D. Proof Test

1. Test Requirements

a. Proof test is to be conducted using brake fluid or equivalent as the pressure medium. Test pressure shall be 13.8 MPa. Test pressure shall be isolated from pressure source and held for not less than 30 seconds. PROOF = 5000 PSI

b. Check the switches to Section A using the procedure established in that section.

25 PSI — NOT OBSERVABLE ON 5 Kpsi GAGE

2. Acceptance Requirements

a. Nonconformance is defined as any evidence of fluid leakage, seepage, or drop in test pressure greater than 172 KPa, or any switch which does not meet the criteria in Section A.

b. If brake fluid is used for this test, the test samples must be destroyed after testing. RECOMMEND 430 KPA (62 PSI) (SAME % AS 25psi/2000psi 62psi/5000psi

E. Impulse

1. Test Requirements ~750 mA

a. Test the switch for a total of 500,000 cycles (see Item c. below), at ~~1-50~~ milliamps and 13 ± 1 volts D.C. using currently released brake fluid as the pressure medium.

b. Brake fluid temperature to be 135 ± 14°C. and ambient temperature to be 107 ± 14°C.

c. Cycle rate is to be 110-130 cycles per minute as follows:

Pressure Variation	Cycles
172 ± 172 K.Pa.G. (Low) 10,000 ± 345 K.Pa.G. (High)	500,000

2. Acceptance Requirements

a. Nonconformance is defined as any switch not meeting the criteria in sections B, C, D, or ~~E~~. Calibration settings after Impulse Test are to be as follows: Actuation Pressure ~~[illegible] KPa ± [illegible] KPa~~, Release Pressure ~~[illegible] KPa min. and Minimum Differential Pressure of 345 KPa.~~ 40 PSI MIN 150 ± 70 PSI

b. Samples used for this test must be destroyed after all testing is completed.

III. TEST PROCEDURES AND REQUIREMENTS (continued)

F. Burst

1. Test Requirement

7000 PSI

a. Burst strength is to be checked using brake fluid or equivalent as the pressure medium.

b. Pressurize the switch to ~~6895 kPa~~ minimum and hold for 30 seconds minimum.

2. Acceptance Requirements

a. Nonconformance is defined as any evidence of fluid leakage or seepage from the switch or threads. Samples used for this test must be destroyed after testing is completed.

G. Humidity

1. Test Requirements

a. Mount the switch in the test port in a humidity chamber. Currently released mating electrical connector must be installed before start of test.

b. Subject the switch to ten (10) humidity cycles as follows:

(1) 8 hours of 38°C minimum at 90 to 100% relative humidity.

(2) Lower temperature to 24°C minimum over a 2 hour period.

(3) Raise temperature to 38°C minimum at 90 to 100% relative humidity over a two hour period.

2. Acceptance Requirements

a. Within 15 minutes after completion of the tenth humidity cycle check the switch to sections A, B, C, D, and ~~E~~ using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, D or ~~E~~.

H. Salt Spray

1. Test Requirements

a. Mount the switch in the test port in a salt spray chamber. The currently released mating electrical connector and wiring must be installed prior to start of test.

b. Expose the switch assembly to 72 hours of salt spray per ASTM-B 117.

ES-ETSC-2C283-AA

6 13

III. TEST PROCEDURES AND REQUIREMENTS (continued)

H. Salt Spray (continued)

1. Acceptance Requirements

a. After exposure, check the switch to sections A, B, C, D, and K using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, D, or K. Samples used for this test must be destroyed after all testing is completed.

I. Vibration

1. Test Requirements

a. Mount the switch in the test port and attach the currently released mating electrical connector before start of test.

b. Switches are to be vibrated in all 3 planes with electrical continuity being monitored during the entire test. See Figure 1 for switch orientation in the 3 planes. Vibration tests are to be conducted at room temperature using brake fluid, ambient air, or equivalent as the pressure medium.

c. Internal pressure shall be maintained at 345 ± 172 kPa when the switch is in the open position and 10,000 ± 172 kPa when the switch is in the closed position.

d. Vibrate the switch at 1.5 mm displacement (peak-to-peak) while varying the frequency uniformly from 5 to 30 to 5 Hz over a 5 minute period.

e. Vibrate the switch in alternate one-hour periods in the open and closed positions for a total of 8 hours in each plane. (Total test time is 24 hours).

2. Acceptance Requirements

a. After the entire vibration sequence check the switches to sections A, B, C, D, and K using the procedure established in each section.

b. Nonconformance is defined as any evidence of leakage or any change in electrical continuity/discontinuity during the vibration cycles, or any switch not meeting the criteria in sections A, B, C, D, or K. Samples used for this test must be destroyed after all testing is completed.

III. TEST PROCEDURES AND REQUIREMENTS (continued)

J. Terminal Strength

1. Test Requirements

a. Mount the switch in the test part.

(1) Apply a 89 ± 9 N axial force to each terminal.

(2) With a pendulum apply a 45 ± 5 N impact force to the switch housing at the connector and, perpendicular to the centerline axis of the switch. See Figure 2 for force application point and direction.

2. Acceptance Requirements

a. Check the switch to sections A, B, C, D, and K using the procedures established in each section.

b. Nonconformance is defined as any terminal or housing fracture, or any switch not meeting the criteria in sections A, B, C, D, or K.

K. Vacuum

1. Test Requirements

a. Mount the switch in the test part. Vacuum tests are to be conducted at room temperature using ambient air as the pressure medium.

b. Subject the switch to 5 cycles of vacuum from atmospheric pressure (760 mm Hg) to an absolute pressure of 3-4 mm Hg. Maintain the vacuum for a minimum of 60 seconds.

2. Acceptance Requirements

a. Check the switch to sections A, B, C, D, and K using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, D, and K.

L. Temperature Cycle

1. Test Requirements

a. Mount switches in test ports; test to be run using currently released brake fluid.

III. TEST PROCEDURES AND REQUIREMENTS (continued)

L. Temperature Cycle (continued)

1. Test Requirements

b. Repeat the following procedure 25 times:

1. Lower the switch and fluid temperature to at least -40°C.

2. Cycle the switches ten times at 10 seconds/cycle. One cycle consists of a pressure variation from 171 ± 172 K.Pa.G to 10,000 ± 345 K.Pa.G. to 172 ± 171 K.Pa.G.

3. Raise switch and fluid temperature to 38°C minimum.

4. Repeat step 2.

c. At completion of step b, check switches per sections A, B, C, D, and K.

2. Acceptance Requirements

a. Nonconformance is defined as any evidence of switch fluid leakage, seepage, or not meeting the criteria of sections B, C, D, and K. Calibration settings must meet the performance criteria indicated in section K.2, switch impulse testing. Samples used for this test must be destroyed after all testing is completed.

M. Creep Check

1. Test Requirements

a. Switches are to be creep checked at room temperature using ambient air, or equivalent.

b. The creep check is to be made after the switch has been cycled two or more times with ambient air, or equivalent to insure calibration stability. The voltage is to be 13.0 ± 1.0 volts D.C. at 4-10 millimps.

c. As the switch pressure is increased, the positive disc snap must occur within 10 milliseconds of electrical discontinuity at the out-in point. The rate of pressure rise at the creep check point is to be no greater than 70 K.Pa.G./second.

d. As the switch pressure is decreased, the negative disc snap must occur within 10 milliseconds of electrical discontinuity at the out-out point. The rate of pressure decay at the creep check point is to be no greater than 70 K.Pa.G./second.

e. Other creep check methods may be used if approved by the releasing Product Engineering Office

2. Acceptance Requirements

a. Nonconformance is defined as any switch that has a time delay greater than 10 milliseconds between the electrical signal and the disc snap signal.

ES-E7SC-2C283-AA

REVISED

PAGE 9 OF 19

IV. STATISTICAL ANALYSIS METHODS

A. For all PV/LP-1 tests and LP-2 tests Sections III, G, H, I, K, and L, the notation Pn - R will be interpreted as minimum probability equal to R at a confidence C, e.g., P90 - .10 means a minimum probability of 90% at 90% confidence.

B. For LP-2 tests Sections III, A, B, C, D, F, J, and M, all samples must pass (AQL=0).

V. REVALIDATION REQUIREMENTS

A. No change in design, material, process or component supplier shall be made without prior approval from the releasing Product Engineering Office. As part of approving a change, the releasing Product Engineering Office will establish the portion of the Product Validation tests required to be run to revalidate the switch. The following table is to be used as a guide in determining the type of tests required for revalidation requirements.

RUNNING CHANGE REVALIDATION

	Component	Process or Material Change or New Supplier
1.	Terminals, Contacts, or Connectors.	III, B, C, E, G, H, I, J, L, M
2.	Case or Housing	All Tests
3.	Disc or Diaphram	III, A, D, E, F, I, K, L, M
4.	Fitting or Fluid Connection	III, D, E, F, H, I, K

1 Annual revalidation is not required on carryover switches.

VI. LOT DEFINITION

A lot is defined as no more than eight (8) hours of production up to 4,000 pieces. If shifts exceed beyond eight (8) hours, or more than 4,000 pieces are produced in a shift, the product must be separated into at least two lots.

VII. RECORD RETENTION

A. Recording and record retention shall conform with Ford Q-101.

B. Production Validation test results and analysis are to be forwarded to the releasing Product Engineering Office before approval for shipment of production parts can be granted

C. In-Process test results shall be available at the supplier's manufacturing facility for the releasing Product Engineering Office and Ford SQA or its representatives to review on request.

NUMBER ES-E7SC-2C285-AA

REVISED

FRAME 10 OF 13

WILL AN ORING BE REQUIRED ?

ES-ETSC-2C283-AA

VIII. INSTRUCTIONS AND NOTES

All switches are to be identified with the Ford part number, vendor identification, and a date code indicating final assembly.

All test equipment and test procedures for testing to this specification must be approved by the releasing Product Engineering Office and no change in equipment or procedure may be made without their written concurrence.

Test port configuration is shown in Figure 3.

The O'ring shall be free from cuts, nicks, abrasion or any other damage which would result in a fluid leak.

All switches must have a shipping cap installed over the port threads to prevent contamination. All shipping caps must be approved by the releasing Product Engineering Office prior to production incorporation.

All switches that do not pass the calibration test are to either be re-adjusted and rechecked or scrapped.

If product nonconformance occurs for test Sections II B, C, D, E, F, and J, production shall be stopped and the problems corrected. All production lots shall be sorted 100% prior to shipment. Nonconformance shall be reported immediately to the releasing Product Engineering Office.

If nonconformance of the statistical acceptance criteria occurs for test Sections II G, H, I, K, and L, a cause to recall the subject weeks production and to stop production may result.

IX. COMPILATION OF REFERENCE DOCUMENTS

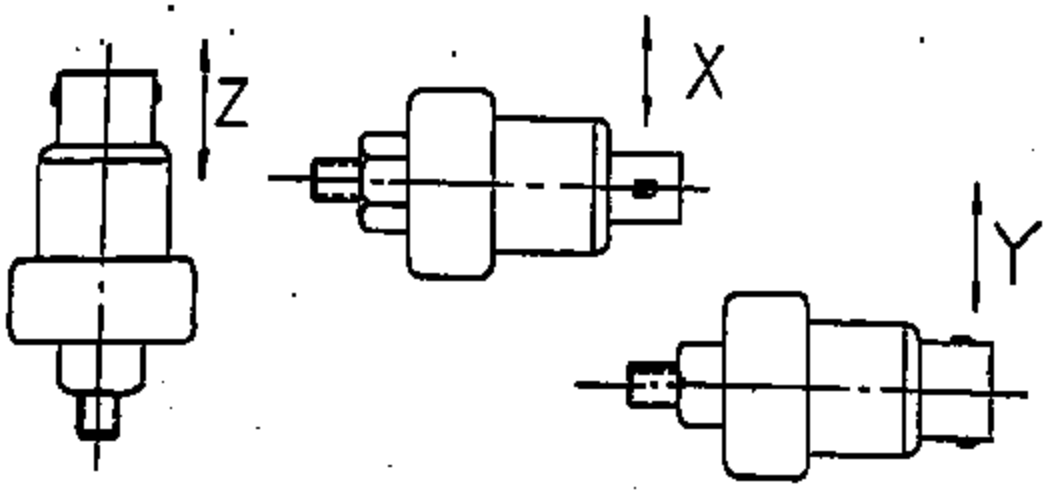
ASTM B-117 Salt Spray Testing

Ford Q-101, Quality System Standard - 1981 Edition

WILL A SHIPPING CAP BE REQUIRED?

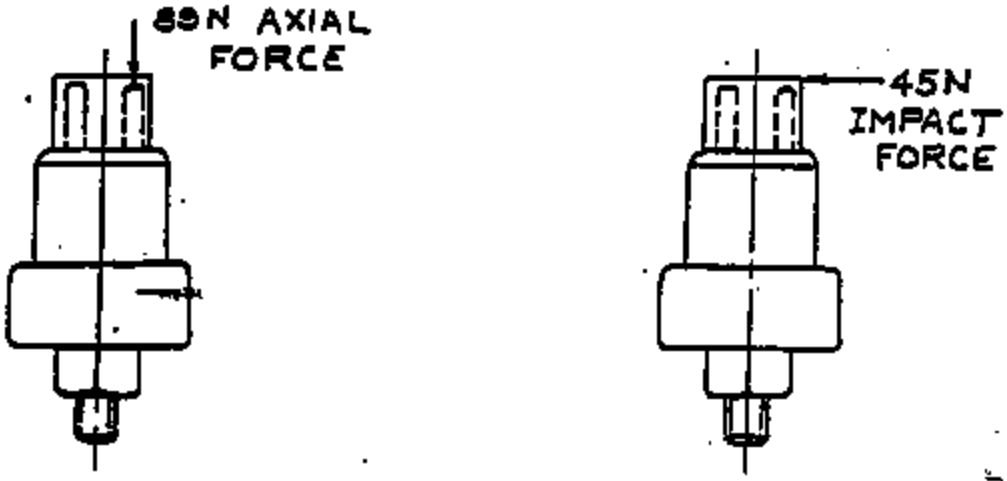
avall1885

11 19



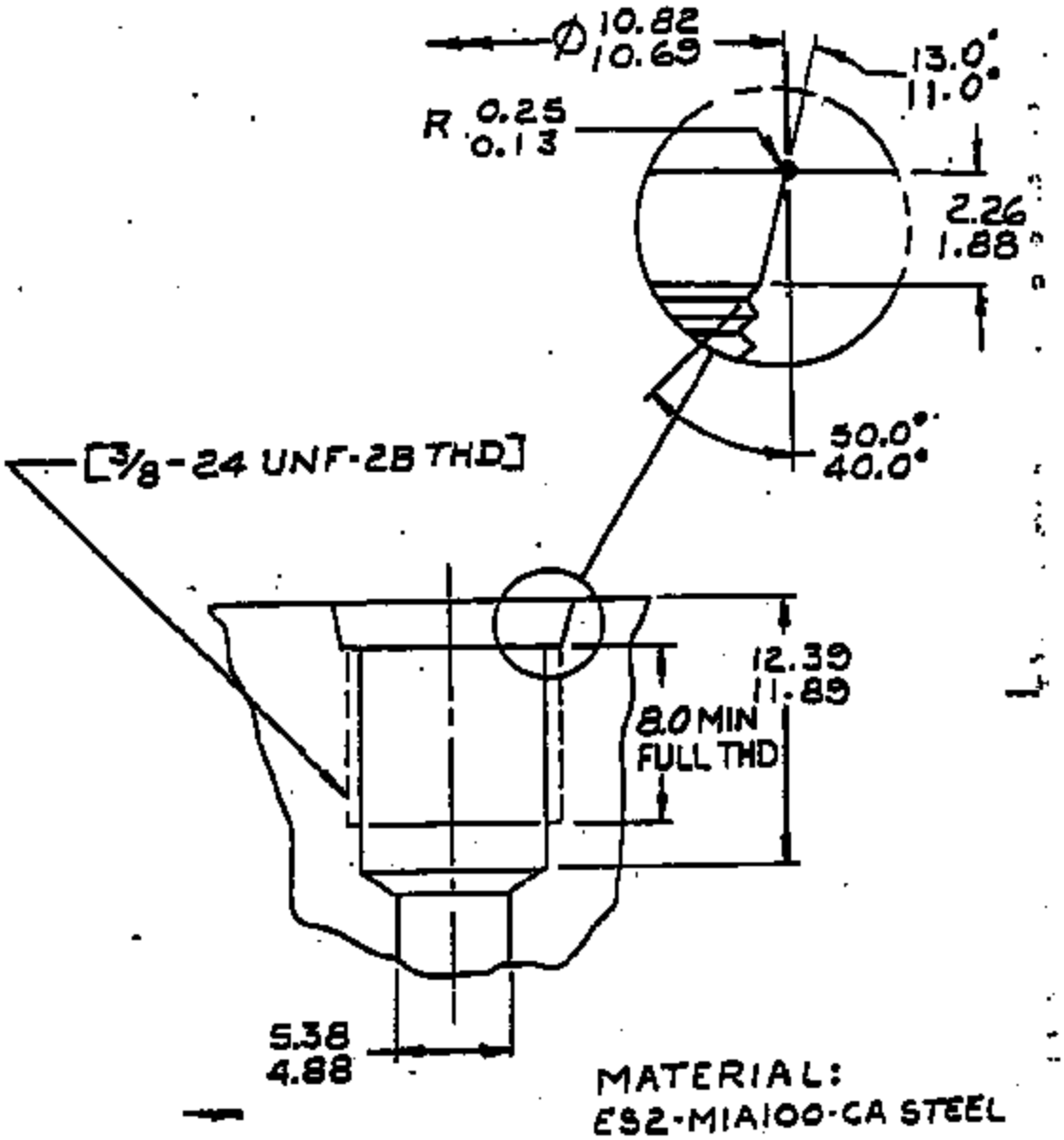
VIBRATION TEST - SWITCH ORIENTATION

FIGURE 1.



TERMINAL STRENGTH - LOAD ORIENTATION

FIGURE 2.



TEST FIXTURE PORT CONFIGURATION

FIGURE 3.

SWITCH ASSEMBLY - SPEED CONTROL ACTUATOR

4-10-90

I. General

This specification covers the test requirements for the speed control actuator switch 9C888 used in the electronic speed control system. Design changes on the switch assembly or its components shall not be made without compliance to Section V of this specification and written approval from the releasing Production Engineering Office.

This engineering specification is a supplement to the released drawing on the above part, and all requirements herein must be met in addition to all other requirements of the part drawing. Minimum measures necessary for demonstrating compliance to these requirements are given in each section.

Rec'd 4/30/90

The engineering tests, sample sizes, and test frequencies contained within this engineering specification reflect the minimum requirements established to provide a regular evaluation of conformance to design intent. The engineering test program is intended as a supplement to normal material inspections, dimensional checking and in-process controls, and should in no way adversely influence other inspection operations.

QI suppliers may implement different test sample size and frequencies providing these changes have been included in an alternate Control Plan approved by the design responsible Product Engineering Office and concurred in by SQA.

II. PRODUCTION VALIDATION AND IN-PROCESS TESTS

- Production Validation (PV) Tests must be completed satisfactorily with parts from production tooling (and processes where possible) before ISIR approval and authorization for shipment of production parts can be effected. Parts must be revalidated completely, or per Section V whenever any change is made which could possibly affect part function or performance.
- In-Process Test Phase 1 (IP-1) - IP-1 tests are used to demonstrate process capability and must be completed using initial production parts from production tooling and processes prior to first production shipment approval. IP-1 tests are to continue in effect until process capability is demonstrated.
- In-Process Tests Phase 2 (IP-2) - IP-2 test program may be implemented only after process capability has been established. Tests must be completed with production parts on a continuing basis. Samples for these tests must be selected on a random basis to represent the entire production population as much as possible. In the event that any of the requirements in these tests is not met, the reaction plan specified in Ford Q101 Section III.E.5, "ES Test Performance Requirements" shall be invoked.

TI-NHTSA 000039

Item	Test Name Functional Tests	PRODUCTION VALIDATION Minimum Sample Size	PRODUCTION VALIDATION Statistical Test Acceptance Criteria	IN-PROCESS IP-1 Minimum Sample Size	IN-PROCESS IP-1 Statistical Test Acceptance Criteria	IN-PROCESS IP-2 Minimum Sample Size	IN-PROCESS IP-2 Statistical Test Acceptance Criteria
III A	Calibration	64	P90-.96	100%	All Must Pass	100%	All Must Pass
B	Voltage Drop	64	P90-.96	12/No.	P90-.84	4/Lot	" " "
C	Current Leakage	23	P90-.90	3/No.	P90-.56	4/Lot	" " "
D	Proof Test	64	P90-.96	12/No.	P90-.84	4/Lot	" " "
F	Burst	6	P90-.72	3/No.	P90-.56	4/Lot	" " "
I	Vibration	6	P90-.72	3/No.	P90-.56	10/6 No.	P60-.90
J	Terminal Strength	12	P90-.84	6/No.	P90-.72	4/Lot	All Must Pass
K	Vacuum	6	P90-.72	3/No.	P90-.56	6/6 Nos.	P90-.72
L	Temperature Cycle	6	P90-.72	3/No.	P90-.56	6/6 Nos.	P90-.72
	Durability Tests						
III E	Impulse	23	P90-.90	12/No.	P90-.84	3/3 No.	P90-.56
G	Humidity	6	P90-.72	3/No.	P90-.56	6/6 No.	P90-.72
H	Salt Spray	6	P90-.72	3/No.	P90-.56	6/6 No.	P90-.72

III. TEST PROCEDURES AND REQUIREMENTS

A. Calibration

1. Test Requirements

a. Switch calibration is to be checked at room temperature (16°C-35°C) using ambient air or equivalent.

b. Calibration settings shall be specified on the part drawing with the settings checked after 2 or more pressure cycles with ambient air, or equivalent. Pressure cycle range is to be determined by the manufacturer to insure switch calibration stability. The cut-in and differential set points are to be measured while conducting 750 ± 50 milliamperes while 13.0 ± 1.0 volts D.C. is applied. The cut-in point is to be checked with increasing pressure.

c. The cut-out point is to be checked with decreasing pressure, and the differential set point is to be calculated using the cut-in pressure minus the cut-out pressure.

2. Acceptance Requirements

a. Nonconformance is defined as any switch point which falls outside the tolerance band specified on the part drawing.

B. Voltage Drop

1. Test Requirements

a. Voltage drop is to be measured after 2 or more cycles with ambient air or equivalent from 0 to 10,000 ± 172 KPa (1450 ± 25 PSI) while conducting 750 ± 50 milliamps and 13.0 ± 1.0 volts D.C. is applied to the switch. Under these conditions with the switch closed the voltage drop is to be measured. Millivolt connection interface at terminals to be less than 10 millivolts.

2. Acceptance Requirements

a. Nonconformance is defined as a voltage drop in excess of 200 millivolts.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

C. Current Leakage

1. Test Requirements

a. Current leakage is to be checked with 500 volts, 60 Hz alternating current.

b. Current leakage is to be checked:

(1) Between the switch leads with the contacts open.
(2) Between the lead and the switch housing with contacts closed.
(3) Between either lead and switch housing with the contacts open.

2. Acceptance Requirements

a. Nonconformance is defined as any leakage current in excess of one (1) milliampere.

D. Proof Test

1. Test Requirements

b. Proof test is to be conducted using brake fluid or equivalent as the pressure medium. Test pressure shall be 27.6 MPa.(4000 PSI). Test pressure shall be isolated from pressure source and held for not less than 30 seconds.

c. Check the switches to Section A using the procedure established in that section.

2. Acceptance Requirements

d. Nonconformance is defined as any evidence of fluid leakage, seepage, or drop in test pressure greater than 430 KPa.(62 PSI), or any switch which does not meet the criteria in Section A.

e. The test samples must be destroyed after testing.

E. Impulse

1. Test Requirements

a. Test the switch for a total of 500,000 cycles. Cycle pressure between (low) 0-276 KPa (0-40 psi) and (high) 10,000 ± 345 KPa (1450 ± 50 psi).
1) 0 - 475,00 cycles: 13 ± 1 volts, trace current to monitor function.
2) 475,001 - 500,000 cycles: 13 ± 1 volts D.C., 750 ± 50 ma.

b. Brake fluid temperature to be 135 ± 14°C and ambient temperature to be 107°C min.

c. Cycle rate is to be 110-130 cycles per minute.

d. Switch must open and close each cycle.

2. Acceptance Requirements

a. After impulse test check to sections A, B, C, & D using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, & D.

c. Samples used for this test must be destroyed after all testing is completed.

F. Burst

1. Test Requirement

a. Burst strength is to be checked using brake fluid or equivalent as the pressure medium.

b. Pressurize the switch to 48.3 MPa (7000 PSI) minimum and hold for 30 seconds minimum.

2. Acceptance Requirements

a. Nonconformance is defined as any evidence of fluid leakage or seepage from the switch or threads. Samples used for this test must be destroyed after testing is completed.

G. Humidity

1. Test Requirements

a. Mount the switch in the test port in a humidity chamber. Currently released mating electrical connector must be installed before start of test.

b. Subject the switch to fifteen (15) continuous humidity cycles as follows:
(1) Raise temperature to 65 +10/-2 °C over 2.5 hours; at 90% relative humidity. 85 - 98%
(2) Hold 3 hours at 65 +10/-2 °C at 90-98% relative humidity.
(3) Lower temperature to 25 +10/-2 °C over 2.5 hours; at 80-98% relative humidity.

2. Acceptance Requirements

a. Within 15 minutes after completion of the fifteenth humidity cycle check the switch to sections A, B, C, D, using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D.

H. Salt Spray

1. Test Requirements

a. Mount the switch in the test port in a salt spray chamber. The currently released mating electrical connector and wiring must be installed prior to start of test.

b. Expose the switch assembly to 72 hours of salt spray per ASTM B-117. [illegible] start of test.

2. Acceptance Requirements

a. After exposure, check the switch to sections A, B, C, D, using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

I. Vibration

1. Test Requirements

a. Mount the switch in the test port and attach the currently released mating electrical connector before start of test.

b. Switches are to be vibrated in all 3 planes with electrical continuity being monitored during the entire test. See Figure 1 for switch orientation in the 3 planes. Vibration tests are to be conducted at room temperature using brake fluid, ambient air, or equivalent as the pressure medium.

c. Internal pressure shall be maintained at 0 KPa G. when the switch is in the closed position and 1.1 times max actuation pressure shown on print when the switch is in the open position.

d. Vibrate the switch at 1.5 mm displacement (peak-to-peak) while varying the frequency uniformly from 5 to 50 to 5 Hz over a 5 minute period.

e. Vibrate the switch in alternate one-hour periods in the open and closed positions for a total of 8 hours in each plane. (Total test time is 24 hours).

2. Acceptance Requirements

a. After the entire vibration sequence check the switches to sections A, B, C, or D using the procedure established in each section.

b. Nonconformance is defined as any evidence of leakage or any change in electrical continuity/discontinuity during the vibration cycles, or any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

J. Terminal Strength

1. Test Requirements

a. Mount the switch in the test port.

(1) Apply a 89 ± 9 N axial force to each terminal.

J. Terminal Strength (cont'd)

(2) With a pendulum apply a 45 ± 5 J impact force to the switch housing at the connector end, perpendicular to the centerline axis of the switch. See Figure 2 for force application point and direction.

2. Acceptance Requirements

a. Check the switch to sections A, B, C, and D using the procedures established in each section.

b. Nonconformance is defined as any terminal or housing fracture, or any switch not meeting the criteria in sections A, B, C, or D.

K. Vacuum

N/A in some WHS?

1. Test Requirements

a. Mount the switch in the test port. Vacuum tests are to be conducted at room temperature using ambient air as the pressure medium.

b. Subject the switch to 5 cycles of vacuum from atmospheric pressure (760 mm Hg) to an absolute pressure of 3-6 mm Hg. Maintain the vacuum for a minimum of 60 seconds.

2. Acceptance Requirements

a. Check the switch to sections A, B, C, and D using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, and D.

L. Temperature Cycle

1. Test Requirements

a. Mount switches in test ports; test to be run using currently released brake fluid.

L. Temperature Cycle (cont'd)

b. Repeat the following procedure 25 times.

(1) Lower the switch and fluid temperature to at least -40°C.

(2) Cycle the switches ten times at 10 seconds/cycles. One cycle consists of a pressure variation from 0 - 276 KPa.G (0-40 psi) to 10,000 ± 345 KPa.G (1450 ± 50 PSI).
Note: Switch must open and close each cycle.

(4) Raise switch and fluid temperature to 38°C minimum.

(5) Repeat Step 2.

c. At completion of Step b, check switches per sections A, B, C, and D.

2. Acceptance Requirements

a. Nonconformance is defined as any evidence of switch fluid leakage, seepage, or not meeting the criteria of sections A, B, C, and D.

IV. STATISTICAL ANALYSIS METHODS

A. For all PV/IP-1 tests and IP-2 tests Sections III, G, H, I, K, and L, the notation Pc - R will be interpreted as minimum probability equal to R at a confidence C, e.g., P90 - .80 means a minimum probability of 80% at 90% confidence.

B. For IP-2 tests Sections III, A, B, C, D, F, and J all samples must pass (AQAP).

V. REVALIDATION REQUIREMENTS

A. No change in design, material, process or component supplier shall be made without prior approval from the releasing Product Engineering Office. As part of approving a change, the releasing Product Engineering Office will establish the portion of the Product Validation tests required to be run to revalidate the switch. The following table is to be used as a guide in determining the type of tests required for revalidation requirements.

V. REVALIDATION REQUIREMENTS (cont'd)

RUNNING CHANGE REVALIDATION

Component	Process or Material Change or New Supplier
1. Terminals, Contacts, or Connector	III, B, C, E, G, H, I, J, L.
2. Case or Housing	All Tests
3. Disc or Diaphragm	III, A,D,E,F,I,K,L.
4. Fitting or Fluid Connection	III, D, E, F, H, I, N

B. Annual revalidation is not required on carryover switches.

VI. LOT DEFINITION

A lot is defined as no more than eight (8) hours of production up to 4,000 pieces. If shifts extend beyond eight (8) hours, or more than 4,000 pieces are produced in a shift, the product must be separated into at least two lots.

VII. RECORD RETENTION

A. Recording and record retention shall conform with Ford Q-101.

B. Production Validation test results and analysis are to be forwarded to the releasing Product Engineering Office before approval for shipment of production parts can be granted.

C. In-Process test results shall be available at the supplier's manufacturing facility for the releasing Product Engineering Office and Ford SQA or its representatives to review on request.

VIII. INSTRUCTIONS AND NOTES

All switches are to be identified with the Ford part number, supplier identification, and a date code indicating final assembly.

All test equipment and test procedures for testing to this specification must be approved by the releasing Product Engineering Office and no change in equipment or procedure may be made without their written concurrence.

Test port configuration is shown in Figure 3.

VIII. INSTRUCTIONS AND NOTES (cont'd)

The O-ring shall be free from cuts, nicks, abrasions or any other damage which would result in a fluid leak.

All switches must have a shipping cap installed over the port threads to prevent contamination. All shipping caps must be approved by the releasing Product Engineering Office prior to production incorporation.

All switches that do not pass the calibration test are to either be readjusted and rechecked or scrapped.

If product nonconformance occurs for test Sections III B, C, D, E, F, and J, production shall be stopped and the problems corrected. All production lots shall be sorted 100% prior to shipment. Nonconformance shall be reported immediately to the releasing Product Engineering Office.

If nonconformance of the statistical acceptance criteria occurs for test Sections III G, H, I, K, and L, a cause to recall the subject weeks production and to stop production may result.

IX. COMPILATION OF REFERENCE DOCUMENTS

ASTM B-117 Salt Spray Testing

Ford Q-101, Quality System Standard - 1983 Edition

(ADDITION OF FIGURES ?)

Fig 1 - [illegible]

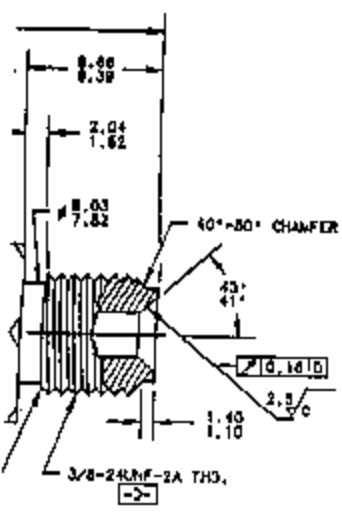
Fig 2 - [illegible]

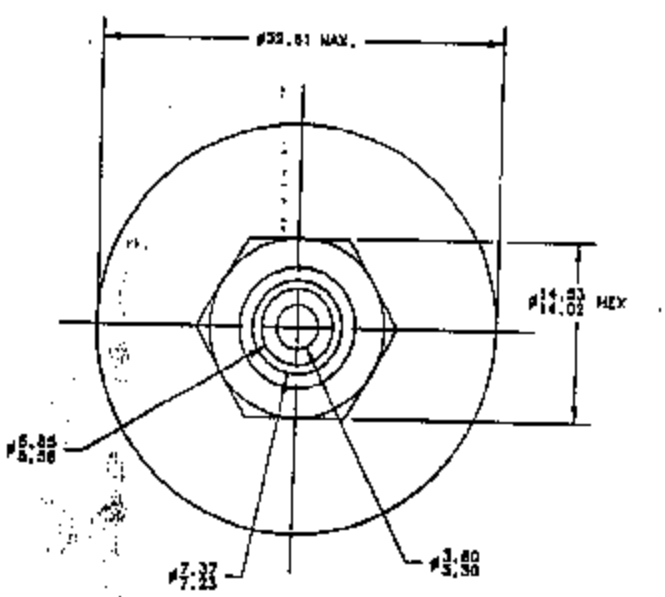
Fig 3 - [illegible]

GCR\VP\ENGSPEC.SW

TI-NHTSA 000049

REVISIONS			
ZONE	LTR	DESCRIPTION	PROJ.# 3386
G7	F	11.56-11.80 WAS 11.62-11.84 GR180958, DB	
D1		40°-50° WAS 35°-45°	
D4		1.15-1.35 WAS 0.76-1.27	
C1		0.25MIN. X 40°-50° WAS 0.38 X 35°-55°	
D3		Ø8.48-8.68 WAS Ø8.51-8.69	
B3		ADDED NOTE	
	G	ADDED REVISION DETAIL TO PRINT GR180921 DB	
G6	H	0.50 ± 0.10 WAS BOXED 0.50	
G8		ADDED DATUM FEATURE -D-	
A6		ADDED FEATURE CONTROL SYMBOL	
G6		COLOR WAS GRAY	
		GR 181025 GF	





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CONFIDENTIAL

METRIC

SPECIFICATIONS AND NOTES

DEVICE MUST CONFORM TO FORD MOTOR CO. SPEC. NO. ▽ ES-F2VC-9F924-AA
ACTUATION PRESSURE ——— 862 ±241 kPag (125 ±35 psig)
RELEASE PRESSURE ——— 138 kPag MIN. (20 psig)
CONTACT ARRANGEMENT ——— SPST NORMALLY CLOSED, OPEN ON PRESSURE RISE
HYDRAULIC SEAL ——— ETHYLENE PROPYLENE
PROOF PRESSURE ——— 20.7 MPa (3000 psi)
PROTECTIVE COVER ON THREADS REQUIRED FOR SHIPMENT.

DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M-1982

MANUFACTURER TO ESTABLISH PRODUCT ENGINEERING APPROVED CONTROL PLAN

CHANGE IN DESIGN COMPOSITION OR PROCESSING FROM THE PART PREVIOUSLY APPROVED FOR PRODUCTION REQUIRES PRIOR ENGINEERING APPROVAL

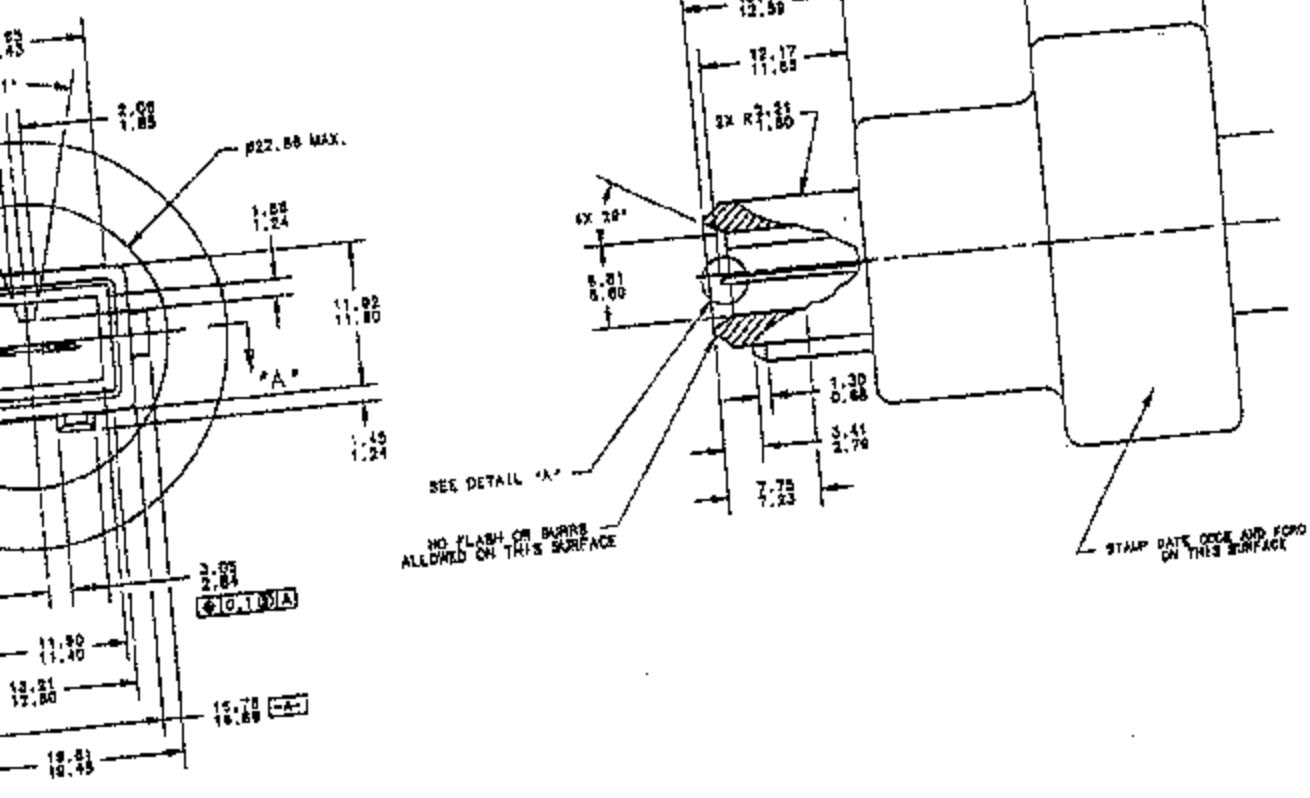
ENGINEERING APPROVAL OF PRODUCTION SAMPLES FROM EACH SUPPLIER IS REQUIRED PRIOR TO AUTHORIZATION OF PRODUCTION

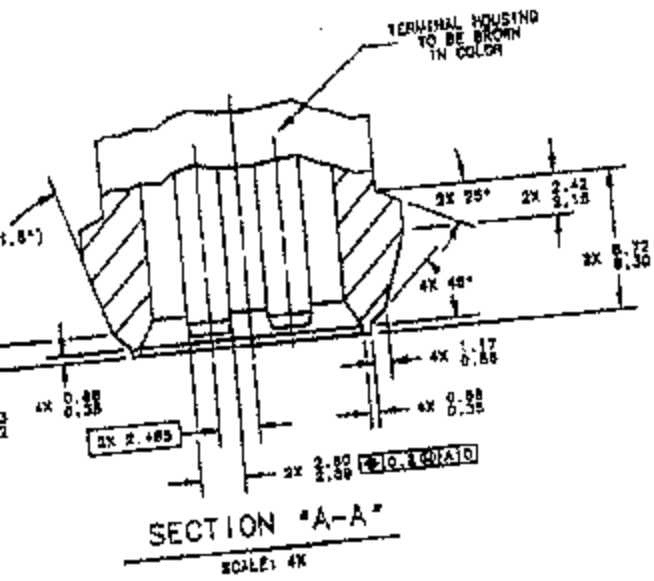
PART MUST COMPLY WITH SPECIFICATION WSS-M99P9999-A1 TO HELP SAFEGUARD HEALTH, SAFETY AND THE ENVIRONMENT

DATE	REL. NO.
NAME	
NO.	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	BY TOM DAIL	DATE 8-29-90	TEXAS INSTRUMENTS
TOLERANCE ON FRACTIONS DECIMALS ANGLES ±2°	CH [signature]	3/7/91	TITLE PRESSURE SWITCH ENVELOPE DRAWING
MATERIAL	ENG.		
	APPROVED [signature]	3/19/91	SIZE D · CODE IDENT NO. 82647 · 57PSL5-
			SCALE · SHEET

TI-NHTSA 000050





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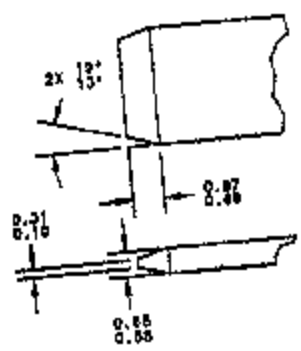

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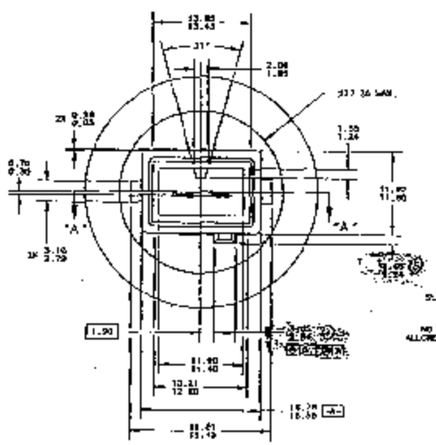
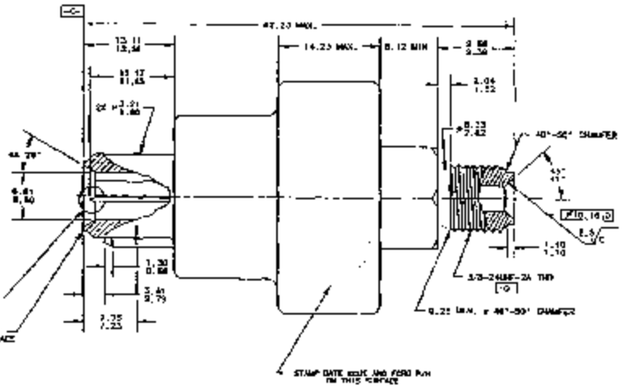
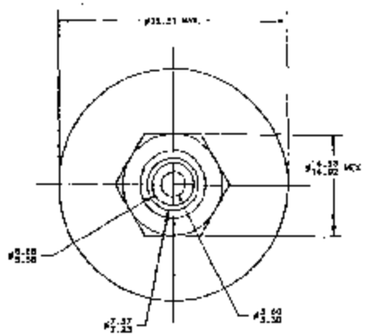






SPECIFICATIONS AND NOTES

DEVICE MUST CONFORM TO FORD MOTOR CO. SPEC. NO V ES-F2Y0-9C524-AA

ACTUATION PRESSURE - ——— 862 ±34 kPag (125 ±5 psig)

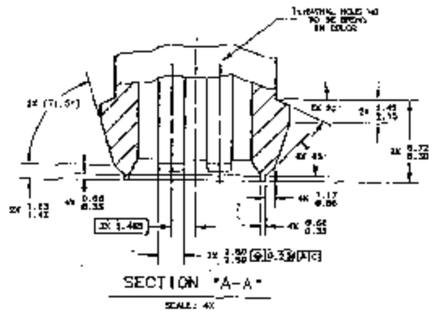
RELEASE PRESSURE - ——— 138 kPag MIN. (20 psig)

CIR. OUT ARRANGEMENT ——— SPST NORMALLY CLOSED, OPEN ON PRESSURE RISE

HYDRAULIC SEAL - ——— ETHYLENE PROPYLENE

PROOF PRESSURE - ——— 20.7 MPa (3000 psi)

PROTECTIVE COVER ON THREADS REQUIRED FOR SHIPMENT.



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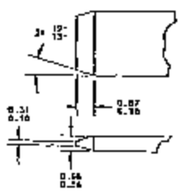

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SCALE: 10X

DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M-1982

MANUFACTURER TO ESTABLISH PRODUCT ENGINEERING APPROVED CONTROL PLAN

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PART MUST COMPLY WITH SPECIFICATION WSS-M99P9999-A1 TO HELP SAFEGUARD HEALTH, SAFETY AND THE ENVIRONMENT

DATE	REL. NO.	CK

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TOLERANCE ON FRACTIONS DECIMALS ANGLES

MATERIAL

BY TEN DATE

CHK'D

ENG'G

APPROVED

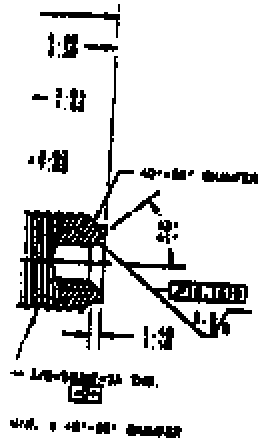
TEXAS INSTRUMENTS

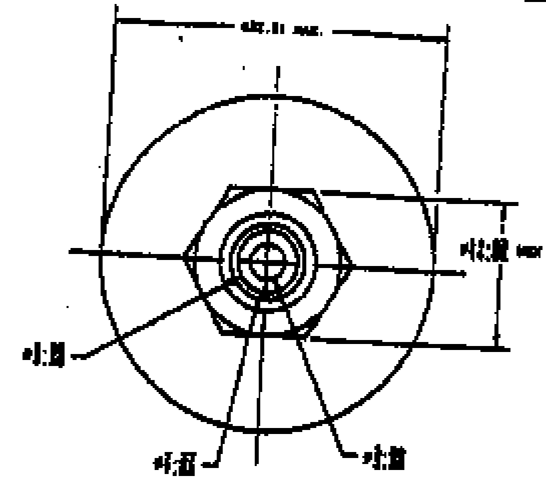
TITLE

PRESSURE SWITCH ENVELOPE DRAWING

SIZE D | CODE IDENT NO. 82647 | 5/PSL5-3

SCALE | SHEET





SPECIFICATIONS AND NOTES
[illegible] SPEC. NO. ▽ [illegible]
ACTUATION PRESSURE ——— [illegible] kPag ([illegible] psig)
RELEASE PRESSURE ——— 1[illegible] kPag MIN. ([illegible] psig)
CONTACT ARRANGEMENT ——— SPST NORMALLY CLOSED, OPEN ON PRESSURE RISE
[illegible] SEAL ——— [illegible]
PROOF PRESSURE ——— [illegible].7 MPa ([illegible] psi)
PROTECTIVE [illegible] OF THREADS REQUIRED FOR SHIPMENT.

DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M-1982

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PART MUST COMPLY WITH SPECIFICATION [illegible] TO HELP SAFEGUARD HEALTH, SAFETY AND THE ENVIRONMENT

[illegible]ROL ITEM — THE ▽ SYMBOL ALSO [illegible] PRODUCT ENGINEERING DESIG-[illegible] CRITICAL CHARACTERISTICS. THESE [illegible]DITIONAL CRITICAL CHARACTERISTICS [illegible]D BY PROCESS REVIEWS, MUST [illegible]ON THE Q-101 CONTROL PLAN(S) WHICH [illegible] PRODUCT ENGINEERING APPROVAL.

METRIC

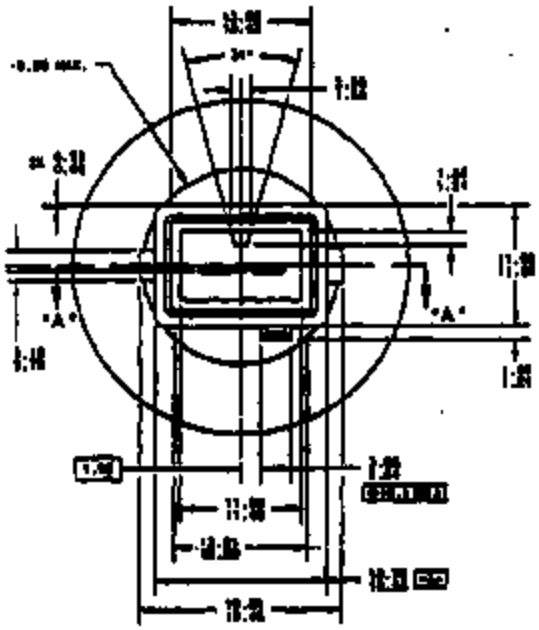
—	REVISED & REDRAWN		
910417	NC00E10079779005		
DATE	REL. NO.		CK
NAME	SWITCH ASY - SPEED CONTROL DEACTIVATE		
NO.	▽F2VC-9F924-AB		

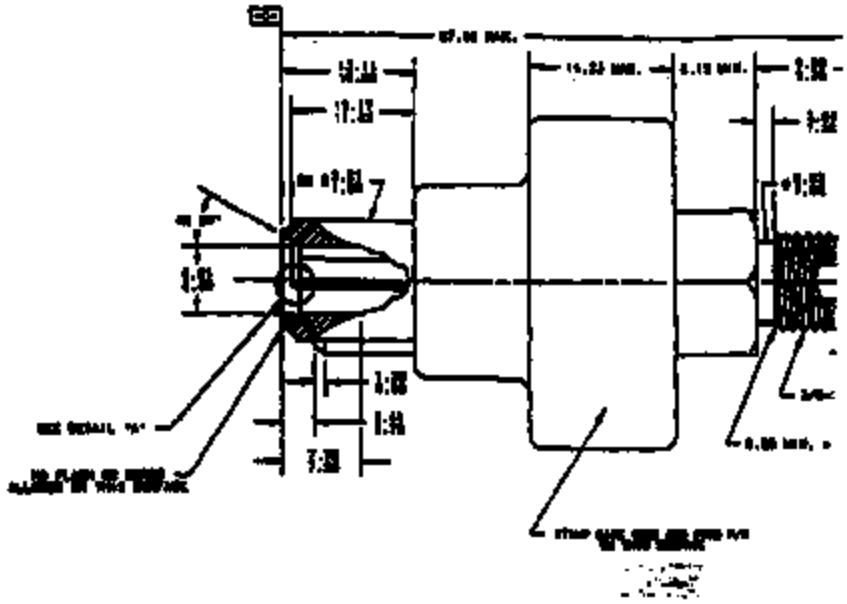
TEXAS INSTRUMENTS

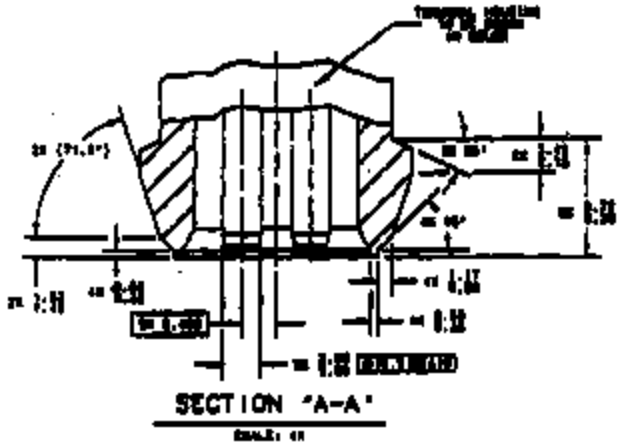
TITLE: PRESSURE SWITCH ENVELOPE DRAWING

SIZE	CODE IDENT NO.	
D	82647	77PSL2-1

TI-NHTSA 000063







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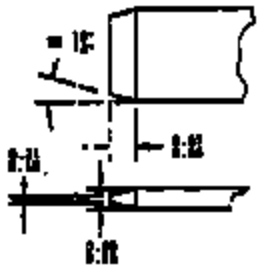

DETAIL "A"

CONTROL
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REQUIRE PRO

Precision Controls Customer Print/Specification Sign-Off
Customer P/N: 2-05948 TI P/N: 7TPSL24
Special Requirements:
Special Req. 13008:
Notes:
Doc. Reviewed: [signature] 3/1/99 CCO
X-Ref. Updated: [signature] [signature] 12

DATE	REV.	CHANGE	ECN
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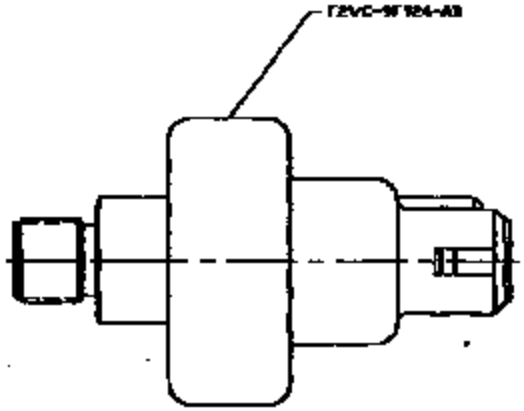
7TPSL24



TI PROPRIETARY INFORMATION
STRICTLY PRIVATE

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TOLERANCES UNLESS OTHERWISE SPECIFIED		TITLE: PRESSURE SWITCH
REF. SB93		
SCALE: 2X	DRAWN BY: ED NEFFERD	DATE: 8-29-98
APPROVED		DWG NO. 2-05948 REV 01

DATE	REV.	CHANGE	ECN
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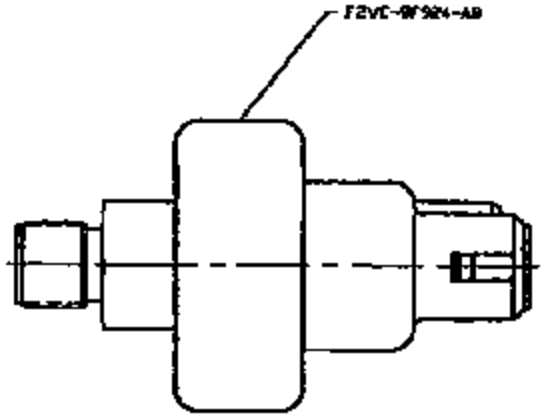
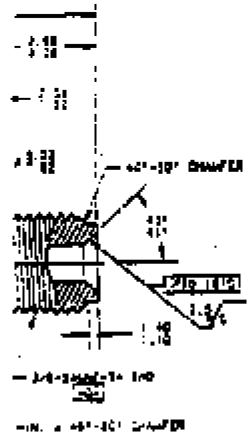


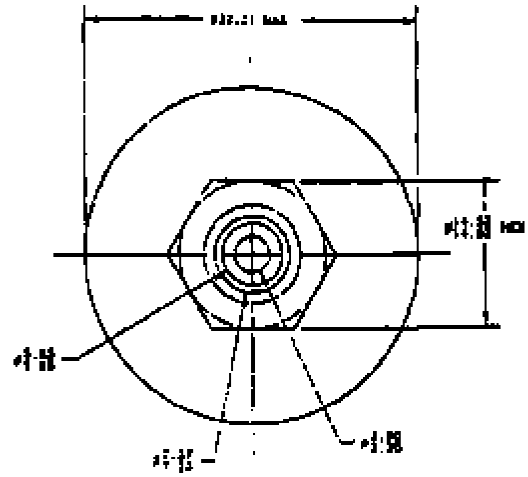
Precision Controls Customer Print/Specification Sign Off
Customer P/N: 2-05948 TI P/N: 7705L2-1
Special Requirements:
Special Req. (MMS):
Notes:
Doc. Reviewed:
X-Ref. Updated:

MATERIAL			THIS DRAWING PROPERTY OF SURFACES CARROLLTON, TEXAS
TOLERANCES UNLESS OTHERWISE SPECIFIED			TITLE PRESSURE SWITCH
XX±	XXX±	ANGULAR	
REF. 5893			
SCALE	DRAWN BY	DATE	DWG NO. 2-05948 REV 01
2X	C.B. BENFORD	8-29-90	
APPROVED		2-20-91	

7705L2-1

DRAWINGS AVAILABLE UPON REQUEST





SPECIFICATIONS AND NOTES

DEVICE MUST CONFORM TO FORD MOTOR CO. SPEC. NO. ▽ [illegible]

ACTUATION PRESSURE ——— [illegible] kPag ([illegible] psig)

RELEASE PRESSURE ——— [illegible] kPag Min. ([illegible] psig)

CONTACT ARRANGEMENT ——— [illegible] NORMALLY CLOSED, OPEN ON PRESSURE RISE

HYDRAULIC SEAL ——— ETHYLENE PROPYLENE

[illegible] PRESSURE ——— [illegible] MPa ([illegible] psi)

PROTECTIVE COVER ON THREADS REQUIRED FOR SHIPMENT.

DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M-1982

MANUFACTURER TO ESTABLISH PRODUCT ENGINEERING APPROVED CONTROL PLAN

CHANGE IN DESIGN COMPOSITION OR PROCESSING FROM THE PART PREVIOUSLY APPROVED FOR PRODUCTION REQUIRES PRIOR ENGINEERING APPROVAL

ENGINEERING APPROVAL OF PRODUCTION SAMPLES FROM EACH SUPPLIER IS REQUIRED PRIOR TO AUTHORIZATION OF PRODUCTION

PART MUST COMPLY WITH SPECIFICATION [illegible] TO HELP SAFEGUARD HEALTH, SAFETY AND THE ENVIRONMENT

	REVISED & REDRAWN
910417	WC005I0079779005
DATE	REL. NO.

NAME SWITCH ASY - SPEED CONTROL DEACTIVATE

NO. ▽F2VC-9F924-AB

TRCL ITEM — THE ▽ SYMBOL ALSO [illegible] PRODUCT ENGINEERING DESIG[illegible] CRITICAL CHARACTERISTICS. THESE [illegible]DITIONAL CRITICAL CHARACTERISTICS [illegible]ED BY PROCESS REVIEWS, MUST [illegible] ON THE O-101 CONTROL PLAN(S) WHICH [illegible] PRODUCT ENGINEERING APPROVAL.

METRIC

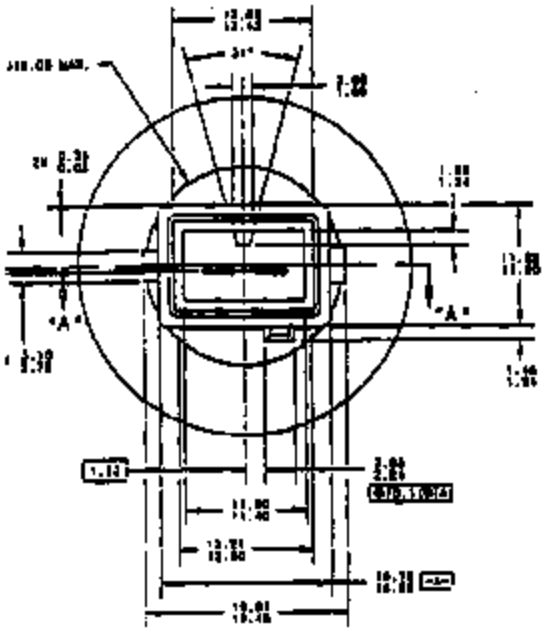
TEXAS INSTRUMENTS

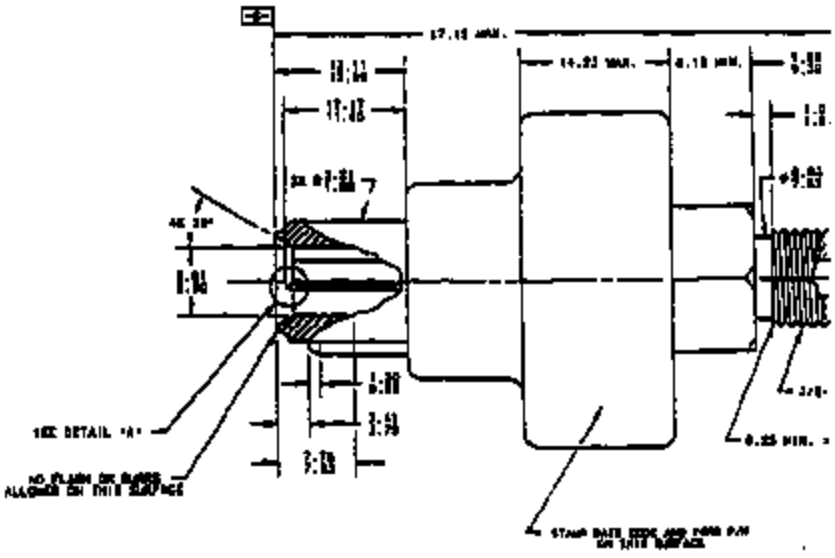
TITLE: PRESSURE SWITCH ENVELOPE DRAWING

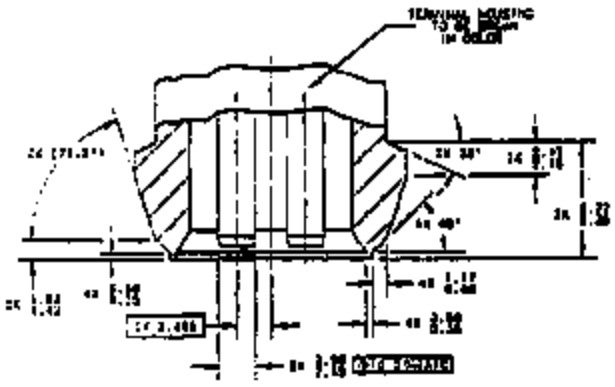
MATERIAL

D | 82647 | 77PSL2-1

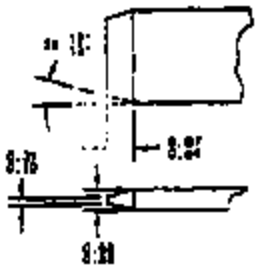
TI-NHTSA 000058







SECTION "A-A"

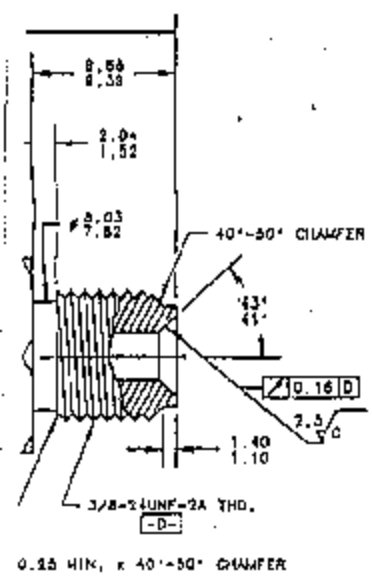


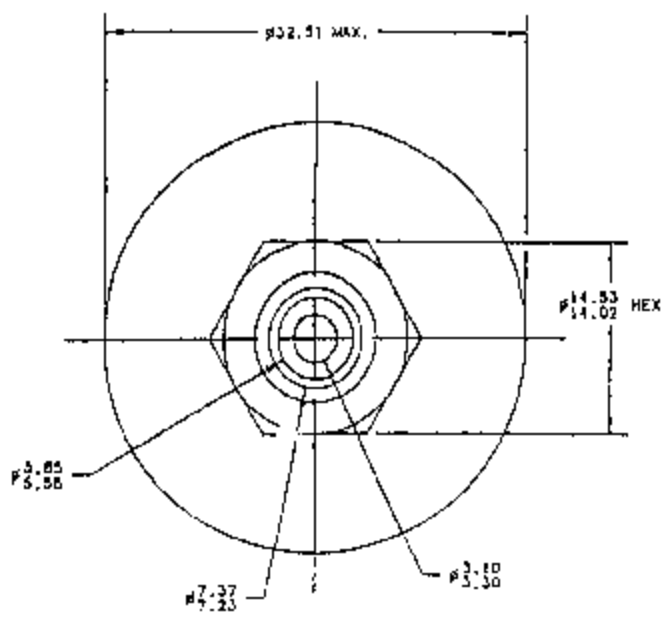
DETAIL "A"

CONTROL
IDENTIFIES
NATED CRIT
AND ADDITI
IDENTIFIED
APPEAR ON T
REQUIRE FRC

4	3	2

REVISIONS		
ZONE	LTR	DESCRIPTION
G7	D	11,10-11,80 WAS 11,83-11,84 CR155556 DS
G4		40°-50° WAS 25°-40°
C4		1,10-1,40 WAS 0,76-1,17
C4		0,25UIN. X 40°-50° WAS 0,25 X 25°-65°
C3		Ø5,38-5,82 WAS Ø5,81-1,02
B3		ADDED NOTE
A5		0,66-0,87 WAS ,026-0,06
	E	ADDED REVISION DETAIL TO PRINT CR155421 DS
C8	F	0,30 - 0,70 WAS BOXED 0,50
C8		DELETED DATUM FEATURE -B-
A5		DELETED FEATURE CONTROL SYMBOL
B8		COLOR WAS GREY
		CR 156803 CF
C8	G	0,25/0,75 WAS 0,30/0,70
		CR163066 CF





SPECIFICATIONS AND NOTES

DEVICE MUST CONFORM TO FORD MOTOR CO. SPEC. NO. ▽ ES-F2VC-9F921-AA

ACTUATION PRESSURE ------- 862 4211 kPag (125 435 psig)

RELEASE PRESSURE --------- 138 kPag MIN. (20 psig)

CONTACT ARRANGEMENT ------ SPST NORMALLY CLOSED, OPEN ON PRESSURE RISE

HYDRAULIC SEAL ---------- ETHYLENE PROPYLENE

PROOF PRESSURE ---------- 20,7 MPa (3000 psi)

PROTECTIVE COVER ON THREADS REQUIRED FOR SHIPMENT.

CERTIFIED

DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M-1982

MANUFACTURER TO ESTABLISH PRODUCT ENGINEERING APPROVED CONTROL PLAN

CHANGE IN DESIGN COMPOSITION OR PROCESSING FROM THE PART PREVIOUSLY APPROVED FOR PRODUCTION REQUIRES PRIOR ENGINEERING APPROVAL

ENGINEERING APPROVAL OF PRODUCTION SAMPLES FROM EACH SUPPLIER IS REQUIRED PRIOR TO AUTHORIZATION OF PRODUCTION

PART MUST COMPLY WITH SPECIFICATION WSS-M99P9999-A1 TO HELP SAFEGUARD HEALTH, SAFETY AND THE ENVIRONMENT

CONFIDENTIAL

ONTROL ITEM — THE ▽ SYMBOL ALSO
IIRES PRODUCT ENGINEERING DESIG-
D CRITICAL CHARACTERISTICS. THESE,
ADDITIONAL CRITICAL CHARACTERISTICS
IRED BY PROCESS REVIEWS, MUST
AR ON THE C-101 CONTROL PLAN(S) WHICH
IRE PRODUCT ENGINEERING APPROVAL.

METRIC

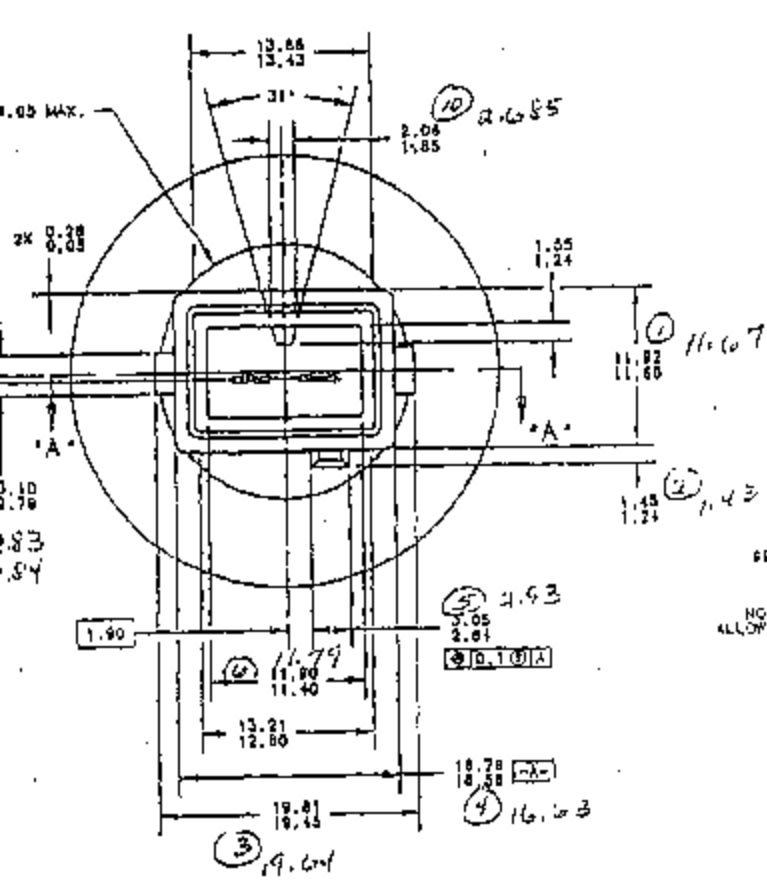
		REVISED ER	
910417	NCOOE10079		
DATE	REL. NO		
NAME SWITCH ASY CONTROL DEA			
NO. ▽F2VC-9F9			

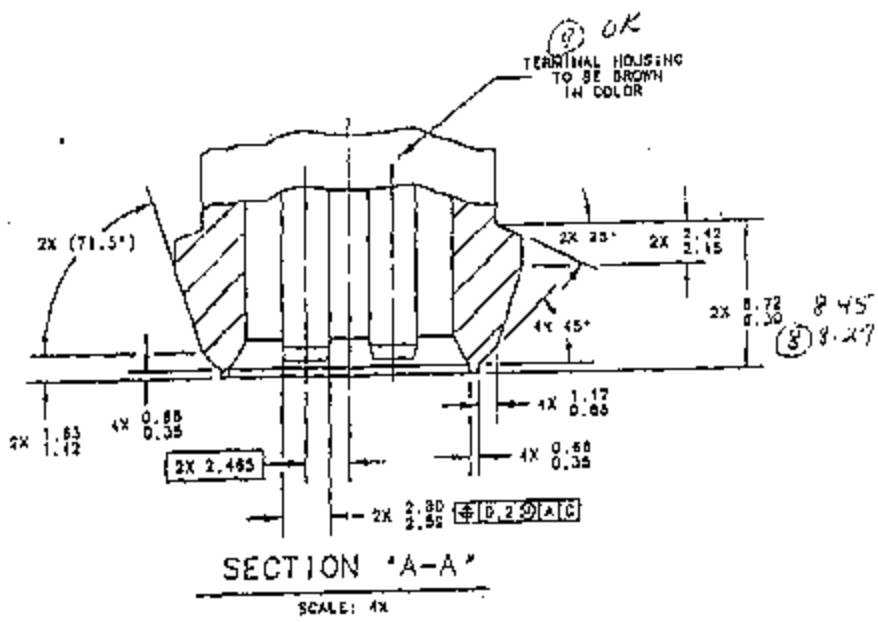
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	BY TOM DAIL	DATE 7-9-90	TEXAS INSTRUMENT
TOLERANCE ON FRACTIONS DECIMALS ANGLES ±2°	CH.		TITLE C PRESSURE SWIT ENVELOPE DRAW
	ENG.		
MATERIAL			
	APPROVED	9/6/91	SIZE D CODE IDENT NO. 82647 77P
			SCALE 1

TEQ 3-5-91

TI-NHTSA 000060

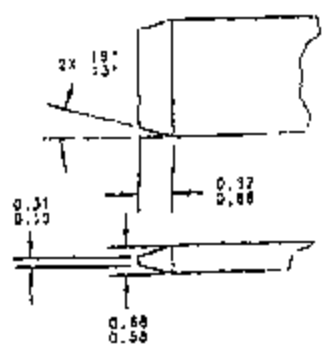
7 6 5





SECTION "A-A"

SCALE: 4X



DETAIL "A"

TYP. 2-PL.
SCALE: 10X

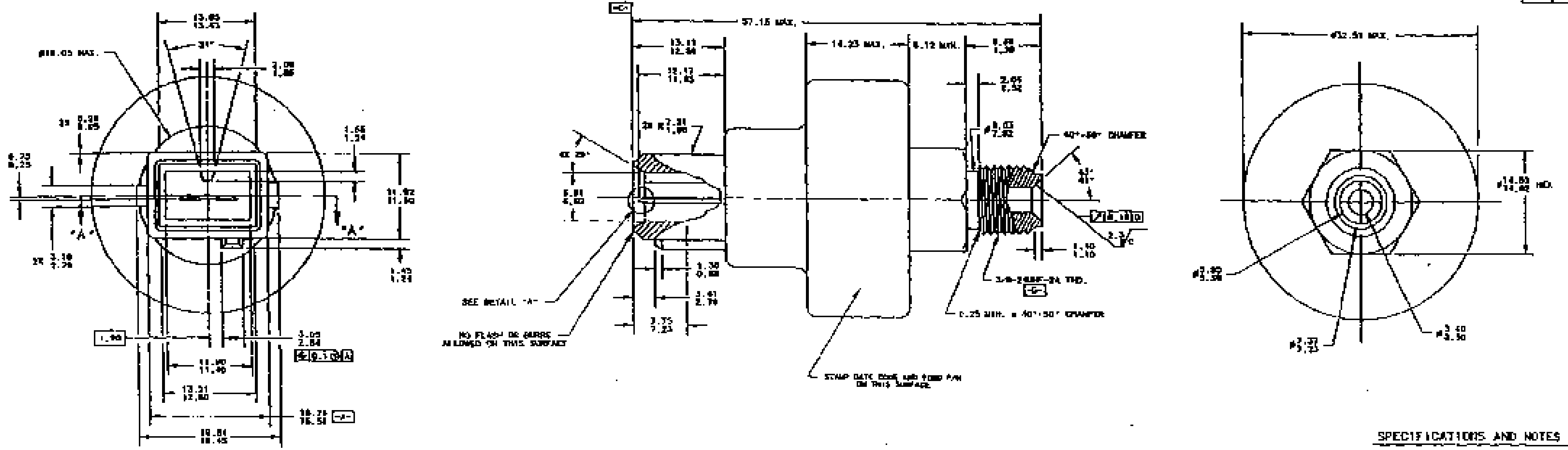
CONFIDENTIAL

THIS DWG. SUPERSEDES 77F

DRAWINGS AVAILABLE UPON REQUEST

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]



CONFIDENTIAL

SPECIFICATIONS AND NOTES

DEVICE MUST CONFORM TO FORD MOTOR CO. SPEC. NO. ES F2VC-9F924-AA

ACTUATION PRESSURE ——— 862 ±241 kPag (125 ±35 psig)

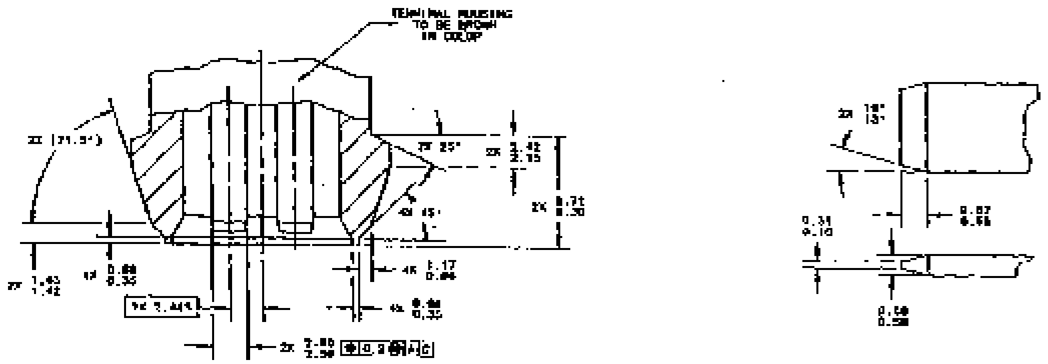
RELEASE PRESSURE ——— 138 kPag MIN. (20 psig)

CONTACT ARRANGEMENT ——— SPST NORMALLY CLOSED, OPEN ON PRESSURE RISE

HYDRAULIC SEAL ——— ETHYLENE PROPYLENE

PROOF PRESSURE ——— 20,7 MPa (3000 psi)

PROTECTIVE COVER ON THREADS REQUIRED FOR SHIPMENT.



SECTION "A-A"

DETAIL "A"

DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M-1982

MANUFACTURER TO ESTABLISH PRODUCT ENGINEERING APPROVED CONTROL PLAN

CHANGE IN DESIGN COMPOSITION OR PROCESSING FROM THE PART PREVIOUSLY APPROVED FOR PRODUCTION REQUIRES PRIOR ENGINEERING APPROVAL

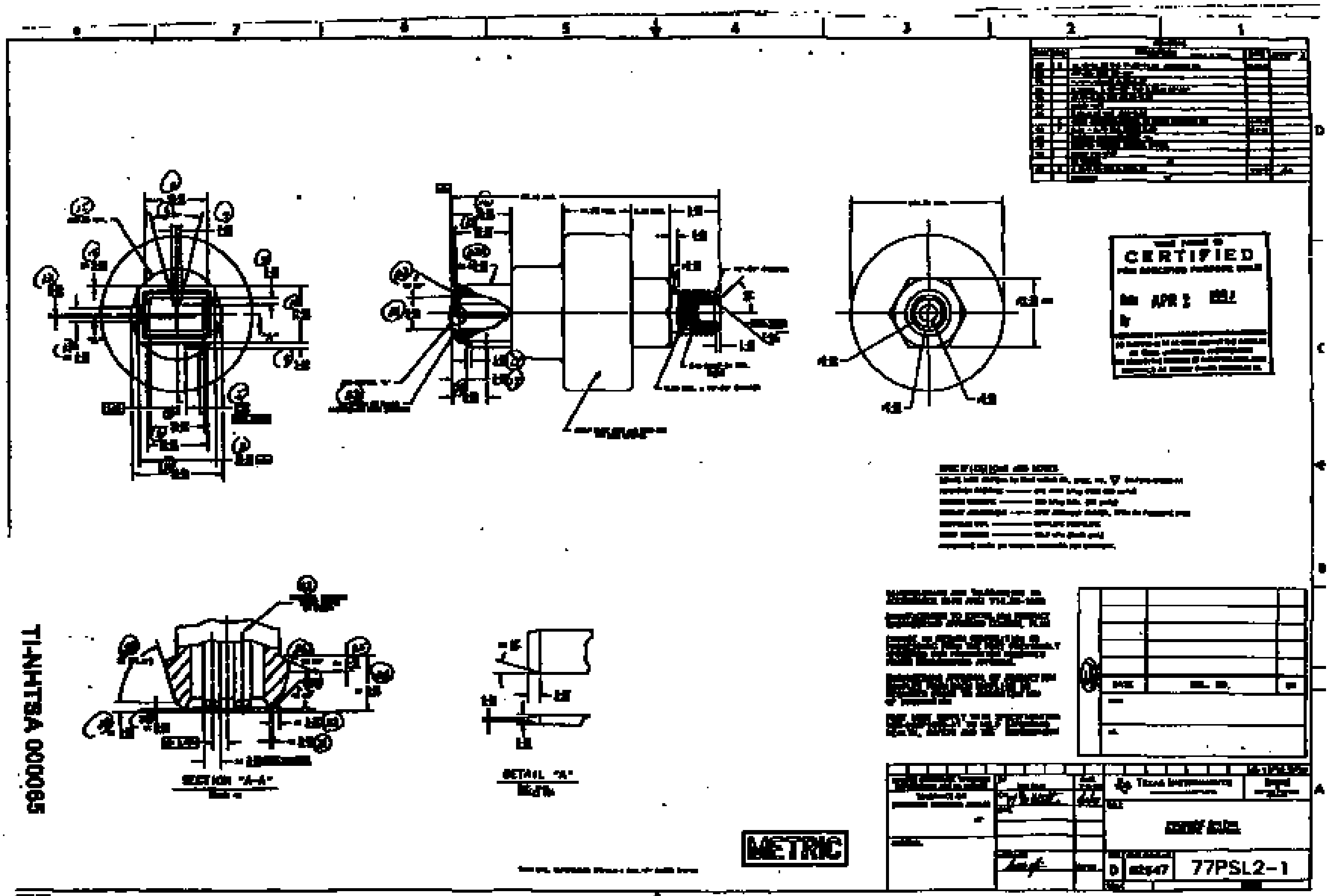
ENGINEERING APPROVAL OF PRODUCTION SAMPLES FROM EACH SUPPLIER IS REQUIRED PRIOR TO AUTHORIZATION OF PRODUCTION

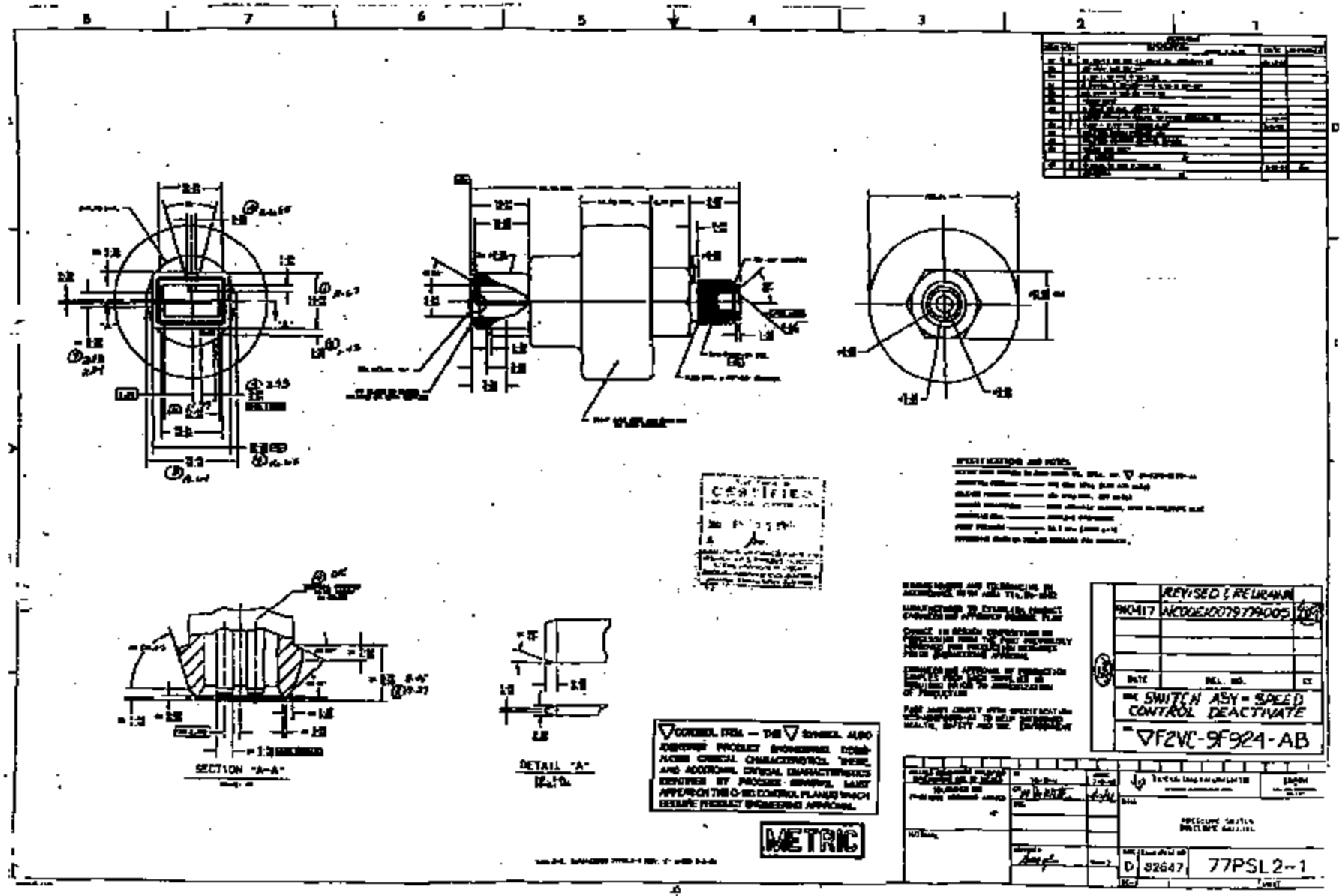
PART MUST COMPLY WITH SPECIFICATION WSS-M99P9999-A1 TO HELP SAFEGUARD HEALTH, SAFETY AND THE ENVIRONMENT

DATE	REL. NO.	CK
NAME		
NO.		

TI-NHTSA 000064

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES | TEXAS INSTRUMENTS





2 1

REVISIONS				
ZONE	LTR	DESCRIPTION PROJ # 3423	DATE	APPROVED
C7	D	11.40–11.90 WAS 11.63–11.84 CR155558 DS	12-17-90	
D4		40°–50° WAS 25°–60°		
C4		1.10–1.40 WAS 0.78–1.27		
C4		0.25MIN. X 40°–50° WAS 0.25 X 25°–60°		
C3		⌀5.56–5.85 WAS ⌀5.91–6.02		
B3		ADDED NOTE		
A5		0.65–0.67 WAS .065–0.86		
	E	ADDED REVISION DETAIL TO PRINT CR155621 DS	1-18-91	
C8	F	0.30 – 0.70 WAS BOXED 0.50	3-5-91	
C8		DELETED DATUM FEATURE -B-		
A5		DELETED FEATURE CONTROL SYMBOL		
B6		COLOR WAS GREY		
		CR 155803 CF		
C6	G	0.25/0.75 WAS 0.30/0.70	4-11-91	
		CR405088 CF		

SPECIFICATIONS AND NOTES

DEVICE MUST CONFORM TO FORD MOTOR CO. SPEC. NO. ▽ E9-F2VC-AF824-AA

ACTUATION PRESSURE ——— 689 4241 kPag (125 ±35 psig)

RELEASE PRESSURE ——— 238 kPag MIN. (20 psig)

CONTACT ARRANGEMENT ——— SPST NORMALLY CLOSED, OPEN ON PRESSURE RISE

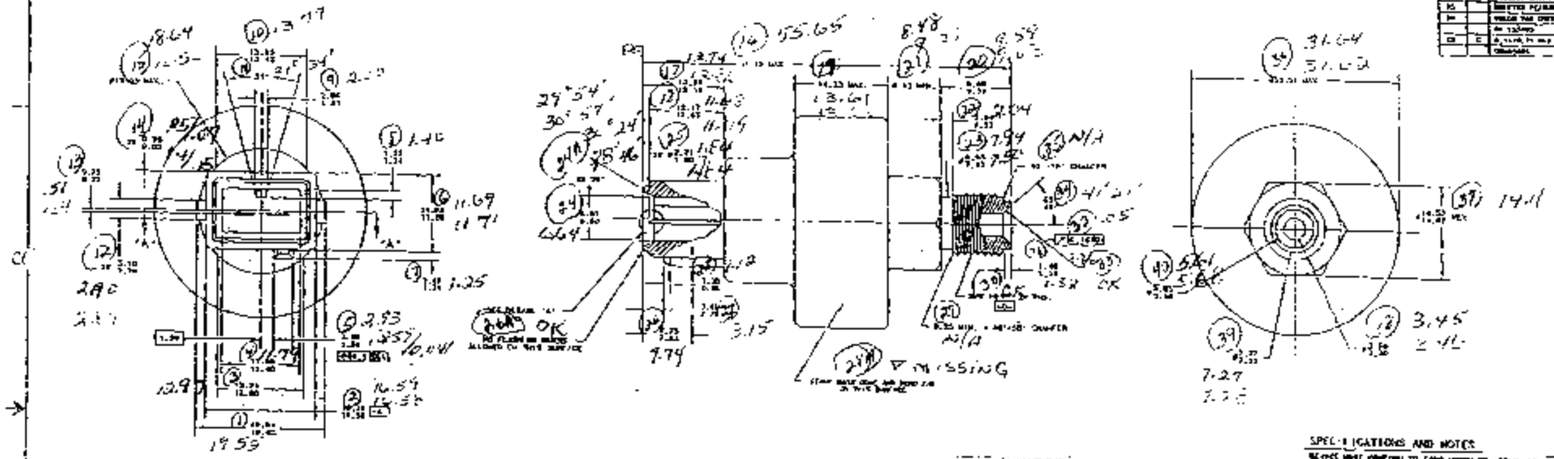
HYDRAULIC SEAL ——— ETHYLENE PROPYLENE

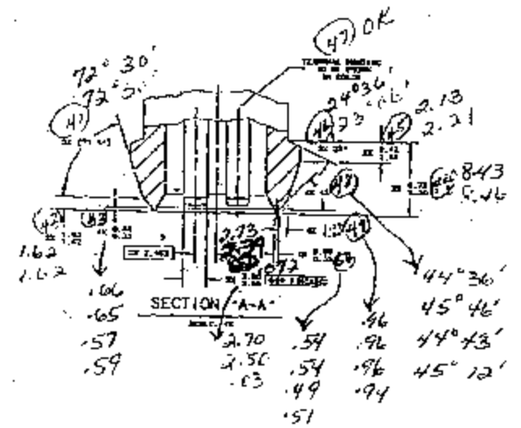
PROOF PRESSURE ——— 20.7 MPa (3000 psi)

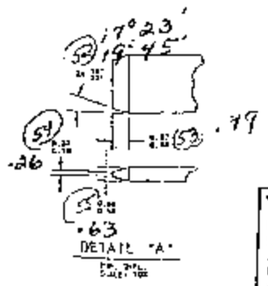
PROTECTIVE COVER ON THREADS REQUIRED FOR SHIPMENT.

TI-NHTSA 000087

77 P/C







CONFIDENTIAL

SPECIFICATIONS AND NOTES

DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M-1982

MANUFACTURER TO ESTABLISH PRODUCT ENGINEER: NO APPROVED CONTROL PLAN

CHANGE IN DESIGN, COMPOSITION OR PROCESSING FROM THE PART PREVIOUSLY APPROVED FOR PRODUCTION REQUIRES PRIOR ENGINEERING APPROVAL

ENGINEERING APPROVAL OF PRODUCTION SAMPLES FROM EACH SUPPLIER IS REQUIRED PRIOR TO AUTHORIZATION OF PRODUCTION

PART MUST COMPLY WITH SPECIFICATION MSS-WSFE2202-A1 TO HELP SAFEGUARD HEALTH, SAFETY AND THE ENVIRONMENT

▽CONTROL ITEM — THE ▽ SYMBOL ALSO IDENTIFIES PRODUCT ENGINEERING DESIGNATED CRITICAL CHARACTERISTICS. THESE, AND ADDITIONAL CRITICAL CHARACTERISTICS IDENTIFIED BY PROCESS REVIEWS, MUST APPEAR ON THE D-101 CONTROL PLAN(S) WHICH REQUIRES PRODUCT ENGINEERING APPROVAL.

METRIC

DATE	REL. NO.	BY
010417	REVISED & REDRAWN MCCOE100797B005	

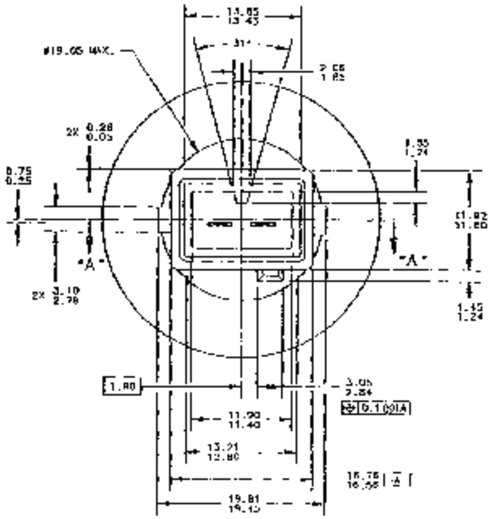
NAME SWITCH ASY - SPEED CONTROL DEACTIVATE

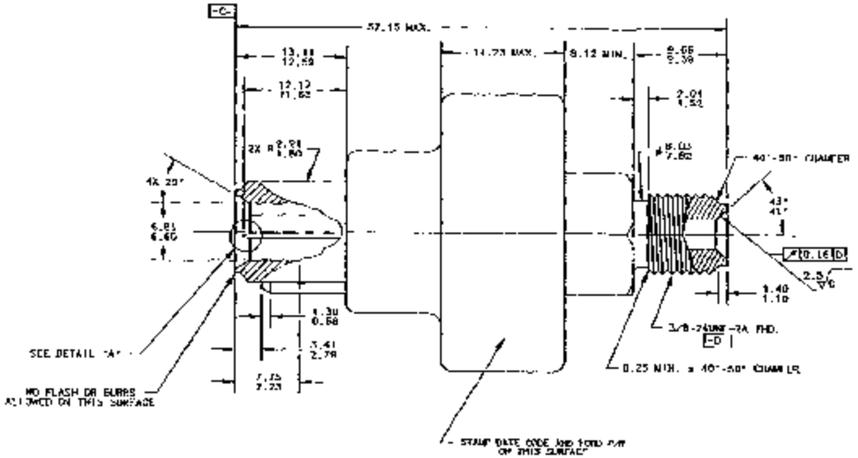
NO. ▽F2VC-9F924-AB

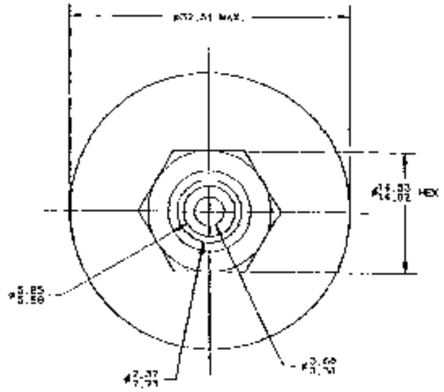
TEXAS INSTRUMENTS

TITLE PRESSURE SWITCH FRONT OFF DRAWING

ZONE	LTR	DESCRIPTION	DATE	APPROVED
		0.28MIN. X 40°-50° MIS 0.25 X 25°-60°		
		Ø0.56-1.65 WAS Ø1.04-1.07		
		ADDED PDYC		
		0.28-0.37 MAX .098 0.36		
	B	ADDED REVISION DETAIL TO PRINT SH1995021 DS	7-18-91	
	F	0.33 ± 0.70 WAS REVISED 0.50	3-5-91	
		DELETED DATUM FEATURE -B-		
		DELETED FEATURE CONTROL SYMBOL		
		DOOR WAS GREY		
		CR 195203 CF		
	C	0.25±0.75 MAX @ 90/0.20	4-11-91	
		CHANGED DIM CF		



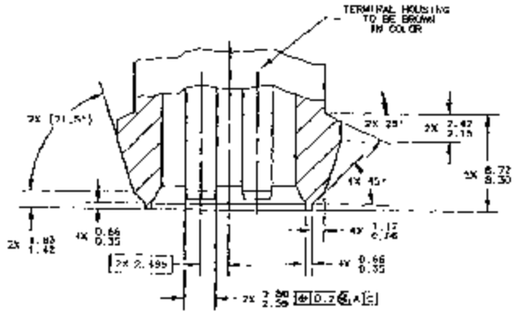




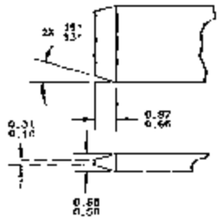
CERTIFIED PRINT
Parts Made To This Print Must Conform To
ENG. STD. E9898 REV. E
Date SEP 13 1991
NEITHER THIS PRINT NOR THE INFORMATION CONTAINED THEREON IS TO BE USED AGAINST THE INTEREST OF TEXAS INSTRUMENTS INCORPORATED OR AGAINST THE INTERESTS OF ANY OF ITS AFFILIATED COMPANIES OR WHOLLY OWNED SUBSIDIARIES.

SPECIFICATIONS AND NOTES

DEVICE MUST CONFORM TO FORD MOTOR CO SPEC NO. ▽ ES-F2VC-9F924-AA
ACTUATION PRESSURE ——— 862 ±241 kPag (375 ±35 psig)
RELEASE PRESSURE ——— 138 kPag MIN (20 psig)
CONTACT ARRANGEMENT ——— SPST NORMALLY CLOSED, OPEN ON PRESSURE RISE
HYDRAULIC SEAL ——— ETHYLENE PROPYLENE
PROOF PRESSURE ——— 20.7 MPa (3000 psi)
PROTECTIVE COATING ON THREADS REQUIRED FOR SHIPMENT.



SECTION "A-A"
SCALE: 4X



DETAIL "A"
TYP. 2 PL.
SCALE: 10X

DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M-1982

MANUFACTURER TO ESTABLISH PRODUCT ENGINEERING APPROVED CONTROL PLAN

CHANGE IN DESIGN COMPOSITION OR PROCESSING FROM THE PART PREVIOUSLY APPROVED FOR PRODUCTION REQUIRES PRIOR ENGINEERING APPROVAL

ENGINEERING APPROVAL OF PRODUCTION SAMPLES FROM EACH SUPPLIER IS REQUIRED PRIOR TO AUTHORIZATION OF PRODUCTION

PART MUST COMPLY WITH SPECIFICATION WSS-M99P9999-A1 TO HELP SAFEGUARD HEALTH, SAFETY AND THE ENVIRONMENT

DATE	REL. NO.	CK
NAME		
NO.		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	BY TOM DAIL	DATE 7-8-90	TEXAS INSTRUMENTS
TOLERANCE ON FRACTIONS DECIMALS ANGLES	CH	APP	

D
C
B
A

Engineering Specification

PART NAME	PART NUMBER
[redacted]	[redacted]

LET																			
FR																			
LET																			
FR																			

DATE	LET	FR	REVISIONS	DR	CK
			ADDED DATA TO COMPLETE		
			SPEC. & RETYPED		
6/11/82			[illegible]		[illegible]

REFERENCE

PREPARED/APPROVED BY: [illegible signature]

CHECKED BY | DETAILED BY

CONCURRENCE/APPROVAL SIGNATURES

DESIGN ENGINEERING SUPERVISOR: [illegible signature]

DESIGN ENGINEERING MGR.

MANUFACTURING ENGRG.

QUALITY CONTROL: [illegible signature]

SUPPLIER QUALITY ASSURANCE: [illegible signature]

ELECTRONICS DIVISION: [illegible signature]

▽ CONTROL ITEM — THE ▽ SYMBOL ALSO IDENTIFIES PRODUCT ENGINEERING DESIGNATED CRITICAL CHARACTERISTICS. THESE AND ADDITIONAL CRITICAL CHARACTERISTICS IDENTIFIED BY PROCESS FMEA, MUST APPEAR ON CONTROL PLANS WHICH REQUIRE PRODUCT ENGINEERING APPROVAL.

FRAME 1 OF 15	REV	▽ [illegible]

SWITCH ASSEMBLY - SPEED CONTROL DEACTIVATE

I. General

This specification covers the test requirements for the speed control deactivate switch -9F924- [illegible] speed [illegible]. Design changes on the switch assembly or its components shall not be made without compliance to Section V of this specification and written approval from the releasing Production Engineering Office.

This engineering specification is a supplement to the released drawing on the above part, and all requirements herein must be met in addition to all other requirements of the part drawing. Minimum measures necessary for demonstrating compliance to these requirements are given in each section.

The engineering tests, sample sizes, and test frequencies contained within this engineering specification reflect the minimum requirements established to provide a regular evaluation of conformance to design intent. The engineering test program is intended as a supplement to normal material inspections, dimensional checking and in-process controls, and should in no way adversely influence other inspection operations.

QA suppliers may implement different test sample sizes and frequencies providing these changes have been included in an alternate Control Plan approved by the design responsible Product Engineering Office and concurred in by SQA.

II. PRODUCTION VALIDATION AND IN-PROCESS TESTS

- Production Validation (PV) Tests must be completed satisfactorily with parts from production tooling (and processes where possible) before ISIR approval and authorization for shipment of production parts can be effected. Parts must be revalidated completely, or per Section V whenever any change is made which could possibly affect part function or performance.

- In-Process Test Phase 1 (IP-1) - IP-1 tests are used to demonstrate process capability and must be completed using initial production parts from production tooling and processes prior to first production shipment approval. IP-1 tests are to continue in effect until process capability is demonstrated.

- In-Process Tests Phase 2 (IP-2) - IP-2 test program may be implemented only after process capability has been established. Tests must be completed with production parts on a continuing basis. Samples for these tests must be selected on a random basis to represent the entire production population as much as possible. In the event that any of the requirements in these tests is not met, the reaction plan specified in Ford Q101 Sect. 3.5, "Engineering Specification (ES) Test Performance Requirements" shall be invoked.

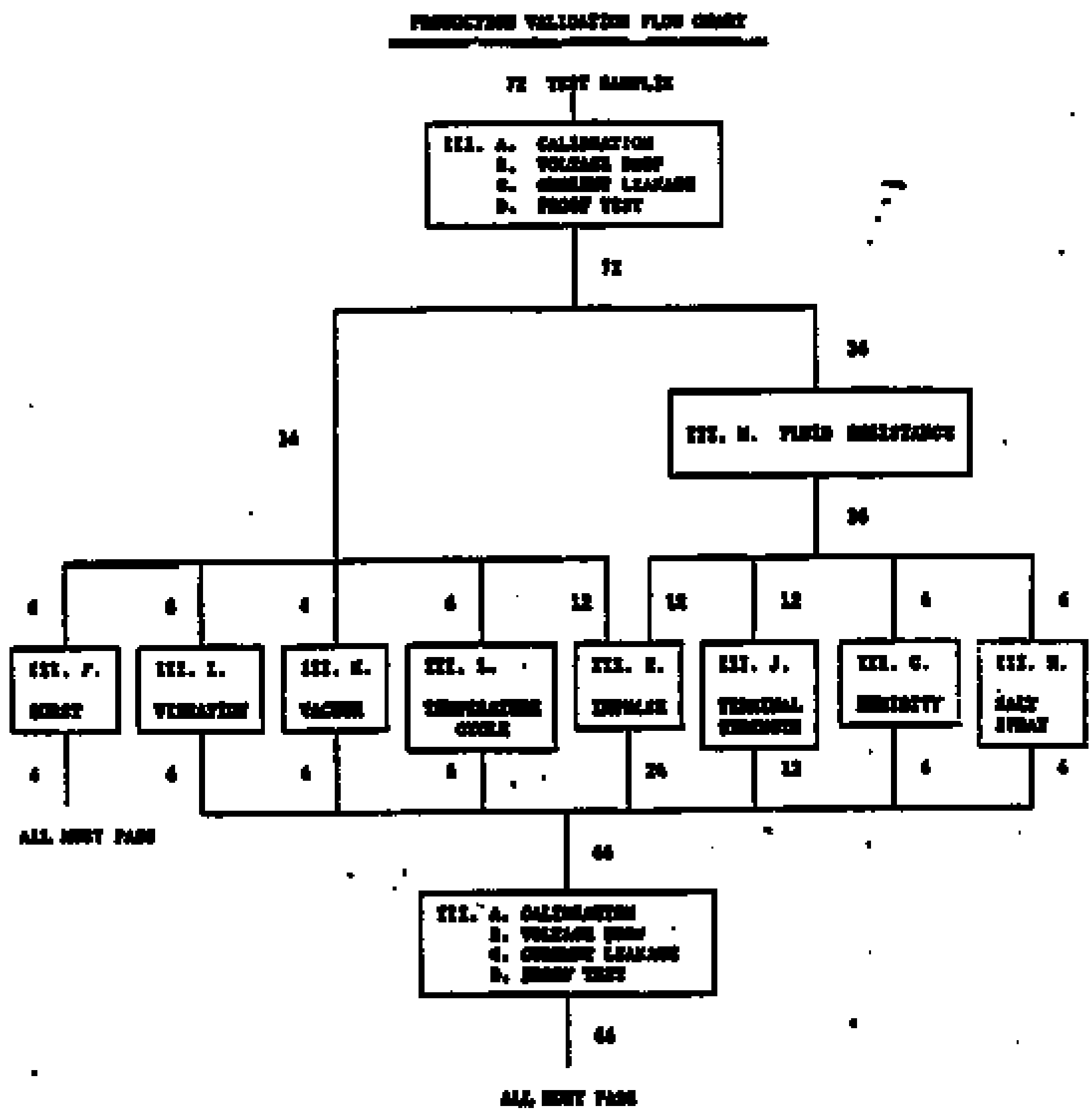
SECTION III. TABLE OF TESTS

Item	Test Name Functional Tests	PRODUCTION VALIDATION Minimum Sample Size	PRODUCTION VALIDATION Statistical Test Acceptance Criteria	IN-PROCESS IP-1 Minimum Sample Size	IN-PROCESS IP-1 Statistical Test Acceptance Criteria	IN-PROCESS IP-2 Minimum Sample Size	IN-PROCESS IP-2 Statistical Test Acceptance Criteria
III.							
▽ A	Calibration	72	P90-.96	100%	All Must Pass	100%	All Must Pass
B	Voltage Drop	72	P90-.96	12/Mo.	P90-.84	4/Lot	" " "
C	Current Leakage	72	P90-.96	3/Mo.	P90-.56	4/Lot	" " "
D	Proof Test	72	P90-.96	12/Mo.	P90-.84	4/Lot	" " "
F	Burst	6	P90-.72	3/Mo.	P90-.56	4/Lot	" " "
I	Vibration	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
J	Terminal Strength	12	P90-.84	6/Mo.	P90-.72	4/Lot	All Must Pass
K	Vacuum	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
L	Temperature Cycle	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
M	Fluid Resistance	36	P90-.94	36/12Mo	P90-.94	36/12Mo.	P90-.94

Durability Tests

Item	Test	PV Minimum Sample Size	PV Criteria	IP-1 Minimum Sample Size	IP-1 Criteria	IP-2 Minimum Sample Size	IP-2 Criteria
III.							
E	Impulse	24	P90-.90	12/Mo.	P90-.84	3/3 Mo.	P90-.56
G	Humidity	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
H	Salt Spray	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72

PD 3947-a2



FRAME	OF	REVISED		NUMBER
[illegible]	18			[illegible]

III. TEST PROCEDURES AND REQUIREMENTS

▽ A. Calibration

1. Test Requirements

a. Switch calibration is to be checked at room temperature (16°C-35°C) using ambient air or equivalent.

b. Calibration settings shall be specified on the part drawing with the settings checked after 2 or more pressure cycles with ambient air, or equivalent. Pressure cycle range is to be determined by the manufacturer to insure switch calibration stability. The cut-in and differential set points are to be measured while conducting 750 ± 50 milliamperes while 13.5 ± 1.0 volts D.C. is applied. The cut-in point is to be checked with increasing pressure.

c. The cut-out point is to be checked with decreasing pressure, and the differential set point is to be calculated using the cut-in pressure minus the cut-out pressure.

2. Acceptance Requirements

a. Nonconformance is defined as any switch point which falls outside the tolerance band specified on the part drawing.

B. Voltage Drop

1. Test Requirements

a. Voltage drop is to be measured after 2 or more cycles with ambient air or equivalent from 0 to 10,000 ±.172 KPa (1450 ± 25 PSI) while conducting 750 ± 50 milliamps and 13.0 ± 1.0 volts D.C. is applied to the switch. Under these conditions with the switch closed the voltage drop is to be measured. Millivolt compensation interface terminals to be less than 10 millivolts.

2. Acceptance Requirements

a. Nonconformance is defined as a voltage drop in excess of 200 millivolts.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

C. Current Leakage

1. Test Requirements

a. Current leakage is to be checked with 500 volts, 60 Hz alternating current.

b. Current leakage is to be checked:

(1) Between the switch leads with the contacts open.
(2) Between the lead and the switch housing with contacts closed.
(3) Between either lead and switch housing with the contacts open.

2. Acceptance Requirements

a. Nonconformance is defined as any leakage current in excess of one hundred (100) microampere.

D. Proof Test

1. Test Requirements

a. Subject sample switches to Section A to establish their initial switching pressures.

b. Proof test is to be conducted using brake fluid or equivalent as the pressure medium. Test pressure shall be as specified on the part drawing. Test pressure shall be isolated from pressure source and held for not less than 10 seconds. — 3000 psig 4000 psig Pass Car Truck

c. Recheck the switches to Section A.

2. Acceptance Requirements

a. No evidence of fluid leakage, seepage, or drop in test pressure greater than 430 KPa.(62 PSI) is permitted.

b. A change in cut-in and cut-out pressures greater than ± 5% from the initial value is not permitted.

c. The test samples must be destroyed after testing.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

E. Impulse

1. Test Requirements

a. Test the switch for a total of 500,000 cycles. Cycle pressure between (low) 0-276 KPa (0-40 psi) and (high) 10,000 ± 345 KPa (1450 ± 50 psi).

1) 0 - 475,00 cycles: 13 ± 1 volts, stress current to monitor function.

2) 475,001 - 500,000 cycles: 13 ± 1 volts D.C., 750 ± 50 ma., per figure 4.

b. Brake fluid temperature to be 135 ± 14°C and ambient temperature to be 107°C min.

c. Cycle rate is to be 110-130 cycles per minute.

d. Switch must open and close each cycle.

2. Appearance Requirements

a. After impulse test check to sections A, B, C, & D using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, & D.

c. Samples used for this test must be destroyed after all testing is completed.

F. Burst

1. Test Requirement

a. Burst strength is to be checked using brake fluid or equivalent as the pressure medium.

b. Pressurize the switch to 48.3 MPa (7000 PSI) minimum and hold for 30 seconds minimum.

2. Appearance Requirements

a. Nonconformance is defined as any evidence of fluid leakage or seepage from the switch or threads. Samples used for this test must be destroyed after testing is completed.

C. Humidity

1. Test Requirements

a. Mount the switch in the test port in a humidity chamber. Correctly released mating electrical connector must be installed before start of test.

b. Subject the switch to ten (10) consecutive humidity cycles as follows:

(1) Raise temperature to 65 +10/-2 °C over 2.5 hours; at 90-98% relative humidity.

(2) Hold 3 hours at 65 +10/-1 °C at 90-98% relative humidity.

(3) Lower temperature to 25 +10/-2 °C over 2.5 hours; at 80-98% relative humidity.

2. Acceptance Requirements

a. Within 15 minutes after completion of the tenth humidity cycle check the switch to sections A, B, C, D, using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D.

D. Salt Spray

1. Test Requirements

a. Mount the switch in the test port in a salt spray chamber. The currently released mating electrical connector and wiring must be installed prior to start of test.

b. Expose the switch assembly to 72 hours of salt spray per ASTM B-117.

2. Acceptance Requirements

a. After exposure, check the switch to sections A, B, C, D, using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

I. Vibration

1. Test Requirements

a. Mount the switch in the test port and attach the currently released mating electrical connector before start of test.

b. Switches are to be vibrated in all 3 planes with electrical continuity being monitored during the entire test. See Figure 1 for switch orientation in the 3 planes. Vibration tests are to be conducted at room temperature using brake fluid, ambient air, or equivalent as the pressure medium.

c. Internal pressure shall be maintained at 0 KPa G. when the switch is in the closed position and 1.1 times max actuation pressure shown on print when the switch is in the open position.

d. Vibrate the switch at 1.5 mm displacement (peak-to-peak) while varying the frequency uniformly from 5 to 50 to 5 Hz over a 5 minute period.

e. Vibrate the switch in alternate one-hour periods in the open and closed positions for a total of 8 hours in each plane. (Total test time is 24 hours).

2. Acceptance Requirements

a. After the entire vibration sequence check the switches to sections A, B, C, or D using the procedure established in each section.

b. Nonconformance is defined as any evidence of leakage or any change in electrical continuity/discontinuity during the vibration cycles, or any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

J. Terminal Strength

1. Test Requirements

a. Mount the switch in the test port.

(1) Apply a 89 ± 9 N axial force to each terminal.

(2) With a pendulum apply a 45 ± 5 N impact force to the switch housing at the connector end, perpendicular to the centerline axis of the switch. See Figure 2 for force application point and direction.

2. Acceptance Requirements

a. Check the switch on sections A, B, C, and D using the procedures established in each section.

b. Nonconformance is defined as any terminal or housing fracture, or any switch not meeting the criteria in sections A, B, C, or D.

K. Vacuum

1. Test Requirements

a. Mount the switch in the test port. Vacuum tests are to be conducted at room temperature using ambient air as the pressure medium.

b. Subject the switch to 3 cycles of vacuum from atmospheric pressure (760 mm Hg) to an absolute pressure of 3-4 mm Hg. Maintain the vacuum for a minimum of 60 seconds.

2. Acceptance Requirements

a. Check the switch to sections A, B, C, and D using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, and D.

III. TEST REQUIREMENTS AND REQUIREMENTS (cont'd)

L. Temperature Cycle

1. Test Requirements

a. Mount switches in test ports; test to be run using currently released brake fluid.

b. Repeat the following procedure 25 times.

(1) Lower the switch and fluid temperature to at least -40°C.

(2) Cycle the switches ten times at 10 seconds/cycles. One cycle consists of a pressure variation from 0 - 276 KPa.G (0-40 psi) to 10,000 ± 345 KPa.G (1450 ± 50 PSI). Note: Switch must open and close each cycle.

(3) Raise switch and fluid temperature to 50°C minimum.

(4) Repeat Step 2.

c. At completion of Step b, check switches per sections A, B, C, and D.

2. Acceptance Requirements

a. Nonconformance is defined as any evidence of switch fluid leakage, seepage, or not meeting the criteria of sections A, B, C, and D.

M. Fluid Resistance

1. Test Requirements

a. Mount the switch in the test port and orient as installed in the vehicle.

b. Install the currently released mating electrical connector (with wire leads) to the switch.

c. Sequentially, immerse the switch into each of the specified fluids, at a temperature of 23 ± 2 °C, for 5 ± 1 second. Remove the switch and drain and store the switch for the specified time at room temperature, prior to immersing into the next fluid.

FRAME 11 OF 16	REVISED		▽ ES-7290-9F924-AA NUMBER

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

Fluid	Drain Time	Storage Time
Reference Fuel C ASTM D471	60 ± 5 min.	none
10W40 Engine Oil	24 ± 1 hour	14 days
Ethylene Glycol/ Water 50/50 by Volume	24 ± 1 hour	24 ± 1 hour
Brake Fluid DOT 3	24 ± 1 hour	48 ± 1 hour
Automatic Transmission/ Power Steering Fluid (none) ESP-M2C138-CJ	24 ± 1 hour	14 days
Isopropyl Alcohol/ Water 50/50 by Volume	24 ± 1 hour	none
Reference Fuel C, ASTM D471 with Methyl Alcohol 85/15 by Volume	24 ± 1 hour	none

d. Per the Flow Chart, subject the prescribed number of immersed switch's to the post immersion tests specified below:

III. E. Impulse
III. G. Humidity
III. H. Salt Spray
III. J. Terminal Strength

Acceptance Requirements

a. Switches must fully meet the requirements of the specified post,immersion test.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

IV. STATISTICAL ANALYSIS METHODS

A. For PV, IP-1 and IP-2 tests, all samples tested must pass. Having all the required samples [redacted] the notation P0-.9 is interpreted as minimum reliability equal to .9, at a confidence C; thus P90-.80 means a minimum reliability of 80% at 90% confidence.

B. All samples must pass in the statistical test acceptance criteria stated for tests with 100% frequency; or samples from lots, which could have a variable size.

V. REVALIDATION REQUIREMENTS

A. No change in design, material, process or component supplier shall be made without prior approval from the releasing Product Engineering Office. As part of approving a change, the releasing Product Engineering Office will establish the portion of the Product Validation tests required to be run to revalidate the switch. The following table is to be used as a guide in determining the type of tests required for revalidation requirements.

EXISTING CHANGE REVALIDATION

Component	Process or Material Change or New Supplier
1. Terminals, Contacts, or Connector	III, B, C, E, G, H,I, J, L, M.
2. Case or Housing	All Tests
3. Disc or Diaphragm	III, A,D,E,F,I,K,L.
4. Fitting or Fluid Connection	III, D, E, F, H, I, K.

5. Annual revalidation is not required on carryover switches.

VI. LOT DEFINITION

A Lot is defined as no more than eight (8) hours of production up to 4,000 pieces. If shifts extend beyond eight (8) hours, or more than 4,000 pieces are produced in a shift, the product must be separated into at least two lots.

VII. RECORD RETENTION

A. Recording and record retention shall conform with Ford Q-101.

B. Production Validation test results and analysis are to be forwarded to the releasing Product Engineering Office before approval for shipment of production parts can be granted.

C. In-Process test results shall be available at the supplier's manufacturing facility for the releasing Product Engineering Office and Ford SQA or its representatives to review on request.

VIII. INSTRUCTIONS AND NOTES

All switches are to be identified with the Ford part number, supplier identification, and a date code indicating final assembly.

All test equipment and test procedures for testing to this specification must be approved by the releasing Product Engineering Office and no change in equipment or procedure may be made without their written concurrence.

Test part configuration is shown in Figure 3.

O-rings, if used in the design, shall be free from cuts, nicks, abrasions or any other damage which would result in a fluid leak.

All switches must have a shipping cap installed over the port threads to prevent contamination. All shipping caps must be approved by the releasing Product Engineering Office prior to production incorporation.

All switches that do not pass the calibration test are to either be readjusted and rechecked, or scrapped. (Salvage of component parts permitted with 100% reinspection).

If product nonconformance occurs for test Sections III. B, C, D, E, F, and J, production shall be stopped and the problems corrected. All production lots shall be sorted 100% prior to shipment. Suspected nonconformance of any shipped parts shall be reported immediately to the releasing Product Engineering Office.

If nonconformance of the statistical acceptance criteria occurs for test Sections III. G, H, I, K, L and M, a cause to recall the subject weeks production and to stop production may result.

PAGE 14 OF 18		REVISED		▽ E8-72VC-9F924-AA HEADER

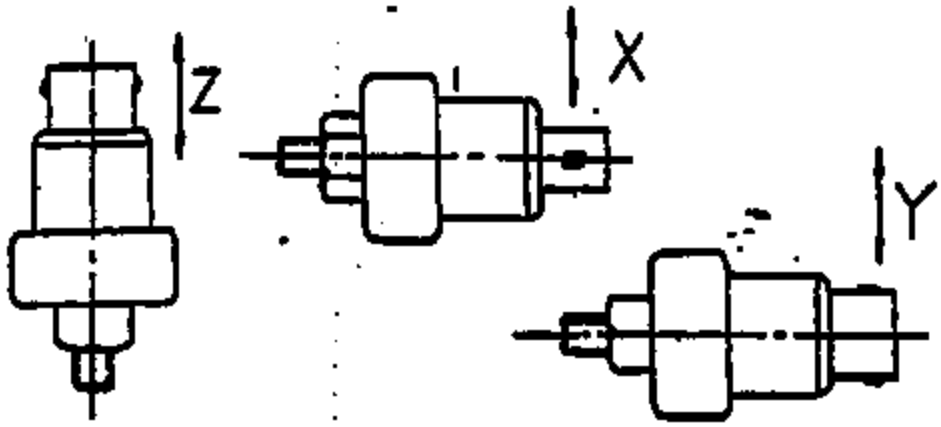
12. COMPILATION OF REFERENCE DOCUMENTS

ASTM A-117, Salt Spray Testing

Ford Q-101, Quality System Standard - 1990 Edition

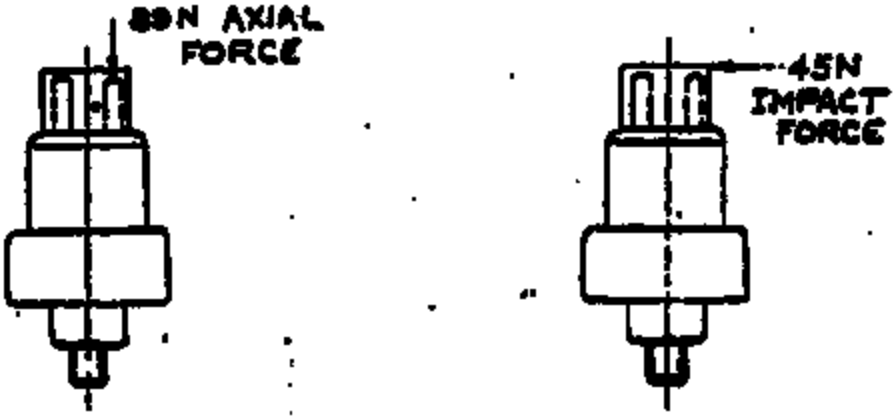
ES-F0ZB-1AA464-AA, Specification - ELF Assy - Wire Connector

ES-F2YF-9C735-AA, Specification - Servo Assembly Speed Control



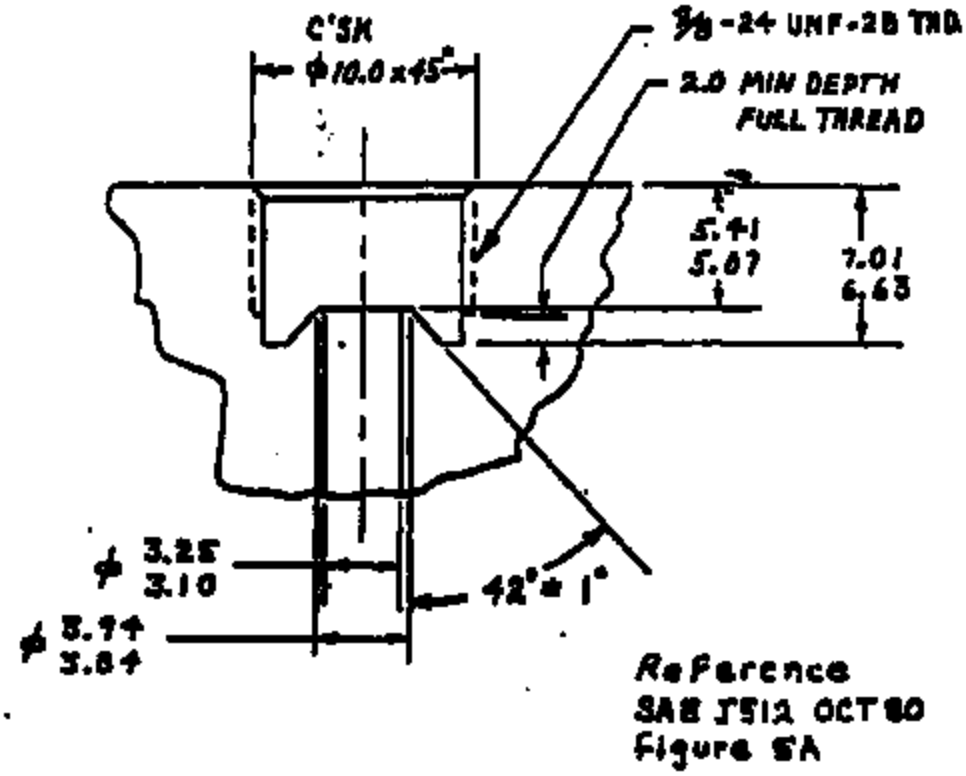
VIBRATION TEST - SWITCH ORIENTATION

- FIGURE 1.



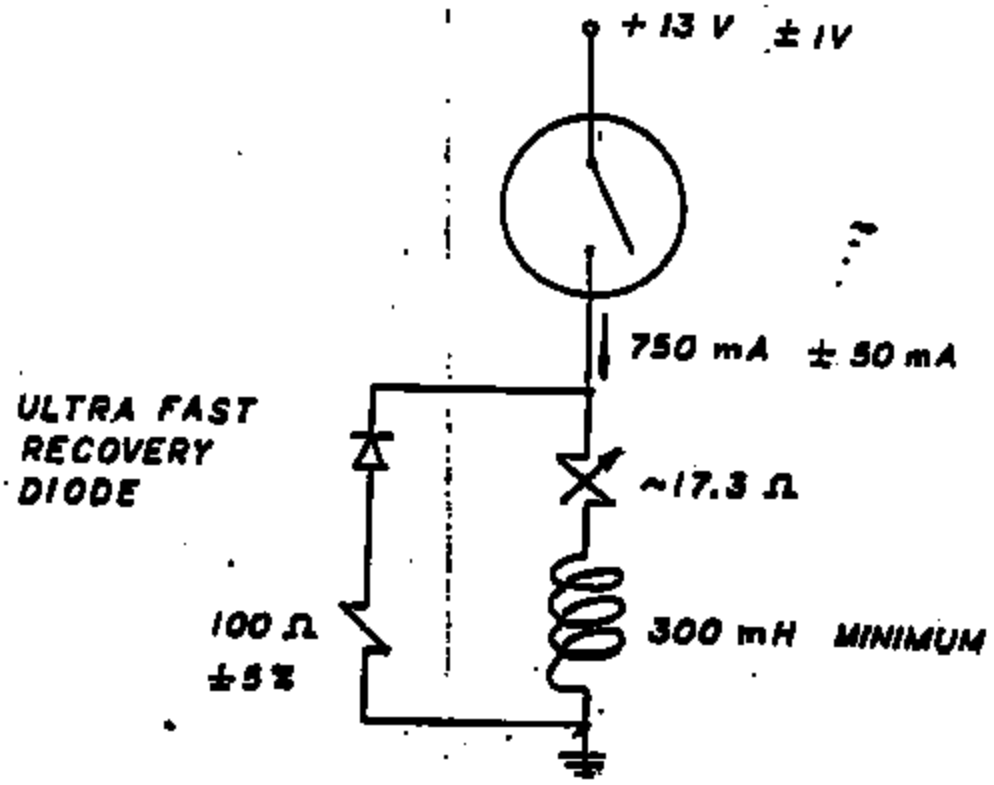
TERMINAL STRENGTH - LOAD ORIENTATION

FIGURE 2.



TEST FIXTURE PORT CONFIGURATION

FIGURE 3



DEACTIVATE SWITCH
TEST SET UP

FIGURE 4

DATE	REV	CHANGE	ECN
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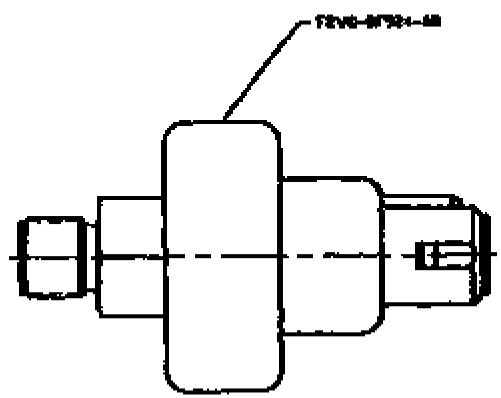
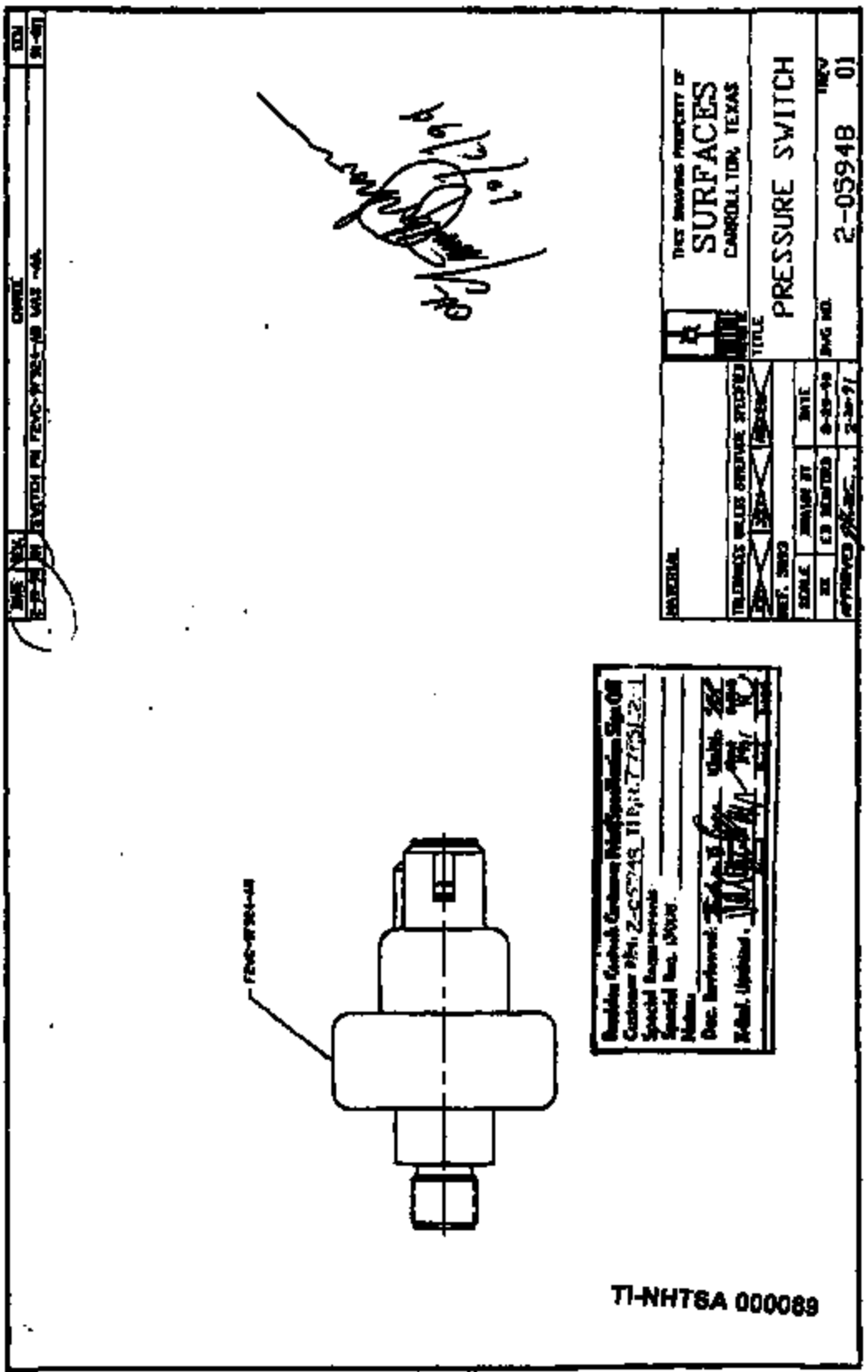


[illegible] Customer Print/Specification Sign Off
Customer P/N: Z-05948 TI P/N: 77PSL2-1
Special Requirements:
Special Req. Users:
Notes:
Doc. Reviewed:
X-Ref. Updated:

MATERIAL	THIS DRAWING PROPERTY OF SURFACES CARROLLTON, TEXAS
TOLERANCES UNLESS OTHERWISE SPECIFIED [illegible]	TITLE PRESSURE SWITCH
REF. DWG [illegible]	
SCALE [illegible] · DRAWN BY [illegible] · DATE [illegible]	DWG NO. 2-05948 · REV 01
APPROVED [illegible] · 2-[illegible]-91	


THIS DRAWING PROPERTY OF
SURFACES
CARROLLTON, TEXAS
PRESSURE SWITCH
2-05948
01
TOLERANCES UNLESS OTHERWISE SPECIFIED
MATERIAL
TI-NHTSA 000089

Engineering Specification 17

PART NAME	PART NUMBER
[redacted]	[redacted]

DATE	LET	FR	REVISIONS	DR	CK
			ADDED DATA TO COMPLETE		
			SPEC. & RETYPED		
901130			NCUIN100797179202		[illegible]

REFERENCE

PREPARED/APPROVED BY: B.B. Peron [illegible]

CHECKED BY

DETAILED BY

CONCURRENCE/APPROVAL SIGNATURES

DESIGN ENGINEERING SUPERVISOR: [signature]

DESIGN ENGINEERING MGT.

MANUFACTURING ENGRG.

QUALITY CONTROL: [signature]

PURCHASING

SUPPLIER QUALITY ASSISTANCE: [signature]

ELECTRONICS DIVISION: [signature]

▽ CONTROL ITEM — THE ▽ SYMBOL ALSO IDENTIFIES PRODUCT ENGINEERING DESIGNATED CRITICAL CHARACTERISTICS. THESE AND ADDITIONAL CRITICAL CHARACTERISTICS IDENTIFIED BY PROCESS REVIEW, MUST APPEAR ON DYNAMIC CONTROL PLANS WHICH REQUIRE PRODUCT ENGINEERING APPROVAL.

FRAME 1 OF 16 | REV | ▽ ES-F2TC-9F924-AA

PD 3947-a1 (Previous editions may NOT be used)

SWITCH ASSEMBLY - SPEED CONTROL, DEACTIVATE

I. General

This specification covers the test requirements for the speed control deactivate switch -9F924- [illegible]. Design changes on the switch assembly or its components shall not be made without compliance to Section V of this specification and written approval from the releasing Production Engineering Office.

This engineering specification is a supplement to the released drawing on the above part, and all requirements herein must be met in addition to all other requirements of the part drawing. Minimum measures necessary for demonstrating compliance to these requirements are given in each section.

The engineering tests, sample sizes, and test frequencies contained within this engineering specification reflect the minimum requirements established to provide a regular evaluation of conformance to design intent. The engineering test program is intended as a supplement to normal material inspections, dimensional checking and in-process controls, and should in no way adversely influence other inspection operations.

QA suppliers may implement different test sample sizes and frequencies providing these changes have been included in an Alternate Control Plan approved by the design responsible Product Engineering Office and concurred in by SQA.

II. PRODUCTION VALIDATION AND IN-PROCESS TESTS

- Production Validation (PV) Tests must be completed satisfactorily with parts from production tooling (and processes where possible) before ISIR approval and authorization for shipment of production parts can be effected. Parts must be revalidated completely, or per Section V whenever any change is made which could possibly affect part function or performance.

- In-Process Test Phase 1 (IP-1) - IP-1 tests are used to demonstrate process capability and must be completed using initial production parts from production tooling and processes prior to first production shipment approval. IP-1 tests are to continue in effect until process capability is demonstrated.

- In-Process Tests Phase 2 (IP-2) - IP-2 test program may be implemented only after process capability has been established. Tests must be completed with production parts on a continuing basis. Samples for these tests must be selected on a random basis to represent the entire production population as much as possible. In the event that any of the requirements in these tests is not met, the reaction plan specified in Ford Q101 Sect. 3.5, "Engineering Specification (ES) Test Performance Requirements" shall be invoked.

SECTION III. TABLE OF TESTS

Item	Test Name Functional Tests	PRODUCTION VALIDATION Minimum Sample Size	PRODUCTION VALIDATION Statistical Test Acceptance Criteria	IN-PROCESS IP-1 Minimum Sample Size	IN-PROCESS IP-1 Statistical Test Acceptance Criteria	IN-PROCESS IP-2 Minimum Sample Size	IN-PROCESS IP-2 Statistical Test Acceptance Criteria
III.							
▽ A	Calibration	72	P90-.96	100%	All Must Pass	100%	All Must Pass
B	Voltage Drop	72	P90-.96	12/Mo.	P90-.84	4/Lot	" " "
C	Current Leakage	72	P90-.96	3/Mo.	P90-.56	4/Lot	" " "
D	Proof Test	72	P90-.96	12/Mo.	P90-.84	4/Lot	" " "
F	Burst	6	P90-.72	3/Mo.	P90-.56	4/Lot	" " "
I	Vibration	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
J	Terminal Strength	12	P90-.84	4/Mo.	P90-.72	4/Lot	All Must Pass
K	Vacuum	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
L	Temperature Cycle	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
M	Fluid Resistance	36	P90-.94	36/12Mo	P90-.94	36/12Mo.	P90-.94

Durability Tests

Item	Test Name	PV Minimum Sample Size	PV Statistical Test Acceptance Criteria	IP-1 Minimum Sample Size	IP-1 Statistical Test Acceptance Criteria	IP-2 Minimum Sample Size	IP-2 Statistical Test Acceptance Criteria
III.							
E	Impulse	24	P90-.90	12/Mo.	P90-.84	3/3 Mo.	P90-.56
G	Humidity	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
H	Salt Spray	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72

n=22

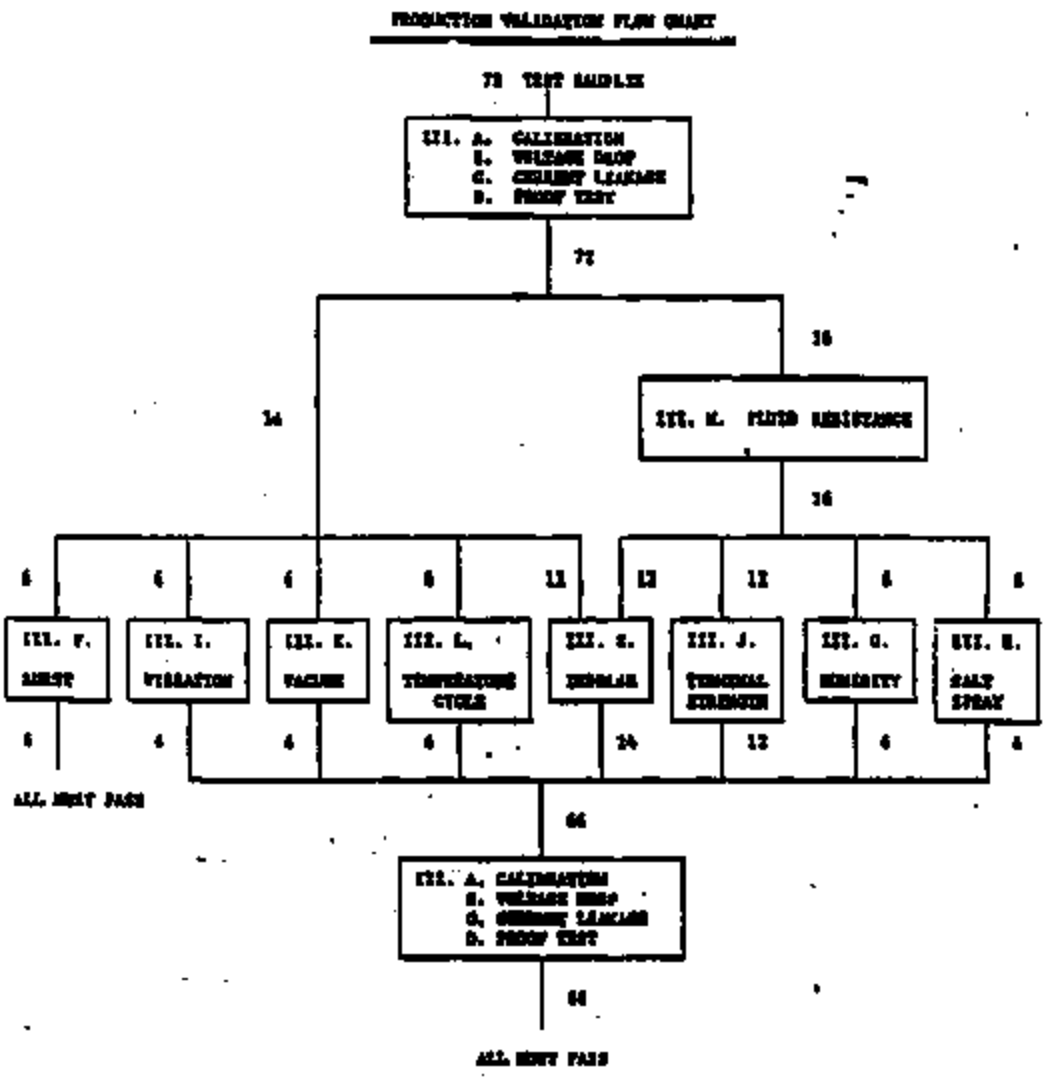
n=4

$$n = \frac{\ln(1-\text{conf})}{\ln(R)}$$

Reliability of 56% at a confidence of 90%

n = 4

Engineering Specification



FRAME 4 OF 16	REVISED		NUMBER

PD 3947-a2

III. TEST PROCEDURES AND REQUIREMENTS

▽ A. Calibration

1. Test Requirements

a. Switch calibration is to be checked at room temperature (16°C-35°C) using ambient air or equivalent.

b. Calibration settings shall be specified on the part drawing with the settings checked after 2 or more pressure cycles with ambient air, or equivalent. Pressure cycle range is to be determined by the manufacturer to insure switch calibration stability. The cut-in and differential set points are to be measured while conducting 750 ± 30 milliamperes while 13.0 ± 1.0 volts D.C. is applied. The cut-in point is to be checked with increasing pressure.

c. The cut-out point is to be checked with decreasing pressure, and the differential set point is to be calculated using the cut-in pressure minus the cut-out pressure.

2. Nonconformance Requirements

a. Nonconformance is defined as any switch point which falls outside the tolerance band specified on the part drawing.

B. Voltage Drop

1. Test Requirements

a. Voltage drop is to be measured after 2 or more cycles with ambient air or equivalent from 0 to 10,000 ± 172 KPa (1450 ± 25 PSI) while conducting 750 ± 30 milliamps and 13.0 ± 1.0 volts D.C. is applied to the switch. Under these conditions with the switch closed the voltage drop is to be measured. Millivolt connection interface to terminals to be less than 10 millivolts.

2. Nonconformance Requirements

a. Nonconformance is defined as a voltage drop in excess of 200 millivolts. (.27fL)

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

C. Current Leakage

1. Test Requirements

a. Current leakage is to be checked with 500 volts, 60 Hz alternating current.

b. Current leakage is to be checked:

(1) Between the switch leads with the contacts open.
(2) Between the lead and the switch housing with contacts closed.
(3) Between either lead and switch housing with the contacts open.

2. Acceptance Requirements

a. Nonconformance is defined as any leakage current in excess of one hundred (100) microamperes.

D. Proof Test

1. Test Requirements

a. Subject sample switches to Section A to establish their initial switching pressures.

b. Proof test is to be conducted using brake fluid or equivalent as the pressure medium. Test pressure shall be as specified on the part drawing. Test pressure shall be isolated from pressure source and held for not less than 30 seconds. ~3000 psig 4000 psig Pass Car Truck

c. Recheck the switches to Section A.

2. Acceptance Requirements

a. No evidence of fluid leakage, seepage, or drop in test pressure greater than 430 KPa.(62 PSI) is permitted.

b. A change in cut-in and cut-out pressures greater than ± 5% from the initial value is not permitted.

c. The test samples must be destroyed after testing.

III. <u>TEST PROCEDURES AND REQUIREMENTS</u> (cont'd)

E. <u>Impulse</u>

1. <u>Test Requirements</u>

a. Test the switch for a total of 500,000 cycles. Cycle pressure between (low) 0-276 KPa (0-40 psi) and (high) 10,000 ± 345 KPa (1450 ± 50 psi).

1) 0 - 475,00 cycles: 13 ± 1 volts, trace current to monitor function.

2) 475,001 - 500,000 cycles: 13 ± 1 volts D.C., 750 ± 50 ma., per figure 4.

b. Brake fluid temperature to be 135 ± 14°C and ambient temperature to be 107°C min.

c. Cycle rate is to be 110-120 cycles per minute.

d. Switch must open and close each cycle.

2. <u>Acceptance Requirements</u>

a. After impulse test check to sections A, B, C, & D using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, & D.

c. Samples used for this test must be destroyed after all testing is completed.

F. <u>Burst</u>

1. <u>Test Requirements</u>

a. Burst strength is to be checked using brake fluid or equivalent as the pressure medium.

b. Pressurize the switch to 48.3 MPa (7000 PSI) minimum and hold for 30 seconds minimum.

2. <u>Acceptance Requirements</u>

a. Nonconformance is defined as any evidence of fluid leakage or seepage from the switch or threads. Samples used for this test must be destroyed after testing is completed.

G. Humidity

1. Test Requirements

a. Mount the switch in the test port in a humidity chamber. Currently released mating electrical connector must be installed before start of test.

b. Subject the switch to ten (10) continuous humidity cycles as follows:

(1) Raise temperature to 65 +10/-2 °C over 2.5 hours; at 90-98% relative humidity.

(2) Hold 3 hours at 65 +10/-2 °C at 90-98% relative humidity.

(3) Lower temperature to 25 +10/-2 °C over 2.5 hours; at 80-98% relative humidity.

2. Acceptance Requirements

a. Within 15 minutes after completion of the tenth humidity cycle check the switch to sections A, B, C, D, using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D.

H. Salt Spray

1. Test Requirements

a. Mount the switch in the test port in a salt spray chamber. The currently released mating electrical connector and wiring must be installed prior to start of test.

b. Expose the switch assembly to 72 hours of salt spray per ASTM B-117.

2. Acceptance Requirements

a. After exposure, check the switch to sections A, B, C, D, using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

I. Vibration

1. Test Requirements

a. Mount the switch in the case part and attach the currently released mating electrical connector before start of test.

b. Switches are to be vibrated in all 3 planes with electrical continuity being monitored during the entire test. See Figure 1 for switch orientation in the 3 planes. Vibration tests are to be conducted at room temperature using brake fluid, ambient air, or equivalent as the pressure medium.

c. Internal pressure shall be maintained at 0 KPa G, when the switch is in the closed position and 1.1 times max actuation pressure shown on print when the switch is in the open position.

d. Vibrate the switch at 1.5 mm displacement (peak-to-peak) while varying the frequency uniformly from 5 to 50 to 5 Hz over a 5 minute period.

e. Vibrate the switch in alternate one-hour periods in the open and closed positions for a total of 8 hours in each plane. (Total test time is 24 hours).

2. Appearance Requirements

a. After the entire vibration sequence check the switches to sections A, B, C, or D using the procedure established in each section.

b. Nonconformance is defined as any evidence of leakage or any change in electrical continuity/discontinuity during the vibration cycles, or any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

J. Terminal Strength

1. Test Requirements

a. Mount the switch in the test port.

(1) Apply a 89 ± 9 N axial force to each terminal.

(2) With a pendulum apply a 43 ± 3 N impact force to the switch housing at the connector end, perpendicular to the centerline axis of the switch. See Figure 2 for force application point and direction.

2. Acceptance Requirements

a. Check the switch to sections A, B, C, and D using the procedures established in each section.

b. Nonconformance is defined as any terminal or housing fracture, or any switch not meeting the criteria in sections A, B, C, or D.

K. Vacuum

1. Test Requirements

a. Mount the switch in the test port. Vacuum tests are to be conducted at room temperature using ambient air as the pressure medium.

b. Subject the switch to 5 cycles of vacuum from atmospheric pressure (760 mm Hg) to an absolute pressure of 3-4 mm Hg. Maintain the vacuum for a minimum of 60 seconds.

2. Acceptance Requirements

a. Check the switch to sections A, B, C, and D using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, and D.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

L. Temperature Cycle

1. Test Requirements

a. Mount switches in test ports; test to be run using currently released brake fluid.

b. Repeat the following procedure 25 times.

(1) Lower the switch and fluid temperature to at least -40°C.

(2) Cycle the switches ten times at 10 seconds/cycles. One cycle consists of a pressure variation from 0 - 276 KPa.G (0-40 psi) to 10,000 ± 345 KPa.G (1450 ± 50 PSI).
Note: Switch must open and close each cycle.

(3) Raise switch and fluid temperature to 38°C minimum.

(4) Repeat Step 2.

c. At completion of Step b, check switches per sections A, B, C, and D.

2. Acceptance Requirements

a. Nonconformance is defined as any evidence of switch fluid leakage, seepage, or not meeting the criteria of sections A, B, C, and D.

M. Fluid Resistance

1. Test Requirements

a. Mount the switch in the test port and orient as installed in the vehicle.

b. Install the currently released mating electrical connector (with wire leads) to the switch.

c. Sequentially, immerse the switch into each of the specified fluids, at a temperature of 23 ± 2 °C, for 5 ± 1 second. Remove the switch and drain and store the switch for the specified time at room temperature, prior to immersing into the next fluid.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

Fluid	Drain Time	Storage Time
Reference Fuel C ASTM D471	60 ± 5 min.	none
10W40 Engine Oil	24 ± 1 hour	14 days
Ethylene Glycol/ Water 50/50 by Volume	24 ± 1 hour	24 ± 1 hour
Brake Fluid DOT 3	24 ± 1 hour	48 ± 1 hour
Automatic Transmission/ Power Steering Fluid (same) ESP-M2C138-CJ	24 ± 1 hour	14 days
Isopropyl Alcohol/ Water 50/50 by Volume	24 ± 1 hour	none
Reference Fuel C, ASTM D471 with Methyl Alcohol 85/15 by Volume	24 ± 1 hour	none

d. For the Flow Chart, subject the prescribed number of immersed switches to the post immersion tests specified below:

III. E. Impulse
III. G. Humidity
III. H. Salt Spray
III. J. Terminal Strength

Acceptance Requirements

a. Switches must fully meet the requirements of the specified post immersion test.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

IV. STATISTICAL ANALYSIS METHODS

A. Per PV, IP-1 and IP-2 tests, all samples tested must pass. Having [redacted] the required sample [redacted] at a given confidence C, the reported PG-X is interpreted as minimum reliability equal to R, at a confidence C; thus PG-.80 means a minimum reliability of 80% at 90% confidence.

B. All samples must pass in the statistical test acceptance criteria stated for tests with 100% frequency; or samples from lots, which could have a variable size.

V. REVALIDATION REQUIREMENTS

A. No change in design, material, process or component supplier shall be made without prior approval from the releasing Product Engineering Office. As part of approving a change, the releasing Product Engineering Office will establish the portion of the Product Validation tests required to be run to revalidate the switch. The following table is to be used as a guide in determining the type of tests required for revalidation requirements.

RUNNING CHANGE REVALIDATION

Component	Process or Material Change or New Supplier
1. Terminals, Contacts, or Connector	III, B, C, E, G, H, I, J, L, M.
2. Case or Housing	All Tests
3. Disc or Diaphragm	III, A, B, E, F, I, K, L.
4. Fitting or Fluid Connection	III, B, E, F, H, I, M.

5. Annual revalidation is not required on carryover switches.

VI. LOT DEFINITION

A lot is defined as no more than eight (8) hours of production up to 4,000 pieces. If shifts extend beyond eight (8) hours, or more than 4,000 pieces are produced in a shift, the product must be separated into at least two lots.

VII. RECORD RETENTION

A. Recording and record retention shall conform with Ford Q-101.

B. Production Validation test results and analysis are to be forwarded to the releasing Product Engineering Office before approval for shipment of production parts can be granted.

C. In-Process test results shall be available at the supplier's manufacturing facility for the releasing Product Engineering Office and Ford SQA or its representatives to review on request.

VIII. INSTRUCTIONS AND NOTES

All switches are to be identified with the Ford part number, supplier identification, and a date code indicating final assembly.

All test equipment and test procedures for testing to this specification must be approved by the releasing Product Engineering Office and no change in equipment or procedure may be made without their written concurrence.

Test part configuration is shown in Figure 3.

O-rings, if used in the design, shall be free from cuts, nicks, abrasions or any other damage which would result in a fluid leak.

All switches must have a shipping cap installed over the part threads to prevent contamination. All shipping caps must be approved by the releasing Product Engineering Office prior to production incorporation.

All switches that do not pass the calibration test are to either be readjusted and rechecked, or scrapped. (Salvage of component parts permitted with 100% reinspection).

If product nonconformance occurs for test Sections III. B, C, D, E, F, and J, production shall be stopped and the problem corrected. All production lots shall be sorted 100% prior to shipment. Suspected nonconformance of any shipped parts shall be reported immediately to the releasing Product Engineering Office.

If nonconformance of the statistical acceptance criteria occurs for test Sections III. G, H, I, K, L and M, a cause to recall the subject works production and to stop production may result.

FRAME	OF	REVISED		NUMBER
14	18			▽ ES-F3VC-9F924-AA

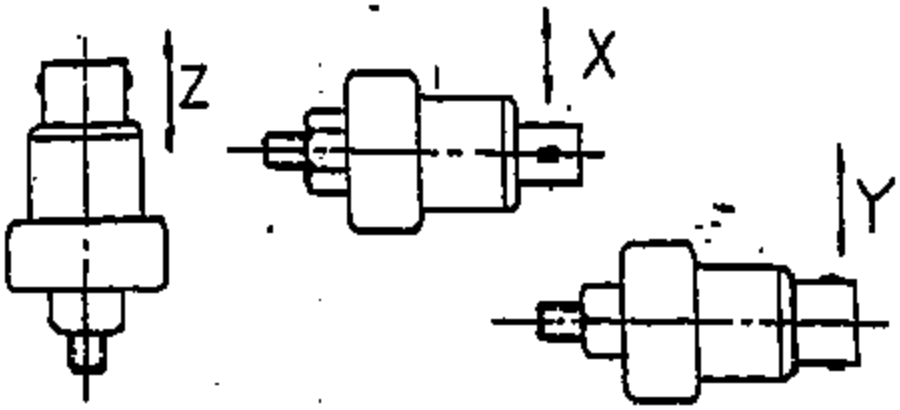
IX. COMPILATION OF REFERENCE DOCUMENTS

ASTM B-117, Salt Spray Testing

Ford Q-101, Quality System Standard - 1990 Edition

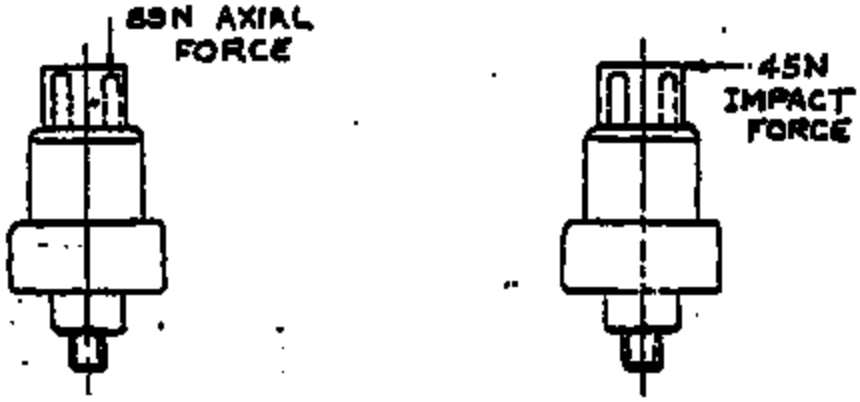
ES-F0ES-14A464-AA, Specification - SLP Assy - Wire Connector

ES-F2VF-9C735-AA, Specification - Servo Assembly Speed Control



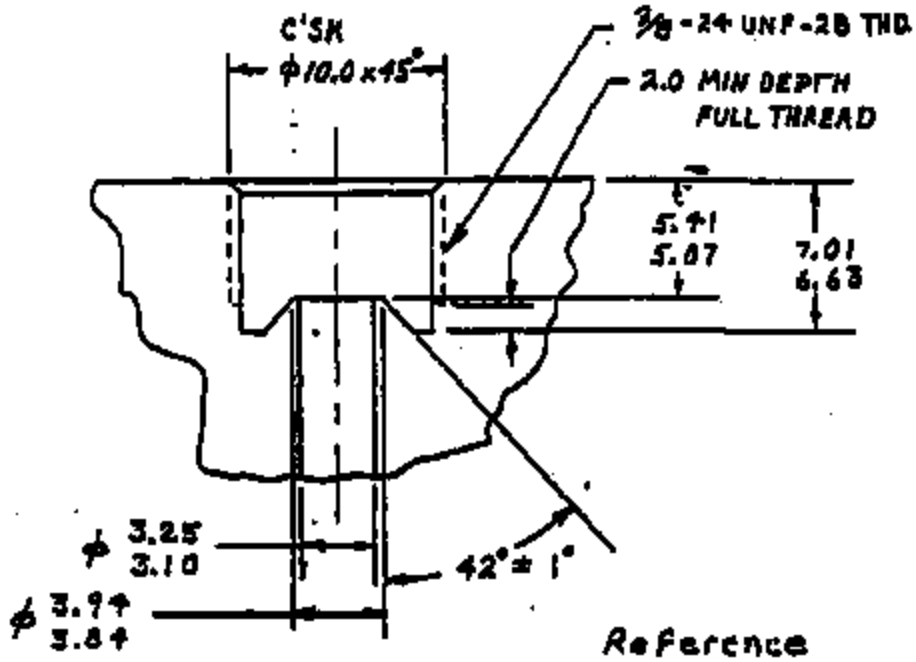
VIBRATION TEST - SWITCH ORIENTATION

FIGURE 1.



TERMINAL STRENGTH - LOAD ORIENTATION

FIGURE 2.

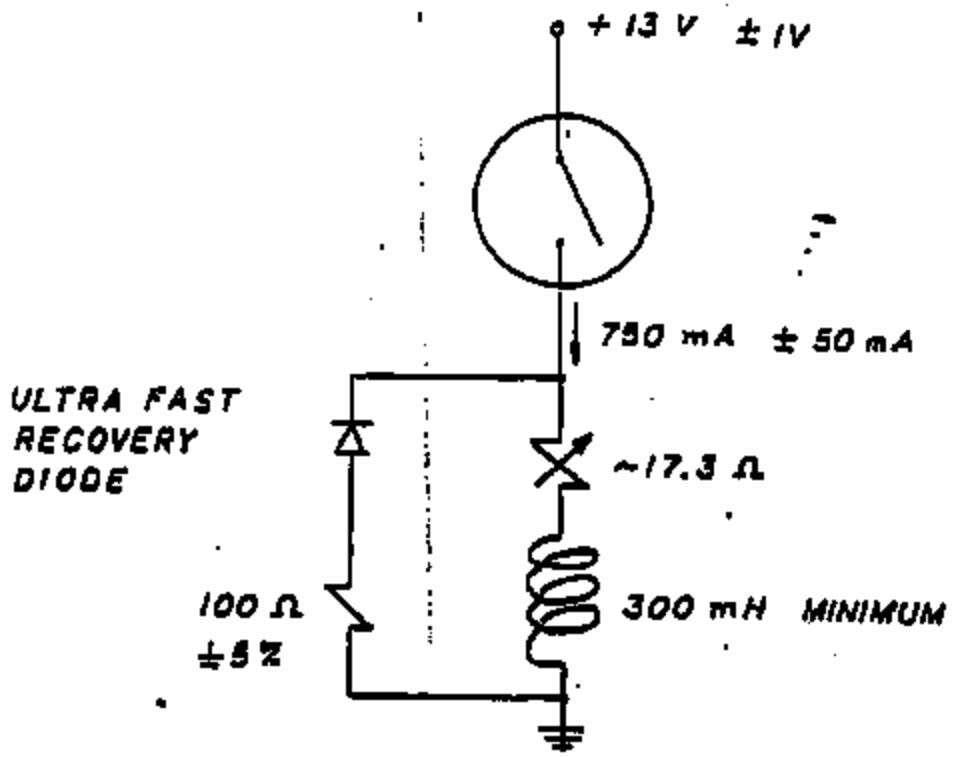


TEST FIXTURE PORT CONFIGURATION

FIGURE 3

FRAME 17 OF 18	REVISED		▽ 92-F290-97934-AA NUMBER

PD 3947-82



DEACTIVATE SWITCH
TEST SET UP

FIGURE 4

CONFIDENTIAL

FORD PART NO. ▽F2VC-9F924-AA (A2)

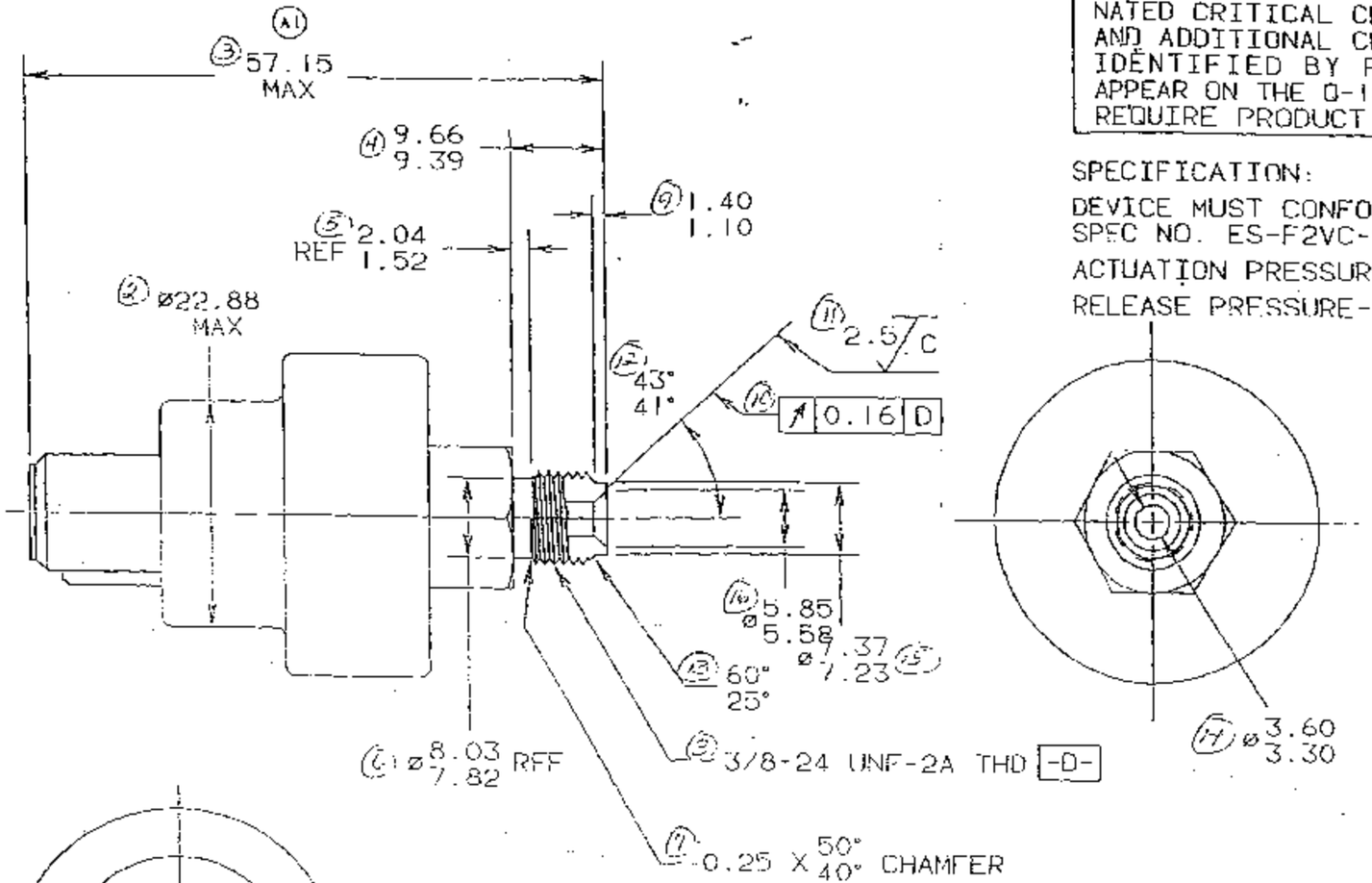
(A4) (A5) ▽ CONTROL ITEM - THE ▽ SYMBOL ALSO IDENTIFIES PRODUCT ENGINEERING DESIGNATED CRITICAL CHARACTERISTICS. THESE, AND ADDITIONAL CRITICAL CHARACTERISTICS IDENTIFIED BY PROCESS REVIEWS, MUST APPEAR ON THE Q-101 CONTROL PLAN(S) WHICH REQUIRE PRODUCT ENGINEERING APPROVAL.

SPECIFICATION:

DEVICE MUST CONFORM TO FORD MOTOR CO.
SPEC NO. ES-F2VC-9F924-A

ACTUATION PRESSURE---- 862 ±241 kPag (125 ±35 psig).

RELEASE PRESSURE------ 138 kPag MIN. (20 psig)



		A5	ADDED CONTROL ITEM BLOCK	9-5-91	CB	JT
		A4	REMOVED "FOR FINAL ASSY SEE..."	9-5-91	CB	JT
		A3	WAS 57PSL5-3	9-5-91	CB	JT
		A2	WAS F2VC-9F924-BA	9-5-91	CB	JT
8438	25136	A1	WAS 62.23 MAX DIM	9-5-91	CB	JT
8438	301		RELEASED	1-11-91		
EPA/NTR	DRO/ECN	CHG	REVISION	DATE	DR.	CK.

UNLESS OTHERWISE SPECIFIED
PART TOLERANCES
± ONE PLACE DECIMAL
± TWO PLACE DECIMAL
± CASTING
± ANGULAR

MATERIAL/FINISH

SEE DWG. INTERPRETATION SPEC. P.S. D93D00

SCALE 2 X SIZE
DO NOT SCALE PRINT

3RD ANGLE PROJECTION

PART DESCRIPTOR

METRIC

KELSEY-HAYES

ASSY-PRESSURE SWITCH

DR R.KENWORTHY DATE 12-15-90
CK D.WIREMAN DATE 1-3-91

IBM

CAD DRAWING "ORIGINAL" TS ELECTRONIC

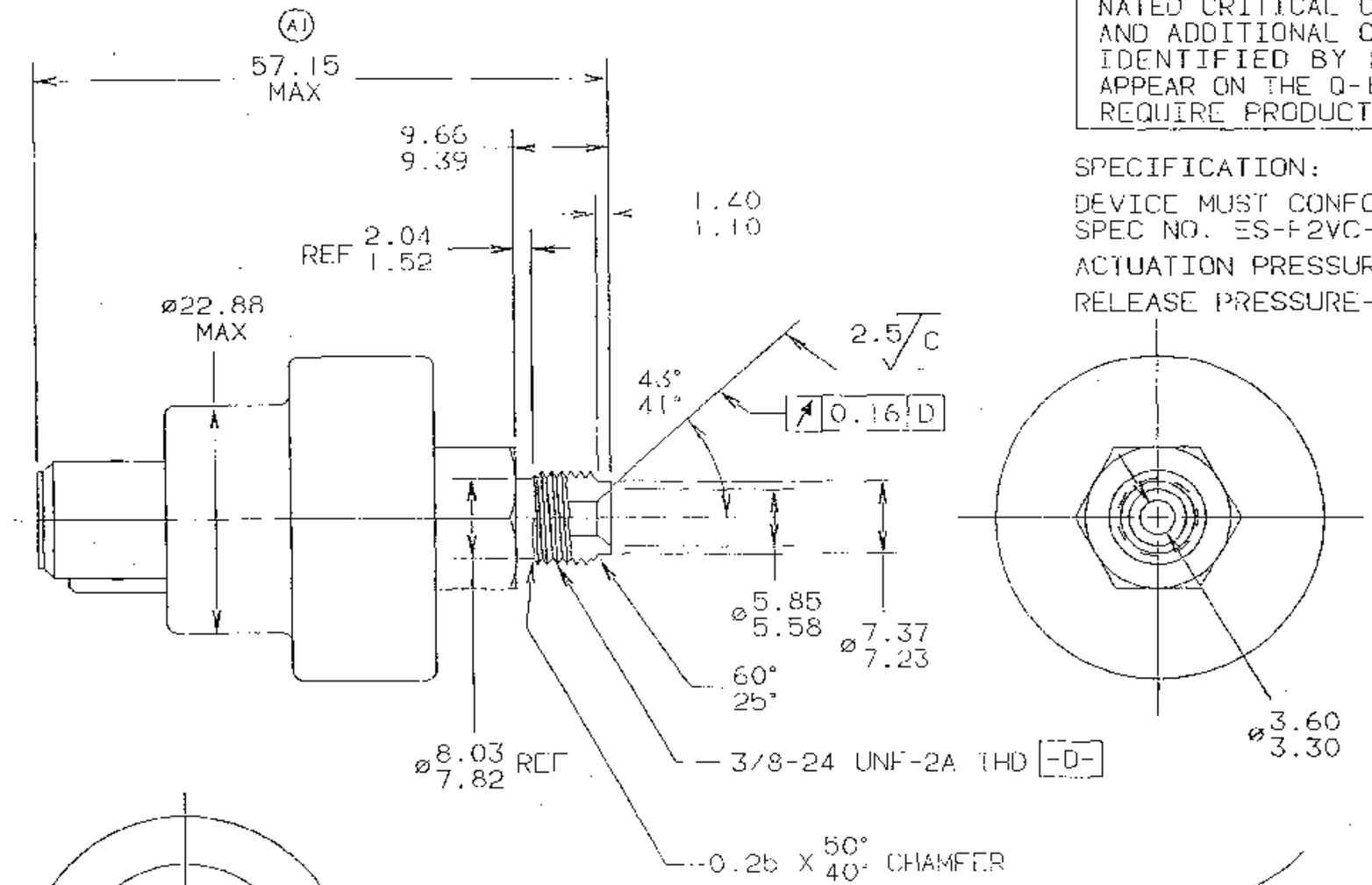
(A4) (A5) ▽ CONTROL ITEM - THE ▽ SYMBOL ALSO IDENTIFIES PRODUCT ENGINEERING DESIGNATED CRITICAL CHARACTERISTICS. THESE, AND ADDITIONAL CRITICAL CHARACTERISTICS IDENTIFIED BY PROCESS REVIEWS, MUST APPEAR ON THE Q-101 CONTROL PLAN(S) WHICH REQUIRE PRODUCT ENGINEERING APPROVAL.

SPECIFICATION:

DEVICE MUST CONFORM TO FORD MOTOR CO.
SPEC NO. ES-F2VC-9F924-A

ACTUATION PRESSURE---- 862 ±241 kPag (125 ±35 psig)

RELEASE PRESSURE----- 138 kPag MIN. (20 psig)



	25519	B1	WAS ▽F2VC-9F924-AA	2-2 92	RK	DW
		A5	ADDED CONTROL ITEM BLOCK	9-5-91	CB	JT
		A4	REMOVED "FOR FINAL ASSY SCE..."	9-5-91	CB	JT
		A3	~~WAS ▽F2VC-9F924-A~~	9-5-91	CB	JT
		A2	WAS F2VC-9F924-BA	9-5-91	CB	JT
8438	25136	A1	~~WAS 62.23 MAX DIM~~	9-5-91	CB	JT
8438	301		RELEASED	1-11-91		
EPA/NIR	DRD/ECN	CHG	REVISION	DATE	DR.	CK.

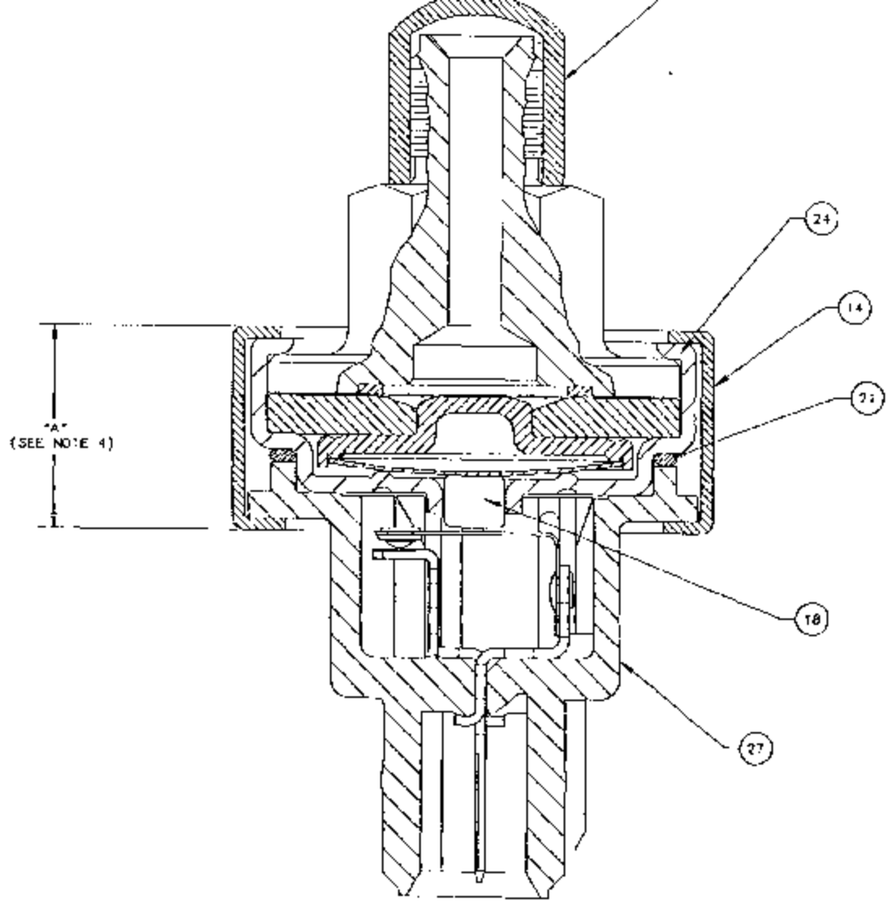
UNLESS OTHERWISE SPECIFIED: PART TOLERANCES	MATERIAL/FINISH
± ONE PLACE DECIMAL	
± TWO PLACE DECIMAL	
± CASTING	
+ ANGULAR	
SEE DWG INTERPRETATION SPEC. P.S. 093000	3RD ANGLE PROJECTION
SCALE 2 X SIZE DO NOT SCALE PRINT	
PART DESCRIPTOR	

METRIC

KELSEY-HAYES

ASSY-PRESSURE SWITCH

TI-NHTSA 000109



NOTES:

1. DEVICES TO BE CRIMPED PER APPROVED MANUFACTURING PROCESS.
2. CRIMP RING (ITEM 14) TO BE FREE OF DENTS, NICKS, SCRATCHES, AND OTHER DEFORMITIES AFTER CRIMPING.
3. O.D. OF CRIMP RING (ITEM 14) TO BE 1.265 / 1.215 AFTER CRIMPING
4. "A" DIMENSION ON FINISHED ASM. MUST BE .560 MAX.
5. ASSEMBLY MUST WITHSTAND 80 - 10 IN. LB TORQUE APPLIED BETWEEN HEX AND BASE ASM.
6. FUNCTIONAL TESTS MUST BE CARRIED OUT PER PROCESS SPEC. AND MUST CONFORM TO Q.C. REQUIREMENTS.
7. CRIMP RING MUST BE CODED WITH CUSTOMER PART NO. PER 13996-2.

CERTIFIED PRINT
Parts Made To This Print Must Conform To
ENG. STD. E9898 REV. E
Date APR 2 2 1992

NEITHER THIS PRINT NOR THE INFORMATION CONTAINED HEREON IS TO BE USED AGAINST THE INTEREST OF TEXAS INSTRUMENTS INCORPORATED OR AGAINST THE INTERESTS OF ANY OF ITS AFFILIATED COMPANIES OR WHOLLY OWNED SUBSIDIARIES.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	BY DEAN STAPLES	DATE 9-24-91	TEXAS INSTRUMENTS ATTLEBORO, MASSACHUSETTS 02703	KLIXON CONTROL PRODUCTS Dearborn
TOLERANCE ON FRACTIONS DECIMALS ANGLES	CH.		TITLE FINAL ASM. (N.C.)	
	ENG.			
MATERIAL			SIZE CODE IDENT NO.	
	APPROVED			

		Start Date	Finish Date
1	OBTAIN U.L. DIFF. DISCS	4/ 6/92	4/ 7/92
2			
3	PILOT BUILDS	4/ 6/92	4/13/92
4			
5	IMPULSE TEST	4/ 8/92	4/13/92
6			
7	SUBMIT DETAIL PRINT	4/ 6/92	4/ 7/92
8			
9	PROD. COST/TOOL EST.	4/ 8/92	4/ 8/92
10			
11	OBTAIN BASE MATERIAL	4/ 8/92	4/ 8/92
12			
13	START OF PRODUCTION	4/13/92	4/13/92
14			
15	SUBMIT VAL. TEST PLAN	4/ 8/92	4/ 9/92
16			
17	PARTIAL ISIR	4/13/92	5/ 1/92
18			
19	FULL ISIR	4/13/92	5/22/92

Noncritical ▨ Critical ■
Slack Milestone ■
Project: EN53 Date: Apr 8, 1992 10:55 AM

SILENT SWITCH
PROGRAM SCHEDULE
EN53

TI-NHTSA 000111

ALERT DETAIL

PRINT DATE/TIME: 92/04/14 15:27
PAGE: 1

ALERT NUMBER
A10207445

ORIGIN ACTIVITY: HC00 CHASSIS PED (IDEG)
ORIGINATOR: SIMMONS, J.L.
CPSC:

TYPE: (U) USE PPH
DATE: 92/04/10
PHONE: 52-37976
NOTICE NO:

STATUS: A
LOCATION:
RESOLVING NOTICE:

ALERT DESC: TO ELIMINATE BRAKE PEDAL CLICK ON NON-ABS E#53 VEHICLES WITH SPEED CONTROL USE P1-F2AC-2C520-CB ADAPTER ASSEMBLY IN PLACE OF PN-F2AC-2E520-CB. THIS ALERT WILL ALSO COVER COSTS

PRODUCTS AFFECTED: CROWN VIC/GRAND MARQUIS - NON-ABS WITH ELECTRONIC SPEED CONTROL.

MODEL CODES: CV84 CVFP
PLANTS AFFECTED: HA22
MFG CONCERN CNTRL:
PROGRAM:
QTY:
EST INCRM VAR COST:
EST INCRM FXD COST:
UNIT MEASURE:
SUPP DOCS:

MODEL YEAR: 92

ENG CONCERN CNTRL:
EFFECTIVE IN:
EMISSION CODE: 000
TIME:
EST INCRM TOOL COST:
EST INCRM FAC COST:
APPEARANCE:

INVALID:
OUT:
DISP:
EST INCRM LOR COST:
UT EFFECT:

---------- AFFECTED PARTS ----------

AFF PART NO:
CPSC:
ACT:
ENTER:

AFF PART DESC:
NOTICE:
SUPPLY/LOCAL:
SUPPLIER:
AVAIL:

REL FOR:
FUNC DEAD:

---------- FURTHER DESCRIPTION/ALERT RESOLUTION/REASONS FOR REJECTION ETC. ----------

USERID: JLS1624
ALERT DESC:
ENGINEER AT ST THOMAS ASSEMBLY PLANT WHILE TRANSPORTING STOCK TO THE VENDOR FOR REWORK. ST THOMAS ASSEMBLY PLANT IS TO SHIP PN-F2AC-2C520-CB ASSEMBLIES TO THE SUPPLIER'S (CHAMA-HEATHERHEAD) AT THOMAS FACILITY WHERE THEY WILL BE REWORKED, CONTAINERS MARKED AS SUCH, AND RETURNED TO ST THOMAS ASSY PLANT. REWORKED PIECES AND P1 PIECES WILL BE IDENTIFIABLE AS SUCH BY THE CREAM/PALE COLOR OF THE SWITCH AS OPPOSED TO THE BROWN COLOR OF THE SWITCH ON THE CURRENT ASSEMBLIES.

ISIR TESTING OF THE SWITCH WILL BE LIMITED TO CALIBRATION, IMPULSE TESTING, AND A MODIFIED TERMINAL STRENGTH TEST IN ADDITION, MATERIAL CERTIFICATION AND DIMENSIONAL CERTIFI-

ACTIVITY: HC00 ENTRY DATE: 92/04/10

USERID: JLS1624
ALERT DESC:
CATION OF THE BASE WILL BE COMPLETED.

P1-F2AC-2C520-CB ASSEMBLIES NEED NOT BE ISIR TESTED. TESTS ON SWITCH ABOVE WILL SUFFICE.

JUDY SIMMONS 52-37976

ACTIVITY: HC00 ENTRY DATE: 92/04/10

-MORE-

TI-NHTSA 000112

ALERT DETAIL

PRINT DATE/TIME: 92/04/14 15:27
PAGE: 2

ALERT NUMBER: A10207465

ORIGIN ACTIVITY: MCRO CHASSIS PEO (LACK)
ORIGINATOR: SIMMONS, J.L.
EPSC:

TYPE: (N) NSE PPM
DATE: 92/04/10
PHONE: 32-37976
NOTICE NO:

STATUS: A
LOCATION:
RESOLVING NOTICE:

---------- FURTHER DESCRIPTION/ALERT RESOLUTION/REASON FOR REJECTION ETC. ----------

USERID: JLS1824 ACTIVITY: MC00 ENTRY DATE: 92/04/10
ALERT DESC:

USERID: BJN5348 ACTIVITY: MC00 ENTRY DATE: 92/04/10
ALERT DESC:
APPROVED BJN.

USERID: BJN5348 ACTIVITY: MC00 ENTRY DATE: 92/04/10
ALERT DESC:
FMVSS NOT AFFECTED.BJN

USERID: JLS1824 ACTIVITY: MC00 ENTRY DATE: 92/04/11
ALERT DESC:
THIS ALERT WILL REMAIN IN EFFECT UNTIL INCORPORATION OF
ENGINEERING CHANGE MCRO E 10206181 000.
J SIMMONS 32-37976

USERID: JLS1824 ACTIVITY: MC00 ENTRY DATE: 92/04/14
ALERT DESC:
CORRECTION TO ABOVE: PART NUMBERS WILL REMAIN IN AFFECT

USERID: JLS1824 ACTIVITY: MC00 ENTRY DATE: 92/04/14
ALERT DESC:
UNTIL MCRO E 10206181 000 IS IN EFFECT.
J SIMMONS 32-37976

---------- APPROVALS ----------

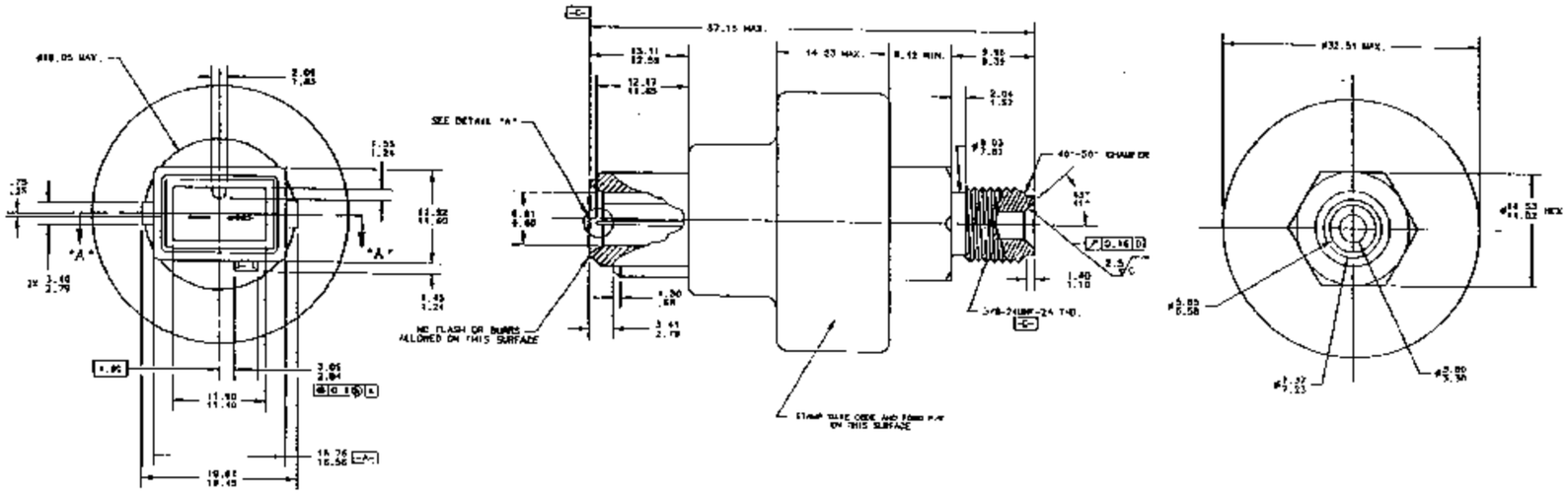
REGION	DEPARTMENT	USERID	ACTIVITY	APPROVER'S NAME	DATE APPROVED	APPROVAL
N	K8447	JLS1824	MC00	SIMMONS, J.L.	92/04/10	Y
N	K8443	LA20644	MC00	ZIEGLINSKI, L.A.	92/04/13	Y
N	K8447	BJN5348	MC00	HAEKOFF, B.J.	92/04/10	Y
N	K8440	9S00378	MC00	DEMARZIA, V.S. (DEPT	92/04/13	Y
N	K8500	GPC41462	MC00	CUMMINS, D.P. CHASSI	92/04/14	Y
N	K8413	AJTA189	MC00	TOMAS, A.J.	00/00/00	
N	K8413	MAIL	MC00	CHASSIS MAIL DATECEE	00/00/00	
N	K8411	PPMALERT	MC00	PPM GATEKEEPER-CHASS	92/04/14	N
N	K8447	JLS1824	MC00	SIMMONS, J.L.	92/04/10	
N	K8411	DLS1814	MC00	DUFFY	92/04/14	Y

-END-

TI-NHTSA 000113

DRAWINGS AVAILABLE UPON REQUEST

REVISIONS				
ZONE	LTR	DESCRIPTION	ENG'G. #3423	DATE	APPROVED
	D	SECTION A-A, CORRECTED TRUE-POSITION DATUM REF., ER-M98747, CJN		9-28-92	



SPECIFICATIONS AND NOTES

DEVICE MUST CONFORM TO FORD MOTOR CO SPEC. NO. V ES-F2VG-9F924-AA

ACTUATION PRESSURE ------ 862 +517/-241 kPag (125 +75/-35 psig)

RELEASE PRESSURE ------ 138 kPag MIN. (20 psig)

CONTACT ARRANGEMENT ---- SPST NORMALLY CLOSED, OPEN ON PRESSURE RISE

TERMINAL/O SEAL ------- ETHYLENE PROPYLENE

PROOF PRESSURE ------- 20.7 kPag (3000 psi)

PROTECTIVE COVER OR PLUGS REQUIRED FOR SHIPMENT.

DEVICE MUST ALLOW INSTALLATION OF MFA CONNECTOR P/N F2AB-14A424-ADA

▽ CONTROL ITEM - THE ▽ SYMBOL ALSO IDENTIFIES PRODUCT ENGINEERING DESIGNATED CRITICAL CHARACTERISTICS. THESE AND ADDITIONAL CRITICAL CHARACTERISTICS IDENTIFIED BY PROCESS REVIEWS, MUST APPEAR ON THE Q-101 CONTROL PLAN(S) WHICH REQUIRE PRODUCT ENGINEERING APPROVAL.

DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M-1982

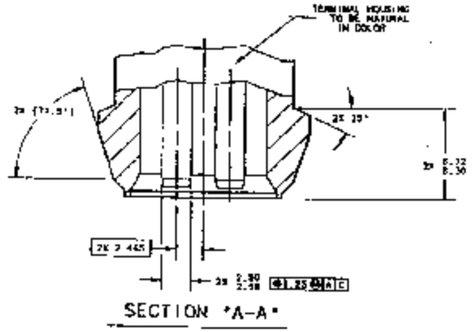
MANUFACTURER TO ESTABLISH PRODUCT ENGINEERING APPROVED CONTROL PLAN

CHANGE IN DESIGN COMPOSITION OR PROCESSING FROM THE PART PREVIOUSLY APPROVED FOR PRODUCTION REQUIRES PRIOR ENGINEERING APPROVAL

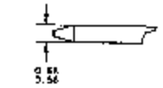
ENGINEERING APPROVAL OF A MINIMUM OF SIX SAMPLES FROM EACH SUPPLIER IS REQUIRED PRIOR TO FIRST SHIPMENT OF PARTS FOR INITIAL RELEASE AND ALL SUBSEQUENT CHANGE REQUESTS

MATERIAL MUST CONFORM TO ES-F17A-2L115 AA

CONFIDENTIAL



SECTION "A-A"



DETAIL "A"
TYP. 2-PL

MATL	DATE	REVISIONS/REL. NO.	CK	APP

PART MUST COMPLY WITH SPECIFICATION WSS-M99P9999-A1 TO HELP SAFEGUARD HEALTH, SAFETY AND THE ENVIRONMENT

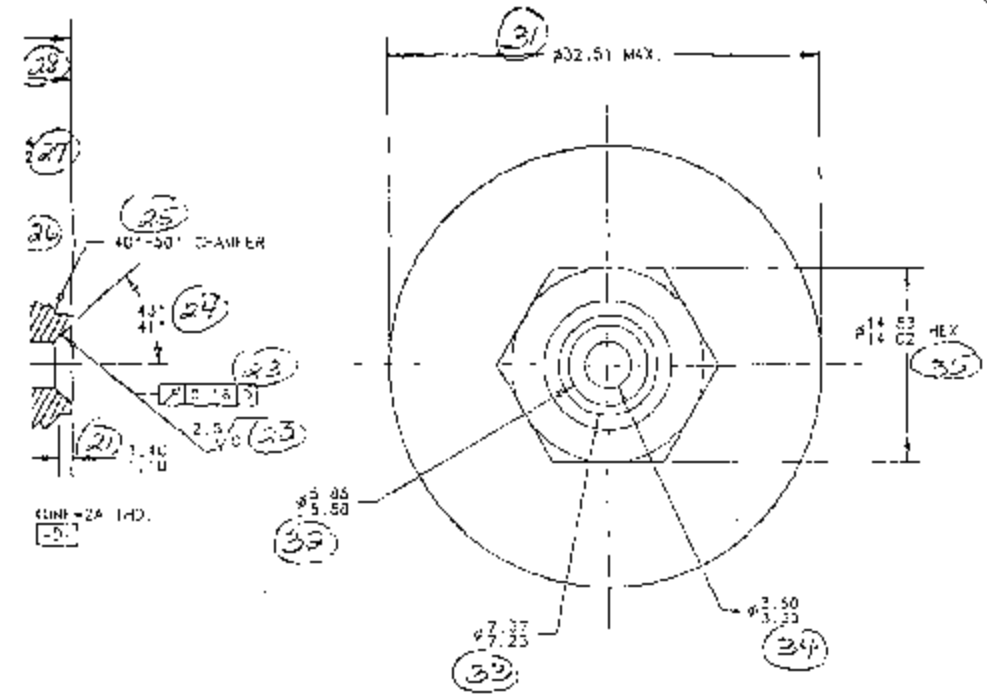
NAME

NO.

TI-NHTSA 000115

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	BY CHAS.FLEURANT	DATE 4-13-93	TEXAS INSTRUMENTS	SIZE B	132-2615
TOLERANCE ON	CK				

REVISIONS		
ZONE	LTR	DESCRIPTION
	G	NEW FORD TITLE BLOCK



(*42) SPECIFICATIONS AND NOTES

DEVICE MUST CONFORM TO FORD MOTOR CO. SPEC. NO. ▽

ACTUATION PRESSURE ------- 862 +517/-241 kPag (12

RELEASE PRESSURE --------- 138 kPag MIN. (20 psig

CONTACT ARRANGEMENT ------ SPST NORMALLY CLOSED,

HYDRAULIC SEAL ---------- ETHYLENE PROPYLENE

PROOF PRESSURE ---------- 20.7 MPa (3000 psi)

PROTECTIVE COVER ON THREADS REQUIRED FOR SHIPMENT

DEVICE MUST ALLOW INSTALLATION OF 1.1A CONNECTOR P

▽ CONTROL ITEM - THE ▽ SYME

IDENTIFIES PRODUCT ENGINEERING
NATED CRITICAL CHARACTERISTICS,
AND ADDITIONAL CRITICAL CHARACT
IDENTIFIED BY PROCESS REVIEW
APPEAR ON THE Q-101 CONTROL PLA
REQUIRE PRODUCT ENGINEERING APP

DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ANS. Y14.5M-1982

MANUFACTURER TO ESTABLISH PRODUCT ENGINEERING APPROVED CONTROL PLAN

CHANGE IN DESIGN COMPOSITION OR PROCESSING FROM THE PART PREVIOUSLY APPROVED FOR PRODUCTION REQUIRES PRIOR ENGINEERING APPROVAL

ENGINEERING APPROVAL OF A MINIMUM OF SIX SAMPLES FROM EACH SUPPLIER IS REQUIRED PRIOR TO FIRST SHIPMENT OF PARTS FOR INITIAL RELEASE AND AL... SUBSEQUENT CHANGE REQUESTS

MATERIAL MUST CONFORM TO ES-F17A-2L118-AA

MATL	DATE	REVISIONS/REL.

PART MUST COMPLY WITH SPECIFICA
TO HELP SAFEGUARD HEALTH, SAFETY

NAME

NO.

PRINT IS
CIFIED
O PURPOSE ONLY

10 1992

E THE INFORMATION CONTAIN
USED AGAINST THE INTEREST
VALENTS INCORPORATED
ST OF ANY OF ITS AFFILIATED
LY OWNED SUBSIDIARIES

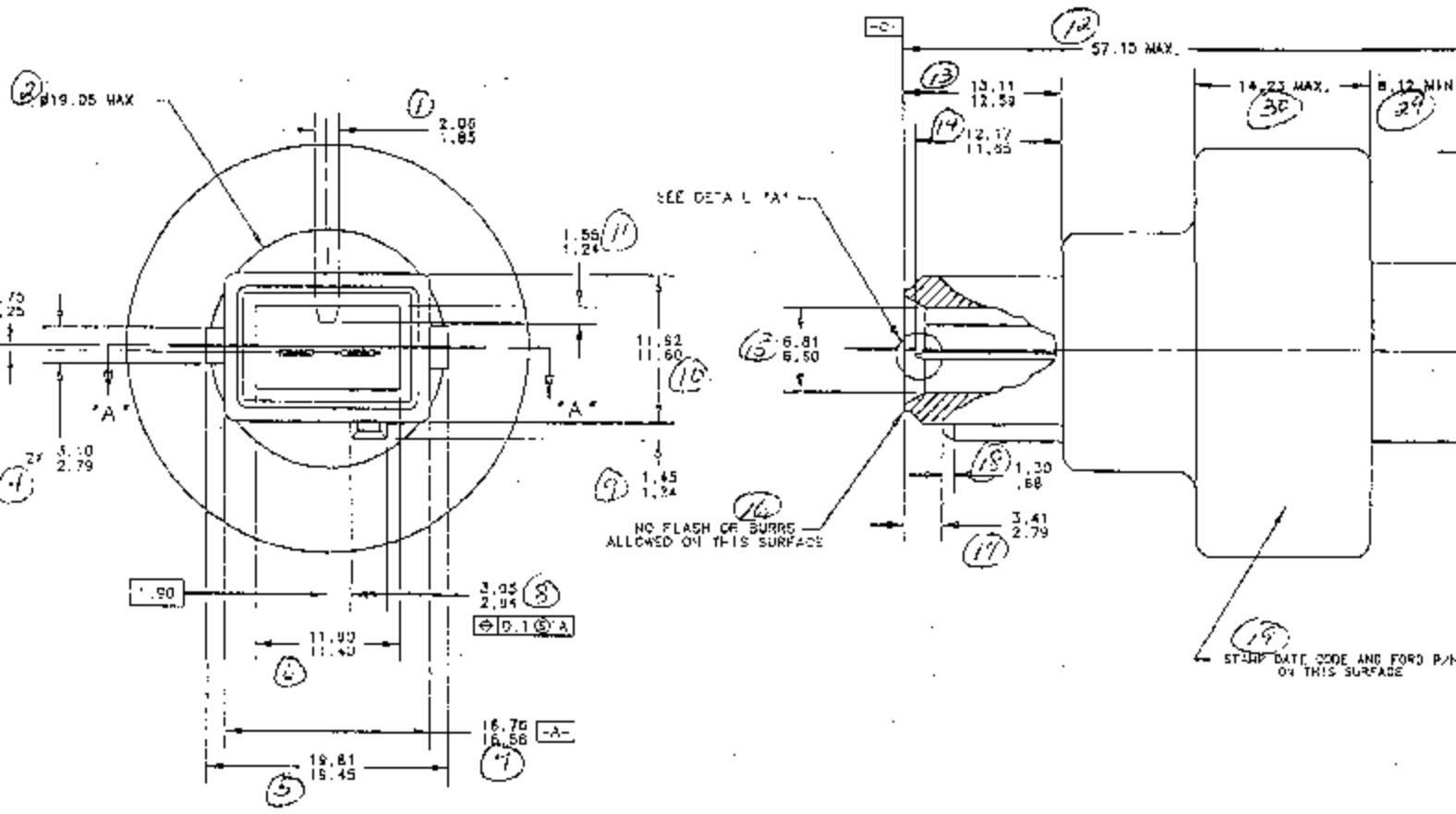
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	BY CHAS. FLEURANT	DATE 4-13-92
TOLERANCE ON FRACTIONS DECIMALS ANGLES ±	CHK.	7-10-92
	ENG.	
MATERIAL		
	APPROVED	3207.0

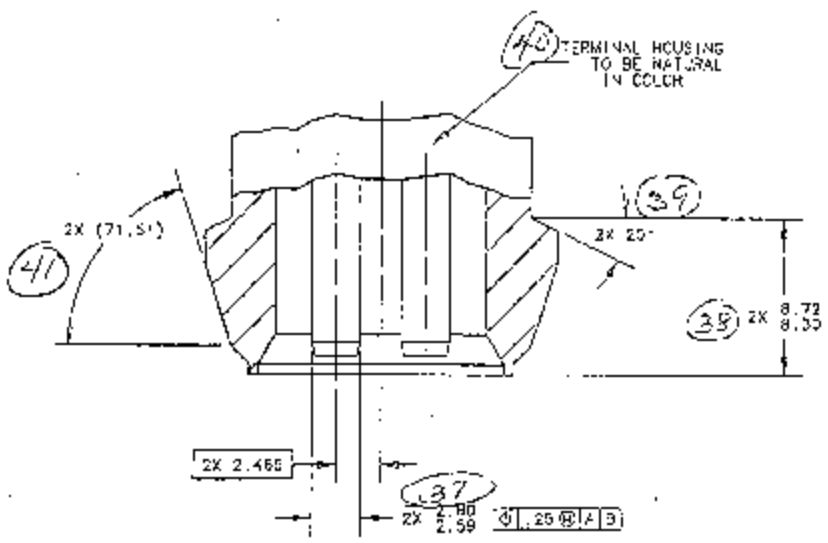
Texas Inst
ATTLEBORO, MASSAC

TITLE
FRES
ENV

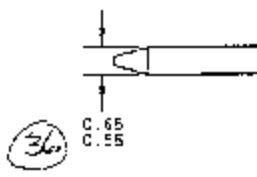
SIZE D | CODE IDENT NO. 82647

METRIC





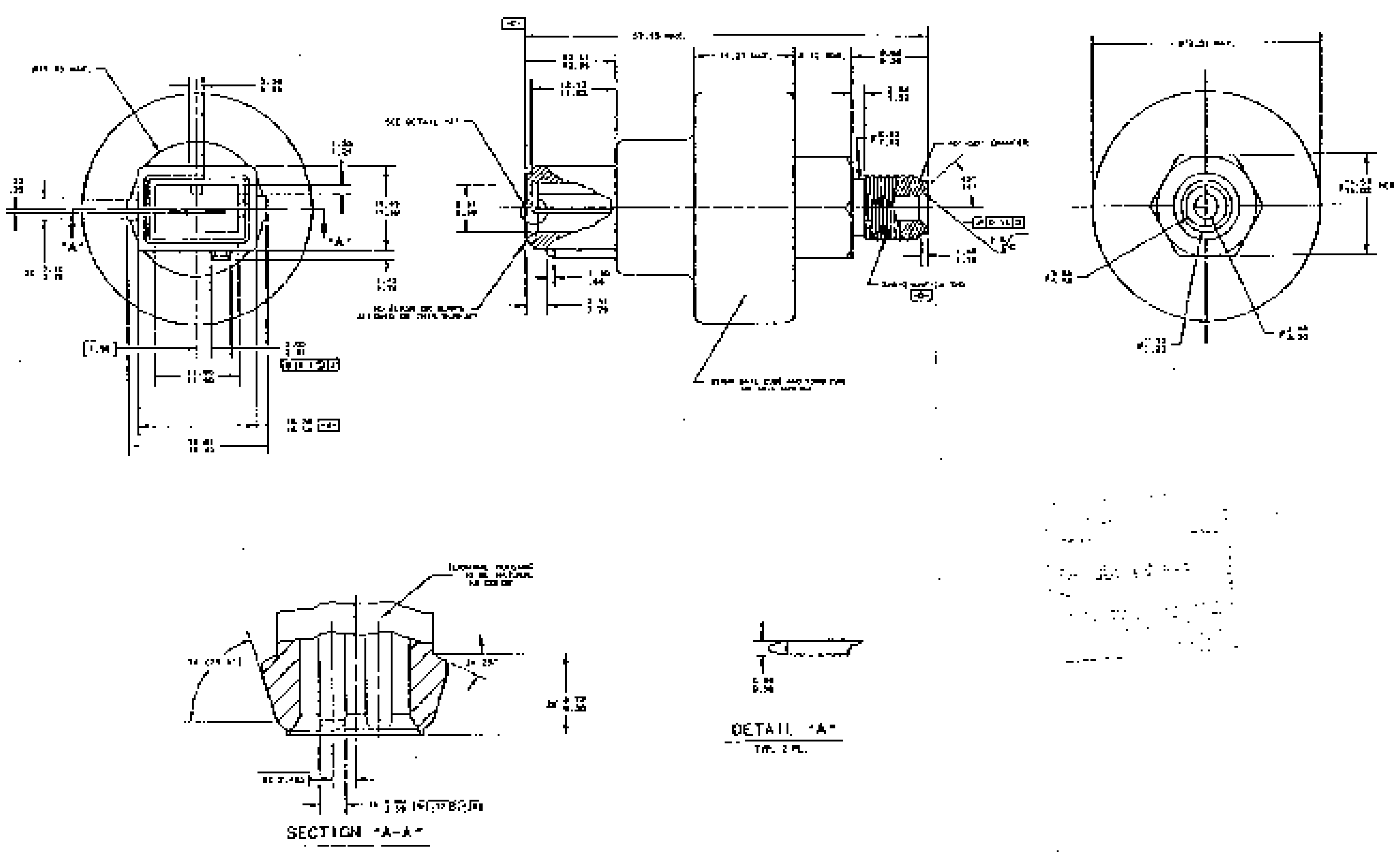
SECTION "A-A"



DETAIL "A"

TYP. 2-PL.

SUPERSEDES DWG. 77PSL3-1 REV. "B".



SPECIFICATIONS AND NOTES

▽ CONTROL ITEM - THE ▽ SYMBOL ALSO IDENTIFIES PRODUCT ENGINEERING DESIGNATED CRITICAL CHARACTERISTICS. THESE, AND ADDITIONAL CRITICAL CHARACTERISTICS IDENTIFIED BY PROCESS REVIEWS, MUST APPEAR ON THE Q-101 CONTROL PLAN(S) WHICH REQUIRE PRODUCT ENGINEERING APPROVAL.

DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M-1982

MANUFACTURER TO ESTABLISH PRODUCT ENGINEERING APPROVED CONTROL PLAN

CHANGE IN DESIGN, COMPOSITION OR PROCESSING FROM THE FIRST RELEASED APPROVED FOR PRODUCTION REQUIRES PRIOR ENGINEERING APPROVAL

ENGINEERING APPROVAL OF A MINIMUM OF SIX SAMPLES ... REQUIRED PRIOR TO ... OF PARTS FOR INITIAL RELEASE AND ALL SUBSEQUENT CHANGE ...

MATERIAL MUST CONFORM TO ES-F2TA-2L138-AA

920930

MATL	DATE	REVISIONS/REL. NO.	CK	APP
		RELEASED		
		MCOOEIO2 ...		

NAME: SWITCH ASSY-SPEED CONTROL DEACTIVATE

NO.: ▽F2AC-9F924-AA

Texas Instruments

TITLE: PRESSURE SWITCH ENVELOPE DRAWING

SIZE	CODE IDENT NO.	
D	82647	77PSL3-1

OK
10/6/94

Precision Controls Customer Print/Specification
Customer P/N: ______ TI P/N: ______
Special Requirements: ______
Special Req. 12008: ______
Notes: ______
Doc. Reviewed: ______
X-Ref. Updated: ______

DRAWINGS AVAILABLE UPON REQUEST

TI PROPRIETARY INFORMATION
STRICTLY PRIVATE

WEATHERHEAD DIVISION
BRASS PRODUCTS

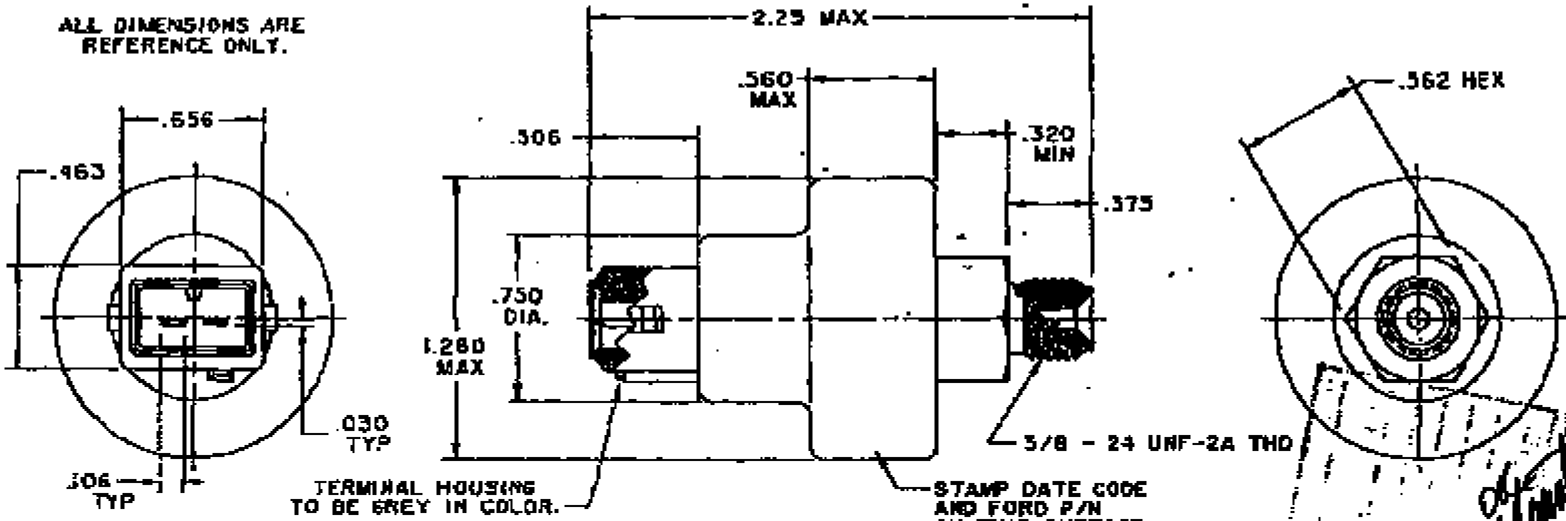
DANA

DWG 08083

PART NO. 120-55046

SHEET	LTR.	DESCRIPTION OF REVISIONS	CHKD.	DCN. NO.	CL. NO.	DATE

ALL DIMENSIONS ARE REFERENCE ONLY.



PURCHASE FROM :
TEXAS INSTRUMENTS
PART NO. 77PSL3-1

SPECIFICATIONS

DEVICE MUST CONFORM TO FORD MOTOR CO. SPEC. NO.
ACTUATION PRESSURE --- 125 ± 35 psig [862 ± 241 kPa]
RELEASE PRESSURE ----- 20 psig MIN. [138 kPa]
CONTACT ARRANGEMENT -- SPST NORMALLY CLOSED, OPEN ON PRESSURE RISE
HYDRAULIC SEAL -------- ETHYLENE PROPYLENE
PROOF PRESSURE -------- 3000 psi [20.7 MPa]

UNLESS OTHERWISE SPECIFIED TOLERANCE ON: ANGLES ± 1° DECIMALS .X ± .1 .XX ± .03 .XXX ± .010	MATERIAL SPECIFICATION: PLASTIC BODY, ALUMINUM BAND STEEL HEX AND END
BREAK SHARP EDGES .005/.015	HEAT TREAT/HARDNESS
THREAD DIMENSIONS AND DESIGNATIONS PER FEDERAL HANDBOOK H-28	PLATING/COATING
WEATHERHEAD STANDARD	DIMENSIONS ARE IN INCHES. DO NOT SCALE DRAWING.

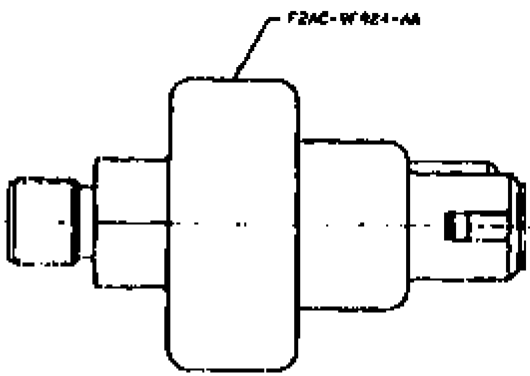
DRAWN BY: B BORDNER 4-10-92
APPROVED FOR DEVELOPMENT
APPROVED FOR PRODUCTION
RELEASED FOR PRODUCTION
FORD PART NO. F2AC-9F924-AA
PART NAME: PRESSURE SWITCH
SIZE B DWG. NO. 120-55046

Print/Specification E
TI PAL
Doc. No.
X-Ref. Updated

77PSL3-1

DATE	REV.	CHANGE	ECN
11-11-93	/00	RELEASED	93-130

Precision Controls Customer Print/Specification Sign Off
Customer P/N: 2-06495 TI P/N: 7KR13-7
Special Requirements:
Special Req. 13909
Notes:
Doc. Reviewed:
X-Ref. Updated:



MATERIAL

TOLERANCES UNLESS OTHERWISE SPECIFIED

REF. QUILT SWITCH

SCALE	DRAWN BY	DATE
2X		10 11 93

APPROVED BY

THIS DRAWING PROPERTY OF
SURFACES
CARROLLTON, TEXAS

TITLE
PRESSURE SWITCH

DWG. NO. 2-06495 REV. 00

Ford Engineering Specification

Copy G 3-2-93

PART NAME	PART NUMBER
SWITCH ASSEMBLY - SPEED CONTROL DEACTIVATE	▽ ES-F2VC-9F924-AA

LET													
FR													
LET													
FR													

DATE	LET	FR	REVISIONS	DR	CK

REFERENCE

PREPARED/APPROVED BY

CHECKED BY DETAILED BY

CONCURRENCE/APPROVAL SIGNATURES

DESIGN ENGINEERING SUPERVISOR

DESIGN ENGINEERING MGR

MANUFACTURING ENGRG

QUALITY CONTROL

PURCHASING

SUPPLIER QUALITY ASSURANCE

ELECTRONICS DIVISION

TI-NHTSA 000122

SWITCH ASSEMBLY - SPEED CONTROL DEACTIVATE

I. General

This specification covers the test requirements for the speed control deactivate switch -9F924- used in the electronic speed control system. Design changes on the switch assembly or its components shall not be made without compliance to Section V of this specification and written approval from the releasing Production Engineering Office.

This engineering specification is a supplement to the released drawing on the above part, and all requirements herein must be met in addition to all other requirements of the part drawing. Minimum measures necessary for demonstrating compliance to these requirements are given in each section.

The engineering tests, sample sizes, and test frequencies contained within this engineering specification reflect the minimum requirements established to provide a regular evaluation of conformance to design intent. The engineering test program is intended as a supplement to normal material inspections, dimensional checking and in-process controls, and should in no way adversely influence other inspection operations.

Q1 suppliers may implement different test sample sizes and frequencies providing these changes have been included in an alternate Control Plan approved by the design responsible Product Engineering Office and concurred in by SQA.

II. PRODUCTION VALIDATION AND IN-PROCESS TESTS

- Production Validation (PV) Tests must be completed satisfactorily with parts from production tooling (and processes where possible) before ISIR approval and authorization for shipment of production parts can be effected. Parts must be revalidated completely, or per Section V whenever any change is made which could possibly affect part function or performance.

- In-Process Test Phase 1 (IP-1) - IP-1 tests are used to demonstrate process capability and must be completed using initial production parts from production tooling and processes prior to first production shipment approval. IP-1 tests are to continue in effect until process capability is demonstrated.

- In-Process Tests Phase 2 (IP-2) - IP-2 test program may be implemented only after process capability has been established. Tests must be completed with production parts on a continuing basis. Samples for these tests must be selected on a random basis to represent the entire production population as much as possible. In the event that any of the requirements in these tests is not met, the reaction plan specified in Ford Q101 Section III.E.3, "ES Test Performance Requirements" shall be invoked.

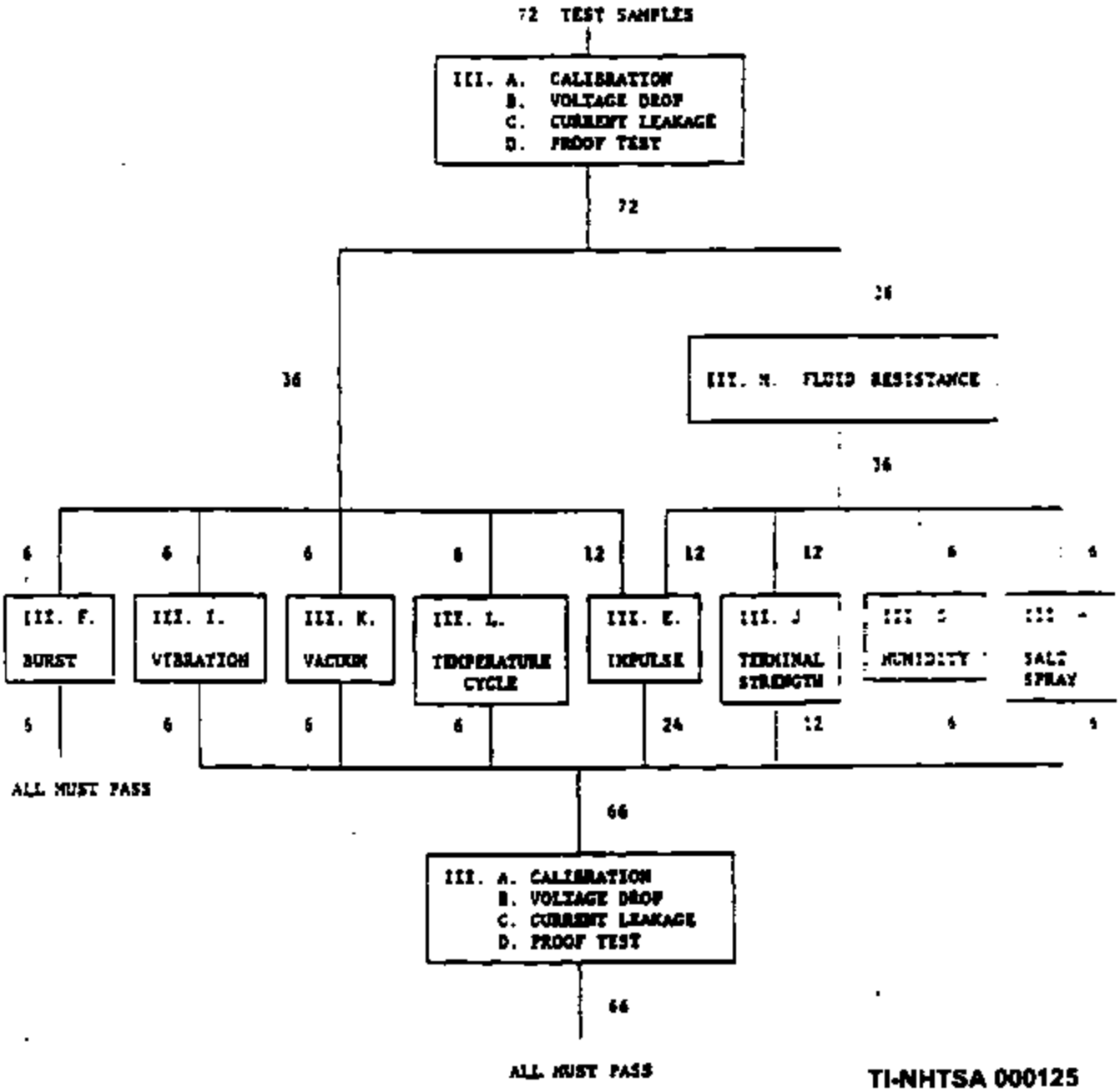
SECTION III. TABLE OF TESTS

Item	Test Name Functional Tests	PRODUCTION VALIDATION Minimum Sample Size	PRODUCTION VALIDATION Statistical Test Acceptance Criteria	IN-PROCESS IP-1 Minimum Sample Size	IN-PROCESS IP-1 Statistical Test Acceptance Criteria	IN-PROCESS IP-2 Minimum Sample Size	IN-PROCESS IP-2 Statistical Test Acceptance Criteria
III.							
▽ A	Calibration	72	P90-.96	100%	All Must Pass	100%	All Must Pass
B	Voltage Drop	72	P90-.96	12/Mo.	P90-.84	4/Lot	" " "
C	Current Leakage	72	P90-.96	3/Mo.	P90-.56	4/Lot	" " "
D	Proof Test	72	P90-.96	12/Mo.	P90-.84	4/Lot	" " "
F	Burst	6	P90-.72	3/Mo.	P90-.56	4/Lot	" " "
I	Vibration	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90 72
J	Terminal Strength	12	P90-.84	6/Mo.	P90-.72	4/Lot	All Must Pass
K	Vacuum	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
L	Temperature Cycle	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
M	Fluid Resistance	16	P90-.94	36/12Mo	P90-.94	36/12Mo.	P90-.94
	Durability Tests						
III							
E	Impulse	24	P90-.90	12/Mo	P90-.84	1/1 Mo	P90 56
H	Humidity	6	P90-.72	3/Mo	P90-.56	6/6 Mo	P90 72
B	Salt Spray	6	P90 72	3/Mo	P90-.56	6/6 Mo	P90 72

k sample [illegible] H & J, D, F

k [illegible] E.

PRODUCTION VALIDATION FLOW CHART



TI-NHTSA 000125

III. TEST PROCEDURES AND REQUIREMENTS

▽ A. Calibration

1. Test Requirements

   a. Switch calibration is to be checked at room temperature (16°C-35°C) using ambient air or equivalent.

   b. Calibration settings shall be specified on the part drawing with the settings checked after 2 or more pressure cycles with ambient air, or equivalent. Pressure cycle range is to be determined by the manufacturer to insure switch calibration stability. The cut-in and differential set points are to be measured while conducting 750 ± 50 milliamperes while 13.0 ± 1.0 volts D.C. is applied. The cut-in point is to be checked with increasing pressure

   Adopt Elected *

   c. The cut-out point is to be checked with decreasing pressure, and the differential set point is to be calculated using the cut-in pressure minus the cut-out pressure.

2. Acceptance Requirements

   a. Nonconformance is defined as any switch point which falls outside the tolerance band specified on the part drawing.

B. Voltage Drop

1. Test Requirements

   a. Voltage drop is to be measured after 2 or more cycles with ambient air or equivalent from 0 to 10,000 ± 172 KPa (1450 ± 25 PSI) while conducting 750 ± 50 milliamps and 13.0 ± 1.0 volts D.C is applied to the switch. Under these conditions with the switch closed the voltage drop is to be measured. Millivolt connection interface at terminals to be less than 10 millivolts.

2. Acceptance Requirements

   a. Nonconformance is defined as a voltage drop in excess of 200 millivolts.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

C. Current Leakage

1. Test Requirements

a. Current leakage is to be checked with 500 volts, 60 Hz alternating current.

b. Current leakage is to be checked:

(1) Between the switch leads with the contacts open.
(2) Between the lead and the switch housing with contacts closed.
(3) Between either lead and switch housing with the contacts open.

2. Acceptance Requirements

a. Nonconformance is defined as any leakage current in excess of one hundred (100) microampere.

D. Proof Test

1. Test Requirements

a. Subject sample switches to Section A to establish their initial switching pressures.

b. Proof test is to be conducted using brake fluid or equivalent as the pressure medium. Test pressure shall be as specified on the part drawing. Test pressure shall be isolated from pressure source and held for not less than 30 seconds.

c. Recheck the switches to Section A.

2. Acceptance Requirements

a. No evidence of fluid leakage, seepage, or drop in test pressure greater than 430 KPa.(62 PSI) is permitted.

b. A change in cut-in and cut-out pressures greater than ± 5% from the initial value is not permitted.

c. The test samples must be destroyed after testing.

TI-NHTSA 000127

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

E. Impulse

1. Test Requirements

a. Test the switch for a total of 500,000 cycles. Cycle pressure between (low) 0-276 KPa (0-40 psi) and (high) 10,000 ± 345 KPa (1450 ± 50 psi).

1) 0 - 475,00 cycles: 13 ± 1 volts,trace current to monitor function.

2) 475,001 - 500,000 cycles: 13 ± 1 volts D.C., 750 ± 50 ma., per figure 4.

b. Brake fluid temperature to be 135 ± 14°C and ambient temperature to be 107°C min.

c. Cycle rate is to be 110-130 cycles per minute.

d. Switch must open and close each cycle.

2. Acceptance Requirements

a. After impulse test check to sections A, B, C, & D using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, & D.

c. Samples used for this test must be destroyed after all testing is completed.

F. Burst

1. Test Requirement

a. Burst strength is to be checked using brake fluid or equivalent as the pressure medium.

b. Pressurize the switch to 48.3 MPa (7000 PSI) minimum and hold for 30 seconds minimum.

2. Acceptance Requirements

a. Nonconformance is defined as any evidance of fluid leakage or seepage from the switch or threads. Samples used for this test must be destroyed after testing is completed.

G. Humidity

1. Test Requirements

a. Mount the switch in the test port in a humidity chamber. Currently released mating electrical connector must be installed before start of test

b. Subject the switch to ten (10) continuous humidity cycles as follows:

(1) Raise temperature to 65 +10/-2 °C over 2.5 hours; at 90-98% relative humidity.

(2) Hold 3 hours at 65 +10/-2 °C at 90-98% relative humidity.

(3) Lower temperature to 25 +10/-2 °C over 2.5 hours; at 80-98% relative humidity

2. Acceptance Requirements

a. Within 15 minutes after completion of the tenth humidity cycle check the switch to sections A, B, C, D, using the procedure established in each section

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D.

H. Salt Spray

1. Test Requirements

a. Mount the switch in the test port in a salt spray chamber. The currently released mating electrical connector and wiring must be installed prior to start of test.

b. Expose the switch assembly to 72 hours of salt spray per ASTM B-117.

2. Acceptance Requirements

a. After exposure, check the switch to sections A, B, C, D, using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

TI-NHTSA 000129

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

I. Vibration

1. Test Requirements

a. Mount the switch in the test port and attach the currently released mating electrical connector before start of test.

b. Switches are to be vibrated in all 3 planes with electrical continuity being monitored during the entire test. See Figure 1 for switch orientation in the 3 planes. Vibration tests are to be conducted at room temperature using brake fluid, ambient air, or equivalent as the pressure medium.

c. Internal pressure shall be maintained at 0 KPa G when the switch is in the closed position and 1.5 times max actuation pressure shown on print when the switch is in the open position.

d. Vibrate the switch at 1.5 mm displacement (peak-to-peak) while varying the frequency uniformly from 5 to 50 to 5 Hz over a 5 minute period.

e. Vibrate the switch in alternate one-hour periods in the open and closed positions for a total of 8 hours in each plane. (Total test time is 24 hours).

2. Acceptance Requirements

a. After the entire vibration sequence check the switches to sections A, B, C, or D using the procedure established in each section.

b. Nonconformance is defined as any evidence of leakage or any change in electrical continuity/discontinuity during the vibration cycles, or any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

J. Terminal Strength

1. Test Requirements

a. Mount the switch in the test port.

(1) Apply a 89 ± 9 N axial force to each terminal.

(2) With a pendulum apply a 45 ± 5 N impact force to the switch housing at the connector and, perpendicular to the centerline axis of the switch. See Figure 2 for force application point and direction.

2. Acceptance Requirements

a. Check the switch to sections A, B, C, and D using the procedures established in each section.

b. Nonconformance is defined as any terminal or housing fracture, or any switch not meeting the criteria in sections A, B, C, or D.

K. Vacuum

1. Test Requirements

a. Mount the switch in the test port. Vacuum tests are to be conducted at room temperature using ambient air as the pressure medium.

b. Subject the switch to 5 cycles of vacuum from atmospheric pressure (760 mm Hg) to an absolute pressure of 3-6 mm Hg. Maintain the vacuum for a minimum of 60 seconds.

2. Acceptance Requirements

a. Check the switch to sections A, B, C, and D using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, and D.

3 mm Hg = 0.058 psi = 0.400 K Pa

6 mm Hg = 0.116 psi = 0.800 K Pa

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

L. Temperature Cycle

1. Test Requirements

a. Mount switches in test ports; test to be run using currently released brake fluid.

b. Repeat the following procedure 25 times.

(1) Lower the switch and fluid temperature to at least -40°C.

(2) Cycle the switches ten times at 10 seconds/cycles. One cycle consists of a pressure variation from 0 - 276 KPa.G (0-40 psi) to 10,000 ± 345 KPa.G (1450 ± 50 PSI).
Note: Switch must open and close each cycle.

(3) Raise switch and fluid temperature to 38°C minimum.

(4) Repeat Step 2.

c. At completion of Step b, check switches per sections A, B, C, and D.

2. Acceptance Requirements

a. Nonconformance is defined as any evidence of switch fluid leakage, seepage, or not meeting the criteria of sections A, B, C, and D.

M. Fluid Resistance

1. Test Requirements

a. Mount the switch in the test port and orient as installed in the vehicle.

b. Install the currently released mating electrical connector (with wire leads) to the switch.

c. Sequentially, immerse the switch into each of the specified fluids, at a temperature of 23 ± 2 °C, for 5 ± 1 second. Remove the switch and drain and store the switch for the specified time at room temperature, prior to immersing into the next fluid

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

Fluid	Drain Time	Storage Time
Reference Fuel C ASTM D471	60 ± 5 min.	none
10W40 Engine Oil	24 ± 1 hour	14 days
Ethylene Glycol/ Water 50/50 by Volume	24 ± 1 hour	24 ± 1 hour
Brake Fluid DOT 3	24 ± 1 hour	48 ± 1 hour
Automatic Transmission/ Power Steering Fluid (same) ESP-M2C138-CJ	24 ± 1 hour	14 days
Isopropyl Alcohol/ Water 50/50 by Volume	24 ± 1 hour	none
Reference Fuel C, ASTM D471 with Methyl Alcohol 85/15 by Volume	24 ± 1 hour	none

d. Per the Flow Chart, subject the prescribed number of immersed switches to the post immersion tests specified below:

III. E. Impulse
III. G. Humidity
III. H. Salt Spray
III. J. Terminal Strength

Acceptance Requirements

a. Switches must fully meet the requirements of the specified post immersion test.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

TI-NHTSA 000133

IV. STATISTICAL ANALYSIS METHODS

A. For PV, IP-1 and IP-2 tests, all samples tested must pass. Having all the required sample size pass will provide data to support the conclusion that the switch has a minimum reliability R, at a given confidence of C. The notation Pc-R is interpreted as minimum reliability equal to R, at a confidence C; thus P90-.80 means a minimum reliability of 80% at 90% confidence.

B. All samples must pass is the statistical test acceptance criteria stated for tests with 100% frequency; or samples from lots, which could have a variable size.

V. REVALIDATION REQUIREMENTS

A. No change in design, material, process or component supplier shall be made without prior approval from the releasing Product Engineering Office. As part of approving a change, the releasing Product Engineering Office will establish the portion of the Product Validation tests required to be run to revalidate the switch. The following table is to be used as a guide in determining the type of tests required for revalidation requirements.

RUNNING CHANGE REVALIDATION

Component	Process or Material Change or New Supplier
1. Terminals, Contacts, or Connector	III. B. C. E. G. H.I. J. L. M.
2. Case or Housing	All Tests
3. Disc or Diaphragm	III. A,D,E,F,I,K,L.
4. Fitting or Fluid Connection	III. D. E. F. H. I. M.

B. Annual revalidation is not required on carryover switches.

VI. LOT DEFINITION

A lot is defined as no more than eight (8) hours of production up to 4,000 pieces. If shifts extend beyond eight (8) hours, or more than 4,000 pieces are produced in a shift, the product must be separated into at least two lots.

TI-NHTSA 000134

VII. RECORD RETENTION

A. Recording and record retention shall conform with Ford Q-101.

B. Production Validation test results and analysis are to be forwarded to the releasing Product Engineering Office before approval for shipment of production parts can be granted.

C. In-Process test results shall be available at the supplier's manufacturing facility for the releasing Product Engineering Office and Ford SQA or its representatives to review on request.

VIII. INSTRUCTIONS AND NOTES

All switches are to be identified with the Ford part number, supplier identification, and a date code indicating final assembly.

All test equipment and test procedures for testing to this specification must be approved by the releasing Product Engineering Office and no change in equipment or procedure may be made without their written concurrence.

Test port configuration is shown in Figure 3.

O-rings, if used in the design, shall be free from cuts, nicks, abrasions or any other damage which would result in a fluid leak.

All switches must have a shipping cap installed over the port threads to prevent contamination. All shipping caps must be approved by the releasing Product Engineering Office prior to production incorporation.

All switches that do not pass the calibration test are to either be readjusted and rechecked, or scrapped. (Salvage of component parts permitted with 100% reinspection).

If product nonconformance occurs for test Sections III. B, C, D, E, F, and J, production shall be stopped and the problems corrected. All production lots shall be sorted 100% prior to shipment. Suspected nonconformance of any shipped parts shall be reported immediately to the releasing Product Engineering Office.

If nonconformance of the statistical acceptance criteria occurs for test Sections III. G, H, I, K, L and M, a cause to recall the subject weeks production and to stop production may result.

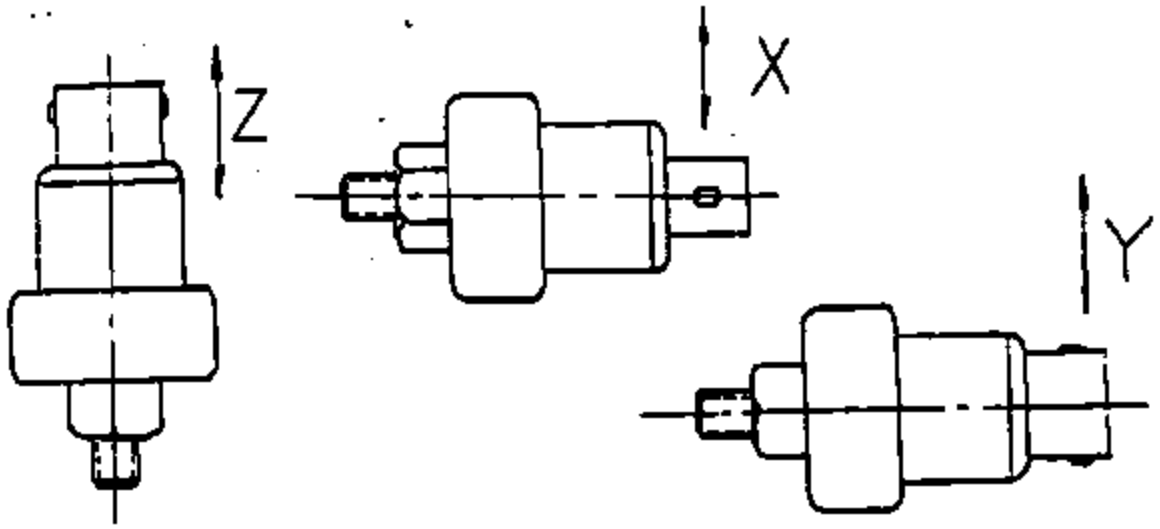
IX. COMPILATION OF REFERENCE DOCUMENTS

ASTM B-117, Salt Spray Testing

Ford Q-101, Quality System Standard 1983 Edition

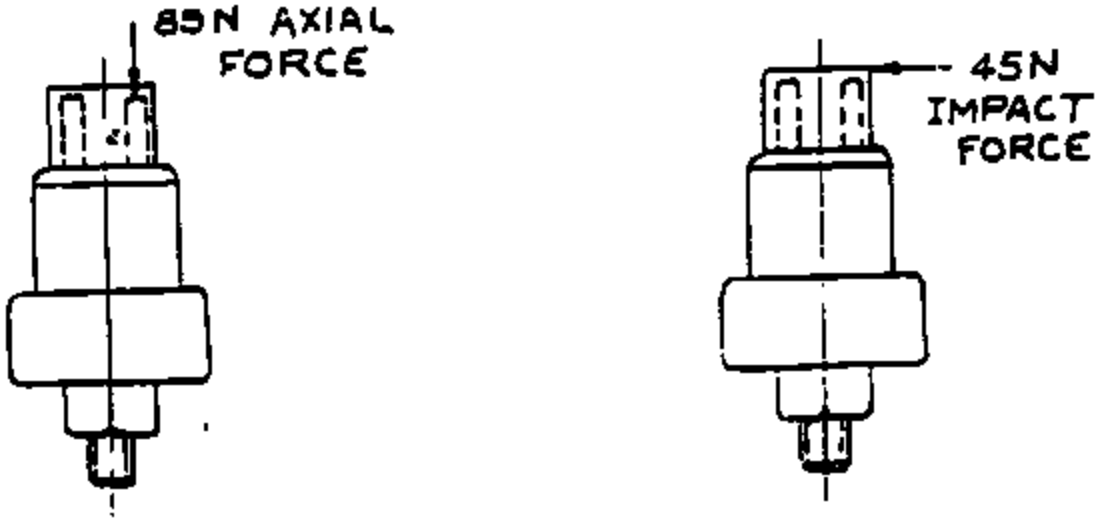
ES-F0EB-14A464-AA, Specification - SLV Assy - Wire Connector

ES-F2VF-9C735-AA, Specification - Servo Assembly Speed Control



VIBRATION TEST - SWITCH ORIENTATION

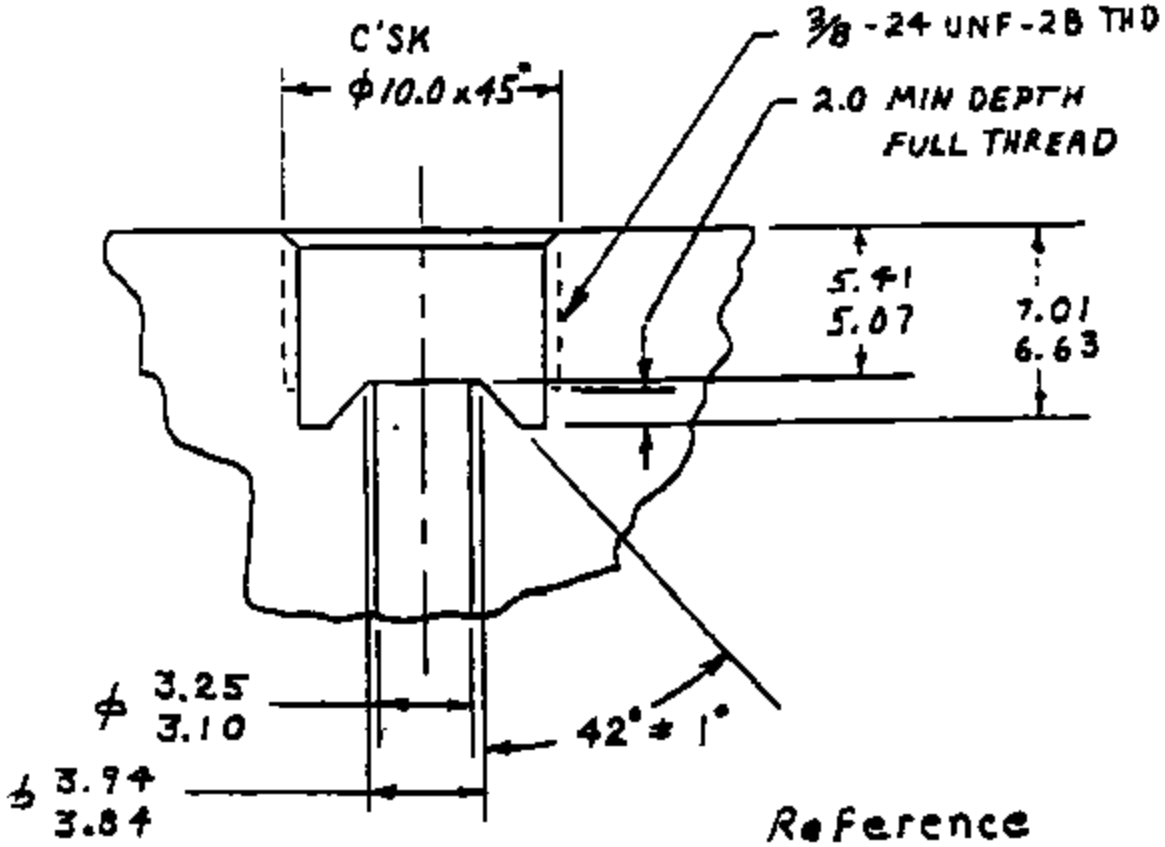
FIGURE 1.



TERMINAL STRENGTH - LOAD ORIENTATION

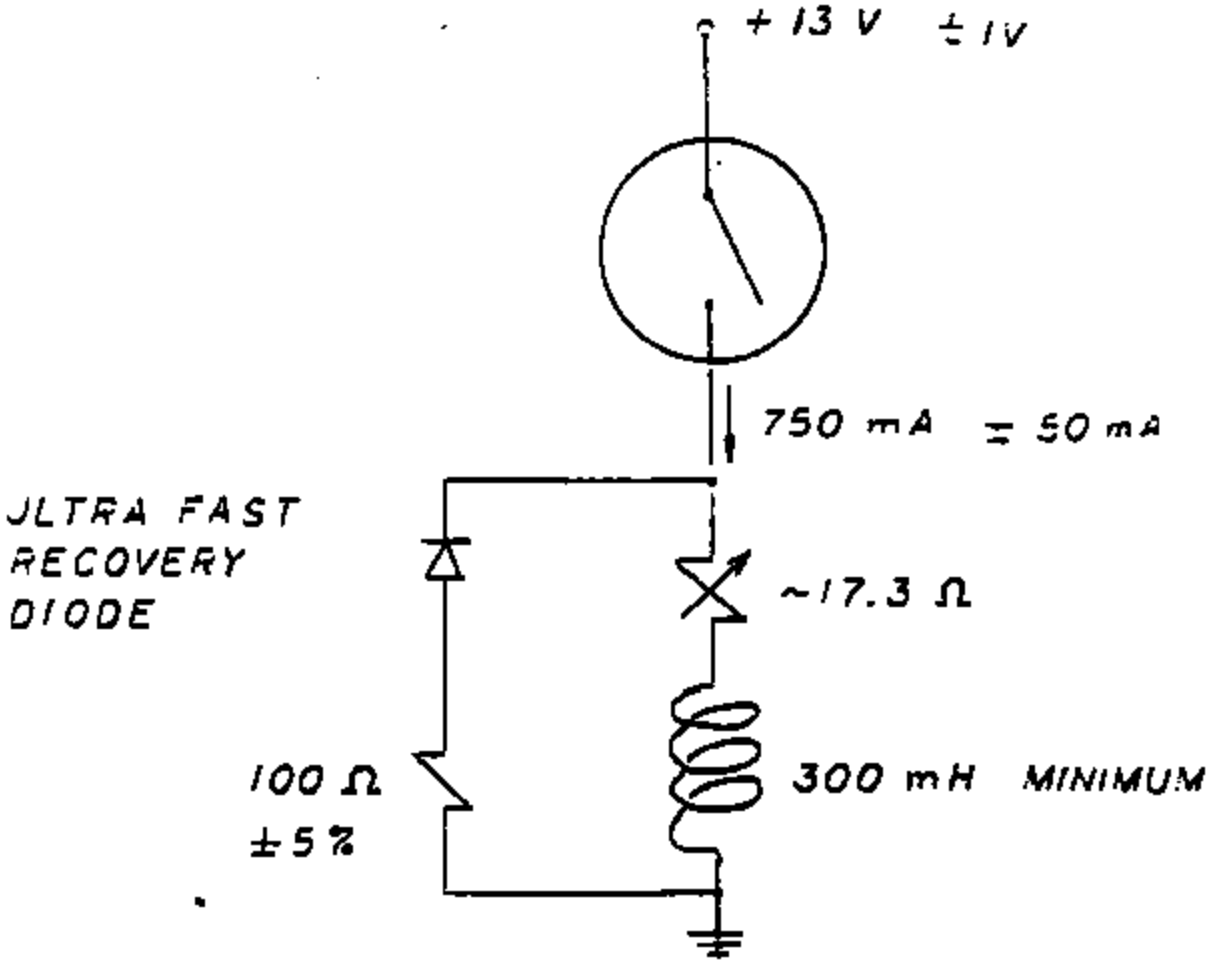
FIGURE 2.

TI-NHTSA 000137



TEST FIXTURE PORT CONFIGURATION

FIGURE 3



DEACTIVATE SWITCH
TEST SET UP

FIGURE 4

DRAWINGS AVAILABLE UPON REQUEST

EXT. PART NUMBER	2234330
SIMILAR PART	
SPECIFICATIONS & INSTRUCTIONS	ES-2669-1, ES-2952

REVISIONS

CON	REV	DESCRIPTION	DATE	BY	
	A	Released 6P-6757			

AREAS MARKED WITH THE FOLLOWING SYMBOLS ARE DESIGNATED CHARACTERISTICS REQUIRING COMPLIANCE WITH AS2000.

(S) SIGNIFICANT CHARACTERISTIC-HIGH FMEA FAILURE SEVERITY WITH FMEA FS INDEX ≥ 7

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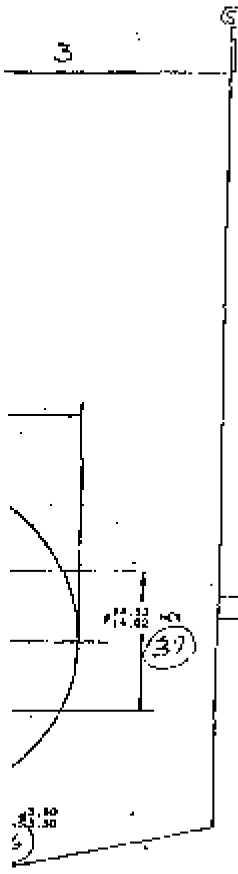
9P9999-A1]

REVISIONS

ZONE	LTR	DESCRIPTION	PROJ.	DATE	APPROVED
	D	SECTION A-A: CORRECTED TRUE-POSITION DATUM REF. CR M10747, CJN			
B4	E	ADDED NOTE ON 3A GO-GAGING CR M15751, CFF			A.R.



SPECIFICATIONS AND NOTES

DEVICE MUST CONFORM TO FORD MOTOR CO. SPEC. NO. ▽ ES-F3VC-9F924-AA
ACTUATION PRESSURE ——— 862 +517/-241 kPag (125 +75/-35 psig)
RELEASE PRESSURE ——— 138 kPag MIN. (20 psig)
CONTACT ARRANGEMENT ——— SPST NORMALLY CLOSED, OPEN ON PRESSURE RISE
HYDRAULIC SEAL ——— ETHYLENE PROPYLENE
PROOF PRESSURE ——— 20.7 MPa (3000 psi)
PROTECTIVE COVER ON THREADS REQUIRED FOR SHIPMENT.
DEVICE MUST ALLOW INSTALLATION OF UTA CONNECTOR P/N F3AB-14A464-AA

▽ CONTROL ITEM - THE ▽ SYMBOL ALSO IDENTIFIES PRODUCT ENGINEERING DESIGNATED CRITICAL CHARACTERISTICS. THESE, AND ADDITIONAL CRITICAL CHARACTERISTICS IDENTIFIED BY PROCESS REVIEWS, MUST APPEAR ON THE Q-101 CONTROL PLAN(S) WHICH REQUIRE PRODUCT ENGINEERING APPROVAL.

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ONFORM TO
UPPER LIMITS.
3A GO-GAGE
.5 IN-LBS

MAT.	DATE	REVISIONS/REL. NO.	CK	APP
(1RGS)	PART MUST COMPLY WITH SPECIFICATION WSS M99P9999-A1 TO HELP SAFEGUARD HEALTH, SAFETY AND THE ENVIRONMENT			
	NAME			
	NO.			

THIS DWG. SUPERSEDES 77PSL3-1 REV. "D", DATED 9-23-93

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS	DRAWN CHAS. FLEURANT	10-21-93
TOLERANCE ON DIMS DECIMALS ANGLES	CHECKED A. RAIMAN	10-21-93
	APPROVED N. SELLERS	10-21-93
	APPROVED	
	SIGNATURES ON FILE. REFER TO ELECTRONIC CHANGE NOTICE.	

TEXAS INSTRUMENTS — KLIXON

TITLE: PRESSURE SWITCH ENVELOPE DRAWING

SIZE	CAGE IDENT NO.	
D	82547	77PSL3-1

SHEET 1 OF 1

MATL.	DATE	REVISIONS/REL. NO.	CK	APP
(SWGS)	PART MUST COMPLY WITH SPECIFICATION WSS-M99P9999-A1 TO HELP SAFEGUARD HEALTH, SAFETY AND THE ENVIRONMENT			
	NAME			
	NO. ▽			

ENGINEERING SERVICE CODES
BRL T84 | 3 GW 1 MY

AlliedSignal
Bendix Automotive Systems - North America
South Bend, Indiana, U.S.A.

		DATE
DRAWN		
CHKD		
ENGR		
MFG		
QUAL TTY		
MATL ENG		
PURCH		

PART NAME: ASSEMBLY-PRESSURE SWITCH

FINAL ASSY
SCALE —
SHEET 1 OF 1

E | 2234330

SWITCH PRES.

▽ CONTROL ITEM-THE ▽ SY
IDENTIFIES PRODUCT ENGI
NATED CRITICAL CHARACTE
AND ADDITIONAL CRITICAL
IDENTIFIED BY PROCESS R
APPEAR ON THE D-101 CON
REQUIRE PRODUCT ENGINEE

MANUFACTURER TO ESTABLISH
ENGINEERING APPROVED CONT

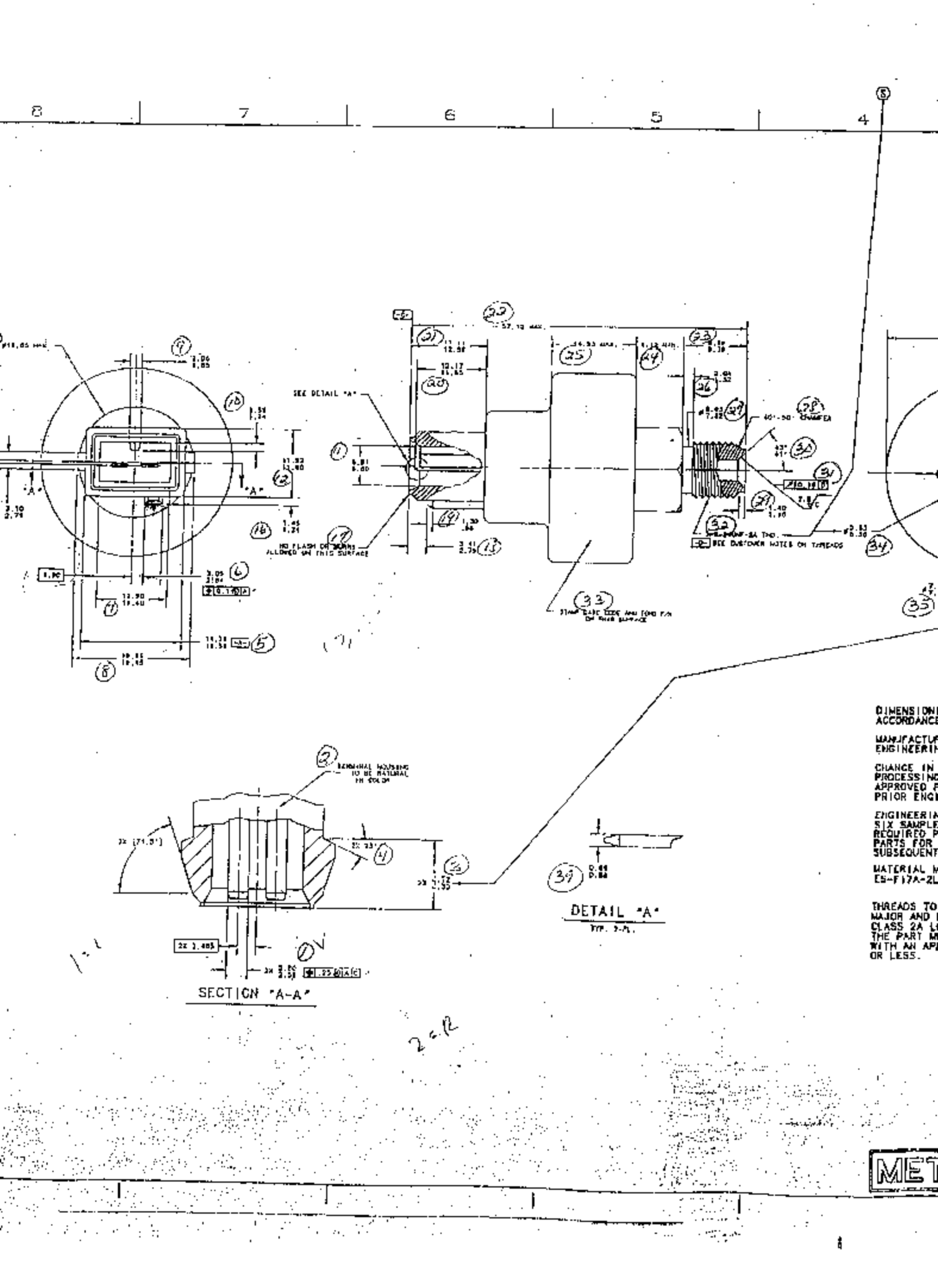
CHANGE IN DESIGN COMPOSIT
PROCESSING FROM THE PART
APPROVED FOR PRODUCTION R
ENGINEERING APPROVAL

MUST CONFORM TO ES-F17A-2
PER ES-2922

MUST CONFORM TO ES-2669-1

ENGINEERING APPROVAL OF P
SAMPLES FROM SUPPLIER IS
PRIOR TO AUTHORIZATION OF

DIMENSIONING AND TOLERANC
ACCORDANCE WITH ANSI Y14.



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TEXAS INSTRUMENTS INC. ! MATERIALS & CONTROLS GROUP ! SITE

PARTS LIST ! PROJECT !PART NUMBER: 77PSL2-1 !REV LTR: L CLS: 65(
EXPLOSION ! NUM: 3423 !DWG PFX: NUM:77PSL2-1 !ECN INC.DT: 98/02/2(

TLE: PRESSURE SWITCH (CUST P/N F2VC-9F924-AB)

LV	CNT	QTY/UM	BITM	PART/DRAWING NUMBER	RV	NOMENCLATURE/PARM DATA
01	1	REF		36952-1		FINAL ASSEMBLY
			1	36952-1	A	
01	2	1	27	27759-10		BASE ASSEMBLY
				27759SH1	L	
02	3	1	2	46515-2		BASE (BROWN)
			1	46515	N	
02	4	1	3	36888-1		STATIONARY TERMINAL
				36888	D	
02	5	1	4	36897-2		MOVABLE TERMINAL ASM
				36897SH1	H	
03	6	1	2	36887-1		MOVABLE TERMINAL
				36887	D	
03	7	1	3	74916-1		RIVET
				74916	G	

TCW 725 01 02 A ADAIMA PRO

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03	8	1	4	36889-1			SPRING ARM
				36889		B	
04	9	AR	2	27716-1			SPR MAT'L STR SPEC(.216 LBS/K
				27716SH1		D	
03	10	1	5	28744-1			MOVABLE CONTACT
				28744		D	
	11	1	24	27293-13			SENSOR ASSEMBLY
				27293SH2		W	
02	12	1	2	36900-1			MOD BAE J512 HEXPORT
				36900		H	
02	13	1	3	74353-1	✓		GASKET
				74353		H	
02	14	1	4	27713-1			CUP
				27713		F	
02	15	3	5	74176-1	✓		SEAL
				74176		C	
03	16	AR		27225-1			KAPTON STRIP SPEC (.175 LBS/K
				27225		AB	
02	17	1	6	27639-1	✓		WASHER
				27639		F	
02	18	1	7	27406-1	✓		CONVERTER
				27406		F	
02	19	1	8	73958-2	✓		SPACER
				73958		J	

TCW 725 01 02 A ADAIMA PRO

02	20	OR	8	73958-3 ✓		SPACER
				73958	J	
03	21	AR		74224-1		KAPTON TAPE (.100 LBS/K)
				74224	F	
02	22	1	9	36656-27		3/4" FORMED DISC
				366565H1	BM	
	23	OR	9	36656-28		3/4" FORMED DISC
				366565H1	BM	
01	24	1	14	74797-1		CRIMP RING
				74797	B	
01	25	1	18	74078-143 ✓		TRANSFER PIN
				74078	G	
01	26	1	21	74247-4		ENVIRONMENTAL SEAL
				74247	L	
01	27	1	22	74888-1		THREAD CAP
				74888	A	
01	28	AR		27318-1		CARTON ASM.
				27318	D	

TCW 725 01 02 A ADAIMA PRO

02	29	1	2	74219-1 74219		D	CARTON
02	30	3	3	74218-1 74218		D	ROW SEPARATOR
02	31	2	4	27317-1 27317		D	DEVICE SEPARATOR
	32	AR	5	13608-4 13608-4			CLOSURE TAPE

NOTES, REV.DATA,DISTRIBUTION,OPERATING CHARACTERISTICS,SPECIAL REQUIREMENTS

REV DESC: CHG 74408-1 TO 28744-1 | CCB APPROVAL DATE: 98/02/24

DFTG WORK GROUP: PRECISION CONTROLS | ECN ORIGINATOR: DI T HA

NOTES:

1 - ACTUATION PRESSURE ---------- 90 -160 PSIG

2 - RELEASE PRESSURE---------- 20 PSIG MIN.

3 - DEVICE TO BE MARKED PER CODING SPECIFICATION 75871-1

TCW 725 01 02 A ADAIMA PRO

DETAILED REVISION DESCRIPTION:

99 CR M39209, 28744-1 CONTACT (MOV) NAS 74408-1
STOCK DISPOSITION
FINISHED DEVICES - USE
PARTS & SUB ASMS - USE SUBS, HOLD PARTS

TCW 725 01 02 A ADAIMA PRO

TEXAS INSTRUMENTS INC. | MATERIALS & CONTROLS GROUP | SITE

PARTS LIST EXPLOSION | PROJECT NUM: 3423 | PART NUMBER: 77PSL3-1 | DWG PFX: NUM: 77PSL3-1 | REV LTR: H CLS: 650 | ECN INC.DT: 98/02/24

ITLE: PRESSURE SWITCH (CUST P/N F2AC-9F924-AA)

LV	CNT	QTY/UM	BITM	PART/DRAWING NUMBER	RV	NOMENCLATURE/PARM DATA
01	1	REF		36952-1		FINAL ASSEMBLY
				36952-1		
01	2	1	27	27759-9		BASE ASSEMBLY
				27759SH1		
02	3	1	2	46515-3		BASE (NATURAL)
				46515		
02	4	1	3	36888-1		STATIONARY TERMINAL
				36888		
02	5	1	4	36897-2		MOVABLE TERMINAL ASM
				36897SH1		
03	6	1	2	36887-1		MOVABLE TERMINAL
				36887		
03	7	1	3	74916-1		RIVET
				74916		
03	8	1	4	36889-1		SPRING ARM
				36889		
04	9	AR	2	27716-1		SPR MAT'L STR SPEC(.216 LBS/K)
				27716SH1		
03	10	1	5	28744-1		MOVABLE CONTACT
				28744		
01	11	1	24	27293-25		SENSOR ASSEMBLY
				27293SH3		
02	12	1	2	36900-1		MOD SAE J512 MEXPORT
				36900		
2	13	1	3	74353-1		GASKET
				74353		
02	14	1	4	27713-1		CUP
				27713		
02	15	3	5	74176-1		SEAL
				74176		
03	16	AR		27225-1		KAPTON STRIP SPEC (.175 LBS/K)
				27225		
02	17	1	6	27639-1		WASHER
				27639		
02	18	1	7	27406-1		CONVERTER
				27406		
02	19	1	8	73958-2		SPACER
				73958		
02	20	OR	8	73958-3		SPACER
				73958		
03	21	AR		74224-1		KAPTON TAPE (.100 LBS/K)
				74224		
02	22	1	9	36656-35		3/4" FORMED DISC
				36656SH1		
02	23	OR	9	36656-41		3/4" FORMED DISC
				36656SH1		
01	24	1	14	74797-1		CRIMP RING
				74797		
01	25	1	18	74078-SEL		TRANSFER PIN
				74078		
01	26	1	21	74247-4		ENVIRONMENTAL SEAL
				74247		
1	27	1	22	74888-1		THREAD CAP
				74888		
01	28	AR		27318-1		CARTON ASM.
				27318		
02	29	1	2	74219-1		CARTON

				74219		
02	30	3	3	74218-1		ROW SEPARATOR
				74218		
02	31	2	4	27317-1		DEVICE SEPARATOR
				27317		
02	32	AR	5	13608-4		CLOSURE TAPE
				13608-4		

! NOTES, REV.DATA, DISTRIBUTION, OPERATING CHARACTERISTICS, SPECIAL REQUIREMENTS !

REV DESC: CHG 74408-1 TO 28744-1 ! CCB APPROVAL DATE: 98/02/24

DFTG WORK GROUP: PRECISION CONTROLS ! ECN ORIGINATOR: DI T HA

NOTES:

1 - ACTUATION PRESSURE ---------- 90-160 PSIG

2 - RELEASE PRESSURE ---------- 20 PSIG MIN.

3 - DIFFERENTIAL PRESSURE ---------- 55 PSI MAX.

4 - DEVICE TO BE MARKED PER CODING SPECIFICATION 75871-3

DETAILED REVISION DESCRIPTION:

99 CR M39209, 28744-1 CONTACT (NOV) WAS 74408-1
STOCK DISPOSITION
FINISHED DEVICES - USE
PARTS & SUB ASMS - USE SUBS, HOLD PARTS

TEXAS INSTRUMENTS INC. ! MATERIALS & CONTROLS GROUP ! SITE

PARTS LIST ! PROJECT / !PART NUMBER: 77PSL4-1 !REV LTR: J CLS: 65(
EXPLOSION ! NUM: 3423 !DWG PFX: NUM:77PSL4-1 !ECN INC.DT: 98/02/24

.TLE: PRESSURE SWITCH (CUST P/N 94DA-9F924-AA)

LV	CNT	QTY/UM	BITM	PART/DRAWING NUMBER	RV	NOMENCLATURE/PARM DATA
01	1	REF		37007-1		FINAL ASSEMBLY
				37007-1	B	
01	2	1	27	27759-9		BASE ASSEMBLY
				27759SH1	L	
02	3	1	2	46515-3		BASE (NATURAL)
				46515	N	
02	4	1	3	36888-1		STATIONARY TERMINAL
				36888	D	
02	5	1	4	36897-2		MOVABLE TERMINAL ASM
				36897SH1	H	
03	6	1	2	36887-1		MOVABLE TERMINAL
				36887	D	
03	7	1	3	74916-1		RIVET
				74916	G	

TCW 725 01 02 A ADAIMA PRO

03	8	1	4	36889-1			SPRING ARM
				36889		B	
04	9	AR	2	27716-1			SPR MAT'L STR SPEC(.216 LBS/K)
				27716SR1		D	
03	10	1	5	28744-1			MOVABLE CONTACT
				28744		D	
	11	1	24	27293-29			SENSOR ASSEMBLY
				27293SR3		AD	
02	12	1	2	37067-1			HEXPORT
				37067		E	
02	13	1	3	74353-1			GASKET
				74353		H	
02	14	1	4	27713-2			CUP
				27713		F	
02	15	3	5	74176-1			SEAL
				74176		C	
03	16	AR		27225-1			KAPTON STRIP SPEC (.175 LBS/K)
				27225		AB	
02	17	1	6	27639-1			WASHER
				27639		F	
02	18	1	7	27406-1			CONVERTER
				27406		F	
02	19	1	8	73958-2			SPACER
				73958		J	

TCW 725 01 02 A ADAIMA PRO

02	20	OR	8	73958-3 ✓		SPACER
				73958	J	
03	21	AR		74224-1		KAPTON TAPE (.100 LBS/K)
				74224	F	
02	22	1	9	36656-35		3/4" FORMED DISC
				36656SH1	BM	
	23	OR	9	36656-41		3/4" FORMED DISC
				36656SH1	BM	
02	24	1	10	74951-4		O-RING
				74951	D	
01	25	1	14	74797-1		CRIMP RING
				74797	B	
01	26	1	18	74078-SEL		TRANSFER PIN
				74078	G	
01	27	1	21	74247-5		ENVIRONMENTAL SEAL
				74247	L	
01	28	1	22	74888-1		THREAD CAP
				74888	A	

TCW 725 01 02 A ADAIMA PRO

01	29	AR		27318-1			CARTON ASM.
				27318		D	
02	30	1	2	74219-1			CARTON
				74219		D	
02	31	3	3	74218-1			ROW SEPARATOR
				74218		D	
	32	2	4	27317-1			DEVICE SEPARATOR
				27317		D	
02	33	AR	5	13608-4			CLOSURE TAPE
				13608-4			

! NOTES, REV.DATA,DISTRIBUTION,OPERATING CHARACTERISTICS,SPECIAL REQUIREMENTS !

REV DESC: CHG 74408-1 TO 28744-1 ! CCB APPROVAL DATE: 98/02/24

DFTG WORK GROUP: PRECISION CONTROLS ! ECN ORIGINATOR: DI T HA

NOTES:

1 - ACTUATION PRESSURE ---------- 90-160 PSIG

2 - RELEASE PRESSURE ---------- 20 PSIG MIN.

3 - DIFFERENTIAL PRESSUERE ---------- 55 PSI MAX.

TCN 725 01 02 A ADAIMA PRO

4 - DEVICE TO BE MARKED PER CODING SPECIFICATION 75871-6.

DETAILED REVISION DESCRIPTION:

99 CR M39209, 28744-1 CONTACT (MOV) WAS 74408-1
STOCK DISPOSITION
FINISHED DEVICES - USE
PARTS & SUB ASMS - USE SUBS, HOLD PARTS

TCW 725 01 02 A ADAIMA PRO

TEXAS INSTRUMENTS INC. ! MATERIALS & CONTROLS GROUP ! SITE

PARTS LIST ! PROJECT !PART NUMBER: 77PSL2-1 !REV LTR: L CLS: 65(
EXPLOSION ! NUM: 3423 !DWG PFX: NUM:77PSL2-1 !ECN INC.DT: 98/02/2(

TITLE: PRESSURE SWITCH (CUST P/N F2VC-9F924-AB)

LV	CNT	QTY/UM	ITM	PART/DRAWING NUMBER	RV	NOMENCLATURE/PARM DATA
01	1	REF		36952-1		FINAL ASSEMBLY
				36952-1	A	
01	2	1	27	27759-10		BASE ASSEMBLY
				27759SH1	L	
02	3	1	2	46515-2		BASE (BROWN)
				46515	N	
02	4	1	3	36888-1		STATIONARY TERMINAL
				36888	D	
02	5	1	4	36897-2		MOVABLE TERMINAL ASM
				36897SH1	H	
03	6	1	2	36887-1		MOVABLE TERMINAL
				36887	D	
03	7	1	3	74916-1		RIVET
				74916	G	

TCN 715 01 02 A ADAIMC PRO

03	8	1	4	36889-1			SPRING ARM
			1	36889		B	
04	9	AR	2	27716-1			SPR MAT'L STR SPEC(.216 LBS/K)
				27716SH1		D	
03	10	1	5	28744-1			MOVABLE CONTACT
				28744		D	
01	11	1	24	27293-13			SENSOR ASSEMBLY
				27293SH2		W	
02	12	1	2	36900-1			MOD SAE J512 HEXPORT
				36900		H	
02	13	1	3	74353-1			GASKET
				74353		H	
02	14	1	4	27713-1			CUP
				27713		F	
02	15	3	5	74176-1			SEAL
				74176		C	
03	16	AR		27225-1			KAPTON STRIP SPEC (.175 LBS/K)
				27225		AB	
02	17	1	6	27639-1			WASHER
				27639		F	
02	18	1	7	27406-1			CONVERTER
				27406		F	
02	19	1	8	73958-2			SPACER
				73958		J	

TCW 715 01 02 A ADAINC PRO

02	20	OR	8	73958-3			SPACER
				73958		J	
03	21	AR		74224-1			KAPTON TAPE (.100 LBS/K)
				74224		F	
02	22	1	9	36656-27			3/4" FORMED DISC
				36656SH1		BM	
02	23	OR	9	36656-28			3/4" FORMED DISC
				36656SH1		BM	
01	24	1	14	74797-1			CRIMP RING
				74797		B	
01	25	1	18	74078-143			TRANSFER PIN
				74078		G	
01	26	1	21	74247-4			ENVIRONMENTAL SEAL
				74247		L	
01	27	1	22	74888-1			THREAD CAP
				74888		A	
01	28	AR		27318-1			CARTON ASM.
				27318		D	

DEV: 77PS
CC: 294
SO: 840
OP: 720
LK: 5720

SPC PROCESS SPECIFICATION

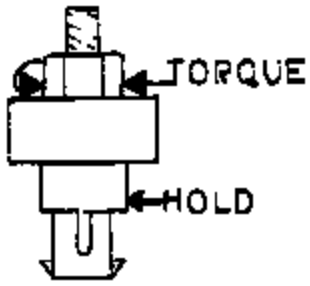
CODE: 77TORQUE

CONTROL CHARACTERISTIC: TIGHTNESS OF BASE TO SENSOR CRIMP

MACHINE: 77PS FINAL ASSEMBLY MACHINE (F.A.M.)

MWO #121980
MECH DWG #143400
ELEC DWG #143398

MEASUREMENT: TORQUE REQUIRED TO TWIST BASE ASSEMBLY RELATIVE TO SENSOR ASSEMBLY.



FREQUENCY: 5 PIECES EVERY 1/2 HOUR.

VISUAL INSPECTION REQUIREMENTS:

1. BASE MUST BE NOT EXHIBIT FRACTURING AFTER CRIMPING.
2. BASE MUST NOT BE CHIPPED.

PROCEDURE

1. OPERATOR TAKES 5 CONSECUTIVE FINISHED DEVICES.
2. OPERATOR ASSEMBLES EACH TO CUSTOM HOLD-DOWN FIXTURE.
3. OPERATOR ASSEMBLES TORQUE WRENCH TO HEXPORT AND TORQUES UNTIL SENSOR MOVES RELATIVE TO BASE ASSEMBLY.
4. RECORD MAX TORQUE OBSERVED AND ENTER DATA INTO 77TORQUE FILE.

NOTE:
IF THE SPC IS OUT OF CONTROL OR OUT OF SPECIFICATION, THE BAR CODE DISPLAY WILL INDICATE TO STOP. THE OPERATOR MUST NOTIFY THE GROUP LEADER OR SUPERVISOR AND TAKE APPROPRIATE ACTION TO BRING THE PROCESS BACK INTO CONTROL.

SIGN OFF ENG_____ DATE / / REV: A

DEV: 77PS
CC: 294
SO: 840
OP: 720
LK: 5720

SPC PROCESS SPECIFICATION

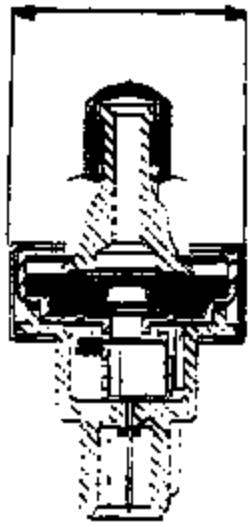
CODE: 77CRDIAM

CONTROL CHARACTERISTIC: MAJOR DIAMETER OF ALUMINUM CRIMP RING AFTER FINAL CRIMP

MACHINE: 77PS FINAL ASSEMBLY MACHINE (F.A.M.)

MFG #121980
MECH DWG #143400
ELEC DWG #143398

MEASUREMENT: MAXIMUM CRIMP DIAMETER OF CRIMP RING.



FREQUENCY: 5 PIECES EVERY 1/2 HOUR.

VISUAL INSPECTION REQUIREMENTS:

1. RING MUST BE FREE OF SLIVERS.
2. RING MUST NOT BE OUT OF ROUND BY MORE THAN .005.

PROCEDURE

1. OPERATOR TAKES 5 CONSECUTIVE FINISHED DEVICES.
2. OPERATOR MEASURES MAXIMUM DIAMETER OF ALUMINUM CRIMP RING WITH DIGITAL CALIPERS.
3. ENTER THIS DATA INTO 77CRDIAM FILE.

NOTE:

IF THE SPC IS OUT OF CONTROL OR OUT OF SPECIFICATION, THE BAR CODE DISPLAY WILL INDICATE TO STOP. THE OPERATOR MUST NOTIFY THE GROUP LEADER OR SUPERVISOR AND TAKE APPROPRIATE ACTION TO BRING THE PROCESS BACK INTO CONTROL.

SIGN OFF ENG_____ DATE / ./ REV: A

DEV: 77PS
CC: 294
SO: 840
OP: 720
LK: 5720

SPC PROCESS SPECIFICATION

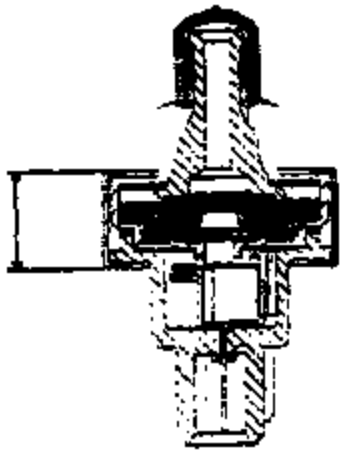
CODE: 77CRHT

CONTROL CHARACTERISTIC: CRIMP HEIGHT OF ALUMINUM CRIMP RING AFTER FINAL CRIMP.

MACHINE: 77PS FINAL ASSEMBLY MACHINE (F.A.M.)

MNO #121980
MECH DWG #143400
ELEC DWG #143398

MEASUREMENT: MAXIMUM CRIMP HEIGHT OF ALUMINUM CRIMP RING.



FREQUENCY: 5 PIECES EVERY 1/2 HOUR.

VISUAL INSPECTION REQUIREMENTS:

1. RING MUST BE FREE OF SLIVERS.
2. RING HEIGHT MUST NOT VARY MORE THAN .005 AROUND PERIPHERY.

PROCEDURE

1. OPERATOR TAKES 5 CONSECUTIVE FINISHED DEVICES.
2. OPERATOR MEASURES MAXIMUM DIAMETER OF ALUMINUM CRIMP RING WITH DIGITAL CALIPERS.
3. ENTER THIS DATA INTO 77CRHT FILE.

NOTE:

IF THE SPC IS OUT OF CONTROL OR OUT OF SPECIFICATION, THE BAR CODE DISPLAY WILL INDICATE TO STOP. THE OPERATOR MUST NOTIFY THE GROUP LEADER OR SUPERVISOR AND TAKE APPROPRIATE ACTION TO BRING THE PROCESS BACK INTO CONTROL.

SIGN OFF ENG_____ DATE / ./ REV: A

DEV: 77PS
CC: 294
SO: 840
OP: 715
LN: 5715

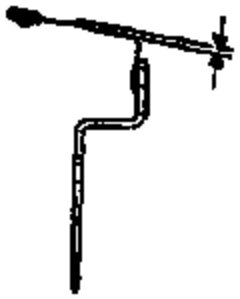
SPC PROCESS SPECIFICATION

CODE: 77BUMP

CONTROL CHARACTERISTIC: TRANSFER PIN BUMP HEIGHT

MACHINE: 77PS EASTERN AUTOMATION MACHINE (E.A.M.)
MMO #121982
MECH DWG #143554
ELEC DWG #143555

MEASUREMENT: HEIGHT OR BUMP AS REFERENCED FROM TOP OF SPRING.



FREQUENCY: 5 PIECES EVERY 1/2 HOUR.

VISUAL INSPECTION REQUIREMENTS:

1. BUMP MUST BE FULLY FORMED AND ROUNDED.

PROCEDURE

1. OPERATOR TAKES 5 CONSECUTIVE MOVABLE TERMINAL ASSEMBLIES.
2. OPERATOR ZERO'S DIAL INDICATOR ON TOP OF SPRING, AND MEASURES HEIGHT TO TOP OF BUMP. (SEE VISUAL AIDE).
3. ENTER THIS DATA INTO 77BUMP FILE.

NOTE:
IF THE SPC IS OUT OF CONTROL OR OUT OF SPECIFICATION, THE BAR CODE DISPLAY WILL INDICATE TO STOP. THE OPERATOR MUST NOTIFY THE GROUP LEADER OR SUPERVISOR AND TAKE APPROPRIATE ACTION TO BRING THE PROCESS BACK INTO CONTROL.

SIGN OFF ENG_____ DATE / ./ REV: A

DEV: 77PS
CC: 294
SO: 840
OP: 715
LK: 5715

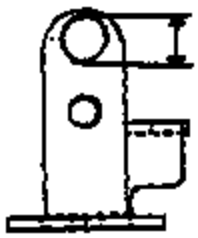
SPC PROCESS SPECIFICATION

CODE: 77CONDIA

CONTROL CHARACTERISTIC: DIAMETER OF ORBITALLY RIVETED CONTACT.

MACHINE: 77PS EASTERN AUTOMATION MACHINE (E.A.M.)
MMO #121982
MECH DWG #143554
ELEC DWG #143555

MEASUREMENT: MAXIMUM ROLL DIAMETER OF CONTACT SHANK AFTER ORBITAL RIVET.



FREQUENCY: 5 PIECES EVERY 1/2 HOUR.

VISUAL INSPECTION REQUIREMENTS:

1. CONTACT MUST BE FULLY INSERTED THROUGH SPRING.
2. CONTACT SHANK MUST BE CONCENTRICLY RIVETED.
3. CONTACT HEAD MUST NOT BE DISTORTED. COMPARE TO RAN CONTACTS

PROCEDURE

1. OPERATOR TAKES 5 CONSECUTIVE MOVABLE TERMINAL ASSEMBLIES.
2. OPERATOR MEASURES ROLL DIAMETER WITH CALIPERS.
3. ENTER THIS DATA INTO 77CONDIA FILE.

NOTE:
IF THE SPC IS OUT OF CONTROL OR OUT OF SPECIFICATION, THE BAR CODE DISPLAY WILL INDICATE TO STOP. THE OPERATOR MUST NOTIFY THE GROUP LEADER OR SUPERVISOR AND TAKE APPROPRIATE ACTION TO BRING THE PROCESS BACK INTO CONTROL.

SIGN OFF ENG_____ DATE / / REV: A

DEV: 77FS
CC: 294
SO: 840
OP: 715
LN: 5715

SPC PROCESS SPECIFICATION

CODE: 77FORCE

CONTROL CHARACTERISTIC: TIGHTNESS OF SPRING RIVETING OPERATION

MACHINE: 77FS EASTERN AUTOMATION MACHINE (E.A.M.)
MMO #121962
MECH DWG #143554
ELEC DWG #143555

MEASUREMENT: FORCE REQUIRED TO ROTATE SPRING AROUND SHANK OF RIVET.

FREQUENCY: 5 PIECES EVERY 1/2 HOUR.

VISUAL INSPECTION REQUIREMENTS:

1. SPRING MUST NOT BE DISTORTED.

PROCEDURE

1. OPERATOR TAKES 5 CONSECUTIVE MOVABLE TERMINAL ASSEMBLIES.
2. INSTALL EACH INTO FORCE TESTER.
3. ZERO GAGE THEN OPERATE LEVER IN A SMOOTH MOTION WHILE OBSERVING GAGE.
4. ENTER MAX FORCE READING INTO 77FORCE FILE.

NOTE:
IF THE SPC IS OUT OF CONTROL OR OUT OF SPECIFICATION, THE BAR CODE DISPLAY WILL INDICATE TO STOP. THE OPERATOR MUST NOTIFY THE GROUP LEADER OR SUPERVISOR AND TAKE APPROPRIATE ACTION TO BRING THE PROCESS BACK INTO CONTROL.

SIGN OFF ENG_____ DATE / ./ REV: A

DEV: 77PS
CC: 294
SO: 840
OP: 715
LK: 5715

SPC PROCESS SPECIFICATION

CODE: 77CHECK

CONTROL CHARACTERISTIC: CHECK STATION DRIFT OR MALFUNCTION.

MACHINE: 77PS BASE ASSEMBLY MACHINE (B.A.M.)

MMO #121981
MECH DWG #143421
ELEC DWG #143422

MEASUREMENT: DIFFERENCE IN BASE GAGE MEASUREMENT BETWEEN THE B.A.M. AUTOMATIC SYSTEM AND THE MANUAL HAND SYSTEM.

FREQUENCY: 5 PIECES EVERY 1/2 HOUR.

VISUAL INSPECTION REQUIREMENTS:

1. BASE ASSEMBLY MUST MEET ALL OTHER VISUAL AND SPC REQUIREMENTS.

PROCEDURE

1. OPERATOR TAKES 5 CONSECUTIVE "GOOD" BASE ASSEMBLIES FROM UNLOAD CONVEYOR.
2. MANUALLY GAGE EACH ASSEMBLY, AND RECORD THE MEASUREMENTS DEVIATION FROM THE CURRENT CHECK STATION TARGET VALUE. NOTE THAT THIS TARGET MAY CHANGE FROM TIME TO TIME.
3. ENTER THIS DATA INTO 77CHECK FILE.

NOTE:

IF THE SPC IS OUT OF CONTROL OR OUT OF SPECIFICATION, THE BAR CODE DISPLAY WILL INDICATE TO STOP. THE OPERATOR MUST NOTIFY THE GROUP LEADER OR SUPERVISOR AND TAKE APPROPRIATE ACTION TO BRING THE PROCESS BACK INTO CONTROL.

SIGN OFF ENG_____ DATE / ./ REV: A

DEV: 77PS
CC: 294
SO: 840
OP: 715
LK: 5715

SPC PROCESS SPECIFICATION

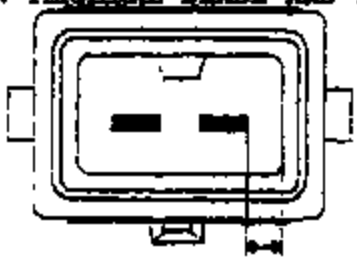
CODE: 77STASEP, 77MOVSEP

CONTROL CHARACTERISTIC: POSITION OF TERMINAL BLADE WITH RESPECT TO GEOMETRIC CENTER OF BASE.

MACHINE: 77PS BASE ASSEMBLY MACHINE (B.A.M.)

MWO # 121961
MECH DWG # 143421
ELEC DWG # 143422

MEASUREMENT: DISTANCE BETWEEN TERMINAL BLADE AND INSIDE WALL OF BASE.



FREQUENCY: 5 PIECES EVERY 1/2 HOUR BOTH TERMINALS.

VISUAL INSPECTION REQUIREMENTS:

1. TERMINALS MUST BE FULLY STAKED. TERMINAL LANCE MUST BE FULLY ROLLED OVER IN PROPER DIRECTION.

PROCEDURE

1. OPERATOR TAKES 5 CONSECUTIVE "GOOD" BASE ASSEMBLIES FROM UNLOAD CONVEYOR.
2. OPERATOR LOCATES LARGEST PLUG GAGE THAT WILL PASS FREE OF BINDING BEYOND THE LEAD-IN CHAMFER OF EACH TERMINAL. PLUG MUST BE HELD STRAIGHT AND NOT INSERTED AT AN ANGLE. SEE VISUAL AIDE FOR MEASUREMENT LOCATION.
3. REPEAT PROCEDURE FOR ASSEMBLIES 2 THROUGH 5.
4. ENTER STATIONARY TERMINAL DATA INTO 77STASEP FILE.
   ENTER MOVABLE TERMINAL DATA INTO 77MOVSEP FILE.

NOTE:

IF THE SPC IS OUT OF CONTROL OR OUT OF SPECIFICATION, THE BAR CODE DISPLAY WILL INDICATE TO STOP. THE OPERATOR MUST NOTIFY THE GROUP LEADER OR SUPERVISOR AND TAKE APPROPRIATE ACTION TO BRING THE PROCESS BACK INTO CONTROL.

SIGN OFF ENG_____ DATE / / REV: A

DEV: 77PS
CC: 294
SO: 840
OP: 715
LK: 5715

SPC PROCESS SPECIFICATION

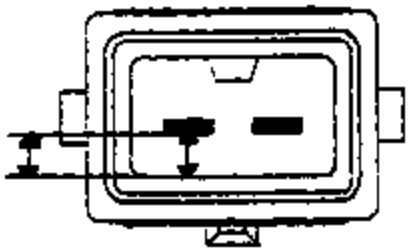
CODE: 77STAPOS, 77MOVPOS

CONTROL CHARACTERISTIC: POSITION OF TERMINAL BLADE WITH RESPECT TO GEOMETRIC CENTER OF BASE.

MACHINE: 77PS BASE ASSEMBLY MACHINE (B.A.M.)

MMO #121981
MECH DWG #143421
ELEC DWG #143422

MEASUREMENT: DISTANCE BETWEEN TERMINAL BLADE AND INSIDE WALL OF BASE.



FREQUENCY: 5 PIECES EVERY 1/2 HOUR BOTH TERMINALS.

VISUAL INSPECTION REQUIREMENTS:

1. TERMINALS MUST BE FULLY STAKED. TERMINAL LANCE MUST BE FULLY ROLLED OVER IN PROPER DIRECTION.

PROCEDURE

1. OPERATOR TAKES 5 CONSECUTIVE "GOOD" BASE ASSEMBLIES FROM UNLOAD CONVEYOR.
2. OPERATOR LOCATES LARGEST PLUG GAGE THAT WILL PASS FREE OF BINDING PAST THE LEAD-IN CHAMFER OF EACH TERMINAL. PLUG MUST BE HELD STRAIGHT AND NOT INSERTED AT AN ANGLE. SEE VISUAL AIDE FOR MEASUREMENT LOCATION.
3. REPEAT PROCEDURE FOR ASSEMBLIES 2 THROUGH 5.
4. ENTER STATIONARY TERMINAL DATA INTO 77STAPOS FILE.
   ENTER MOVABLE TERMINAL DATA INTO 77MOVPOS FILE.

NOTE:
IF THE SPC IS OUT OF CONTROL OR OUT OF SPECIFICATION, THE BAR CODE DISPLAY WILL INDICATE TO STOP. THE OPERATOR MUST NOTIFY THE GROUP LEADER OR SUPERVISOR AND TAKE APPROPRIATE ACTION TO BRING THE PROCESS BACK INTO CONTROL.

SIGN OFF ENG_____ DATE / ./ REV: A

DEV: 77PS
CC: 294
SO: 840
OP: 715
LK: 5715

SPC PROCESS SPECIFICATION

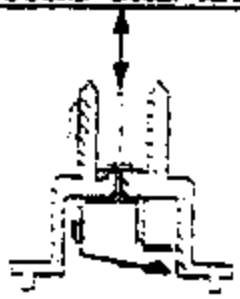
CODE: 77STAPO, 77MOVPO

CONTROL CHARACTERISTIC: TERMINAL RESISTANCE TO PUSHOUT AFTER STAKING OPERATION.

MACHINE: 77PS BASE ASSEMBLY MACHINE (B.A.M.)

MMO #121981
MECH DWG #143421
ELEC DWG #143422

MEASUREMENT: TERMINAL MOVEMENT SUBSEQUENT TO 22 POUND LOAD APPLICATION



FREQUENCY: 5 PIECES EVERY 1/2 HOUR.

VISUAL INSPECTION REQUIREMENTS:

1. TERMINALS MUST BE FULLY STAKED. TERMINAL LANCE MUST BE FULLY ROLLED OVER IN PROPER DIRECTION.

PROCEDURE

1. OPERATOR TAKES 5 CONSECUTIVE "GOOD" BASE ASSEMBLIES FROM UNLOAD CONVEYOR.
2. OPERATOR ASSEMBLES FIRST BASE ASSEMBLY TO DIAL INDICATOR AND MEASURES HEIGHT OF EACH TERMINAL.
3. OPERATOR APPLIES 22 POUND LOAD ON EACH TERMINAL BLADE.
4. OPERATOR REPEATS STEP #2 AND RECORDS DELTA READINGS.
5. REPEAT PROCEDURE FOR ASSEMBLIES 2 THROUGH 5.
6. ENTER STATIONARY TERMINAL DATA INTO 77STAPO FILE. ENTER MOVABLE TERMINAL DATA INTO 77MOVPO FILE.

NOTE: BASE ASSEMBLIES SUBJECTED TO THIS SPC OPERATION MUST NOT BE USED AS GOOD PRODUCT. SCRAP.

NOTE:
IF THE SPC IS OUT OF CONTROL OR OUT OF SPECIFICATION, THE BAR CODE DISPLAY WILL INDICATE TO STOP. THE OPERATOR MUST NOTIFY THE GROUP LEADER OR SUPERVISOR AND TAKE APPROPRIATE ACTION TO BRING THE PROCESS BACK INTO CONTROL.

SIGN OFF ENG_____ DATE / ./ REV: A

DEV: 77FS
CC: 294
SO: 840
OP: 715
LK: 5715

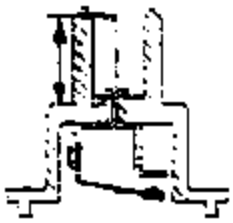
SPC PROCESS SPECIFICATION

CODE: 77START, 77MOVET

CONTROL CHARACTERISTIC: HEIGHT OF TERMINALS AFTER STAKE.

MACHINE: 77FS BASE ASSEMBLY MACHINE (B.A.M.)
MMO #121981
MECH DWG #143421
ELEC DWG #143422

MEASUREMENT: HEIGHT OF TERMINAL TIP ABOVE BASE REFERENCE SURFACE.



FREQUENCY: 5 PIECES EVERY 1/2 HOUR BOTH TERMINALS.

VISUAL INSPECTION REQUIREMENTS:

1. TERMINALS MUST BE FULLY STAKED. TERMINAL LANCE MUST BE FULLY ROLLED OVER IN PROPER DIRECTION.

PROCEDURE

1. OPERATOR TAKES 5 CONSECUTIVE "GOOD" BASE ASSEMBLIES FROM UNLOAD CONVEYOR.
2. OPERATOR ASSEMBLES FIRST BASE ASSEMBLY TO DIAL INDICATOR AND ZERO'S INDICATOR ON BASE REFERENCE SURFACE (SEE VISUAL AIDS).
3. MEASURE DIMENSION FROM REFERENCE SURFACE TO EACH TERMINAL TIP; RECORD AS YOU GO.
4. REPEAT PROCEDURE FOR ASSEMBLIES 2 THROUGH 5.
5. ENTER STATIONARY TERMINAL DATA INTO 77START FILE.
   ENTER MOVABLE TERMINAL DATA INTO 77MOVHT FILE.

NOTE:
IF THE SPC IS OUT OF CONTROL OR OUT OF SPECIFICATION, THE BAR CODE DISPLAY WILL INDICATE TO STOP. THE OPERATOR MUST NOTIFY THE GROUP LEADER OR SUPERVISOR AND TAKE APPROPRIATE ACTION TO BRING THE PROCESS BACK INTO CONTROL.

SIGN OFF ENG_____ DATE / ./ REV: A

DEV: 77PS
CC: 294
SO: 840
OP: 715
LK: 5715

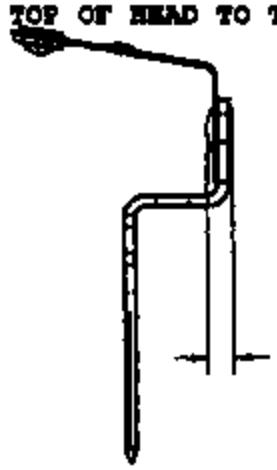
SPC PROCESS SPECIFICATION

CODE: 77RIVHT

CONTROL CHARACTERISTIC: RIVET HEIGHT MOVABLE TERMINAL ASSEMBLER

MACHINE: 77PS EASTERN AUTOMATION MACHINE (E.A.M.)
MMO #121982
MECH DWG #143554
ELEC DWG #143555

EASUREMENT: OVER-ALL HEIGHT OF RIVET FROM TOP OF HEAD TO TOP OF ROLL-OVER.



REQUENCY: 5 PIECES EVERY 1/2 HOUR.

ISUAL INSPECTION REQUIREMENTS:

1. RIVET HEAD MUST NOT HAVE ROUGH EDGES AFTER RIVETING.
2. ROLL OVER ON TUBULAR END MUST BE COMPLETE. ALL THE WAY THROUGH MATERIAL, AND ROUNDED IN APPEARANCE. ROLL MUST NOT BE FLATTENED OUT COMPLETELY.
3. SPRING MUST BE ALIGNED SQUARELY WITH TERMINAL.

ROCEDURE

1. OPERATOR TAKES 5 CONSECUTIVE MOVABLE TERMINAL ASSEMBLIES.
2. OPERATOR MEASURES OVER-ALL RIVET HEIGHT WITH DIGITAL MIC'S.
3. ENTER THIS DATA INTO 77RIVHT FILE.

NOTE:
IF THE SPC IS OUT OF CONTROL OR OUT OF SPECIFICATION, THE BAR CODE DISPLAY WILL INDICATE TO STOP. THE OPERATOR MUST NOTIFY THE GROUP LEADER OR SUPERVISOR AND TAKE APPROPRIATE ACTION TO BRING THE PROCESS BACK INTO CONTROL.

ON OFF ENG_____ DATE / / REV: A

DEV: 77PS
CC: 294
SO: 840
OP: 705
LK: 5705

SPC PROCESS SPECIFICATION

CODE: 77PSCODE

CONTROL CHARACTERISTIC: CRIMP RING DIAMETER INCREASES OR OUT OF ROUNDNESS DUE TO OVER PRESSURE DURING CODING.

MACHINE: MATHEWS CODER (52PS AREA)

MEASUREMENT: GO / NO-GO INSERTION TEST.

FREQUENCY: 5 PIECES EVERY 15 MINUTES.

VISUAL INSPECTION REQUIREMENTS:

1. CODE MUST BE LEGIBLE
2. RING MUST SEAT FULLY IN GAGE AFTER CODING.

PROCEDURE

1. OPERATOR TAKES 5 CONSECUTIVE RINGS OFF ROTARY CODER AS THEY ARE EJECTED.
2. OPERATOR PLACES 5 RINGS INTO GO GAGE ONE AFTER ANOTHER.
3. OPERATOR ENTERS "100" INTO SPC IF PART SEATS FULLY INTO GAGE, OR ENTER "0" INTO SPC IF PART WILL NOT SEAT FULLY INTO GAGE.

NOTE:
IF THE SPC IS OUT OF CONTROL OR OUT OF SPECIFICATION, THE BAR CODE DISPLAY WILL INDICATE TO STOP. THE OPERATOR MUST NOTIFY THE GROUP LEADER OR SUPERVISOR AND TAKE APPROPRIATE ACTION TO BRING THE PROCESS BACK INTO CONTROL.

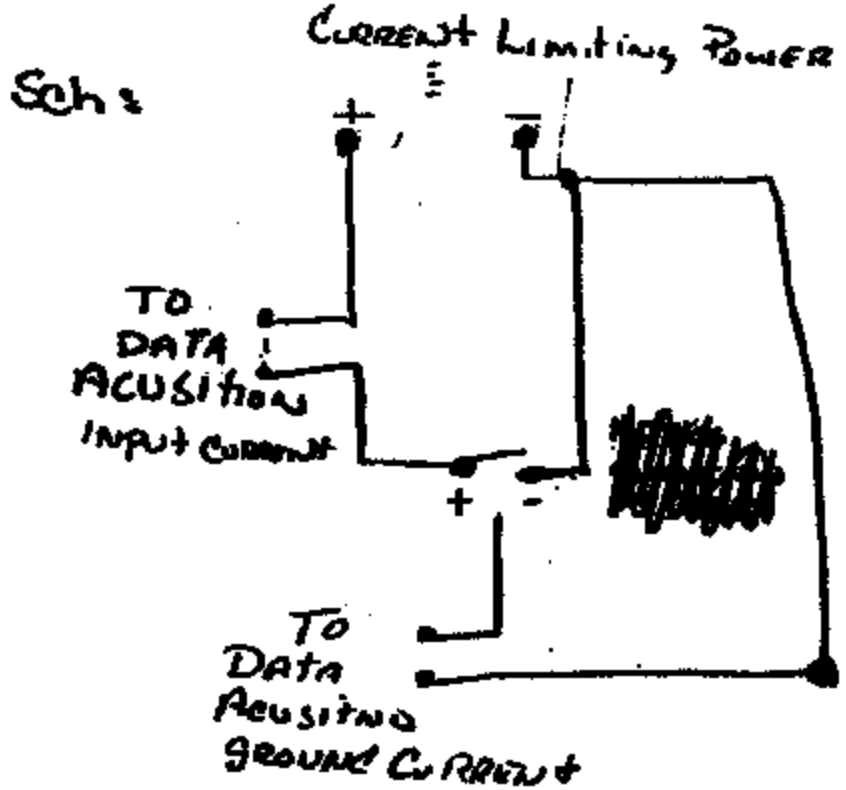
SIGN OFF ENG_____ DATE / / REV: A

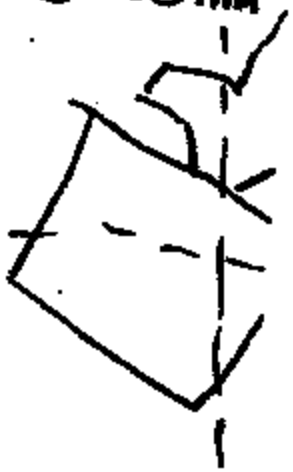
77PS part differences.

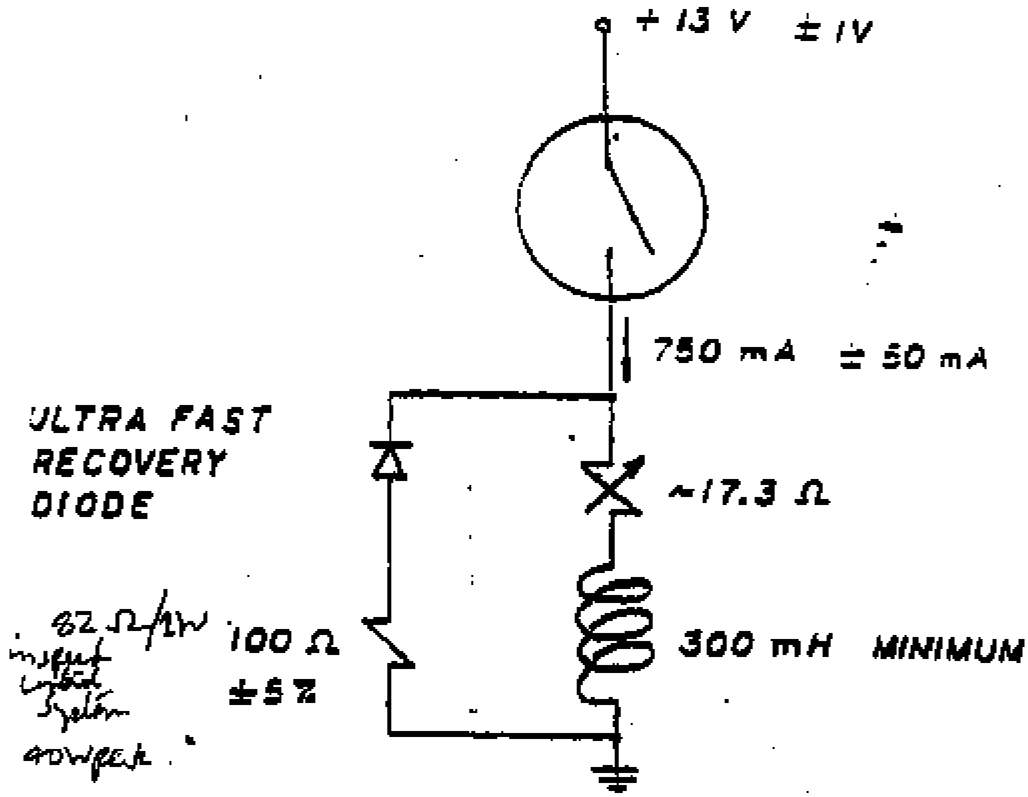
	77PS2-1	77PS3-1	77PS4-1	
description	part number	part number	part number	EFFECT
CUP	27713-1		27713-2	Spacer seat to bump height 4/1000 larger on 2-1 then 4-1
HEXPORT	36900-1		37067	4-1 CBore is .330 (.13 deeper than 2-1) Same math, diff plating
DISC	36856-27		36856-35	*-35 measured height = .0275 +/- .0003"
(OR)	36856-28		36856-41	*-41 measured height = .0291 +/- .0003"
				*-27 measured height = .0298 +/- .0003"
				*-28 measured height = .0310 +/- .0003"
				Crown height on 4-1 are ~ 2/1000 to 4/1000 lower than 2-1 (measured)

CURRENT Limited Bur

Sch:



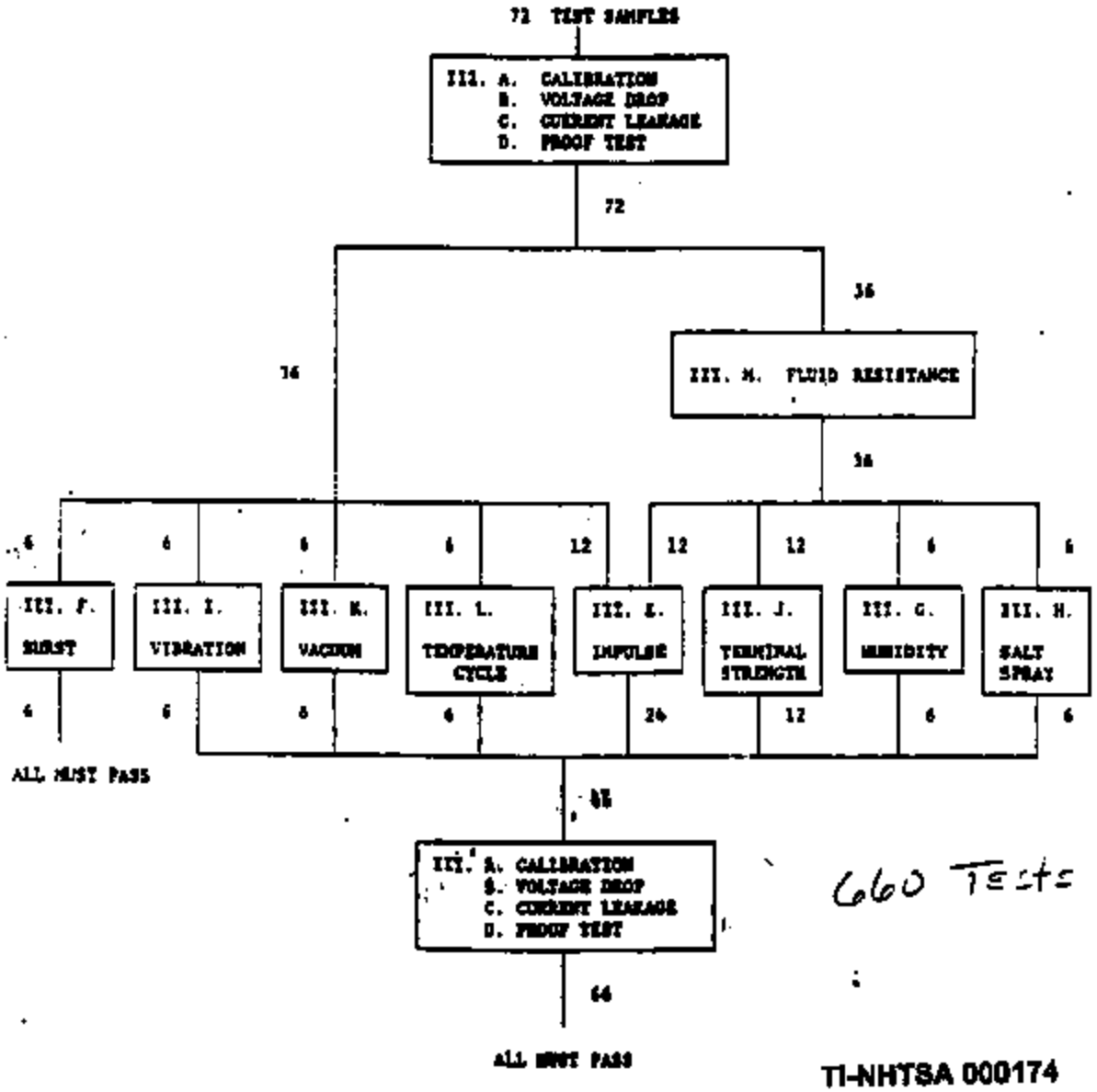




DEACTIVATE SWITCH
TEST SET UP

FIGURE 4

PRODUCTION VALIDATION FLOW CHART



TI-NHTSA 000174

Engineering Specification

SWITCH ASSEMBLY - SPEED CONTROL DEACTIVATE

I. General

This specification covers the test requirements for the speed control deactivate switch -9F924- [illegible] speed control components. Design changes on the switch assembly or its components shall not be made without compliance to Section V of this specification and written approval from the releasing Production Engineering Office.

This engineering specification is a supplement to the released drawing of the above part, and all requirements herein must be met in addition to all other requirements of the part drawing. Minimum measures necessary for demonstrating compliance to these requirements are given in each section.

The engineering tests, sample sizes, and test frequencies contained within this engineering specification reflect the minimum requirements established to provide a regular evaluation of conformance to design intent. The engineering test program is intended as a supplement to normal material inspections, dimensional checking and in-process controls, and should in no way adversely influence other inspection operations.

Ql suppliers may implement different test sample sizes and frequencies providing these changes have been included in an alternate Control Plan approved by the design responsible Product Engineering Office and documented in by SQA.

II. PRODUCTION VALIDATION AND IN-PROCESS TESTS

- Production Validation (PV) Tests must be completed satisfactorily with parts from production tooling (and processes where possible) before ISIR approval and authorization for shipment of production parts can be effected. Parts must be revalidated completely, as per Section V whenever any change is made which could possibly affect part function or performance.

- In-Process Test Phase 1 (IP-1) - IP-1 tests are used to demonstrate process capability and must be completed using initial production parts from production tooling and processes prior to first production shipment approval. IP-1 tests are to continue in effect until process capability is demonstrated.

- In-Process Tests Phase 2 (IP-2) - IP-2 test program may be implemented only after process capability has been established. Tests must be completed with production parts on a continuing basis. Samples for these tests must be selected on a random basis to represent the entire production population as much as possible. In the event that any of the requirements in these tests is not met, the reaction plan specified in Ford Q101 Sect. 3.5, "Engineering Specification (ES) Test Performance Requirements" shall be invoked.

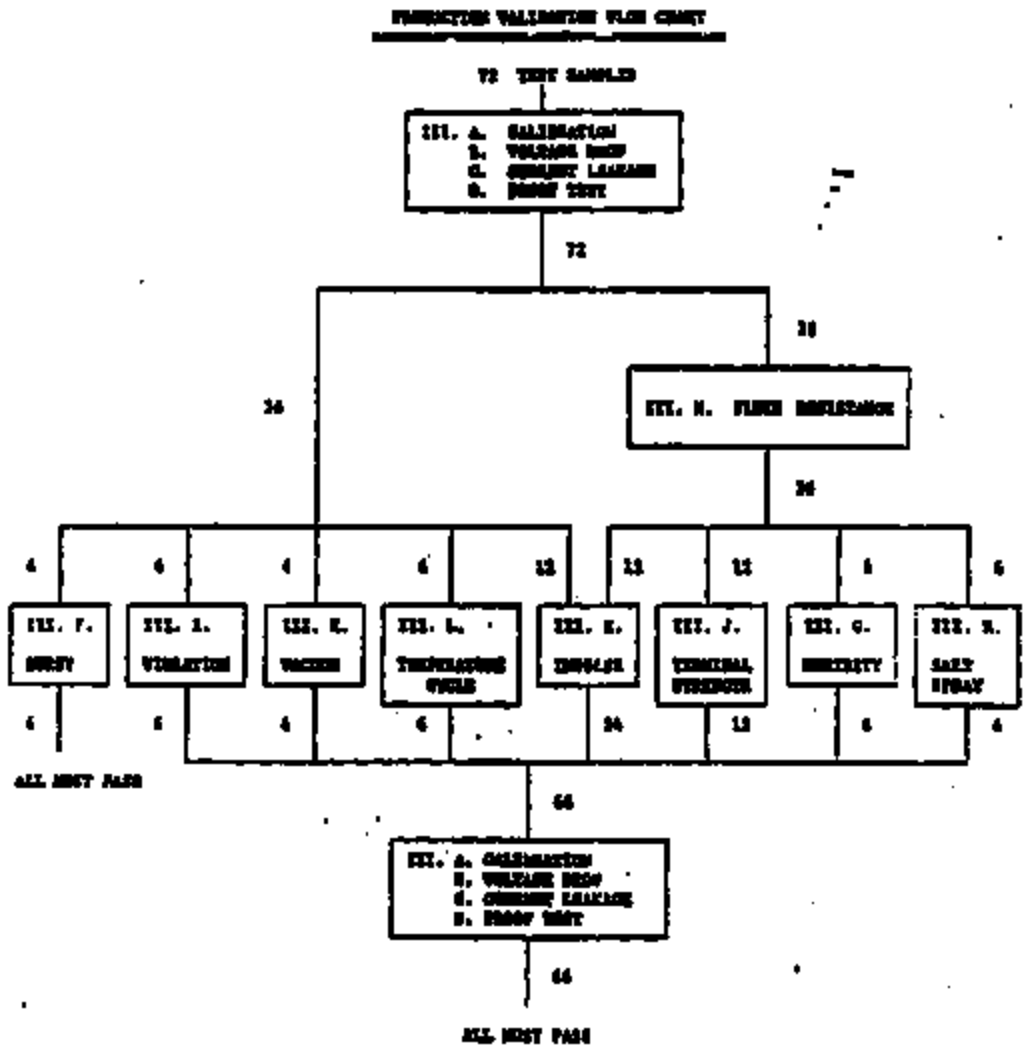
FRAME 2 OF 18	REVISED		▽ ES-F2VC-9F924-AA NUMBER

FORM PD 3947-a2 (Previous versions may not be used)

SECTION III. TABLE OF TESTS

Item	Test Name Functional Tests	PRODUCTION VALIDATION Minimum Sample Size	PRODUCTION VALIDATION Statistical Test Acceptance Criteria	IN-PROCESS IP-1 Minimum Sample Size	IN-PROCESS IP-1 Statistical Test Acceptance Criteria	IN-PROCESS IP-2 Minimum Sample Size	IN-PROCESS IP-2 Statistical Test Acceptance Criteria
III.							
▽ A	Calibration	72	P90-.96	100%	All Must Pass	100%	All Must Pass
B	Voltage Drop	72	P90-.96	12/Mo.	P90-.84	4/Lot	" " "
C	Current Leakage	72	P90-.96	3/Mo.	P90-.56	4/Lot	" " "
D	Proof Test	72	P90-.96	12/Mo.	P90-.84	4/Lot	" " "
F	Burst	6	P90-.72	3/Mo.	P90-.56	4/Lot	" " "
I	Vibration	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
J	Terminal Strength	12	P90-.84	6/Mo.	P90-.72	4/Lot	All Must Pass
K	Vacuum	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
L	Temperature Cycle	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
M	Fluid Resistance	36	P90-.94	36/12Mo	P90-.94	36/12Mo.	P90-.94
	Durability Tests						
III.							
E	Impulse	24	P90-.90	12/Mo.	P90-.84	3/3 Mo.	P90-.56
G	Humidity	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
H	Salt Spray	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72

Engineering Specification



FRAME 4 OF 18	REVISED		NUMBER

PD 3947-82

III. TEST PROCEDURES AND REQUIREMENTS

▽ a. Calibration

1. Test Requirements

a. Switch calibration is to be checked at room temperature (16°C-32°C) using ambient air or equivalent.

b. Calibration settings shall be specified on the part drawing with the settings checked after 2 or more pressure cycles with ambient air, or equivalent. Pressure cycle range is to be determined by the manufacturer to insure switch calibration stability. The cut-in and differential set points are to be measured while conducting 750 ± 50 milliamperes while 13.0 ± 1.0 volts D.C. is applied. The cut-in point is to be checked with increasing pressure.

c. The cut-out point is to be checked with decreasing pressure, and the differential set point is to be calculated using the cut-in pressure minus the cut-out pressure.

2. Acceptance Requirements

a. Nonconformance is defined as any switch point which falls outside the tolerance band specified on the part drawing.

b. Voltage Drop

1. Test Requirements

a. Voltage drop is to be measured after 2 or more cycles with ambient air or equivalent from 0 to 10,000 ± 172 KPa (1450 ± 25 PSI) while conducting 750 ± 50 milliamps and 13.0 ± 1.0 volts D.C. is applied to the switch. Under these conditions with the switch closed the voltage drop is to be measured. Millivolt connection interface terminals to be less than 10 millivolts.

2. Acceptance Requirements

a. Nonconformance is defined as a voltage drop in excess of 200 millivolts.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

C. Current Leakage

1. Test Requirements

a. Current leakage is to be checked with 500 volts, 60 Hz alternating current.

b. Current leakage is to be checked:

(1) Between the switch leads with the contacts open.
(2) Between the lead and the switch housing with contacts closed.
(3) Between either lead and switch housing with the contacts open.

2. Acceptance Requirements

a. Nonconformance is defined as any leakage current in excess of one hundred (100) microamperes.

D. Proof Test

1. Test Requirements

a. Subject sample switches to Section A to establish their initial switching pressures.

b. Proof test is to be conducted using brake fluid or equivalent as the pressure medium. Test pressure shall be as specified on the part drawing. Test pressure shall be isolated from pressure source and held for not less than 10 seconds. — 3000 psi 4000 psi Ram Car Truck

c. Recheck the switches to Section A.

2. Acceptance Requirements

a. No evidence of fluid leakage, seepage, or drop in test pressure greater than 410 KPa.(62 PSI) is permitted.

b. A change in cut-in and cut-out pressures greater than ± 5% from the initial value is not permitted.

c. The test samples must be destroyed after testing.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

E. Impulse

1. Test Requirements

a. Test the switch for a total of 500,000 cycles. Cycle pressure between (low) 0-276 kPa (0-40 psi) and (high) 10,000 ± 345 kPa (1450 ± 50 psi).

1) 0 - 475,000 cycles: 13 ± 1 volts, green current to monitor function.

2) 475,001 - 500,000 cycles: 13 ± 1 volts D.C., 750 ± 50 ma., per figure 4.

b. Brake fluid temperature to be 135 ± 14°C and ambient temperature to be 107°C min.

c. Cycle rate is to be 110-130 cycles per minute.

d. Switch must open and close each cycle.

2. Acceptance Requirements

a. After impulse test check to sections A, B, C, & D using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, & D.

c. Samples used for this test must be destroyed after all testing is completed.

F. Burst

1. Test Requirement

a. Burst strength is to be checked using brake fluid or equivalent as the pressure medium.

b. Pressurize the switch to 48.3 kPa (7000 PSI) minimum and hold for 30 seconds minimum.

2. Acceptance Requirements

a. Nonconformance is defined as any evidence of fluid leakage or seepage from the switch or threads. Samples used for this test must be destroyed after testing is completed.

G. Humidity

1. Test Requirements

a. Mount the switch in the test port in a humidity chamber. Currently released mating electrical connector must be installed before start of test.

b. Subject the switch to ten (10) continuous humidity cycles as follows:

(1) Raise temperature to 65 +10/-2 °C over 2.5 hours; at 90-95% relative humidity.

(2) Hold 3 hours at 65 +10/-2 °C at 90-95% relative humidity.

(3) Lower temperature to 25 +10/-2 °C over 2.5 hours; at 80-95% relative humidity.

2. Assurance Requirements

a. Within 15 minutes after completion of the tenth humidity cycle check the switch to sections A, B, C, D, using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D.

H. Salt Spray

1. Test Requirements

a. Mount the switch in the test port in a salt spray chamber. The currently released mating electrical connector and wiring must be installed prior to start of test.

b. Expose the switch assembly to 72 hours of salt spray per ASTM B-117.

2. Assurance Requirements

a. After exposure, check the switch to sections A, B, C, D, using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

1. Vibration

1. Test Requirements

a. Mount the switch in the test part and attach the currently released mating electrical connector before start of test.

b. Switches are to be vibrated in all 3 planes with electrical continuity being monitored during the entire test. See Figure 1 for switch orientation in the 3 planes. Vibration tests are to be conducted at room temperature using brake fluid, ambient air, or equivalent as the pressure medium.

c. Internal pressure shall be maintained at 0 KPa @ when the switch is in the closed position and 1.1 times max actuation pressure shown on print when the switch is in the open position.

d. Vibrate the switch at 1.5 mm displacement (peak-to-peak) while varying the frequency uniformly from 5 to 50 to 5 Hz over a 5 minute period.

e. Vibrate the switch in alternate one-hour periods in the open and closed positions for a total of 8 hours in each plane. (Total test time is 24 hours).

2. Acceptance Requirements

a. After the entire vibration sequence check the switches to sections A, B, C, or D using the procedure established in each section.

b. Nonconformance is defined as any evidence of leakage or any change in electrical continuity/discontinuity during the vibration cycles, or any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

J. Terminal Strength

1. Test Requirements

a. Mount the switch in the test port.

(1) Apply a 89 ± 9 N axial force to each terminal.

(2) With a pendulum apply a 45 ± 5 N impact force to the switch housing at the connector end, perpendicular to the centerline axis of the switch. See Figure 2 for force application point and direction.

2. Acceptance Requirements

a. Check the switch to sections A, B, C, and D using the procedures established in each section.

b. Nonconformance is defined as any terminal or housing fracture, or any switch not meeting the criteria in sections A, B, C, or D.

K. Vacuum

1. Test Requirements

a. Mount the switch in the test port. Vacuum tests are to be conducted at room temperature using ambient air as the pressure medium.

b. Subject the switch to 5 cycles of vacuum from atmospheric pressure (760 mm Hg) to an absolute pressure of 3.4 mm Hg. Maintain the vacuum for a minimum of 60 seconds.

2. Acceptance Requirements

a. Check the switch to sections A, B, C, and D using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, and D.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

L. Temperature Cycle

1. Test Requirements

a. Mount switches in test parts; test to be run using currently released brake fluid.

b. Repeat the following procedure 25 times.

(1) Lower the switch and fluid temperature to at least -40°C.

(2) Cycle the switches ten times at 10 seconds/cycles. One cycle consists of a pressure variation from 0 - 276 KPa.G (0-40 psi) to 10,000 ± 345 KPa.G (1450 ± 50 PSI). Note: Switch must open and close each cycle.

(3) Raise switch and fluid temperature to 38°C minimum.

(4) Repeat Step 2.

c. At completion of Step b, check switches per sections A, B, C, and D.

2. Acceptance Requirements

a. Nonconformance is defined as any evidence of switch fluid leakage, seepage, or not meeting the criteria of sections A, B, C, and D.

M. Fluid Resistance

1. Test Requirements

a. Mount the switch in the test part and orient as installed in the vehicle.

b. Install the currently released mating electrical connector (with wire leads) to the switch.

c. Sequentially, immerse the switch into each of the specified fluids, at a temperature of 23 ± 2 °C, for 5 ± 1 second. Remove the switch and drain and store the switch for the specified time at room temperature, prior to immersing into the next fluid.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

Fluid	Drain Time	Storage Time
Reference Fuel C ASTM D471	60 ± 5 min.	none
10W40 Engine Oil	24 ± 1 hour	14 days
Ethylene Glycol/ Water 50/50 by Volume	24 ± 1 hour	24 ± 1 hour
Brake Fluid DOT 3	24 ± 1 hour	48 ± 1 hour
Automatic Transmission/ Power Steering Fluid (none) ESP-M2C166-G1	24 ± 1 hour	14 days
Isopropyl Alcohol/ Water 50/50 by Volume	24 ± 1 hour	none
Reference Fuel C, ASTM D471 with Methyl Alcohol 85/15 by Volume	24 ± 1 hour	none

d. For the Flow Chart, subject the prescribed number of immersed switch's to the post immersion tests specified below:

III. E. Impulse
III. G. Humidity
III. H. Salt Spray
III. J. Terminal Strength

Acceptance Requirements

a. Switches must fully meet the requirements of the specified post immersion test.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

IV. STATISTICAL ANALYSIS METHODS

A. For PV, IP-1 and IP-2 tests, all samples tested must pass. Having all the required sample size [illegible] will provide data to support the conclusion that the switch has a minimum reliability R, at a given confidence of C. The notation Pa-R is interpreted as minimum reliability equal to R, at a confidence C; thus P90-.90 means a minimum reliability of 90% at 90% confidence.

B. All samples must pass in the statistical test acceptance criteria stated for tests with 100% frequency; or samples from lots, which could have a variable size.

V. REVALIDATION REQUIREMENTS

A. No change in design, material, process or component supplier shall be made without prior approval from the releasing Product Engineering Office. As part of approving a change, the releasing Product Engineering Office will establish the portion of the Product Validation tests required to be run to revalidate the switch. The following table is to be used as a guide in determining the type of tests required for revalidation requirements.

NEEDED CHANGE REVALIDATION

Component	Process or Material Change or New Supplier
1. Terminals, Contacts, or Connector	III, B, C, E, G, H,I, J, L, M.
2. Case or Housing	All Tests
3. Disc or Diaphragm	III, A,D,E,F,I,K,L.
4. Fitting or Fluid Connection	III, B, C, F, H, I, M.

B. Annual revalidation is not required on carryover switches.

VI. LOT DEFINITION

A lot is defined as no more than eight (8) hours of production up to 4,000 pieces. If shifts extend beyond eight (8) hours, or more than 4,000 pieces are produced in a shift, the product must be separated into at least two lots.

VII. RECORD RETENTION

A. Recording and record retention shall conform with Ford Q-101.

B. Production Validation test results and analysis are to be forwarded to the releasing Product Engineering Office before approval for shipment of production parts can be granted.

C. In-Process test results shall be available at the supplier's manufacturing facility for the releasing Product Engineering Office and Ford SQA or its representatives to review on request.

VIII. INSTRUCTIONS AND NOTES

All switches are to be identified with the Ford part number, supplier identification, and a date code indicating final assembly.

All test equipment and test procedures for tooling to this specification must be approved by the releasing Product Engineering Office and no change in equipment or procedure may be made without their written concurrence.

Test part configuration is shown in Figure 1.

O-rings, if used in the design, shall be free from cuts, nicks, abrasions or any other damage which would result in a fluid leak.

All switches must have a shipping cap installed over the port threads to prevent contamination. All shipping caps must be approved by the releasing Product Engineering Office prior to production incorporation.

All switches that do not pass the calibration test are to either be readjusted and rechecked, or scrapped. (Salvage of component parts permitted with 100% reinspection).

If product nonconformance occurs for test Sections III. B, C, D, E, F, and J, production shall be stopped and the problems corrected. All production lots shall be sorted 100% prior to shipment. Suspected nonconformance of any shipped parts shall be reported immediately to the releasing Product Engineering Office.

If nonconformance of the statistical acceptance criteria occurs for test Sections III. G, H, I, K, L and M, a cause to recall the subject weeks production and to stop production may result.

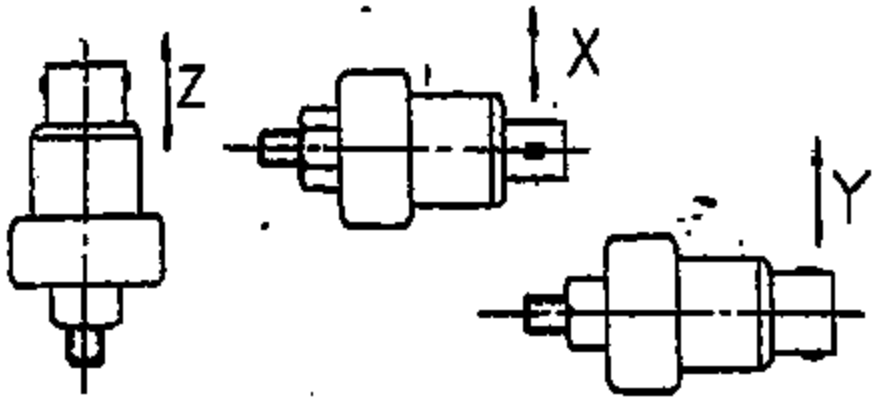
IX. COMPILATION OF REFERENCE DOCUMENTS

ASTM B-117, Salt Spray Testing

Ford Q-101, Quality System Standard - 1990 Edition

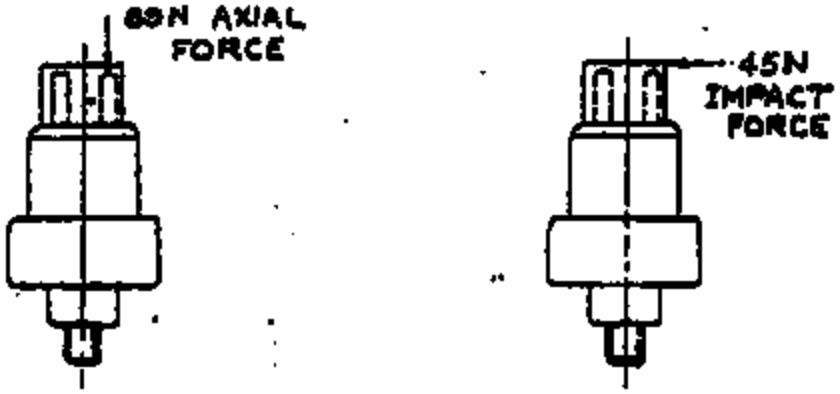
ES-F9EB-14A464-AA, Specification - ELV Assy - Wire Connector

ES-F2VF-9C733-AA, Specification - Servo Assembly Speed Control



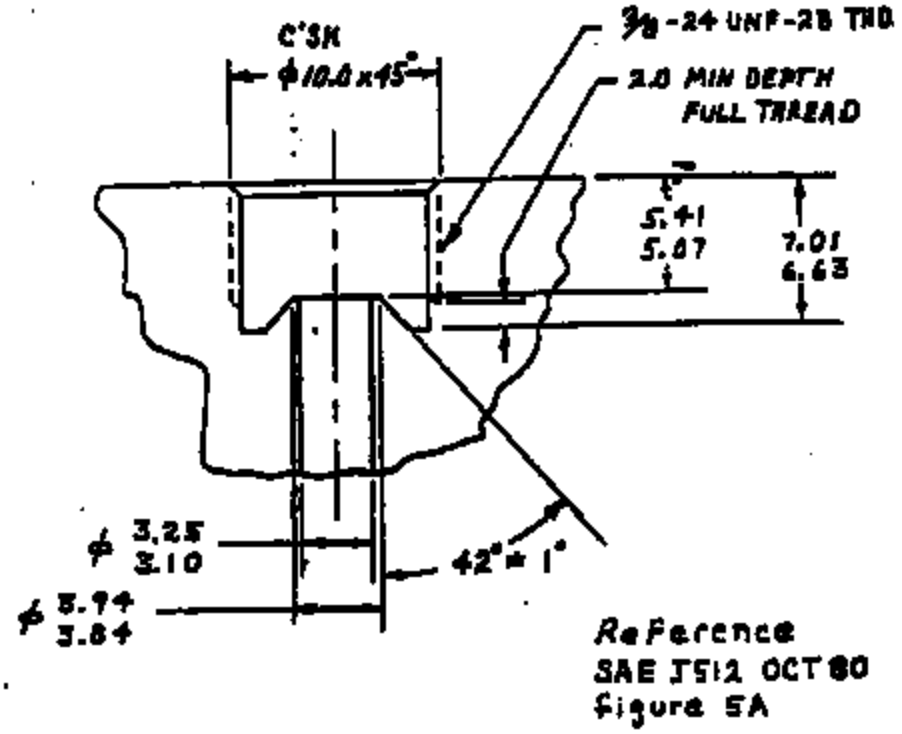
VIBRATION TEST - SWITCH ORIENTATION

FIGURE 1.



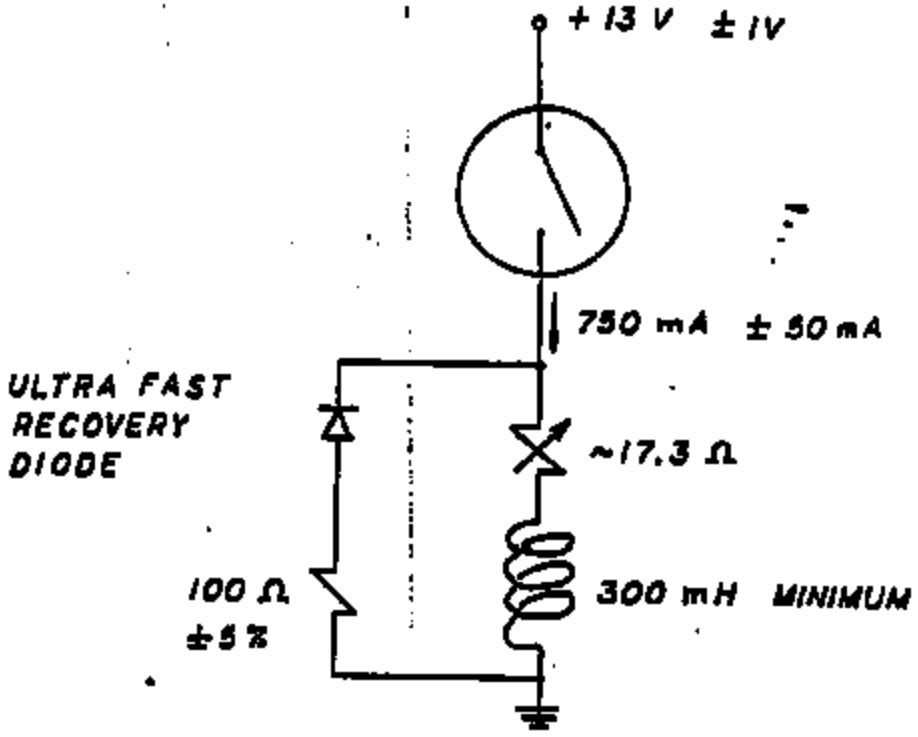
TERMINAL STRENGTH - LOAD ORIENTATION

FIGURE 2.



TEST FIXTURE PORT CONFIGURATION

FIGURE 3

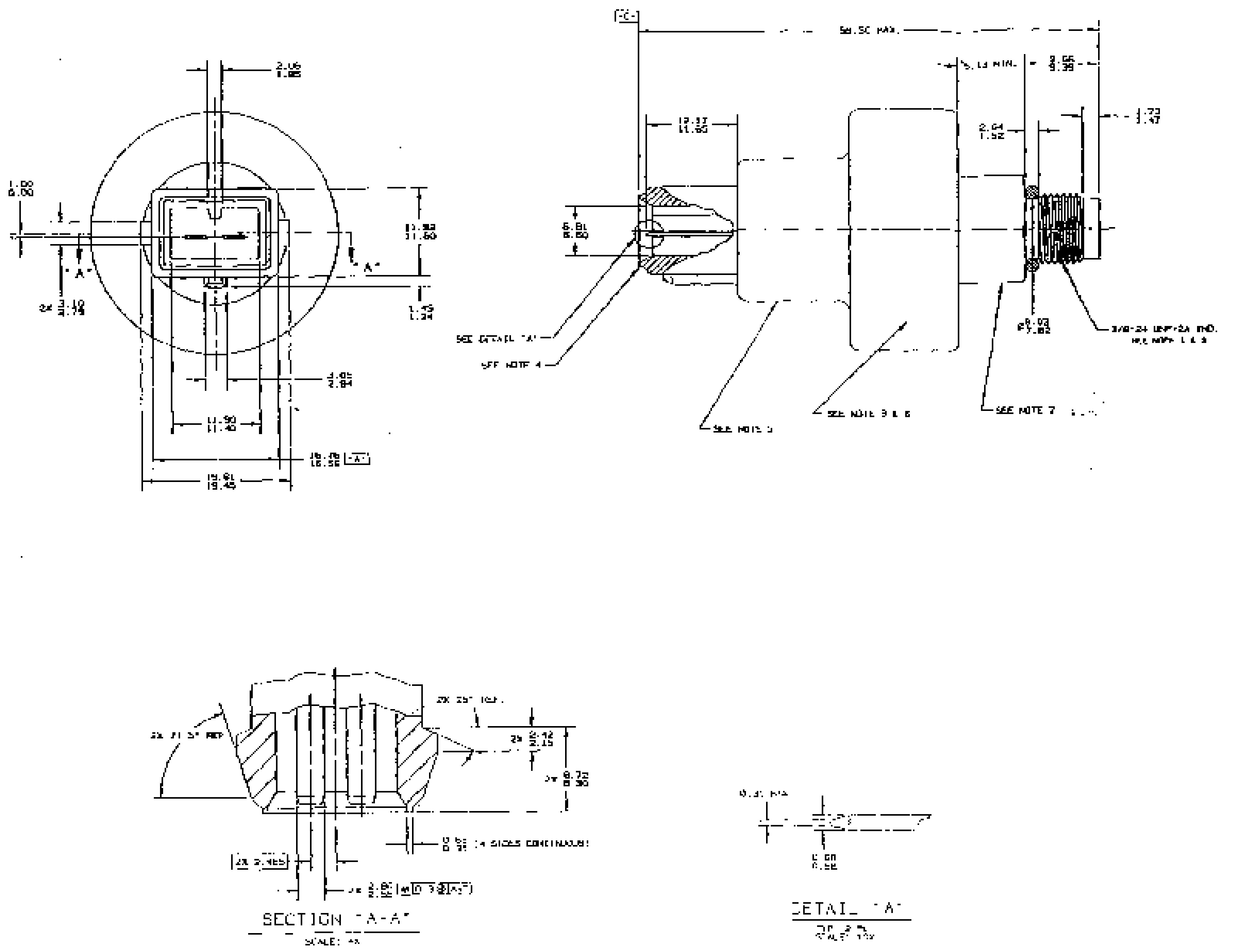


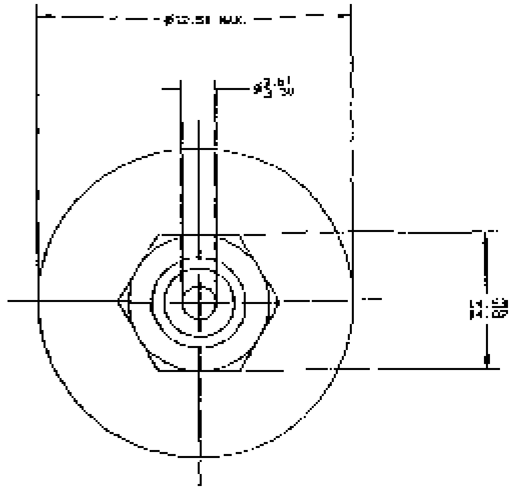
DEACTIVATE SWITCH
TEST SET UP

FIGURE 4

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	B	FORD NOTOP SPEC. WAS # ES-E5SC-9N924-AA LR #17205 D.L.	5-18-94	





REFERENCE ONLY
JAN 22 199[illegible]

SPECIFICATIONS

DEVICE MUST CONFORM TO FORD MOTOR CO. SPEC. NO. ES-F3GA-9N924 AA.

NOTES:

1. PROTECTIVE COVER ON THREADS REQUIRED FOR SHIPMENT
2. ELECTROPLATED THREADS ARE MANUFACTURED TO ANSI STD B1.1 WHEREBY MAJOR AND PITCH DIAMETERS CONFORM TO CLASS 2A LOWER LIMITS/ 3A UPPER LIMITS AFTER PLATING. THE PLATED PART MUST ASSEMBLE TO THE 3A GO PD GAUGE WITH AN APPLIED TORQUE OF 4.5 IN LBF OR LESS.
3. STAMP DATE CODE AND FORD P/N ON THIS SURFACE.
4. SEALING SURFACE MUST BE FREE OF FLASH OR VOIDS WHICH WOULD BE DETRIMENTAL TO SEALING PERFORMANCE.
5. STAMP CALIBRATION PROOF MARK ON THIS SURFACE
6. CRIMP RING MATERIAL TO BE 5052 ALUMINUM.
7. HEXPORT PLATING TO BE ZINC WITH YELLOW CHROMATE.

TI-NHTSA 000192

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM

TOLERANCE ON FRACTIONS DECIMALS ANGLES

BY CORY MASLEN DATE 7-30-92

TEXAS INSTRUMENTS

ctric furnace carry the prefix E before their number, i.e., E52100. A series of four numerals designates the composition of the AISI steels the first two indicate the steel type, and the last two indicate, as far as feasible, the average carbon content in "points" or hundredths of 1 percent. Thus 1020 is a carbon steel with a carbon range of 0.18 to 0.23 percent, probably made in the basic oxygen or basic open-hearth furnace, and E4340 is a nickel-chromium-molybdenum steel with 0.38 to 0.43 percent carbon made in the electric-arc furnace. The compositions for the standard steels are listed in Tables 6.2.12a and 6.2.12b. A group of steels developed during World War II, known as NE steels, has been discontinued, although the latter alloys have been included in the AISI steels. The NE steels that were retained are those with the first two digits 86, 87, or 98. A group of steels known as H steels, which are similar to the standard AISI steels, is being produced with a specified Jominy hardenability; these steels are identified by a suffix H added to the conventional series number. In general, these steels have a somewhat greater allowable variation in chemical composition but a smaller variation in hardenability than would be normal for a given grade of steel. This smaller variation in hardenability results in greater reproducibility of the mechanical properties of the steels on heat treatment; therefore, H steels have become increasingly important in machinery steels.

Boron steels are designated by the letter B inserted between the second and third digits, e.g., 50B44. The effectiveness of boron in increasing hardenability was a discovery of the late thirties, when it was noticed that heats treated with complex deoxidizers (containing boron) showed exceptionally good hardenability, high strength, and ductility after heat treatment. It was found that as little as 0.0005 percent of boron increased the hardenability of steels with 0.15 to 0.50 carbon, whereas boron contents of over 0.003 percent had an adverse effect on hot workability. Boron steels achieve special importance in times of alloy shortages, for they can replace such costlier alloying elements as nickel, molybdenum, chromium, and manganese and, when properly heat-treated, possess physical properties comparable to the alloy grades they replace. Additional advantages for the use of boron in steels are a decrease in susceptibility to flaking, formation of less adherent scale, greater softness in the cold-rolled condition, and better machinability.

Specific applications of these steels cannot be given, since the selection of a steel for a given part must depend upon an intimate knowledge of ferrous steels as the availability and cost of the material, the detailed design of the part, and the severity of the service to be imposed. However, the mechanical properties desired in the part to be heat-treated will determine to a large extent the carbon and alloy contents of the steel. Table 6.2.13 gives a résumé of mechanical properties that can be expected on heat-treating AISI steels, and Table 6.2.14 gives an indication of the effect of mass on the mechanical properties of heat-treated steels.

The low-carbon AISI steels are used for carburized parts, mild-headed bolts and rivets, and for similar applications where

Table 6.2.12a Chemical Composition of AISI Carbon Steels

AISI grade designation	Chemical composition limits (ladle analysis), %			
	C	Mn	P	S
1006	0.08 max	0.25–0.40	0.04 max	0.05 max
1008	0.10 max	0.30–0.50	0.04 max	0.05 max
1010	0.08–0.13	0.30–0.60	0.04 max	0.05 max
1012	0.10–0.15	0.30–0.60	0.04 max	0.05 max
1013	0.11–0.16	0.30–0.60	0.04 max	0.05 max
1016	0.13–0.18	0.60–0.90	0.04 max	0.05 max
1017	0.15–0.20	0.30–0.60	0.04 max	0.05 max
1018	0.15–0.20	0.60–0.90	0.04 max	0.05 max
1019	0.15–0.20	0.70–1.00	0.04 max	0.05 max
1020	0.18–0.23	0.30–0.60	0.04 max	0.05 max
1021	0.18–0.23	0.60–0.90	0.04 max	0.05 max
1022	0.18–0.23	0.70–1.00	0.04 max	0.05 max
1023	0.20–0.25	0.30–0.60	0.04 max	0.05 max
1025	0.22–0.28	0.30–0.60	0.04 max	0.05 max
1026	0.22–0.28	0.60–0.90	0.04 max	0.05 max
1030	0.28–0.34	0.60–0.90	0.04 max	0.05 max
1035	0.32–0.38	0.60–0.90	0.04 max	0.05 max
1037	0.32–0.38	0.70–1.00	0.04 max	0.05 max
1038	0.35–0.42	0.60–0.90	0.04 max	0.05 max
1039	0.37–0.44	0.70–1.00	0.04 max	0.05 max
1040	0.37–0.44	0.60–0.90	0.04 max	0.05 max
1042	0.40–0.47	0.60–0.90	0.04 max	0.05 max
1043	0.40–0.47	0.70–1.00	0.04 max	0.05 max
1045	0.43–0.50	0.60–0.90	0.04 max	0.05 max
1046	0.43–0.50	0.70–0.90	0.04 max	0.05 max
1049	0.46–0.53	0.60–0.90	0.04 max	0.05 max
1050	0.48–0.55	0.60–0.90	0.04 max	0.05 max
1055	0.50–0.60	0.60–0.90	0.04 max	0.05 max
1060	0.55–0.65	0.60–0.90	0.04 max	0.05 max
1064	0.60–0.70	0.50–0.80	0.04 max	0.05 max
1065	0.60–0.70	0.60–0.90	0.04 max	0.05 max

HIGHLIGHTS

Stephen B. Offiler
Week Ending 91-08-16

FORD MY'92 ELECTRONIC SPEED CONTROL DEACTIVATE PS

VALIDATION:
The Thermal Cycle test was successfully expedited in order to begin the important Impulse test as soon as possible. Half of the Impulse test is run on virgin devices, and the other half is to be run on parts which have completed the Fluid Resistance test. We are now running the virgin Pass Car and Light Truck parts simultaneously. A significant problem is occurring on the PC devices. We have had three failures to date (325K of 500K) due to fluid leakage. Autopsy of two (thus far) shows fatigued Kapton; no real evidence of foreign matter nor damage to the Kapton during assembly. Stan Hornol is providing valuable assistance in failure analysis. Note that we are running AMI-built PC and LT side-by-side, with no failures of the LT parts, which is directing F/A toward the cup. We are continuing to run the test for two reasons: one, to attempt to complete the LT parts successfully; and two, to continue to fail PC parts to provide additional F/A clues. Hypotheses include: increased converter travel in the rebump design; extraordinarily tight sensor crimp as evidenced by the deformations where the Kapton layers overlap; very flat washers (unlike the norm, which is slightly cup-shape) which may also contribute to tight crimp. We are giving this matter top priority. At this point, it is safe to assume that the PC parts presently undergoing Fluid Resistance will also fail on Impulse. This means that after the problem is corrected, at the very least the Fluid Resistance test will need to be re-run, or at worst the entire validation will have to be re-run from scratch, which is about a nine-week process either way. We are now trying to determine how to best approach Ford with this news.

MECHANIZATION:
Mechanization has performed repeated measurements on the three AMI gage blocks and three switch assemblies, and Jeff has performed exactly the same measurements manually. The AMI calibrator (measure-only mode) and the check station produced commendable sigma's, although lack of agreement between the two requires more effort to understand. Jeff's measurements produced sigma's slightly worse than the automatic equipment. The good news is that it appears that a very good correlation exists between Jeff's manual measurements and the check station. We are planning a "pre-effectivity run" (a.k.a. "final debug run") of a few hundred switch assemblies, collecting all data on each piece and identifying each individually for later analysis. This will provide a statistically significant number of parts for check station vs. Jeff correlations, as well as allow Pareto analysis of problems which occur during the run.

Dave Peripoli has spent quite a bit of time working on the riveter on the Eastern Automation equipment. At present, we've got a hybrid of Milford and Thompson riveter parts, which seems to be running fairly well. However, for the long-term Mechanization is looking into elimination of the rivet. We are working with an ultrasonic welding firm, Staple, who has provided very impressive samples. I am meeting with them today to provide actual springs and movable terminals, so we can do actual in-product performance and life tests.

Progress on the above items is presently impacted by lack of terminals. We have 27K movables and 45K stationaries from Bassler which were rejected for contamination. The sticky green substance has been identified as the environmentally-friendly cleaner/rustproofing product (Irmco 119) that Bassler uses to remove the EF stamping lube (Irmco 185).

Apparently he is not drying and/or removing this product correctly. Rick B. has determined that a phosphoric-acid tumbling product he uses regularly in-house will remove the green stains. We are having him expedite this cleaning process so we may continue with riveter work and the pre-effectivity run.

MISCELLANEOUS:
We have finally received the correct mating-connector terminals and wedges from UTA. The confusion was caused in part because this is a brand-new design and is not properly documented yet; additionally the correct individual who has knowledge of this product was out sick.

The hexport samples in 10B21 material have arrived. One has been sent to TSL for analysis of hardness, in the same fashion as done previously for a 10L10 part. This will allow direct comparison, in order to determine if the 10B21 is actually significantly harder. These parts, without re-roll, gaged very well - however, they were not plated in a 5K batch size, and they were packed individually for shipment. The hardness results, along with the quote, will help determine whether we will proceed with a full plating lot (5K).

Engineering Specification

PART NAME: [redacted]

PART NUMBER: [redacted]

LET															
FR															
LET															
FR															

DATE	LET	FR	REVISIONS	DR	CK	REFERENCE
			ADDED DATA TO COMPLETE			
			SPEC. & RETYPED			PREPARED/APPROVED
88/11/30			NCC(E)00797179002		[illegible]	R.S. Pucio
						CHECKED BY
						CONCURRENCE/SIGNATURE
						DESIGN ENGINEERING: R. Thomas
						ENGINEERING
						MANUFACTURING
						QUALITY: [illegible]
						PURCHASING
						[illegible]: R.S. R[illegible]
						ELECTRONICS: [illegible]

▽ CONTROL ITEM — THE ▽ SYMBOL ALSO IDENTIFIES PRODUCT ENGINEERING DESIGNATED CRITICAL CHARACTERISTICS. THESE [illegible]

FRAME 1 OF 18 | REV | ▽ [illegible]-9F924-AA

PD 3947-a1 (Previous editions may still be used)

TI-NHTSA 000196

SWITCH ASSEMBLY - SPEED CONTROL DEACTIVATE

I. General

This specification covers the test requirements for the speed control deactivate switch -9F924- [redacted]. Design changes on the switch assembly or its components shall not be made without compliance to Section V of this specification and written approval from the releasing Production Engineering Office.

This engineering specification is a supplement to the released drawing on the above part, and all requirements herein must be met in addition to all other requirements of the part drawing. Minimum measures necessary for demonstrating compliance to these requirements are given in each section.

The engineering tests, sample sizes, and test frequencies contained within this engineering specification reflect the minimum requirements established to provide a regular evaluation of conformance to design intent. The engineering test program is intended as a supplement to normal material inspections, dimensional checking and in-process controls, and should in no way adversely influence other inspection operations.

QS suppliers may implement different test sample sizes and frequencies providing these changes have been included in an alternate Control Plan approved by the design responsible Product Engineering Office and concurred in by SQA.

II. PRODUCTION VALIDATION AND IN-PROCESS TESTS

- Production Validation (PV) Tests must be completed satisfactorily with parts from production tooling (and processes where possible) before ISIR approval and authorization for shipment of production parts can be effected. Parts must be revalidated completely, or per Section V whenever any change is made which could possibly affect part function or performance.

- In-Process Test Phase 1 (IP-1) - IP-1 tests are used to demonstrate process capability and must be completed using initial production parts from production tooling and processes prior to first production shipment approval. IP-1 tests are to continue in effect until process capability is demonstrated.

- In-Process Tests Phase 2 (IP-2) - IP-2 test program may be implemented only after process capability has been established. Tests must be completed with production parts on a continuing basis. Samples for these tests must be selected on a random basis to represent the entire production population as much as possible. In the event that any of the requirements in these tests is not met, the reaction plan specified in Ford Q101 Sect. 3.5, "Engineering Specification (ES) Test Performance Requirements" shall be invoked.

SECTION III. TABLE OF TESTS

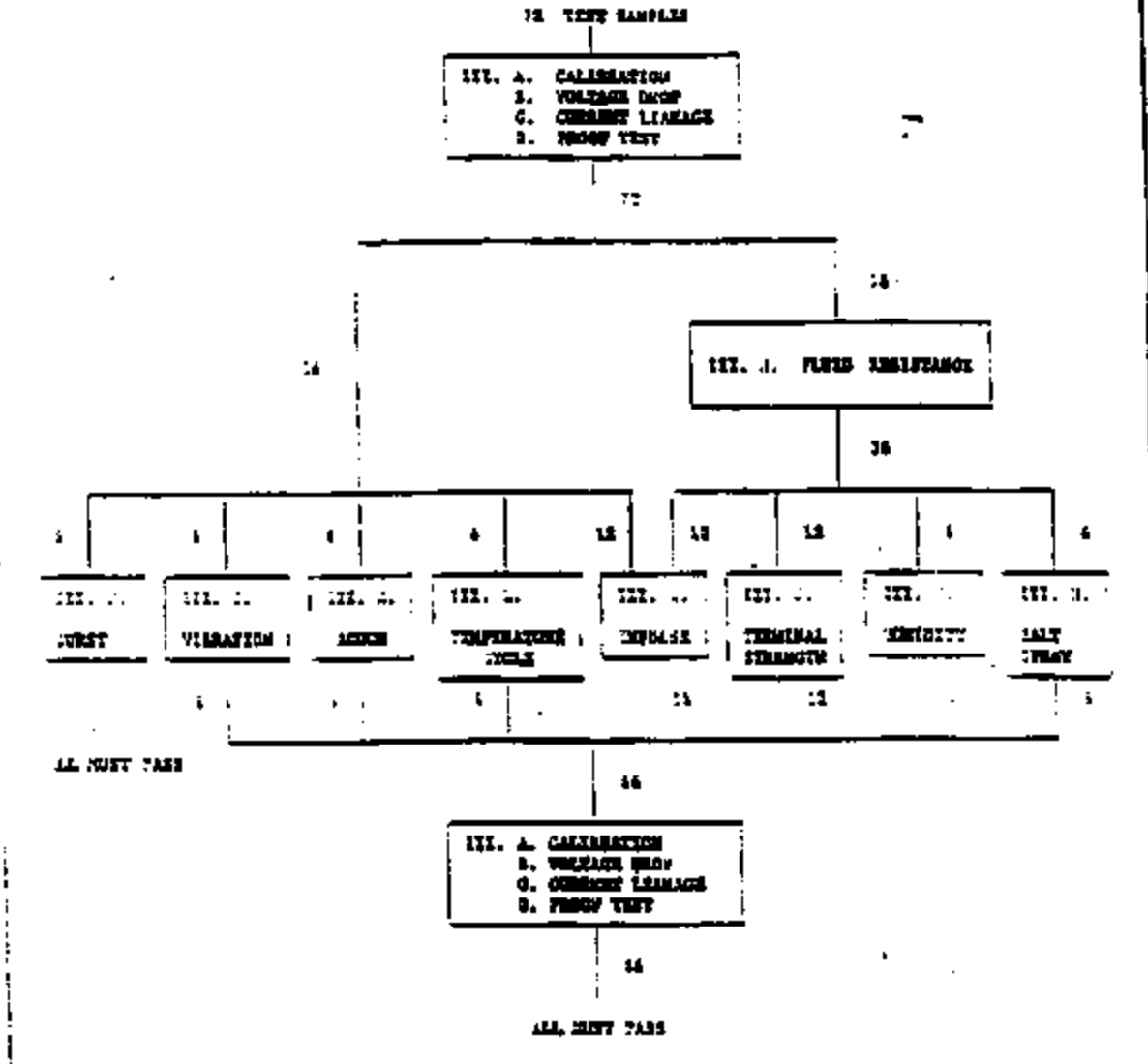
Item	Test Name Functional Tests	PRODUCTION VALIDATION Minimum Sample Size	PRODUCTION VALIDATION Statistical Test Acceptance Criteria	IN-PROCESS IP-1 Minimum Sample Size	IN-PROCESS IP-1 Statistical Test Acceptance Criteria	IN-PROCESS IP-2 Minimum Sample Size	IN-PROCESS IP-2 Statistical Test Acceptance Criteria
III							
A	Calibration	[illegible]	P90-.96	100%	All Must Pass	100%	All Must Pass
B	Voltage Drop	72	P90-.96	12/Mo.	P90-.84	4/Lot	" " "
C	Current Leakage	72	P90-.96	3/Mo.	P90-.56	4/Lot	" " "
D	Proof Test	72	P90-.96	12/Mo.	P90-.84	4/Lot	" " "
F	Burst	6	P90-.72	3/Mo.	P90-.56	4/Lot	" " "
I	Vibration	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
J	Terminal Strength	12	P90-.84	6/Mo.	P90-.72	4/Lot	All Must Pass
K	Vacuum	6	P90-.72	1/Mo.	P90-.56	6/6 Mo.	P50 .72
L	Temperature Cycle	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
M	Fluid Resistance	36	P90-.94	36/12Mo	P90-.94	36/12Mo.	P90-.94

Durability Tests

Item	Test Name	PV Minimum Sample Size	PV Statistical Test Acceptance Criteria	IP-1 Minimum Sample Size	IP-1 Statistical Test Acceptance Criteria	IP-2 Minimum Sample Size	IP-2 Statistical Test Acceptance Criteria
III.							
E	Impulse	[illegible]	P90-.90	12/Mo.	P50-.24	3/3 Mo.	P90-.50
G	Humidity	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
H	Salt Spray	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72

Engineering Specification

PRODUCTION VALIDATION FLOW CHART



FRAME 4 OF 18	REVISED		VES-7270-9F024-AA NUMBER

PD 3947-82

III. TEST PROCEDURES AND REQUIREMENTS

▽ A. Calibration

1. Test Requirements

a. Switch calibration is to be checked at room temperature (15°C-35°C) using ambient air or equivalent.

b. Calibration settings shall be specified on the part drawing with the settings checked after 2 or more pressure cycles with ambient air, or equivalent. Pressure cycle range is to be determined by the manufacturer to insure switch calibration stability. The cut-in and differential set points are to be measured while conducting 750 ± 50 milliamperes while 13.0 ± 1.0 volts D.C. is applied. The cut-in point is to be checked with increasing pressure.

c. The cut-out point is to be checked with decreasing pressure, and the differential set point is to be calculated using the cut-in pressure minus the cut-out pressure.

2. Acceptance Requirements

a. Nonconformance is defined as any switch point which falls outside the tolerance band specified on the part drawing.

B. Voltage Drop

1. Test Requirements

a. Voltage drop is to be measured after 2 or more cycles with ambient air or equivalent from 0 to 10,000 ± 172 KPa (1450 ± 25 PSI) while conducting 750 ± 50 milliamps and 13.0 ± 1.0 volts D.C. is applied to the switch. Under these conditions with the switch closed the voltage drop is to be measured. Millivolt connection interface terminals to be less than 10 millivolts.

2. Acceptance Requirements

a. Nonconformance is defined as a voltage drop in excess of 200 millivolts.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

C. Current Leakage

1. Test Requirements

a. Current leakage is to be checked with 500 volts, 50 Hz alternating current.

b. Current leakage is to be checked:

(1) Between the switch leads with the contacts open.
(2) Between the lead and the switch housing with contacts closed.
(3) Between either lead and switch housing with the contacts open.

2. Acceptance Requirements

a. Nonconformance is defined as any leakage current in excess of one hundred (100) microamperes.

D. Proof Test

1. Test Requirements

a. Subject sample switches to Section A to establish their initial switching pressures.

b. Proof test is to be conducted using brake fluid or equivalent as the pressure medium. Test pressure shall be as specified on the part drawing. Test pressure shall be isolated from pressure source and held for not less than 30 seconds.

c. Recheck the switches to Section A.

2. Acceptance Requirements

a. No evidence of fluid leakage, seepage, or gross in case pressure greater than 430 KPa.(62 PSI) is permitted.

b. A change in cut-in and cut-out pressures greater than ± 5% from the initial value is not permitted.

c. The test samples must be destroyed after testing.

XII. TEST PROCEDURES AND REQUIREMENTS (cont'd)

E. Impulse

1. Test Requirements

a. Test the switch for a total of 500,000 cycles. Cycle pressure between (low) 0-276 kPa (0-40 psi) and (high) 10,000 ± 345 kPa (1450 ± 50 psi).

1) 0 - 475,00 cycles: 13 ± 1 volts, trace current to monitor function.

2) 475,001 - 500,000 cycles: 13 ± 1 volts D.C., 250 ± 50 ma., per figure 4.

b. Brake fluid temperature to be 125 ± 4°C and ambient temperature to be 107°C min.

c. Cycle rate is to be 100-120 cycles per minute.

d. Switch must open and close each cycle.

2. Appearance Requirements

a. After impulse test check to sections A, B, C, & D using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, & D.

c. Samples used for this test must be destroyed after all testing is completed.

F. Burst

1. Test Requirement

a. Burst strength is to be checked using brake fluid or equivalent as the pressure medium.

b. Pressurize the switch to 48.3 MPa 7000 PSI minimum and hold for 30 seconds minimum.

2. Appearance Requirements

a. Nonconformance is defined as any evidence of fluid leakage or seepage from the switch or threads. Samples used for this test must be destroyed after testing is completed.

III. [illegible]

G. Humidity

1. Test Requirements

a. Mount the switch in the test port in a humidity chamber. Currently released mating electrical connector must be installed before start of test.

b. Subject the switch to ten (10) continuous humidity cycles as follows:

(1) Raise temperature to 65 +10/-2 °C over 2.5 hours; at 90-98% relative humidity.

(2) Hold 3 hours at 65 +10/-2 °C at 90-98% relative humidity.

(3) Lower temperature to 25 +10/-2 °C over 2.5 hours; at 80-98% relative humidity.

2. Acceptance Requirements

a. Within 15 minutes after completion of the tenth humidity cycle check the switch to sections A, B, C, D, using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D.

H. Salt Spray

1. Test Requirements

a. Mount the switch in the test port in a salt spray chamber. The currently released mating electrical connector and wiring must be installed prior to start of test.

b. Expose the switch assembly to 72 hours of salt spray per ASTM B-117.

2. Acceptance Requirements

a. After exposure, check the switch to sections A, B, C, D, using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

XII. TEST PROCEDURES AND REQUIREMENTS (cont'd)

I. Vibration

1. Test Requirements

a. Mount the switch in the test port and attach the currently released mating electrical connector before start of test.

b. Switches are to be vibrated in all 3 planes with electrical continuity being monitored during the entire test. See Figure 1 for switch orientation in the 3 planes. Vibration tests are to be conducted at room temperature using brake fluid, ambient air, or equivalent as the pressure medium.

c. Internal pressure shall be maintained at 0 KPa G. when the switch is in the closed position and 1.2 times max actuation pressure shown on print when the switch is in the open position.

d. Vibrate the switch at 1.5 mm displacement (peak-to-peak) while varying the frequency uniformly from 5 to 30 to 5 Hz over a 5 minute period.

e. Vibrate the switch in alternate one-hour periods in the open and closed positions for a total of 8 hours in each plane. (Total test time is 24 hours).

2. Acceptance Requirements

a. After the entire vibration sequence check the switches in sections A, B, C, or D using the procedure established in each section.

b. Nonconformance is defined as any evidence of damage or any change in electrical continuity/discontinuity during the vibration cycles, or any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

J. Terminal Strength

1. Test Requirements

A. Mount the switch in the test port.

(1) Apply a 89 ± 9 N axial force on each terminal.

(2) With a pendulum apply a 45 ± 5 N impact force to the switch housing at the connector end, perpendicular to the centerline axis of the switch. See Figure 2 for force application point and direction.

2. Nonconformance Requirements

A. Check the switch to sections A, B, C, and D using the procedures established in each section.

b. Nonconformance is defined as any terminal or housing fracture, or any switch not meeting the criteria in sections A, B, C, or D.

K. Vacuum

1. Test Requirements

A. Mount the switch in the test port. Vacuum tests are to be conducted at room temperature using ambient air as the pressure medium.

b. Subject the switch to 3 cycles of vacuum from atmospheric pressure (760 mm Hg) to an absolute pressure of 3-6 mm Hg. Maintain the vacuum for a minimum of 60 seconds.

2. Nonconformance Requirements

A. Check the switch to sections A, B, C, and D using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, and D.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

L. Temperature Cycle

1. Test Requirements

a. Mount switches in test ports; test to be run using currently released brake fluid.

b. Repeat the following procedure 25 times.

(1) Lower the switch and fluid temperature to at least -40°C.

(2) Cycle the switches ten times at 10 seconds/cycles. One cycle consists of a pressure variation from 0 - 276 KPa.G (0-40 psi) to 10,000 ± 345 KPa.G (1450 ± 10 PSI). Note: Switch must open and close each cycle.

(3) Raise switch and fluid temperature to 38°C minimum.

(4) Repeat Step 2.

c. At completion of Step b. check switches per sections A, B, C, and D.

2. Acceptance Requirements

a. Nonconformance is defined as any evidence of switch fluid leakage, seepage, or not meeting the criteria of sections A, B, C, and D.

M. Fluid Resistance

1. Test Requirements

a. Mount the switch in the test port and orient as installed in the vehicle.

b. Install the currently released mating electrical connector (with wire leads) to the switch.

c. Sequentially, immerse the switch into each of the specified fluids, at a temperature of 23 ± 2 °C, for 5 ± 1 second. Remove the switch and drain and store the switch for the specified time at room temperature, prior to immersing into the next fluid.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

Fluid	Drain Time	Storage Time
Reference Fuel C ASTM D471	30 ± 5 min.	none
10W40 Engine Oil	24 ± 1 hour	14 days
Ethylene Glycol/ Water 50/50 by Volume	24 ± 1 hour	24 ± 1 hour
Brake Fluid DOT 3	24 ± 1 hour	48 ± 1 hour
Automatic Transmission/ Power Steering Fluid (same) ESP-M2C138-CJ	24 ± 1 hour	14 days
Isopropyl Alcohol/ Water 50/50 by Volume	24 ± 1 hour	none
Reference Fuel C, ASTM D471 with Methyl Alcohol 85/15 by Volume	24 ± 1 hour	none

J. For the Flow Chart, subject the prescribed number of immersed switches to the post immersion tests specified below:

III. E. Impulse
III. G. Humidity
III. H. Salt Spray
III. J. Terminal Strength

Acceptance Requirements

a. Switches must fully meet the requirements of the specified post immersion test.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

IV. STATISTICAL ANALYSIS METHODS

A. For PV, IF-1 and IF-2 tests, all samples tested must pass. [redacted] PXXY is interpreted as minimum reliability equal to R, at a confidence C; thus P90-.80 means a minimum reliability of 90% at 80% confidence.

B. All samples must pass is the statistical test acceptance criteria stated for tests with 100% frequency; or samples from lots, which could have a variable size.

V. REVALIDATION REQUIREMENTS

A. No change in design, material, process or component supplier shall be made without prior approval from the releasing Product Engineering Office. As part of approving a change, the releasing Product Engineering Office will establish the portion of the Product Validation tests required to be run to revalidate the switch. The following table is to be used as a guide in determining the type of tests required for revalidation requirements.

MINIMUM CHANGE REVALIDATION

Component	Process or Material Change or New Supplier
1. Terminals, Contacts, or Connector	III, B, C, E, G, H, I, J, L, M.
2. Case or Housing	All Tests
3. Disc or Diaphragm	III, A, B, E, F, I, J, L.
4. Fitting or Fluid Connection	III, B, E, F, H, I, M.

B. Annual revalidation is not required on carryover switches.

VI. LOT DEFINITION

A lot is defined as no more than eight (8) hours of production up to 4,000 pieces. If shifts exceed beyond eight (8) hours, or more than 4,000 pieces are produced in a shift, the product must be separated into at least two lots.

VII. RECORD RETENTION

A. Recording and record retention shall conform with Ford Q-101.

B. Production Validation test results and analysis are to be forwarded to the releasing Product Engineering Office before approval for shipment of production parts can be granted.

C. In-Process test results shall be available at the supplier's manufacturing facility for the releasing Product Engineering Office and Ford SQA or its representatives to review on request.

VIII. INSTRUCTIONS AND NOTES

All switches are to be identified with the Ford part number, supplier identification, and a date code indicating final assembly.

All test equipment and test procedures for testing to this specification must be approved by the releasing Product Engineering Office and no change in equipment or procedure may be made without their written concurrence.

Test port configuration is shown in Figure 1.

O-rings, if used in the design, shall be free from cuts, nicks, abrasions or any other damage which would result in a fluid leak.

All switches must have a shipping cap installed over the port threads to prevent contamination. All shipping caps must be approved by the releasing Product Engineering Office prior to production incorporation.

All switches that do not pass the calibration test are to either be readjusted and rechecked, or scrapped. (Salvage of component parts permitted with 100% reinspection).

If product nonconformance occurs for test Sections III. B, C, D, E, F, and J, production shall be stopped and the problems corrected. All production lots shall be sorted 100% prior to shipment. Suspected nonconformance of any shipped parts shall be reported immediately to the releasing Product Engineering Office.

If nonconformance of the statistical acceptance criteria occurs for test Sections III. G, H, I, K, L and M, a cause to recall the subject weeks production and to stop production may result.

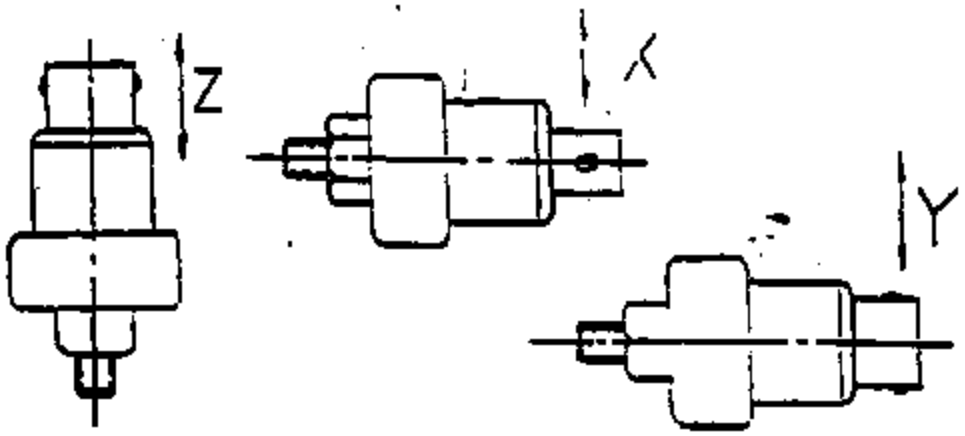
IX. COMPILATION OF REFERENCE DOCUMENTS

ASTM B-117. Salt Spray Testing

Ford Q-101. Quality System Standard - 1990 Edition

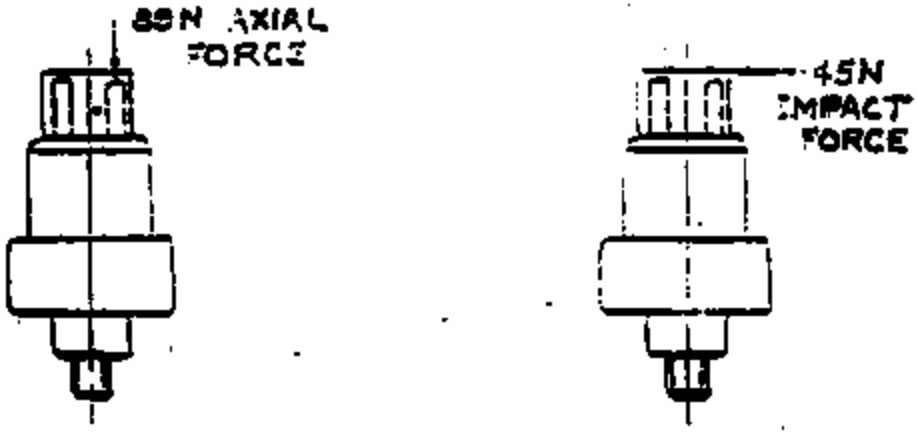
ES-F0HB-14A464-AA. Specification - SLT Assy - Wire Connector

ES-F2VF-9C733-AA. Specification - Servo Assembly Speed Control



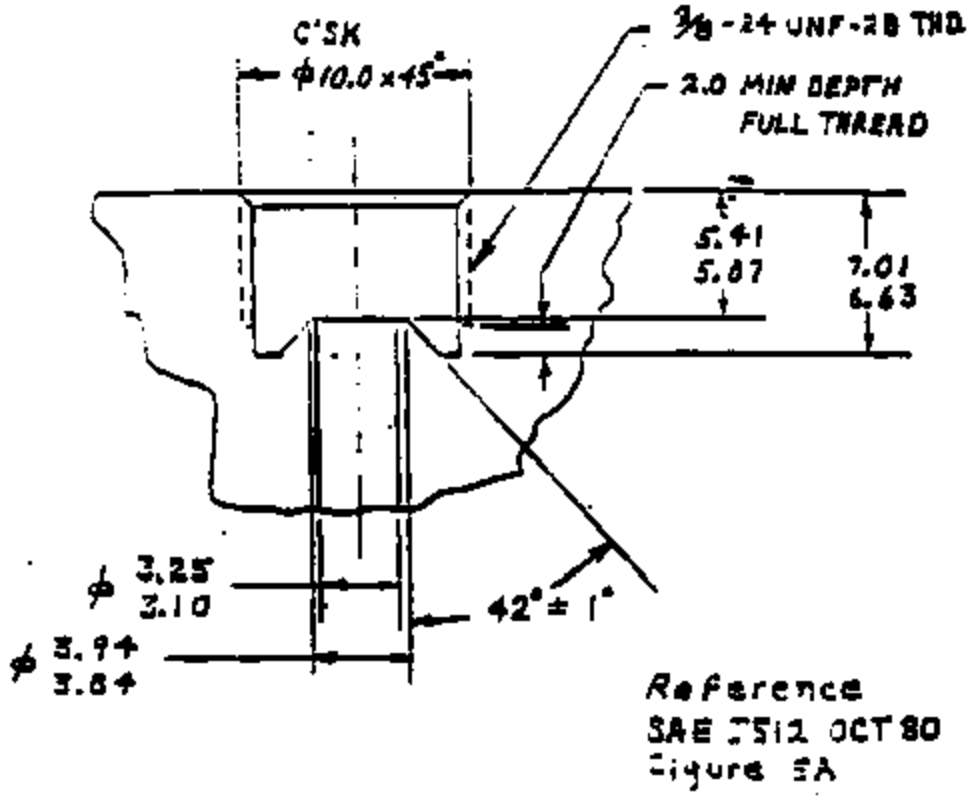
VIBRATION TEST - SWITCH ORIENTATION

FIGURE 1.



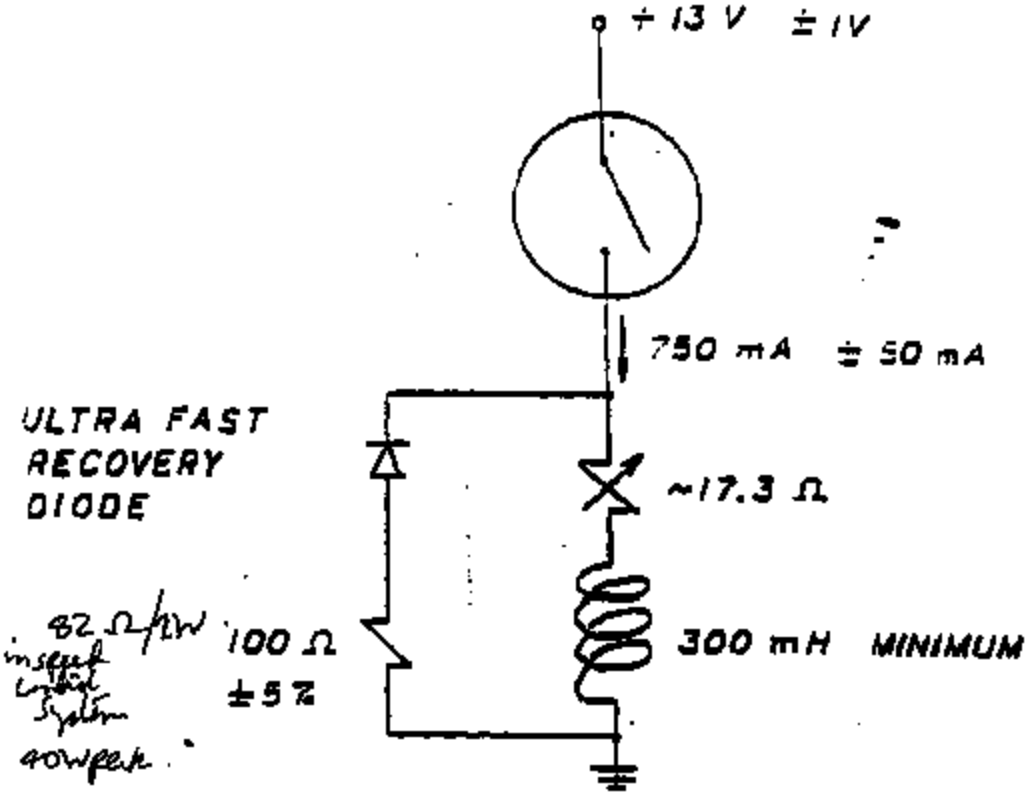
TERMINAL STRENGTH - LOAD ORIENTATION

FIGURE 2.



TEST FIXTURE PORT CONFIGURATION

FIGURE 3



DEACTIVATE SWITCH
TEST SET UP

FIGURE 4

Ford Engineering Specification

PART NAME
SWITCH ASSEMBLY - SPEED CONTROL DEACTIVATE

PART NUMBER
▽ ES-F2VC-9F924-AA

DATE	LET	FR	REVISIONS	DR	CK

REFERENCE

PREPARED/APPROVED BY

CHECKED BY | DETAILED BY

CONCURRENCE/APPROVAL SIGNATURES

DESIGN ENGINEERING SUPERVISOR

DESIGN ENGINEERING MGT.

MANUFACTURING ENGRG.

QUALITY CONTROL

PURCHASING

SUPPLIER QUALITY ASSISTANCE

ELECTRONICS DIVISION

FRAME 1 OF 18 | REV | ▽ ES-F2VC-9F924-AA

SWITCH ASSEMBLY - SPEED CONTROL DEACTIVATE

I. General

This specification covers the test requirements for the speed control deactivate switch -9F924- used in the electronic speed control system. Design changes on the switch assembly or its components shall not be made without compliance to Section V of this specification and written approval from the releasing Production Engineering Office.

This engineering specification is a supplement to the released drawing on the above part, and all requirements herein must be met in addition to all other requirements of the part drawing. Minimum measures necessary for demonstrating compliance to these requirements are given in each section.

The engineering tests, sample sizes, and test frequencies contained within this engineering specification reflect the minimum requirements established to provide a regular evaluation of conformance to design intent. The engineering test program is intended as a supplement to normal material inspections, dimensional checking and in-process controls, and should in no way adversely influence other inspection operations.

Q1 suppliers may implement different test sample sizes and frequencies providing these changes have been included in an alternate Control Plan approved by the design responsible Product Engineering Office and concurred in by SQA.

II. PRODUCTION VALIDATION AND IN-PROCESS TESTS

- Production Validation (PV) Tests must be completed satisfactorily with parts from production tooling (and processes where possible) before ISIR approval and authorization for shipment of production parts can be effected. Parts must be revalidated completely, or per Section V whenever any change is made which could possibly affect part function or performance.

- In-Process Test Phase 1 (IP-1) - IP-1 tests are used to demonstrate process capability and must be completed using initial production parts from production tooling and processes prior to first production shipment approval. IP-1 tests are to continue in effect until process capability is demonstrated.

- In-Process Tests Phase 2 (IP-2) - IP-2 test program may be implemented only after process capability has been established. Tests must be completed with production parts on a continuing basis. Samples for these tests must be selected on a random basis to represent the entire production population as much as possible. In the event that any of the requirements in these tests is not met, the reaction plan specified in Ford Q101 Section III.E.3, "ES Test Performance Requirements" shall be invoked.

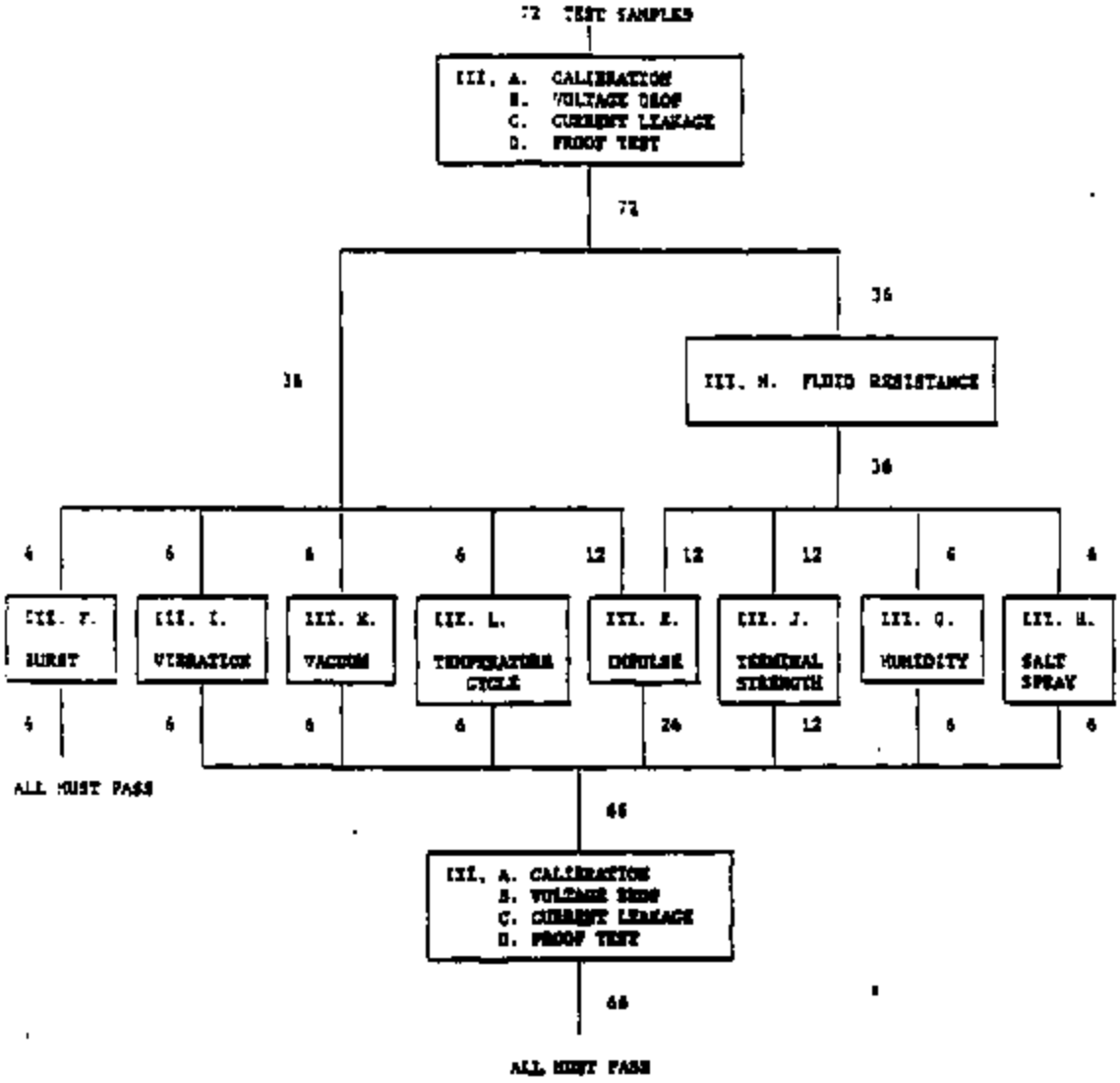
SECTION III. TABLE OF TESTS

Item	Test Name Functional Tests	PRODUCTION VALIDATION Minimum Sample Size	PRODUCTION VALIDATION Statistical Test Acceptance Criteria	IN-PROCESS IP-1 Minimum Sample Size	IN-PROCESS IP-1 Statistical Test Acceptance Criteria	IN-PROCESS IP-2 Minimum Sample Size	IN-PROCESS IP-2 Statistical Test Acceptance Criteria
III.							
▽ A	Calibration	72	P90-.96	100%	All Must Pass	100%	All Must Pass
B	Voltage Drop	72	P90-.96	12/Mo.	P90-.84	4/Lot	" " "
C	Current Leakage	72	P90-.96	3/Mo.	P90-.56	4/Lot	" " "
D	Proof Test	72	P90-.96	12/Mo.	P90-.84	4/Lot	" " "
F	Burst	6	P90-.72	3/Mo.	P90-.56	4/Lot	" " "
I	Vibration	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
J	Terminal Strength	12	P90-.84	6/Mo.	P90-.72	4/Lot	All Must Pass
K	Vacuum	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
L	Temperature Cycle	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
M	Fluid Resistance	36	P90-.94	36/12Mo	P90-.94	36/12Mo.	P90-.94

Durability Tests

Item	Test Name	PV Minimum Sample Size	PV Acceptance Criteria	IP-1 Minimum Sample Size	IP-1 Acceptance Criteria	IP-2 Minimum Sample Size	IP-2 Acceptance Criteria
III.							
E	Impulse	24	P90-.90	12/Mo.	P90-.84	3/3 Mo.	P90-.56
G	Humidity	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
N	Salt Spray	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72

PRODUCTION VALIDATION FLOW CHART



FRAME 4 OF 18	REVISED		VES-F2VC-9F924-AA NUMBER

III. TEST PROCEDURES AND REQUIREMENTS

7 A. Calibration

1. Test Requirements

a. Switch calibration is to be checked at room temperature (16°C-35°C) using ambient air or equivalent.

b. Calibration settings shall be specified on the part drawing with the settings checked after 2 or more pressure cycles with ambient air, or equivalent. Pressure cycle range is to be determined by the manufacturer to insure switch calibration stability. The cut-in and differential set points are to be measured while conducting 750 ± 50 milliamperes while 13.0 ± 1.0 volts D.C. is applied. The cut-in point is to be checked with increasing pressure.

c. The cut-out point is to be checked with decreasing pressure, and the differencial set point is to be calculated using the cut-in pressure minus the cut-out pressure.

2. Acceptance Requirements

a. Nonconformance is defined as any switch point which falls outside the tolerance band specified on the part drawing.

8. Voltage Drop

1. Test Requirements

a. Voltage drop is to be measured after 2 or more cycles with ambient air or equivalent from 0 to 10,000 ± 172 KPa (1450 ± 25 PSI) while conducting 750 ± 50 milliamps and 13.0 ± 1.0 volts D.C. is applied to the switch. Under these conditions with the switch closed the voltage drop is to be measured. Millivolt connection interface at terminals to be less than 10 millivolts.

2. Acceptance Requirements

a. Nonconformance is defined as a voltage drop in excess of 200 millivolts.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

C. Current Leakage

1. Test Requirements

a. Current leakage is to be checked with 500 volts, 60 Hz alternating current.

b. Current leakage is to be checked:

(1) Between the switch leads with the contacts open.
(2) Between the lead and the switch housing with contacts closed.
(3) Between either lead and switch housing with the contacts open.

2. Acceptance Requirements

a. Nonconformance is defined as any leakage current in excess of one hundred (100) microampere.

D. Proof Test

1. Test Requirements

a. Subject sample switches to Section A to establish their initial switching pressures.

b. Proof test is to be conducted using brake fluid or equivalent as the pressure medium. Test pressure shall be as specified on the part drawing. Test pressure shall be isolated from pressure source and held for not less than 30 seconds.

c. Recheck the switches to Section A.

2. Acceptance Requirements

a. No evidence of fluid leakage, seepage, or drop in test pressure greater than 410 KPa.(62 PSI) is permitted.

b. A change in cut-in and cut-out pressures greater than ± 5% from the initial value is not permitted.

c. The test samples must be destroyed after testing.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

E. Impulse

1. Test Requirements

a. Test the switch for a total of 500,000 cycles. Cycle pressure between (low) 0-276 KPa (0-40 psi) and (high) 10,000 ± 345 KPa (1450 ± 50 psi).

1) 0 - 475,00 cycles: 13 ± 1 volts, trace current to monitor function.

2) 475,001 - 500,000 cycles: 13 ± 1 volts D.C., 750 ± 50 ma., per figure 4.

b. Brake fluid temperature to be 135 ± 14°C and ambient temperature to be 107°C min.

c. Cycle rate is to be 110-130 cycles per minute.

d. Switch must open and close each cycle.

2. Acceptance Requirements

a. After impulse test check to sections A, B, C, & D using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, & D.

c. Samples used for this test must be destroyed after all testing is completed.

F. Burst

1. Test Requirement

a. Burst strength is to be checked using brake fluid or equivalent as the pressure medium.

b. Pressurize the switch to 48.3 MPa (7000 PSI) minimum and hold for 30 seconds minimum.

2. Acceptance Requirements

a. Nonconformance is defined as any evidence of fluid leakage or seepage from the switch or threads. Samples used for this test must be destroyed after testing is completed.

G. Humidity

1. Test Requirements

a. Mount the switch in the test port in a humidity chamber. Currently released mating electrical connector must be installed before start of test.

b. Subject the switch to ten (10) continuous humidity cycles as follows:

(1) Raise temperature to 65 +10/-2 °C over 2.5 hours; at 90-98% relative humidity.

(2) Hold 3 hours at 65 +10/-2 °C at 90-98% relative humidity.

(3) Lower temperature to 25 +10/-2 °C over 2.5 hours; at 80-98% relative humidity.

2. Acceptance Requirements

a. Within 15 minutes after completion of the tenth humidity cycle check the switch to sections A, B, C, D, using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D.

H. Salt Spray

1. Test Requirements

a. Mount the switch in the test port in a salt spray chamber. The currently released mating electrical connector and wiring must be installed prior to start of test.

b. Expose the switch assembly to 72 hours of salt spray per ASTM B-117.

2. Acceptance Requirements

a. After exposure, check the switch to sections A, B, C, D, using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

E. Vibration

1. Test Requirements

a. Mount the switch in the test port and attach the currently released mating electrical connector before start of test.

b. Switches are to be vibrated in all 3 planes with electrical continuity being monitored during the entire test. See Figure 1 for switch orientation in the 3 planes. Vibration tests are to be conducted at room temperature using brake fluid, ambient air, or equivalent as the pressure medium.

c. Internal pressure shall be maintained at 0 KPa G. when the switch is in the closed position and 1.1 times max actuation pressure shown on print when the switch is in the open position.

d. Vibrate the switch at 1.5 mm displacement (peak-to-peak) while varying the frequency uniformly from 5 to 50 to 5 Hz over a 5 minute period. 0.15" total peak

e. Vibrate the switch in alternate one-hour periods in the open and closed positions for a total of 8 hours in each plane. (Total test time is 24 hours).

2. Acceptance Requirements

a. After the entire vibration sequence check the switches to sections A, B, C, or D using the procedure established in each section.

b. Nonconformance is defined as any evidence of leakage or any change in electrical continuity/discontinuity during the vibration cycles, or any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

J. Terminal Strength

1. Test Requirements

a. Mount the switch in the test port.

(1) Apply a 89 ± 9 N axial force to each terminal.

(2) With a pendulum apply a 45 ± 5 N impact force to the switch housing at the connector end, perpendicular to the centerline axis of the switch. See Figure 2 for force application point and direction.

2. Acceptance Requirements

a. Check the switch to sections A, B, C, and D using the procedures established in each section.

b. Nonconformance is defined as any terminal or housing fracture, or any switch not meeting the criteria in sections A, B, C, or D.

K. Vacuum

1. Test Requirements

a. Mount the switch in the test port. Vacuum tests are to be conducted at room temperature using ambient air as the pressure medium.

b. Subject the switch to 5 cycles of vacuum from atmospheric pressure (760 mm Hg) to an absolute pressure of 3-6 mm Hg. Maintain the vacuum for a minimum of 60 seconds.

2. Acceptance Requirements

a. Check the switch to sections A, B, C, and D using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, and D.

3 mm Hg = 0.058 psi = 0.400 K Pa

6 mm Hg = 0.116 psi = 0.800 K Pa

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

L. Temperature Cycle

1. Test Requirements

a. Mount switches in test ports; test to be run using currently released brake fluid.

b. Repeat the following procedure 25 times.

(1) Lower the switch and fluid temperature to at least -40°C.

(2) Cycle the switches ten times at 10 seconds/cycles. One cycle consists of a pressure variation from 0 - 276 KPa.G (0-40 psi) to 10,000 ± 345 KPa.G (1450 ± 50 PSI). Note: Switch must open and close each cycle.

(3) Raise switch and fluid temperature to 38°C minimum.

(4) Repeat Step 2.

c. At completion of Step b, check switches per sections A, B, C, and D.

2. Acceptance Requirements

a. Nonconformance is defined as any evidence of switch fluid leakage, seepage, or not meeting the criteria of sections A, B, C, and D.

M. Fluid Resistance

1. Test Requirements

a. Mount the switch in the test port and orient as installed in the vehicle.

b. Install the currently released mating electrical connector (with wire leads) to the switch.

c. Sequentially, immerse the switch into each of the specified fluids, at a temperature of 23 ± 2 °C, for 5 ± 1 second. Remove the switch and drain and store the switch for the specified time at room temperature, prior to immersing into the next fluid.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

Fluid	Drain Time	Storage Time
Reference Fuel C ASTM D471	60 ± 5 min.	none
10W40 Engine Oil	24 ± 1 hour	14 days
Ethylene Glycol/ Water 50/50 by Volume	24 ± 1 hour	24 ± 1 hour
Brake Fluid DOT 3	24 ± 1 hour	48 ± 1 hour
Automatic Transmission/ Power Steering Fluid (same) ESP-M2C138-CJ	24 ± 1 hour	14 days
Isopropyl Alcohol/ Water 50/50 by Volume	24 ± 1 hour	none
Reference Fuel C. ASTM D471 with Methyl Alcohol 85/15 by Volume	24 ± 1 hour	none

d. Per the Flow Chart, subject the prescribed number of immersed switches to the post immersion tests specified below:

III. E. Impulse
III. G. Humidity
III. H. Salt Spray
III. J. Terminal Strength

Acceptance Requirements

a. Switches must fully meet the requirements of the specified post immersion test.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

6. STATISTICAL ANALYSIS METHODS

A. For EV, IP-1 and IP-2 tests, all samples tested must pass. Having all the required sample size pass will provide data to support the conclusion that the switch has a minimum reliability R, at a given confidence of C. The notation Pc-R is interpreted as minimum reliability equal to R, at a confidence C; thus P90-.80 means a minimum reliability of 80% at 90% confidence.

B. All samples must pass is the statistical test acceptance criteria stated for tests with 100% frequency; or samples from lots, which could have a variable size.

7. REVALIDATION REQUIREMENTS

A. No change in design, material, process or component supplier shall be made without prior approval from the releasing Product Engineering Office. As part of approving a change, the releasing Product Engineering Office will establish the portion of the Product Validation tests required to be run to revalidate the switch. The following table is to be used as a guide in determining the type of tests required for revalidation requirements.

RUNNING CHANGE REVALIDATION

Component	Process or Material Change or New Supplier
1. Terminals, Contacts, or Connector	III, B, C, E, G, H.I. J. L, M.
2. Case or Housing	All Tests
3. Disc or Diaphragm	III, A.D.E.F.I.M.L.
4. Fitting or Fluid Connection	III. D, E, F, H, I, M.

B. Annual revalidation is not required on carryover switches.

8. LOT DEFINITION

A lot is defined as no more than eight (8) hours of production up to 4,000 pieces. If shifts extend beyond eight (8) hours, or more than 4,000 pieces are produced in a shift, the product must be separated into at least two lots.

VII. RECORD RETENTION

A. Recording and record retention shall conform with Ford Q-101.

B. Production Validation test results and analysis are to be forwarded to the releasing Product Engineering Office before approval for shipment of production parts can be granted.

C. In-Process test results shall be available at the supplier's manufacturing facility for the releasing Product Engineering Office and Ford SQA or its representatives to review on request.

VIII. INSTRUCTIONS AND NOTES

All switches are to be identified with the Ford part number, supplier identification, and a date code indicating final assembly.

All test equipment and test procedures for testing to this specification must be approved by the releasing Product Engineering Office and no change in equipment or procedure may be made without their written concurrence.

Test port configuration is shown in Figure 3.

O-rings, if used in the design, shall be free from cuts, nicks, abrasions or any other damage which would result in a fluid leak.

All switches must have a shipping cap installed over the port threads to prevent contamination. All shipping caps must be approved by the releasing Product Engineering Office prior to production incorporation.

All switches that do not pass the calibration test are to either be readjusted and rechecked, or scrapped. (Salvage of component parts permitted with 100% reinspection).

If product nonconformance occurs for test Sections III. B, C, D, E, F, and J, production shall be stopped and the problems corrected. All production lots shall be sorted 100% prior to shipment. Suspected nonconformance of any shipped parts shall be reported immediately to the releasing Product Engineering Office.

If nonconformance of the statistical acceptance criteria occurs for test Sections III. G, H, I, K, L and M, a cause to recall the subject weeks production and to stop production may result.

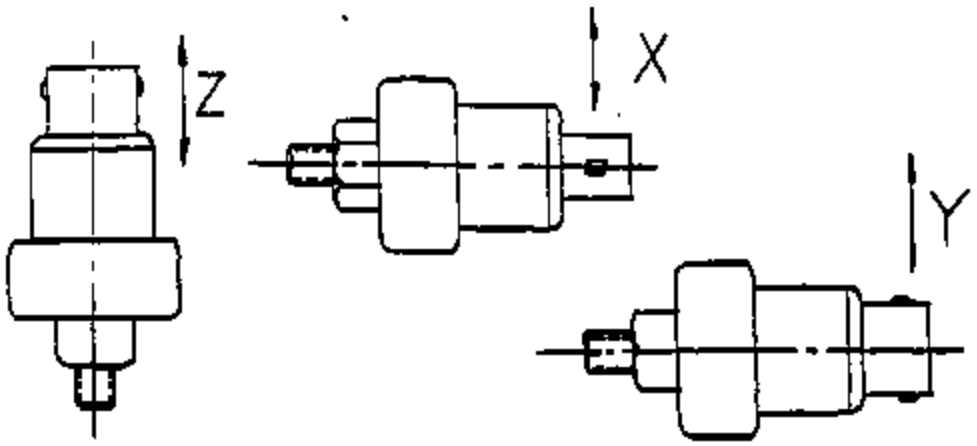
IX. COMPILATION OF REFERENCE DOCUMENTS

ASTM B-117. Salt Spray Testing

Ford Q-101. Quality System Standard 1993 Edition

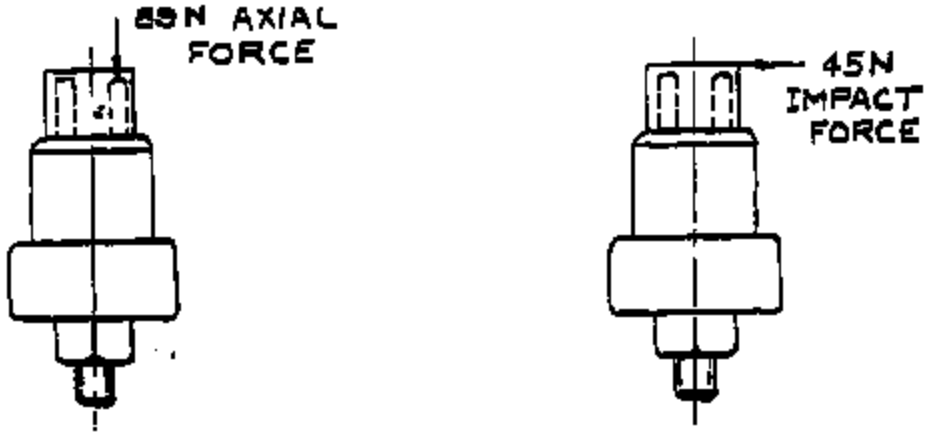
ES-F0EB-14A464-AA. Specification - SLV Assy - Wire Connector

ES-F2VF-9C735-AA. Specification - Servo Assembly Speed Control



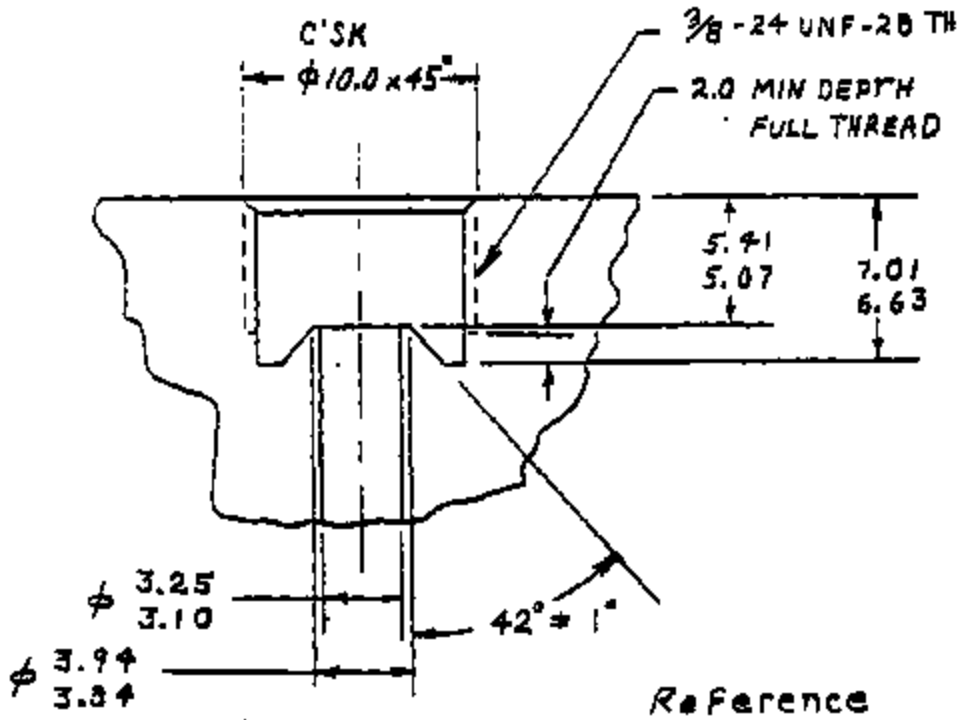
VIBRATION TEST - SWITCH ORIENTATION

FIGURE 1.



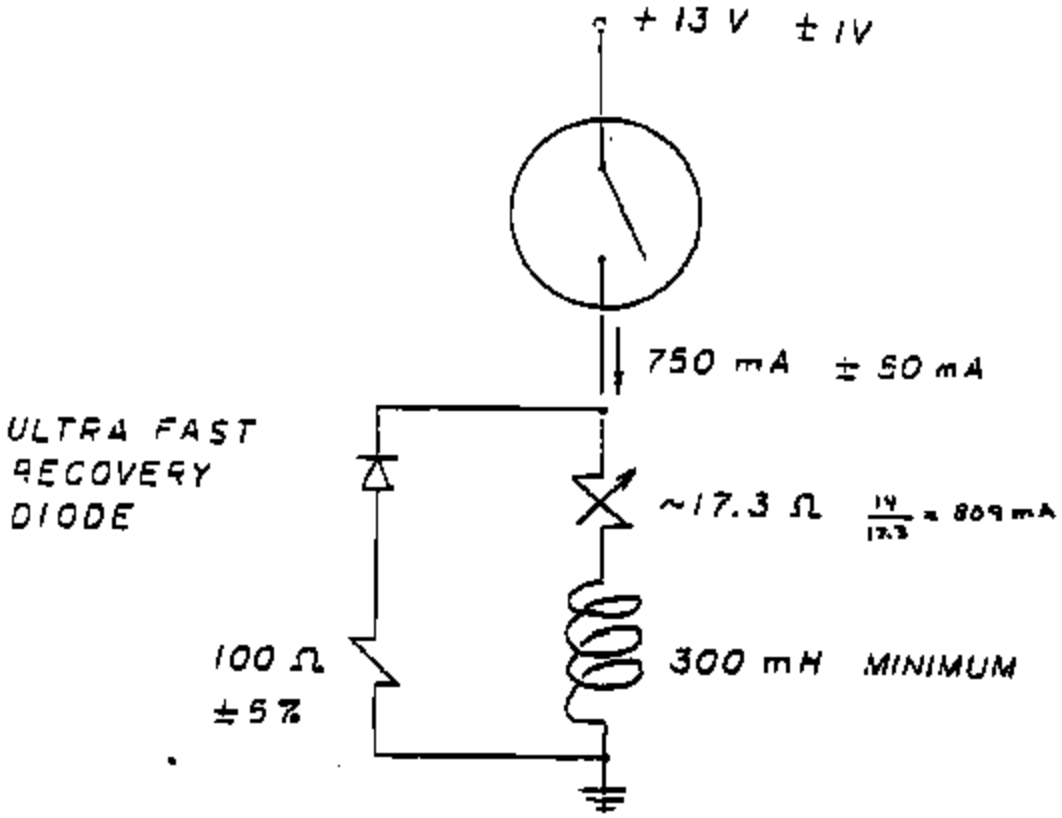
TERMINAL STRENGTH - LOAD ORIENTATION

FIGURE 2.



TEST FIXTURE PORT CONFIGURATION

FIGURE 3



DEACTIVATE SWITCH
TEST SET UP

FIGURE 4

Appendix I

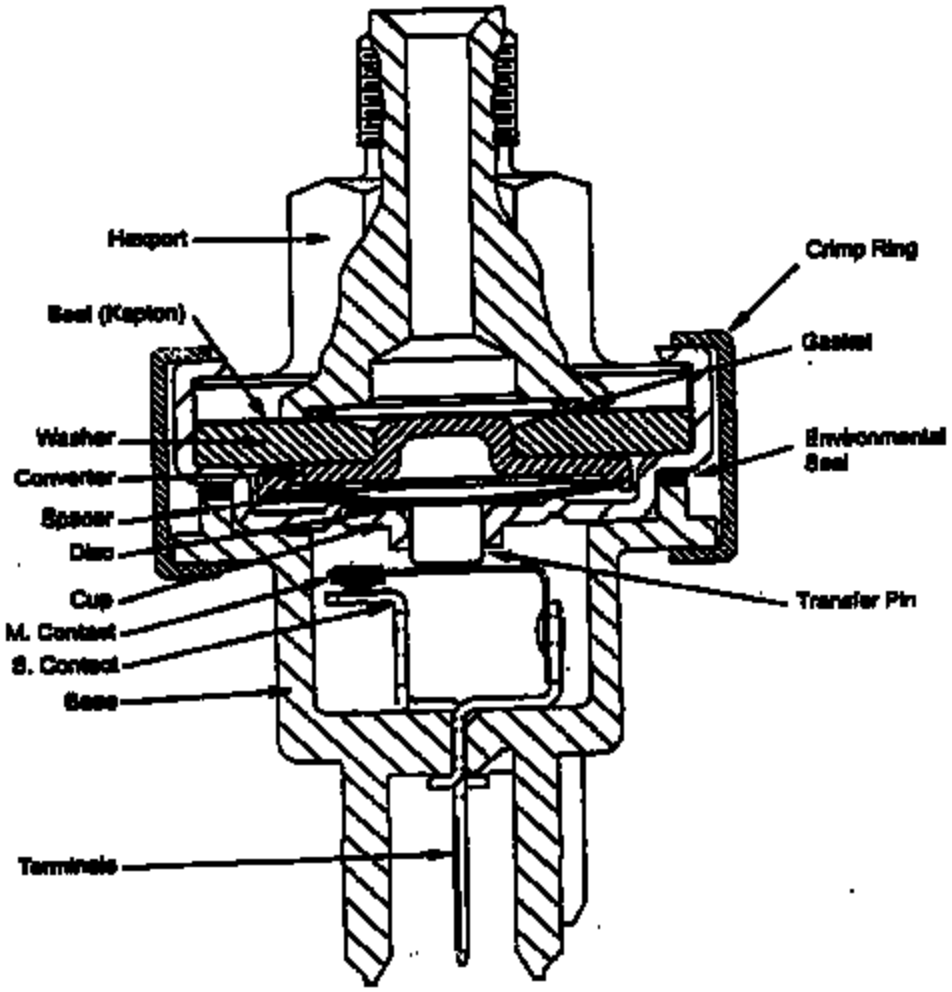


Diagram showing components of switch.

TEXAS INSTRUMENTS

ATTLEBORO, MASSACHUSETTS 02703

SAMPLE REPORT

REASON FOR REPORT		VENDOR	P.O.	PART NO.	REV.
NEW PART		———		77PS62-1	G
REPLACEMENT TOOL.		REPORT REQ. BY: E. Rose	DATE: 4/6/82	INSPECTED BY: Elaine Gravel	DATE: 4/7/
CORRECTED TOOL.					
REPAIRED TOOL.					
REVIEW					
OTHER Dimensional Analysis	X				

THE DIMENSIONS INDICATED BELOW REPRESENT TEXAS INSTRUMENTS' FINDINGS REGARDING THE ACTUAL VALUES FOR ALL CHARACTERISTICS MEASURED. IN CASES WHERE ACTUAL VALUES DEVIATE FROM THE SPECIFIED DIMENSIONS, THE DISPOSITION MUST INDICATE THE REQUIRED ACTION FOR EACH NON-CONFORMANCE IN THE APPROPRIATE COLUMN.

	(CIRCLE ALL OUT OF TOLERANCE DIMENSIONS)					DISPOSITION	
		A	B	C	D	Inspect Method	
1	11.40 - 11.90	11.806	11.792	11.817	11.794	TM	
2	12.80 - 13.21	13.043	13.043	13.072	13.094	TM	
3	16.50 - 16.96	[illegible]	16.652	[illegible]	[illegible]	MIC	
4	19.45 - 19.81	19.752	19.754	19.727	19.798	MIC	
5	2.74 - 3.05	2.930	2.93	2.944	2.951	MIC	
	⊕ 0.1 Ⓜ A	[illegible]	[illegible]	[illegible]	[illegible]	TM	
6	31° ± 2°	29°29'	29°38'	29°57'	29°34'	↓	
7	1.85 - 2.06	1.929	1.956	1.969	1.978		
8	1.24 - 1.55	1.365	1.387	1.423	1.400		
9	1.24 - 1.45	1.319	[illegible]	1.225	1.308	↓	
10	11.60 - 11.92	[illegible]	[illegible]	[illegible]	[illegible]	MIC	
11	13.43 - 13.85	13.810	13.769	13.786	13.447	TM	
12	0.25 - 0.75	[illegible]	[illegible]	[illegible]	[illegible]		
13	2.79 - 3.10 4X 1	2.900	2.909	2.912	2.908	↓	
~~13~~	2	2.943	2.915	2.913	2.911	MIC	
14	0.05 - 0.26 4X	[illegible]	[illegible]	[illegible]	[illegible]	TM	
15	⌀ 19.05 MAX.	[illegible]	[illegible]	[illegible]	[illegible]	TM	
16	12.59 - 13.11	[illegible]	[illegible]	[illegible]	[illegible]	TM	
17	11.65 - 12.17	N/A NO TERMINALS →					
18	0.62 - 1.30	1.025	1.135	1.122	1.185	TM	
19	2.79 - 3.41	3.006	3.061	3.152	3.107		
20	7.23 - 7.75	7.579	7.581	7.514	7.546		
21	6.60 - 6.81	6.701	6.673	6.915	6.679		
22	29° ± 3° 4X	—	[illegible]	—	—		
		—	[illegible]	—	—	↓	
23	No Flash or burrs	Slight flash on edges					

REMARKS AND/OR INSTRUCTIONS:

Noryl GTX 830

DISPOSITION: TOOL APPROVED FOR PROD. | RESUBMISSION REQ'D

MFG. ENG.: | QRA ENG.:

PURCH. AGENT:

TEXAS INSTRUMENTS

ATTLEBORO MASSACHUSETTS 02703

SAMPLE REPORT

REASON FOR REPORT		VENDOR		P.O.	PART NO.	REV.
NEW PART					771542-1	G
REPLACEMENT TOOL.		REPORT REQ BY	DATE	INSPECTED BY		DATE
CORRECTED TOOL.		E. Ross	4/22/92			4/7/9
REPAIRED TOOL.						
REVIEW						
OTHER						

THE DIMENSIONS INDICATED BELOW REPRESENT TEXAS INSTRUMENTS' FINDINGS REGARDING THE ACTUAL VALUES FOR ALL CHARACTERICS MEASURED. IN CASES WHERE ACTUAL VALUES DEVIATE FROM THE SPECIFIED DIMENSIONS, THE DISPOSITION MUST INDICATE THE REQUIRED ACTION FOR EACH NON-CONFORMANCE IN THE APPROPRIATE COLUMN.

	(CIRCLE ALL OUT OF TOLERANCE DIMENSIONS)						DISPOSITION
			A	B	C	D	
23	Loud on surface						TM
23A	1.80-2.21 2X	1	1.651	1.651	1.651	1.651	
		2	1.651	1.778	1.651	1.651	
24	2.30-2.72 2X	1	2.535	2.537	2.474	2.577	
		2	2.786	2.572	2.570	2.519	
25	2.15-2.42 2X	1 / 2	2.166 / 2.217	2.171 / 2.234	2.272 / 2.257	2.271	
26	25°±2° 2X	1	24°25'	24°58'	24°47'	24°06'	
		2	24°10'	24°14'	24°06'	24°43'	
27	45°±2° 4 Plcs.	1	44°35'	45°47'	44°47'	45°01'	
		2	44°02'	45°32'	46°01'	45°50'	
27	(71.5°) 2X	1	72°	71°01'	71°20'	72°01'	
		2	71°07'	72°	72°10'	71°12'	
29	1.42-1.63 2X	1	1.530	1.538	1.572	1.603	
		2	1.539	1.618	1.602	1.596	
30	0.35-0.66 4X	1-4	[illegible]	[illegible]	[illegible]	[illegible]	
31	0.35-0.66 4X	1-4	[illegible]	[illegible]	[illegible]	[illegible]	
32	0.75-1.17 4X	1-4	[illegible]	[illegible]	[illegible]	[illegible]	
33	Trim bearing Boss		block	on per	Engine Base.	Trying	new material.

REMARKS AND OR INSTRUCTIONS:

DISPOSITION: TOOL APPROVED FOR PROD. | RESUBMISSION REQ'D

MFG. ENG.: | QRA ENG.:

PURCH. AGENT:

TI-NHTSA 000234

MACHINE CONTROLS

AMI Sensors & Checks

2) Hexport Check

- LVDT that measures the depth of the fluid path hole to determine if the correct hexport is being used.
- The part # and corresponding hexport are bar coded into the PLC.
- The fluid path hole of each hexport has a unique depth.
- The limits for each hexport are programmed into the PLC.
- The AMI stops on (1) fault.
- A master set up block is used to "0" out the LVDT.

4) Gasket Check

- 4 reflective sensors check to see if there is a gasket and that it is in place.
- None of the 4 is allowed to receive a reflection or the nest is called bad.
- The shift register is set bad on one fault, the AMI stops on two faults.
- There are 5 set-up masters to ensure the reflective sensors are in the correct positions.
- Under SPC control using a P-Chart.

7) Kapton Check #1 & #2

- 4 pogo pins are used to make a continuity check on the nest. The 4 pins must touch the 4 corners of the kapton (two corners of each piece) to ensure that two pieces are present.
- If one of the pogo pins goes to ground the nest is called bad.
- The shift register is set bad on one fault and the AMI stops on two faults.
- There is a set-up block to ensure the pins are in the correct position.
- Under SPC control using a P-Chart.

9) Kapton Check #3

- 2 pogo pins are used to make a continuity check. The 2 pins must touch the two corners of the third piece of Kapton to ensure the third piece has been placed in the nest.
- If one of the pogo pins goes to ground the nest is called bad.
- The shift register is set bad on one fault and the AMI stops on two faults.
- There is a set-up block to ensure the pins are in the correct position.
- Under SPC control using a P-Chart.

11) Washer/Converter

- The washer and converter are checked for part presence using a height probe sensor utilizing two micro switches. The height probe fixture comes down into the nest and if the micro switches are not broken the PLC indicates the parts are present. If the micro switches are broken the PLC assumes there are no components and calls the nest bad.

13) Spacer Check

- This station consist of three pogo pins, two continuity pins, and a hold down pin. The continuity pins come down and make contact with the spacer and if they do not go to ground the part is considered good. If there is a ground the part is considered bad.
- The shift register is set bad on one fault and the AMI stops on two faults.

16) Disc Load Check

- This check is done with a LVDT. It is checking to make sure that there is not more than one disc, and the disc is not upside down.

19) Cup Load Check

- The cup is checked for part presence using a micro switch. The height check fixture comes down into the nest and if the micro switch is not broken the PLC believes there is a cup present. If the micro switch is broken the PLC believes there is no cup.
- The shift register is set bad on one fault and the AMI stops on two faults.

xx) Pre-Crimp Station

- The device is held tightly together by pushing up from the bottom on the hexport and holding it from the top with a pin that sits on the disc. Then an air-actuated cylinder engages and pre-crimps the part with three tools 120 degrees apart.

20) Low Pin Check

- The low pin check uses a LVDT to ensure the disc has not moved out of the converter and become trapped.

Crimp Table Operation:

1) Transfer pre-crimped part onto table.
2) Check for part presence.
3) 45 degree crimp to a pressure with an electrical stop.
4) Check for presence/no presence of o-ring depending on application.
5) 90 degree crimp to a pressure with an electrical stop.
6) Over pressure to wet the Kapton in place with air at 1250 +/- 50 psi.
7) Unload station.

SPC checks on the AMI:

1) Gasket check

- We use a set of 5 masters. We have four masters with misplaced gaskets located at 90, 180, 270 and 360 degrees and a hexport with no gasket. The detection system must call all these masters bad.
- The SPC is performed at the beginning of the shift, after four hours of running or if any adjustments or repairs are performed on the machine.

2) Kapton & spacer check

- This check is done using a continuity check. We shut off the Kapton feed at each station and then check to see if the continuity check station indicates the Kapton is missing. This is done for all three stations as well as the spacer station.
- The SPC is performed at the beginning of the shift, after four hours of running or if any adjustments or repairs are performed on the machine.

3) Low pin check

- This check is done using a go and a no/go gage. The two calibrated blocks are run through the station. When the go gage passes through the station the fault light must not come on. When the no/go gage passes through the light must come on.
- The SPC is performed at the beginning of the shift, after four hours of running or if any adjustments or repairs are performed on the machine.

4) Sensor crimp height and diameter

- This test is performed using a calibrated plug gage. First the diameter is checked using the plug gage as a go/no-go gage. If the sensor fits in it is good if it does not fit in it is no good. Then the height of the crimp is checked using a dial indicator and this is inputted into an X bar and R chart with good and bad ranges.
- This test is performed on five sensors after each running hour, which is approximately equal to a 2000 piece lot.

BAM Controls

3) **Base Presence**

- Uses a through beam to ensure a base has placed in the nest.

4) Stationary terminal presence and position

- Two micro switches are used to ensure there is a terminal present and it is the proper position.
- This station is also used to seat the terminal in the base cavity. If the terminal is not in place or in the wrong position the arm will travel too far and break the micro switches.

11) Moveable terminal presence and position

- Two micro switches are used to ensure there is a terminal present and it is the proper position.
- This station is also used to seat the terminal in the base cavity. If the terminal is not in place or in the wrong position the arm will travel too far and break the micro switches

13) Check for contact

- A reflective sensor is used to ensure a contact is in place.

14) **Part Presence**

- A through beam sensor is used to ensure there is a base in the nest before proceeding to the crimp station.

16) **Calibrate Base**

- This station sets the distance between the contact on the moveable arm and the stationary contact. This distance is predetetmined and programmed into the PLC.

19) **Check Station**

- Checks to ensure the calibrator calibrated the base to the proper dimension. Measuring the distance until the contacts meet and continuity is made does this.

21) **Off-Load/Good Low**

- When running split lots the bases on the low end of the specification are off loaded at this station.

22) **Off-Load/Good High**

- When running split lots the bases on the high end of the specification are off loaded at this station.
- When running normal lots all bases are off loaded at this station or they are allowed to go directly into F.A.M.

23) **Rework**

- Any base that is not calibrated to the correct dimension and identified as so by the check station is off loaded at this station.

1) Check Empty Nest

- Uses a height probe and a micro switch to ensure the nest has been unloaded before loading another base into the nest.

SPC checks and frequencies:

1) Calibrator check
   - 5 pcs. per hour to compare the calibrator to the calibrated SPC gauge.

2) Terminal Height
   - 5 pcs. per hr to compare the terminal height in reference to the base.

3) Terminal Pushout
   - 5 pcs per hour to measure the torque required to push out the terminal from its stake.

4) Terminal separation
   - 5 pcs. every two hours to measure the distance between the terminals and the face of the base.

5) Terminal position
   - 5 pcs. every to hours to measure the distance between the terminals and the other face of the base.

FAM Controls

23) Crimp Ring Presence

- A height check probe is used to insure a part has been loaded. The height check fixture is attached to a micro switch and when the height check fixture comes down if the part is present the micro switch will not break contact. If it is not present it will break contact and send a signal to the PLC to stop the machine.

2) Sensor Presence

- A height check probe is used to insure a part has been loaded. The height check fixture is attached to a micro switch and when the height check fixture comes down if the part is present the micro switch will not break contact. If it is not present it will break contact and send a signal to the PLC to stop the machine.

4) Environmental Seal Presence

- A height check probe is used to insure a part has been loaded. The height check fixture is attached to a micro switch and when the height check fixture comes down if the part is present the micro switch will not break contact. If it is not present it will break contact and send a signal to the PLC to stop the machine.

8) Pin Check

- This station uses a LVDT to measure the height of the pin. The upper and lower limits of the pin size are loaded into the PLC and the machine stops if the measurement falls out of these limits.

10) Base Presence

- A height check probe is used to insure a part has been loaded. The height check fixture is attached to a micro switch and when the height check fixture comes down if the part is present the micro switch will not break contact. If it is not present it will break contact and send a signal to the PLC to stop the machine.

20) Empty Nest Check

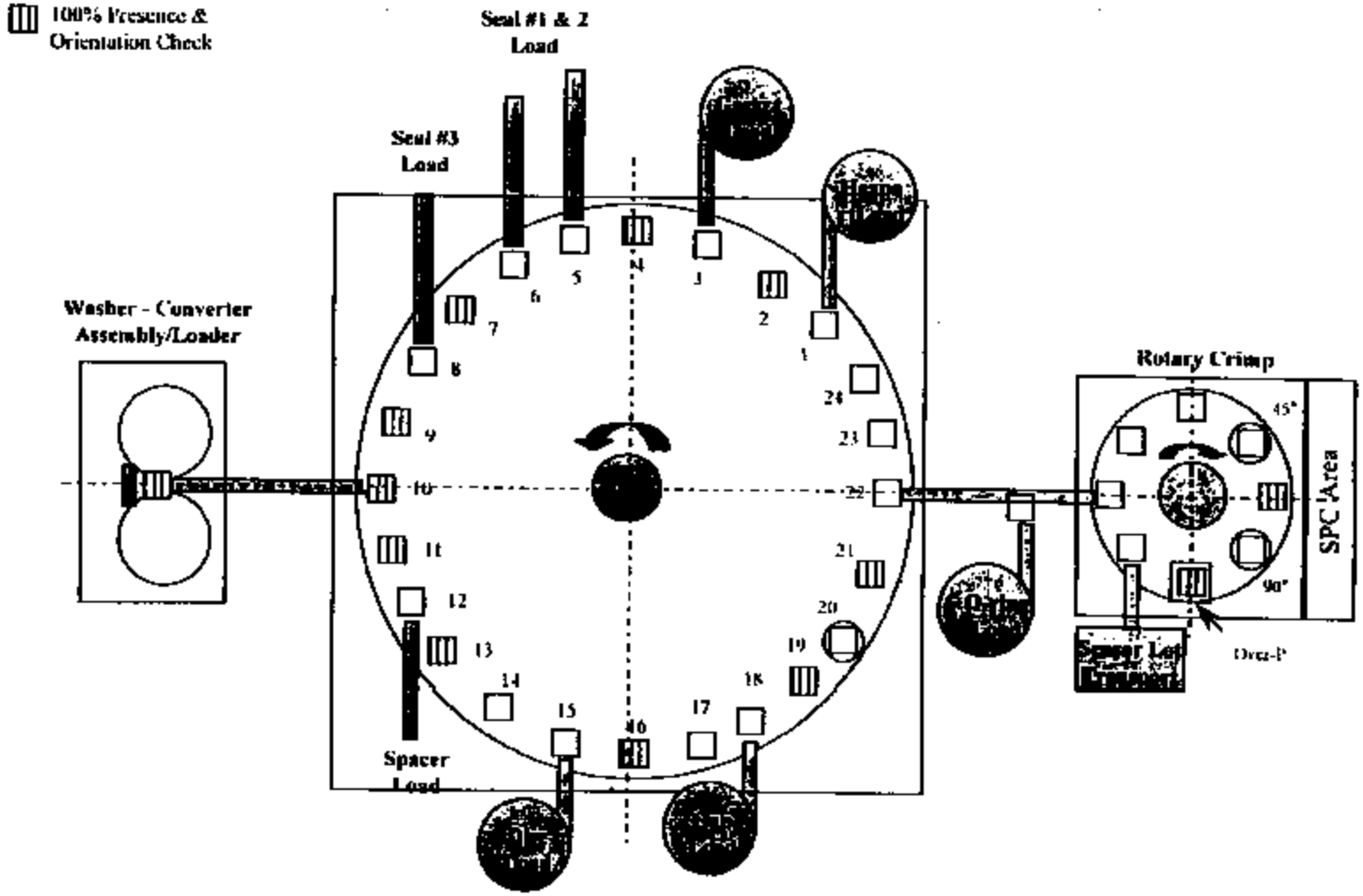
- A height check probe comes down to check and make sure the nest is empty before loading another crimp ring into the nest.

SPC checks and frequencies:

1) 90 degree torque. The torque that is needed to turn the hexport is checked at the set-up and then 5 pcs. per hour.

2) Height of crimp. The height of the crimp (which indicates it height of the device) is measured ant the set-up and then 5 pcs. per hour.

Sensor Assembly Machine



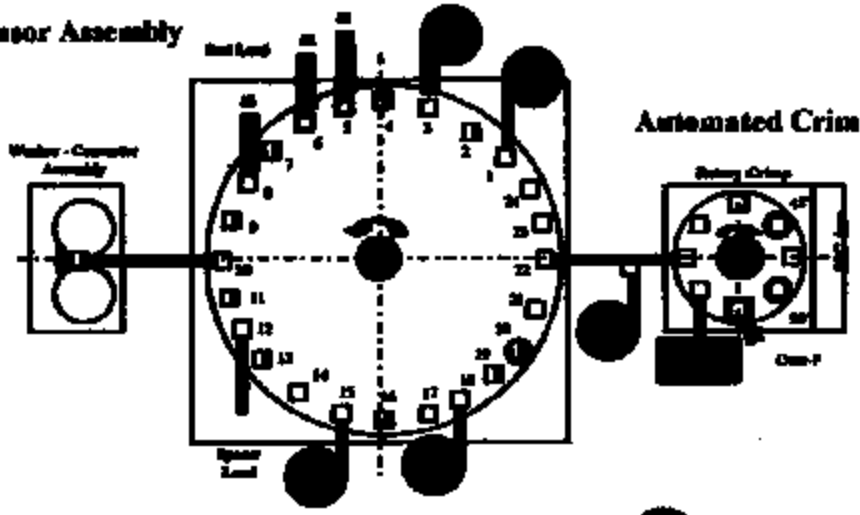
TEXAS INSTRUMENTS

Ford - Electronic Speed Control Deactivation Pressure Switch
TI P/N 77PSL Series

BOSCH

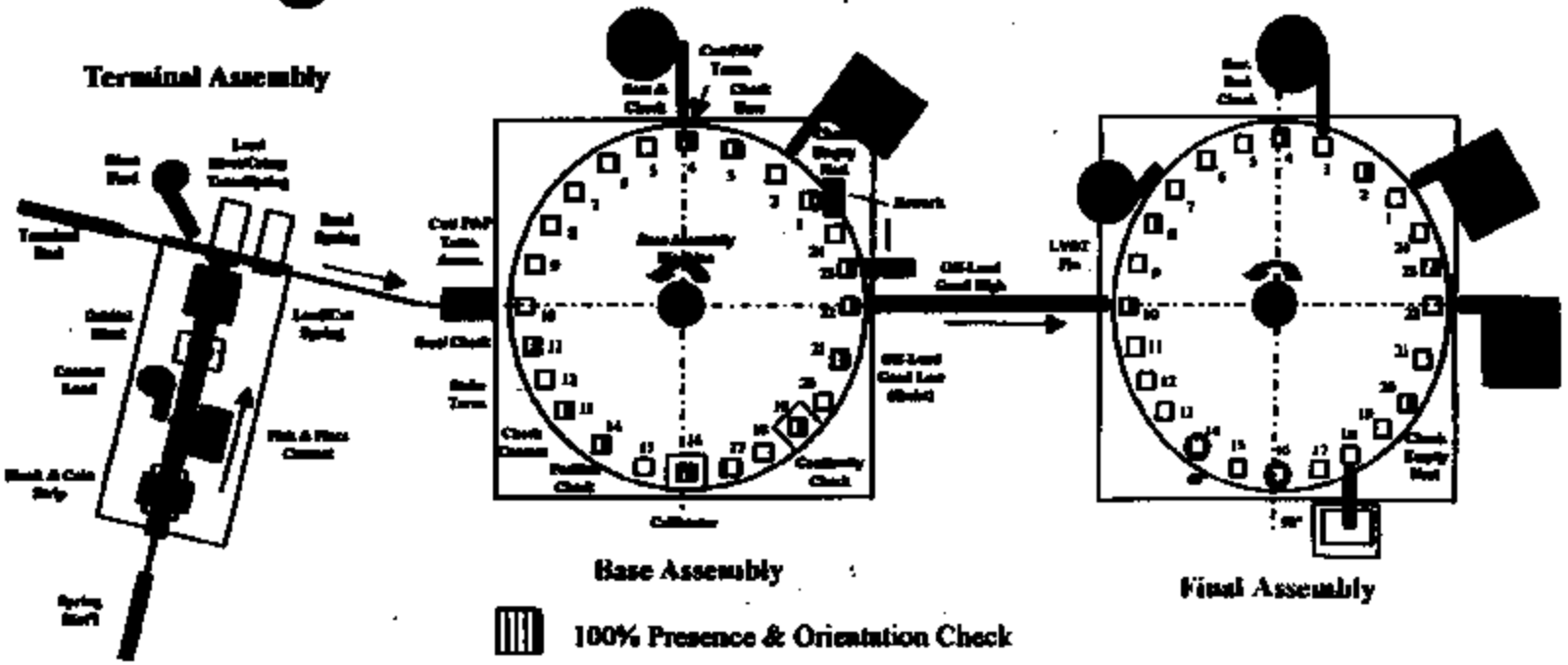
Sensor Assembly

Automated Crimper



77PS Product Line

Terminal Assembly



Base Assembly

Final Assembly

100% Presence & Orientation Check

TI-NHTSA 000242

Deactivator Switch

The deactivator switch is a normally closed switch and replaces the vacuum dump valve as a redundant safety feature in the system. Normally when the brake pedal is depressed, an electrical signal from the brakelamp circuit to the servo amplifier will disengage the system. Under increased brake pedal efforts (5-10 lbs. engine running), the deactivator switch mounted in the brake line will open and remove power to the speed control servo clutch, releasing the throttle independent of the amplifier control. The deactivator switch is located at the rear brake proportioning valve (ABS brakes) or junction block (non-ABS brakes) below the brake booster. Refer to illustration following Deactivator Switch Installation.

To: G. Baker
Fax 1598
8 Pages

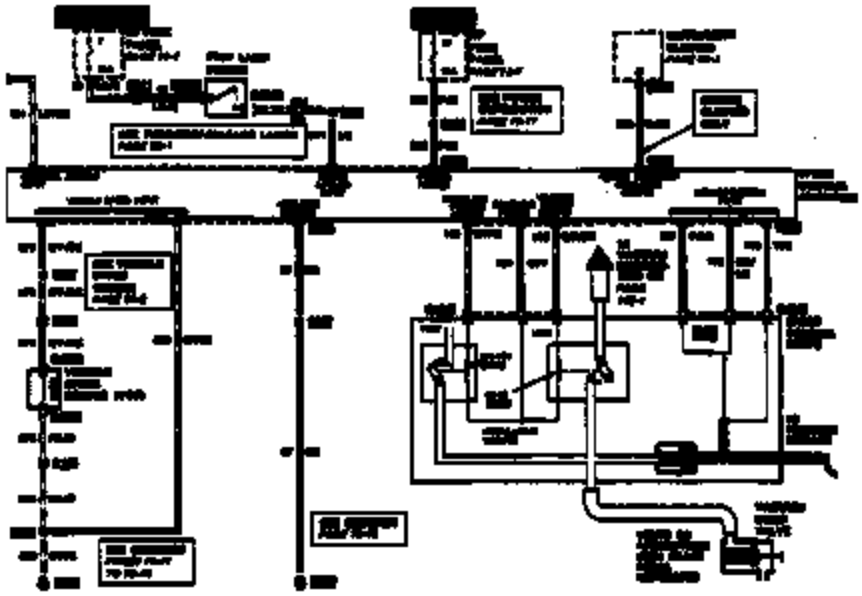
Voltage Measurements

Remove 14401 harness connector from servo assembly. Connect the negative lead of voltmeter to Pin 10 (Circuit 359) of connector. Measure the DC or AC voltage of the following circuits with positive lead of meter.

VOLTAGE MEASUREMENT-DC					
CIRCUIT NAME	PIN	CIRCUIT	WIRE COLOR	TEST CONDITION	APPROXIMATE VOLTAGE
Ignition Feed	7	298	W/P	-Ignition in RUN position	Battery voltage (12 volts)
Deactivator Switch Feed	9	836	D	-No brakes applied -Brake applied(1)	-Battery voltage (12 volts) -Less than 1/2 volt
Stoplamp Switch Feed	4	811	LB	-No brakes applied -Brake pedal depressed	-Less than 1/2 volt -Battery voltage (12 volts)
Command Signal (control line)	8	151	LB/BK	-No switches pressed -Press and hold ON switch	-Less than 1/2 volt -Battery voltage (12 volts)
Electronic Cluster Display	1	383	O/LB	-Ignition in RUN position	5 volts

(1) - Increased brake pedal effort will be required to trigger switch with engine OFF.

VOLTAGE MEASUREMENT-AC					
CIRCUIT NAME	PIN	CIRCUIT	WIRE COLOR	TEST CONDITION	APPROXIMATE VOLTAGE
Speed Sensor Output Signal	3	679	GY/BK	-Vehicle on road about 30 mph -Vehicle on road about 45 mph	-1.4 volts AC minimum -1.8 volts AC minimum



- Component
- Connector
- Ground
- Splice
- Page
- Harness

- How The Circuit Works

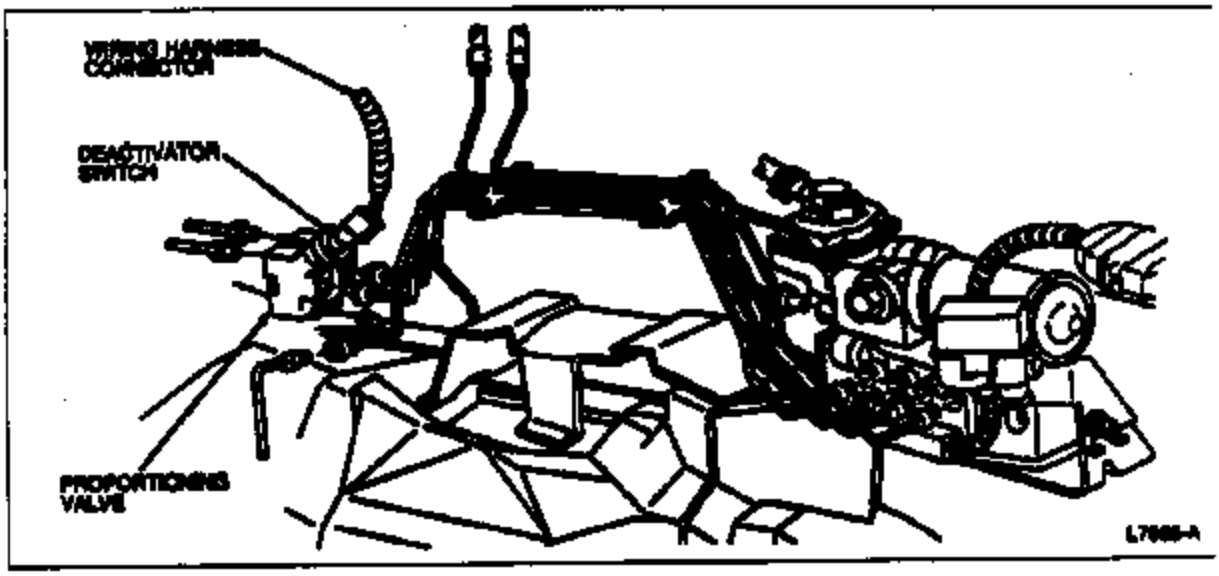
Deactivator Switch

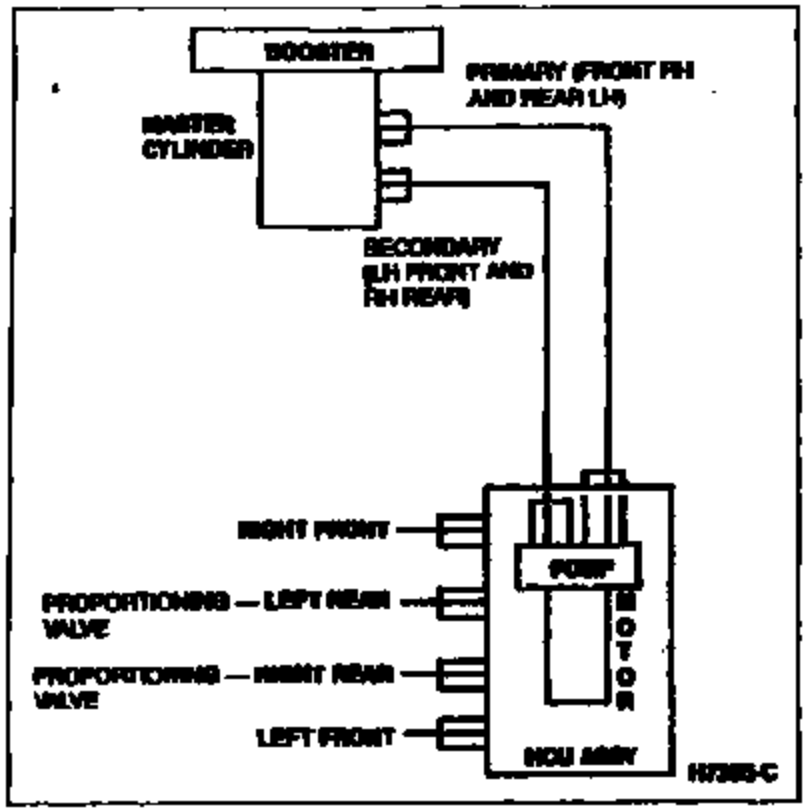
Removal

1. Remove electrical connector from switch.
2. Unscrew switch and remove from brake proportioning valve.

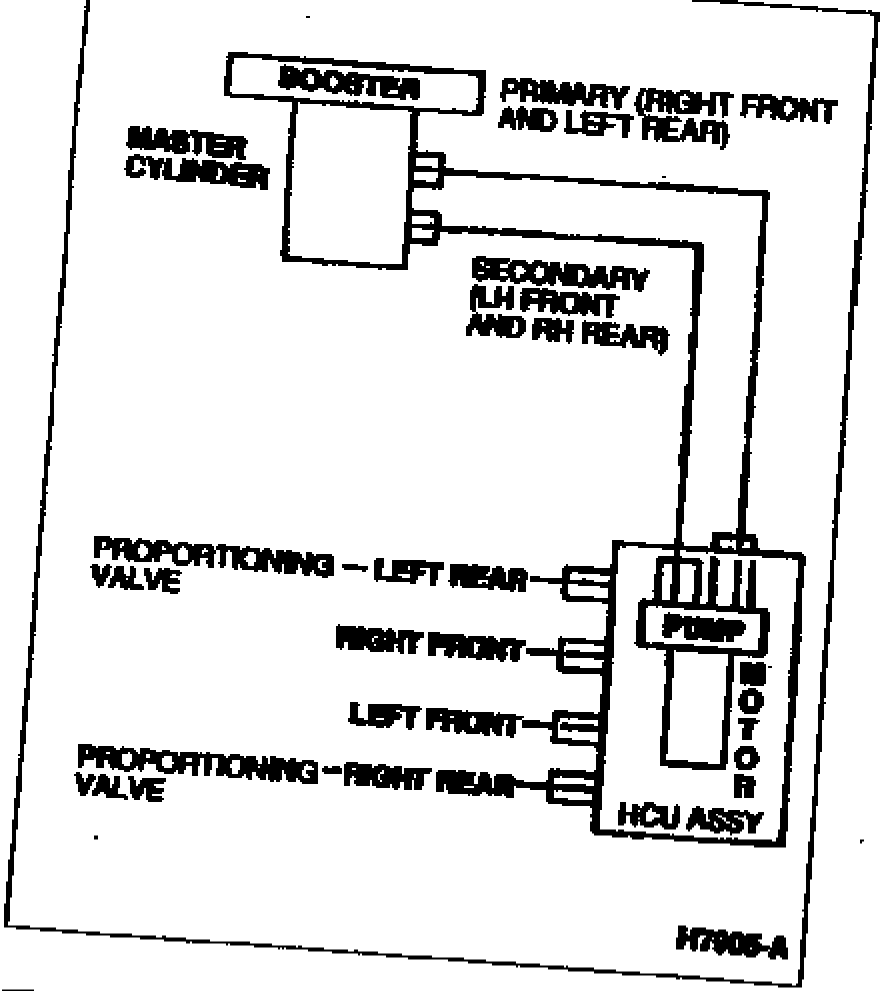
Installation

1. Screw switch into proportioning valve. Tighten to 15-20 N-m (12-14 lb-ft).
2. Attach electrical connector.
3. Bleed brake lines as outlined in «Section 06-09».





ABS Only



Voltage Measurements

Remove 14401 harness connector from speed control servo. Connect the negative lead of voltmeter to Pin 10 (Circuit 675(Town Car) or 359(Crown Victoria/Grand Marquis)) of connector. Measure the DC or AC voltage of the following circuits with positive lead of meter.

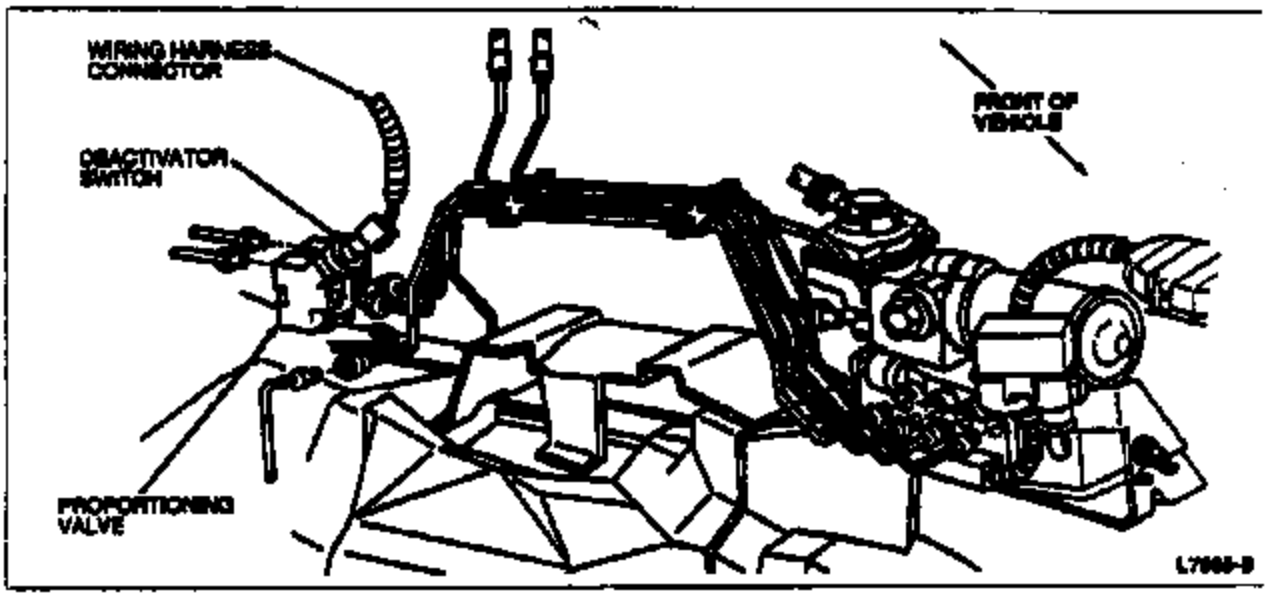
VOLTAGE MEASUREMENT-DC					
CIRCUIT NAME	PIN	CIRCUIT	WIRE COLOR	TEST CONDITION	APPROXIMATE VOLTAGE
Ignition Feed	7	239(a) 254(b)	W/LB (1) W/P (2)	-Ignition in RUN position	Battery voltage (12 volts
Deactivator Switch Feed	9	836	O	-No brakes applied -Brake applied(c)	-Battery voltage (12 volts -Less than .2 volt
Stoplamp Switch Feed	4	811	LG	-No brakes applied -Brake pedal depressed	-Less than .2 volt -Battery voltage (12 volts
Command Signal (control line)	5	151	LB/BK	-No switches pressed -Press and hold ON switch	-Less than .2 volt -Battery voltage (12 volts
Electronic Cluster Display	1	353	O/LB	-Ignition in RUN position	5 volts

(a) - Town Car
(b) - Crown Victoria/Grand Marquis
(c) - Increased brake pedal efforts will be required to trigger switch with engine O/F.

VOLTAGE MEASUREMENT-AC					
CIRCUIT NAME	PIN	CIRCUIT	WIRE COLOR	TEST CONDITION	APPROXIMATE VOLTAGE
VSS Output Signal	3	570	GY/BK	-Vehicle on road about 30 mph -Vehicle on road about 45 mph	-1.4 volts at minimum -1.8 volts at minimum

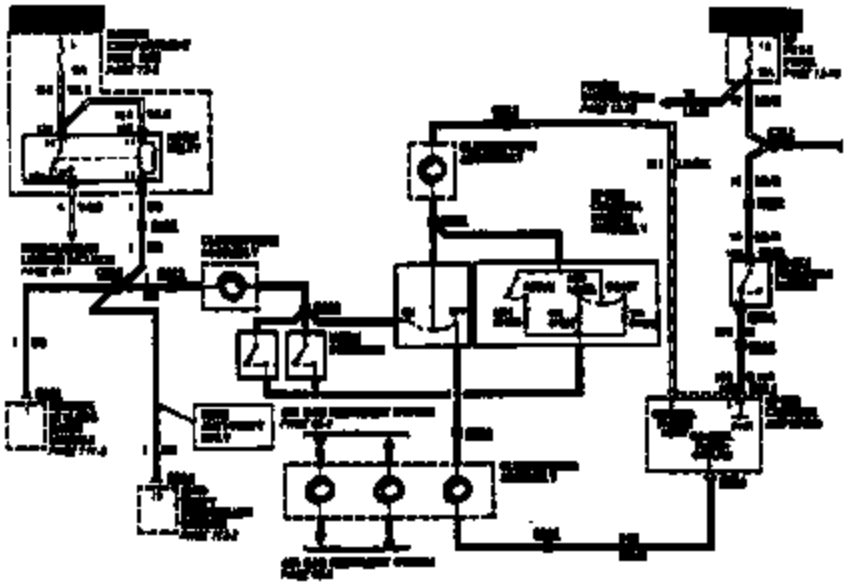
Deactivator Switch

The deactivator switch is a normally closed switch and replaces the vacuum dump valve as a redundant safety feature in the system. Normally when the brake pedal is depressed, an electrical signal from the brakelamp circuit to the speed control servo will disengage the system. Under increased brake pedal efforts (5-10 lbs, engine running), the deactivator switch mounted in the brake line will open and remove power to the speed control servo clutch, releasing the throttle independent of the speed control servo control. The deactivator switch is located at the rear brake proportioning valve (ABS brakes) or junction block (Non-ABS brakes) below the brake booster.



93 TC C.V. GM.

31-1 Speed Control



➲ Component

➲ Connector

➲ Page

➲ Harness

31-2 Speed Control

Deactivator Switch

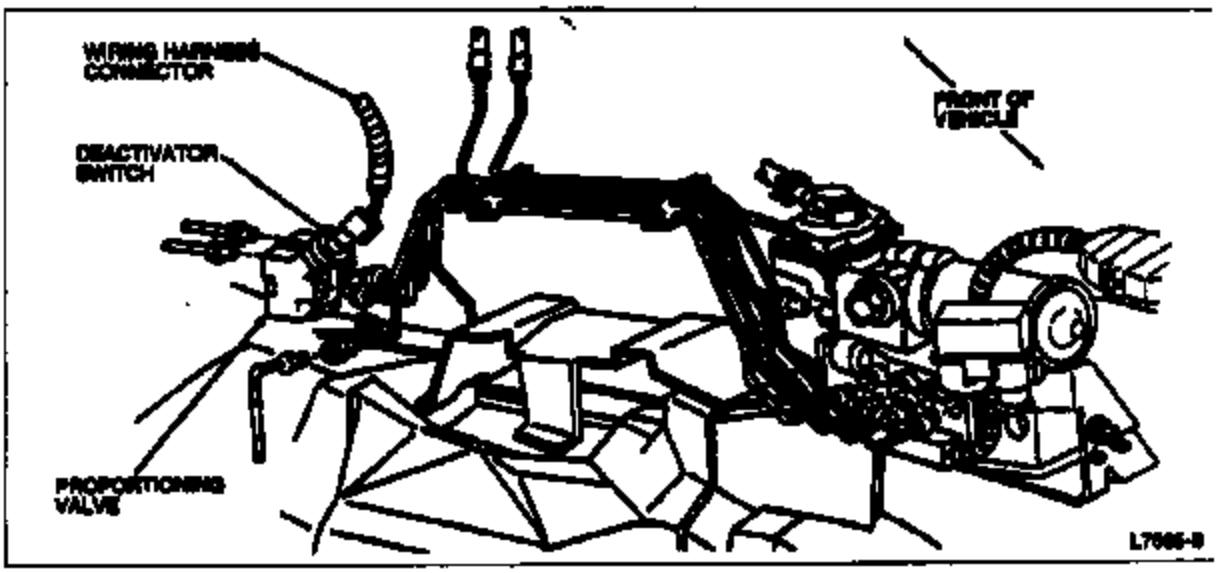
Removal

1. Remove electrical connector from switch.
2. Unscrew switch and remove from brake proportioning valve or junction block.

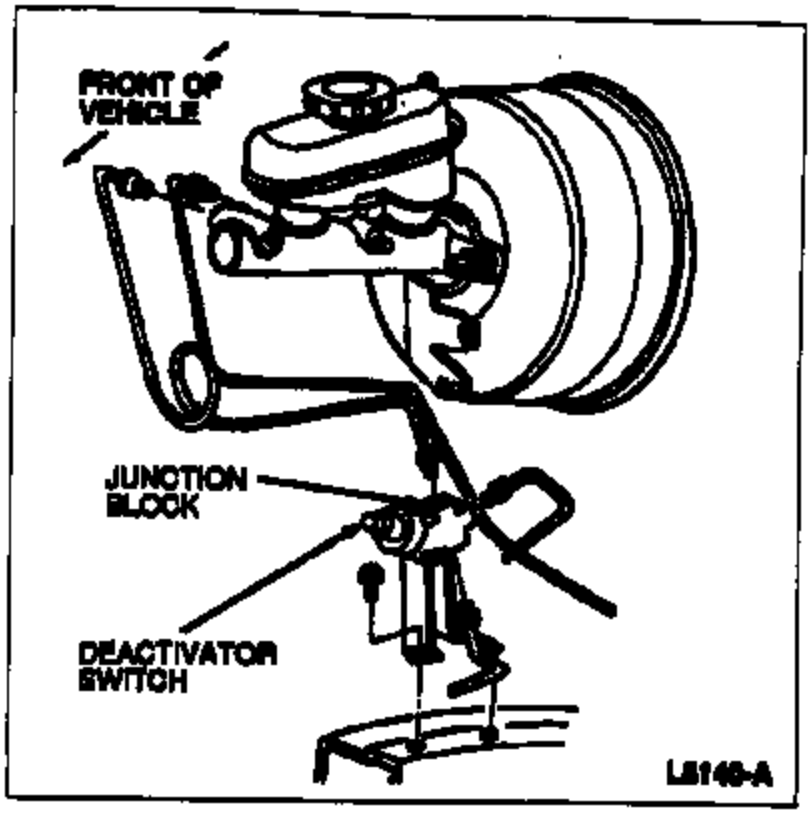
Installation

1. Screw switch into proportioning valve or junction block. Tighten to 15-20 N-m (12-14 lb-ft).
2. Attach electrical connector.
3. Bleed brake lines as outlined in «Section 06-09» ABS brakes, or «Section 06-06», non-ABS brakes.

Proportioning Valve Location



Junction Block Location


FRONT OF VEHICLE
JUNCTION BLOCK
DEACTIVATOR SWITCH
LS140-A

Deactivator Switch

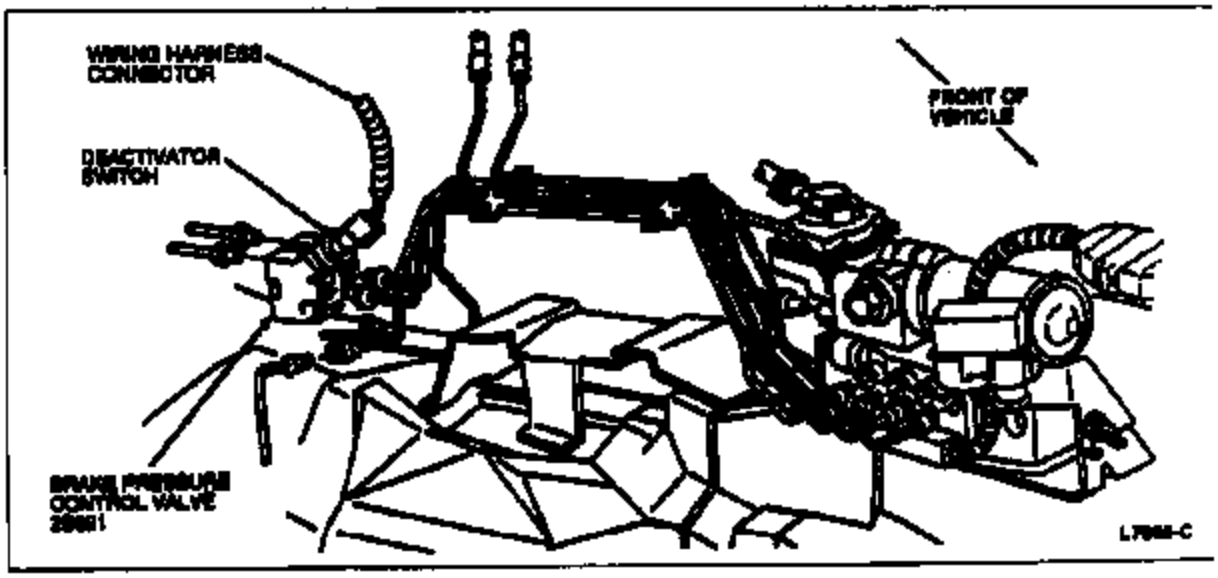
Removal

1. Remove electrical connector from deactivator switch.
2. Unscrew deactivator switch and remove from brake pressure control valve (vehicles with anti-lock brakes) or brake pressure switch adapter (vehicles with conventional hydraulic brakes).

Installation

1. Screw deactivator switch into brake pressure control valve or brake pressure switch adapter. Tighten to 15-20 N-m (11-15 lb-ft).
2. Attach electrical connector.
3. Bleed brake lines as outlined in «Section 06-09» (anti-lock brakes), or «Section 06-06» (conventional hydraulic brakes).

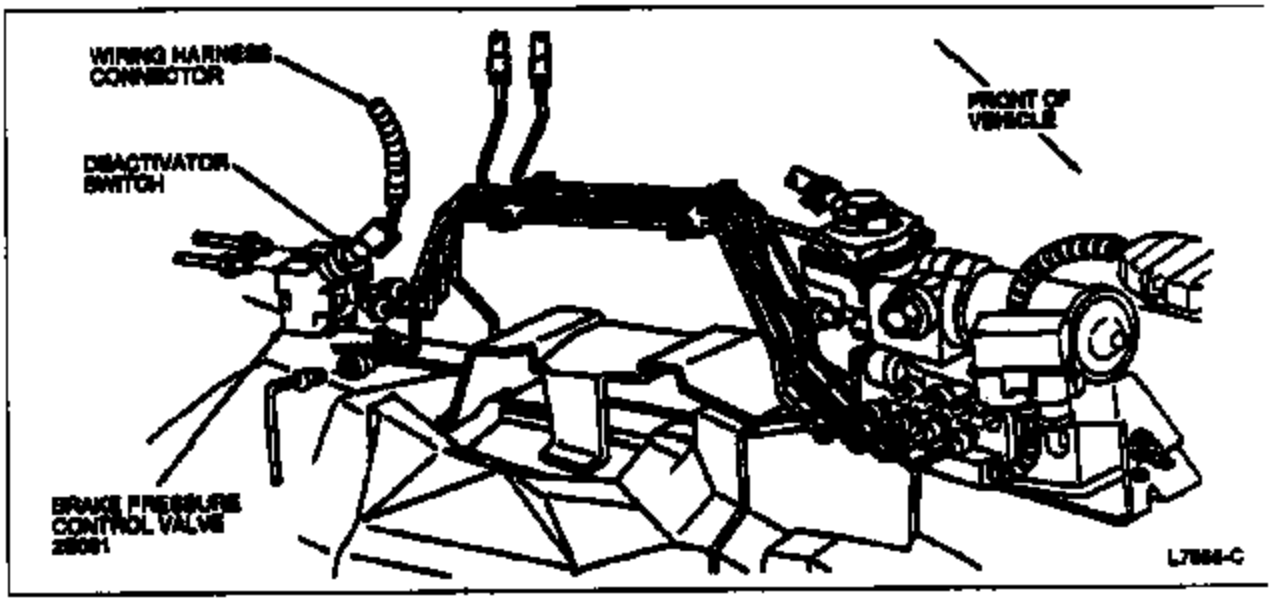
Brake Pressure Control Valve Location

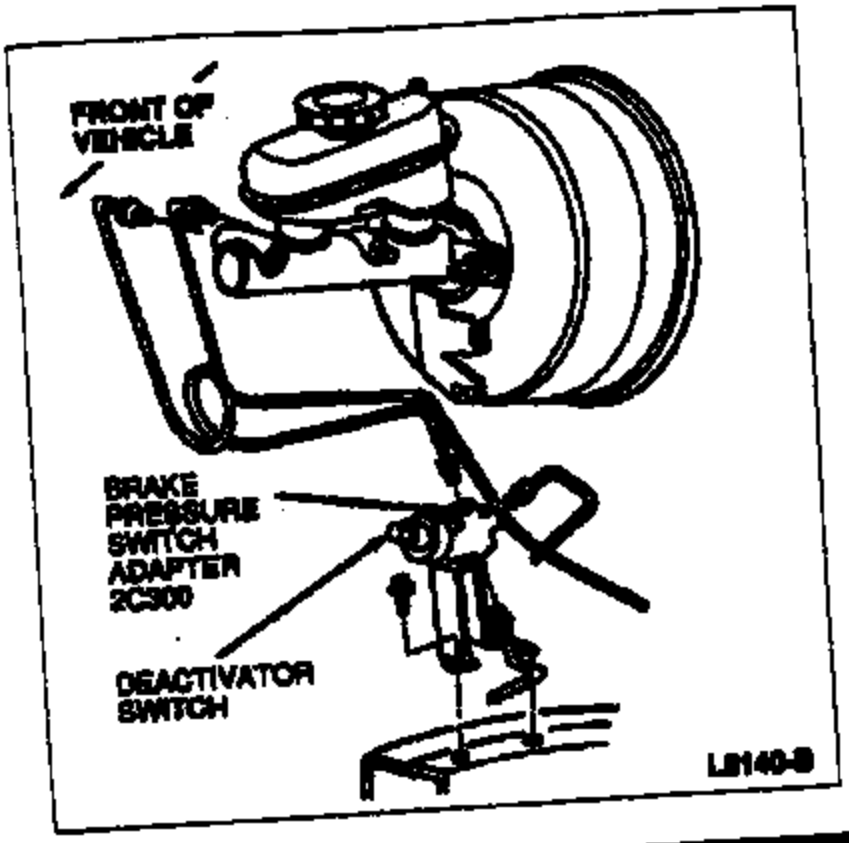


Junction Block Location

Deactivator Switch:

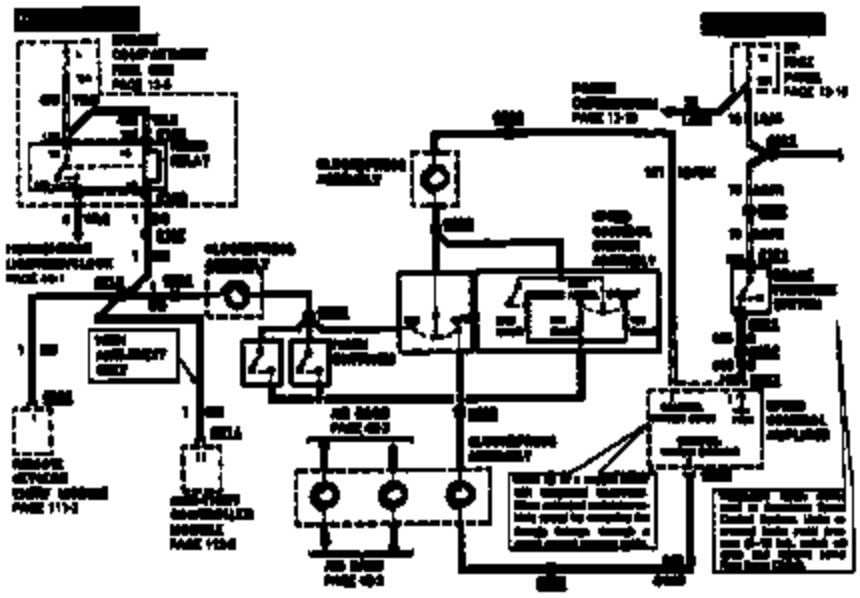
- Is a normally closed switch and replaces the speed control dump valve (8C727) as a redundant safety feature in the system.
- An electrical signal from the BOO circuit to the speed control servo will disengage the system when the brake pedal is applied.
- Under increased brake pedal efforts (22.25-44.5N (5-10 lbs), engine running), the deactivator switch mounted in the brake line will open and remove power to the speed control servo, releasing the throttle from speed control servo control.
- The deactivator switch is located at the rear brake pressure control valve (anti-lock brakes) or brake pressure switch adapter (2C300) (conventional hydraulic brakes) below the power brake booster.




FRONT OF VEHICLE
BRAKE PRESSURE SWITCH ADAPTER 2C300
DEACTIVATOR SWITCH
LS140-B

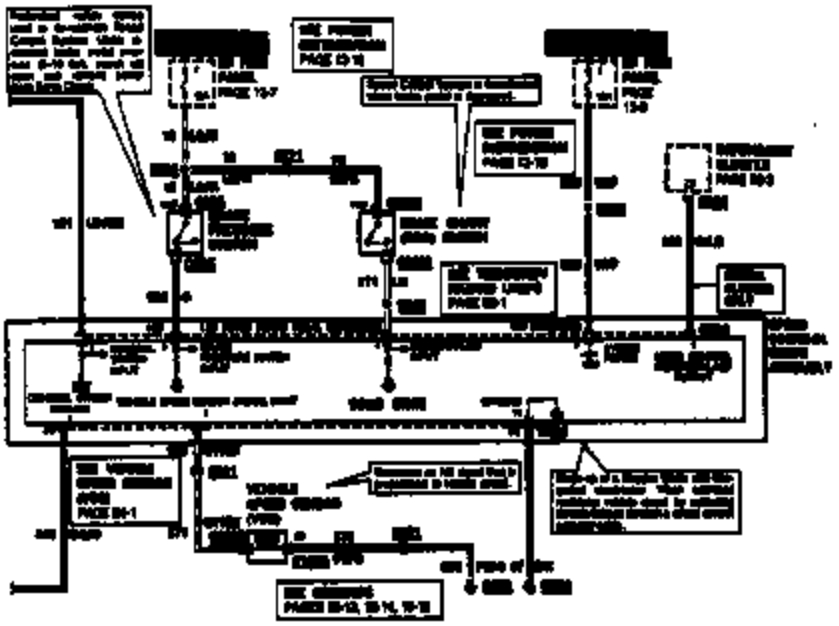
31-1 Speed Control

Town Car



- Component
- Connector
- Page
- Harness

31-2 Speed Control



- Component
- Connector
- Ground
- Splice
- Page
- Harness

- How The Circuit Works

Deactivator Switch

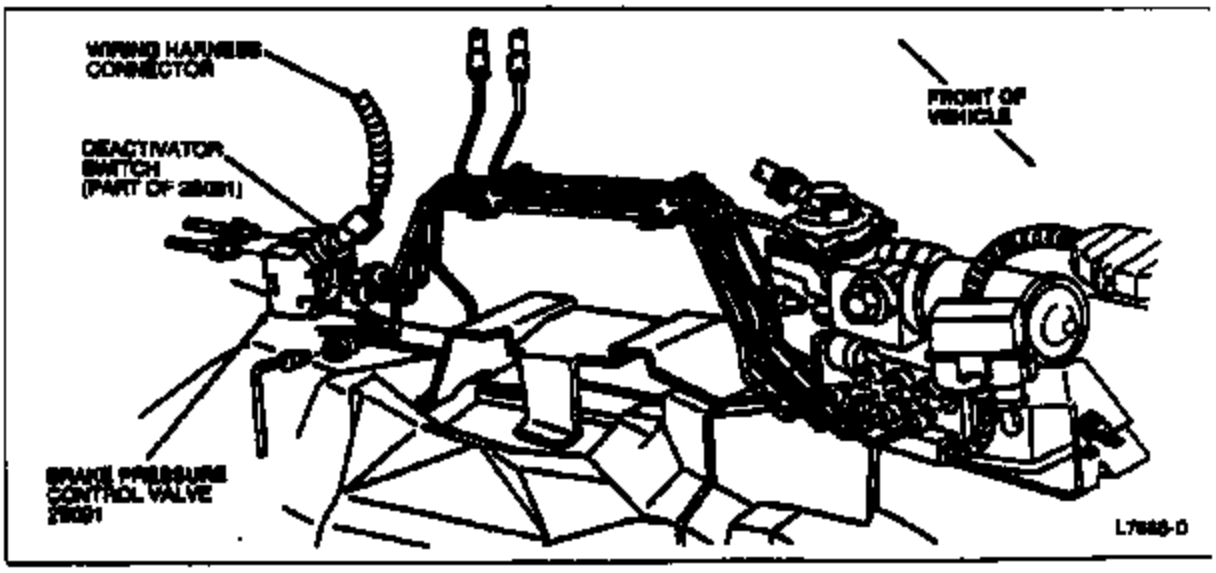
Removal

1. Remove electrical connector from deactivator switch.
2. Unscrew deactivator switch and remove from brake pressure control valve (2B091) (vehicles with anti-lock brakes) or brake pressure switch adapter (2C300) (vehicles with conventional hydraulic brakes).

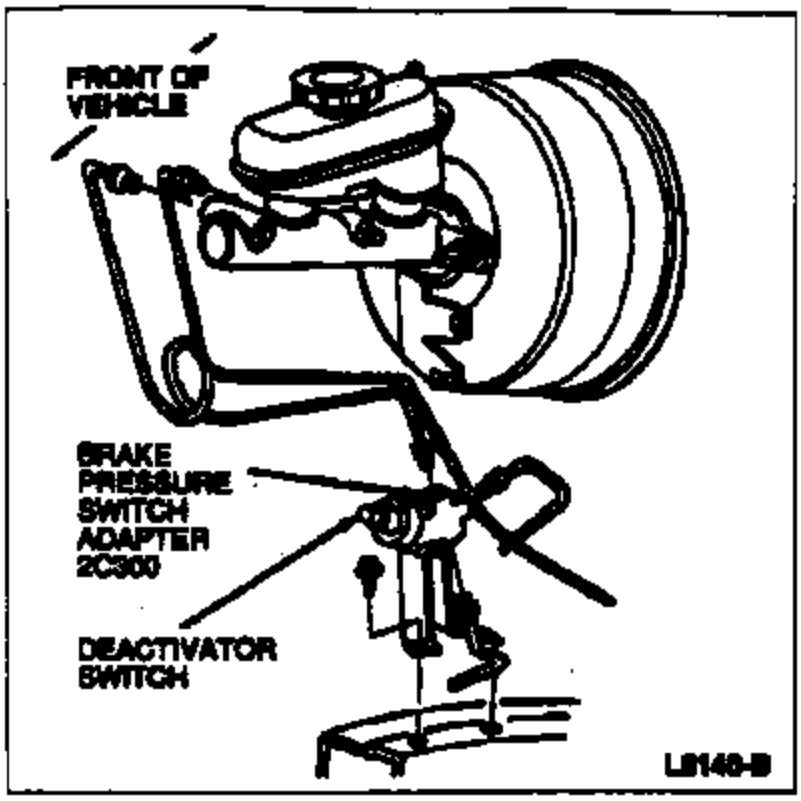
Installation

1. Screw deactivator switch into brake pressure control valve or brake pressure switch adapter. Tighten to 16-20 N-m (11-16 lb-ft).
2. Attach electrical connector.
3. Bleed brake lines as outlined in «Section 06-09» (anti-lock brakes), or «Section 06-06» (conventional hydraulic brakes).

Brake Pressure Control Valve Location



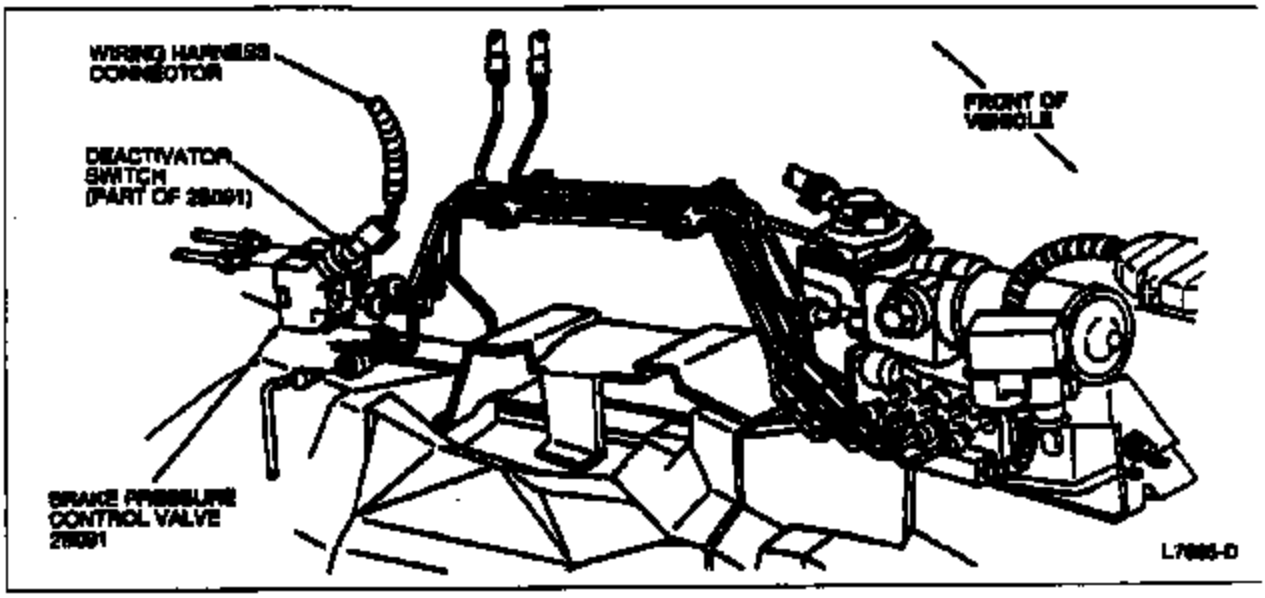
Junction Block Location

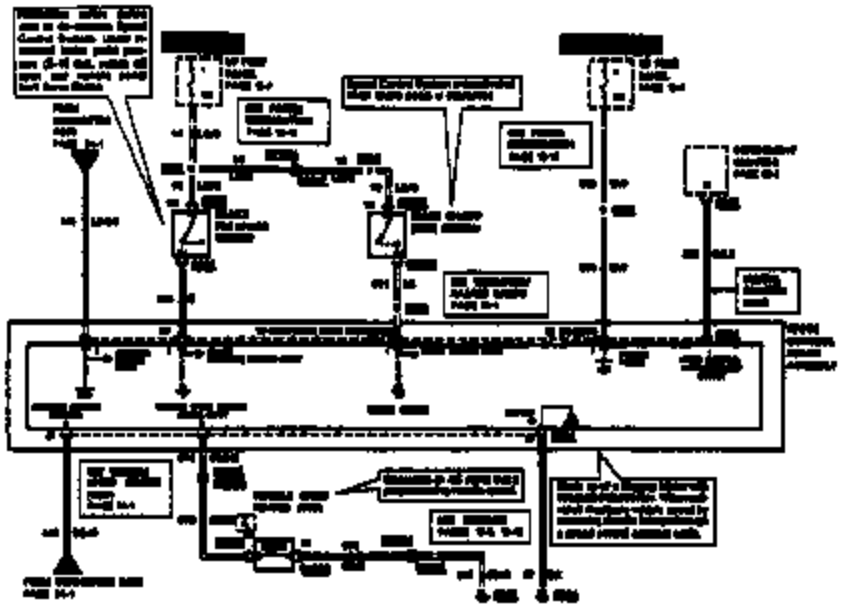

FRONT OF VEHICLE
BRAKE PRESSURE SWITCH ADAPTER 2C300
DEACTIVATOR SWITCH
LB140-B

The deactivator switch:

- is a normally closed switch and replaces the speed control dump valve (SC727) as a redundant safety feature in the system.
- An electrical signal from the BOO circuit to the speed control servo will disengage the system when the brake pedal is applied.
- Under increased brake pedal efforts (22.25-44.5 N (5-10 lbs), engine running), the deactivator switch mounted in the brake line will open and remove power to the speed control servo, releasing the throttle from speed control servo control.
- The deactivator switch is located at the rear brake pressure control valve (anti-lock brakes) or brake pressure switch adapter (2C300) (conventional hydraulic brakes) below the power brake booster.

Deactivator Switch





- Component
- Connector
- Ground
- Splice
- Page
- Harness

- How the Circuit Works
- Troubleshooting Hints

Deactivator Switch

Removal

1. Disconnect electrical connector from deactivator switch.
2. Unscrew deactivator switch and remove from brake pressure control valve (2B091) (vehicles with anti-lock brakes) or brake pressure switch adapter (2C300) (vehicles with conventional hydraulic brakes).

Installation

1. Screw deactivator switch into brake pressure control valve or brake pressure switch adapter. Tighten to 15-20 N-m (11-15 lb-ft).
2. Connect electrical connector.
3. Bleed brake lines as outlined in «Section 06-06».

- returns to its open position when the brake pedal is released. Refer to «Section 17-01» for additional information.

The deactivator switch:

- is a normally closed switch and replaces the speed control dump valve as a redundant safety feature in the system.
- uses an electrical signal from the stoplight switch circuit to the speed control servo to disengage the system when the brake pedal is applied.
- under increased brake pedal efforts (22.25-44.5 N (5-10 lbs), engine running), the deactivator switch mounted in the brake line will open and remove power to the speed control servo, releasing the throttle from speed control servo control.
- is located at the rear brake pressure control valve (anti-lock brakes) or brake pressure switch adapter (2C300) (conventional hydraulic brakes) below the power brake booster.
- is mounted to end part of the brake pressure control valve. The brake pressure control valve is mounted in-line to the rear brake hydraulic lines.

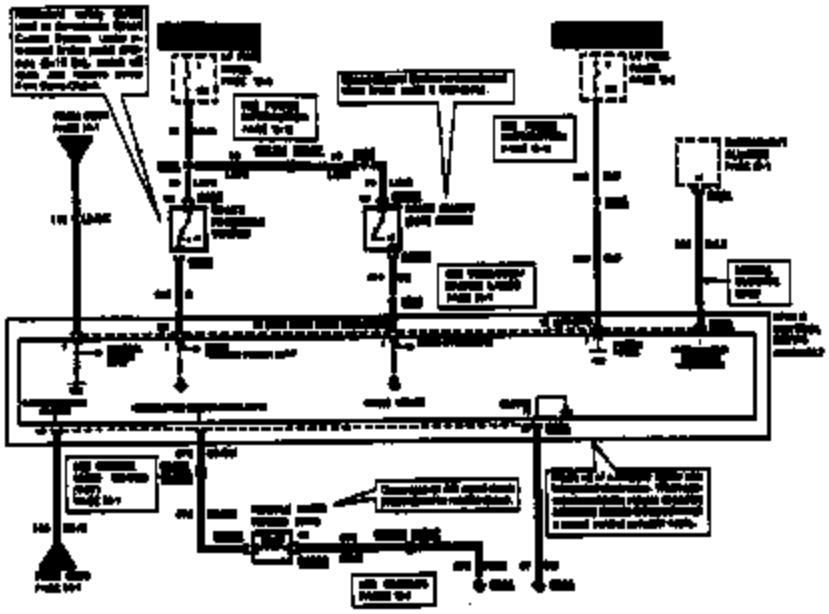
The electronic instrument cluster (10849) consists of one microcomputer-based module that processes sensor information and controls the three vacuum fluorescent displays. The displays include:

- speedometer/odometer.
- electronic fuel and engine coolant temperature gauges.
- message center.

The message center includes the SPEED CONTROL indicator. This indicator:

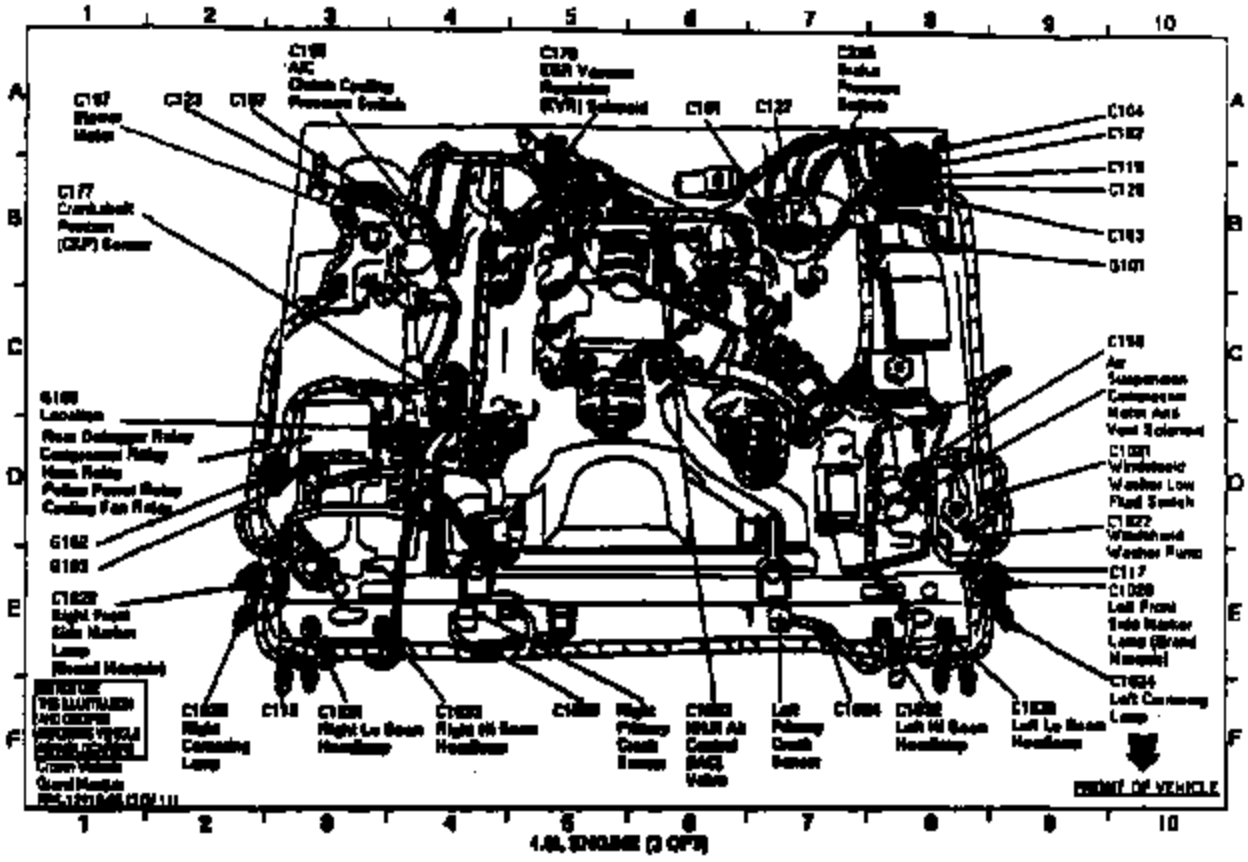
- indicates to the driver that the speed control system is ON.
- illuminates when the speed control is actuated and when RESUME is actuated.
- turns off when the brake pedal is applied and/or when the speed control OFF switch is pressed.

Crown Victoria and Grand Marquis vehicles with the conventional instrument cluster do not have a speed control indicator.



- Component
- Connector
- Ground
- Splice
- Page
- Harness

- How the Circuit Works



Deactivator Switch

Removal

1. Disconnect electrical connector from deactivator switch.
2. Unscrew deactivator switch and remove from brake pressure control valve (2B091) (vehicles with anti-lock brakes) or brake pressure switch adapter (2C300) (vehicles with conventional hydraulic brakes).

Installation

1. Screw deactivator switch into brake pressure control valve or brake pressure switch adapter. Tighten to 15-20 N-m (11-14 lb-ft).
2. Connect electrical connector.
3. Bleed brake lines as described in «Section 06-06».

97 Crown Vic Grand Marquis
Town Car

- sends an electrical signal to the speed control servo to disengage the speed control system.
- returns to its open position when the brake pedal is released. Refer to «Section 17-01» for additional information.

The deactivator switch:

- is a normally closed switch. Replaces the speed control dump valve as a redundant safety feature in the system.
- uses an electrical signal from the stoplight switch circuit to the speed control servo to disengage the system when the brake pedal is applied.
- under increased brake pedal efforts (22.26-44.5 N [5-10 lbs], engine running), the deactivator switch mounted in the brake line will open and remove power to the speed control servo, releasing the throttle from speed control servo control.
- is located at the rear brake pressure control valve (anti-lock brakes) or brake pressure switch adapter (2C300) (conventional hydraulic brakes) below the power brake booster.
- is mounted to end part of the brake pressure control valve. The brake pressure control valve is mounted in-line to the rear brake hydraulic lines.

The electronic instrument cluster (10849) consists of one microcomputer-based module that processes sensor information and controls the three vacuum fluorescent displays. The displays include the following:

- speedometer/odometer
- electronic fuel and engine coolant temperature gauges
- message center

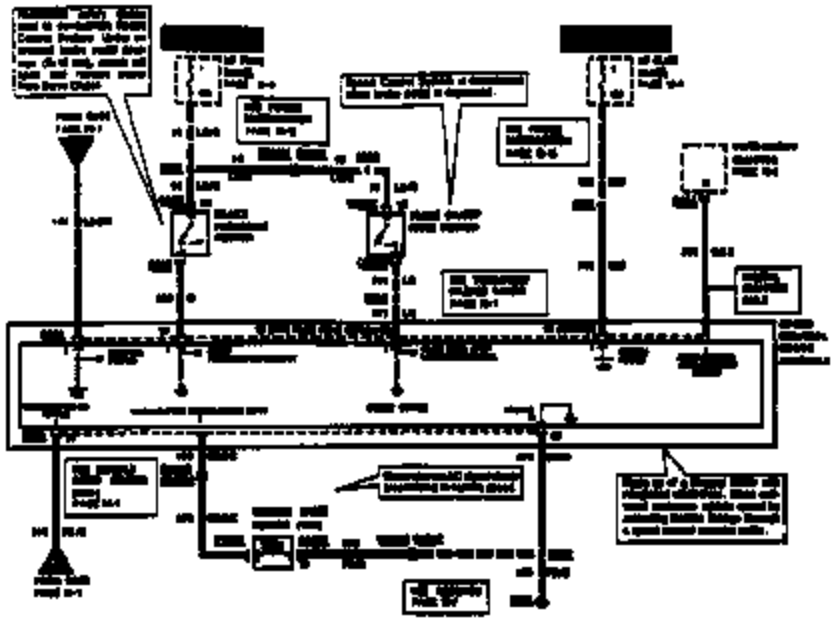
The message center includes the SPEED CONTROL SET indicator. This indicator:

- turns ON when the speed control is maintaining the vehicle speed (SET or RESUME).
- turns off when the brake pedal is applied and/or when the speed control OFF switch is pressed.

Vehicles with the conventional instrument cluster do not have a speed control SET indicator.

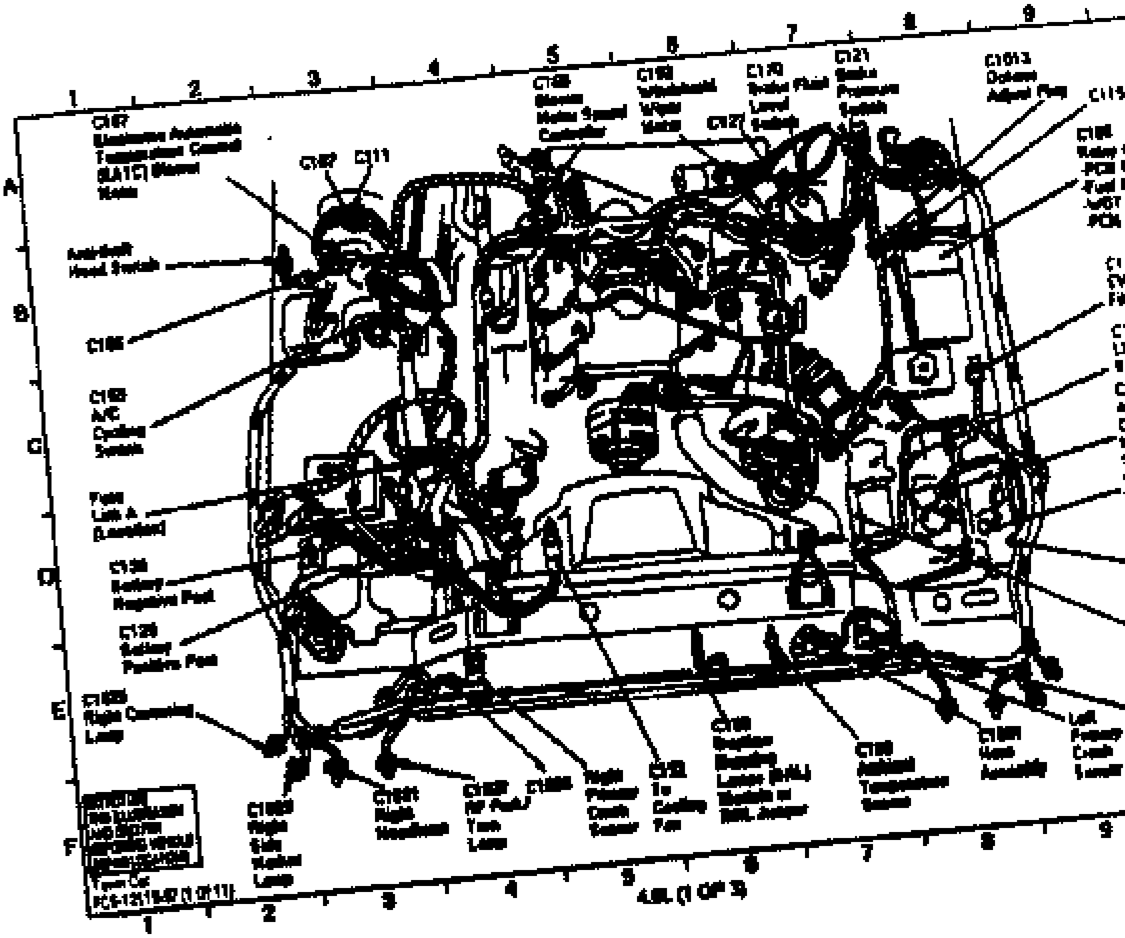
Electronic Instrument Cluster

97 CU - GM



- Component
- Connector
- Ground
- Splice
- Page
- Harness

- How the Circuit Works


C1013
Battery Negative Post
Battery Positive Post
Right Cornering Lamp
Right Headlamp
Ambient Temperature Sensor
Horn Assembly
4.6L (1 OF 3)

Deactivator Switch

Removal

1. Disconnect electrical connector from deactivator switch.
2. Unscrew deactivator switch and remove from brake pressure control valve (2B091) (vehicles with anti-lock brakes) or brake pressure switch adapter (2C390) (vehicles with conventional hydraulic brakes).

Installation

1. Screw deactivator switch into brake pressure control valve or brake pressure switch adapter. Tighten to 15-20 N-m (11-15 lb-ft).
2. Connect electrical connector.
3. Bleed brake lines as described in «Section 06-06».

- horn blow switch (13A875)
- speed control actuator switch.

The stoplight switch:

- is a normally open switch that closes when brake pedal (2455) is applied.
- sends an electrical signal to the speed control servo to disengage the speed control system.
- returns to its open position when the brake pedal is released. Refer to «Section 17-01» for additional information.

The deactivator switch:

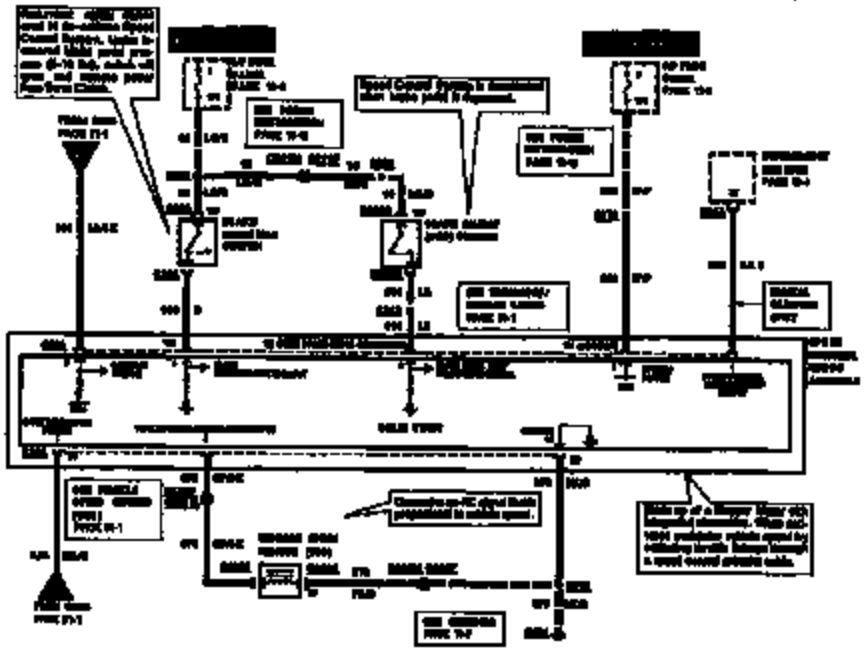
- is a normally closed switch. Replaces the speed control dump valve as a redundant safety feature in the system.
- uses an electrical signal from the stoplight switch circuit to the speed control servo to disengage the system when the brake pedal is applied.
- under increased brake pedal efforts (22.25-44.5 N [5-10 lbs], engine running), the deactivator switch mounted in the brake line will open and remove power to the speed control servo, releasing the throttle from speed control servo control.
- is located at the rear brake pressure control valve (anti-lock brakes) or brake pressure switch adapter (2C300) (conventional hydraulic brakes) below the power brake booster.
- is mounted to end part of the brake pressure control valve. The brake pressure control valve is mounted in-line to the rear brake hydraulic lines.

The electronic instrument cluster (10849) consists of one microcomputer-based module that processes sensor information and controls the three vacuum fluorescent displays. The displays include the following:

- speedometer/odometer
- electronic fuel and engine coolant temperature gauges
- message center

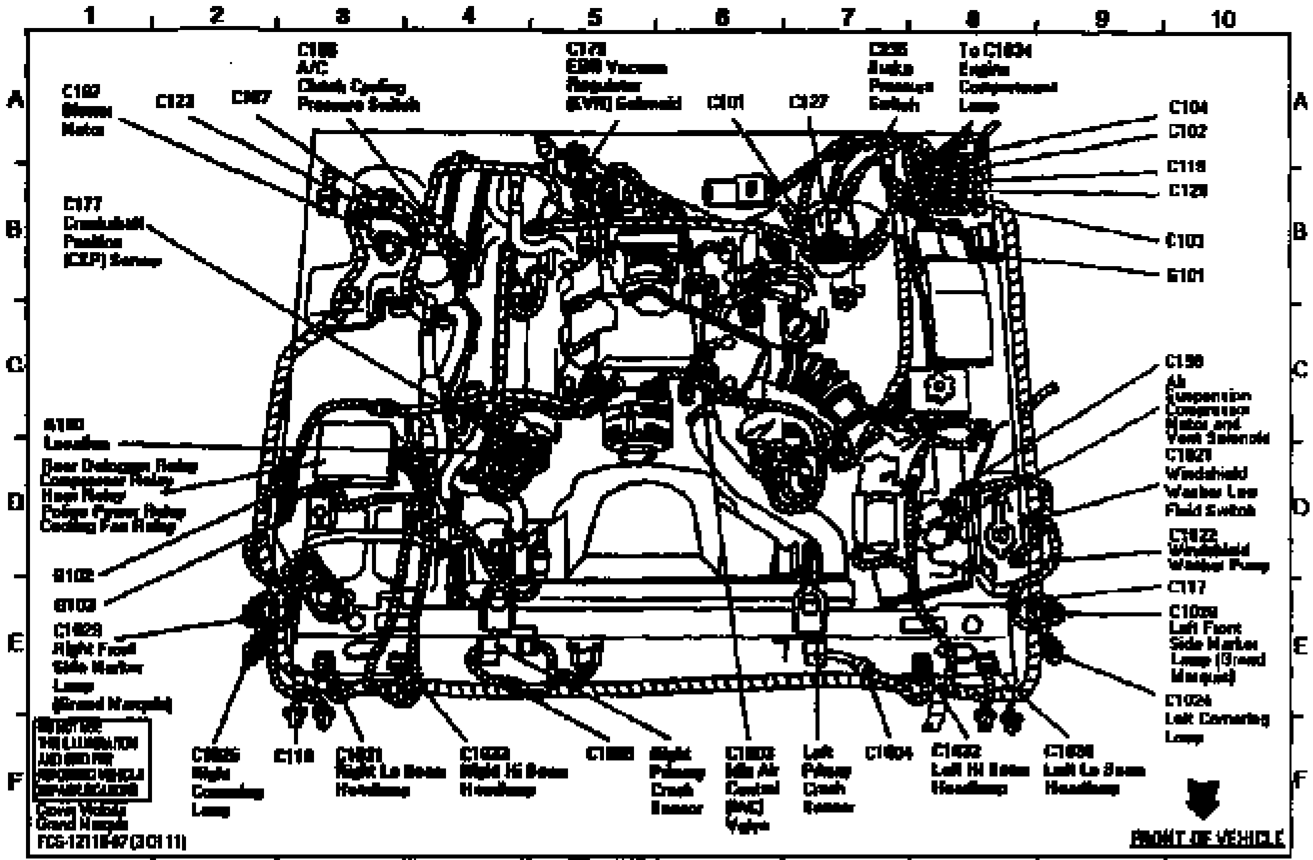
The message center includes the SPEED CONTROL SET indicator. This indicator:

- turns ON when the speed control is maintaining the vehicle speed (SET or RESUME).



- Component
- Connector
- Ground
- Splice
- Page
- Harness

- How the Circuit Works



4.6L ENGINE (3 OF 3)

TEXAS INSTRUMENTS

DIMENSIONAL ANALYSIS ON PART NUMBER

F2VC-9F924-AB/1259070

	BLUEPRINT SPEC	CAVITY # 1B ACTUAL	CAVITY # 2C ACTUAL	CAVITY # 3C ACTUAL	CAVITY # 4B ACTUAL	CAVITY # 5D ACTUAL	CAVITY # 6D ACTUAL	COMMENTS
1	2.84 - 3.05	2.93	2.92	2.92	2.92	2.93	2.93	
	⌖ 0.1 Ⓢ A	0.041	0.020	0.033	0.031	0.015	0.013	
	1.90	1.859	1.920	1.933	1.869	1.885	1.887	
2	22.88 MAX	18.64	18.57	18.54	18.60	18.63	18.61	
		18.56	18.66	18.66	18.77	18.71	18.67	
3	57.15 MAX	55.65	55.70	55.71	55.70	55.69	55.68	
4	9.66 - 9.39	9.39	9.61	9.57	9.49	9.58	9.55	
5	2.04-1.52 ref	2.040	1.732	1.780	1.727	1.781	1.796	
6	Ø 8.03-7.82ref	7.94	7.94	7.97	7.97	7.98	7.96	
		7.50		7.99				
7	10.25X30-40 DEG	CHAMFER	N/A -	THREADS	HAVE BEEN	ADDED		
8	3/8-24UNF-2A	OK	OK	OK	OK	OK	OK	
	THD. -D-							
9	1.40 - 1.10	1.316	MEASURED	ON A CROSS	SECTIONED	PART		

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TEXAS INSTRUMENTS

DIMENSIONAL ANALYSIS ON PART NUMBER

FZYC-9F924-AB/12596701

	BLUEPRINT SPEC	CAVITY # 1B ACTUAL	CAVITY # 2C ACTUAL	CAVITY # 3C ACTUAL	CAVITY # 4B ACTUAL	CAVITY # 5D ACTUAL	CAVITY # 6D ACTUAL	COMMENTS
1	2.84 - 3.05	2.93	2.92	2.92	2.92	2.93	2.93	
	Ø 0.1 Ⓜ A	0.041	0.026	0.033	0.031	0.015	0.013	
	1.96	1.859	1.920	1.933	1.869	1.885	1.887	
2	22.00 MAX	18.64	18.57	18.54	18.60	18.63	18.61	
		18.56	18.46	18.66	18.77	18.71	18.67	
3	57.15 MAX	55.65	55.70	55.71	55.70	55.69	55.68	
4	9.66 - 9.39	9.59	9.61	9.57	9.49	9.58	9.55	
		9.63	9.66	9.64	9.62	9.74	9.67	OUT OF SPEC. DELETED PER TWA 1-9-96
5	2.04-1.52 mH	2.040	1.732	1.783	1.727	1.781	1.796	
6	8.03-7.82mH	7.94	7.94	7.97	7.97	7.96	7.96	
		7.58		7.99				
7	[6.25X50-4H HEX	CHAMFER	N/A -	THREADS	HAVE BEEN	ADDED		
8	3/8-24UNF-2A	OK	OK	OK	OK	OK	OK	
	THD. -B-							
9	1.40 - 1.10	1.316	MEASURED	ON A CROSS	SECTIONED	PART		

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TEXAS INSTRUMENTS

DIMENSIONAL ANALYSIS ON PART NUMBER

F2YC-9F924-AB/1259870I

	BLUEPRINT SPEC	CAVITY # 1B ACTUAL	CAVITY # 2C ACTUAL	CAVITY # 3C ACTUAL	CAVITY # 4B ACTUAL	CAVITY # 5B ACTUAL	CAVITY # 6D ACTUAL	COMMENTS
1	2.84 - 3.05	2.93	2.92	2.92	2.92	2.93	2.93	
	Ø 0.1 Ⓜ A	0.041	0.029	0.033	0.031	0.015	0.013	
	1.96	1.959	1.920	1.933	1.869	1.885	1.887	
2	22.00 MAX	18.64	18.57	18.54	18.68	18.63	18.61	
		18.56	18.66	18.66	18.77	18.71	18.67	
3	57.15 MAX	55.65	55.70	55.71	55.70	55.69	55.68	
4	9.66 - 9.39	9.59	9.61	9.57	9.49	9.58	9.55	
		9.63	9.66	9.64	9.62	9.74	9.67	OUT OF SPEC.
5	2.04-1.52 ref	2.048	1.732	1.783	1.727	1.781	1.796	
6	Ø 8.03-7.82ref	7.94	7.94	7.97	7.97	7.96	7.96	
		7.56		7.99				
7	10.25X50-40 DEG	CHAMFER	N/A -	THREADS	HAVE BEEN	ADDED		
8	3/8-24UNF-2A	OK	OK	OK	OK	OK	OK	
	THD. -B-							
9	1.40 - 1.10	1.316	MEASURED	ON A CROSS	SECTIONED	PART		

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TEXAS INSTRUMENTS

DIMENSIONAL ANALYSIS ON PART NUMBER

F2VC-9F924-AB/12598701

	BLUEPRINT SPEC	CAVITY # 1C ACTUAL	CAVITY # 2C ACTUAL	CAVITY # 3C ACTUAL	CAVITY #4C ACTUAL	CAVITY # 5C ACTUAL	CAVITY # 6C ACTUAL	COMMENTS
10	↗ 0.36 B	0.051	0.046	0.040	0.088	0.030	0.056	
11	2.5√ E	OK -	MEASURED	ON A CROSS	SECTIONED	PART		
12	43DEG-41DEG	41DEG 21MIN	MEASURED	ON A CROSS	SECTIONED	PART		
13	60DEG-25DEG	N/A -	THREADS	HAVE BEEN	AIDED			
14	Ø 3.60-3.30	3.45	3.45	3.43	3.45	3.44	3.45	
		3.46	3.43	3.42	3.46	3.41	3.45	
15	Ø 7.37-7.23	7.27	7.35	7.33	7.31	7.32	7.37	
		7.28	7.32	7.33	7.31	7.30	7.37	
16	Ø 5.85-5.50	5.61	5.72	5.64	5.61	5.60	5.61	
		5.60	5.60	5.66	5.70	5.66	5.63	

TEXAS INSTRUMENTS

DIMENSIONAL ANALYSIS ON PART NUMBER

F2YC-9F924-AB/12590781

	BLUEPRINT SPEC	CAVITY # 1B ACTUAL	CAVITY # 2C ACTUAL	CAVITY # 3C ACTUAL	CAVITY # 4D ACTUAL	CAVITY # 5D ACTUAL	CAVITY # 6D ACTUAL	COMMENTS
1	2.84 - 3.05	2.93	2.92	2.92	2.92	2.93	2.93	
	Ⓜ 0.1 Ⓢ A	0.043	0.020	0.013	0.031	0.015	0.013	
	1.98	1.859	1.920	1.933	1.869	1.885	1.887	
2	22.80 MAX	18.64	18.57	18.54	18.60	18.63	18.61	
		18.56	18.66	18.66	18.77	18.71	18.67	
3	57.15 MAX	55.65	55.70	55.71	55.70	55.69	55.68	
4	9.66 - 9.39	9.59	9.61	9.57	9.49	9.58	9.56	
		9.63	9.66	9.64	9.62	9.74	9.67	OUT OF SPEC.
5	2.04-1.52 ref	2.040	1.732	1.703	1.727	1.701	1.796	
6	Ø 8.03-7.82ref	7.94	7.94	7.97	7.97	7.98	7.96	
		7.58		7.99				
7	10.25X50-40 DEG	CHAMFER	N/A -	THREADS	HAVE BEEN	ADDED		
8	3/8-24UNF-2A	OK	OK	OK	OK	OK	OK	
	ETHD. -B-							
9	1.40 - 1.10	1.316	MEASURED	ON A CROSS	SECTIONED	PART		

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TEXAS INSTRUMENTS

DIMENSIONAL ANALYSIS ON PART NUMBER

F2YC-9F924-AB/(2598781)

	BLUEPRINT SPEC	CAVITY # 1B ACTUAL	CAVITY # 2C ACTUAL	CAVITY # 3C ACTUAL	CAVITY #4B ACTUAL	CAVITY # 5D ACTUAL	CAVITY # 6B ACTUAL	COMMENTS
10	⌀ 0.16 Ⓢ	0.051	0.048	0.040	0.048	0.030	0.056	
11	2.97 C	OK -	MEASURED	ON A CROSS	SECTIONED	PART		
12	430EG-410EG	410EG 210INC	MEASURED	ON A CROSS	SECTIONED	PART		
13	600EG-250EG	N/A -	THREADS	HAVE BEEN	ADDED			
14	⌀ 3.60-3.38	3.45	3.45	3.43	3.45	3.44	3.45	
		3.46	3.43	3.42	3.46	3.47	3.45	
15	⌀ 7.37-7.23	7.27	7.35	7.33	7.31	7.32	7.37	
		7.28	7.32	7.33	7.37	7.38	7.37	
16	⌀ 5.85-5.58	5.61	5.72	5.64	5.67	5.68	5.61	
		5.60	5.60	5.66	5.70	5.66	5.63	

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1.0 SCOPE

This specification establishes the inspection criteria, methods, standards and reaction plans for the inspection of the 77PS pressure switch. It is the intent of this document to meet or exceed requirements set forth by customer purchase orders and engineering standards.

2.0 DEFINITIONS

2.1 This specification is applicable to all production units.

2.2 Unless otherwise noted all sampling plans allow zero defects (reject on one defect).

2.3 Every effort shall be made to employ statistical methods (X & R Chart, precontrol, etc.) to assure ongoing process control after capability has been demonstrated.

2.4* A route card shall accompany each sublot of material, after it obtains identity.

2.5 A lot is defined as that quantity of devices which is homogenous. A lot shall not exceed 8 hours of production or 4000 devices. If one day's production exceeds 4000 devices sub-lot numbers may be used. A sub-lot of the same shift's production will be noted with a letter and will not exceed 4000 devices.

2.6 Unless otherwise specified, all tests will be conducted at room ambient conditions.

2.7 Final inspection will be accomplished in accordance with section 3.0 of this QAS. A Reject Notice (form number 5341) shall be initiated and the applicable reaction plan will be initiated.

2.8 Special Inspections and Requirements will be accomplished in accordance with section 4.0 of this QAS.

2.9 Reliability testing will be accomplished per section 5.0 of this QAS.

* The route card shall indicate the link number, description, data, operator number and inspection status. (Where applicable)

3.0 FINAL INSPECTION TEST

The following inspections will be accomplished on completed devices. When a discrepancy is encountered, Quality Engineering will be notified by a Reject Notice (form 5341). Tear down analysis or other means will be employed to ascertain the cause of the discrepancy and to define what corrective actions will be initiated.

3.1 Post Pressure Tester Inspection

Five (5) devices per box selected at random, will be visually checked for:

- Code - Legibility and correctness of code.
- Crimp ring and hexport - free of dents, nicks, scratches, surface contamination and other deformities.
- Sensors to be free of metallic flakes and slivers.
- Check base for cracks, bent or deformed terminals and large surface dents.
- Record results on "Inspection Log Sheet".
- Terminal location with connectors or go no go gage
- Polarity key - correctness of location
- Check threads

3.2 Packing

Check all shipping labels for current Engineering Revision number and ensure correct customer part number is on label and device. Ensure labels on box are in correct position and legible. Auditing frequency of packed devices to be set by Quality Engineer.

4.0 SPECIAL INSPECTIONS AND REQUIREMENTS

The following chart is to be used as a guide for special testing of pilots prior to build. Results will be used as the final inspection for these attributes.

Note: Those specific tests which require a hydraulic seal to the hexport must have an O-ring fitted to the hexport, e.g., impulse testing, proof/burst testing.

4.0 Special Inspections and Requirements (Cont'd)

3 Devices	4 Devices
Calibration 4.1.1	(1) Calibration 4.1.1
Impulse 4.1.3	(2) Dimensional 4.1.6
	(5) CurrentLeakage 4.1.2
	(6) Proof 4.1.4
	(4) Calibration 4.1.1
Calibration 4.1.1	(3) Term Strength Push-out 4.1.7
Current Leakage 4.1.2	(7) Calibration 4.1.1
Proof 4.1.4	Current Leakage 4.1.2
	Proof 4.1.4
	(8) Burst 4.1.5
Scrap	(9) Scrap

4.1.1 Calibration/Voltage Drop (Automatic)

Nine (9) devices from each disc lot will be 100% tested for actuation, release, and voltage drop using TI automatic test equipment.

All tests will be accomplished after the third cycle with the switch conducting 700-800 mA at 12.0 - 14.0 VDC.

The actuation and release pressure will meet the customer requirements as indicated on envelope drawing.

The rate of pressure change (ramp-up, ramp down) will be 50 PSI/sec.

The voltage drop across the contact area is automatically checked by the test equipment.

4.1.1 (continued)
The voltage drop will not exceed 200 MV with a 700 to 800 mA current flow through the switch.

Devices which fail must be segregated from acceptable units and appropriately identified by category.

Results of the calibration and voltage drop test shall be maintained by inspection for 2 years.

Note: The automatic pressure tester provides screen indications for actuation, release, differential plus voltage drop so discrepancies can be categorized.

4.1.2 Current Leakage

Four (4) devices per sample of nine (9) will be measured for current leakage. The current leakage is to be measured with 500 volts, 60 Hz alternating current applied. The current leakage is to be checked as follows:

- Between the switch leads with contacts open
- Between the lead and switch housing with contacts closed
- Between either lead and switch housing with contacts open

For lot acceptance the measured leakage current shall not exceed 0.1 milliampere. Record results on inspection characteristic data sheet.

4.1.3 Impulse Test

The pressure medium used shall be currently released with power steering fluid equivalent or brake fluid. The switches will be cycled as per the table in section 5.2.5.4.

Note: Upon completion of impulse testing the switches are to be tested per Para. 4.1.1, 4.1.2, 4.1.4, 4.1.5. Record results on inspection characteristic data sheet.

4.1.4 Proof Test
The test is to be conducted using power steering fluid or equivalent as pressure medium. Test pressure is to be isolated from pressure source and held for not less than 30 seconds. For lot acceptance, the switches shall not show any evidence of oil leakage, seepage or drop in pressure greater than 62.0 psig. Record results on inspection log. L2-1 (P/C) 3000 psig; L2-3 (L/T) 4000 psig.
Note: The test samples must be scrapped after testing.

(What About Post Calibration Requirements) +/- 5%

4.1.5 **Burst Test**

The burst pressure medium shall be power steering fluid or equivalent. The switch is to be pressurized to 7000 psig and held for 30 seconds minimum. For acceptance all switches will not show evidence of oil leakage or seepage from the switch or threads. Record data on inspection characteristics data sheets.

Note: Samples used for this test must be scrapped after testing is completed.

4.1.6 **Dimensional Checks**

Four (4) devices from each disc lot, pilot will be checked for dimensions as follows:

~~TDR Gage~~	~~2201230 [illegible]~~ N/A [illegible] component gage AT [illegible]
Length	2.250" Max
Crimp Ring Dia.	1.280" Max
Hex	.552 - .572

3A

Thread (torque wrench go-no go) 3/8 - 24 - UNF-2A
4.5 in.-pounds max

Connector and dimensions (per print)
Terminal location and dimensions (go gages)
Note: Record results on inspection log

4.1.7 **Terminal Strength**

The same four devices used in 4.1.6 will be measured for terminal strength.

The switch shall be mounted in a special force test gage.

A pendulum shall apply a 10.0 lb (.415 lb at 1.0 ft) impact force to the switch housing at the connector end, perpendicular to the center line axis of the switch.

Push Out Test

The same four (4) devices used in 4.1.7 will be tested for push out force. The switches will be mounted in test stand with a force gage.

For acceptance, the terminals will withstand a 20.0 lb axial push force.

Upon completion of the test, the switches shall be tested for calibration, current leakage, and proof test.

For lot acceptance all switches shall not have any terminal or housing fracture, and must pass test defined above. Record results on inspection log.

4.2 Inspection of Salvaged/Reworked Material

All salvage material will be inspected prior to use. Ten percent (10%) of the salvage parts or subassemblies will be inspected to determine that they conform to print specification or engineering standard. A defect requires notification of the supervisor or group leader by a rejection notice (Form #5341) and a resample after corrective action.

4.3 Record Retention

Route cards, control charts, inspection characteristics, data sheets, test forms, laboratory test results, gage repeatability studies, and engineering specification test methods must be retained through the current model year and for one year thereafter. All records will be available for review by customers and copies of individual records will be furnished upon request.

5.0 RELIABILITY

Reliability testing will be accomplished per the following schedule:

5.1

	Type Test	Sample Size	Frequency	Min. Req.
	Humidity	6	2/Yr	P90=.72
	Salt Spray	6	2/Yr	P90=.72
	Vibration	6	2/Yr	P90=.72
*	Vacuum	6	2/Yr	P90=.72
*	Temperature Cycle	6	2/Yr	P90=.72

Note: Additional reliability testing may be accomplished to assure product conformance.

* The vacuum test will be conducted by Design Engineering personnel. The temp cycle test will be conducted by QC using Design Engineering equipment.

5.2 Test Procedures:

5.2.1 Humidity

5.2.1.1 Mount the switch in the test port in a humidity chamber. Currently released mating electrical connector must be installed before start of test.

5.2.1.2 Subject the switch to ten (10) continuous humidity cycles as follows:
- Raise temperature to 65 + 10/-2°C over 2.5 hours; at 90 - 98% relative humidity.
- Hold 3 house at 65 + 10/-2°C at 90-98% relative humidity.

- Lower temperature to 25 + 10/-2°C over 2.5 hours; at 80-98% relative humidity.

5.2.1.3 Acceptance Requirements

Within 15 minutes after completion of the tenth humidity cycle, check the switch to 4.1.1, 4.1.2 and 4.1.4.

5.2.1.4 Nonconformance is defined as any switch not meeting the criteria in section 4, Para. 4.1.1, 4.1.2, and 4.1.4.

5.2.2 Salt Spray

5.2.2.1 Mount the switch horizontal in the test port in a salt spray chamber. The currently released mating electrical connector and wiring must be installed prior to start of test.

5.2.2.2 Expose the switch assembly to 72 hours of salt spray per ASTM B-117.

5.2.2.3 After exposure, check the switch to 4.1.1, 4.1.2, and 4.1.4 using the procedure established in each section.

5.2.2.4 Nonconformance is defined as any switch not meeting the criteria in 4.1.1, 4.1.2, and 4.1.4. Samples used for this test must be destroyed after all testing is completed.

5.2.3 Vibration

5.2.3.1 Mount the switch in the test port and attach the currently released mating electrical connector before the start of test.

5.2.3.2 Switches are to be vibrated in all 3 planes with electrical continuity being monitored during the entire test. Vibration tests are to be conducted at room temperature using brake fluid, ambient air, or equivalent as the pressure medium.

5.2.3.3 Internal pressure shall be maintained at zero KPa G when the switch is in the closed position and 1.1 times max actuation pressure shown on print when the switch is in the open position.

5.2.3.4 Vibrate the switch at 1.5mm displacement (peak-to-peak) while varying the frequency uniformly from 5 to 50 to 5Hz over a 5 minute period.

5.2.3.5 Vibrate the switch in alternate one-hour periods in the open and closed positions for a total of 8 hours in each plane. (Total test time is 24 hours.)

5.2.3.6 After the entire vibration sequence, check the switches to section 4.0, para. 4.1.1, 4.1.2, and 4.1.4 using the procedures established in each section.

5.2.3.7 Nonconformance is defined as any evidence of leakage or any change in electrical continuity/discontinuity during the vibration cycles, or any switch not meeting the criteria in section 4.0, para. 4.1.1, 4.1.2, and 4.1.4. Samples used for this test must be destroyed after all testing is complete.

5.2.4 Vacuum

5.2.4.1 Mount the switch in the test port. Vacuum tests are to be conducted at room temperature using ambient air as the pressure medium.

5.2.4.2 Subject the switch to 5 cycles of vacuum from atmospheric pressure (760mm Hg) to an absolute pressure of 3-6mm Hg. Maintain the vacuum for a minimum of 60 seconds.

5.2.4.3 Check the switch to section 4.0, para. 4.1.1, 4.1.2 and 4.1.4 using the procedure established in each section.

5.2.4.4 Nonconformance is defined as any switch not meeting the criteria in section 4.0, para. 4.1.1, 4.1.2, and 4.1.4.

Note: 3mm Hg = 0.058 psi = 0.400 KPa
6mm Hg = 0.116 psi = 0.800 KPa

5.2.5 Temperature Cycle

5.2.5.1 Mount switches in test ports; test to be run using currently released brake fluid.

Repeat the following procedure 25 times.

5.2.5.2 Lower the switch and fluid temperature to at least -40°C.

5.2.5.3 Cycle the switches ten times at 10 seconds/cycle. One cycle consists of a pressure variation from 0-276 KPa G (0-40 psi) to 9,655 - 10,345 KPa G (1400 - 1500 psi). Note: Switch must open and close each cycle.

5.2.5.4 Raise switch fluid temperature to 38°C minimum.

5.2.5.5 Repeat step 5.2.5.3.

5.2.5.6 At completion, check switches per section 4.0, para. 4.1.1, 4.1.2 and 4.1.4.

5.2.5.7 Nonconformance is defined as any evidence of switch fluid leakage, seepage, or not meeting the criteria of sections 4.0, para. 4.1.1, 4.1.2 and 4.1.4.

6.0 AUDITING

6.1 To provide uniform and systematic procedures for conducting an audit for a single operation or an entire product line. Audits will be conducted to ensure all operations are in control and being performed to the latest manufacturing standards and procedures and comply to both internal and customer drawings and specifications.

6.2 The detailed instructions for conducting an audit will be found in QAS 299.

6.3 Areas to be Audited

A. Process Specifications (Operations)
B. SPC process specifications
C. Route slips
D. Preventive maintenance
E. Blueprints
F. Tools
G. Quality (Produce/operation)
H. Statistical process control (SPC)
I. Housekeeping and material identification
J. Safety