1. GENERAL.

Hydraulic power is used to operate the following aircraft systems:

- Flaps.
- Landing gear.
- Brakes.
- Nose wheel steering.
- Propeller brake.

An electrically driven pump normally supplies hydraulic pressure to four accumulators. For emergency and certain maintenance uses, a hand pump is installed.

The electrical pump is controlled by a single switch in the cockpit.

The four hydraulic accumulators provide pressure as follows:

- One main accumulator supplying flaps, landing gear, nose wheel steering and propeller brake.
- One emergency accumulator supplying landing gear emergency uplock release.
- Two accumulators for the brake system, one for the outboard brakes and one for the inboard brakes.

All hydraulic system components are located in the nose area on each side of nose wheel well (left and right hydraulic compartment).

Hydraulic fluid used in the system is mineral based MIL-H-5606. The fluid is red for identification and easy detection of leaks.

2. MAIN COMPONENTS AND SUBSYSTEMS. (Fig. 1.)

2. 1. Hydraulic reservoirs.

Main reservoir.

The main reservoir has a capacity of 310 cubic inches (approx. 5 liters). The reservoir is pressurized from the emergency accumulator circuit to provide a positive pressure supply to the hydraulic pump. In case of loss of pressurization, a spring will ensure a positive fluid supply.

Hand pump reservoir.

The hand pump reservoir supplies hydraulic fluid to the hand pump exclusively. It has a capacity of 150 cubic inches (2.5 liters) and is filled through a gravity fill port. Overflow from the main reservoir relief valve and bleed valve is also directed into this reservoir.

2. 2. Hydraulic pumps.

Electrical pump.

The electrically powered pump provides hydraulic pressure for all normal operation.

The pump is automatically shut off to prevent operation when there is no demand. The electric motor for the pump is controlled by a pressure switch in the main accumulator hydraulic circuit and by landing gear operation.

The pump will operate automatically when:

- The main accumulator hydraulic pressure drops below 2100 psi and until the pressure reaches 2900 psi.
- Landing gear is selected DOWN and until left main gear is locked down.
- Landing gear is selected UP and until both main gears are locked up.
- R PROP BRK switch is selected ON.

If required, automatic pump control may be overridden by using the override (OVRD) position of the HYD PUMP switch enabling the pump to run continuously. In OVRD the pump delivers hydraulic fluid with a pressure of 3000 psi.

Hand Pump.

Should the electric pump fail Main, Outboard and Inboard brake accumulator may be pressurized from a hand pump to the right of the center pedestal. The hand pump is operated by a detachable handle stowed on the right, rear cockpit wall.

2. 3. Hand pump selector.

As the hand pump does not have the capacity to simultaneously operate all systems, a selector valve is installed. The valve allows pressure to be directed to the following accumulators, one at a time:

- Main accumulator.
- Outboard brake accumulator.
- Inboard brake accumulator.

To extend/retract the flaps, the flaps handle must first be set to desired setting before using the hand pump to extend/retract the flaps to selected setting.

To extend the landing gear, the handle must first be selected down before using the handpump to extend the gear.

2. 4. Hydraulic accumulators.

The four identical accumulators are of piston-type and are precharged with nitrogen to 1650 psi. Each accumulator has a capacity of 22 cubic inches (approx 0.35 liters) hydraulic fluid at 2900 psi pressure.

It is important to notice that, in case of a hydraulic pump failure, when pressure is consumed and pressure in an accumulator is reaching 1650 psi (precharged pressure), the hydraulic pressure will rapidly drop to zero since the piston has reached it's end position and thereby seizing to create pressure into the system.

2. 5. Warning system.

An amber caution light is provided on the Central Warning Panel. The light will come on together with the MASTER CAUTION light and single chime in case of low pressure in main or emergency accumulator or high fluid temperature in the main reservoir.

It shall be noted that low pressure in one or both brake accumulators always results in low pressure in the main accumulator. This means in practice that low pressure in any of the four accumulators will trigger the warning system.

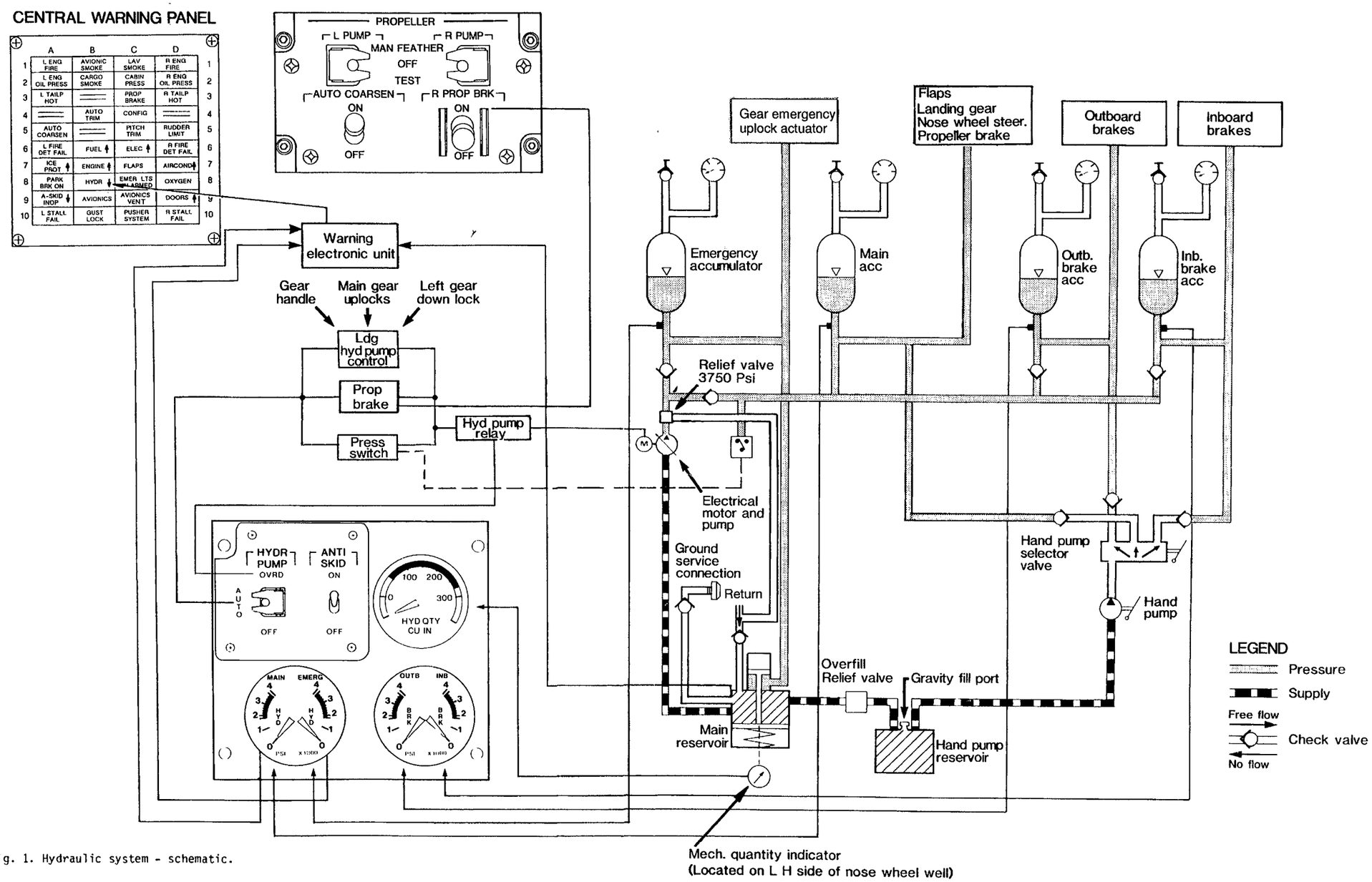
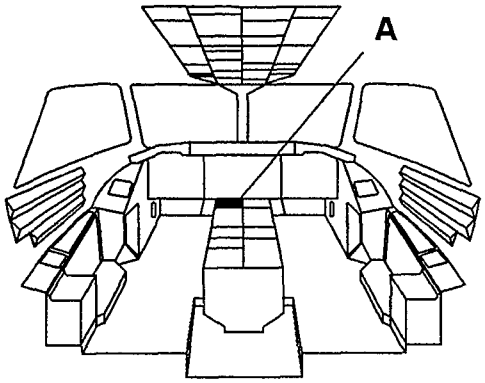


Fig. 1. Hydraulic system - schematic.

A11221

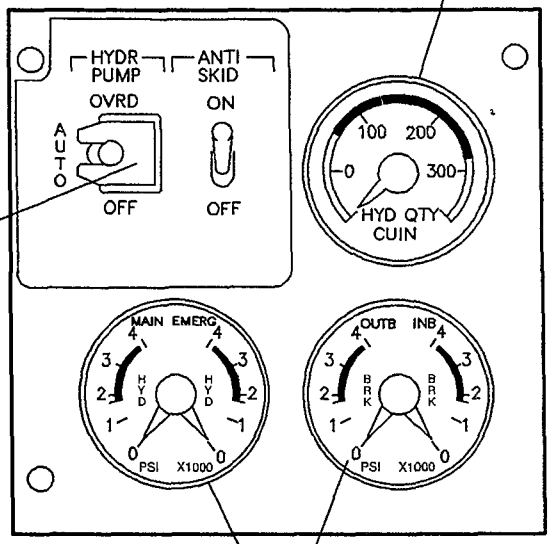
FIG. 1. Hydraulic system – schematic.

3. CONTROLS AND INDICATORS.



HYD QTY indicator.
Indicates fluid quantity in the main reservoir.

A HYDRAULIC PANEL



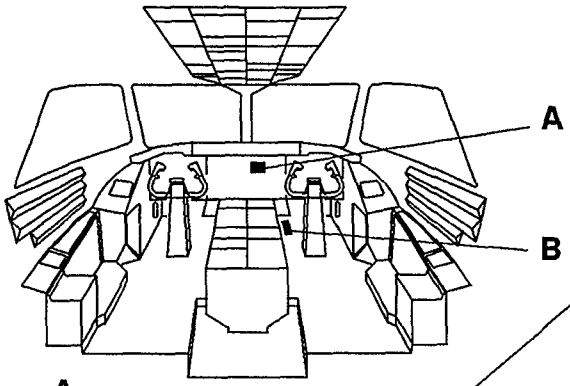
HYDR PUMP switch

- **OVRD (override)**
  The pump runs continuously.
- **AUTO**
  The pump will operate during the following conditions:
  - If main hydraulic pressure falls below 2100 psi and until pressure reaches 2900 psi.
  - During landing gear extension or retraction, irrespective of pressure.
  - When R PROP BRK switch is selected ON.
- **OFF**
  No electrical power to pump.

Hydraulic pressure indicators.
Indicates hydraulic pressure in the main system, emergency accumulator and the two brake accumulators respectively.

A11210

FIG. 2. Hydraulic system controls and indicators.



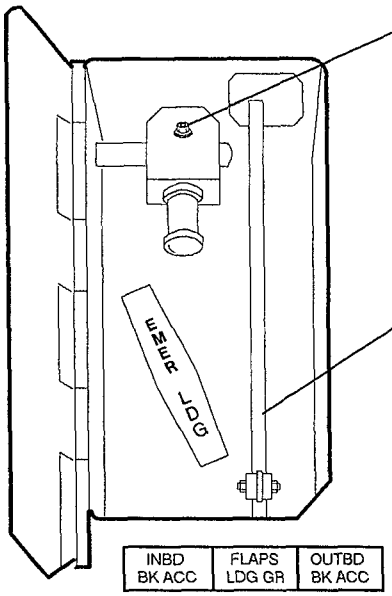
A CENTRAL WARNING PANEL

6	L FIRE DET FAIL	FUEL ↑	ELEC ↑	R FIRE DET FAIL	6
7	ICE PROT ↑	ENGINE ↑	FLAPS	AIR COND ↑	7
8	PARK BRK ON	HYDR ↓	EMER LTS UNARMED	OXYGEN	8
9	A-SKID INOP ↓	AVIONICS	AVIONICS VENT	DOORS ↑	9
10	L STALL FAIL	GUST LOCK	PUSHER SYSTEM	R STALL FAIL	10

HYDR caution light (amber)

Comes on to indicate low hydraulic pressure in any of the hydraulic accumulators or high temperature of the fluid in the main reservoir.

B HAND PUMP CONTROLS



A11209

Hand pump.

Provides hydraulic pressure to operate flaps, brakes and landing gear. Operated by a detachable handle, stowed on the right rear cockpit wall.

Hand pump selector.

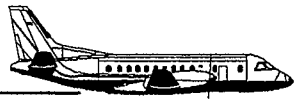
Directs hand pump pressure to the systems served by the hand pump.

- INBD BK ACC
  The inboard brake accumulator is pressurized by the hand pump.
- FLAPS LDG GR
  The main accumulator is pressurized by the hand pump.
  - ° To operate the flaps, the flap handle must be set to desired flap setting before using the hand pump.
  - ° To extend the landing gear the gear selector must be in down position.
- OUTBD BK ACC
  The outboard brake accumulator is pressurized by the hand pump.

FIG. 3. Hand pump controls and hydraulic indication.

4. ELECTRICAL POWER SUPPLY.

Hydraulic pump power	L GEN BUS	No CB, protected by a 200 amp fuse in the L PDU.
Hydr pump control (AUTO)	L MAIN BUS	F-9 PUMP AUTO
Hydr pump control (OVRD)	L ESS BUS	F-8 PUMP OVRD (A/C 160-299)
Hydr pump control (OVRD)	L BAT BUS	F-8 PUMP OVRD (only A/C 300-up Mod No 2414)
Hydr quantity ind	R ESS BUS	M-3 PR IND QTY IND
Hydr press ind, main & inb. brake	R ESS BUS	M-3 PR IND QTY IND
Hydr press ind, emerg & outb. brake	L ESS BUS	F-4 PRESS IND



1. LIMITATIONS.

	Unit	Min	Normal	Max
1. 1. OPERATING LIMITS.				
Pressure.				
– Electrical pump AUTO	psi	2050	2100–2900	2950
– Electrical pump OVRD	psi	–	3000	–
– Low pressure warning (HYDR)	psi	1800	1850	1900
Temperature.				
– High temperature warning (HYDR)				
° Light on	°C	–	116	–
° Light off	°C	–	93	–
Quantity.				
– Main reservoir				
° Capacity	cu. in liters	–	310 5.1	–
° Refill level (system pressurized)	cu. in liters	141 2.3	–	–
– Hand pump reservoir capacity	cu. in liters	–	150 2.5	–
1. 2. HYDRAULIC FLUID SPECIFICATION.				
MIL–H–5606.				

2. NORMAL OPERATION.

CONDITIONS	NORMAL PROCEDURES
2. 1. OPERATION OF HYDRAULIC SYSTEM.	**Before engine start.** 1. HYDR PUMP switch ..... AUTO – Check HYD PUMP switch to be in AUTO and guarded position. NOTE The pump will start when L MAIN BUS is powered. (Ground power ON or generator supplying power). **After engine start.** 2. Hydraulic gauges ..... CHECK – Check pressures and quantity to be within green arc. **During approach.** 3. Hydraulic pressure ..... CHECK – Check all four hydraulic pressure indicators to be within green arc. NOTE Hydraulic quantity will vary during normal operation of the hydraulic sub-systems. Typical variations from the nominal values are (approx values): – EXT./Retr. of landing gear: +/– 25 cu. in – Ext./Retr. of flaps (landing): +/– 13 cu. in – System depressurized (on ground): + 90 cu. in