

**CHAPTER 23**

**STANDARD PRACTICES**

<u>Section</u>	<u>Title</u>	<u>Page</u>
23-10	Cleaning . . . . .	23.1
23-20	Lubrication . . . . .	23.3
23-30	Torque Requirements . . . . .	23.5
23-31	Torque Stripe . . . . .	23.7
23-32	Standard Torques . . . . .	23.8
23-33	Special Torques . . . . .	23.9
23-34	D210-series Nuts on Critical Fasteners . . . . .	23.13
23-40	Non-Destructive Testing . . . . .	23.14
23-41	Magnetic Particle Inspection . . . . .	23.14
23-42	Fluorescent Penetrant Inspection . . . . .	23.15
23-50	Corrosion Control . . . . .	23.15
23-60	Priming and Painting . . . . .	23.16
23-70	Approved Materials . . . . .	23.19
23-71	Paint Strippers . . . . .	23.19
23-72	Solvents and Cleaners . . . . .	23.19
23-73	Fillers and Putty . . . . .	23.20
23-74	Torque Seal . . . . .	23.20
23-75	Primers . . . . .	23.21
23-76	Powder Coat . . . . .	23.21
23-77	Paints . . . . .	23.22
23-78	Lubricants . . . . .	23.25
23-79	Adhesives and Sealants . . . . .	23.26
23-80	Miscellaneous Practices . . . . .	23.28
23-81	Part Interchangeability . . . . .	23.28
23-82	Thermal Fitting Parts . . . . .	23.28
23-83	Replacement Component Identification (Data) Plates . . . . .	23.28
23-84	Crimp Inspection . . . . .	23.29
23-85	Storage Limits . . . . .	23.30
23-86	B526 Screws and B527-08 Washers . . . . .	23.30

Intentionally Blank

## CHAPTER 23

## STANDARD PRACTICES

23-10 Cleaning**CAUTION**

Wash helicopter exterior surfaces, windshields, and windows with mild soap and water. Harsh abrasives, alkaline soaps, or detergents can scratch painted or plastic surfaces, or cause corrosion of metal. Protect areas where cleaning solution could cause damage.

**CAUTION**

Never use high-pressure spray to clean helicopter. Never blow compressed air into main or tail rotor blade tip drain holes, pitot tube, or static ports.

**WARNING**

**Refer to Safety Data Sheet (SDS) and observe precautions when working in proximity to hazardous materials.**

**A. Cleaning Exterior Surfaces**

1. Rinse away loose dirt and debris from exterior surface with clean water.
2. Apply mild soap and clean warm water solution to exterior surface using a clean, soft cloth, sponge, or soft bristle brush. Use caution near antennas and sensitive equipment.
3. Remove oil and grease using a cloth wetted with aliphatic naphtha.
4. Rinse all surfaces thoroughly.
5. If desired, polish painted surfaces with a good quality automotive wax using soft cleaning cloths, or a chamois cloth, free of abrasive debris.

23-10 Cleaning (continued)**B. Cleaning Windshield and Windows****CAUTION**

Do not use gasoline, other alcohols, benzene, carbon tetrachloride, thinner, acetone, or window (glass) cleaning sprays.

1. Rinse away loose dirt and debris from windshield and windows with clean water.
2. Apply mild soap and clean warm water solution, or aircraft plastic cleaner, to windshield and windows using a clean, soft cloth or sponge in a straight back and forth motion. Do not rub harshly.
3. Remove oil and grease using a cloth wetted with isopropyl alcohol (rubbing alcohol) or aliphatic naphtha.
4. After cleaning plastic surfaces, apply a thin coat of hard polishing wax. Rub lightly with a soft cloth. Do not use a circular motion.
5. To remove scratches, rub windshield or windows with jeweler's rouge then hand polish with commercial plastic polish. Polish in figure eight motion.

**C. Cleaning Seat Assemblies and Back Rests**

1. Vacuum and brush, then wipe with damp cloth. Dry immediately.
2. Soiled upholstery, except leather, may be cleaned with a good upholstery cleaner suitable for the material. Follow manufacturer's instructions. Avoid soaking or harsh rubbing.
3. Leather should be cleaned with saddle soap or a mild hard soap and water.

**D. Cleaning Carpet**

Remove loose dirt with a whisk broom or vacuum. For soiled spots and stains, use nonflammable dry cleaning liquid.

23-20 Lubrication**WARNING**

**Refer to Safety Data Sheets (SDS) and observe precautions when working in proximity to hazardous materials.**

Most bearings are sealed or self-lubricated and do not require periodic lubrication. Bearings with scheduled lubrication intervals are listed in Table 1-1 (see Chapter 1).

Engine lubrication requirements are located in the R22 Pilot's Operating Handbook, the appropriate model Lycoming Operator's Manual, and Lycoming Service Instruction No. 1014 (current revision).

Main and tail gearboxes require servicing when indicated by sight gage level. Additionally, change gearbox oil and clean respective sight gage when oil becomes so dirty its level cannot be determined.

**WARNING**

**A257-2 oil is the only approved oil for use in gearboxes.**

When installing a new or overhauled gearbox, drain and flush gearbox after the first 4 hours of flight or first chip light, whichever occurs first. Thereafter, change gearbox oil at intervals listed in Table 1-1 (see Chapter 1).

**Given**

**Symbols**

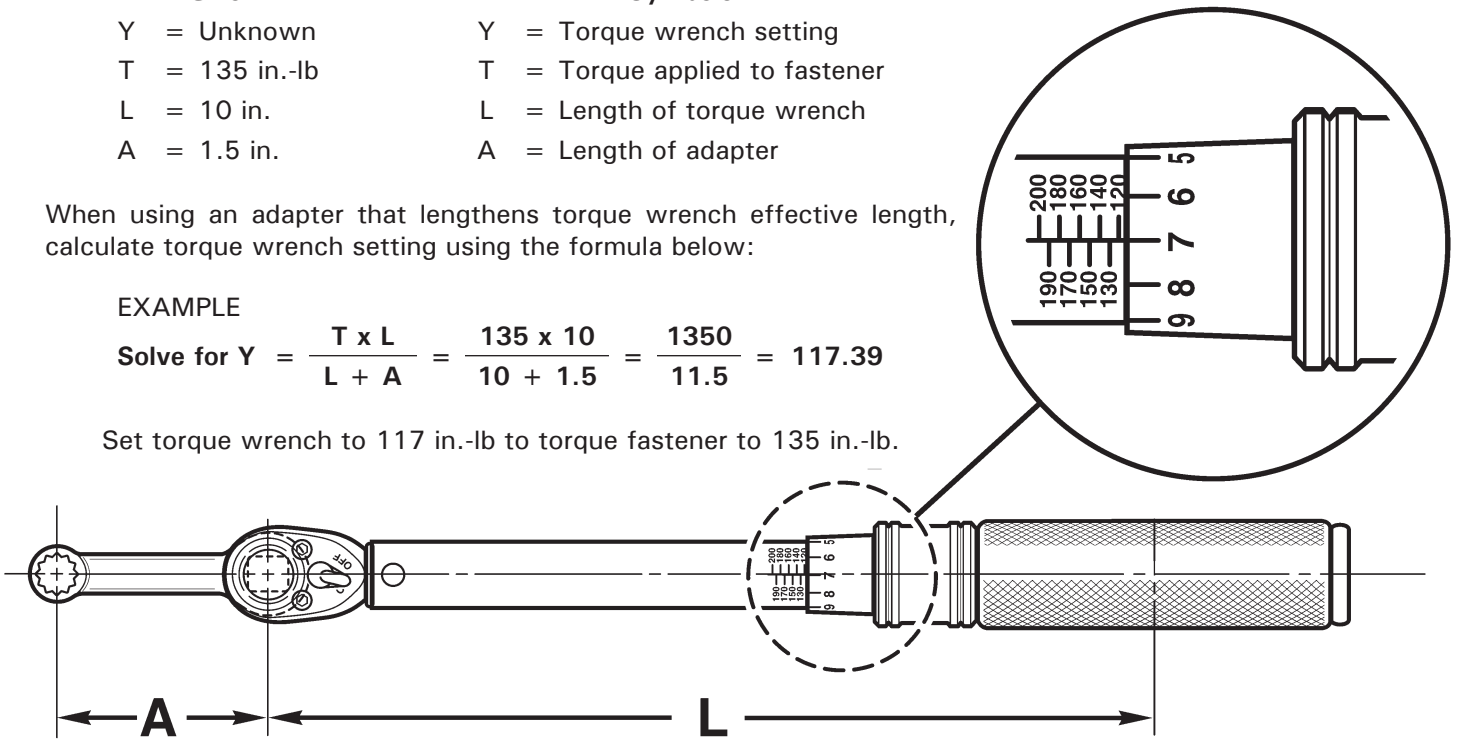
- |                |                                |
|----------------|--------------------------------|
| Y = Unknown    | Y = Torque wrench setting      |
| T = 135 in.-lb | T = Torque applied to fastener |
| L = 10 in.     | L = Length of torque wrench    |
| A = 1.5 in.    | A = Length of adapter          |

When using an adapter that lengthens torque wrench effective length, calculate torque wrench setting using the formula below:

**EXAMPLE**

$$\text{Solve for } Y = \frac{T \times L}{L + A} = \frac{135 \times 10}{10 + 1.5} = \frac{1350}{11.5} = 117.39$$

Set torque wrench to 117 in.-lb to torque fastener to 135 in.-lb.



**FIGURE 23-1 LENGTHENING TORQUE WRENCH EFFECTIVE LENGTH**

**Given**

**Symbols**

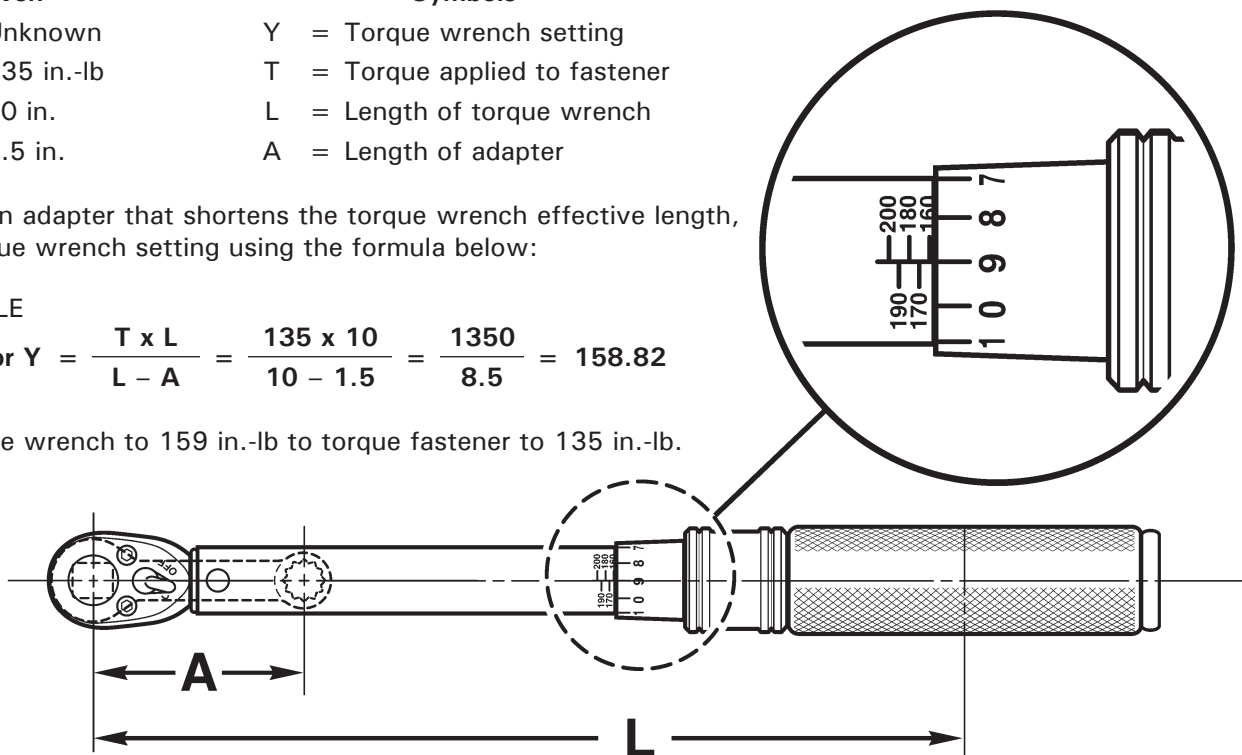
- |                |                                |
|----------------|--------------------------------|
| Y = Unknown    | Y = Torque wrench setting      |
| T = 135 in.-lb | T = Torque applied to fastener |
| L = 10 in.     | L = Length of torque wrench    |
| A = 1.5 in.    | A = Length of adapter          |

When using an adapter that shortens the torque wrench effective length, calculate torque wrench setting using the formula below:

**EXAMPLE**

$$\text{Solve for } Y = \frac{T \times L}{L - A} = \frac{135 \times 10}{10 - 1.5} = \frac{1350}{8.5} = 158.82$$

Set torque wrench to 159 in.-lb to torque fastener to 135 in.-lb.



**FIGURE 23-2 SHORTENING TORQUE WRENCH EFFECTIVE LENGTH**

23-30 Torque Requirements

**A. Tool Calibration**

Dimensions and tolerances given in this manual are critical. Calibrate measuring tools per manufacturer’s recommendation at least once a year, when tool is dropped, misused, or calibration is suspect. Measuring tools include torque wrenches, micrometers, calipers, dial indicators, spring scales, protractors, and balancing equipment.

**WARNING**

**Proper torque is critical. Always use calibrated wrenches and undamaged, properly lubricated (where applicable) hardware. Ensure clamping surfaces are clean, and clamp only bare metal or wet-primed surfaces. Improper torque or dirty or painted clamping surfaces may result in loss of clamp-up, hardware or part damage, and premature failure.**

**B. Torque Value**

Torque fasteners to standard dry values listed in § 23-32 unless otherwise specified. If torque is applied by rotating bolt, increase torque value by 10% to account for higher friction at bolt head and shank.

For example, the torque wrench setting for an NAS6605 bolt used with an MS21075 nutplate is determined as follows:

NAS6605 bolt (5 indicates 5/16 inch size) dry torque per § 23-32	240 in.-lb
Add 10% because torque must be applied at bolt head	+ 24 in.-lb
Torque wrench setting	<u>264 in.-lb</u>

**C. Secondary Locking Mechanism**

A secondary locking mechanism is required on all critical fasteners. B330 stamped nuts (palnuts) serve as the secondary locking mechanism in most areas on the helicopter, and are torqued per § 23-32. Palnuts must be replaced when removed. The R22 Illustrated Parts Catalog (IPC) lists secondary locking mechanisms for specific fasteners.

23-30 Torque Requirements (continued)**D. Critical Fastener****CAUTION**

D210-series nuts, which supersede MS21042L-series and NAS1291-series nuts, are required on critical fasteners.

**WARNING**

**Assembly of flight controls is critical and requires inspection by a qualified person. If a second person is not available, RHC recommends the installer take a 5-minute break prior to inspecting flight control connections he has assembled.**

A critical fastener is one which, if removed or lost, would jeopardize safe operation of the helicopter. This includes joints in the primary control system, and non-fail-safe structural joints in the airframe, landing gear, and drive system.



23-30 Torque Requirements (continued)**E. Torque Requirements****CAUTION**

Never substitute AN bolts for NAS bolts. NAS bolts have higher tensile strength.

1. Any self-locking nut whose drag has deteriorated appreciably must be replaced. Damaged hardware must be replaced.
2. Bolt and nut are to be clean and dry except when assembly procedure specifies anti-seize or thread-locking compound.
3. If chattering or jerking occurs, disassemble and re-torque fastener.
4. If special adapters which change effective length of torque wrench are used, final torque value must be calculated using formulas in Figures 23-1 and 23-2.
5. Unless otherwise specified, proper thread engagement requires:
  - a. If palnut is not required, one to four threads exposed beyond primary nut.
  - b. If palnut is required, two to four threads exposed beyond primary nut.
  - c. For B526-8 screws, one to five threads exposed beyond primary nut.

**WARNING**

**Proper thread engagement ensures proper locking of fastener. Exceeding maximum thread exposure beyond primary nut may allow nut to seat against unthreaded shank, resulting in insufficient joint clamping.**

6. Refer to Part A. Torque wrenches must be calibrated annually, when dropped, or when a calibration error is suspected.

23-31 Torque Stripe**WARNING**

**Refer to Safety Data Sheet (SDS) and observe precautions when working in proximity to hazardous materials.**

Refer to Figure 2-1. Lacquer-paint Torque Seal® is applied to all critical fasteners after palnut installation in a stripe ("torque stripe") extending from the fastener's exposed threads across both nuts and onto the component. Subsequent rotation of the nut or bolt can be detected visually. Position torque stripes for maximum visibility during preflight inspections. Approved Torque Seal® is listed in § 23-74.

23-32 Standard Torques

**NOTE**

1. Torque values are in inch-pounds unless otherwise specified.
2. Torque values include nut self-locking torque.
3. Increase torque values 10% if torqued at bolt head.
4. Wet indicates threads lubricated with A257-9 anti-seize.
5. For elbow and tee fittings which require alignment, torque to indicated value, then tighten to desired position.
6. Tolerance is  $\pm 10\%$  unless range is specified.
7. Unless otherwise specified, thread sizes 8-32 and smaller are not used for primary structure and do not require control of torques.

FASTENER SERIES	SIZE	EXAMPLE FASTENER	DRY TORQUE
NAS6603 thru NAS6608 Bolts NAS1303 thru NAS1308 Bolts NAS623 Screws NAS1351 & NAS1352 Screws NAS600 thru NAS606 Screws	10-32	NAS6603	50 in.-lb
	1/4-28	NAS6604	120 in.-lb
	5/16-24	NAS6605	240 in.-lb
	3/8-24	NAS6606	350 in.-lb
	7/16-20	NAS6607	665 in.-lb
	1/2-20	NAS6608	995 in.-lb
AN3 Bolts AN4 Bolts AN6 Bolts AN8 Bolts AN502 & AN503 Screws AN509 Screws AN525 Screws MS24694 Screws MS27039 Screws	10-32	AN3	37 in.-lb
	1/4-28	AN4	90 in.-lb
	3/8-24	AN6	280 in.-lb
	1/2-20	AN8	795 in.-lb
STAMPED NUTS (PALNUTS)	10-32	B330-7 (MS27151-7)	6–15 in.-lb
	1/4-28	B330-13 (MS27151-13)	11–25 in.-lb
	5/16-24	B330-16 (MS27151-16)	20–40 in.-lb
	3/8-24	B330-19 (MS27151-19)	29–60 in.-lb
	7/16-20	B330-21 (MS27151-21)	42–85 in.-lb
	1/2-20	B330-24 (MS27151-24)	54–110 in.-lb
TAPERED PIPE THREADS	1/8-27	N/A	60 in.-lb
	1/4-18	N/A	85 in.-lb
	3/8-18	N/A	110 in.-lb
	1/2-14	N/A	160 in.-lb
	3/4-14	N/A	230 in.-lb
ROD END JAM NUTS (AN315 and AN316)	10-32	AN315-3	15 in.-lb
	1/4-28	AN316-4	40 in.-lb
	5/16-24	AN316-5	80 in.-lb
	3/8-24	AN316-6	110 in.-lb

23-33 Special Torques

These torques are non-standard and supersede those in § 23-32.

NOTE	
1.	Torque values are in inch-pounds unless otherwise specified.
2.	Torque values include nut self-locking torque.
3.	Increase torque values 10% if torqued at bolt head.
4.	Wet indicates threads lubricated with A257-9 anti-seize.
5.	For elbow and tee fittings which require alignment, torque to indicated value, then tighten to desired position.
6.	Tolerance is ± 10% unless range is specified.
7.	Unless otherwise specified, thread sizes 8-32 and smaller are not used for primary structure and do not require control of torques.

AREA	(QUANTITY) FASTENER	TORQUE
DRIVE SYSTEM	(1) AN320-15 nut (1 ½ inch socket) on A007-3 shaft assembly	183–233 ft-lb wet
	(1) AN320-18 nut (1 <sup>11</sup> / <sub>16</sub> inch socket) on A007-5 shaft assembly	340–400 ft-lb wet
	(6) NAS6606-24H bolts, lower sheave	300 in.-lb
EMPENNAGE	(4) NAS6603-2 & (4) NAS6603-5 bolts, vertical stabilizer attach	70 in.-lb
FANWHEEL	(1) AN320-15 or AN320-18 nut – see DRIVE SYSTEM	
	(8) or (12) NAS6603-3 or -6 bolts and D210-3 nuts, cone-to-fanwheel	70 in.-lb
	(6) NAS6605-12, -13, or -14 bolts, hub	300 in.-lb
FUEL SYSTEM	(1) A457-15 bulkhead union and nut	285 in.-lb
	(1) A657-1 nut, fuel valve elbow-to-bulkhead union	120 in.-lb
	(1) A726-1 line assembly, bulkhead union-to-gascolator	285 in.-lb
	(2) B254-3 strainer assembly, tank outlets	200 in.-lb wet
	(1) B283 hose assembly nuts, gascolator-to-carburetor	120 in.-lb
	(5) B289-1 bolts, fuel sender (torque in criss-cross pattern)	37 in.-lb
	(2) B330-5 palnut, fuel sender ground stud	9 in.-lb
	(2) B330-6 palnut, fuel sender center stud	11 in.-lb
	(1) D205-32 hose assembly nuts, main tank-to-fuel valve	120 in.-lb
	(1) D205-33 hose assembly nuts, tank interconnect	120 in.-lb
	(1) D205-34 hose assembly nuts, main tank drain	60 in.-lb
	(1) D210-4 nut, gascolator mounting plug	70 in.-lb
	(16) AN805 nuts, fuel primer line	20–30 in.-lb
	(1) AN815-4D union, main tank, drain hose (bladder tanks)	145 in.-lb
	(1) AN815-6D union, main tank, tank interconnect hose	200 in.-lb
	(1) AN894D4-2 bushing, primer system	50–65 in.-lb
(1) AN894D6-4 bushing, primer system	110–130 in.-lb	

23-33 Special Torques (continued)

AREA	(QUANTITY) FASTENER	TORQUE
FUEL SYSTEM (continued)	(1) AN924-4D nut, main tank, drain valve (bladder tanks)	145 in.-lb
	(1) AN924-5D nut, low-fuel warning switch	150 in.-lb
	(4) MS27039C1-06 screws, fuel valve	16 in.-lb
	(4) MS27039DD1-26 screws, air bypass door	22–25 in.-lb
	(1) MS27769D2 plug, gascolator	60 in.-lb
	Primer system line assembly nuts, flared end fittings	20–30 in.-lb
FUSELAGE	(1) B277-052 clamp, lower rib	50 in.-lb
	(1) D210-5 nut, tow ball	240 in.-lb
	(8) MS51861-37C screws, door hinges	36 in.-lb
LANDING GEAR	(4) AN4-25A bolts, ground handling support	70 in.-lb
	(56) NAS6604 bolts, floats to skids and skid extensions	50 in.-lb
MAIN ROTOR BLADE	(2 per blade) A722-4 screw, tip weight retaining	40 in.-lb wet
	(2 per blade) B289-2 self-sealing bolts in pitch horn	70 in.-lb
	(2 per blade) NAS1351N3-10P screw, cover retaining	40 in.-lb wet
MAIN ROTOR GEARBOX	(1) AN320-8 nut, gearbox pinion	290–410 in.-lb
	(1) AN10-41A bolt, gearbox mounting (3) A650-1 fittings, gearbox mounting (requires MS21044N10 nuts)	90 ft-lb dry torqued from bolt head or nut
	(1) F650-3 bolt, gearbox mounting (3) A650-3 fittings, gearbox mounting (requires D210-10 nuts)	65 ft-lb, wet torque from bolt head or nut
	(6) NAS1352-4-14 screws in end cover	140 in.-lb
	(1) chip detector (threaded, non-quick-disconnect type)	Large nut 150 in.-lb Small nut 75 in.-lb
	(1) chip detector housing	150 in.-lb
	(1) nut, chip detector wiring	4–6 in.-lb
	(1) filler plug	150 in.-lb
	(1) sight gage	150 in.-lb
MAIN ROTOR HUB	(1) NAS630-80 (or MS21250-10080) teeter hinge bolt; (2) NAS630-80 (or MS21250-10080) coning hinge bolts in A154-1 hub	New bolt: 0.016–0.017 inch elongation (stretch), wet Used bolt: 0.015–0.017 inch elongation, wet, & cotter pin holes must align
	(2) NAS632-82 (or MS21250-12082) coning hinge bolts in B370-1 hub	New bolt: 0.011–0.012 inch elongation (stretch), wet Used bolt: 0.010–0.012 inch elongation, wet, & cotter pin holes must align

23-33 Special Torques (continued)

AREA	(QUANTITY) FASTENER	TORQUE
OVERTRAVEL SPRING	(1) A486 screw, upper rod end	37 in.-lb
POWERPLANT	(1) A058-5 carburetor air temp probe	36–48 in.-lb
	(1) A760-1 oil temperature sender	300 in.-lb
	(2) B277-024 clamps, carb heat scoop	30 in.-lb
	(2) A740-1 manifold pressure line nuts	25–35 in.-lb
	(4) AN818-8 nuts, oil cooler line (stainless-steel lines)	40 ft-lb
	(4) AN818-8 nuts, oil cooler line (aluminum lines)	230–260 in.-lb
	(1) AN894D4-3 bushing, manifold pressure line, at firewall	135–150 in.-lb
	(4) MS20074-04-04 bolts, airbox-to-carburetor	30 in.-lb
	(1) 3080-00038 cylinder head temperature probe	70–80 in.-lb
	(1) bolt, alternator belt tension	204 in.-lb
	(4) bolts, D723-1 oil adapter	90–100 in.-lb
	(4) carburetor-to-engine nuts	96 in.-lb initial, 204 in.-lb final, torque in a crisscross pattern
	(8) exhaust riser flange nuts, plain	160–180 in.-lb
	(8) exhaust riser flange nuts, self-locking	200–220 in.-lb
	(2) ground strap-to-engine nuts	96 in.-lb
	(1) nut, B315-1 clip for magneto harness clamp	60 in.-lb
	(1) nut on A462-1 carburetor heat control wire-to-slider valve attach fitting	25–30 in.-lb
	(1) nut on A462-4 mixture control wire-to-carburetor mixture arm attach fitting	25–30 in.-lb
	(8) spark plugs	420 in.-lb wet with A257-10 thread lubricant
	(1) thermostatic oil cooler bypass valve	290–310 in.-lb
	(6 per cover) NAS1352-4H10P valve cover retaining screws when used with clean, dry, red silicon gasket on clean, dry valve cover and cylinder head mating surfaces	25 in.-lb cold engine, 20 in.-lb warm engine
	(1) terminal retaining nut, alternator output terminal (use back-up wrench on stud retaining nut to prevent loss of stud clamp-up)	50 in.-lb
	(2) terminal retaining nuts, D748-3 alternator field and aux terminals (use back-up wrench on stud retaining nuts to prevent loss of stud clamp-up)	14 in.-lb
(2) terminal retaining nuts, D748-4 alternator field and aux terminals (use back-up wrench on stud retaining nuts to prevent loss of stud clamp-up)	20 in.-lb	
(1) terminal retaining nut, oil temperature sender	20 in.-lb	

23-33 Special Torques (continued)

AREA	(QUANTITY) FASTENER	TORQUE
STEEL TUBE FRAME	(2) NAS1351-8H40P internal-wrenching screws	70–75 ft-lb wet
	(3) NAS6604-3 bolts – (1) lower-left frame aft strut-to-upper frame, and (2) on removable aft, right strut	120 in.-lb with B270-1 on shank to seal strut holes
SWASHPLATE	(2) NAS1352N08-6 screws, magnetic pick-up bracket	35 in.-lb
	(16) NAS1352N08-8 screws	35 in.-lb
	(1) NAS6605-8 bolt clamping early revision A203 yokes	190 in.-lb
	(1 per link) 21FKF-616 jam nut, main rotor pitch link barrel	100 in.-lb
TAIL ROTOR GEARBOX	(1) B549-1 retainer, input seal	70 ft-lb wet
	(3) MS20074-04-06 bolts, gearbox-to-tailcone mounting	100 in.-lb
	(8) MS20074-04-06 bolts on A021 gearbox	60 in.-lb
	(12) MS20074-04-06 bolts on B021 gearbox	100 in.-lb
	(1) NAS679A4 nut, A031 pitch control housing stud	90 in.-lb
	(1) NAS679A4 nut, A119-1 bumper retainer	120 in.-lb
	(1) D210-8 nut retaining B546 input yoke on B021 gearbox	70 ft-lb wet with B270-11
	(1) NAS1304-38 bolt, spherical tail rotor teeter (delta) hinge	150 in.-lb
	(1) NAS6604-38 bolt, elastomeric tail rotor teeter (delta) hinge	150 in.-lb
	(1) chip detector on A021 gearbox	100 in.-lb
	(1) chip detector on B021 gearbox	60 in.-lb
	(1) nut, chip detector wiring on B021 gearbox	4–6 in.-lb
	(1) filler plug vent assembly	100 in.-lb
	(1) sight gage on A021 gearbox	150 in.-lb
(1) sight gage on B021 gearbox	100 in.-lb	
WINDSHIELD	(24) AN526C832R12 screws, on center outside retainer	16 in.-lb

### 23-34 D210-series Nuts on Critical Fasteners

When performing maintenance that involves disassembly of a critical fastener (joints with a secondary lock), reassemble the fastener using a D210-series nut.

If a fastener is disassembled that has an MS21042L-series or NAS1291-series nut with a B330-series palnut or B332-series lockwasher (secondary lock),

replace MS21042L08 nut or NAS1291-08 nut with D210-08 nut,  
replace MS21042L3 nut or NAS1291-3 nut with D210-3 nut,  
replace MS21042L4 nut or NAS1291-4 nut with D210-4 nut,  
replace MS21042L5 nut or NAS1291-5 nut with D210-5 nut,  
replace MS21042L6 nut or NAS1291-6 nut with D210-6 nut,  
replace NAS1291-7 nut with D210-7 nut,  
replace NAS1291-8 nut with D210-8 nut, or  
replace NAS1291-10 nut with D210-10 nut.

## 23-40 Non-Destructive Testing

### WARNING

Refer to Safety Data Sheet (SDS) and observe precautions when working in proximity to hazardous materials.

## 23-41 Magnetic Particle Inspection

Ferromagnetic steel parts are inspected for structural defects using magnetic particle inspection. Steel parts covered by this specification are inspected per ASTM E1444 wet continuous process with ultra-violet light. Applicable requirements and limitations of the above standard apply.

Procedures and equipment used to perform the inspection shall conform to requirements of ASTM E1444. Produce magnetization using direct current. A magneto test penetrometer or a 30–60 gauss meter is used to verify the direction and effectiveness of all magnetic fields produced. Whenever possible, parts shall be inspected with both circular and longitudinal magnetization, but at least in two directions at right angles to each other. Minimum duration of application is  $\frac{1}{2}$  second.

Pre- and post-solvent clean parts using PCBTF or similar solvent. Demagnetizing is accomplished using  $AC \pm 3$  oersteds maximum. Verify part is demagnetized using a magnetic field strength indicator which does not exceed an absolute value above three gauss.

Area of part to be examined, position of part, directions of magnetization to be used and method of establishing the magnetization are presented within the inspection section of individual parts. Record the size and location of all rejectable indications.

### A. Inspection Criteria

Parts (except gears) which are inspected by magnetic particle inspection shall be accepted or rejected according to the following criteria:

#### Acceptable indications:

- Indications smaller than 0.015 inch are not considered rateable.
- Indications caused by sharp changes in cross-section or part geometry.

#### Rejectable indications:

- Indications interpreted as cracks, seams, laps, shuts, or any flaws which are open to the surface.
- Indications oriented at an angle of more than 15 degrees from the longitudinal axis with length exceeding 0.125 inch.
- Circumferential indications on any shoulder or fillet (changes in diameter).
- Any indications which break over an edge, shoulder, fillet radius, keyway, spline, or an adjacent area of part more than 0.015 inch.
- Indications caused by undercuts at the toe of a weld.
- Indications caused by cracks in the weld or parent metal.
- Indications caused by inclusions in weld material exceeding 0.1 inch in length.



### 23-42 Fluorescent Penetrant Inspection

This specification provides for surface inspection of parts fabricated from nonmagnetic materials to detect discontinuities open to the surface, such as cracks, cold shuts, laps, porosity and other surface defects.

Applicable requirements and limitations of ASTM E1417 shall apply. After inspection is complete, solvent clean parts.

The step-by-step procedure and equipment used to perform the inspection shall be accomplished per ASTM E1417.

#### **A. Inspection Criteria**

Parts inspected by fluorescent penetrant method shall be accepted or rejected on basis of acceptance limits specified. If acceptance limits are not specified, rejectable surface defects and any of the following:

- Cracks
- Seams
- Cold shuts or laps
- Surface inclusions
- In castings, aligned discontinuous surface indications other than cracks, cold shuts and inclusions are rejectable if more than 3/8 inch in length.

### 23-50 Corrosion Control

[Reserved].

### 23-60 Priming and Painting

This specification outlines preparation and application requirements for primers and topcoat. Primers provide corrosion protection and a final finish or a base for topcoat. Use only approved materials listed in § 23-70.

Do not prime or paint with a topcoat finish the following areas (unless directed):

- Sliding friction joints.
- Stainless steel parts.
- Swivel joints and adjustable rod ends.
- Plastic, rubber, electrical components and wires or similar materials.
- Bolted joints where torque is a specific requirement for clamping action.
- Bearing press fit or close tolerance slip fit joints (except where wet chromate primer is part of the assembly procedure).

**WARNING**

**Refer to Safety Data Sheet (SDS) and observe precautions when working in proximity to hazardous materials.**

#### **A. Priming**

##### 1. Cleaning

- a. Alkaline clean is the preferred method for cleaning aluminum and stainless steel except where immersion is not practical. Do not immerse assembled components.
- b. Do not alkaline clean steel as it may cause a corrosive reaction. Clean steel using QSOL 220 or equivalent solvent.
- c. Extremely greasy or dirty parts may be pre-cleaned in a solvent vapor bath or hand wiped with QSOL 220 or equivalent solvent.
- d. Air dry. Do not touch cleaned parts with bare hands.

##### 2. Surface Preparation

Unless otherwise specified, chemical conversion coating is the standard treatment before priming aluminum. However, if bare or clad aluminum is primed without conversion coating, the following procedure must be used:

- a. Alkaline clean if immersion is practical, otherwise wipe clean with QSOL 220 or equivalent degreasing agent.
- b. Lightly scuff the surface with Scotch-Brite pads.
- c. Wipe with a tack rag to remove any foreign material or damp wipe with QSOL 220 or equivalent solvent.
- d. Air dry. Do not touch parts with bare hands.

23-60 Priming and Painting (continued)**A. Priming (continued)****3. Primer Application**

Apply primer after mixing per manufacturers recommendations. Allowable thickness of primer is 0.0005 – 0.0020 inch, per coat. For parts with internal openings, such as tubes, prime the inside as follows:

- a. Thin primer to watery consistency using required reducer.
- b. Pour in primer, slosh around, then drain immediately.
- c. Dry parts at least six hours before using.

**4. Inspection**

Inspect for complete coverage and (excessive thickness) runs in paint. If primer has runs, strip part and re-prime. Refer to § 23-70 for approved methods.

**NOTE**

Primed areas that have been sanded to bare metal must have conversion coating (if required) and primer re-applied prior to topcoat to restore anti-corrosion properties.

**B. Painting**

Prior to liquid topcoat application, ensure surfaces have been cleaned and primed. In general, most parts will be cleaned and primed as detail parts. However, in some cases, such as the gearbox assembly, this is not practical and primer and topcoat are applied on the assembled component.

Previously primed surfaces, or primed surfaces that have completely cured require the following preparation before paint:

1. Lightly sand using 220-grit or finer aluminum-oxide abrasive paper.
2. Lightly scuff with Scotch-Brite pads (optional).
3. Wipe with clean cloth and QSOL 220 or equivalent solvent.
4. Wipe with tack cloth.
5. Apply topcoat.

Intentionally Blank

23-70 Approved Materials

The following items are available from the noted manufacturer(s) or their distributor(s). Check with appropriate regulatory authority(s) for allowable usage of materials.

**WARNING**

**Refer to Safety Data Sheet (SDS) and observe precautions when working in proximity to hazardous materials.**

**CAUTION**

Follow product manufacturer’s instructions for handling and storage.

23-71 Paint Strippers

PRODUCT	MANUFACTURER/SUPPLIER	APPLICATION
Cee-Bee Stripper A-292	McGean-Rohco: Cee-Bee Division Downey, CA	Metal parts, except blades and flex plates.
Plastic Media Blasting System	Pauli & Griffin Co. Vacaville, CA	Metal parts except blades and unsupported sheet metal less than 0.040 inch thick.

23-72 Solvents and Cleaners

PRODUCT	MANUFACTURER/SUPPLIER	APPLICATION
QSOL 220	Safety-Kleen Systems, Inc. Plano, TX	General use and for cleaning prior to applying primer, topcoat, adhesive, or sealant.
Benzene, 1-Chloro-4 (Trifluoromethyl) PCBTF***	Any	" "
Final Klean 3909S	Du Pont Chemical Los Angeles, CA	Remove adhesive residue on cabin and windshield.
EM-Citro*	LPS Laboratories, Inc. Tucker, GA	" "
Acetone***	Any	" "
Lacolene (Aliphatic Hydrocarbon)	Any	Windshield and plastic cleaning.
Plexus®	B.T.I. Chemical Co. Oak Park, CA	" "
Presolve	LPS Laboratories, Inc. Tucker, GA	Hydraulic components only.
Tetrachloroethylene (Perchloroethylene)	Any	Vapor degreaser.

23-72 Solvents and Cleaners (continued)

PRODUCT	MANUFACTURER/SUPPLIER	APPLICATION
815 GD	Brulin Corporation Indianapolis, IN	Ultrasonic cleaning, general use. **
SF50	L&R Mfg. Co. Kearny, NJ	“ ”
#112 Ammoniated or #222 Nonammoniated cleaning & rinse solution	L&R Mfg. Co. Kearny, NJ	Ultrasonic cleaning, avionics components only.
Cleanup Wipe E-4365	Sontara Candler, NC	Cleaning and drying.

\* May be used on acrylic plastic.

\*\* Mix 5%-20% by volume; titration not required.

\*\*\* Acetone and PCBTF may be mixed together at 1:1 ratio.

23-73 Fillers and Putty

PRODUCT	MANUFACTURER/SUPPLIER	APPLICATION
05096 Glazing Putty 05861 Dry Guide Coat 31180 Finishing Glaze	3M St. Paul, MN	Minor surface imperfections.
SBF1191 Filler	Gearhead Products Indianapolis, IN	“ ”
FE-351 Cream Hardener	Catalyst Systems Gnadenhutten, OH	“ ”

23-74 Torque Seal

PRODUCT	MANUFACTURER/SUPPLIER	APPLICATION
83314 thru 83321 Except 83316 (red)	Dykem Cross-Check ITW Pro Brands	Torque seal.

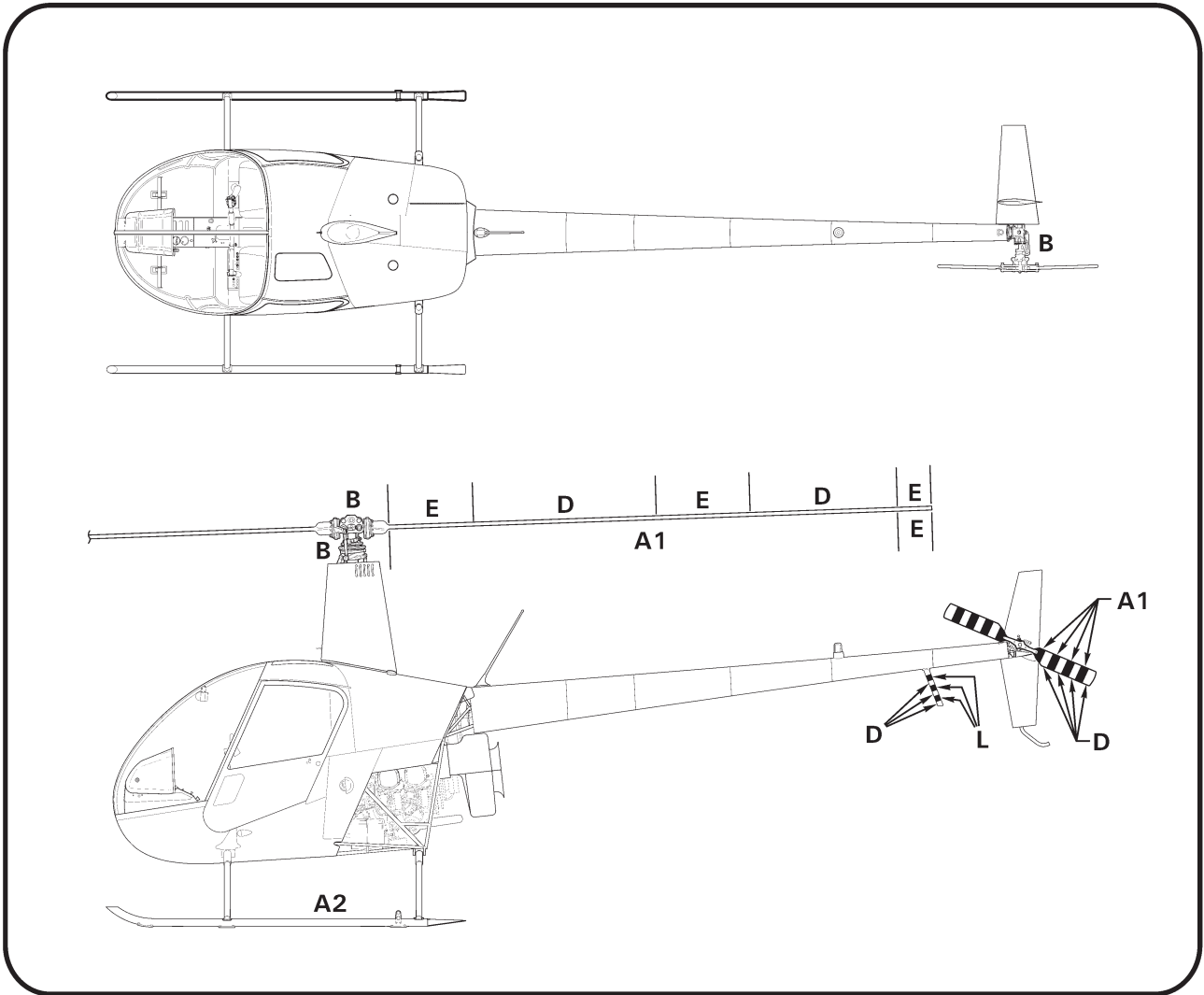
23-75 Primers

PRODUCT	MANUFACTURER/SUPPLIER	APPLICATION
Desoprime CF CA 7422 or CA 7502	PPG Industries Irvine, CA	Unlimited.
Water Reducible Epoxy Primer 44GN072	PPG Industries Irvine, CA	Use only where specified.
Gray Urethane Primer Filler LE 3404S	Axalta Coating Systems Philadelphia, PA	Scrolls.
High Solids Epoxy Primer 53022 Type III	Transchem Coatings Los Angeles, CA	Unlimited.
High Solids Epoxy Primer 10P20-44	AkzoNobel Waukegan, IL	Use only where specified.
Spray2Fix HS Epoxy Primer 10P20-44SC (Aerosol)	AkzoNobel Waukegan, IL	Limited or touch-up use only.

23-76 Powder Coat

PRODUCT	MANUFACTURER
Interpon 100-AL101QF Gray Zinc Rich Epoxy Powder*	AkzoNobel Santa Fe Springs, CA
81-2158 Vitralon Gray Zinc Rich Epoxy Powder*	Pratt & Lambert Chemical Coatings Buffalo, NY
39/80020 Smooth Matte Black Polyester Topcoat Powder*	Tiger Drylac USA Cucamonga, CA
49/72460 Smooth Glossy Gray RAL 7043 Polyester Topcoat Powder*	" "
49/22460 Smooth Glossy Yellow RAL 1028 Polyester Topcoat Powder*	" "
PFWF104S9 White Polyester Topcoat Powder*	Dupont Co. Wilmington, DE

\* Shelf life is 12 months from date of manufacture at ambient temperature.



**FIGURE 23-12 PAINT CODES**  
(Refer to Chapter 26 for rotor blade paint dimensions.  
Exterior surface codes are D & F unless otherwise specified.)

**23-77 Paints**

Refer to Figures 23-12 & 23-13 for paint code application. Paint codes for specific helicopter serial numbers are listed on the inside cover of Airframe Maintenance Record (logbook).

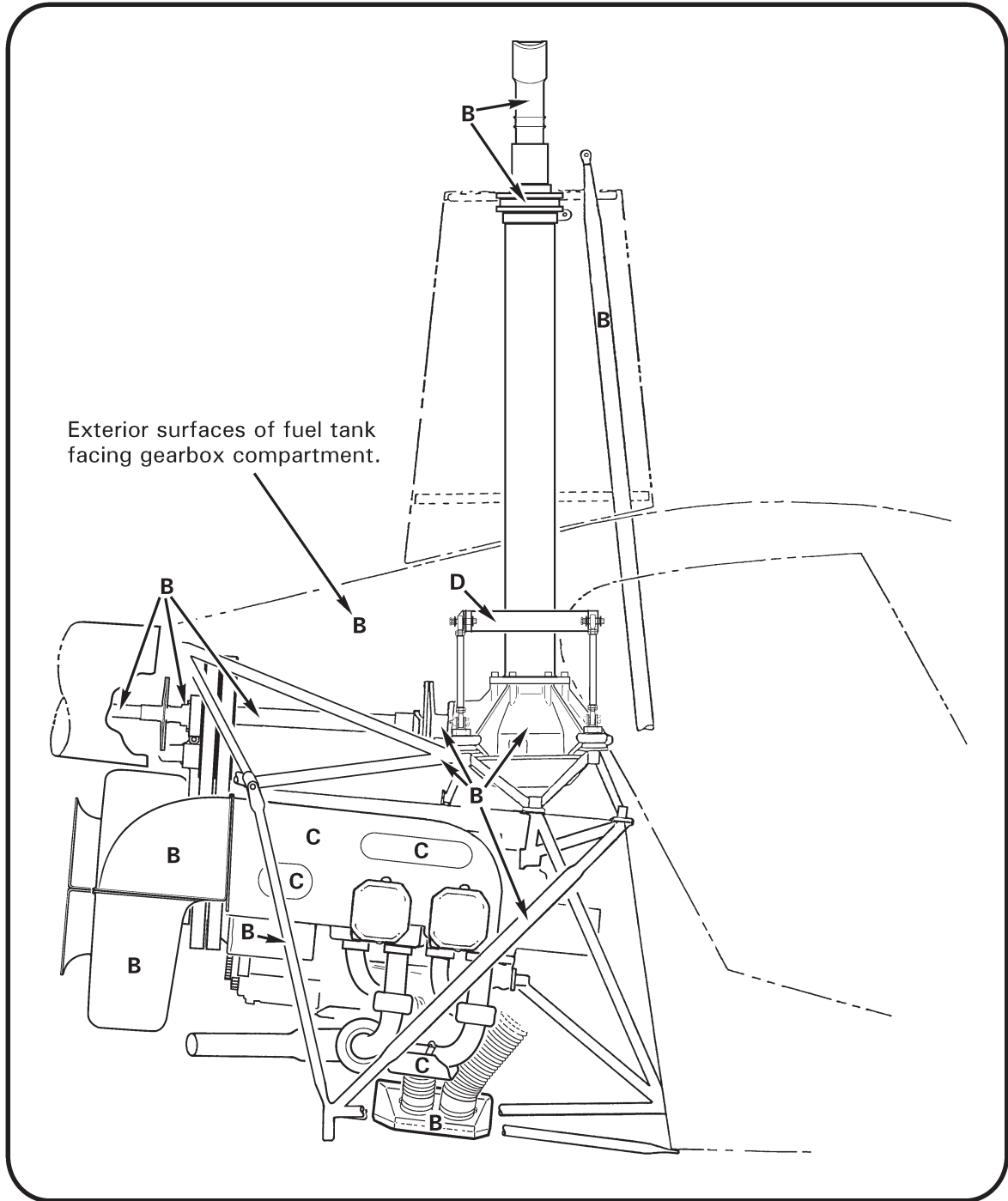
**NOTE**

Use fisheye eliminator, accelerator, or other additives per manufacturer's recommendations.



23-77 Paints (continued)

CODE	MATERIAL	MANUFACTURER
A1	Flat Black 18BK06 with 18BK006CAT Catalyst PC-216 Curing Selection	PPG Aerospace; Irvine, CA
	Abrasion Resistant CTG 23T3-90 Black with PC-216 Curing Selection	AkzoNobel; Waukegan, IL
A2	Semi-gloss Black 3900-05 with 39-SG Catalyst	Cardinal Industries Finishes; El Monte, CA
B	Dark gray Imron AF400/AF700	Axalta; Wilmington, DE
	Alumigrip 4200G15290	AkzoNobel; Waukegan, IL
C	Engine gray IE-8948	Randolph Products Co.; Chicopee, MA
	Lycoming Gray G-5436 fast dry engine enamel	Randolph Aircraft Products Co.; Riverside, CA
	Lycoming A219 gray engine enamel (aerosol can-touch up; shelf life 2 years)	Tempo Products; Cleveland, OH
D	White Imron AF400/AF700	Axalta; Wilmington, DE
	Alumigrip 4200G10208	AkzoNobel; Waukegan, IL
E	Yellow Imron AF400/AF700	Axalta; Wilmington, DE
	Alumigrip 4200G40227	AkzoNobel; Waukegan, IL
F	Imron AF400/AF700 Colors	Axalta; Wilmington, DE
G	Clear Imron AF740	" "
H	Flat Clear 666-58-9000 with X-503 activator	AkzoNobel; Waukegan, IL
J	White Imron 2.1 FT flat polyurethane enamel with 9T00-A activator, D-121 & D-101 tints, 2100-P 2.1 binder, & 9T20 flattener	Axalta; Wilmington, DE
K	Printcolor White Ink MS Series 750-9005	Deco Technology Group Inc; Orance, CA
	Printcolor Black Ink MS Series 750-8005	" "
	Printcolor Maize Yellow Ink MS Series 750-1205	" "
	Printcolor Carnation Red Ink MS Series 750-3005	" "
	Printcolor Glass Hardener Series 700	" "
	Gensolve normal speed thinner GS-017L	" "
L	Red Imron AF400/AF700	Axalta; Wilmington, DE
	Alumigrip 4200G4	AkzoNobel; Waukegan, IL
M	Orange Imron AF400/AF700	Axalta; Wilmington, DE
N	Krylon 1311 (shelf life 2 years) Matte Clear (aerosol can)	Krylon Div. of Borden Columbus, OH
O	Light gray Imron AF400/AF700	Axalta; Wilmington, DE
P	Silver Bullet AM Tracer Black 20-452AM-F1 with 16-CURE-F4 activator	Burke Industrial Coatings Ridgefield, WA



**FIGURE 23-13 PAINT CODES**

23-77 Paints (continued)

For limited touch-up of interior and landing gear only:

CODE	MATERIAL	MANUFACTURER
A3	Cardinal A-2000-05 Flat black (aerosol can)	Cardinal Industries Finishes; Cleveland, OH
	Krylon 1613 Semi-Flat Black (aerosol can)	Krylon Div. of Borden Columbus, OH

23-78 Lubricants

RHC PART NO.	LUBRICANT TYPE	MANUFACTURER'S PART NO.	MANUFACTURER
A257-1	Grease (general purpose)	101	Southwestern Petroleum Corp. Fort Worth, TX
A257-2	Gear oil	201 SAE 90	Southwestern Petroleum Corp. Fort Worth, TX
A257-3	Grease	Aero Shell 14 MIL-G-25537	Shell Oil Co.
A257-4	Oil (automatic transmission fluid)	Dexron II or Dexron II/Mercon or Dexron III/Mercon	Any
A257-6	Grease (fuel resistant)	Fuelube	Fleet Supplies Inc. Cleveland, OH
		EZ Turn	United-Erie Div. of Interstate Chemical Co. Erie, PA
A257-7	Dry film lubricant	Lubri-Kote Type A 1040 CR	Mealey Ind. Lubricants Cleveland, OH
A257-8	Rubber lubricant	P-80	International Products Corp. Trenton, NJ
A257-9	Anti-seize	Silver Grade	Loctite Corp. Newington, CT
A257-10	Substitute A257-16		
A257-12	Grease	MobilGrease 28 MIL-PRF-81322	Exxon Mobil Corp., Fairfax, VA
A257-16	Engine Oil (Approved for 0–90° F ambient). Substitute A257-24 as required.	Type M 20W-50, SAE J1966	Any
A257-17	Substitute A257-19		
A257-19	Valve lubricant and sealant compound	111	Dow Corning Corp. Midland, MI
A257-24	Engine oil (Approved for > 60° F ambient)	SAE 50, SAE J1966	Any

23-79 Adhesives and Sealants

RHC PART NO.	DESCRIPTION	COLOR	MFR. PART NO.	MANUFACTURER
B270-1	Sealant – manganese-cured, fuel resistant (2-part)	Gray	AC-730 B-*	3M Co. St. Paul, MN
B270-2	Substitute B270-1			
B270-4	Substitute B270-13			
B270-5	Sealant – synthetic rubber putty (1-part)	White Light Gray	Q4-2805 94-031	Dow Corning Corp. Midland, MI
B270-6	Sealant & lubricant – thread (1-part)	Gray	Titeseal 55	Radiator Spec. Co. Charlotte, NC
B270-7	Substitute B270-14			
B270-8	Adhesive – rubber, nitrile/acetone (1-part)	Tan	C 160	Stabond Corp. Gardena, CA
	Adhesive – rubber, nitrile/acetone (1-part)	Tan	843	3M Co. St. Paul, MN
B270-9	Adhesive – epoxy, structural, flexible (2-part)	Gray	2216 B/A	3M Co. St. Paul, MN
B270-10	Adhesive/sealant – threadlocker, anaerobic, tight-fits (1-part)	Red	271	Henkel Loctite Corp. Rocky Hill, CT
B270-11	Adhesive/sealant – threadlocker, anaerobic, loose-fits (1-part)	Red	277	Henkel Loctite Corp. Rocky Hill, CT
B270-12	Sealant – electrical potting (2-part)	Any color except red	MIL-PRF-8516 Type II, Class 2, Category A or B	Any
B270-13	Sealant – silicone rubber, noncorrosive (1-part)	Translucent	3145	Dow Corning Corp. Midland, MI
B270-14	Substitute B270-8			
B270-15	Adhesive – plastic, for vinyl (1-part)	Clear	2262	3M Co. St. Paul, MN
B270-16	Substitute B270-14			
B270-17	Adhesive – cyanoacrylate, instant (1-part)	Clear	Super Bonder 495	Henkel Loctite Corp. Rocky Hill, CT
B270-18	Adhesive – weatherstrip (1-part)	Black	051135-08008	3M Co. St. Paul, MN
B270-19	Adhesive – epoxy structural, rigid (2-part)	Green	1838 B/A	3M Co. St. Paul, MN
B270-20	Adhesive/sealant – threadlocker, anaerobic, non-permanent (1-part)	Purple	222 or 222MS	Henkel Loctite Corp. Rocky Hill, CT
B270-21	Protectant – corrosion, non-drying (1-part)	Lt. Amber	LPS 3	LPS Laboratories, Inc. Tucker, GA

23-79 Adhesives and Sealants (continued)

RHC PART NO.	DESCRIPTION	COLOR	MFR. PART NO.	MANUFACTURER
B270-22	Protectant – corrosion, drying (1-part)	Amber	LPS Hardcoat	LPS Laboratories, Inc. Tucker, GA
B270-23	Sealant – gasket (1-part)	Brown	GM3H (Gasket Maker #4)	Perfect Seal, Inc. Cincinnati, OH
	Sealant – gasket (1-part)	Brown	JV66B	Dana Corp.; Churubusco, IN (Victor Reinz Brand)
B270-24	Activator/primer – anaerobic adhesive (1-part)	Translucent Green	7649	Henkel Loctite Corp. Rocky Hill, CT
B270-25	Clear coat – automotive touch up, brush in bottle (1-part)	Clear	Clear Coat Touch up Bottle	Automotive Touchup Harahan, LA
B270-26	Sealant – polysulfide, window glazing (2-part)	Black	AC-251 B-1	3M Co. St. Paul, MN
B270-27	Adhesive – epoxy, high strength structural, flexible (2-part)	Translucent Red Blue	EA 9309NA EA 9309.2NA	Henkel Loctite Corp. Rocky Hill, CT
B270-28	Substitute B270-27			

\* Dash number for minimum hours application life may be -½, -2, -6, or -12.

## 23-80 Miscellaneous Practices

### 23-81 Part Interchangeability

Refer to R22 Illustrated Parts Catalog for part interchangeability information.

### 23-82 Thermal Fitting Parts

General Procedures for using heat to fit parts during assembly or evaluating parts that may have been overheated in service:

*Aluminum parts* must not be heated above 200° F for more than 5 minutes. Higher temperatures or longer times adversely affect strength and corrosion properties. Scrap any aluminum parts suspected of going above 325° F regardless of time at temperature.

*Steel parts (bare)* – Maximum temperature 300° F. Higher temperature can reduce the strength or cause temper brittleness in some alloys.

*Steel parts (cadmium plated)* – Maximum temperature 300° F. Higher temperatures will melt the plating and adversely affect steel strength by a process called liquid metal embrittlement.

*Bearings and carburized parts* such as gears, clutch shafts, and clutch housings should not be heated above 300° F. Higher temperatures will reduce the surface hardness and increase wear rates.

Always heat parts in an oven with temperature control set no greater than the maximum temperature allowed for the part.

Always attach a pyrometer and thermocouple to the smallest aluminum part in the oven. Never depend on the oven control to determine part temperature.

Cooling a part for thermal fitting at assembly is not recommended. Water vapor from the air will condense on the part and frequently introduce water into the assembly causing severe internal corrosion over time.

### 23-83 Replacement Component Identification (Data) Plates

In order to issue a replacement component identification plate for field installation, RHC must first receive the old identification plate in legible condition. If old identification plate is lost or destroyed, then RHC must have an original letter (photocopies or faxes are NOT acceptable) from customer's Civil Aviation Authority authorizing identification plate replacement AND stating component name, part number, and serial number for each requested identification plate. There is a charge for each plate issued.

Identification plates may be carefully removed using a sharp plastic scraper. If necessary, use a heat gun to soften plate adhesive. Retain in a dry, contaminate-free area until ready for reinstallation.

Damp wipe local area with acetone or equivalent solvent prior to reinstallation. Residual adhesive on identification plate is usually sufficient for good adhesion. If necessary, use B270-9 adhesive or equivalent to secure.

23-84 Crimp Inspection

Refer to Figure 23-14.

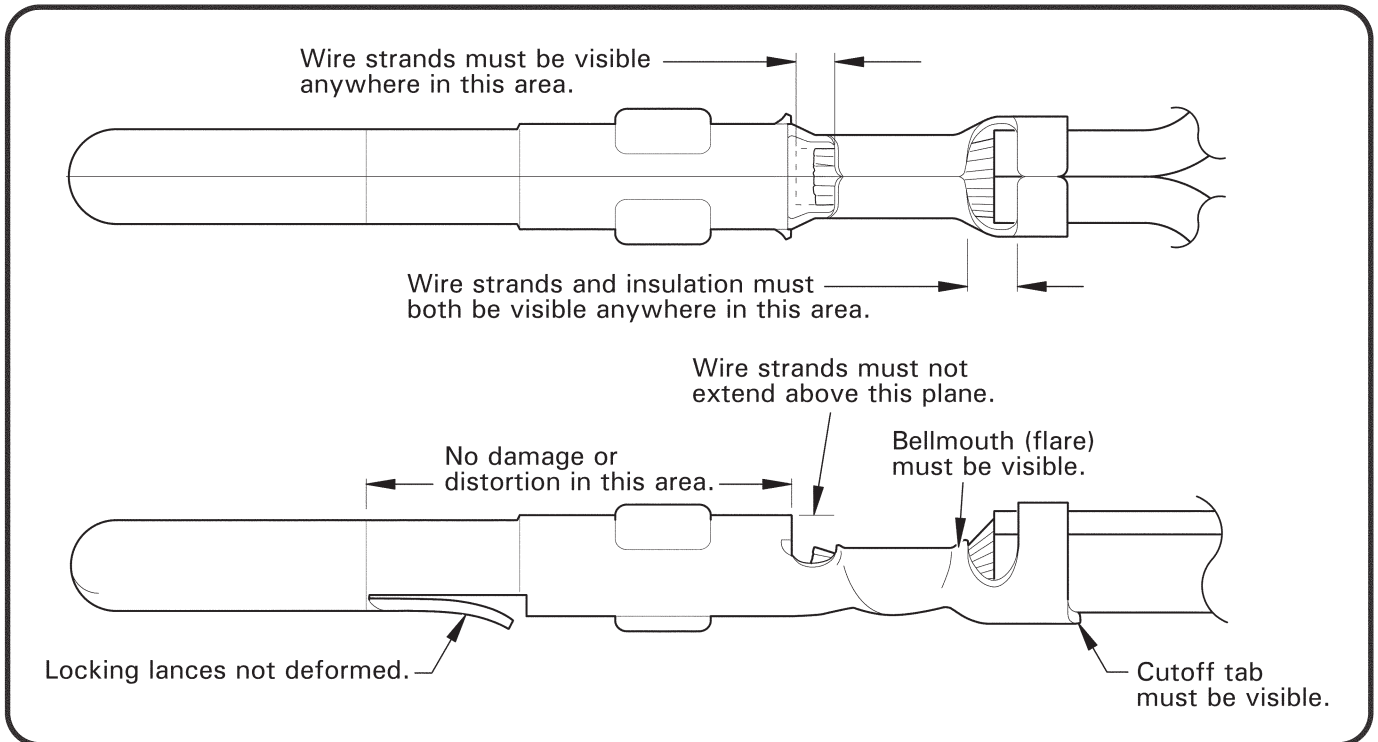


FIGURE 23-14 CRIMP INSPECTION

23-85 Storage Limits

1. B283 hoses have a shelf storage life of 5 years. Hose service life is "on condition", with a maximum of 12 years.
2. Elastic cords have a shelf storage life of 5 years. Elastic cord service life is "on condition", with a maximum of 12 years. Use invoice or FAA Form 8130 date as start date.
3. Store V-belts at less than 85° F (30° C), with relative humidity below 70%. Avoid solvent and oil vapors, atmospheric contaminants, sunlight, and ozone sources (electric motors, arc welding, ionizing air purifiers, etc.). Belt shelf life is 4 years if preceding recommendations are followed. Use invoice date or FAA Form 8130 date as start date.
4. Oils and greases have a 5 year shelf life when stored and kept sealed in their original container. Use invoice date or FAA Form 8130 date as start date unless the manufacturer has marked container with manufacture date (in which case use manufacture date as start date).
5. Rubber o-rings, seals, and gaskets have a twenty (20) quarter, five (5) year shelf life from the indicated cure date. Fluorocarbon (Viton) and silicon rubber products shall adhere to manufacturer's expiration date(s). Service life is "on condition" with a maximum of 12 years.
6. Store uninstalled fuel bladder in original container (if available) at 70°F to 80°F and below 70% humidity. Coat bladder with clean, non-detergent engine mineral oil to prevent rubber from drying out and cracking. Store bladder in relaxed condition free from tension, compression, or other deformation such as creases or folds.

23-86 B526 Screws and B527-08 Washers

B526 (TORX Plus®) truss head screws may be used to secure cowlings and access panels. A B527-08 nylon washer may be used under a B526 screw head to further protect thin or painted surfaces.

B526 screws are interchangeable with MS27039C080\_ screws used to secure cowlings and access panels as follows:

<u>PART:</u>	<u>INTERCHANGEABLE WITH:</u>
MS27039C0806 screw . . . . .	B526-6 screw
MS27039C0807 screw . . . . .	B526-8 screw
MS27039C0808 screw . . . . .	B526-8 screw

B526 screws are interchangeable with AN525-832R\_ & AN526C832R\_ screws as follows:

<u>PART:</u>	<u>INTERCHANGEABLE WITH:</u>
AN525-832R6 or AN526C832R6 screw . . . .	B526-6 screw
AN525-832R7 or AN526C832R7 screw . . . .	B526-8 screw
AN525-832R8 or AN526C832R8 screw . . . .	B526-8 screw

**NOTE**  
B526 screws are compatible with T20 or 20IP drivers.