SECTION 1

GENERAL DESCRIPTION

TABLE OF CONTENTS

1-1. GENERAL DESCRIPTION. The R182 Series aircraft described in this manual are high-wing, single-engine monoplanes of all-metal, semimonocoque construction. They are equipped with hydraulic retractable tricycle landing gear. The steerable nose gear is an air-hydraulic shock strut and the main gear is a tubular spring steel type. The standard four place seating arrangement consists of two individual front seats, a split-back bench in the rear, and an optional child's seat. A luggage compartment is located aft of the rear seat. These aircraft are powered by an air-cooled, horizontally-opposed, six-cylinder, Lycoming "Blue-Streak", engine, driving an all-metal, constant-speed propeller.

1-2. AIRCRAFT SPECIFICATIONS. Leading particulars of these aircraft, with dimensions based on gross weight, are given in figure 1-1. If these dimensions are to be used in determining size for construction of a hangar, remember such factors as nose gear strut inflation, tire pressure, and load distribution may result in some dimensions, that are considerably different than those given.

1-3. STATIONS. A station diagram is shown in figure 1-2 to assist in locating equipment, when a written description is inadequate or impractical.

1-4. Deleted - not used.

1-5. Deleted - not used.

MAXIMUM WEIGHT		
Ramp	3112 LBS	
Takeoff and Landing	3100 Lbs	
STANDARD EMPTY WEIGHT		
Skylane RG	1782 LBS	
Skylane RG II	1827 LBS	
Turbo Skylane RG	1827 LBS	
Turbo Skylane RG II	1870 LBS	
MAXIMUM USEFUL LOAD		
Skylane RG	1330 LBS	
Skylane RG II	1285 LBS	
Turbo Skylane RG	1285 LBS	
Turbo Skylane RG II	1242 LBS	
FUEL CAPACITY		
Standard Wing		
Total	61 Gal.★	
Usable	56 Gal.★	
Long Range Wing		THRU 1978★
Total	80 Gal.★	
Usable	75 Gal.★	
Total (Wet Wing)	92 Gal.●	
Usable (Wet Wing)	88 Gal.●	1979 & ON●
ENGINE		
Model	O-540 Series Lycoming	
Oil Capacity		
Sump	8 Qts.	
With Filter	9 Qts.	
PROPELLER (Constant Speed)	82" McCauley	
MAIN LANDING GEAR		
Tire Size	15x6.00-6 (6-Ply Rated)	
Pressure	68 Psig	
NOSE GEAR		
Tire Size	5.00-5 (6-Ply Rated)	
Pressure	50 PSI	
Strut Pressure (Extended)	55 PSI	
WHEEL ALIGNMENT (At Empty Weight)		
Camber	6° ±1°	
Toe-in	0.0" to + .06" - .00"	
AILERON TRAVEL		
Up	20° ±2°	
Down	15° ±2°	
WING FLAP TRAVEL	THRU 1981	
	0° ±0° to 40° +1° -2°	
	1982 & ON	Down
	0° ±0° to 38° +0° -1°	
		Down

Figure 1-1. Specifications (Sheet 1 of 2)

RUDDER TRAVEL (Parallel to Water Line)		
Right	24° ± 1°	THRU 1980
Left	24° ± 1°	
Right	24° +0°, -1°	1981 & ON
Left	24° +0°, -1°	
RUDDER TRAVEL (Perpendicular to Hinge Line)		
Right	27° 13' ± 1°	THRU 1980
Left	27° 13' ± 1°	
Right	27° 13' +0°, -1°	1981 & ON
Left	27° 13' +0°, -1	
ELEVATOR TRAVEL (Relative to Stabilizer)		
Up	28° ± 1°	THRU 1980
Down	17° ± 1°	
Down	21° ± 1°	1981 & ON
ELEVATOR TRIM TAB TRAVEL		
Up	25° ± 2°	
Up	24° ± 2°	THRU 1980
Down	15° ± 1°	1981 & ON
PRINCIPAL DIMENSIONS		
Wing Span	432.00"★	
Tail Span	140.00"	
Length	341.12"	
Fin Height (Nose Gear Depressed and Flashing Beacon Installed on Fin)	105.08"	
Track Width	109.25"	
BATTERY LOCATION		
Tailcone		
BEGINNING WITH 1980 MODEL YEAR		

★ Measured with strobe lights installed.

Figure 1-1. Specifications (Sheet 2 of 2)

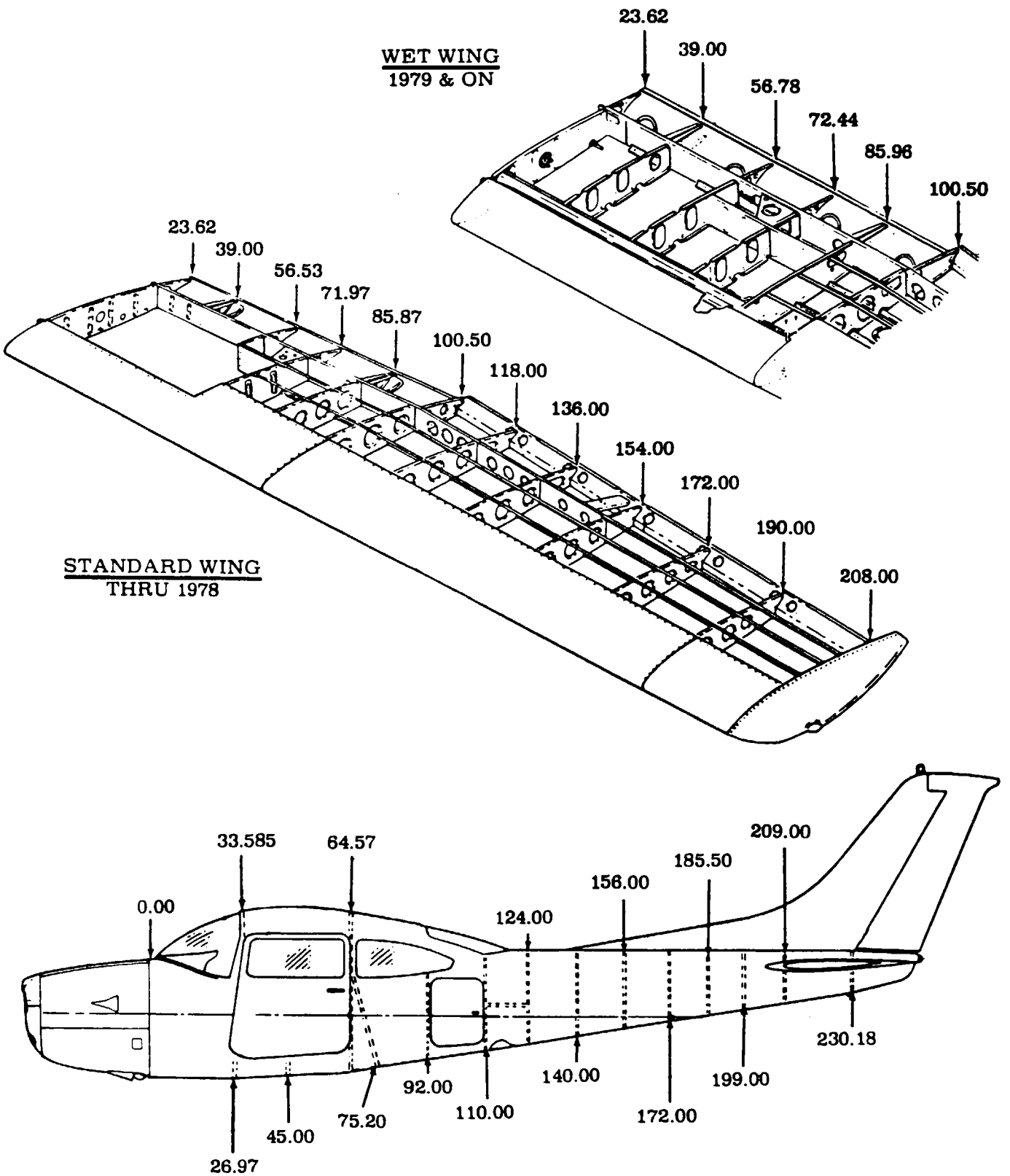


Figure 1-2. Reference Stations

1-6. GENERAL AIRFRAME PRACTICES. the following paragraphs deal with general torque and safetying practices used to ensure security of installation and prevent overstressing of components. Special torque values, when required, are specified with the specific component maintenance and installation instructions.

1-7. TORQUEING PROCEDURES. The importance of correct application cannot be overemphasized. Undertorque can result in unnecessary wear of nuts and bolts as well as parts they are holding together. When insufficient pressures are applied, uneven loads will be transmitted throughout assembly, which may result in excessive wear or premature failure due to fatigue. Overtorque can be equally damaging because of failure of a bolt or nut from overstressing threaded areas.

a. Calculating Torque. There are a few simple, but very important, procedures that should be followed to assure that correct torque is applied:

1. Calibrate torque wrench periodically to assure accuracy; and recheck frequently.
2. When using a torque wrench adapter which changes distance from torque wrench drive to adapter drive, the indicated reading must be adjusted for desired torque reading. (See Figure 20-1.)
3. Be sure that bolt and nut threads are clean and dry unless otherwise specified.
4. Determine friction drag torque and add to specified dry torque value to ensure proper bolt utilization.
   (a) Hand-turn nut onto bolt until it stops.
   (b) Using a torque wrench, measure running torque (torque required to turn nut on bolt).
   (c) This running torque must be added to specified dry torque value to ensure proper bolt utilization.

EXAMPLE

Average running torque for a nut	= 15 in.-lbs.
Dry torque required	= 125 ±5 in.-lbs.
Final torque wrench reading	= 140 ±5 in.-lbs.

   (d) Since running torque will become less due to nut/bolt re-use (in accepted applications), this procedure must be repeated each time.
   (e) When necessary to tighten from bolt head, increase torque value by an amount equal to shank torque (torque required to turn bolt when installed). Measure with a torque wrench.

EXAMPLE

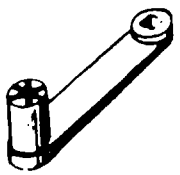
Average running torque for a nut	= 15 in.-lbs.
Average running shank torque for installed bolt	= 10 in.-lbs.
Dry torque required	= 125 ±5 in.-lbs.
Final torque wrench reading	= 150 ±5 in.-lbs.

b. Torque Values - Bolts and Nuts. (See Table 1-1.)

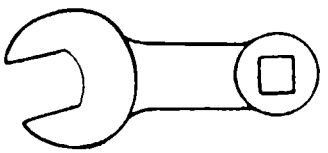
1. Tables included in this section do not apply to the following exceptions:
   (a) Sheet metal screws should be tightened firmly, but with no specific torque value.
   (b) Screws attached to nutplates should be tightened firmly, but with no specific torque value.
   (c) Bolts, nuts, and screws used in control systems and installations where required torque would cause binding or interfere with proper operation of parts.
   (d) Screws used with dimpled washers should not be drawn tight enough to eliminate washer crown.
   (e) Fasteners that have a specified torque in a specific installation.

SHORT OPEN END ADAPTER

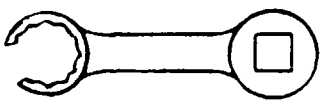
SETSCREW ADAPTER



HOSE CLAMP ADAPTER



OPEN-END WRENCH ADAPTER



FLARE NUT WRENCH ADAPTER

SPANNER WRENCH ADAPTER

NOTE

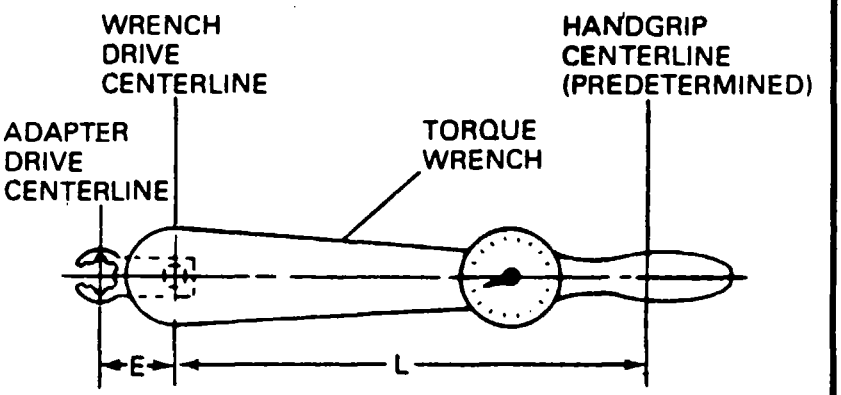
When using a torque wrench adapter which changes the distance from torque wrench drive to adapter drive, apply following formula to obtain corrected torque reading.

FORMULA

$$\frac{T \times L}{L + E} = Y$$

LEGEND

T = Desired Torque
Y = Indicated Torque
L = Effective Length Lever
E = Effective Length of Extension

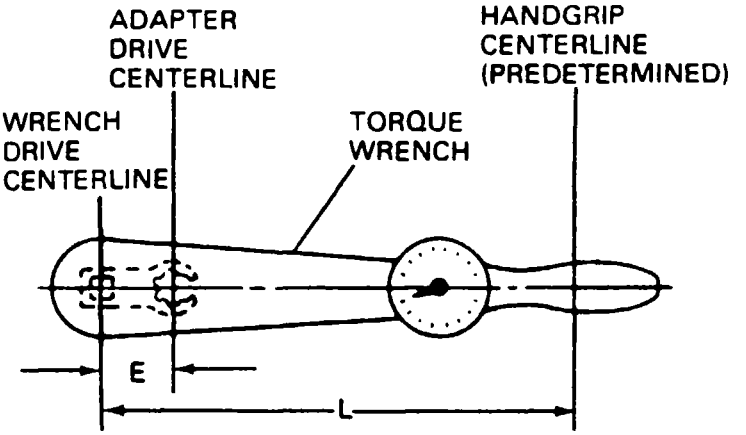


EXAMPLE

T = 135 In.-Lbs
Y = Unknown
L = 10.0 In.-Lbs
E = 1.5 In.

$$Y = \frac{135 \times 10}{10 + 1.5} = \frac{1350}{11.5} = 117.39$$

Y = 117 In.-Lbs



EXAMPLE

T = 135 In.-Lbs
Y = Unknown
L = 10.0 In.-Lbs
E = -1.5 In.

$$Y = \frac{135 \times 10}{10 - 1.5} = \frac{1350}{8.5} = 158.82$$

Y = 159 In.-Lbs

Figure 1-3. Torque Wrench Adapter Adjustment

BOLT TORQUE VALUES

Tension	Shear
BOLTS	
AN3 thru AN20 AN42 thru AN49 AN73 thru AN81 AN173 thru AN186 AN509NK9 AN525NK525 MS20033 thru MS20046 MS20073 MS20074 MS24694 MS27039	NOTE: Bolts in tension column may be used with shear nuts. Bolts in shear column should not be used unless a minimum of two threads extend beyond nut after installation.
NUTS	
AN310 AN315 AN363 AN365 MS20365 MS20500 MS21045 NAS679 NAS1021	AN320 AN364 MS20364 NAS1022

Nut-bolt size	FINE THREAD SERIES Torque Limits in.-lbs.		Torque Limits in.-lbs.	
	MIN.	MAX.	MIN.	MAX.
8-36	12	15	7	9
10-32	20	25	12	15
1/4-28	50	70	30	40
5/16-24	100	140	60	85
3/8-24	160	190	95	110
7/16-20	450	500	270	300
1/2-20	480	690	290	410
9/16-18	800	1000	480	600
5/8-18	1100	1300	660	780
3/4-16	2300	2500	1300	1500
7/8-14	2500	3000	1500	1800
1-14	3700	4500	2200	3300
1-1/8-12	5000	7000	3000	4200
1-1/4-12	9000	11000	5400	6600

Nut-bolt size	COURSE THREAD SERIES Torque Limits in.-lbs.		Torque Limits in.-lbs.	
	MIN.	MAX.	MIN.	MAX.
8-32	12	15	7	9
10-24	20	25	12	15
1/4-20	40	50	25	30
5/16-18	80	90	48	55
3/8-16	160	185	95	110
7/16-14	235	255	140	155
1/2-13	400	480	240	290
9/16-12	500	700	300	420
5/8-11	700	900	420	540
3/4-10	1150	1600	700	950
7/8-9	2200	3000	1300	1800
1-8	3700	5000	2200	3000
1-1/8-8	5500	6500	3300	4000
1-1/4-8	6500	8000	4000	5000

Tension	Shear
BOLTS	
MS20004 thru MS20024 NAS144 thru NAS148 NAS172 NAS174 NAS333 thru NAS340 NAS585 thru NAS590 NAS624 thru NAS644 NAS1303 thru NAS1320 NAS517	NAS464
NUTS	
AN310 AN315 NA363 AN365 MS20365 MS21045 NAS679 NAS1021 NAS1291	AN320 AN364 NAS1022 MS20364

Nut-bolt size	FINE THREAD SERIES Torque Limits in.-lbs.		Torque Limits in.-lbs.	
	MIN.	MAX.	MIN.	MAX.
10-32	25	30	15	20
1/4-28	80	100	50	60
5/16-24	120	145	70	90
3/8-24	200	250	120	150
7/16-20	520	630	300	400
1/2-20	770	950	450	550
9/16-18	1100	1300	650	800
5/8-18	1250	1550	750	950
3/4-16	2650	3200	1600	1900
7/8-14	3550	4350	2100	2600
1-14	4500	5500	2700	3300
1-1/8-12	6000	7300	3600	4400
1-1/4-12	11000	13400	6600	8000

Nut-bolt size	MS17825 Torque Limits in.-lbs.		MS17826 Torque Limits in.-lbs.	
	MIN.	MAX.	MIN.	MAX.
10-32	28	35	16	20
1/4-28	65	80	35	45
5/16-24	180	225	70	90
3/8-24	260	325	100	125
7/16-20	460	575	180	225
1/2-20	720	900	240	300
9/16-18	880	1100	320	400
5/8-18	1300	1600	480	600
3/4-16	2200	2800	880	1100
7/8-14	3700	4600	1500	1900
1-14	5400	6800	2400	3000
1-1/8-12	8000	10000	4000	5000
1-1/4-12	11000	14000	5600	7000

Table 1-1. Torque Values - Bolts and Nuts

2. The values shown in Table 1-1 are based on parts being clean and dry with no lubricants added.
3. Castellated nuts requiring cotter pins should be tightened to low torque value. Torque can be increased to install cotter pin, but should never exceed maximum torque value.

NOTE

Self-locking castellated nuts, MS17825 and MS17826, require a separate torque range. These values are shown separately in torque value tables.

c. Torque Value - Threaded Straight Fittings.

NOTE

Tables in this section are for general applications. Refer to specific installations for special torque values and procedures.

1. Connectors installed in bosses with no required orientation should be installed using torque values given in Table 1-2.
2. Connectors installed in bosses requiring a specific orientation do not use a torque value, but use the following steps:
   (a) Place jam-nut on fitting along with retainer and packing.
   (b) Turn nut down until packing is firmly against lower threaded section of fitting.
   (c) Install fitting into boss and tighten until there is a sudden increase in torque.
   (d) Tighten fitting 1-1/2 turns.
   (e) Orientation is accomplished by tightening fitting, but not exceeding one turn.
   (f) Tighten jam-nut to torque values in Table 1-2.

THREADED CONNECTOR					
TUBE OUTSIDE DIAMETER (Inches)	THREAD	JAM-NUT Torque-Limits (in.-lbs.)		CONNECTOR w/ PACKING w/o JAM-NUT Torque-Limits (in.-lbs.)	
		MIN.	MAX.	MIN.	MAX.
1/8	5/16-24	35	50	50	55
3/16	3/8-24	65	80	65	75
1/4	7/16-20	85	105	95	105
5/16	1/2-20	105	125	125	135
3/8	9/16-18	120	150	155	165
1/2	3/4-16	240	280	280	305
5/8	7/7-14	320	380	380	405
3/4	1/16-12	500	600	550	600
1	1-5/16-12	720	880	800	900
1-1/4	1-5/8-12	960	1200	900	1000
1-1/2	1-7/8-12	1200	1440	900	1000
2	2-1/2-12	1400	1500	900	1000

Table 1-2. Torque Values
Jam-Nuts and Threaded Connector

TORQUE VALUE - HOSE ASSEMBLIES				
HOSE INSIDE DIAMETER	Nipple or Nut			
	ALUMINUM Torque-Limits in.-lbs.		STEEL Torque-Limits in.-lbs	
	MIN.	MAX.	MIN.	MAX.
1/8	20	30	75	85
3/16	25	35	95	105
1/4	50	65	135	150
5/16	70	90	170	200
3/8	110	130	270	300
1/2	230	260	450	500
5/8	330	360	650	700
3/4	460	500	900	1000
1	500	700	1200	1400
1-1/4	800	900	1520	1680
1-1/2	800	900	1900	2100
1-3/4	—	—	—	—
2	1800	2000	2660	2940

Table 1-3. Torque Values
Hose Assemblies

THREADED STRAIGHT FITTING TORQUE VALUE (RIGID TUBE)													
TUBE OUTSIDE DIAMETER	FLARED END						STRAIGHT END						
	ALUMINUM Torque-Limits in-lbs.		ALUMINUM On Oxygen Lines Torque-Limits in-lbs.		STEEL Torque-Limits in-lbs.		6061-0 ALUMINUM 5052-0 ALUMINUM Torque-Limits in-lbs.		STEEL Torque-Limits in-lbs.		6061-T(X) ALUMINUM w/ steel sleeve Torque-Limits in-lbs.		
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	TUBE WALL	MIN.	MAX.
1/8							20	30	45	55			
3/16					90	100	30	40	90	100	0.028	45	55
1/4	40	65			135	150	40	65	135	150	0.022	80	105
											0.028	80	105
											0.035	80	105
											0.049	90	115
5/16	60	80	100	125	180	200	60	80	180	200	0.028	80	105
											0.035	80	105
											0.042	125	175
3/8	75	125			270	300	75	125	270	300	0.028	125	175
											0.035	125	175
											0.049	125	175
1/2	150	250			450	500	150	250	450	500	0.028	135	180
											0.035	200	300
											0.049	400	500
											0.058	400	500
											0.065	400	500
5/8	200	350			700	800	200	350	700	800	All	500	600
3/4	300	500			1100	1150	300	500	1100	1150	All	600	700
1	500	700			1200	1400	500	700	1200	1400	All	1000	1300
1-1/4	600	900			1300	1450	600	900	1300	1450	All	1300	1500
1-1/2	600	900			1350	1500	600	900	1350	1500	All	1400	1700
2							600	900	1500	1700			

Table 1-4. Torque Values - Straight Threaded Fittings (Line)

3. Bulkhead fittings are installed with jam-nuts and should be torqued to values in Table 1-2.
4. Torque values for hose end fittings (nipple or nut) are given in Table 1-3.
5. Torque values for straight threaded fittings used with rigid lines are given in Table 1-4.

1-8. SAFETYING PROCEDURES. The use of safety wire, cotter pins, lockwashers, and self-locking nuts is to prevent relative movement of critical components subject to vibration, torque, tension, etc., which could cause attaching parts to be broken, loosened, and/or detached.

1-9. SAFETY WIRE PROCEDURES.

a. Identification. Lockwire comes in three types which are identified by size and color. The three types are classified by use.

1. Inconel and Monel wire is used for general lockwiring and is identified by a natural wire color.
   (a) Inconel can withstand temperatures up to 1500°F.
   (b) Monel can withstand temperatures up to 800°F.
2. Copper that is cadium-plated and dyed yellow is used for shear and seal wiring applications.
   (a) Shear applications are those where it is necessary to break or shear wire to permit operation or actuation of emergency devices.
   (b) Seal applications are where wire is used with a lead seal to prevent tampering or use of a device without indication.
3. Aluminum Alloy (Alclad 5056) is dyed blue and is used exclusively for safety-wiring magnesium parts.
4. Size of wire is dependent on material and purpose of installation.
   (a) 0.020-inch diameter copper wire should be used for shear and seal application.
   (b) 0.020-inch diameter wire may be used to lockwire parts with tie holes smaller than 0.045 inches; or, on parts with tie hole diameters between 0.045 and 0.062 when spacing between ports is less than two inches; or, when bolts and screws of 0.25-inch diameter or less are closely spaced.
   (c) 0.032-inch minimum diameter wire is used for general purpose lockwiring.

NOTE

When using single-wire method of locking, the largest wire that will fit tie holes should be used.

b. Lockwire Installation. There are two basic forms of lockwiring. The single-wire method has limited application; the double-twist method is the common method of lockwiring.

1. Use new wire for each application; do not try to re-use old wire.
2. Single-wire method is accomplished by passing a single wire through tie holes and back with ends then twisted together. (See Figure 1-4.)
   (a) Single-wire method is used for shear and seal wiring applications.
   (b) Single-wire method can be used in closely spaced. closed geometric patterns. Closely spaced is defined as spacing two inches or less between centers of parts.

CAUTION

Screws in closely spaced geometric patterns which secure hydraulic or air seals, hold hydraulic pressure, or are used in critical areas should use double-twist method of lockwiring.

3. Lockwiring by the double-twist method is really one wire twisted on itself several times and is accomplished by the following steps (see Figure 1-4).
   (a) Insert one end of wire through tie holes of bolt head and firmly loop around bolt head.

NOTE

This does not necessarily apply to castellated nuts when slot is close to top of nut. The wire will be more secure if it is made to pass along side of stud.

(b) While taut, twist strands to within 1/8 inch of next part. The twisting keeps wire taut without overstressing and prevents wire from becoming nicked, kinked, or mutilated.
(c) Lockwiring multiple groups by double-twist method is accomplished in a similar manner except twists between parts are alternated between clockwise and counterclockwise.
(d) After last tie hole, wire is twisted three to five times to form a pigtail.
(e) Cut off any excess wire and bend pigtail towards part.

4. When lockwiring widely spaced multiple groups by double-twist method, three units shall be the maximum number in a series.

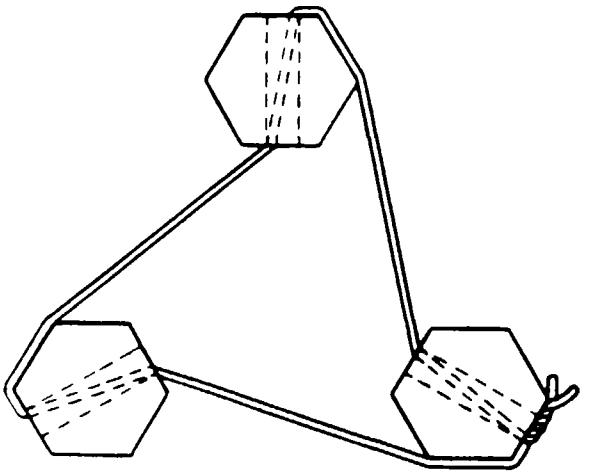
NOTE

Widely spaced multiple groups shall mean those in which fasteners are from four to six inches apart. Lockwiring shall not be used to secure fasteners or fittings which are spaced more than six inches apart, unless tie points are provided on adjacent parts to shorten span of lockwire to less than six inches.

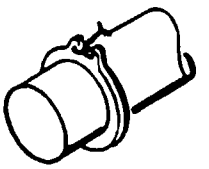
5. When lockwiring closely spaced multiple groups, the number of units that can be lockwired by a 24-inch length of wire shall be the maximum number in a series.
6. Parts should be lockwired so that wire is placed in tension (pulled on) if a part attempts to loosen.

c. Required Lockwire Installation Applications.

1. Bolts and other fasteners securing critical parts that affect airplane safety and operation.
   (a) In blind-tapped hole applications or bolts or castellated nuts on studs, lockwiring is installed in same manner as described for bolt heads.
   (b) Hollow head bolts are safetied in manner prescribed for regular bolts.
   (c) Drain plugs and cocks may be safetied to a bolt, nut, or other part having a free tie hole in accordance with instructions described.
   (d) External snap rings may be locked if necessary using general locking principles as described and illustrated. Internal snap rings should not be lockwired.
   (e) When locking is required on electrical connectors which use threaded coupling rings, or on plugs which employ screws or rings to fasten individual parts of plug together, they shall be lockwired with 0.020-inch diameter wire in accordance with locking principles as described and illustrated. It is preferable to lockwire all electrical connectors individually. Do not lockwire one connector to another unless it is necessary to do so.
   (f) Drilled head bolts and screws need not be lockwired if installed into self-locking nuts or installed with lockwashers. Castellated nuts with cotter pins or lockwire are preferred on bolts or studs with drilled shanks, but self-locking nuts are permissible within limitations described in Paragraph 1-13.
2. For new design, lockwire shall not be used to secure nor shall lockwire be dependent upon fracture as basis for operation of emergency devices such as handles, switches, and guard-covering handles that operate emergency mechanisms such as emergency exits, fire extingushers, emergency cabin pressure release, emergency landing gear release, and the like. However, where existing structural equipment or safety of flight emergency devices requires shear wire to secure equipment while not in use, but which are dependent upon shearing or breaking of lockwire for successful emergency operation of equipment, particular care exercised to assure that wiring under these circumstances shall not prevent emergency operations of these devices.



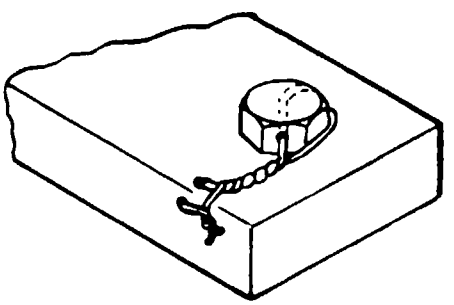
BOLTS IN CLOSELY SPACED, CLOSED GEOMETRICAL PATTERN. SINGLE- WIRE METHOD.



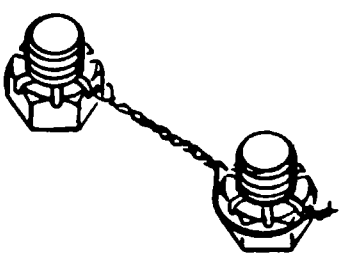
EXTERNAL SNAP RING
SINGLE-WIRE METHOD

NOTE

RIGHT-HAND THREADED PARTS SHOWN. REVERSE DIRECTION FOR LEFT-HAND THREADS.



SINGLE FASTENER APPLICATION
DOUBLE-TWIST METHOD



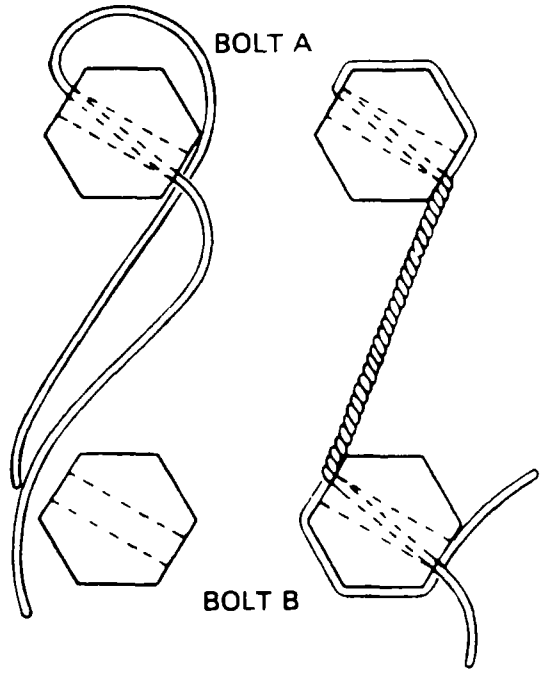
CASTELLATED NUTS ON DRILLED STUDS
DOUBLE-TWIST METHOD

Figure 1-4. Lockwire Safetying (Sheet 1 of 2)

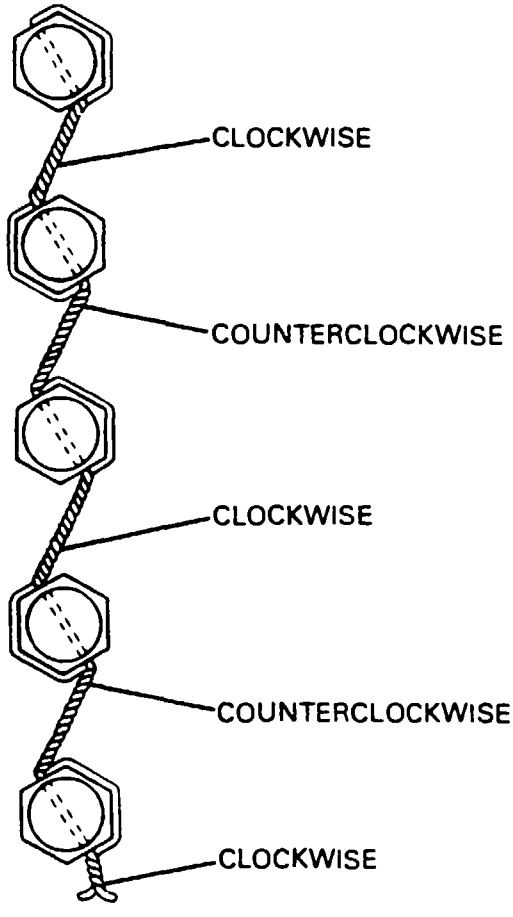
DOUBLE-TWIST METHOD

STEP 1. Insert wire through bolt A and bend around bolt (if necessary, bend wire across bolt head). Twist wires clockwise until they reach bolt B.

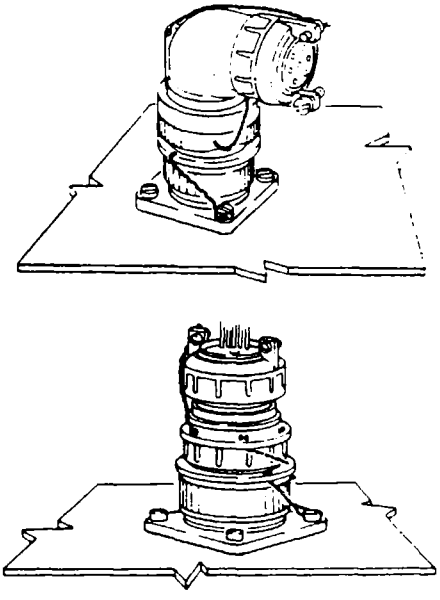
STEP 2. Insert one end of wire through bolt B. Bend other end around bolt (if necessary, bend wire across head of bolt). Twist wires counterclockwise 1/2 inch or six twists. Clip ends. Bend pigtail back againt part.



DOUBLE-TWIST METHOD



MULTIPLE FASTENER APPLICATION
DOUBLE-TWIST METHOD



ELECTRICAL CONNECTION

Figure 1-4. Lockwire Safetying (Sheet 2 of 2)

1-10. USE OF COTTER PINS.

a. Cotter Pin Installation. Castellated nuts and pins may be safetied with cotter pins or lockwire. The preferred method is to use cotter pins.

1. Select cotter pin material in accordance with temperature, atmosphere, and service limitations (see Table 1-5).
2. Cotter pins shall be new upon each application.
3. When nuts are to be secured to fastener with cotter pins, tighten nut to low side (minimum) of applicable specified or selected torque range, unless otherwise specified, and if necessary, continue tightening until slot aligns with hole. In no case shall you exceed high side (maximum) torque range.
4. If more than 50 percent of cotter pin diameter is above nut castellation, a washer should be used under nut or a shorter fastener should be used. A maximum of two washers may be permitted under a nut.
5. The largest diameter cotter pin which hole and slots will accommodate should be used, but in no application to a nut, bolt, or screw shall pin size be less than sizes described in Table 1-6.
6. Install cotter pin with head firmly in slot of nut with axis of eye at right angles to bolt shank. Bend prongs so that head and upper prong are firmly seated against bolt (see figure 1-5).
7. In pin applications, install cotter pin with axis of eye parallel to shank of clevis pin or rod end. Bend prongs around shank of pin or rod end (see Figure 1-5).

CAUTION

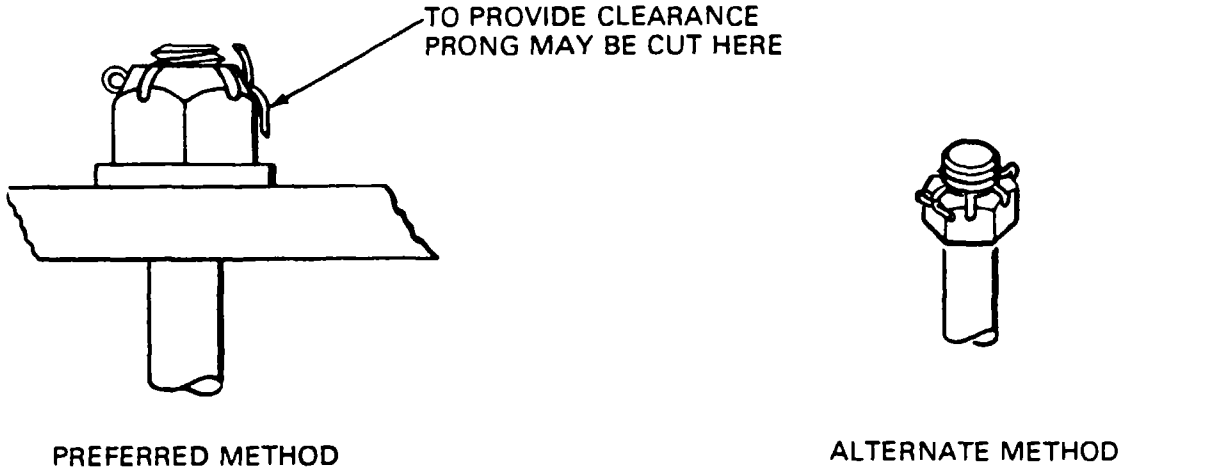
Cadium-plated cotter pins should not be used in applications bringing them in contact with fuel, hydraulic fluid, or synthetic lubricants.

COTTER PINS (MS24665)		
MATERIAL	TEMPERATURE	USE
Carbon Steel	Up to 450°F	Pins that contact cadmium-plated surfaces. General Applications Normal Atmospheres
Corrosion-Resistant	Up to 800°F	Pins that contact corrosion-resistant steel. Corrosive atmospheres

Table 1-5. Cotter Pin Temperature and Use

COTTER PIN - MINIMUM SIZE	
THREAD SIZE	MINIMUM PIN SIZE
6	0.028
8	0.044
10	0.044
1/4	0.044
5/16	0.044
3/8	0.072
7/16	0.072
1/2	0.072
9/16	0.086
5/8	0.086
3/4	0.086
7/8	0.086
1	0.086
1-1/8	0.116
1-1/4	0.116
1-3/8	0.116
1-1/2	0.116

Table 1-6. Cotter Pin Minimum Size



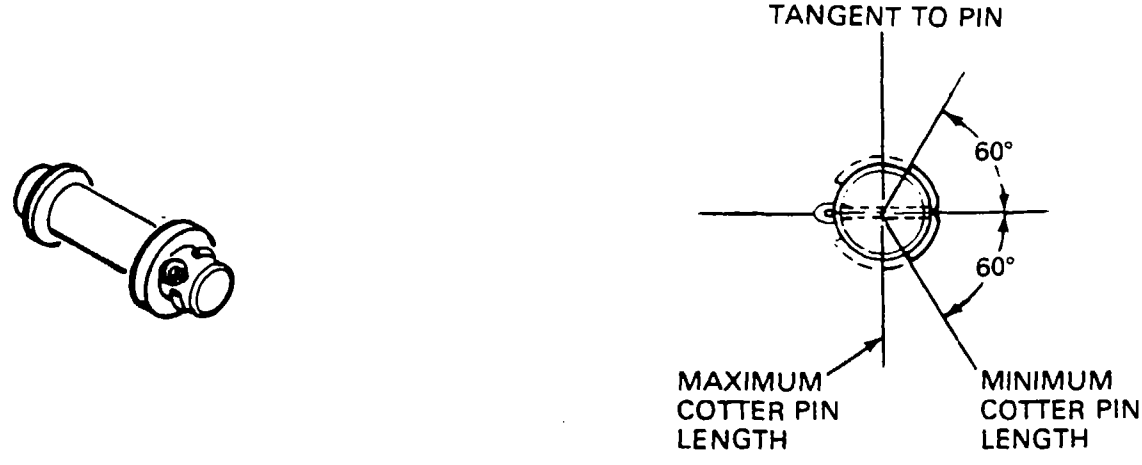


Figure 1-5. Installation of Cotter Pins

1-11. USE OF LOCKING CLIPS.

a. Safetying Turnbuckles. (See Figure 1-6.)

1. Prior to safetying, both threaded terminals shall be screwed an equal distance into turnbuckle body and shall be screwed in at least so far that not more than three threads of any terminal are exposed outside body.
2. After turnbuckle has been adjusted to its locking position, with slot indicator groove on terminals and slot indicator notch on body aligned, insert end of locking clip into terminal and body (refer to Figure 1-6) until U-curved end of locking clip is over hole in center of body.
   (a) Press locking clip into hold to its full extent.
   (b) Curved end of locking clip will expand and latch in body slot.
   (c) To check proper seating of locking clip, attempt to remove pressed "U" end from body hole with fingers only.

NOTE

Do not use tool as locking clip could be distorted.

3. Locking clips are for one time use only and shall not be re-used.
4. Both locking clips may be inserted in same hole of turnbuckle body or in opposite holes of turnbuckle body.

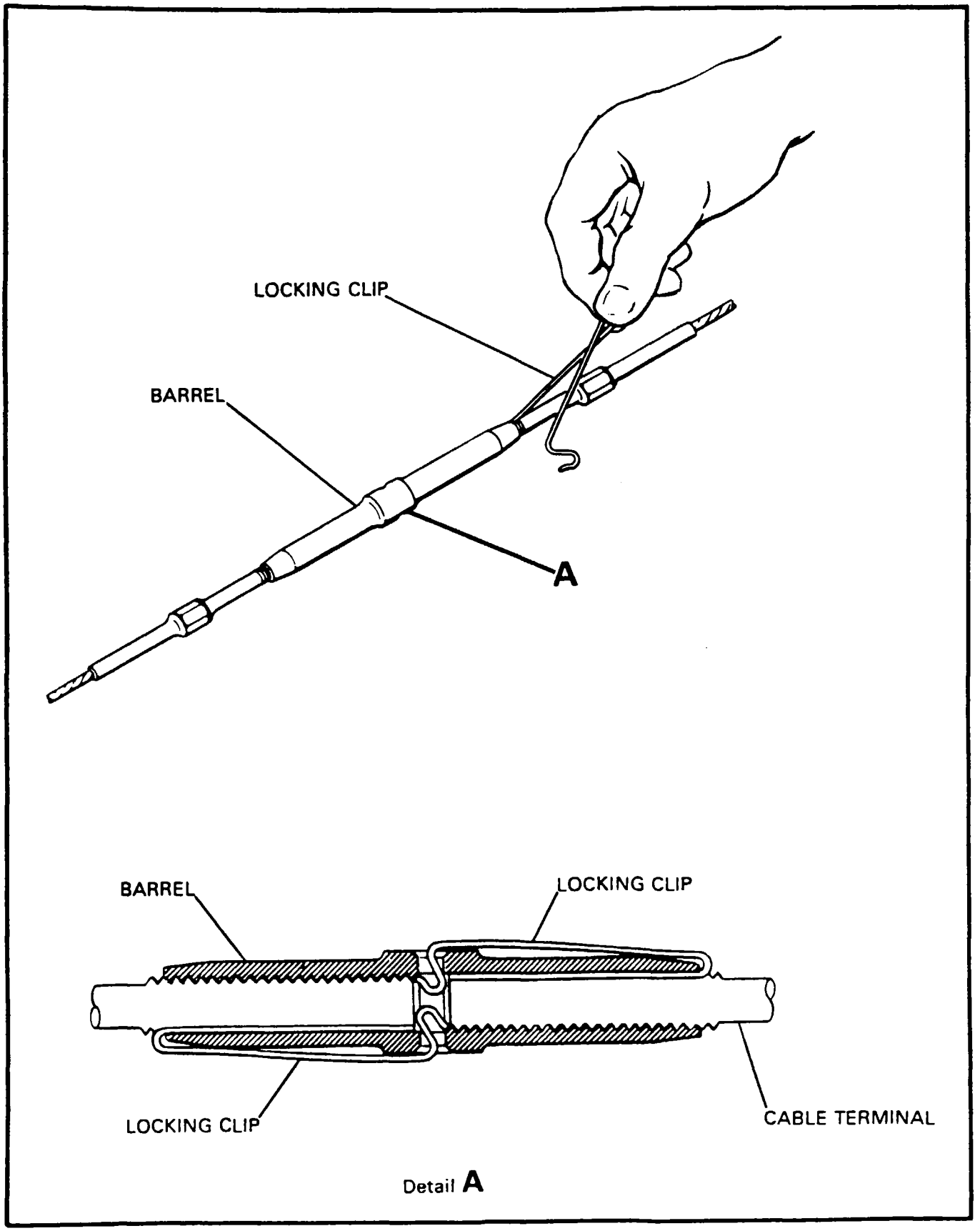


Figure 1-6. Safetying Turnbuckle Assemblies

-12. USE OF LOCKWASHERS.

a. Lockwashers can be used only under the following conditions.

1. When self-locking feature cannot be provided in externally or internally threaded part.
2. When a cotter pin cannot be used to prevent rotation of internal threads with respect to external threads.
3. When lockwire cannot be used to prevent loosening of threaded parts.
4. When fastening is not used for fabrication of primary structure.
5. When loosening of threaded parts would not endanger safety of airplane or people.
6. When corrosion encouraged by gouging aluminum or magnesium alloys by edges of teeth on tooth-locked washers would not cause malfunctioning of parts being fastened together.

-13. USE OF SELF-LOCKING NUTS.

a. Restrictions.

1. Self-locking nuts cannot be used under certain conditions.
   (a) Used, reworked, or reprocessed nuts should not be installed for any application.
   (b) Do not use if at joints in control systems for singular attach points.
   (c) Do not use on externally threaded parts that serve as an axle of rotation for another part where tensional (torque) loads can cause nut to loosen and/or become separated. Examples are pulleys, levers, linkages, and cam followers.

NOTE

Self-locking nuts can be used when threaded parts are held by a positive locking device that requires shearing or rupture before torsional loads can act on threaded parts.

   (d) Do not use where a loose nut, bolt, or screw could fall or be drawn into an area that would impede or damage or otherwise distort operation.
   (e) Do not use to attach access panels and doors or to assemble components that are routinely disassembled or removed for access and servicing.
   (f) In general, do not use self-locking nuts where loss of bolt affects safety of flight.
2. Bolts, studs, or screws, excluding Hi-Locks, must extend through self-locking nut for a length equivalent of two threaded pitches. This length includes chamfer.
3. Self-locking nuts which are attached to structure shall be attached in a positive manner to eliminate possibility of their rotation or misalignment when tightening is to be accomplished by rotating bolts to structure, and permit replacement of nuts.