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VERSION	EFFECTIVE DATE	DESCRIPTION OF REVISION(S)
001	2020.02	Module creation and release.
001.1	2021.10	Corrected description of file types (Submodule 7, pages 3.15-3.16).
001.2	2023.04	Submodule 8 - Added content on Friction and Mechanical lock blind rivet procedures. Inclusion of Measurement Standards for clarification, page iv. Minor appearance and format updates.
002	2024.04	Regulatory update for EASA 2023-989 Compliance.
002.1	2025.01	Page 5.8 - Corrected orientation of Figure 5-10B. Page 12.3 - Corrected orientation of checknuts Figure 12-9.

Module was reorganized based upon the EASA 2023-989 subject criteria. Enhancements included in this version 002.1 are:

7.1 *Fuel Tank Safety* - topic added.
7.1 *Ballistic Parachutes* - topic added.
7.4 *Avionics Test Equipment* - topic moved to Modules 11, 12, and 13 per 2023-989.
7.7 *Connector Pin Wire Support* - topic added.
7.7 *Soldering Electrical Wires* - topic added.
7.7 *HIRF Protection Principles* - topic added.
7.8 *Special Purpose Rivets and Fasteners* - topic added.
7.9 *Visual Inspection of Springs* - topic added.
7.9 *Inspecting Squareness of Springs* - topic added.
7.13 *Cable Tension Regulators* - topic added.
7.13 *Cable Guides and Adjustment* - topic added.
7.14 *Additive Manufacturing* - topic added.
7.15 *Welding* - submodule deleted per 2023-989.
7.18 *Structural Repair Manuals* - topic added.
7.18 *Dye Penetrant Color Contrast* - topic added.
7.19 *HIRF Test Equipment* - topic added.
7.21 *Documentation and Communication* - new submodule added.

decimal form. When very accurate dimensions are necessary, decimal allowances are used. Fractional allowances are sufficient when precise tolerances are not required. Standard tolerances of –0.010 or –1⁄32 may be given in the title block of many drawings, to apply throughout the drawing.

FINISH MARKS

Finish marks are used to indicate the surface that must be machine finished. Such finished surfaces have a better appearance and allow a closer fit with adjoining parts. During the finishing process, the required limits and tolerances must be observed. Do not confuse machined finishes with those of paint, enamel, chromium plating, and similar coating.

SCALE

Some drawings are made the same size as the drawn part; reflecting a scale of 1:1. Other scales may be used. However, when drawings are made on a computer, drawing sizes may be easily increased (zoom in) or decreased (zoom out). Some electronic printers have the same capability. Furthermore, when a 1:1 copy of a print is made, the copy size may differ slightly from that of the original. For accurate information, refer to the dimensions shown on the drawing. [**Figure 5-3H**]

METHODS OF ILLUSTRATION

APPLIED GEOMETRY

Geometry is the branch of mathematics that deals with lines, angles, figures, and certain assumed properties in space. Applied geometry, as used in drawings, makes use of these properties to accurately and correctly represent objects graphically. In the past, draftsmen utilized a variety of instruments with various scales, shapes, and curves to make their drawings. Today, computer software graphics programs show drawings at nearly any scale, shape, and curve imaginable, outdating the need for additional instruments. Several different methods are used to illustrate objects graphically. The most common are orthographic projections, pictorial drawings, diagrams, and flowcharts.

ORTHOGRAPHIC PROJECTION

To show the exact size and shape of all the parts of complex objects, several views are necessary. This is the system used in orthographic projection.

In orthographic projection, there are six possible views of an object, because all objects have six sides—front, top, bottom, rear, right side, and left side. **Figure 5-10A** shows an object placed in a transparent box, hinged at the edges. The projections on the sides of the box are the views as seen looking straight at the object through each side. If the outlines of the object are drawn on each surface of the box, and the box is then opened [**Figure 5-10B**] to lay flat [**Figure 5-10C**], the result is a six-view orthographic projection.

It is seldom necessary to show all six views to portray an object clearly; therefore, only those views necessary to illustrate the required characteristics of the object are drawn. One, two, and three-view drawings are the most common. Regardless of the number of views used, the arrangement is generally as shown in

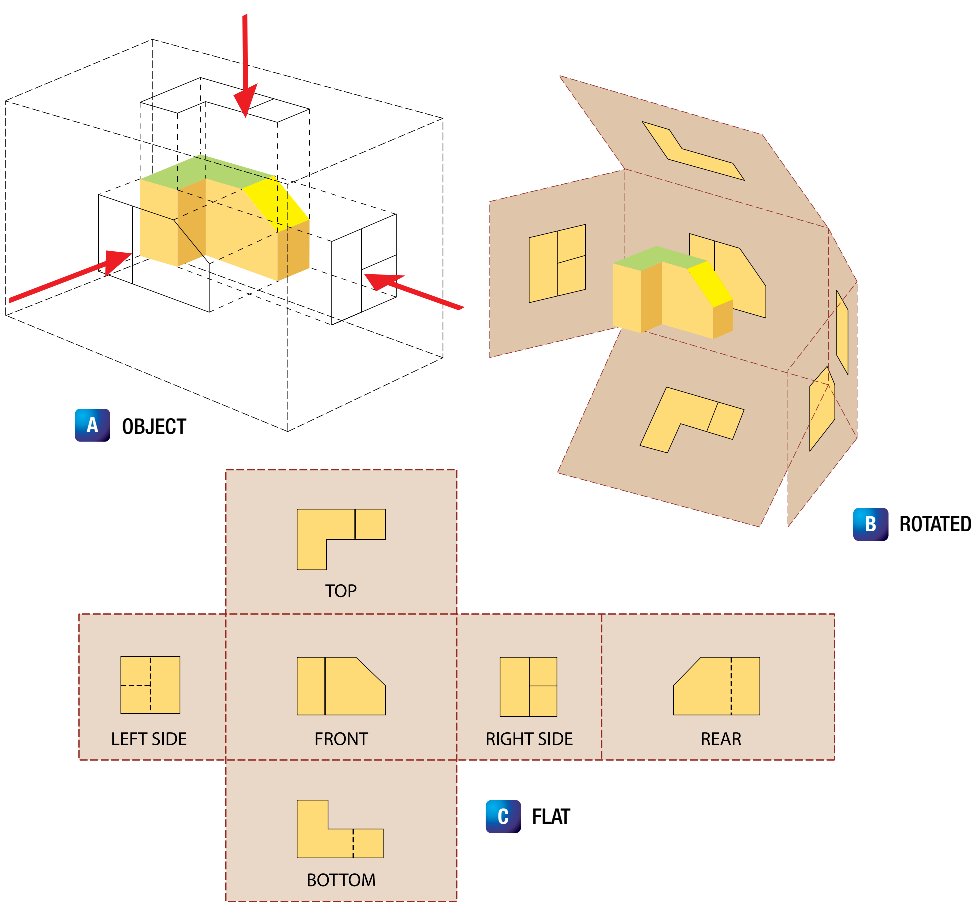

Figure 5-10. Orthographic projection.

deflection can be measured and compared to limits published in the manual. A typical percentage limit of elongation could be 2% when the clean and dry chain is loaded with the correct tension.

Another main issue with this type of installation is cleanliness and lubrication. Follow the manufacturer's recommendation for cleaning and lubricating the chain and sprocket.

INSPECTION OF SCREW JACKS, LEVER DEVICES, AND PUSH-PULL ROD SYSTEMS

JACK SCREWS

A jack screw transmission of power is common on aircraft. It is often used as the drive for lowering and raising flaps and on stabilizer and rudder trim mechanisms. A gear arrangement or gearbox is used to transfer the power to the jack screw.

A ball nut attached to the moving component is rotated which follows the helically ground jack screw until the component is in the selected position. Lubrication and backlash are the two primary maintenance concerns with a jack screw arrangement.

The jackscrew must be cleaned before lubricating or making clearance adjustments. Regular lubrication intervals are specified in maintenance data due to the environmental exposure of many jackscrew installations. Ball nut wear is possible and is also checked. Use of jigs or special measuring tools is common. [**Figure 12-7**]

LEVERS

Levers can be found in numerous places within an aircraft and maintenance of these items can vary, depending on their location and purpose. As a rule, levers will be used to transmit thrust from one medium to another. For example, a push/pull system may drive a lever that operates a service, with an increase or decrease of mechanical advantage or a change of direction. Apart from the bearings of the lever requiring lubrication, (unless they are sealed-for-life bearings), there is little maintenance required, other than physical checks for damage, distortion and cracks. Some commonly visible lever are shown in **Figure 12-8.** The action produced by moving the levers is hidden below the console.

PUSH-PULL ROD SYSTEMS

Push rods are used as links in the flight control system to give push-pull motion. They may be adjusted at one or both ends. **Figure 12-9** shows the parts of a push rod. Notice that it consists of a tube with threaded rod ends. An adjustable antifriction rod end, or rod end clevis, attaches at each end of the tube. The rod end, or clevis, permits attachment of the tube to flight control system parts. The checknut, when tightened, prevents the rod end or clevis from loosening. They may have adjustments at one or both ends.

The rods should be perfectly straight, unless designed to be otherwise. When installed as part of a control system, the assembly should be checked for correct alignment and free movement. It is possible for control rods fitted with bearings to become disconnected because of failure of the peening that retains the ball races in the rod end. This can be avoided by installing the control rods so that the flange of the rod end is interposed between the ball race and the anchored end of the attaching pin or bolt as shown in **Figure 12-10**.

Another alternative is to place a washer, having a larger diameter than the hole in the flange, under the retaining nut on the end of the attaching pin or bolt. This retains the rod on the bolt in the event of a bearing failure.

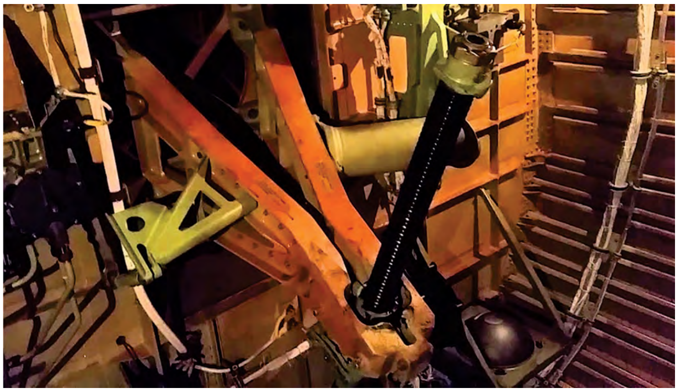

Figure 12-7. A jackscrew control arrangement on a Boeing 737-NG horizontal stabilizer.

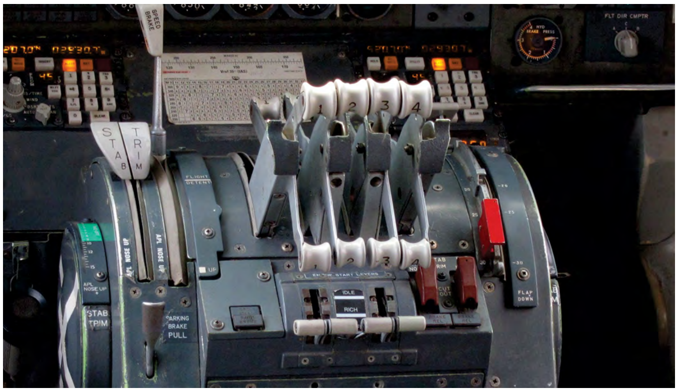

Figure 12-8. Aircraft engine control levers.

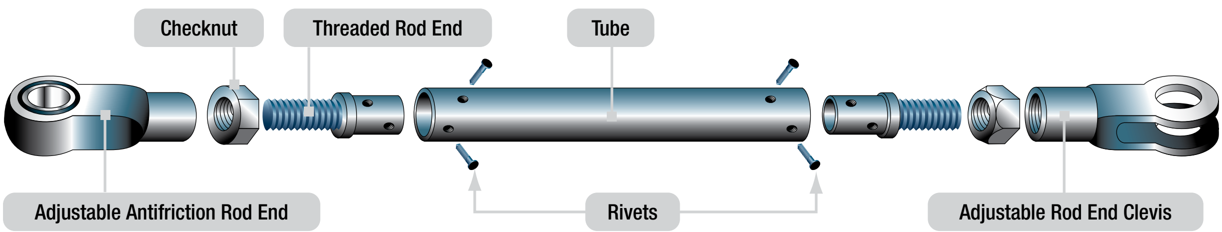

Figure 12-9. Push rod.