ARTIFICIAL "Q" FEEL UNITS

- Used in powered flight control systems
- Hydraulic power caused the pilot to lose aerodynamic feel that can be felt in manual control system
- A "Q" feel system simulates the actual control surface loading felt in a manual system, but lost in a powered control system.
- Q FEEL IS USED TO PREVENT THE AIRCREW FROM DAMAGING THE AIRCRAFT BY PULLING EXCESSIVE G FORCES.

ARTIFICIAL Q FEEL

- "Q" feel increase as the aerodynamic forces on the controls increase (airspeed increase).
- Increase the control column centralising forces in proportion to the square of the airspeed.
- Aerodynamic forces conforms to the equation:

$$Q = 1/2\, \rho v^2$$

WHERE ρ (RHO) = AIR DENSITY

WHERE v = AIRFLOW VELOCITY

MACH TRIM OPERATION

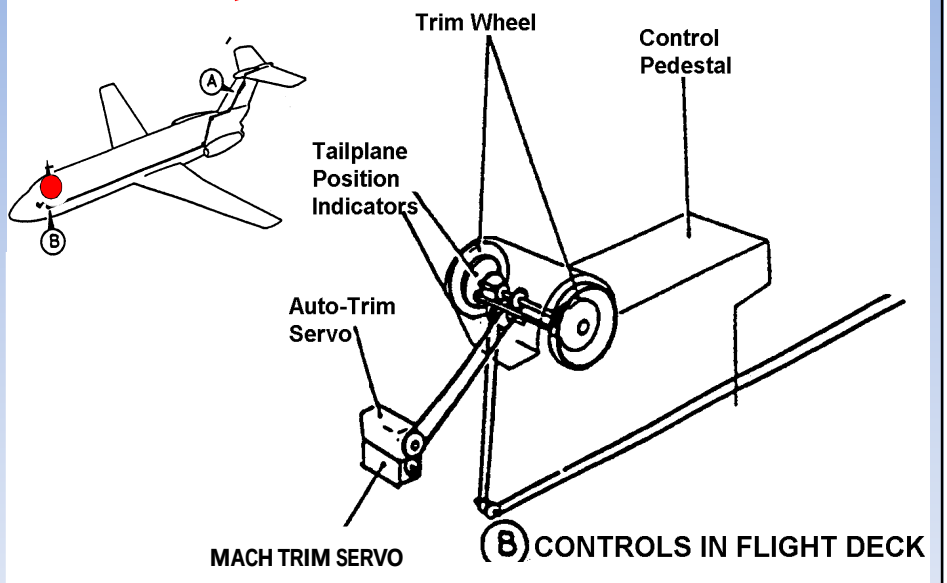
WITH THE AUTOPILOT DISENGAGED THE MACH TRIM ACTUATOR IS CLUTCHED TO THE TRIM CONTROLS AS SOON AS POWER IS SUPPLIED TO THE AIRCRAFT.

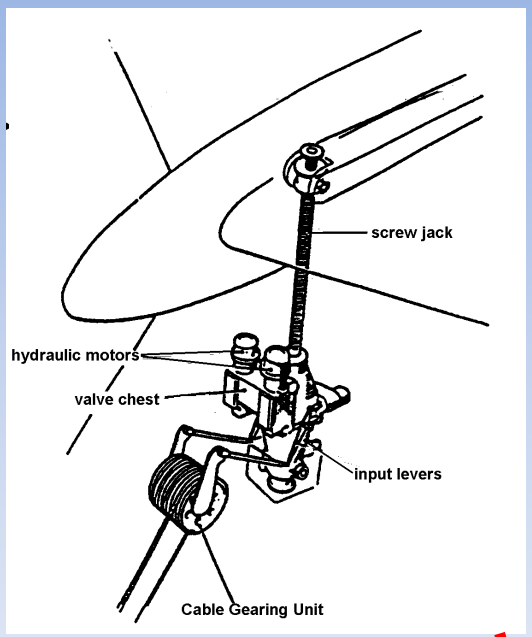
THE SYSTEM BECOMES ACTIVE AS SOON AS THE AIRCRAFT ENTERS THE MACH TRIM SPEED RANGE.

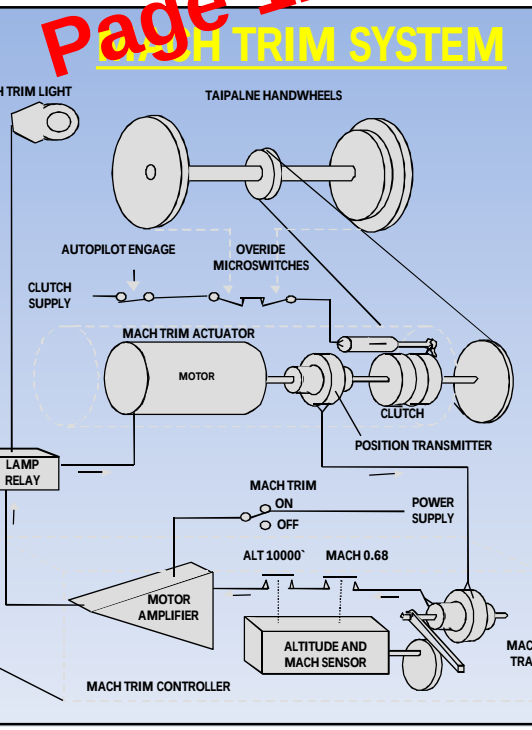
IF THE TRIM WHEELS ARE OPERATED THE MACH TRIM ACTUATOR AUTOMATICALLY DE-CLUTCHES UNTIL THE TAILPLANE INCIDENCE IS SET TO THE DESIRED TRIM SETTING.

IT THEN RE-ENGAGES WHEN THE TRIM WHEELS ARE RELEASED.

MACH TRIM OPERATION







RUDDER LIMITING

- The stepped stop extends into a clawed stop on the rudder.
- The stepped stop is extended by the operation of a q pot which restricts movement of the clawed stop.
- As airspeed increases caused the stepped stop to extend into the claw stop.
- The clawed stop restricts the movement of the input lever.

YAW DAMPER

The yaw damper is used to improved directional stability

To prevent "dutch roll".

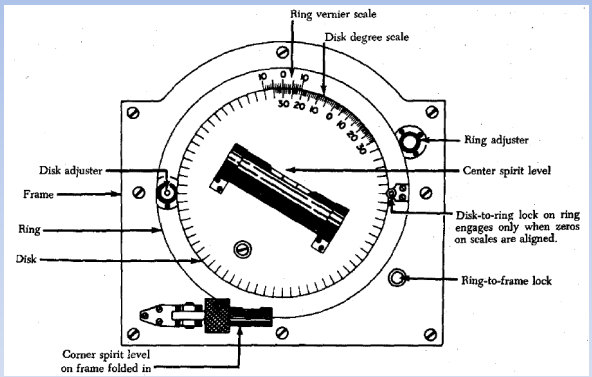
Swept back wing aircraft prone to "dutch roll".

Yaw damper system differ from one aircraft to another.

Yaw damper is coupled to the autopilot system to provide yaw correction before the onset of "dutch roll"

Yaw damper can also limit rudder (dampen) movement to prevent excessive yaw.

Usage of Universal Propeller Protractor



1. Align the zeroes
2. Engage disk to ring lock.
3. Place it on control surface.
4. Unlock the ring until the bubble is centered.
5. Lock the ring.
6. Deflect control surface fully up (or down).
7. Unlock the disk and turn the disk adjuster until the bubble is centered.
8. Lock the disk.
9. Read the deflection on the disk scale against zero mark on the ring.

Aileron Travel Check Video

9.17.6 Checking For Static and Running Friction

- Minimum Breakout Force
- Running Friction
- Check for proper lubrication, seize or worn pulleys, cable binding or chafing, abnormal wear and tear

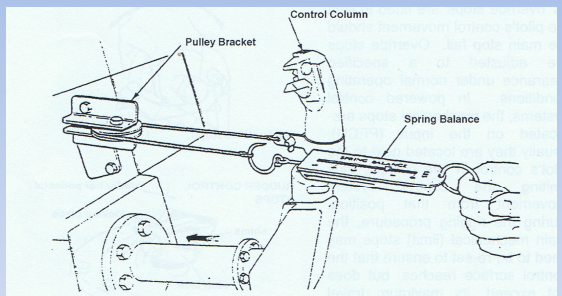
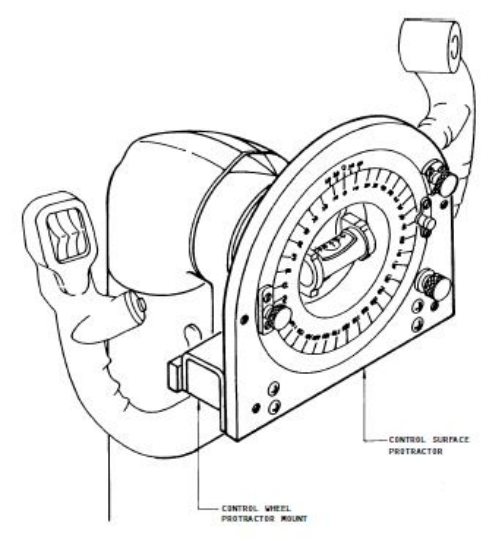
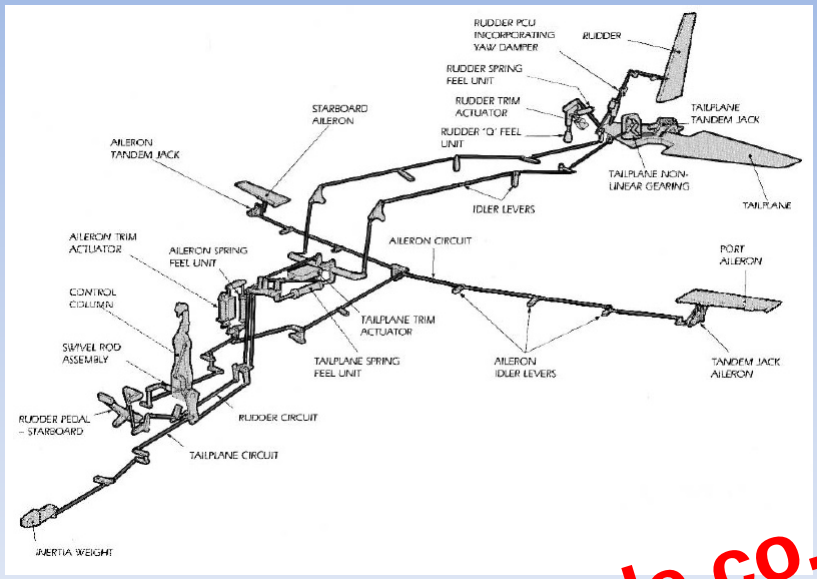


Figure 45 – Static & Running Friction Test

Fitting Protractor to Control Column



Hawk 200 Push-pull Rod Control System



BAE HAWK 200

Example of Rigging

Powered Control System

Stage 1

1. Disconnect all control tubes and set the pilot's control to neutral. Lock the pedals in neutral with tools provided.
2. Connect the forward control tube the the rudder lever, make any necessary adjustments and insert the master rigging pin in the appropriate housings
3. Continue to build up the system in the cockpit, connect various control tubes to their corresponding lever, adjusting as necessary; fit the subsidiary pins in their correct positions, locking the levers in neutral.

Stage 2

1. Set the control lever on the cable tension regulator vertical by inserting a subsidiary pin.
2. Set the artificial units as describe in the AMM.
3. Set the trim actuator to neutral and connect to the artificial feel unit.
4. Fit the control cables to the cable tension regulator, and run the cables around their pulleys.
5. Connect the cables to the tie rods and feed the cables around their pulleys to the rear part of the fuselage.