S/N: 2105, 2128-2129, 2261, 2387, 2447, 2606, 2673, 2835, 2946, 3150, 3209, 3242, 3277, 3339, 3357, 3390, 3413, 3423, 3457, 3462, 3467, 3477, 3532, 3552, 3692, 3900, 3916-3917, 4043, 4109, 4137, 4267, 4301, 4338, 4345, 4350, 4386, 4512, 4536, 4565, 4576, 4611, 4629, 4647, 4767, 7204, 7491, 7737, 7811

General description - Pitch channel and roll channel TRIM actuator SFIM 85T31 Automatic Pilot

A. Purpose

The pitch and roll channels each have a TRIM actuator parallel-mounted on its own flight control.

These actuators create an anchoring point for the flight controls and support a series mounted control actuator.

This system allows artificial feel and positions the stick.

Each TRIM actuator on its flight control makes it possible:

- to establish an anchoring point for this flight control to be used as support for a series mounted A.P. control actuator.
- for the human pilot to move the cyclic pitch stick against the artificial loads (control wheel steering) with his own muscular force and to save the position of the stick and the altitude.
- for human pilot to move the stick by releasing the artificial loads with loss of the stick and altitude position.
- to automatically move the pilot cyclic stick during A.P. periods for a long-term altitude hold.
- to move the pilot cyclic stick at a predetermined speed by action on an operating button (TRIM function) with or without automatic pilot.

B. Description

Figure 1

The TRIM actuator is in the form of a parallelepiped-shaped unit.

- a splined output shaft (2) is connected to the flight control by means of a lever,
- a harness ending with an electronic connector (1). (DETAIL A).

Internal composition:

- a fuse (11),
- two jaws (9) which retain a pre stressed artificial load spring (10),
- a load detection electric micro switch (3),
- a flyweight damper (8),
- a reduction gear train (7),
- a magnetic clutch (6),
- a worm screw (5),
- an electric motor (4),
- a splined output shaft (2).

A mechanical fuse system is located on the output shaft which disconnects the lever when the load goes above a certain threshold.

C. Reference anchoring device

1. Mechanical device.

The spring is prestressed between two jaws (9) so as to fully transmit the actuator movement towards the control linkage and grant the stick a certain rigidity.

One jaw (9) is integral with the output shaft, the other jaw (9) is integral with the reduction gear (7), the magnetic clutch, the worm screw (5) and the electric motor (4).

It anchors the system when in stop position. The magnetic clutch interlaid between the two reduction gear stages is used to suppress this anchoring (suppression of the artificial feel loads).

A flyweight damper (8) is positioned upstream of the spring to prevent any jerks which may relieve the prestressed spring when the transmission is disengaged.

2. Electric device

The relative movement of the two jaws is detected by the micro switch:

- if prestressing is not exceeded the switch is closed between D and E.
- if the prestressing is exceeded, the switch is closed in D and C (DETAIL C).

D. Operating Principle

1. Control wheel steering.

Motor shutdown, the flight control is anchored.

The pilot must apply a certain force to compress the prestressed spring. Beyond a certain threshold the jaw movement is detected by the micro switch, in this case the TRIM action is inhibited. Whenever the load ceases, the spring returns the jaw and the stick to their initial positions.

2. Load release

From the stick or from a push button located on the control panel, the pilot may release the artificial load.

Exciting the magnetic clutch only releases the cinematic from the anchor point created by the electric motor and the worm screw.

The prestress spring returns the jaw integral with the reduction gear to the prestressing position. The flyweight damper allows this operation to be performed without jerks.

Whenever, the pilot would like to change his flight references he can do so (from the stick):

- release the artificial loads and

- excite the magnetic clutch to free all the moving elements from the anchor point created by the motor.

The spring maintains the two jaws in the prestressing position so as to transmit the stick movement to the clutch.

Whenever the artificial load disengagement button is released, the stick and the actuator find a new anchoring point.

3. **Isolating an actuator**

The pilot has two push buttons on the control panel which isolate either the pitch TRIM actuator or the roll TRIM actuator.

Activating the push button cuts off power supply of the corresponding channel on the TRIM control electronic unit.

The associated TRIM actuator keeps its prestressed load but the motor control is inhibited.

4. **Automatic movement of the cyclic stick**

The AP computer delivers a stabilisation signal. This stabilisation signal is switched through a minimum threshold detection assembly to the TRIM control board.

The polarity of the signal defines the motor rotation direction. The rotation speed depends on the control signal value.

5. **Moving the cyclic stick by action on the four-way switch**

Activating the four-way switch slowly modifies the altitude reference depending on the pressure direction.

6. **Specifications**

Anchored if the clutch electromagnet is not powered.

Full travel of the output shaft between the stops: 80° ± 2°.

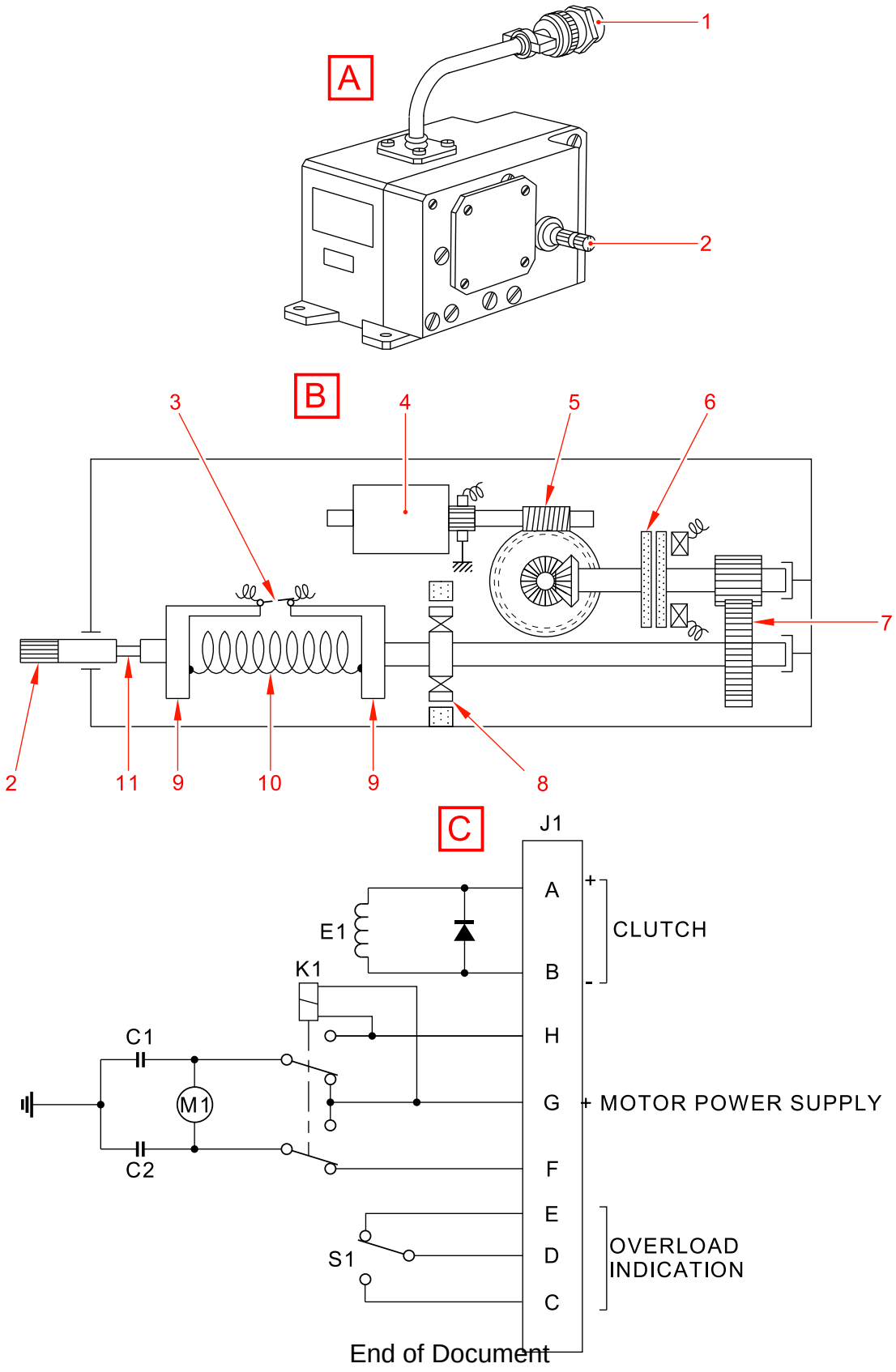
Variable output shaft rotation speed depending on the motor power supply voltage.

. for 27 V : 3°/s ± 1%

. for 18 V : 2°/s ± 1%

Stop precision: less than 0.3°.

Figure 1: General description - Pitch channel and roll channel TRIM actuator



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