

Excerpts of the Airplane Flight and Maintenance Manuals

NTSB Investigation: ERA21LA322 | N906ER | DA42-L360

FLIGHT CONTROLS - ELEVATOR

1. General

The DA42 L360 aircraft has the usual elevator control system. An elevator attaches to the horizontal stabilizer gives longitudinal control of the airplane. Two control sticks operate the elevator. The DA42 L360 aircraft has a mechanically operated elevator trim system.

2. Description

The basic elevator control system has not changed from the original DA 42 with the diesel engines and information contained in AMM # 7.02.01 still applies except for the following:

The DA42 L360 is equipped with an electrically operated actuator that limits the elevator up travel to 13 degrees as soon as the power setting of both engines exceeds 14.5 inHg at sea level with the flaps up. This is 2.5 degrees less than the 15.5 degrees full deflection. When the power of both engines is reduced below 14.5 inHg, or if the Flaps are set to APP or LDG, the elevator stop will disengage and full elevator deflection is regained. The elevator stop will not engage if the Flaps are in the APP or LDG position. The linear actuator acts as a movable stop and is controlled by position switches, on the throttle and flap switch.

An amber STICK LIMIT caution is provided on the PFD to inform the pilot in case a malfunction is present. The STICK LIMIT caution appears when the variable elevator stop should be in place and is actually not activated (power ON condition) or should be retracted and actually limits the elevator travel (power OFF condition). The annunciation circuitry is not operative when one power lever is positioned Above 14.5 inHg power setting, while the other is below or in idle position (engine failure or training) or when the flaps are not in the UP position. Figure 1 shows the stick limiter.

3. Operation

If you move the control stick forward:

- The torque tube assembly turns
- The lever below the torque tube assembly pushes the short push-rod aft
- The short push-rod pushes the long push-rod aft
- The long push-rod pushes the aft bellcrank rearward
- The bellcrank pushes the vertical push-rod up
- The vertical push-rod moves the front of the elevator horn upwards
- The elevator moves down.

If you move the control stick aft:

- The torque tube assembly turns
- The short and long push-rods move forward
- The bellcrank pulls the vertical push-rod downwards
- The elevator moves up.

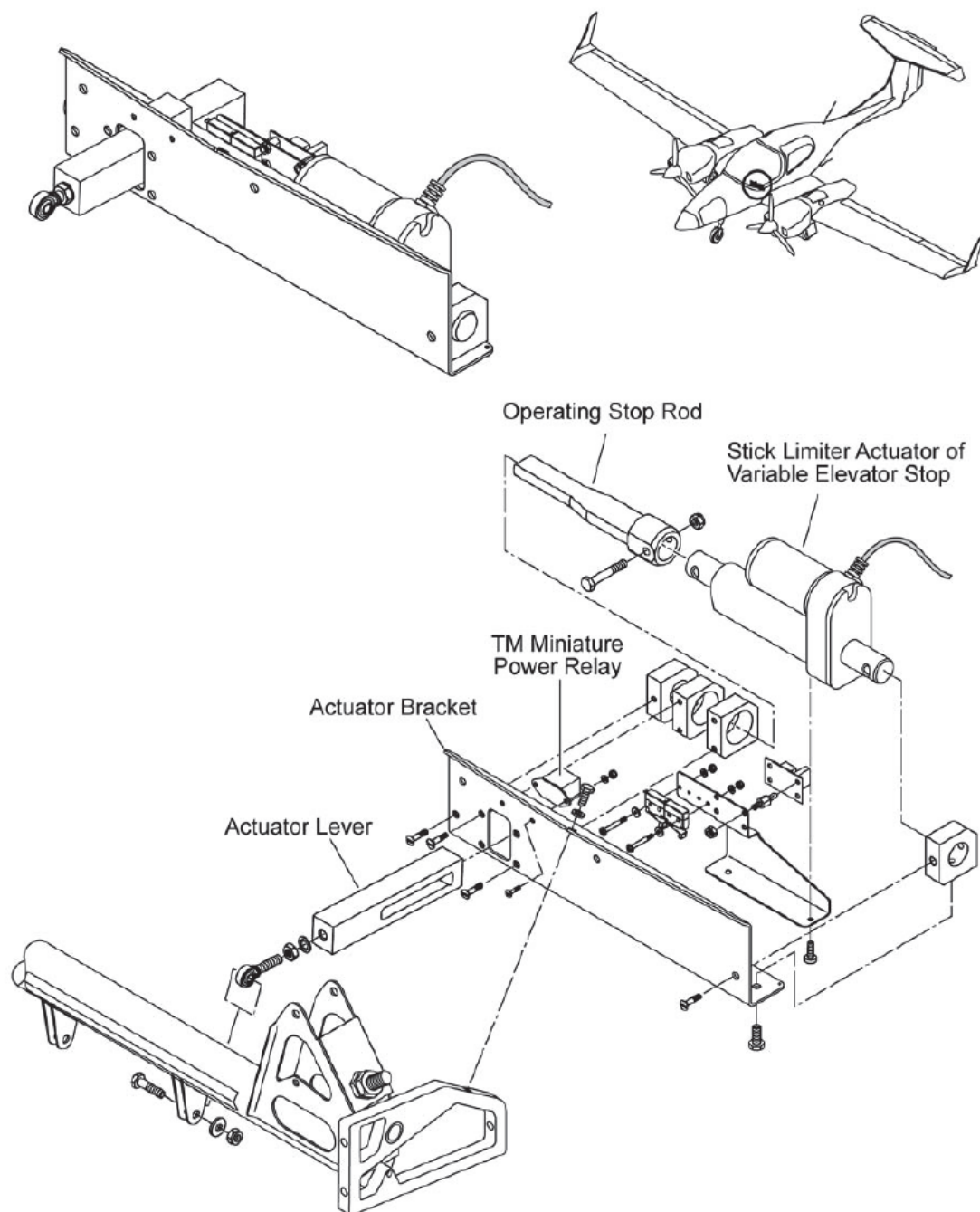


Figure 1 - Stick Limiter

3.9.6 EMERGENCY DESCENT

- (a) FLAPS UP
- (b) LANDING GEAR DOWN
- (c) THROTTLE levers IDLE
- (d) Airspeed as required

WARNING

MAX. STRUCTURAL CRUISING SPEED: $V_{NO} = 155$ KIAS.

NEVER EXCEED SPEED IN SMOOTH AIR: $V_{NE} = 194$ KIAS.

WARNING

THIS EMERGENCY DESCENT PROCEDURE MAY IMPOSE A RISK OF "SHOCK COOLING" THAT COULD CAUSE DAMAGE TO THE ENGINES.

NOTE

The Propeller levers might be set full FWD to increase drag as long as the RPM limits are not exceeded.

END OF CHECKLIST

2.3 AIRSPEED INDICATOR MARKINGS

Marking	KIAS	Significance
White band	57 - 111 KIAS	Operating range with flaps fully extended.
Green band	64 - 155 KIAS	Normal operating range.
Yellow band	155 - 194 KIAS	'Caution' range - "Only in smooth air".
Blue band	90 KIAS	Best rate of climb speed, single engine.
Red band	65 KIAS	Minimum control speed, single engine.
Red band	194 KIAS	Maximum speed for all operations V_{NE} .

4A.6.24 STALLS

NOTE

Stall warning for the DA42 L360 is provided by an audible tone. Stall warning is activated by an angle of attack sensor on the leading edge of the left wing.

CAUTION

STALL WARNING MAY NOT BE PRESENT DURING POWER ON STALLS WITH A FORWARD CENTRE OF GRAVITY.

NOTE

Stall for the DA 42L is defined by the airplane reaching aft elevator stop or a mild rolling without a nose down pitch break. When either of these cues occurs the pilot should recover the aircraft from the stall.

To recover from the stall, standard techniques should be followed: reduce angle of attack (and pitch angle) by moving stick forward and apply power to increase airspeed.

When executing power on stalls, moving throttles forward and bringing the pitch attitude to approximate level flight should suffice as a recovery technique, while at the same time minimizing altitude lost.

2.10 MANEUVERING LOAD FACTORS**NOTE**

The tables below show aircraft structural limitations.

CAUTION

AVOID EXTENDED NEGATIVE G-LOADS DURATION.
EXTENDED NEGATIVE G-LOADS CAN CAUSE
PROPELLER CONTROL PROBLEMS AND ENGINE
SURGING.

	at V_A	at V_{NE}	with flaps in APP or LDG position
Positive	3.8	3.8	2.0
Negative	-1.52	0	

WARNING

EXCEEDING THE MAXIMUM LOAD FACTORS WILL
LEAD TO AN OVERSTRESSING OF THE AIRPLANE.

5.3.5 STALLING SPEEDS**STALL SPEEDS FOR IDLE THRUST (KIAS)**

FLAPS LAND, GEAR DOWN					
Weight	Bank Angle				
	0 Degrees	15 Degrees	30 Degrees	45 Degrees	60 Degrees
3935	57	58	61	68	81
3748	57	58	61	68	81
3417	56	57	60	67	79
3300	55	56	59	65	78
3200	54	55	58	64	76
3100	53	54	57	63	75
3000	52	53	56	62	74
FLAPS APPROACH, GEAR DOWN					
Weight	Bank Angle				
	0 Degrees	15 Degrees	30 Degrees	45 Degrees	60 Degrees
3935	61	62	66	73	86
3748	61	62	66	73	86
3417	59	60	63	70	83
3300	58	59	62	69	82
3200	57	58	61	68	80
3100	56	57	60	67	79
3000	55	56	59	65	78
FLAPS APPROACH, GEAR UP					
Weight	Bank Angle				
	0 Degrees	15 Degrees	30 Degrees	45 Degrees	60 Degrees
3935	64	65	69	76	91
3748	64	65	69	76	91
3417	62	63	67	74	88
3300	61	62	66	73	86
3200	60	61	64	71	85
3100	59	60	63	70	83
3000	58	59	62	69	82