

CF-105 SERVICE DATA

Utility Hydraulics System

Wheel Brakes Circuit

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CF-105 SERVICE DATA



UNLIMITED

UTILITY HYDRAULICS SYSTEM

WHEEL BRAKES CIRCUIT

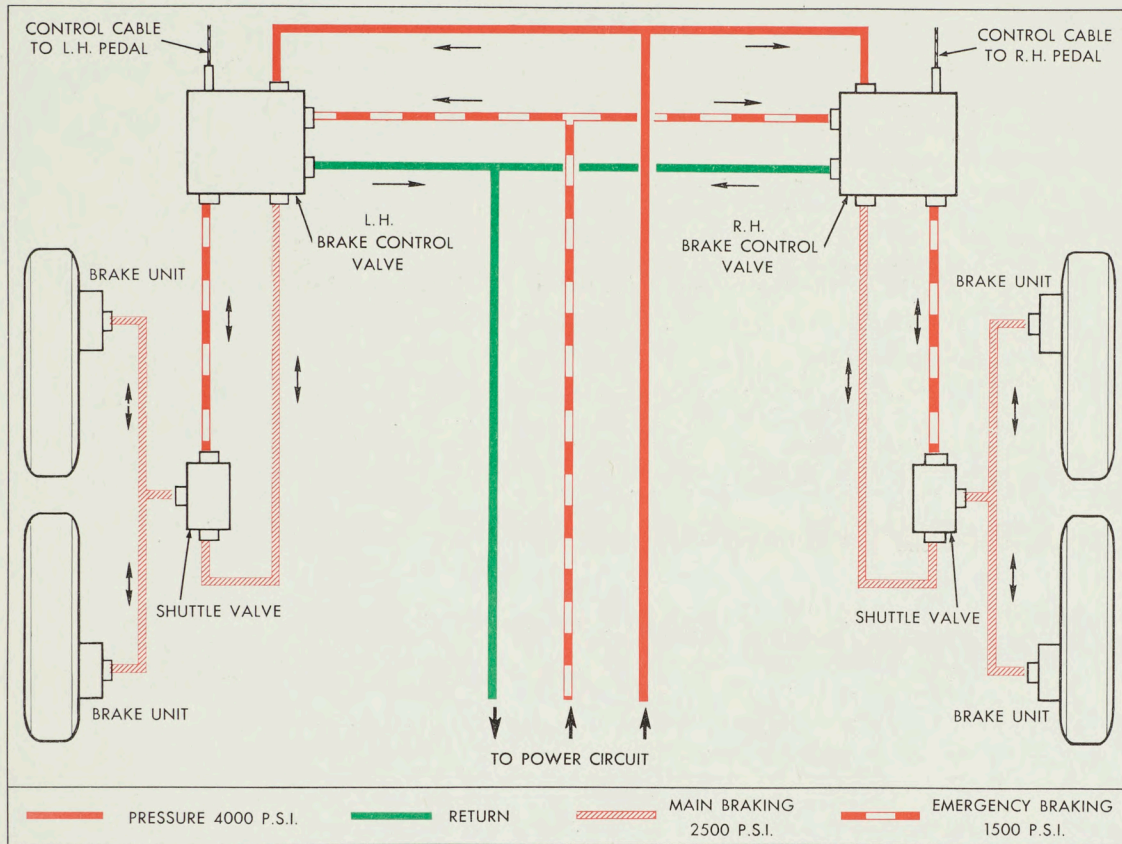
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7M1-2201-1

FIG. 1 WHEEL BRAKES - SCHEMATIC

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SYSTEM DATA SHEET

SYSTEM UTILITY HYDRAULICS	SUB-SYSTEM WHEEL BRAKES	AIRCRAFT EFF'TY 25201	REF. NO. 19-3
<p>DESCRIPTION</p> <p>General</p> <ol style="list-style-type: none"> The wheel brakes circuit consists of a normal braking system and an emergency braking system. The emergency system takes over automatically from the normal system whenever the pressure to the normal system drops below 1000 psi. The brakes are automatically applied during retraction of the landing gear. Each pair of brake units on the main landing gear is operated independently by control valves in the armament bay. Differential and proportional braking is obtained by foot pressure on a brake pedal on each of the pilot's rudder pedals. The brake pedals are mechanically connected to the control valves by cable runs. For parking, the brake pedals can be held in the on position by depressing the brake pedals, pulling a handle on the instrument panel marked PARKING, and releasing the brake pedals before releasing the parking brake handle. Two warning lights on the pilot's right hand console are operated by pressure switches in the power circuit. One, marked UTIL HYD, warns the pilot that the emergency braking system is coming into operation and the other, marked EMERG BRAKE HYD, warns the pilot that the emergency brake pressure has failed or has been exhausted. A limited number of brake applications can be obtained after the engines have been shut down, from the charge in the accumulators in the power circuit. Steel pipelines incorporating swivel and expanding joints are used to allow movement of the landing gear. <p>Brake Control Valves</p> <ol style="list-style-type: none"> Fluid from the power circuit main pressure line at pressures up to 4000 psi and from the power circuit reduced pressure line at pressures up to 1500 psi is delivered to each of the two brake control valves. Two spring operated spool valves, one for normal braking and one for emergency braking are contained in each control valve. A pressure operated spring-loaded spool valve is also installed in each control valve to automatically change over from normal to emergency, or from emergency to normal, according to the pressure of the fluid in the power circuit. When the pressure in the power circuit is above 1000 psi the change-over valve is held by fluid pressure in the normal braking position, allowing pressure fluid from the main pressure line in the power circuit to be delivered to the normal brake valve. From the normal brake valve pressure fluid at pressures up to 2500 psi is delivered into the main brake pipeline. If the pressure in the main pressure line of the power circuit falls below 1000 psi, the pressure operated change-over valve is moved by spring pressure to the emergency braking position, allowing pressure fluid from the reduced pressure line in 			
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the power circuit to be delivered to the emergency brake valve. From the emergency brake valve, fluid at pressures up to 1500 psi is delivered into the emergency brake pipeline.

9. A solenoid valve, operated by a micro-switch on the main landing gear, is also installed in each control valve to operate the main braking system when the landing gear is being retracted. When the solenoid valve is energised, pressure fluid operates the main brake valve and applies the wheel brakes.

Shuttle Valves

10. From each control valve a main brake pipeline and an emergency brake pipeline is led to a shuttle valve on the rear brake torque rod of each main landing gear. The shuttle valve prevents fluid in the operative svstem from entering the non-operative system.

Brake Units

11. From the shuttle valves, brake pressure fluid is delivered to triple cylinder, multiple disc, brake units. Pressure is applied by pistons having a spring loaded return to overcome the pressure of the return fluid when braking pressure is released.

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COMPONENT DATA SHEET

SYSTEM UTILITY HYDRAULICS		SUB-SYSTEM WHEEL BRAKES		COMPONENT Valve - Brake Control		REF. NO. 19-3-1	
AVRO PART NO. 7-1954-11		MANUFACTURER Hydra-Power		MAN'FR'S PART NO. HP 402100		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE:		KNOWN-		ESTIMATED-		500 hours	
FUNCTION To apply hydraulic pressure to the wheel brakes.							
LOCATION In the armament bay, station 469.							
ACCESS Unobstructed when missile pack is removed.						MEN X MINUTES	
REPLACEMENT PROCEDURE Install with four attachment bolts. Connect the electrical cable. Connect the cable from the rudder pedal. Connect the six hydraulic pipelines. Prime the system.						MEN X MINUTES	

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INSPECTION		MEN X MINUTES	
Check for security, damage, cracks, corrosion and leaks.			
FUNCTIONAL CHECKS		MEN X MINUTES	
GROUND HANDLING AND GROUND TEST EQUIPMENT			
Hydraulic ground test rig. Electrical ground power circuit.			
SPECIAL TOOLS TO REMOVE OR SERVICE			
REMARKS			
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COMPONENT DATA SHEET

SYSTEM UTILITY HYDRAULICS	SUB-SYSTEM WHEEL BRAKES	COMPONENT Valve - Shuttle	REF. NO. 19-3-2
AVRO PART NO. 7-1992-107	MANUFACTURER Hydra-Power	MAN'FR'S PART NO. HP 51800	AIRCRAFT EFFECTIVITY 25201
OVERHAUL LIFE: KNOWN-		ESTIMATED- 1500 hours	
<p>FUNCTION</p> <p style="text-align: center;">To supply emergency pressure to the brakes on failure of the normal system.</p>			
<p>LOCATION</p> <p style="text-align: center;">Rear brake torque rod.</p>			
<p>ACCESS</p> <p style="text-align: center;">Unobstructed.</p>			MEN X MINUTES
<p>REPLACEMENT PROCEDURE</p> <p style="text-align: center;">Install with two bolts. Connect three hydraulic lines.</p>			MEN X MINUTES

INSPECTION Check for security, damage, cracks, corrosion and leaks.		MEN X MINUTES	
FUNCTIONAL CHECKS		MEN X MINUTES	
GROUND HANDLING AND GROUND TEST EQUIPMENT Hydraulic ground test rig.			
SPECIAL TOOLS TO REMOVE OR SERVICE			
REMARKS			
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COMPONENT DATA SHEET

SYSTEM UTILITY HYDRAULICS	SUB-SYSTEM WHEEL BRAKES	COMPONENT Unit - Brake	REF. NO. 19-3-3
AVRO PART NO. 7-1092-15	MANUFACTURER Goodyear	MAN'FR'S PART NO. FD 732	AIRCRAFT EFFECTIVITY 25201
OVERHAUL LIFE: KNOWN-		ESTIMATED-	
FUNCTION To reduce aircraft speed on the ground.			
LOCATION On main undercarriage leg.			
ACCESS Unobstructed when wheels are removed.			MEN X MINUTES
REPLACEMENT PROCEDURE Install brake unit on the axle. Connect brake link to the back plate. Replace wheel.			MEN X MINUTES

INSPECTION		MEN X MINUTES							
Check brakes for leaks, overheating and wear. Check brake clearances.									
FUNCTIONAL CHECKS		MEN X MINUTES							
GROUND HANDLING AND GROUND TEST EQUIPMENT									
Hydraulic ground test rig.									
SPECIAL TOOLS TO REMOVE OR SERVICE									
REMARKS									
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COMPONENT DATA SHEET

SYSTEM UTILITY HYDRAULICS		SUB-SYSTEM WHEEL BRAKES		COMPONENT Assembly - Swivel		REF. NO. 19-3-4	
AVRO PART NO. 7-1992-25		MANUFACTURER		MAN'FR'S PART NO.		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE:		KNOWN-		ESTIMATED-		1500 hours	
FUNCTION To connect hydraulic supply lines on aircraft structure to line on main landing gear leg.							
LOCATION Upper end main landing gear leg.							
ACCESS Unobstructed.						MEN X MINUTES	
REPLACEMENT PROCEDURE Install four bolts securing assembly to brackets on airframe structure and leg. Connect hydraulic pipelines. Prime the system.						MEN X MINUTES	

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INSPECTION		MEN X MINUTES	
Check for leakage and security.			
FUNCTIONAL CHECKS		MEN X MINUTES	
GROUND HANDLING AND GROUND TEST EQUIPMENT			
Hydraulic ground test rig.			
SPECIAL TOOLS TO REMOVE OR SERVICE			
REMARKS			
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COMPONENT DATA SHEET

SYSTEM UTILITY HYDRAULICS	SUB-SYSTEM WHEEL BRAKES	COMPONENT Fitting - Trombone	REF. NO. 19-3-5
AVRO PART NO. 7-1992-21	MANUFACTURER Dowty	MAN'FR'S PART NO.	AIRCRAFT EFFECTIVITY 25201
OVERHAUL LIFE: KNOWN-		ESTIMATED- 1500 hours	
FUNCTION Sliding joint in brake hydraulic lines.			
LOCATION On main landing gear leg.			
ACCESS Unobstructed.			MEN X MINUTES
REPLACEMENT PROCEDURE Connect the fitting to the landing gear leg. Connect four hydraulic lines. Prime the system.			MEN X MINUTES

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<p>INSPECTION</p> <p style="text-align: center;">Check for damage, wear, security and leakage.</p>	<p style="text-align: center;">MEN X MINUTES</p> <table border="1" style="width: 100%; height: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"></td> <td style="width: 50%;"></td> </tr> </table>																				
<p>FUNCTIONAL CHECKS</p>	<p style="text-align: center;">MEN X MINUTES</p> <table border="1" style="width: 100%; height: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"></td> <td style="width: 50%;"></td> </tr> </table>																				
<p>GROUND HANDLING AND GROUND TEST EQUIPMENT</p> <p style="text-align: center;">Hydraulic ground test rig.</p>																					
<p>SPECIAL TOOLS TO REMOVE OR SERVICE</p>																					
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<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">ISSUE</td> <td style="width: 10%; text-align: center;">1</td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> </tr> <tr> <td>DATE</td> <td>8 Dec 56</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	ISSUE	1									DATE	8 Dec 56									
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UTILITY HYDRAULICS SYSTEM

SPEED BRAKES CIRCUIT

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COMPONENT DATA SHEET

SYSTEM UTILITY HYDRAULICS	SUB-SYSTEM SPEED BRAKES	COMPONENT Valve - Speed Brakes Selector	REF. NO. 19-4-2
AVRO PART NO. 7-1956-13	MANUFACTURER Weston Hydraulics	MAN'FR'S PART NO. 14130	AIRCRAFT EFFECTIVITY 25201
OVERHAUL LIFE: KNOWN-		ESTIMATED- 500 hours	
FUNCTION To direct flow of hydraulic fluid to the speed brake jacks.			
LOCATION In the fuselage, station 538.			
ACCESS Through hydraulic access panel - 52 camlocs.			MEN X MINUTES
REPLACEMENT PROCEDURE Attach the valve to the mounting with four bolts. Connect six hydraulic pipelines. Connect one electrical connector. Prime the system.			MEN X MINUTES

CF-105 SERVICE DATA
SYSTEM DATA SHEET

SYSTEM	SUB-SYSTEM	AIRCRAFT EFFTY	REF. NO.
UTILITY HYDRAULICS	SPEED BRAKES	25201	19-4
<p>DESCRIPTION</p> <p>General</p> <p>1. Pressure fluid from the power circuit is delivered via a selector valve to two speed brake jacks, which operate two speed brakes located on the underside of the fuselage.</p> <p>2. Steel pipelines incorporating swivel and expanding joints are used to allow movement between the speed brake jacks and the aircraft structure.</p> <p>Speed Brakes Selector Valve</p> <p>3. A solenoid operated selector valve, controlled by a three position switch marked OUT, HOLD and IN, on the inboard throttle lever, controls the flow of pressure and return fluid between the power circuit and the speed brake jacks.</p> <p>4. A relief valve in the selector valve, set to open at a differential pressure of 4200 psi allows the speed brakes to blow back on all selections of the selector valve, should the airload on the speed brakes become excessive.</p> <p>Speed Brake Jacks</p> <p>5. The speed brake jacks are of the single cylinder double-acting type. Extension of the jacks retracts the speed brakes.</p> <p>6. When the speed brakes are selected OUT, pressure fluid is directed to the rod end of each jack and the opposite end is connected to return.</p> <p>7. When the speed brakes are selected IN, pressure fluid is directed to both ends of each jack, utilizing differential pressure on the piston and the airload on the speed brakes, to close the speed brakes.</p> <p>8. On a HOLD selection, the rod end of each jack is closed to form a hydraulic lock and the opposite end is connected to return.</p>			
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COMPONENT DATA SHEET

SYSTEM UTILITY HYDRAULICS	SUB-SYSTEM SPEED BRAKES	COMPONENT Jack - Speed Brakes	REF. NO. 19-4-1
AVRO PART NO. 7-1956-7	MANUFACTURER Jarry Hydraulics	MAN'F'R'S PART NO.	AIRCRAFT EFFECTIVITY 25201
OVERHAUL LIFE: KNOWN-		ESTIMATED- 500 hours	
FUNCTION To operate speed brakes.			
LOCATION In the fuselage, station 485-510.			
ACCESS Through electrical access panel - 44 camlocs and plate inboard of the jack - 24 screws.			MEN X MINUTES
REPLACEMENT PROCEDURE Install the attachment bolts. Connect swivel elbows with two attachment bolts. Prime the system.			MEN X MINUTES

TW1-3413-2-5

INSPECTION		MEN X MINUTES							
Check for security, damage, cracks, corrosion and leaks.									
FUNCTIONAL CHECKS		MEN X MINUTES							
GROUND HANDLING AND GROUND TEST EQUIPMENT									
Hydraulic ground test rig.									
SPECIAL TOOLS TO REMOVE OR SERVICE									
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SYSTEM UTILITY HYDRAULICS		SUB-SYSTEM SPEED BRAKES		COMPONENT Valve - Speed Brakes Selector		REF. NO. 19-4-2	
AVRO PART NO. 7-1956-13		MANUFACTURER Weston Hydraulics		MAN'FR'S PART NO. 14130		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE:		KNOWN-		ESTIMATED-		500 hours	
FUNCTION To direct flow of hydraulic fluid to the speed brake jacks.							
LOCATION In the fuselage, station 538.							
ACCESS Through hydraulic access panel - 52 camlocs.						MEN X MINUTES	
REPLACEMENT PROCEDURE Attach the valve to the mounting with four bolts. Connect six hydraulic pipelines. Connect one electrical connector. Prime the system.						MEN X MINUTES	

INSPECTION Check for security, damage, cracks, corrosion and leaks.		MEN X MINUTES	
FUNCTIONAL CHECKS		MEN X MINUTES	
GROUND HANDLING AND GROUND TEST EQUIPMENT Hydraulic ground test rig.			
SPECIAL TOOLS TO REMOVE OR SERVICE			
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COMPONENT DATA SHEET

SYSTEM UTILITY HYDRAULICS		SUB-SYSTEM SPEED BRAKES		COMPONENT Coupling - Expansion		REF. NO. 19-4-3	
AVRO PART NO. 7-1956-35		MANUFACTURER Dowty		MAN'FR'S PART NO. XP 3052		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE:		KNOWN-		ESTIMATED-		500 hours	
FUNCTION To compensate for extension and contraction of hydraulic lines.							
LOCATION On speed brake 'up' and 'down' lines.							
ACCESS Through electrical access door - 44 camlocs, and plate inboard of the jack - 24 screws.						MEN X MINUTES	
REPLACEMENT PROCEDURE Connect the coupling to the swivel fitting on the jack. Connect the hydraulic pipeline. (Hold flats on the coupling with a wrench to prevent turning). Prime the system.						MEN X MINUTES	

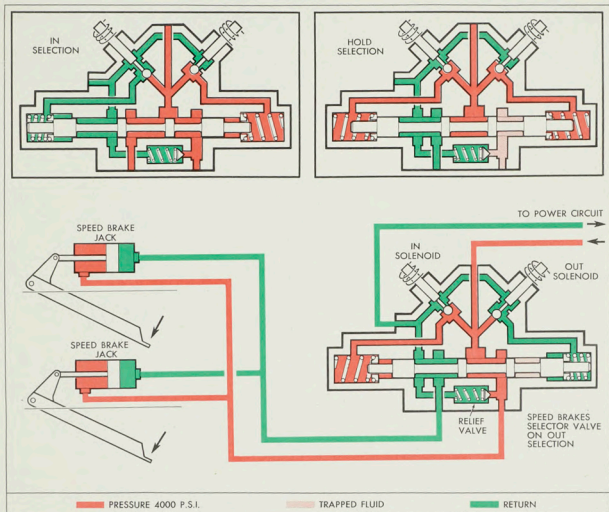
INSPECTION Check for leaks.							MEN X MINUTES		
FUNCTIONAL CHECKS							MEN X MINUTES		
GROUND HANDLING AND GROUND TEST EQUIPMENT Hydraulic ground test rig.									
SPECIAL TOOLS TO REMOVE OR SERVICE									
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INSPECTION Check for security, leaks and damage.		MEN X MINUTES	
FUNCTIONAL CHECKS		MEN X MINUTES	
GROUND HANDLING AND GROUND TEST EQUIPMENT Hydraulic ground test rig.			
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 Cummins

FIG. 1 SPEED BRAKES—SCHEMATIC

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