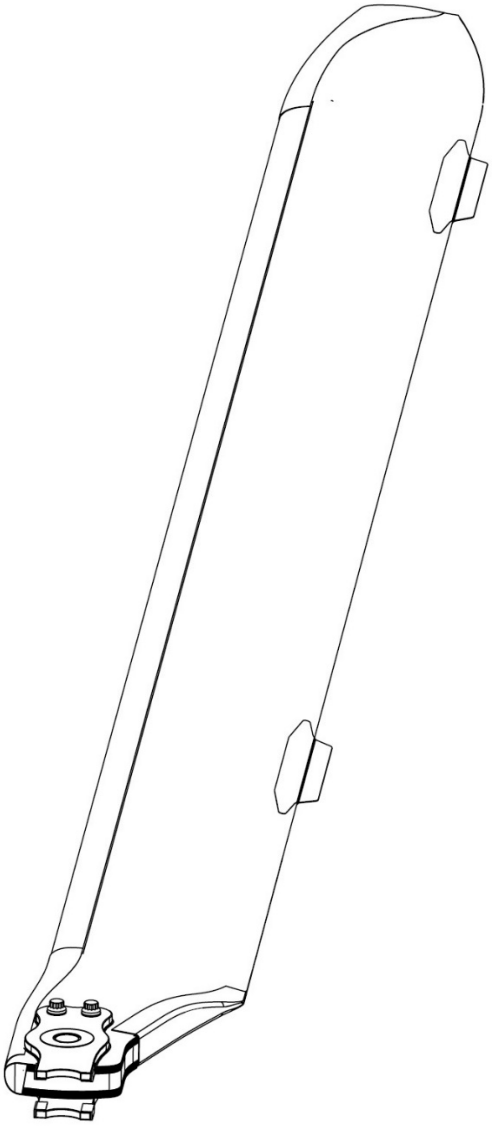
Van Horn Aviation, L.L.C.
1510 W. Drake Drive
Tempe, Arizona 85283

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS



ICA MANUAL No. VMM-MR-206L-501

Main Rotor Blade Assembly 20633000-101
Eligible for Installation on Model 206L, 206L1, 206L3, and 206L4

REVISIONS

REV	DATE	DESCRIPTION	APPROVED
N/C	05/24/18	Initial Release	DR
A	07/16/20	Added trim tab inspection to 100-hr inspection requirement. Added two additional inspection requirements to Chapter 5. Expanded damage limits and damage dispositions in section 5.11. Added more detail to grip plate assembly installation in section 62.8.	DR
B	07/28/20	Added inspection criteria for abrasion strip cracks. Added instructions for installation of polyurethane tape over abrasion strip cracks.	DR

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CHAPTER 0 – INTRODUCTION

0.1 SCOPE

This manual contains information, descriptions, and instructions essential for the continued airworthiness of the Van Horn Aviation L.L.C. 20633000-101 Blade Assembly.

0.2 ARRANGEMENT

This manual follows the Airline Transport Association (ATA) specification 100 numbering system where practical.

0.3 UNITS OF MEASUREMENT

All measurements, tolerances, and other numbers referenced in this manual will be in English units.

0.4 CHANGES TO THE ICA

0.4.1 Changes to text and tables, including new material on added pages shall be indicated by a vertical bar in the outer margin extending close to the entire area of the material affected.

0.4.2 Please send any comments or corrections to Van Horn Aviation L.L.C., 1510 West Drake Drive, Tempe, AZ 85283 USA, via email to info@vanhornaviation.com, or call +1 (480) 483-4202.

0.5 DISTRIBUTION

0.5.1 The ICA will be shipped with the original purchase of a 20633000-101 Blade Assembly.

0.5.2 The ICA can be found on Van Horn Aviation's website: https://vanhornaviation.com/documentation/

CHAPTER 4 – AIRWORTHINESS LIMITATIONS

4.1. AIRWORTHINESS LIMITATIONS SCHEDULE

The Airworthiness Limitations section is FAA approved and specifies inspections and other maintenance required under §§43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

Part Number	Part Name	Airworthiness Limitation
20633000-101	Blade Sub-Assembly Only	16,000 Hours
20631020-301 20631020-303	Grip Plate Assembly*	4,000 Hours

*Includes all installation hardware: bolts, nuts, and washers.

FAA Approved: _____

Date: 8/16/18

CHAPTER 5 – INSPECTION/CHECK REQUIREMENTS

5.1. PRE-FLIGHT CHECK

No.	Requirements	Airworthiness Criteria
1.	Visually check the main rotor blades for any visible damage such as cracks, blisters, delaminations, abrasion strip dents or local contour deformation.	See 5.11 DAMAGE LIMITS.

5.2. 100 (+/- 10 hour tolerance) HOUR INSPECTION AND ANNUALLY

No.	Inspection Requirements	Airworthiness Criteria
1.	Check the general condition of the rotor blade. Check for skin dents, scratches, cracks or blisters. Check the trailing edge for nicks or delaminations. Look for paint cracks around the trim tabs; if paint cracks are found, perform tap test inspection.*	See 5.11 DAMAGE LIMITS.
2.	Inspect the abrasion strips for wear, cracks, dents, puncture and edge voids. Inspect all polyurethane or elastomeric protective coatings for wear or damage.	See 5.11 DAMAGE LIMITS.

5.3. 2,000 (+/- 30 hour tolerance) HOUR INSPECTION

No.	Inspection Requirements	Airworthiness Criteria
1.	Inspect grip plate assemblies, root plates, and bushings for cracks. Conduct a tap test of blade upper and lower surface.*	Contact Van Horn Aviation if any discrepancies found exceeding damage limits in 5.11 DAMAGE LIMITS.

5.4. 4, 000 (+/- 30 hour tolerance) HOUR INSPECTION

No.	Inspection Requirements	Airworthiness Criteria
1.	Remove and replace the 20631020-301 and -303 grip plate assemblies. Replace all installation hardware. See 62.8 GRIP PLATE ASSEMBLY REPLACEMENT. Inspect entire main rotor blade assembly for cracks, voids, blisters, or other damage. Inspect bushing holes through blade. Inspect root plates for cracks. Conduct a tap test of blade upper and lower surface.*	Contact Van Horn Aviation if any discrepancies found exceeding damage limits in 5.11 DAMAGE LIMITS.

5.5. SUDDEN STOPPAGE OR ACCELERATION

No.	Inspection Requirements	Airworthiness Criteria
1.	No inspection required.	Remove the rotor blades and return to Van Horn Aviation for evaluation.

5.6. OVERSPEED – 107 PERCENT OR GREATER

No.	Inspection Requirements	Airworthiness Criteria
1.	For main rotor overspeed 107 to 114 percent: Inspect main rotor blades for any visible damage such as cracks, blisters, delaminations, or local contour deformation.	No defects permitted.
2.	For main rotor overspeed above 114 percent: Inspect main rotor blades for any visible damage such as cracks, blisters, delaminations, or local contour and dimensionally check main rotor blade attachment bushing for elongation in excess of .0015 inch.	No defects permitted.

5.7. OVERTORQUE

No.	Inspection Requirements	Airworthiness Criteria
1.	No inspection is required for overtorques between 100 to 110 percent.	N/A
2.	Overtorques 110 to 120 percent: Inspect the main rotor blades for any visible damage such as cracks, blisters, delaminations, or local contour deformation. If any of these conditions exist, remove the rotor blades and return to Van Horn Aviation for evaluation.	No defects permitted.
3.	Overtorques above 120 percent require the inspections in No. 2 above at the time of the overtorque and again after 25 hours of operation.	No defects permitted.

5.8. LIGHTNING STRIKE

No.	Inspection Requirements	Airworthiness Criteria
1.	Scrap the blades if there is any evidence of a lightning strike. Return the scrapped blades to Van Horn Aviation for testing.	N/A

5.9. BLADE STRIKE

No.	Inspection Requirements	Airworthiness Criteria
1.	Inspect both main rotor blades immediately after a suspected blade strike has occurred. Inspect both main rotor blades for any visible damage such as cracks, blisters, delaminations, broken fibers, or local contour deformation. Inspect the abrasion strips for dents, cracks, debonds or deformation. Tap inspect the strike area for debonds greater than 1.0 inch diameter.*	Contact Van Horn Aviation if any discrepancies are found that exceed damage limits in 5.11 DAMAGE LIMITS.

5.10. HAIL

No.	Inspection Requirements	Airworthiness Criteria
1.	If there is visible hail impact damage to the aircraft fuselage, do a tap test in section of the upper surface of the blade to look for voids/debonds caused by hail. Visible indications of hail damage are dimples in the blade skin.	See 5.11 DAMAGE LIMITS.

*The internal structure of the blade will cause tone changes during the tap test. Figure 5-1 shows the blade's internal components with their approximate locations and shapes. Other than the components shown, the remainder of the blade's internal structure is high density structural foam. Tone changes can be expected as the tap test traverses the various blade sections. Tone changes that are not associated with internal component boundaries should be treated as suspected voids. Van Horn Aviation recommends the use of an Abaris Tap Hammer for tap inspections (SKU: ABATH).

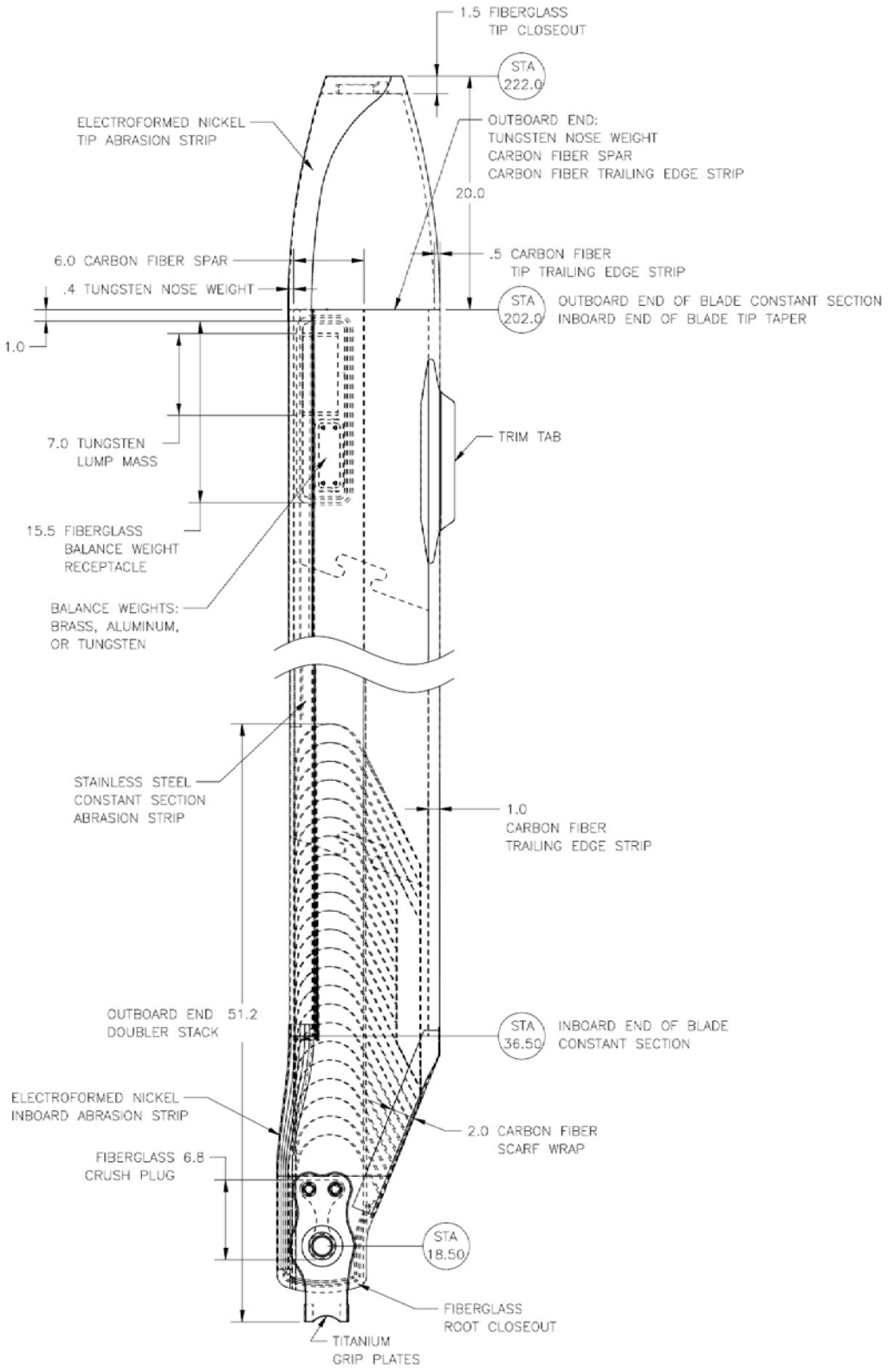

Figure 5-1

Main Rotor Blade Configuration

5.11. DAMAGE LIMITS

5.11.1. Damage Description

Damage may take the form of cracks, scratches, nicks, dents, debonds, voids, abrasion and erosion. Limits are provided for each of these types of damage. Damage exceeding these limits require evaluation, and if possible, repair at an authorized FAA repair station. Minor damage may be corrected using the instructions provide in this chapter. For all other damage, contact VHA for repair station recommendations.

Carbon/epoxy material strength can be degraded by prolonged exposure to moisture and ultraviolet radiation. This rotor blade is protected from both of these conditions using epoxy primer, multiple coats of polyurethane topcoat, and a nano hybrid polyurethane matte coat. It is very important to maintain these protective coatings throughout the life of the blade by adhering to the 5.11.7 Spot Refinishing requirements.

5.11.2. Abrasion Strips

Three abrasion strips are used on the leading edge. The electroformed nickel inboard abrasion strip extends from near the inboard end of the blade to approximately STA 37.0. It overlaps the stainless steel constant section abrasion strip that starts at STA 36.0 and extends to STA 202.0. The electroformed nickel tip abrasion strip starts at approximately STA 201.0 and extends to the blade tip. The inboard and tip abrasion strips both overlap onto the constant section abrasion strip by approximately 1.0 inch. Both overlap joints are protected from the environment with a layer of polyurethane tape, or with a sprayed-on elastomeric compound.

To ensure longevity of the paint finish and abrasion strips, operators who fly in extreme environments that result in salt, chemical or corrosive accumulation on the blade are required to wash the blades as frequently as necessary to prevent the buildup of any harmful contaminants. Reference paragraph l.

The inspection, maintenance and damage criteria listed below applies to all three abrasion strips.

a. Non-sharp dents not exceeding 0.050 inch depth are acceptable at any location.

b. Sharp dents are not permitted.

c. Punctures not permitted.

d. Cracks in any abrasion strip require a tap inspection upon discovery. Tap inspect a 1.0 inch wide band either side of the crack. No debonds allowed in the 1.0 inch band. Tap inspect the blade assembly directly aft of the abrasion strip trailing edge for voids or debonds. If any voids or debonds are found, contact Van Horn Aviation for further assistance. If no debond or voids are found in the blade sub-assembly or under the abrasion strip, the cracks in the abrasion strips may remain as is. Cover the cracks with polyurethane tape, reference paragraph m.

e. Tap test an area of 1.0 inch radius from any dent to inspect for voids.

f. If debonds or voids exist, there is a possibility of underlying carbon fiber damage; therefore, evaluation at an approved FAA repair station is required. Contact VHA for repair station recommendations.

g. If there are no debonds or voids after tap inspection around a dent, leave the dent exposed so that it may be monitored for evidence of cracking in the future.

h. Visually inspect the trailing edge of all abrasion strips for debonds. A paint crack along any edge of the three abrasion strips indicates a possible abrasion strip debond or underlying fiber damage. Report all suspected abrasion strip debonds to VHA for evaluation. If the combined length of all paint cracks along the edge of any abrasion strips is less than 8.0 inches in length, and there are no debonds in the blades sub assembly, the blade may remain in service until the blades can be scheduled for evaluation at an approved repair station. Touch up any paint cracks with epoxy primer or polyurethane paint in accordance with 5.11.7 Spot Refinishing.

i. If an abrasion strip is worn though because of erosion, send blade to an approved FAA repair station for repair. Contact VHA for repair station recommendations.

j. If the electroformed nickel tip abrasion strip exhibits minor surface defects or blisters that are less than 0.5 inch square, and less than 0.050 inch deep, then the defect may stay as is. Dress the edges of the defect with 400 - 1000 grit sandpaper and leave the area exposed for periodic monitoring.

k. Scratches in any of the three abrasion strips that are less than 0.005 inch deep may be blended. Use 400 – 1000 grit sandpaper to smooth the edges of the scratch. Apply ACF-50 Anti-Corrosion Formula to all blended scratches.

l. Wash the blades with clean, unpressurized water and mild soap to remove any accumulated salt, chemicals or other contaminants. Grease may be removed by wiping with MEK, MPK, acetone or denatured alcohol and a microfiber cloth. Apply a uniform coat of ACF-50 Anti-Corrosion Formula directly to the bare metal of the abrasion strips as added protection when operating in extreme conditions. Re-application of ACF-50 may be necessary after cleaning the blades.

m. Polyurethane tape. Cover or replace all damaged abrasion strip protective coverings with 3M Polyurethane Protective Tape 8542HS. Abrasion strip cracks that are dispositioned to remain as is must be covered with a strip of 3M 8542HS tape that overlaps the crack by 1.0 inch to either side. Install new 8542HS tape in accordance with the 3M Polyurethane Protective Tape Application Instructions (3M Technical Bulletin). Use 3M 86A Adhesion Promoter on all painted surfaces to ensure a good bond. Edge seal the tape with 3M 2110 Repair Paste. Touch up missing or damaged sealant with 3M 2110 Repair Paste, 3M DP 190 epoxy

adhesive, PR-1440 sealant or equivalent (per AMS-S-8802, Type 2, Class B). Damaged polyurethane tape may be repaired in accordance with 3M Scotch-Weld Repair Paste 2110 B/A Repair Bulletin.

5.11.3. Skin

The skin is composed of four (4) layers of plain weave carbon fiber fabric. Impact damage may progress from little evidence of external damage to puncture with surrounding voids, depending on impact force. In all cases of suspected skin damage, a tap test is required to determine the extent of damage.

a. Voids are not allowed within 1.0 inch of the trailing edge.

b. Voids not exceeding 1.0 inch diameter are acceptable at any spanwise location and may remain as is. Voids larger than 1.0 inch diameter must be evaluated for repair by an FAA authorized repair station.

c. If voids are detected, remove paint in the damaged area to check for broken fibers. Remove paint and primer only. Do not sand into skin plies.

d. Broken fibers are not permitted. If broken fibers are detected, send blade to an authorized FAA repair station for evaluation, and if possible, repair. Contact VHA for repair station recommendations.

e. Scratches, nicks, or fiber damage in the extreme trailing edge 0.10 deep or less may be blended out over a distance of at least 2.0 inches each side of the damage. See Figure 5-2.

f. Damage at the tip trailing edge may be removed by blending up to a 1.0 inch radius at the tip. See Figure 5-2.

g. Erosion damage to the skin plies occur when the paint layer has been compromised, exposing the skin plies to particle and water abrasion. All erosion damage to the carbon/epoxy skin plies must be repaired at the next maintenance interval. In the interim, protect all exposed fibers by applying epoxy primer to the damage area.

h. Hail Impact Damage. Tap inspect the upper surface of the blade assembly to locate any voids as a result of hail impact. Five (5) or fewer total voids due to hail impact not exceeding 1.0 inch diameter are acceptable on the upper surface only. No other voids may exist on the blade assembly. Contact Van Horn Aviation for further evaluation if more than five (5) voids are found.

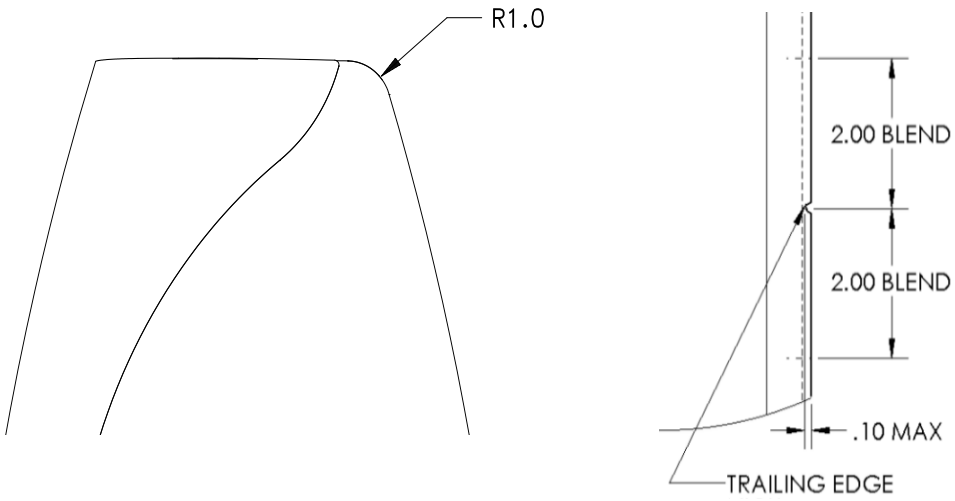

Figure 5-2

Tip and Trailing Edge Damage Limits

5.11.4. Trim Tab Assembly

Both the inboard and outboard trim tab assemblies are composed of identical sheet metal parts and are bonded to the blade assembly with epoxy film adhesive. During installation of the trim tab assemblies, a flexible sealant is applied internally along the length of the joggle. This results in a more flexible joint and allows trim tab adjustments to be made with less force. The sealant protects the internal bondline by preventing the ingress of environmental contaminants.

a. No edge debonds greater than 1.0 inch in length are permitted anywhere along the edges of the trim tab assembly. If edge debonds of greater than 1.0 inch in length are found, contact VHA or a VHA-approved repair station for further evaluation.

b. No paint cracks are permitted around the periphery of the trim tab assembly. If paint cracks exist, tap test over trim tab assembly to look for debonds. Report any debonds to VHA or a VHA-approved repair station for further evaluation.

c. No splitting permitted between the trim tab halves. Temporarily seal any areas that are split with PR-1440 or equivalent, and contact VHA for further evaluation.

d. Minor paint damage caused by adjusting the trim tab assemblies or handling may be spot refinished in accordance with 5.11.7 Spot Refinishing.

5.11.5. Tip Closeout

The 20633000-101 main rotor assembly is closed out at the outboard tip with a 1.5-inch-wide fiberglass block.

a. No cracks permitted in the tip closeout. A crack in the tip closure may first appear as a crack in the paint. If a crack is suspected, sand to remove the paint finish and epoxy primer with 180-320 grit sandpaper to expose the face of the tip closeout. Visually inspect the exposed area with a 10x-40x inspection glass. If no crack is found, touch up the paint per 5.11.7 Spot Refinishing. If a crack is found, contact VHA for or VHA-approved repair station for evaluation.

b. Paint scratches, pinholes and paint erosion on the tip closeout may be touched up with epoxy primer or polyurethane paint in accordance with 5.11.7 Spot Refinishing.

5.11.6. Miscellaneous

a. Sweep Alignment Screw. If the sweep alignment screw becomes loose, or is lost, use 3M DP420 or 3M DP460 epoxy adhesive to rebond the loose screw or to install a new MS21318-9 drive screw. Paint erosion or chipping around the sweep alignment screw may be touched up with paint in accordance with 5.11.7 Spot Refinishing.

b. Span Balance Weight Cover. The span balance weight cover is edge sealed with PR-1440 sealant. Touch up any missing or damaged sealant with PR-1440 sealant or equivalent per AMS-S-8802, Type 2, Class B.

5.11.7. Spot Refinishing

VHA finishes the main rotor blade surfaces with an epoxy surfacing film that is co-cured with the skin. An epoxy primer paint is applied to the cured assembly, followed by a two-stage polyurethane topcoat system. The first stage of paint is a basecoat color layer; the second stage of paint is a clear coat layer, with an optional matting agent.

a. When preparing the blade surface for paint touch-up, do not sand into the skin plies.

b. The color of the primer layer and surfacing film is gray. Underneath the surfacing film is a layer of copper mesh for lightning strike protection, which is bonded to the skin. Carbon fiber skin plies are black.

c. A polyurethane film that is co-cured with the skin protects the tapered tip from STA 202.0 to the tip at STA 222.0. Paint erosion is permitted in this area if the polyurethane film has not eroded through and exposed the carbon/epoxy skin.

d. Exposed carbon/epoxy skin not exceeding 0.50 inch aft of the abrasion strip trailing edge must be protected by at least one coat of epoxy primer within 25 flight hours of exposure or 60 days, whichever occurs first.

e. Exposed carbon/epoxy skin exceeding 0.50 inch aft of the abrasion strip trailing edge must be protected by at least one coat of epoxy primer within 10 flight hours of exposure or 30 days, whichever occurs first.

f. Paint peeling may occur. Feather paint edges using 320 grit or finer abrasive paper to stop peeling. Touchup paint is required for appearance only if black carbon/epoxy skin is not exposed. Touch up exposed skin with one coat of epoxy primer.

g. Paint nicks and scratches require touchup paint for appearance only if black carbon/epoxy skin is not exposed. Touch up exposed skin with one coat of epoxy primer.

h. Paint defects such as pinholes, bare edges and small chips do not need surface preparation. Apply primer or paint directly to the defect.

i. Paint touch-up may be performed using either a two-stage or single-stage method. Exact matching is difficult using single-stage paint, so it is recommended to use this method for small areas only. Single-stage paint is Axalta Imron Elite SS Single Stage Color. Any aerospace-quality polyurethane paint may be substituted. Use a compatible epoxy primer. Two-stage paint is Axalta Imron Elite Basecoat Color used with Axalta Imron Elite 8840S Clearcoat.

j. White paint (upper blade surface except tip) is Axalta color 786255.

k. Black paint (lower blade surface) is Axalta color 99.

l. Coca Cola Red (high visibility paint scheme) is Axalta color M1049.

m. Gloss clearcoat is Imron Elite 8430S Clearcoat. Matte coat is Toughguard TG-NHP-701 base with 28% TG-NHP-702 Matte Additive.

CHAPTER 11 – PLACARDS AND DECALS

There are no placards or decals associated with this STC.

CHAPTER 62 – MAIN ROTOR BLADE

62.1 DESCRIPTION

The 20633000-101 main rotor blade is a composite and metallic structure incorporating the NASA-developed RC(4)-12(12% thick) rotor blade airfoil. This is a highly efficient laminar flow airfoil developed to have near zero pitching moments across a broad range of airspeeds. The blade radius and chord length are the same as the existing production blade, except that the tip of the blade is tapered to reduce noise and tip drag. The root fitting is machined titanium alloy plate fastened to the blade root using two .750-inch bolts. Stainless steel bushings are bonded into the root of the blade. The basic blade section is fabricated using unidirectional carbon/epoxy tape and plain weave carbon/epoxy fabric with a rigid cell structural foam core. Span balance is accomplished using weight added in a tip weight pocket. Electroformed nickel and stainless steel abrasion strips are added for erosion protection. The blade is painted with a polyurethane coating, giving the blade assembly either a gloss or a matte luster.

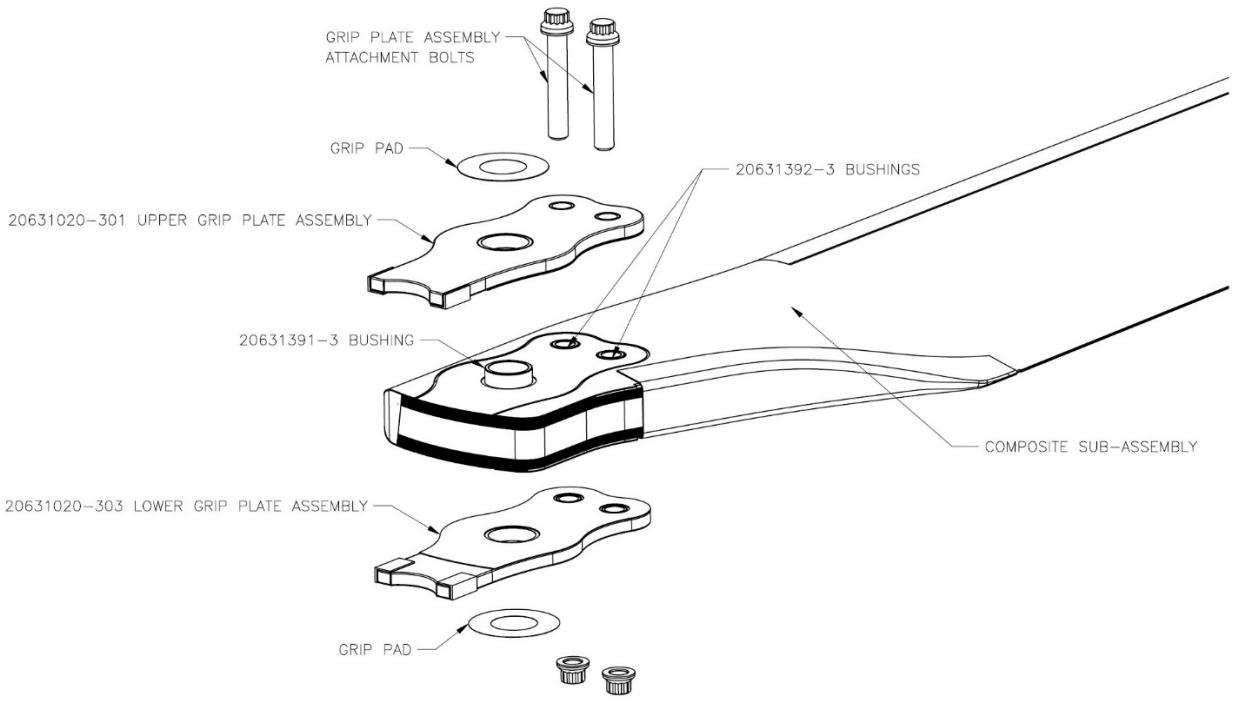

Figure 62-1

Main Rotor Blade Root Assembly

62.2 INSTALLATION

Install the 20633000-101 main rotor blade according to the current FAA-accepted maintenance manual for existing production main rotor blades 206-015-001-ALL except as follows:

The 20633000-101 main rotor blade incorporates a sweep alignment screw positioned on the upper surface of the blade 20 inches inboard from the tip. See Figure 62-2. Tape the alignment cord over the alignment screw.

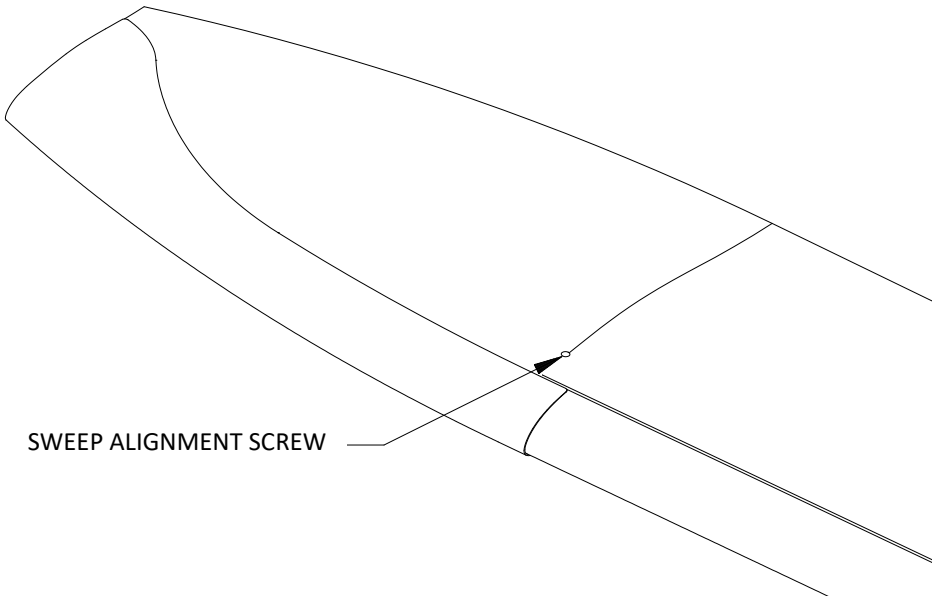

Figure 62-2

Main Rotor Blade Alignment Screw

62.3 DYNAMIC TRACKING AND BALANCING OF MAIN ROTOR BLADES

The 20633000-101 main rotor blade incorporates a different airfoil, different span and chord weight distribution. These differences have an effect on how the blades respond to normal adjustments during tracking and balancing. Blade response will be as predicted, but the magnitude of changes to adjustments may be different depending upon the equipment used.

62.3.1 Dynamic Balancing

Dynamically balance the 20633000-101 main rotor blades according to the current FAA-accepted maintenance manual for the existing production main rotor blade 206-015-001-ALL.

62.3.2 Dynamic Tracking

Dynamically track 20633000-101 main rotor blades according to the current FAA-accepted maintenance manual for the existing production main rotor blade 206-015-001-ALL with the following exceptions and recommended practices.

62.4 WEIGHT AND BALANCE

The weight of each 20633000-101 main rotor blade is recorded on each blade's historical record (log card). Adjust the helicopter's weight and balance record as required.

62.5 CLEANING

Use a soft cloth and non-caustic, non-abrasive cleaner to clean VHA composite main rotor blades.

62.6 GRIP PAD REPLACEMENT

Grip Pad 20631341-1 (see Figure 62-3) may be replaced with Bell grip pad 206-010-233-005. Install either the VHA or Bell grip pad according to the current FAA-accepted component repair and overhaul (CR&O) manual for the existing production main rotor blade 206-015-001-ALL with the following exceptions and recommended practices.

a) Titanium grip plate 20631321-3 is not shot peened. CR&O caution is N/A.

62.7 WEAR PAD REPLACEMENT

Wear pad 20631342-1 (see Figure 62-3) may be replaced with Bell wear pad 206-010-242-003. Install either the VHA or Bell wear pad according to the current FAA-accepted component repair and overhaul (CR&O) manual for the existing production main rotor blade 206-010-200-ALL with the following exceptions and recommended practices.

a) Titanium grip plate 20631321-3 is not shot peened. CR&O caution is N/A.
b) Sweep check is not required.
c) Blade alignment is required after wear pad replacement.

62.8 GRIP PLATE ASSEMBLY REPLACEMENT

As required, contact VHA for 20631020-301/-303 grip plate assembly replacements.

Install the 20631020-301/-303 grip plate assemblies with the required hardware as listed in paragraph a. Undamaged washers and bolts may be reused after being visually inspected for damage. Do not reuse bolts that have deep scratches or burrs on the shaft, cracks, or any damaged threads. Always use new NAS1804-12 Self Locking Nuts with every installation.

a) Hardware required:
   - (2x) NAS 632-54 or MS21250-12052 Bolts
   - (2x) MS20002C12 Countersunk Washers (under the bolt heads)
   - (2x) MS2000212 Flat Washers (under the self-locking nuts.)
   - (2x) NAS1804-12, 12-Point Self Locking Nuts (always use new)
b) Apply primer coating TT-P-1757B or equivalent per MIL-PRF-16173, Grade 2, to shaft of bolts before installation.
c) Apply MIL-PRF-24139 grease to the exterior of the blade root center bushing and to the interior of the grip plate center bushings.
d) Install the countersunk washers under the bolt heads.
e) Locate the grip plate assemblies to the blade assembly. The -301 grip plate assembly is installed on the upper surface; the -303 assembly is on the lower surface.
f) Install the bolts from the direction of the upper surface (data plate surface). Put Loctite Blue 242 or Loctite 248 Threadlocker on the threads of the bolts.
g) Install the nuts and torque to 140-160 ft-lb.

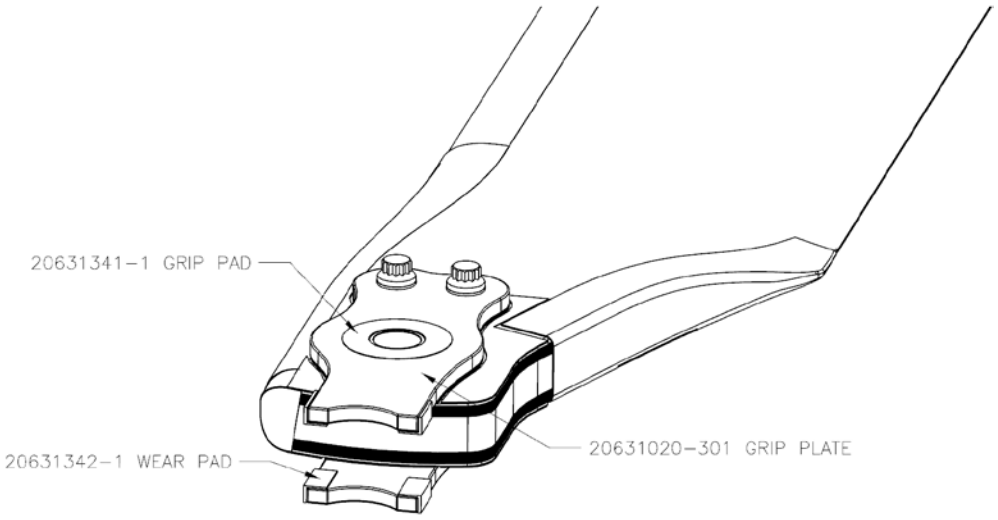

Figure 62-3

Assembled Main Rotor Blade Root Assembly