Attachment 26

Operational Factors Group Chairman's Factual Report

DCA00MA030

Flap Load Relief System

Flap Load Relief

A flap load relief function is provided which protects the flaps from excessive air loads. This function is operative at the flaps 40 position only. The flap lever does not move, but the flap position indicator displays flap retraction and re-extension.

When the flaps are set at 40 the TE flaps:

- retract to 30 if airspeed exceeds approximately 158 knots.
- re-extend when airspeed is reduced below approximately 152 knots.

Autoslats

At flaps 1, 2 and 5 an autoslat function is available that moves the LE slats to the fully extend position if the aircraft approaches a stall condition.

The autoslat system is designed to enhance aircraft stall characteristics at high angles of attack during takeoff or approach to landing. When TE flaps 1 through 5 are selected, the LE slats are in the extend position. As the aircraft approaches the stall angle, the slats automatically drive to the full extended position, prior to stick shaker activation. The slats return to the extend position when the pitch angle is sufficiently reduced below the stall critical attitude.

Autoslat operation is normally powered by hydraulic system B. An alternate source of power is provided by system A through a power transfer unit (PTU) if a loss of pressure is sensed from the higher volume system B engine driven pump. The PTU provides system A pressure to power a hydraulic motorized pump, pressurizing system B fluid to provide power for the autoslat operation. **(Refer to Chapter 13, Hydraulics, Power Transfer Unit).**

Alternate Extension

In the event that hydraulic system B fails, an alternate method of extending the LE devices, and extending and retracting the TE flaps is provided.

The TE flaps can be operated electrically through the use of two alternate flap switches. The guarded alternate flaps master switch closes a flap bypass valve to prevent hydraulic lock of the flap drive unit and arms the alternate flaps position switch. The alternate flaps position switch controls an electric motor that extends or retracts the TE flaps. The switch must be held in the DOWN position until the flaps reach the desired position. No asymmetry protection is provided through the alternate (electrical) flap drive system.

Flap Extension

Extending the flaps at airspeeds approaching flap limiting speed creates undue wear and premature failure of flap tracks and drive mechanisms. Flaps should normally be extended on the following speed schedule.

1. Select flaps 5 at 220 knots.

2. Slow to 190 knots before selecting flaps 15.

3. Slow to 150 knots before selecting flaps 25.

4. Slow to 140 knots or target speed, whichever is higher, before selecting flaps 30 and/or 40.

(-700) The following procedures are to be used for flap extension:

1. Select flaps 5 when decelerating through the flaps up maneuvering speed, displayed on the MASI as "UP."

2. Select flaps 15 when decelerating through the flaps 5 maneuvering speed, displayed on the MASI as "5."

3. Select flaps 25 when decelerating through the flaps 15 maneuvering speed, displayed on the MASI as "15."

(-700) MASI displayed speeds provide approximately 15 to 20 knots above the minimum maneuvering speed for each flap setting. The AUTO position on the speed reference selector takes precedence followed by manual settings. If MASI speeds cannot be displayed revert to the standardized Southwest Airlines flap schedules for aircraft maneuvering.

After flaps are extended, pilots should avoid exceeding the recommended flap maneuvering speed for the selected flap position. Minimizing the rate of descent will allow the aircraft to slow to the new flap maneuver speed more quickly and further reduce loads on the flap mechanism (500 fpm or less is optimum for this purpose). The flaps are normally extended to position 5 before lowering the landing gear.

Normal flap extension (for a flaps 40 landing) is flaps 0 to 5 to 15 to 25 to 30 to 40. Positions 1, 2, and 10 may be used for maneuvering at the pilot's discretion.

Maneuver and Flap Extension Speeds

Flap Pos	Normal Maneuver	Select Flaps
0	220*	1
1	200*	5 (or 2)
2	190*	5
5	190*	10
10	170	15
15	150*/V_{REF}	25
25	140*	30-40

* Add 10 knots above 117,000 pounds gross weight.

Note: Speeds listed in the non-normal/QRH checklists supersedes speeds listed here.

Caution: When moving the flap lever, check that the lever has made a positive seat in the selected detent and cross check the flap gauge to ensure the gauge reflects the correct flap setting.

Landing Flap Selection

It is Southwest Airlines policy to land with flaps 30 where applicable. Flap 40 landings are strongly recommended in situations such as the following:

- ILS approaches at or near minimums
- Non-precision approaches
- Wet or icy runways
- Short runways (less than 6000 feet long)
- Tailwind landings
- Visibility below 3/4 mile or 4000 RVR

Landing performance limits or non-normal aircraft conditions may require the use of less than flaps 30 or 40.