

HYDRAULIC SYSTEM (Continued)

LANDING GEAR

The landing gear is actuated by positioning the landing gear lever to either the extend or retract position. During gear extension, hydraulic pressure retracts the uplocks and then extends the gear actuators. The actuators mechanically lock in the extend position. Upon retraction, hydraulic pressure unlocks the actuators and retracts the gear into the uplocks. Hydraulic pressure automatically shuts off when the gear are down and locked on extension or up and locked on retraction.

Three green annunciators illuminate when the nose, left main or right main gear are down and locked. These lights are not illuminated in the retracted position. A red GEAR UNLOCKED annunciator is illuminated anytime all landing gear are not locked in the position selected by the landing gear handle.

A "LANDING GEAR" or tone audio warning is provided by the warning/caution advisory system if either of the following conditions occur and the landing gear are not down.

1. Airspeed below 130 KIAS, and either throttle is below approximately 85% N₂. Warning can be silenced.
2. Flaps are extended beyond the Takeoff and Approach Setting. Warning cannot be silenced.

Emergency landing gear extension is provided by two emergency gear handles located below the landing gear handle. Pulling the "T" handle retracts the uplocks, allowing the landing gear to free fall to the extend position. Some yawing may be required to achieve green lights on all gear. Rotating the extended "T" handle 1/4 turn clockwise will lock the handle. After the "T" handle has been pulled, the round collar handle can be pulled to discharge the nitrogen blow down system. Nitrogen will retract the uplocks, in the event they did not release mechanically, and then extend the gear. After the gear is extended, the collar and "T" handle can be pushed in for knee clearance. If significant resistance is encountered, the handle should be left extended to prevent cable crimping.

CAUTION

- Prior to using the emergency extension system, the landing gear handle must be down to prevent possible energizing of the gear hydraulic system to the retract position.
- Once the emergency gear extension system has been used, do not attempt to raise the gear.

FLAP/GROUND FLAPS 55°/SPEED BRAKES

The flaps can be selected to the UP (0°), TAKEOFF AND APPROACH (15°), LAND (35°) and GROUND FLAPS (55°) positions using the flap select handle. A slight downward pressure is required to move the handle beyond the TAKEOFF AND APPROACH gate to the landing position. The handle must be lifted at the landing gate before it can be moved aft to the GROUND FLAPS (55°) position.

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EMERGENCY EXTENSION

In the event of normal system malfunction, a manually operated system is provided to release the landing gear for free-fall extension. A pneumatic system is installed to assure positive locking of all three gear actuators.

The manual system is actuated by the red AUX GEAR CONTROL T-handle located under the pilot's instrument panel. The handle is pulled and rotated 90° clockwise to lock. This action mechanically disengages the landing gear uplocks, allowing the landing gear to free-fall to the down and locked position and also unlocks the red, collar-type, blow down knob. Approximately 150 KIAS with flaps up is the optimum speed/configuration for free fall extension. The pneumatic system should always be used in conjunction with the manual system in order to assure positive locking of all three gear actuators.

Pulling the red, collar-type knob on the T-handle shaft mechanically ports the emergency air bottle into the uplocks and then into the extend side of all three landing gear. If the uplocks had not released mechanically, the air charge will release them. The gear is driven to the down and locked position and normal indications will appear in the cockpit providing the gear handle is down. After actuation of the pneumatic system, the knob and T-handle should be left in the extended position. After each use, the system must be re-serviced.

WHEEL BRAKES

The Model 525B uses hydraulically powered main landing gear brakes. Crew inputs to the brake metering valve are mechanically transmitted via a series of cables from the toe brakes on the rudder pedals. The brake metering valve regulates hydraulic pressure to the brakes based on pilot or copilot input. An electronic anti-skid system monitors the main gear wheel speeds and reduces brake pressure as necessary to optimize stopping distance and prevent wheel lock-up. A parking brake valve is used to trap pressurized fluid in the brake lines and is controlled by a control knob in the cockpit. The pneumatic brake system is a back-up system used to supply pressure to the brake assemblies in the event of hydraulic brake system failure. It supplies pressurized nitrogen from a bottle in the nose directly to shuttle valves on the brakes and is controlled by a lever in the cockpit.

Brake Metering Valve & Cable System Operation

The brakes are operated by a separate, closed center hydraulic system with an independent reservoir, pump/electric motor, and accumulator. A pressure switch located near the fluid end of the accumulator senses brake system pressure and commands the pump on and off accordingly. There is no cockpit switch for the brake pump. The pump is powered on any time the gear handle is in the down position and the accumulator pressure is below 1175 ± 75 psig. When the accumulator pressure reaches 1500 ± 50 psig, the power is removed for the pump. A separate low pressure switch built into the pump monitors the system for low pressure. If the system pressure drops below (900 ± 50) psig and the gear handle is down, the low pressure switch causes the (PWR BRK LOW PRESS) annunciator to illuminate. During normal operation, the accumulator provides pressurized fluid to the brake metering valve which regulates pressure (0 to $1000 +50/-20$ psi) to the brake assemblies in proportion to the brake pedal deflection of the pilot's or co-pilot's brake pedals. Braking can be controlled independently from either cockpit position. The cable system that transmits pedal deflection to the brake metering valve is designed such that pedal inputs by the pilot do not cause the copilots pedals to move, and vice versa.

■ LANDING GEAR WILL NOT EXTEND

1. Airspeed - BELOW V_{LO} (200 KIAS).
2. GEAR CONTROL Circuit Breaker (L Panel) - RESET.
3. Landing Gear Handle - CHECK DOWN.

● IF HANDLE FAILS TO MOVE (FROM UP POSITION) OR GEAR WILL NOT EXTEND

4. GEAR CONTROL Circuit Breaker (L Panel) - PULL.
5. Auxiliary Gear Control - PULL T-HANDLE AND ROTATE TO LOCK.
6. Auxiliary Gear Control - PULL KNOB TO BLOW DOWN (for positive lock).
7. Auxiliary Gear Control - STOW (knob and T-handle).

CAUTION

- Prior to using the emergency extension, the landing gear handle must be down and/or the gear control circuit breaker pulled, to prevent possible energizing of the gear hydraulic system to the retract position.
- Once the emergency gear extension system has been used, do not attempt to raise the gear.

NOTE

Pneumatic pressure should be used to assure positive locking of all three gear actuators.

□ IF THE LANDING GEAR HANDLE REMAINS UP

CAUTION

Power brakes and antiskid are inoperative.

8. Refer to Abnormal Procedures, WHEEL BRAKE FAILURE.

Procedure completed

□ IF THE LANDING GEAR HANDLE IS DOWN

Procedure completed

● IF HANDLE MOVES AND GEAR EXTENDS

Procedure completed

FLAPS

The flaps are electrically controlled and hydraulically actuated by the main hydraulic system. Normal flap travel is from 0° to 35° and any intermediate position can be selected. A mechanical detent is installed at the takeoff and approach (15°) position of the flap lever. The full flap position (35°) is reached by pushing down on the flap lever when passing through the takeoff and approach detent.

The gear warning tone or the "LANDING GEAR" aural warning, if the aural system is installed, will sound any time the flaps are selected past the T.O. & APPR. position with the gear not down and locked. The warning cannot be silenced with the "Horn Silence" button when the airplane is in this configuration.

The flaps have an additional position called GROUND FLAPS (55°) which provides additional drag during the landing roll. Selection of the GROUND FLAPS (55°) position in flight is prohibited. If the flap handle is placed in the GROUND FLAPS position in flight the FLAPS >35° annunciator and MASTER CAUTION will illuminate after an 8 second delay. Even though the GROUND FLAPS position is prohibited from use in flight, it has been demonstrated that the airplane can be safely flown if that position should inadvertently be selected. If the GROUND FLAPS position is inadvertently selected during landing approach a high sink rate may be expected. In such a case, engine thrust should be increased and the flaps raised to a normal landing setting. On the ground selecting GROUND FLAPS also extends the speed brakes. If GROUND FLAPS deploy in flight, the speed brakes will deploy if the throttles are below approximately 91% N₂ RPM and retract with the throttles above approximately 91% N₂. Avoid cycling the throttles above and below 91% N₂, as the speed brakes will cycle.

CONTROL LOCK

The control lock is mechanically operated and locks the ailerons, elevators and rudder in the neutral position and the throttles in the OFF position. The control lock handle, located below the instrument panel on the left side, controls the system. When the handle is pulled straight aft to the detent, the flight controls and throttles are locked. To release the control lock system, rotate the T-handle 45 ° clockwise and push it in. With the control lock engaged, the maximum deflection of the nosewheel is restricted to 60 ° either side of center. Exceeding this amount of turn will cause excessive force to be placed on the control lock mechanism and rudder control cables. Towing the airplane with the control lock engaged should be avoided. The controls should be neutralized before engaging the lock.

ELECTRICAL

GENERAL

Electrical power is normally supplied by two 29-volt direct current (DC), 300-ampere, engine driven starter/generators. A 24-volt, 44-ampere hour (optional 42 ampere-hour sealed lead/acid battery) battery is located in the tailcone compartment to supply power for starting and emergency requirements. A receptacle below the left engine pylon is provided for connection of an external power unit.

**LANDING DISTANCE - FEET ACTUAL DISTANCE FLAPS - LAND
SEA LEVEL**

CONDITIONS: LANDING GEAR - DOWN ANTI-ICE - ON OR OFF
THRUST - IDLE AT 50 FEET GROUND FLAPS - AFTER TOUCHDOWN
AIRSPEED - VREF AT 50 FEET

SOME CONDITIONS MAY BE BRAKE ENERGY OR CLIMB LIMITED. OBTAIN ALLOWABLE WEIGHT FROM MAXIMUM LANDING WEIGHT TABLES.

*WEIGHT = 13870 POUNDS VREF = 112 KIAS VAPP = 122 KIAS						WEIGHT = 12750 POUNDS VREF = 108 KIAS VAPP = 117 KIAS					
TEMP DEG C	TAILWIND 10 KTS	ZERO WIND	HEADWINDS 10 KTS	20 KTS	30 KTS	TEMP DEG C	TAILWIND 10 KTS	ZERO WIND	HEADWINDS 10 KTS	20 KTS	30 KTS
-25	3210	2640	2490	2340	2190	-25	3020	2490	2340	2190	2050
-20	3250	2680	2520	2370	2220	-20	3050	2520	2370	2220	2080
-15	3290	2720	2560	2400	2260	-15	3090	2550	2400	2250	2120
-10	3330	2760	2600	2440	2290	-10	3130	2590	2430	2290	2150
-5	3380	2790	2630	2470	2330	-5	3170	2620	2460	2320	2180
0	3420	2830	2670	2510	2360	0	3210	2650	2500	2350	2210
5	3470	2870	2710	2550	2400	5	3250	2690	2540	2390	2240
10	3520	2920	2750	2590	2430	10	3290	2730	2570	2420	2270
15	3570	2960	2790	2630	2470	15	3340	2770	2610	2460	2310
20	3620	3000	2830	2670	2510	20	3380	2810	2650	2490	2340
25	3670	3040	2870	2710	2550	25	3430	2850	2680	2530	2380
30	3720	3090	2910	2750	2590	30	3470	2880	2720	2560	2410
35	3770	3130	2950	2790	2620	35	3520	2920	2760	2600	2440
40	3820	3180	3000	2820	2660	40	3560	2960	2800	2630	2480
45	3870	3220	3040	2860	2700	45	3610	3000	2830	2670	2510
50	3920	3260	3080	2900	2740	50	3650	3040	2870	2700	2550
54	3960	3300	3110	2930	2770	54	3680	3070	2900	2730	2580

WEIGHT = 12600 POUNDS VREF = 107 KIAS VAPP = 117 KIAS						WEIGHT = 12400 POUNDS VREF = 106 KIAS VAPP = 116 KIAS					
TEMP DEG C	TAILWIND 10 KTS	ZERO WIND	HEADWINDS 10 KTS	20 KTS	30 KTS	TEMP DEG C	TAILWIND 10 KTS	ZERO WIND	HEADWINDS 10 KTS	20 KTS	30 KTS
-25	3000	2460	2320	2180	2040	-25	2960	2440	2290	2150	2010
-20	3030	2500	2350	2200	2070	-20	3000	2470	2320	2180	2040
-15	3070	2530	2380	2230	2100	-15	3030	2500	2350	2210	2070
-10	3100	2560	2410	2270	2130	-10	3070	2540	2390	2240	2100
-5	3140	2600	2440	2300	2160	-5	3110	2570	2410	2270	2130
0	3180	2630	2480	2330	2190	0	3140	2600	2450	2300	2160
5	3220	2670	2510	2370	2220	5	3190	2640	2480	2340	2190
10	3270	2710	2550	2400	2250	10	3230	2680	2520	2370	2230
15	3310	2750	2590	2430	2290	15	3270	2710	2560	2400	2260
20	3350	2780	2620	2470	2320	20	3310	2750	2590	2440	2290
25	3400	2820	2660	2500	2360	25	3360	2790	2630	2470	2330
30	3440	2860	2700	2540	2390	30	3400	2820	2660	2510	2360
35	3480	2900	2730	2580	2420	35	3440	2860	2700	2540	2390
40	3530	2940	2770	2610	2460	40	3490	2900	2740	2580	2430
45	3570	2980	2810	2640	2490	45	3530	2940	2770	2610	2460
50	3620	3010	2840	2680	2520	50	3570	2980	2810	2650	2490
54	3650	3040	2870	2710	2550	54	3610	3010	2830	2670	2520

WEIGHT = 12200 POUNDS VREF = 106 KIAS VAPP = 115 KIAS						WEIGHT = 12000 POUNDS VREF = 105 KIAS VAPP = 114 KIAS					
TEMP DEG C	TAILWIND 10 KTS	ZERO WIND	HEADWINDS 10 KTS	20 KTS	30 KTS	TEMP DEG C	TAILWIND 10 KTS	ZERO WIND	HEADWINDS 10 KTS	20 KTS	30 KTS
-25	2930	2410	2270	2130	1990	-25	2900	2390	2240	2100	1970
-20	2970	2440	2300	2160	2020	-20	2940	2420	2270	2130	1990
-15	3000	2470	2330	2190	2050	-15	2970	2450	2300	2160	2020
-10	3040	2510	2360	2210	2080	-10	3010	2480	2330	2190	2050
-5	3070	2540	2390	2240	2110	-5	3040	2510	2360	2220	2080
0	3110	2570	2420	2270	2140	0	3070	2540	2390	2250	2110
5	3150	2610	2450	2310	2170	5	3120	2580	2430	2280	2140
10	3190	2640	2490	2340	2200	10	3160	2610	2460	2320	2180
15	3230	2680	2530	2380	2230	15	3200	2650	2500	2350	2200
20	3280	2720	2560	2410	2270	20	3240	2690	2530	2380	2240
25	3320	2760	2600	2440	2300	25	3280	2720	2570	2410	2270
30	3360	2790	2630	2480	2330	30	3320	2760	2600	2450	2300
35	3400	2830	2670	2510	2360	35	3360	2800	2630	2480	2340
40	3440	2860	2700	2550	2400	40	3410	2830	2670	2520	2370
45	3490	2900	2740	2580	2430	45	3440	2870	2700	2550	2400
50	3530	2940	2770	2610	2460	50	3490	2900	2740	2580	2430
54	3560	2970	2800	2640	2490	54	3520	2930	2770	2610	2460

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TO OBTAIN LANDING DISTANCE WITH NEGATIVE (DOWNHILL) RUNWAY GRADIENT, REFER TO LANDING PROCEDURES

* FOR USE IN AN EMERGENCY WHICH REQUIRES LANDING IN EXCESS OF THE MAXIMUM DESIGN LANDING WEIGHT OF 12750 POUNDS

Figure 4-50* (Sheet 1 of 30)

V_{MCA} :	Minimum airspeed in the air in the takeoff configuration at which directional control can be maintained, when one engine is suddenly made inoperative. V_{MCA} is a function of engine thrust which varies with altitude and temperature.
V_{MCG} :	Minimum airspeed on the ground in the takeoff configuration at which directional control can be maintained, when one engine is suddenly made inoperative, using only aerodynamic controls. V_{MCG} is a function of engine thrust which varies with altitude and temperature. $V_{MCG} = 88$ KIAS.
V_{MCL} :	Minimum airspeed in the air, in the landing configuration, at which directional control can be maintained, when one engine is suddenly made inoperative. V_{MCL} is a function of engine thrust which varies with altitude and temperature.
V_{MO}/M_{MO} :	Maximum Operating Limit Speed is the calibrated speed limit that may not be deliberately exceeded in normal flight operations.
V_R :	The rotation speed is the speed at which rotation is initiated during takeoff to attain V_2 climb speed at or before a height of 35 feet above runway surface.
V_{REF} :	The airspeed equal to the landing at the 50-foot point with flaps in landing position and landing gear extended ($1.23 V_{SRO}$).
V_{SB} :	Maximum operating speed with the speed brakes in the extended position.
V_{SRO} :	The stalling speed or minimum steady flight speed in the landing configuration.
V_{SR1} :	The stalling speed or minimum steady flight speed obtained in a specified configuration.
V_X :	Best Angle-of-Climb Speed. The airspeed that delivers the greatest gain of altitude in the shortest possible horizontal distance.