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Maintenance Manual

Hose End Pressure Control Valve

F594/F595 Series

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 Maintenance Manual  
 Hose End Pressure Control Valve – F594/F595 Series

**LIST OF EFFECTIVE PAGES**

On a revised page, the portion of text or illustrations affected by the change is indicated by a vertical line in the outer margin of the page. When a revision is issued, the entire document is reissued with the current revision number and date shown on all pages. For major revisions, the basic number is incremented. For minor revisions, the number following the decimal is incremented. Dates of issue for original and subsequent revisions are as follows:

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## INTRODUCTION

### 1. General

This manual provides component maintenance shop instructions for the Hose End Pressure Control Valve (valve) (HECV).

### 2. Revision Service

This manual will be revised as necessary to show the current information.

### 3. Weights and Measurements

Weights and measurements in this manual are expressed in both English (U.S. customary) and Metric (SI) units.

## DESCRIPTION AND OPERATION

### 1. Description

The Hose End Pressure Control Valve (valve) (see Figure 1) provides the means of controlling higher flow rates in aircraft refueling operations. The valve inlet is connected to the end of the hose supplying the fuel, ahead of the nozzle. Many valve outlet/outlet flange/adaptor combinations are available to mate with the varying nozzle and hose variations. The major functional components of the valve are the outlet adapter, the poppet and the valve body. The F595 series valve has provisions for a manual lockout assembly used for system setup and checkout. The lockout assembly can be ordered separately.

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## 2. Operation (Refer to Figure 2)

The valve contains a large sleeve-type poppet which is normally held in its open position by a spring. When the downstream pressure increases to the control pressure of the valve, the poppet begins to close. This reduces the flow and maintains the control pressure at the nozzle. If there are sudden increases in the downstream pressure, the poppet will close rapidly, and limit the downstream surge pressure to an acceptable level.

**CAUTION: WHEN BEING USED DURING PRESSURE ASSISTED DE-FUELING OPERATIONS, THE HOSE END PRESSURE CONTROL VALVE MUST BE MADE INOPERATIVE BY USING A HYDRAULIC (F594) OR A MECHANICAL (F595) LOCKOUT DEVICE.**

## 3. Leading Particulars (Refer to Table 1)

## 4. Model Variations

### A. General

The basic F594A/F595A series valve has flanged inlets to mate with F582/F584 series swivels, and outlets to mate with F116/F117 series nozzles. The flanges also mate with the older F100/F115 series nozzles and F577/F577 series swivels. Refer to Table 2 for the available valve variations. Refer to the **ILLUSTRATED PARTS LIST** section for additional details.

### B. F595 Supersedes F594

**NOTE: The springs used in the F595 are different in color from the springs used in the F594. Refer to the IPL section for the color information.**

The F595 series valve has superseded and replaced the F594 series valve. The F595 series valve adds provisions for a manual lockout assembly which replaces its vent plug during system setup and testing. The vent plug is installed during normal operation of the valve.

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Table 1. Leading Particulars

Service Automotive and Aviation Fuels
Operating Pressure 0 to 200 psi (13,8 bar)
Rated Flow 0 to 600 gpm
Pressure Drop (approximate) 2.8 psi at 300 US gpm (0,2 bar at 1 100 l/m)
Control Pressure (approximate) Mod A (basic valve) 45 psi (3,1 bar) Mod B 35 psi (2,4 bar) Mod G (air-set) Reference air pressure + 5 psi Mod K 50 psi (3,4 bar)
Flow Characteristics Refer to Figure 3
Fluid Temperature –40 to 160°F (–54 to 71°C)
Ambient Temperature –40 to 160°F (–54 to 71°C)
Envelope Dimensions Refer to Figure 4
Weight (approximate) 2.3 pounds (1,05 kg)

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Table 2. Model Variations

MOD LETTERS		DESCRIPTION
F594	F595	
Baseline F594A	–	Standard hose end pressure control valve, 45 psi spring
–	Baseline F595A	Standard hose end pressure control valve, 45 psi spring, lockout assembly, vent plug assembly
B		Changes spring to 35 psi version
C		Adds 2.5-inch internal ANPT inlet coupling
D		Adds 2.5-inch internal BSPPL inlet coupling
E		Adds 2.5-inch external APT outlet coupling
F		Adds 2.5-inch external BSPPL outlet coupling
G	–	Air-set pressure control
J		Adds 2-inch external ANPT outlet coupling
K		Changes spring to 50 psi version
L	–	Adds adapter for military D-1 nozzle
M	–	Adds outlet flange for J. C. Carter 60427 nozzle (cannot be used with Mods C, D, E, F, J or L)
N	–	Changes spring to 55 psi version and substitutes yellow-green anodized valve body
–	N	Changes spring to 55.
P		Adds military standard MS33786-40 inlet and outlet flange adapters

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## FAULT ISOLATION

### 1. General

Refer to Table 3 for fault isolation information. Locate suspected faulty component and take appropriate remedial action.

Table 3. Fault Isolation		
FAULT	POSSIBLE CAUSE	CORRECTIVE ACTION
External leakage from the vent port	Damaged or excessively worn packing (12, IPL Figure 1) or seal (11)	Replace the packing and the seal.
	Scratches on the smaller diameter of poppet (3)	Repair or replace the poppet.
Lockup pressure is excessive	Damaged or excessively worn packing (6) or seal (5)	Replace the packing and the seal.
	Damage to the packing groove of poppet (3)	Replace the poppet.
Control pressure is erratic	Sticking or binding of the poppet (3)	Overhaul the valve. (Disassemble the valve, polish the poppet, and clean or replace the seals (5 and 11).

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## DISASSEMBLY

### 1. Replacement Parts Kits

Refer to the **ILLUSTRATED PARTS LIST** section for the Replacement Parts Kit information.

### 2. Disassembly Procedure (Refer to IPL Figure 1)

**NOTE:** This disassembly procedure provides instructions for the basic F594/F595 series valves. Refer to the parts list in the **ILLUSTRATED PARTS LIST** for parts added by modifications (Mods).

- A. (F595 Only) Turn the lockout assembly (28) or the vent plug (25) 1/4-turn counter-clockwise and pull it upward to remove it from the valve body (29). Remove the packing (28.1 from the packing groove on the shaft of the lockout assembly. Remove the packing (25.1) and the wave spring (25.2) from the vent plug.
- B. Remove the packing (23) from the packing groove of the valve body (22 or 29).
- C. Remove the retaining ring (1), the poppet (3) and the spring (4) from the valve body (22 or 29).
- D. Remove the seal (5) and the packing (6) from the valve body (22 or 29).
- E. Remove the screws (7) and the retainer (9) from the valve body (22 or 29). Remove the packing (10) from the shoulder of the retainer.
- F. Remove the seal (11) and the packing (12) from the valve body (22 or 29).
- G. Remove the packing (13), the ball (14) and the spring (15) from the valve body (22 or 29).
- H. Remove the screw (16) and the washer (17) from the valve body (22 or 29).
- I. (F594 Only) Remove the retaining ring (19) and the screen (20) from the valve body (22 or 29).
- J. (F595 Only) Do not remove the pin (24) from the valve body (29) unless replacement is necessary.



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## CLEANING

### 1. Cleaning Materials

Refer to Table 4 for recommended cleaning materials. Suitable equivalent cleaning materials may be substituted for the items listed.

### 2. Cleaning Procedures

**WARNING: DRY CLEANING SOLVENT IS FLAMMABLE AND TOXIC TO EYES, SKIN, AND RESPIRATORY TRACT. SKIN/EYE PROTECTION REQUIRED. AVOID REPEATED/PROLONGED CONTACT. USE ONLY IN WELL VENTILATED AREAS. GOOD GENERAL VENTILATION IS NORMALLY ADEQUATE. KEEP AWAY FROM OPEN FLAMES OR OTHER IGNITION SOURCES.**

A. Clean all metal parts by washing thoroughly in dry cleaning solvent. Remove stubborn deposits by scrubbing with a nonmetallic stiff bristle brush. Use a Teflon pick to remove obstructions from ports, grooves and passages.

**NOTE:** All of the parts must be free of corrosion, dirt, grease, oil, or any other foreign matter.

**WARNING: WEAR EYE PROTECTION WHEN DRYING PARTS WITH COMPRESSED AIR. DO NOT DIRECT AIRSTREAM AT PERSONNEL OR LIGHT METAL PARTS.**

B. Dry parts with clean lint-free tissues or clean, dry compressed air.

Table 4. Recommended Cleaning Materials		
DESCRIPTION	SPECIFICATION	SOURCE
Brush, Bristle, stiff, nonmetallic	--	Commercially available
Dry Cleaning Solvent	P-D-680, Type 2	Commercially available
Pick, Teflon	--	Commercially available
Plastic Bags	--	Commercially available
Tissues, lint-free	--	Commercially available

C. Package clean parts in plastic bags.

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## INSPECTION

### 1. General

A. Under strong light and magnification, visually check all parts in accordance with the general criteria specified in paragraph 2 below.

B. Repair minor damage in accordance with local directives. If damage is major or beyond simple repair, replace the part rather than attempt extensive repairs.

### 2. Component Checks (Refer to Table 5)

Table 5. Component Checks	
DESCRIPTION (IPL Figure 1 Item Number)	CHECK CRITERIA
General	Visually check all parts as applicable for nicks, cracks, cuts, burrs, corrosion, breaks, scoring, chafing, scarring, deformation, dents, thread damage, or any other obvious defects. Make sure that the ports, passages, recesses and sealing grooves are clean and unobstructed.
	Check all sealing and seating surfaces for damage or corrosion that would affect sealing.
Poppet (3)	Sealing Outside Diameters – Check for light scoring. Can be cleaned and polished with 600-grit emery cloth.
	Replace the poppet if there are any nicks in the knife-edge sealing surface. (Nicks in the knife-edge sealing surface will result in downstream leakage.)
Compression Springs (4 and 15)	Replace if there is any deformation.
Seals (5 and 11)	Replace if there is embedded contamination or mechanical damage.
Packings (6, 10, 23, 25.1 and 28.1)	Replace if there are cuts, swelling, visible wear, deformation or other damage.

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Table 5. Component Checks (continue)

DESCRIPTION (IPL Figure 1 Item Number)	CHECK CRITERIA
Retainer (9)	Packing Shoulder – Check for corrosion and contamination. Can be cleaned and polished with 600-grit emery cloth.
Ball (14)	Replace if there is any corrosion, scratching or pitting.
Valve Body (22 or 29)	Packing/Seal Grooves – Check for corrosion and contamination. Can be cleaned and polished with 600-grit emery cloth.
	(F595 Only) Vent Plug Port – Make sure that the pin (24) is securely installed.
Vent Plug (25)	Replace if the 1/4-turn fastener does not latch securely.

## ASSEMBLY

### 1. Replacement Parts Kits

Refer to the **ILLUSTRATED PARTS LIST** section for the Replacement Parts Kit information.

### 2. Recommended Maintenance Materials

Refer to Table 7 for recommended assembly materials. Suitable equivalent materials may be substituted for the items listed.

Table 7. Recommended Assembly Materials

DESCRIPTION	SPECIFICATION	SOURCE
Petrolatum	–	Commercially available

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### 3. Lubrication

During assembly, apply a light coating of petrolatum (petroleum jelly) on all of the packings and the seals prior to installation, to facilitate installation and prevent damage.

### 4. Assembly Procedure

- A. (F594 Only) Install the screen (20) in the valve body (22) and secure it by installing the retaining ring (19). Make sure that the retaining ring is fully seated in its groove.
- B. (F595 Only) If removed, press a new pin (24) into the pin bore of the valve body (29), to the dimension shown in Figure 5.
- C. Install the spring (15), the ball (14) and the packing (13) in the valve body (22 or 29).
- D. Install the packing (12) on the seal (11). Install the seal in the valve body (22 or 29).
- E. Install the packing (10) on the shoulder of the retainer (9). Install the retainer in the valve body (22 or 29) and secure it with the screws (7) and the washers (8).
- F. Install the packing (6) and the seal (5) in the valve body (22 or 29).
- G. Install the spring (4) and the poppet (3) in the valve body (22 or 29) and secure with the retaining ring (1). Make sure that the retaining ring is fully seated in its groove.
- H. (F595 Only) Install the wave spring (25.2) and the packing (25.1) on the vent plug (25). Install the packing (28.1) in the packing groove on the shaft of the lockout assembly (28). Install the vent plug in the valve body (29). Package the lockout assembly separately and retain it for use during system setup and testing.
- I. Package screws (16), the washers (17) and the packing (23) separately for use during installation of the valve.

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## TESTING

### 1. General

- A. Perform all of the tests using Stoddard solvent, jet fuel or equivalent (referred to as solvent herein).
- B. All of the test equipment and fixtures are to be supplied by user.

### 2. Valve Test – External Leakage

- A. Install a cap with a gage on the valve inlet flange.
- B. Slowly pressurize the outlet to 200 psig (13,8 bar).
- C. There must not be any external leakage. If there is any leakage, continue the pressure for a short time. Then, remove the solvent pressure and repeat the test. If there still is external leakage, refer to the **FAULT ISOLATION** section.
- D. Release the solvent pressure.
- E. Remove the valve from test setup.

### 3. Valve Test – High Flow

#### A. Test Setup

- 1) Connect the valve outlet to the inlet of a gaged (0 to 200 psi) F116 or F117 test nozzle.
- 2) Install the connected valve and nozzle in a high flow circuit, with upstream and downstream shutoff valves.

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#### B. Flow Test Procedure

- 1) With the upstream shutoff valve fully open, apply a 75 psi dead head to the valve inlet.
- 2) De-actuate the mechanical servo (7) or vent the air pressure from the air servo (13).
- 3) Using the downstream shutoff valve for flow control, increase the flow to 20 gpm, 50 gpm, 200 gpm and 300 gpm. Observe the nozzle pressure for each flow rate.
- 4) Decrease the flow from 300 gpm to 200 gpm, 50 gpm, 20 gpm and 0 gpm. Observe the nozzle pressure for each flow rate.
- 5) The nozzle pressure must be as follows:
  - F594A/F595A 50 psi (3,4 bar) maximum
  - F594B/F595B 40 psi (2,7 bar) maximum
  - F594K/F595K 55 psi (3,8 bar) maximum
  - F594N/F595N 60 psi (4,1 bar) maximum

#### C. Pressure Lock-Up

- 1) Close the upstream shutoff valve. Open the downstream shutoff valve to release the system pressure. Close the test nozzle.
- 2) Open the upstream shutoff valve and observe the rise of nozzle lock-up pressure for 30 seconds.
- 3) The nozzle lock-up pressure must be as follows:
  - F594A/F595A 65 psi (4,5 bar) maximum
  - F594B/F595B 55 psi (3,8 bar) maximum

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- F594K/F595K 70 psi (4,8 bar) maximum
- F594N/F595N 75 psi (5,2 bar) maximum
- 4) Release the solvent pressure.
- E. Remove the valve from test setup.

## ILLUSTRATED PARTS LIST

### 1. General

This section lists, describes, and illustrates all detail parts required for maintenance support of the Hose End Pressure Control Valve.

### 2. Scope of Information

A. The parts list is arranged in the general order of disassembly. The listing is indentured to show the relationship between each part and its next higher assembly. Item numbers used in the parts list are keyed to the corresponding numbers of the accompanying illustration.

### B. MODIFICATION CODE

The modification code (see Table 1) indicates the parts usage with respect to the end item. When the MODIFICATION CODE column is blank, the part usage is applicable to all versions unless otherwise specified in the DESCRIPTION column.

### C. Abbreviations

ASSY	Assembly.
FIG.	Figure.
IPL	Illustrated Parts List.
MOD	Modification.

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FIG. ITEM	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	MOD CODES	UNITS PER ASSY	
				F594	F595
<b>F594A AND F595A BASELINE HOSE END PRESSURE CONTROL VALVES</b>					
1	RR275S	· RETAINER		1	1
3	2783013-101	· POPPET		1	1
4	2671762	· SPRING (Green) (Not used on Mod G – Air-Set)		1	–
	001005-101	· SPRING (Yellow)		–	1
	2763651-101	· SPRING (Orange)	B	1	–
	001018-101	· SPRING (Red)	B	–	1
	2701514	· SPRING (Blue)	K	1	–
	2671762	· SPRING (Green)	K	–	1
	2775267-101	· SPRING (White)	N	1	1
5	2671765-146	· SEAL, LIP		1	1
6	2661058BD147	· PACKING, PREFORMED		1	1
7	NK500A8-8M	· SCREW, SELF-LOCKING		4	4
9	2763595-101	· RETAINER		1	1
10	7-229N675-7	· PACKING, PREFORMED		1	1
11	S12560-126	· SEAL, CHANNEL		1	1
12	2661058BD127	· PACKING, PREFORMED		1	1
13	2661058BD007	· PACKING, PREFORMED		1	1
14	2706786-20	· BALL		1	1
15	2671764	· SPRING, COMPRESSION		1	1
16	971009-101	· SCREW, CAP, SOCKET HEAD		6	6
17	CMS35338-139	· WASHER, LOCK		6	6
23	2661058A042	· PACKING, PREFORMED		1	1
	2661058A151	· PACKING, PREFORMED	M	1	–

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FIG. ITEM	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	MOD CODES	UNITS PER ASSY	
				F594	F595
<b>F594A AND F595A BASELINE HOSE END PRESSURE CONTROL VALVES</b>					
24	CMS16555-620	· PIN, STRAIGHT. HEADLESS		–	1
25	941017-101	· PLUG, VENT		–	1
25 .1	2661058BD008	· · PACKING, PREFORMED		–	1
25 .2	SSR-0050-S17	· · SPRING, WAVE		–	1
28	941020-101	· LOCKOUT ASSEMBLY		–	1
28 .1	2661058BD008	· · PACKING, PREFORMED		–	1
29	941033-101	· BODY, VALVE		–	1
30	2681436-2	· COUPLING (Not shown)	C	1	1
31	2681436-4	· COUPLING (Not shown)	D	1	1
32	2661058A042	· PACKING, PREFORMED (Not shown)	C,D	1	1
33	2681470-1	· COUPLING (Not shown)	E	1	1
34	2681470-3	· COUPLING (Not shown)	F	1	1
35	2681470-4	· COUPLING (Not shown)	J	1	1
36	2706706-04-10	· SCREW, CAP, SOCKET HEAD (Not shown)	E,F,J	6	6
37	2706770-44	· WASHER, LOCK (Not shown)	E,F,J	6	6
38	CAN816-4-4D	· NIPPLE (Not shown)	G	1	–
	H3C1/4	· NIPPLE (Alternate) (Not shown)	G	1	–
39	CMS29512-04	· PACKING, PREFORMED (Not shown)	G	1	–
40	2722490	· ADAPTER (Not shown)	L	1	–
41	2661058A232	· PACKING, PREFORMED (Not shown)	L	1	–
42	CMS35649-2252	· NUT (Not shown)	L	6	–
43	2706770-44	· WASHER, LOCK (Not shown)	L	6	–
44	CMS90728-13	· SCREW, CAP, SOCKET HEAD (Not shown)	L	6	–

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FIG. ITEM	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	MOD CODES	UNITS PER ASSY	
				F594	F595
<b>F594A AND F595A BASELINE HOSE END PRESSURE CONTROL VALVES</b>					
45	2722490	· ADAPTER (Not shown)	P	1	1
46	2661058A232	· PACKING, PREFORMED (Not shown)	P	1	1
47	CMS35649-2252	· NUT (Not shown)	P	6	6
48	2706770-44	· WASHER, LOCK (Not shown)	P	12	12
49	CMS90728-13	· SCREW, CAP, SOCKET HEAD (Not shown)	P	6	6
50	2803005-101	· COUPLING (Not shown)	P	1	1
51	2661058A042	· PACKING, PREFORMED (Not shown)	P	1	1
52	CMS35276-280	· SCREW, MACHINE (Not shown)	P	6	6
53	CNAS1149C416 R	· WASHER, FLAT (Not shown)	P	6	6

<b>REPLACEMENT PARTS KITS AVAILABLE</b>		
KIT PART NUMBER	DESCRIPTION	ITEMS IN KIT (IPL Figure 1)
KITF574-101	Seals	5, 6, 10, 11, 12, 13, 23

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