

2.1. FLIGHT CONTROLS

PRIMARY CONTROLS

The conventional primary flight controls are operated by dual control wheels and pedals. The control wheels operate the ailerons and the elevators. The adjustable pedals operate the rudder and the nose steering. The toe brakes, which are an integral part of the pedals, operate the wheel brakes.

The pilot's and copilot's rudder pedals are individually adjustable through the RUDDER PEDAL ADJ control handles on both lower sides of the instrument panel close to the cockpit walls. Pulling out and holding the handle the springloaded pedals adjusting mechanism unlocks allowing to readjust the pedals only by pushing the pedals to the desired position. At this point pushing in the handle the rudder pedal adjusting mechanism locks again.

The control surfaces are mechanically connected to the pilot controls through systems of cables, pulleys, push-pull rods and bellcranks.

An up-down spring mechanism, linked to the stabilizer, is installed in the longitudinal control system to provide a suitable pilot stick force through the complete center of gravity range.

SECONDARY CONTROLS

Secondary control is provided by the aileron and rudder trim tabs for roll and yaw, and by the all movable horizontal stabilizer for pitch attitude. All trimming surfaces are electrically operated and controlled.

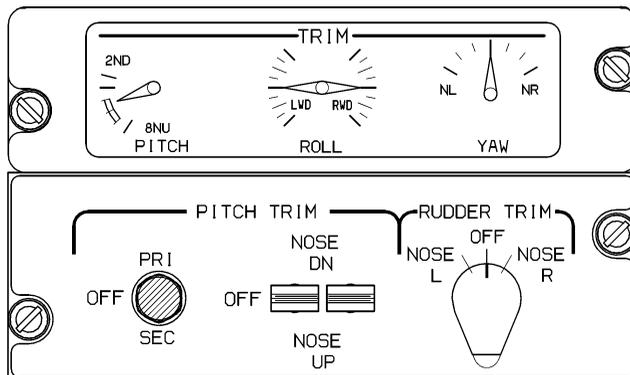


Figure 2.1-1. Trim Indicator and Trim Control Panels

DESCRIPTION AND OPERATION

FLIGHT CONTROLS

ROLL TRIM SYSTEM

The roll trim is accomplished by positioning the aileron trim tab on the inboard trailing edge of the right aileron through actuation of the roll trim actuator. The roll trim system operates on the left single feed bus through the 3-amp ROLL TRIM circuit breaker on the pilot's circuit breaker panel.

The aileron trim is controlled through the pilot's and copilot's Control Wheel Trim Switches (CWTS). Each control wheel trim switch is a dual-function (trim and trim arming) switch which controls roll trim and primary pitch trim. One switch is located on the outboard horn of each control wheel. Each switch has four positions: LWD, RWD, NOSE UP and NOSE DN. The arming button on top of each switch must be depressed for trim motion to occur. Actuation of either control wheel trim switch to LWD or RWD will signal the aileron trim tab actuator to move the tab as required to lower the appropriate wing.

Actuation of the pilot's switch will override actuation of the copilot's switch.

Aileron trim tab position indication is provided by the ROLL indicator located in the TRIM indicator panel in the center pedestal. Two semi-circular scales and a pointer present the trim tab position in terms of LWD (left wing down) and RWD (right wing down). The scales markings represent increments of trim tab travel. The indicator operates on the right single feed bus through the 3-amp TRIM POSN circuit breaker on the copilot's circuit breaker panel.

YAW TRIM SYSTEM

The yaw trim is accomplished by positioning the rudder trim tab on the lower trailing edge of the rudder through actuation of the yaw trim actuator. The yaw trim system operates on the 28 VDC left single feed bus through the 3-amp YAW TRIM circuit breaker on the pilot's circuit breaker panel.

The yaw trim is pilot-controlled through the RUDDER TRIM switch located on the pedestal trim control panel. The switch has three positions: NOSE LEFT, OFF and NOSE RIGHT. The switch knob is split and both halves must be rotated simultaneously to initiate yaw trim motion. When the switch is released, both halves return to the center OFF position. Actuation of the rudder trim switch to NOSE LEFT or NOSE RIGHT will signal the yaw trim actuator to move the rudder trim tab in the appropriate direction.

Rudder trim tab position indication is provided by the YAW indicator located in the TRIM indicator panel in the center pedestal. A semi-circular scale and pointer indicates the direction (L or R) of yaw trim. The scale markings represent increments of rudder trim tab travel. The indicator operates on the right single feed bus through the 3-amp TRIM POSN circuit breaker on the copilot's circuit breaker panel.

PITCH TRIM SYSTEM

Pitch trim is accomplished by repositioning the horizontal stabilizer to the desired trim setting through actuation of the horizontal stabilizer pitch trim actuator. The three-motor, screw-jack type actuator has a primary and a secondary mode of operation.

Primary pitch trim control circuits operate on the left dual feed bus through the 3-amp PRI PITCH TRIM circuit breaker on the pilot's circuit breaker panel. Secondary pitch trim control circuits operate on the essential bus through the 5-amp SEC PITCH TRIM circuit breaker on the pilot's circuit breaker panel.

When in primary mode: one motor drives the low rate pitch trim changes in the range from 2° ND to 2° degrees NU, the second motor drives the high rate pitch trim changes in the range from 2° NU to 8° degrees NU, and the third motor is operated by the autopilot at the low rate speed.

When in secondary mode the autopilot is disengaged and the manual control only is allowed through the low rate motor in the range from 2° ND to 8° degrees NU.

The primary and secondary pitch trim systems are electrically independent and mode selection is made through PITCH TRIM selector switch located on the pedestal trim control panel. The switch has three positions: PRI, OFF, and SEC. When the switch is set to PRI trim changes are accomplished through the control wheel trim switches (CWTS). When the switch is set to SEC trim changes are accomplished through the pedestal NOSE DN-OFF-NOSE UP split switch. When the switch is set to the OFF position, both pitch trim electrical control circuits are isolated from the airplane electrical system. The autopilot is inoperative with the PITCH TRIM selector switch in the OFF position.

Each control wheel trim switch (CWTS), located on the outboard horn of each control wheel, is a dual-function (trim and trim arming) switch which controls primary pitch trim and roll trim. Each switch has four positions: LWD, RWD, NOSE UP and NOSE DN. The arming button on top of each switch must be depressed for trim motion to occur.

Actuation of either control wheel trim switch to NOSE UP or NOSE DN will signal the primary mode motors in the pitch trim actuator to move the stabilizer in the appropriate direction. Actuation of the pilot's switch will override actuation of the copilot's switch.

Actuation of either switch to any of the four positions when the autopilot is engaged (without pushing the arming button) allows to insert autopilot pitch and roll attitude changes.

DESCRIPTION AND OPERATION

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The NOSE DN - OFF - NOSE UP switch, on the pedestal trim control panel, controls secondary pitch trim. The switch is spring loaded to the center (OFF) position and is split in two parts: only moving both halves together the appropriate movement of the horizontal stabilizer is obtained. With the PITCH TRIM selector in the SEC position, actuation of the switch will drive the third motor of the horizontal stabilizer pitch trim actuator to move the stabilizer in the appropriate direction only at the low rate speed.

When the SEC trim has been selected the autopilot cannot be engaged. With the PITCH TRIM selector in the PRI position, this switch has no effect.

A control wheel Master Switch (MSW) is located beneath the control wheel trim switch on the outboard horn of each control wheel. Each momentary type control wheel Master Switch, when depressed, will inhibit either primary or secondary pitch trim or rudder trim in the event of an actuator runaway. In addition the control wheel Master Switch provides the autopilot disconnection as well as the nose steering release.

A trim-in-motion audio signal system is installed on the primary pitch trim actuator to alert the crew of horizontal stabilizer movement.

Horizontal stabilizer trim position indication is provided by the PITCH indicator located in the trim indicator panel on the pedestal. ND and NU markings indicate the direction of trim travel for airplane nose down and airplane nose up respectively. The indicator operates on the right single feed bus through the 3-amp TRIM POSN circuit breaker on the copilot's circuit breaker panel. The scale markings represent increments of two degrees of the longitudinal trim travel.

2.3. CONTROL LOCKS

The control lock consists of a clamp, a pin and a connecting rod joined together with a chain. The pin and the connecting rod lock the primary flight controls while the clamp fits around the engine control levers in order to avoid starting the engines with the flight control locks installed.

It is important that the locks be installed and removed together to preclude the possibility of an attempt to taxi or fly the airplane with the engine control released and the flight controls locked.

Install the control locks in the following sequence:

1. Connect the pilot control column and the pilot rudder pedals by means of the connecting rod: with the pedals aligned at neutral insert the long pin of the rod through the pedals locking holes then insert the short pin of the rod through the control column locking plate.
2. Insert the pin through the hole provided in the rear side of the pilot control wheel when centered.
3. Position the clamp around the engine control levers.

Remove the locks in the following order: first the connecting rod from the control column and the rudder pedals, then the pin from the control wheel and, as last step, the clamp from the engine control levers.