INFORMATION FOR BANNER TOW OPERATIONS

FAA/FS-I-8700-1

March 27, 2003

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Flight Standards Service
General Aviation and Commercial Division

PREFACE

This publication is presented as an information guide for banner tow operations, to promote safe operations through careful preparation and planning. For preparation and planning, administrative concerns are also addressed.

FAA investigations of aerial advertising/banner towing accidents have revealed that the majority of the accidents are associated with one or more of the following circumstances: the banner pickup maneuver, entangled or snarled banner towlines, or loss of engine power. An analysis of banner tow accidents has revealed the following information:

Of the accidents resulting in ditching in rivers, lakes, or the ocean, the aircraft may have been capable of landing on shore. Sometimes the decision is made to ditch in order to protect the public on congested beaches or riverbanks.

Of the accidents caused by engine failure resulting in an off airport landing, the accidents could have easily occurred offshore. In one ditching accident, the pilot was saved by the timely appearance of a person on a personal watercraft. This person prevented the incapacitated pilot from drowning. The pilot did not have any flotation device. Pilots of banner tow aircraft operated over water should have the capability to save themselves in the first critical minutes of a ditching accident. FAA-approved flotation devices should be readily available.

Lifeguard stations along riverbanks or beaches are generally not equipped to respond to offshore aviation accidents. Lifeguards are normally not trained to deal with the HAZMAT issues of released fuel and oil and may not be familiar with the aircraft exits and seat belt assemblies. It is recommended that an FAA-approved personal flotation device be carried in the aircraft when banner tow flying along beaches, rivers, or lakes.

The FAA would like to thank everyone who participated in the development of this publication, especially the support provided by Aerial Sign Company, Inc., of Hollywood, Florida.

This publication can be viewed and down-loaded off the Internet at Universal Resource Locators: http://www.faa.gov/avr/afs/infoforgeneralaviation/, http://www.faa.gov/avr/afs/infoformechanics/, http://www.faa.gov/avr/afs/infoforpilotsowners/, and http://www.faa.gov/avr/afs/, under the heading, “Information and Advisories.”

/s/
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CHAPTER 1. INTRODUCTION

This publication provides information on safety recommendations and available procedures to assist individuals in Banner Tow Operations.

TERMINOLOGY. For the purpose of this publication, the following terminology is applied.

Aerial Pickup Towline. The line connecting the grapple hook to the banner. The line is made of non-stretching material, extended length 250 ft. (76 m) is provided with an endless loop at forward end and snap at aft end for connecting to mast assembly bridle ring.

Banner. A banner is an advertising medium supported by a temporary framework attached externally to an aircraft and towed behind that aircraft.

Grapple Hook and Cable Assembly. The device used to engage the towline when making an aerial pickup launch; consists of a ring on forward end (which connects to the tow-hitch) connected by a line to a multi-prong bar on aft end, provided with a safety link at forward end.

Mast Assembly or Lead Pole. A rigid pole that connects to the front of the banner and is equipped with bridle lines that join at a collector ring to which the towline couples. The mast stabilizes the banner and controls roll attitude. Only non-conductive materials are to be used.

Rudder Guard or Vee Bar. A device attached to the aft fuselage to guide the grapple line away from the tailwheel or control surface horns.

Safety Link. A weak link contained in the towing apparatus as recommended by FAA AC 43.13-2A. The link is strong enough for towing, but breaking strength is low enough to protect airplane and pilot in the event of an accidental overload.

Spring Keeper. A short length of spring attached to the bottom of the horizontal stabilizer or empennage.

Swim Line. A designated distance from the shoreline, which has an outer limit within which people would normally swim. This distance is usually set at 180 feet from shore.

Takeoff Launch Towline. Similar to Aerial Pickup Towline, but used for takeoff launch. Ring on forward end of towline couples to tow hitch, followed by stiffened section of the line that avoids fouling of the tailwheel. Made of non-stretching materials, this type of towline is normally 350 ft. (107 m) long.

Tow Hitch. The tow release mechanism and its mounting fixture that is normally attached to the tail of the airplane, serves as a point of attachment for all trailing equipment, and has a remote control release from the cockpit. Term usually includes the cockpit control.

CHAPTER 2. EQUIPMENT AND OPERATION SAFETY ISSUES

GRAPPLE HOOK DEPLOYMENT. A crucial event during banner tow operations is the deployment of the grapple hook. The grapple hook should be released in such a manner that it, or the grapple line, does not snarl in aircraft control surfaces or landing gear, to include the tailwheel, in conventional gear configurations. The hook line must be observed to have clearance before every low approach. If the grapple line becomes snarled on the tailwheel or a control surface, a reduction in the capability of the pilot to control the airplane may occur. In a worst case scenario, movement of the rudder or elevator control surface may be limited or even jammed. Further, the pilot may not be able to release the grapple line because of the entanglement. The best cure is prevention.

PREVENTION OF GRAPPLE LINE ENTANGLEMENT. Depending upon aircraft configuration, several devices can be used to help avoid entanglement.

The tow hitch end of the grapple line can be stiffened to prevent it from looping around the tailwheel or the empennage as the line is deployed. Stiffening of the line may be accomplished by working a 2-foot length of stiff plastic garden hose over the line. The hose is then carefully heat formed over the knots at the ring. See Figure 2-1, Examples of a Plastic Garden Hose Installation.

Devices, such as spring keepers, can be used to hold the grapple line away from the tailwheel or the tail control surfaces until the grapple line is released. The spring keeper is attached to the bottom of the horizontal stabilizer or the empennage bracing wire into which the grapple line is connected.

The configuration of some aircraft may not permit the use of keepers to hold the grapple line away from the airframe. As an alternate method, the use of a rudder guard or Vee bar (if a multiple rope system is used), may be helpful. This device is attached to the aft fuselage and serves to guide the grapple line away from the tailwheel or control surface horns during deployment. See Figure 2-2, Examples of a Vee Bar.

The pilot should avoid uncoordinated or abrupt maneuvers during grapple line deployment. Trained ground support personnel should be available during banner pickup operations, and be briefed to observe the aircraft and inform the pilot if the line appears to be trailing abnormally. Picking up a banner with a loosely, snarled line will only tighten it and complicate the problem.

BANNER PICKUP. The banner pickup is the most critical portion of a banner tow operation. A typical flight begins by taking off with the grapple hook assembly stowed. Upon reaching a safe altitude, the pilot will deploy the grapple hook and allow it to trail aft of the aircraft. See Figure 2-3, Examples of Typical Towrope Configuration, Stowed for Deployment.

A shallow approach is conducted perpendicular to the pickup-masts in an effort to snag the towline loop with the grapple hook. As the masts are reached, the airplane is rotated into a steep climb to assure the banner will be peeled off the ground instead of jerked off at an acute angle, depending upon aircraft performance capabilities. As the banner is peeled off the ground, back pressure is gradually reduced until the airplane is climbing at a normal angle with the banner in tow.

The approach to the pickup-masts should be flown appropriate to the performance characteristics of the aircraft. Care must be taken to avoid snagging the towline with the airframe. An approach that is both too low and too slow may result in the grapple hook bouncing off the ground. The length of

the grapple hook and line assembly should be limited to a length that will not allow the hook to strike the cockpit area of the airplane if it should come up over the fuselage. Grapples contacting a hard surface have been known to bounce upward and forward, over the airplane, snarling the horizontal stabilizer or a wing.

Stalls during the banner pickup procedure constitute one of the more frequent causes of banner tow operational accidents. A stall occurs when an airfoil reaches a critical angle of attack and is a function of wing loading, independent of airspeed. In fact, an excessively abrupt rotation of an airplane during a pickup, or a snap or steep turn after a missed pickup, may be sufficient to precipitate an accelerated stall.

NOTE: The formula for stall is the square root of the load factor times the normal stall speed. Gradually reducing back pressure while in the climb as the banner is picked up increases the margin from the stall threshold by decreasing the wing loading and consequently the angle of attack.

FLYING WITH A BANNER IN TOW. The accidental release of a banner in flight may not be hazardous to the tow plane or crew but it may pose a threat to people and property on the surface. Banner towlines should be examined carefully for flaws before each towing day. Grapple hooks should also be examined for cleanliness and smoothness. Any surface irregularities on a hook can act as an abrasive and degrade the towline loop during the pickup as the line moves laterally over the hook while tension on the line is increased. Whenever possible, banner material and lines should be of non-conductive material. This reduces the risk of shorting out power lines in the case where a banner is released over power lines by accident.

LANDING WITH BANNER IN TOW. Should a malfunction make it impossible to release the banner, it is generally uneventful if a hard surface runway is used. However, a special technique can be used if the landing is attempted on a sod or dirt runway. If the masthead and banner lay down on the sod runway, each blade of grass folds over the mast and each individual letter pole on lettered banners causes drag. The pilot needs to be aware that the masthead may dig into the soft turf like an anchor, stretching the tow line, and sometimes breaking it. If the tow line breaks, the sudden release of energy will cause the airplane to pitch down and a nose over condition may occur. This condition can be countered by maintaining back pressure on the flight controls and adding full power once the drag caused by the masthead is experienced. After the airplane is again stabilized, the power is reduced.

MULTIPLE TOW HITCHES. When multiple tow hitches are used, an airplane may tow a succession of banners without having to land and reinstall a grapple line after every drop. A bank of as many as four or five tow hitches may be installed on the aircraft and a grapple line is affixed to each. These lines are stowed within reach of the pilot in the same manner as previously discussed. Care must be taken to prevent multiple lines from tangling, and since the pilot will be confronted by a multitude of grapples and hitch releases, each line and release should be positively matched to prevent confusion in the event of an emergency. The length of flights and fuel consumption should be considered in determining how many hooks will be added to a multiple tow hitch. See Figure 2-4, Examples of Multiple Grapple Hook Installation.

BOOM-HOOK SYSTEM.

An alternative to the multiple tow hitch system is a boom pickup system. A typical installation consists of a rigid boom pivoted aft of the landing gear, approximately the length of the aft fuselage. The boom is equipped with a hook that can be used to snag the towline and pickup the banner. A retract cable is employed to stow the boom under the fuselage during takeoff and landing.

The boom system eliminates the multiple grapple line of the multiple hitch system as well as the problems previously discussed concerning grapple line snarling and grapple bounce. On the negative side, due to the relatively short length of the boom, the airplane must be flown more carefully during the banner pickup and high enough to avoid snagging the towline with the landing gear yet low enough to engage the bridle with the hook. Turbulence can cause the hook to bounce while in the normal trail position and it may swing from side to side in a crosswind.

FIGURE 2-1. EXAMPLES OF A PLASTIC GARDEN HOSE INSTALLATION

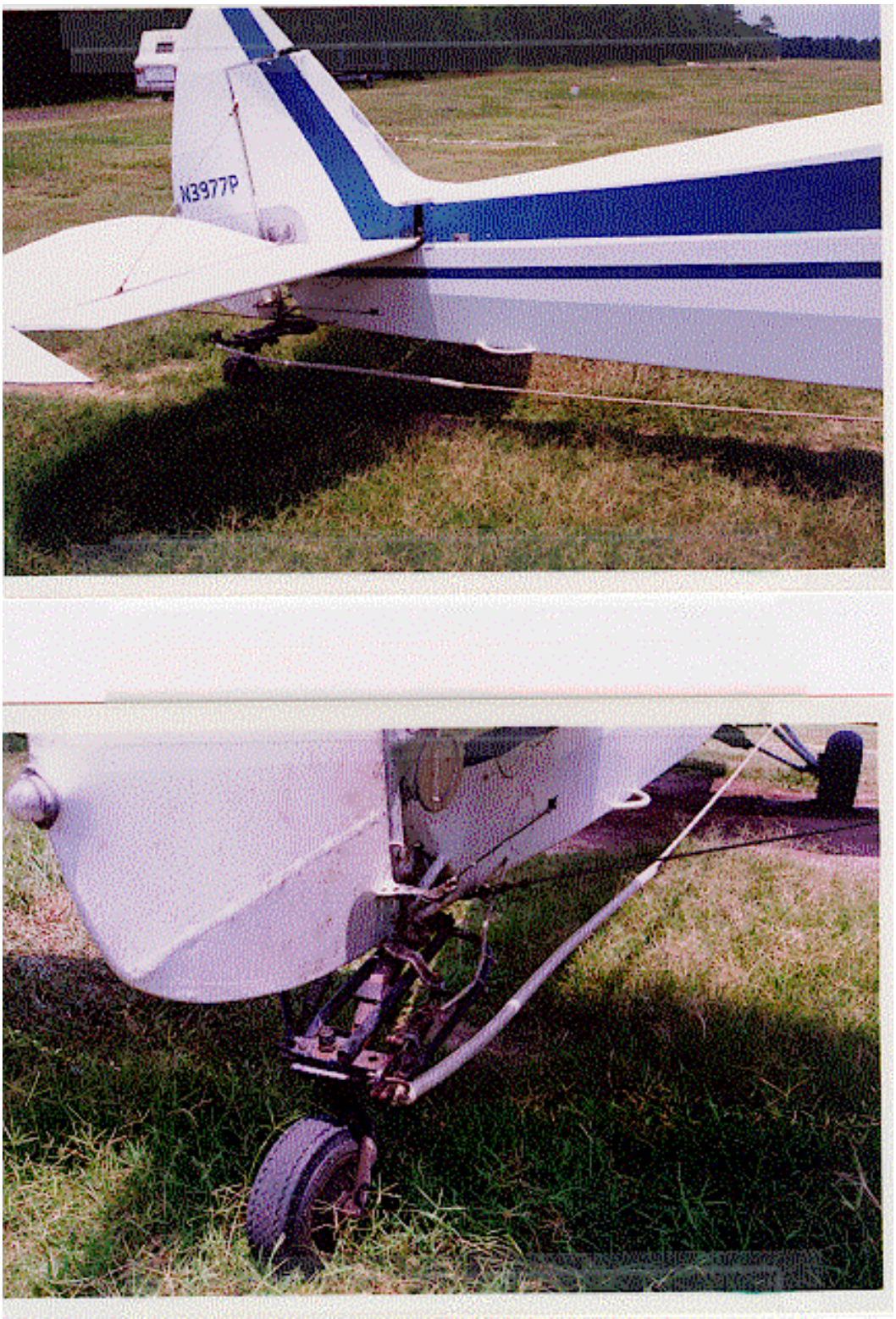


FIGURE 2-2. EXAMPLES OF A VEE BAR

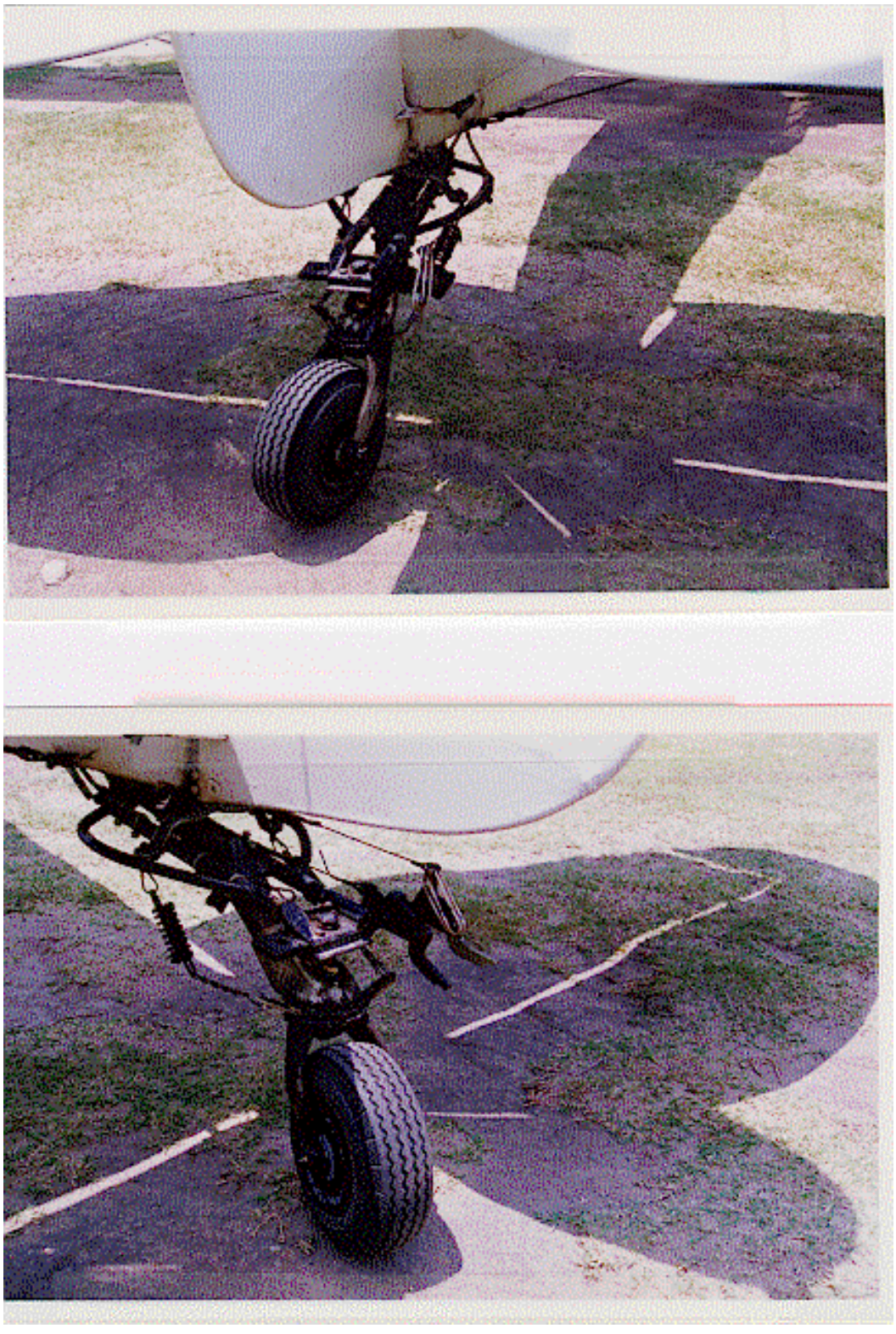
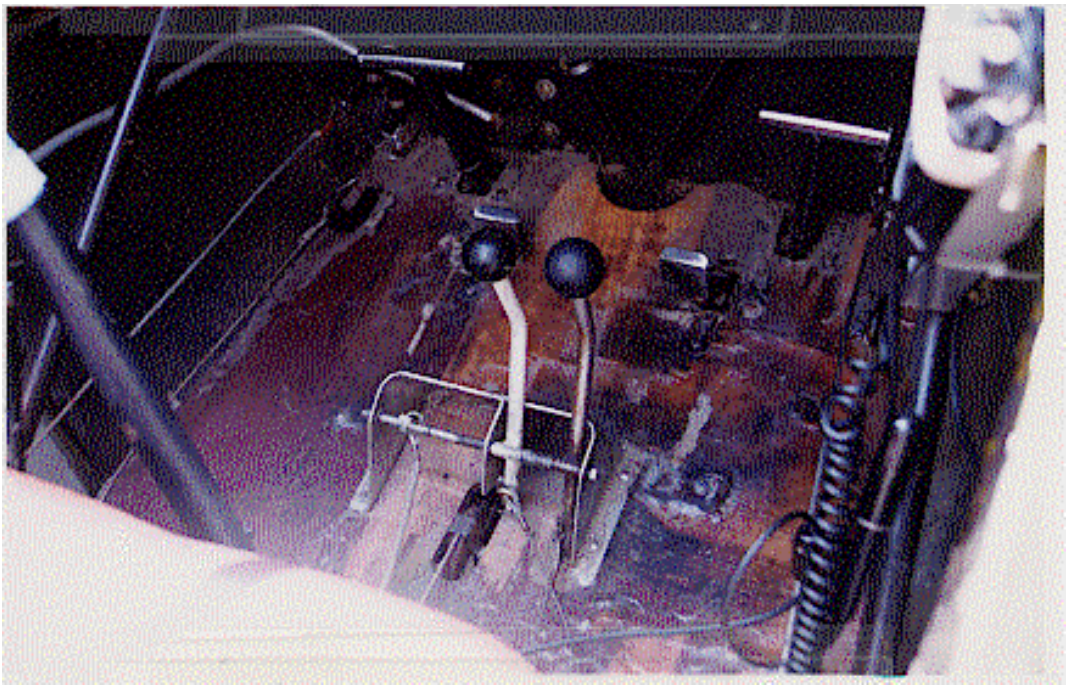


FIGURE 2-3. EXAMPLES OF TYPICAL TOWROPE CONFIGURATION, STOWED FOR DEPLOYMENT

FIGURE 2-4. EXAMPLES OF MULTIPLE GRAPPLE HOOK INSTALLATION



CHAPTER 3. FAA FORM 7711-2, APPLICATION FOR CERTIFICATE OF WAIVER OR AUTHORIZATION

Items from FAA Form 7711-2 are explained below for the purpose of uniformity.

FRONT SIDE OF FORM.

Items 1 and 2, Name of Organization/Name or Responsible Person. If you are a representative of an organization, the organization's name should appear in Item 1. Your name and title or position as the organization's representative, for application purposes, should appear in Item 2. If you are not representing an organization, the term N/A should be entered in Item 1 and your name entered in Item 2.

Item 3, Permanent Mailing Address. Permanent mailing address of the organization or responsible person entered in Item 2.

Item 4, Title 14 CFR Part 91, Section 91.311, Minimum Safe Altitudes: General, to be Waived. List all sections of the regulations to be waived.

Item 5, Detailed Description of Proposed Operations. It is sufficient to use the term aerial advertising/banner tow operations for a description. However, additional information may be included.

Item 6, Area of Operation. Identify the geographic areas of the intended banner tow operation.

Item 7, Time Period. List the beginning dates and hours and ending dates and hours when the banner tow operations will be conducted. The maximum time period for operations that can be waived is 24 calendar months. The application should be submitted to the Flight Standards District Office (FSDO) at least 30 days before the beginning date of the banner tow operation or for renewal. If the application is for a one-time banner tow operation, it is advisable to request an alternate date for the operation. Alternate dates should be listed in this item. If there are any questions, please contact the FSDO.

Item 8, Aircraft Make and Model. List the names of all pilots, their certificate numbers, ratings, home addresses, and the makes and models of all aircraft that will be used in the banner tow operation. If the type of aircraft and/or the names of the pilots are not known at the time the application is submitted, the FAA will accept the application with the statement, "A list containing aircraft and/or pilot information will be furnished on [date]."

BACK SIDE OF FORM.

Items 9 though 14 apply to air show and air race waiver requests only.

Item 15, Certification. The applicant or an organization's representative must sign in this block.

FIGURE 3-1. FAA FORM 7711-2, APPLICATION FOR CERTIFICATE OF WAIVER OR AUTHORIZATION (FRONT)

No certificate may be issued unless a completed application form has been received (14 C.F.R. 91, 101, and 105).

US Department of Transportation
Federal Aviation Administration

APPLICATION FOR CERTIFICATE OF WAIVER OR AUTHORIZATION

Form Approved: O.M.B. No. 2120-0027

APPLICANTS - DO NOT USE THESE SPACES

Region	Date

Action
☐ Approved ☐ Disapproved - *Explain under "Remarks"*

Signature of authorized FAA representative

INSTRUCTIONS

Submit this application in triplicate (3) to any FAA Flight Standards district office.

Applicants requesting a Certificate of Waiver or Authorization for an aviation event must complete all the applicable items on this form and attach a properly marked 7.5 series Topographic Quadrangle Map(s), published by the U.S. Geological Survey (scale 1:24,000), of the proposed operating area. The map(s) must include scale depictions of the flightlines, showlines, race courses, and the location of the air event control point, Police dispatch, ambulance, and fire fighting equipment. The applicant may also wish to submit photographs and scale diagrams as supplemental material to assist in the FAA's evaluation of a particular site. Application for a Certificate of Waiver or Authorization must be submit- ted 45 days prior to the requested date of the event.

Applicants requesting a Certificate of Waiver or Authorization for activities other than an aviation event will complete items 1 through 8 only and the certification, item 15, on the reverse.

1. Name of organization	2. Name of responsible person

3. Permanent mailing address	House number and street or route number	City	State and ZIP code	Telephone No.

4. FAR section and number to be waived

5. Detailed description of proposed operation *(Attach supplement if needed)*

6. Area of operation *(Location, altitudes, etc.)*

7a. Beginning *(Date and hour)*	b. Ending *(Date and hour)*

8. Aircraft make and model (a)	Pilot's Name (b)	Certificate number and rating (c)	Home address *(Street, City, State)* (d)

FAA Form 7711-2 (6-86) Supersedes Previous Edition AFS Electronic Forms System - JetForm FormFlow - 12/1998

FIGURE 3-2. FAA FORM 7711-2, APPLICATION FOR CERTIFICATE OF WAIVER OR AUTHORIZATION (BACK)

ITEMS 9 THROUGH 14 TO BE FILLED OUT FOR AIR SHOW/AIR RACE WAIVER REQUESTS ONLY.

9. The air event will be sponsored by:

10. Permanent mailing address	House number and street or route number	City	State and ZIP code	Telephone No.

11. Policing *(Describe provisions to be made for policing the event.)*

12. Emergency facilities *(Mark all that will be available at time and place of air event.)*

☐ Physician ☐ Fire truck ☐ Other - *Specify* _____

☐ Ambulance ☐ Crash wagon _____

13. Air Traffic control *(Describe method of controlling traffic, including provision for arrival and departure of scheduled aircraft.)*

14. Schedule of Events *(include arrival and departure of scheduled aircraft and other periods the airport may be open.)*

Hour (a)	Date (b)	Event (c)

If sufficient space is not available, the entire schedule of events may be submitted on separate sheets, in the order and manner indicated above.

Please Read > The undersigned applicant accepts full responsibility for the strict observance of the terms of the Certificate of Waiver or Authorization, and understands that the authorization contained in such certificate will be strictly limited to the above described operation.

15. Certification - I CERTIFY that the foregoing statements are true.

Date	Signature of Applicant

Remarks

FAA Form 7711-2 (6-86) Supersedes Previous Edition AFS Electronic Forms System - JetForm FormFlow - 12/1998

CHAPTER 4. BANNER TOW SPECIAL PROVISIONS

ADMINISTRATION. Special provisions are issued in the interest of safety and become a part of the Certificate of Waiver. These provisions may be issued because the proposed operation uses nonstandard equipment or for other reasons such as geographical considerations, pilot limitations, air traffic control limitations, or weather conditions. The FSDO prescribes provisions appropriate to the safety of the operation. Noncompliance with the provisions attached to the certificate is noncompliance with the Certificate of Waiver. The provisions and limitations of the Certificate of Waiver shall apply regardless of any statements contained in the application. Failure to comply with any provision or limitations specified in the Certificate of Waiver constitutes cancellation of the authorization in the Certificate of Waiver.

Sample Special Provisions for Banner Tow Operations. These special provisions are for suggested use only. Modification or development of new provisions may be required.

- Conduct all banner tow operations in VFR weather conditions defined by Title 14 of the Code of Federal Regulations (14 CFR) part 91, section 91.155. Operations shall be conducted only between the hours of official sunrise and official sunset.

- The certificate holder shall obtain the airport manager's approval to conduct banner tow operations at each airport of intended operation.

- If the airport involved has an FAA control tower, the holder shall inform the FAA control tower of the time of the banner tow operation.

- Notify appropriate airport officials in advance when banner tow operations will be in close proximity to each non-towered airport.

- The FAA shall approve tow attachments and release mechanisms on the aircraft.

- A thorough inspection of the aircraft and special equipment shall be made before each day's operation by the operator/pilot.

- Only essential crewmembers will be carried during banner tow operations.

- When banner tow operations are conducted around congested areas, due care will be exercised so that in the event of emergency release of the banner and/or tow line, it will not cause undue hazard to persons or property on the surface.

- Banner pickup or banner drop should be in a pre-designated area not closer than 500 feet to taxiways, runways, persons, buildings, parked automobiles, and other aircraft whenever possible. If the tow plane lands with the banner attached, due care should be exercised to avoid obstacles and endangering other aircraft in the air or persons, property, or aircraft on the surface.

- Only the aircraft and pilots on the attached list may be used under the terms of this certificate. Changes to the list must be submitted to the FSDO for approval at least 5 days prior to operating.

For flights in which the pilot receives no compensation, the pilot of the tow aircraft shall hold at least a valid Private Pilot certificate and have a minimum of 200 hours Pilot In Command (PIC) time.

Operations outside the geographic area of the issuing FSDO will be coordinated with the appropriate jurisdictional FSDO in advance and the operator will comply with all special provisions imposed by that office.

As required, meetings sponsored by the FSDO to discuss changes, amendments, additions to airspace, regulations, or flight patterns must be attended by the operator.

Each first time banner pilot presented by the operator must be observed in pre-flight, banner pick-up, tow, and banner drop by the FSDO prior to assignment to a commercial banner tow flight.

A current copy of the following is to be carried onboard all aircraft:

- If the aircraft is a restricted category aircraft, the operating limitations must also be in the aircraft
- Certificate of Waiver or Authorization
- List of all approved pilots and aircraft
- For helicopter banner tow operations, add the following

  - The provisions of 14 CFR section 91.119(d) are not applicable when operating under the terms of this certificate.

  - Section 91.119(c) operations over congested areas must not be lower than 1,000 feet and operations elsewhere shall be prohibited. See TFRs for operation around open air assemblies.

TRAINING FOR BANNER TOW OPERATIONS. Before operating under the terms of the authorization, the holder of the authorization should ensure that all pilots satisfactorily complete ground and flight training applicable to the aircraft used and review 14 CFR sections appropriate to such operations, terms, and special provisions of the authorization. A proficiency flight check in one of the aircraft to be used for banner towing should also be conducted. This proficiency flight check typically includes the commercial pilot operations listed in the Commercial Pilot Practical Test Standards, flight at critically slow airspeeds, maximum performance maneuvers, and emergency procedures to include equipment malfunctions and specific banner towing safety procedures. This training should include procedures that will allow the pilot to conduct a go-around in the event the banner does not properly release during drop-offs. See Figure 4-1, Suggestions for Banner Tow Training Syllabus; a suggested training program outline. Ground support personnel should also receive training appropriate to the banner tow operation.

Pilots authorized to operate aircraft with multiple release systems, should receive training that includes methods to visually verify:

- Hook and release mechanisms prior to each pickup and drop-off.
- That release handles are numbered in sequence and positioned in a manner that will allow the pilot to activate all handles.

- That the rack or other device used to secure grapple hooks to the aircraft should be labeled in a letter or number sequence that is easily recognizable by the pilot while airborne to correspond with the appropriate release handle

- That before being authorized to operate an aircraft with a multiple release system, it is required that each pilot be trained to proficiency and certified for multiple release systems by a qualified instructor pilot

Training records should be kept for a minimum of 14 months and made available for inspection by the Administrator upon request.

The holder of the Certificate of Authorization shall maintain and keep current at the home base of operations designated in the application, the following records:

- The date of each banner tow service

- The N number of aircraft used for each operation conducted

- The name, address and certificate number of each pilot used in banner towing operations and the date the pilot met the knowledge and skill requirements and completed the flight proficiency check described in Figure 4-1, Suggestions for Banner Tow Training Syllabus

- NOTE: If the company invoice has all the above-required information, the invoice would suffice for this record.

These records must be kept for a minimum of 14 months and made available for inspection by the Administrator upon request.

RULES TO FOLLOW FOR FLIGHT OPERATIONS. Operations around congested areas or around open-air assembly of persons shall be executed in accordance with a planned course of action with emphasis on selection and availability of emergency landing areas. Due to the area around which such operations are usually conducted (congested areas/open-air assembly of persons), the pilot will exercise special precautions to ensure compliance with section 91.119(a)(b)(c). Operations around congested areas/open-air assemblies must be no lower than 1,000 feet above the highest obstacle. The operator should take into account the lowest point on the trailing banner when determining a helicopter's correct flight altitude. For safety purposes, the altitude should be sufficient for the aircraft and trailing banner to comply with section 91.119(b)(c). Some banners may extend more than 250 feet behind the aircraft. Operations may be within a horizontal radius of 2,000 feet and operations elsewhere shall be in compliance with section 91.119(c). Section 91.119(d) is not applicable to helicopters under the terms of this authorization except near open air assemblies.

NOTE: Due to Temporary Flight Restrictions (TFR) requirements, distances laterally may be limited to no closer then 3 statue miles.

When banner tow operations are conducted at stadiums, the following limitations are to be included in the certificate of waiver.

- At **no time** shall an aircraft fly across a stadium. All flights must be outside the stadium boundary. Check NOTAMs for any TFR requirements.

- An aircraft overtaking another aircraft shall pass to the outside and well clear of the overtaken aircraft.

- The direction of flight around a stadium will be established by local policy.

When banner tow operations are being conducted along ocean front beach areas, lakes or rivers, the following limitations are to be included in the Certificate of Waiver.

- Comply with 14 CFR section 91.119, Minimum Safe Altitudes: General.

- Before conducting towing operations within Class B, C, or D airspace, each pilot will establish and maintain two-way radio communications with Air Traffic Control (ATC) for coordination purposes and additional instructions or clearances as required by ATC.

Before conducting banner operations:

- The authorization holder will sign and comply with any ATC banner tow operator's Letter of Agreement

- ATC Letters of Agreement or, a copy, will be carried aboard the aircraft during banner tow operations

- Banner tow operations will be conducted during day visual flight rules (VFR)

- At no time will an aircraft towing a banner fly directly over another aircraft or fly under another aircraft towing a banner

- Banner tow operations at airports will be conducted in accordance with ATC clearance or the local standard traffic pattern procedures established by airport management

- All pilots of banner tow aircraft must adhere to the regulatory requirements regarding seeing and avoiding other aircraft (14 CFR section 91.113(b))

- All banner tow operators will meet with the issuing FSDO as required to discuss amended, changed, new regulations, flight patterns, TFR's, or other data deemed necessary by the FSDO

FIGURE 4-1. SUGGESTIONS FOR BANNER TOW TRAINING SYLLABUS

Description of sample flight training for banner tow pilots. Some areas may not be applicable in all situations and additional areas may be added.

I. Hands-on Training for Special Equipment for Tow Aircraft.

A. Traffic Patterns. The pilot is trained to maintain an accurate pattern altitude in the traffic pattern while towing a banner.

B. Banner Pickup Maneuver: Swings.

1. The pilot should practice swings. This is accomplished without a hook installed on the aircraft and is designed to produce an understanding of the visual cues associated with a banner pick-up maneuver.

2. The pilot should fly swings with a hook installed on the aircraft. During this time there is a ground support person, with a radio, positioned in the vicinity of the poles providing precise information about the height of the hook during the maneuver and whether the swing was early or late.

3. When the instructor considers that the pilot has the mental picture and understanding of the swing, the pilot should complete actual pickups and drops of a banner with the instructor monitoring the maneuver and providing additional instruction as required.

4. The pilot in training should fly actual banner flights accompanied by a qualified banner tow pilot if possible. This banner flight time should teach the pilot:

a. Familiarization of banner routes, check points or landmarks

b. Fuel management

c. ATC procedures and communications

d. If flights are conducted with two people in the cockpit, limiting the banner must be considered to compensate for the weight of the extra person. Aircraft must be operated within its weight and balance limitations.

II. Solo Work.

A. Upon completion of training, the pilot will complete pickups and drops while a check pilot monitors the maneuvers from a ground location near the pickup poles and provides instruction as necessary.

B. The pilot should include upper air work including power on and off stalls, slow flight, steep turns, as well as takeoffs and landings. This provides awareness and appreciation of the flight characteristics of the aircraft.

FIGURE 4-2. SAMPLE OF PRE-FLIGHT AND POST-FLIGHT CHECKLIST OF BANNER TOW EQUIPMENT

The following is a suggested checklist. Its purpose is to help the banner tow operator better understand the importance of the pre and post flight inspection of the equipment used in banner towing. It is NOT intended to replace or supersede the current FAA approved Aircraft Flight Manual, Pilot Operating Handbook, or Rotorcraft Flight Manual for the aircraft being flown. No person may operate a civil aircraft without complying with the Abnormal/Emergency procedures.

a. If a safety link is used, the safety link should be closely checked following each flight. When a heavy load has been exerted on the safety link the ends of the link will bend out of their parallel position. High winds, excessive speeds, and extra large or extra long signs, may cause the load limits of the link to be exceeded.

b. Check the ends of the tow-lines, hook lines, and/or grapple lines frequently for wear. Examine the hemming of the letter fabric. If an edge is snagged or coming loose at the hem, repair it before the next flight.

c. Check the operation of the tow hitch.

d. A suitable shoulder harness should be installed.

e. Inspect the grapple hook for anything unsafe.

f. Check the banner layout assuring that nothing is twisted, and the towline at front of banner is in good condition.

g. Check the banner for any tangles or uncoupled fasteners.

h. Inspect the grapple line and assure that it is correctly coupled before takeoff.

i. Extend the main section of the towline along the flight path to minimize slack.

j. Attach the towline snap to the bridle ring on the mast assembly.

k. Inspect the towline for serviceable condition. It will usually start to deteriorate from the inside rope first. Small broken fibers will be visible extending through the outer strands, indicating an unsafe condition. There should not be any knots in the line. Knots weaken a towline.

DESCRIPTION OF SUGGESTED AIRPLANE FLIGHT MANEUVERS.

I. The Banner Pickup (All procedures should be adjusted for different aircraft performance).

a. After takeoff and the grapple hook is dropped, the pilot should visually inspect the grapple line and hook to ensure it did not become entangled in the tail section of the aircraft during deployment.

b. The airplane approaches the poles at 250 feet AGL at 1.6 times the airplane stall speed.

FIGURE 4-2. SAMPLE OF PRE-FLIGHT AND POST-FLIGHT CHECKLIST OF BANNER TOW EQUIPMENT - Continued

c. At the point where the down-line is initiated, the airplane is pitched down at a minimum of 5° and maximum of 15° angle while reducing the engine power to maintain proper airspeed.

NOTE: Where to initiate the down-line varies depending upon wind conditions.

d. At the point of the mast poles, full throttle should be selected to assure a safe climb-out. (If the banner should snag another banner or object on the ground, the pilot would have a better chance of reacting to this situation.)

e. Minimum airspeed through the pickup poles should be 1.6 times stall speed.

NOTE: The pilot should always fly to a point at pickup. This will allow the ground crew to give direction to the pilot after a missed attempt such as 10 feet forward or aft of the pilot's established reference point.

f. Upon hooking the banner the airplane is climbed at a minimum speed of 1.2 times the stall speed and maximum engine power is applied.

g. Upon reaching 225 feet - 250 feet AGL, maintain proper forward momentum and altitude. Although the climb is stopped, the aircraft may remain in a nose-high attitude.

h. Full power and adequate airspeed are maintained until reaching 1,000 feet AGL.

II. The Banner Drop (All procedures should be adjusted for different aircraft performance).

a. The airplane approaches the designated drop zone at 300 feet AGL.

b. Upon reaching the drop zone full power is applied prior to releasing the banner and minimum airspeed should be 1.2 times stall speed. Full power should be maintained after the banner release handle is activated. This is a safety procedure in the event the banner does not release and snags an object. The pilot would then have power to assist in recovery. Caution should be exercised as to not exceed 1.5 times the stall speed of the aircraft.

c. Rotation is initiated prior to dropping the banner.

d. When the airplane is established on the up-line a delay of approximately 3 seconds is incorporated into the maneuver to allow the banner to reach its lowest altitude.

e. After the banner is released, the pilot should be prepared to hold the controls in position as the nose will pitch up because of the reduction of drag after banner release.

FIGURE 4-2. SAMPLE OF PRE-FLIGHT AND POST-FLIGHT CHECKLIST OF BANNER TOW EQUIPMENT - Continued

III. Description of Helicopter Flight Maneuvers.

a. Helicopter operators must provide a means to prevent the banner from becoming entangled in the helicopter's tail-rotor during all phases of flight. The only way to prevent the banner from tangling in the tail-rotor in the event of a power failure may be to immediately jettison the banner.

b. A 14 CFR part 133 operator may tow a banner using an external load attaching device without a Certificate of Waiver or Authorization. However, the part 133 operator must have at least a Class B authorization on the part 133 operating certificate.

c. The provisions of 14 CFR section 91.119(d) is not applicable when operating with a banner. The operator must take into account the lowest point on the trailing apparatus when determining the helicopter's correct flight altitude in order to comply with section 91.119(b)(c). Operations over congested areas or open-air assemblies of persons must not be lower than 1,000 feet above ground level and operations elsewhere will be conducted in compliance with section 91.119(c).

d. The pilot needs to be aware that the masthead may dig into the soft turf like an anchor, stretching the rope, and sometimes breaking it.

e. Only jettisonable grapple hooks should be used for banner tow operations.

IV. Oversize Banners Towed by Helicopters. Extremely large banners using long suspension ropes and heavily weighted bags for flight positioning require additional review. The operator should take into account the lowest point on the trailing banner when determining a helicopter's correct flight altitude. For safety purposes, the altitude should be sufficient for the aircraft and trailing banner to comply with section 91.119(b)(c). Some banners may extend as much as 250 feet behind the aircraft.

CHAPTER 5. BANNER TOW AIRCRAFT

Certain procedures for towing should be observed in addition to normal flight rules and safety measures. Tow at the lowest airspeed that provides adequate engine cooling, positive control, and a safe margin over stall. The drag of the banner increases in proportion to the square of an increase in speed; an increase in airspeed of 10% will produce a 20% increase in drag, requiring more power. Wear of the banner equipment will also be greater at the higher speeds.

During towing operations the engine must work harder than normal. Watch the airspeed indicator and work toward finding the best tow speed for the airplane. At towing speeds, a climb prop is more efficient than a cruise prop. Use the flattest pitch and largest prop diameter allowable for the engine and airplane. Slow flight may reduce engine cooling on some airplanes, with resultant cylinder head temperature increase, although oil temperatures may not be up significantly.

On some airplanes, a slight extension of flaps helps by effectively increasing the attack angle of the wings, allowing the nose to be a little lower for better visibility and engine cooling.

AIRCRAFT REQUIREMENTS. No person may operate an aircraft used in banner towing unless:

The aircraft has a current annual inspection in accordance with 14 CFR part 43 or has received an inspection for the issuance of an airworthiness certificate in accordance with 14 CFR part 21.

A tow hitch release system is installed using methods, techniques, and practices approved by the Administrator (type certificate data sheets, aircraft specifications, aircraft manufacturer's kits, STC, FAA field approvals, AC 43.13-2A, etc.).

A safety link or other safety device is installed between the tow hitch release and banner assembly. This device must be designed to break away at loads no greater than the structural design limits of the tow release system.

A guard or other protective device is installed to prevent the grapple hook assembly from draping across the rudder horn and/or tailwheel when the grapple hook is dropped.

OPERATION OF BANNER TOW AIRCRAFT WITH DOOR REMOVED. When an aircraft is used for a special purpose such as banner towing, the operator may determine it is advantageous to operate the aircraft with a door removed. If an operator wishes to operate an aircraft with a door removed, the operator should contact the local FSDO for guidance.

Owners or operators interested in obtaining an authorization for those aircraft listed in AC 105-2C and Form 7711-2, should forward a written request to the FSDO that has jurisdiction over the area in which operations are to be conducted.

The request should contain the following information:

- Name and address of the registered owner
- The make, model, serial number, and registration number of the aircraft

- The location where the aircraft is normally based
- The reason for the aircraft to be operated with the door removed

A copy of the operating limitations will be forwarded to FAA Aircraft Registry, Oklahoma City, OK for enclosure into the aircraft historic file.

AIRWORTHINESS REQUIREMENTS FOR BANNER TOW AIRCRAFT.

An aircraft that is in full compliance with its type design and has an FAA-approved banner tow installation may be operated under a standard airworthiness certificate for banner towing purposes. An aircraft that has a standard airworthiness certificate and is modified for a special purpose operation may have a multiple airworthiness certificate (standard/restricted) when the following conditions occur:

The special purpose modification does not meet the type design.

The special purpose modification is not approved for standard category use.

The aircraft will be operated outside the normal category operating limitations. (Order 8130.2D, dated 9/30/99.)

I. Airworthiness Certificates.

When aircraft are used for special purposes such as Aerial Advertising, a Special Airworthiness Certificate in the Restricted Category may be issued to the aircraft in accordance with 14 CFR section 21.25.

Title 14 CFR section 21.25(b)(6) and (7) states aerial advertising includes skywriting, banner towing, airborne signs, and public address systems; and any other operation specified by the Administrator.

It is possible for an aircraft that is used for banner tow operations to have multiple airworthiness certificates. The aircraft may have a Standard Airworthiness Certificate that is displayed when the aircraft is operated as it was originally certificated, and a Special Airworthiness Certificate in the Restricted Category to be displayed during banner tow operations.

If an operator wishes to have multiple airworthiness certificates for the aircraft he or she must meet the requirements of 14 CFR section 21.187(5). Title 14 CFR section 21.187 (a)(1), requires the operator to demonstrate compliance with the requirements for each category when the aircraft is in the configuration for that category. Title 14 CFR section 21.187(a)(2) requires demonstration that the aircraft can be converted from one category to another by removing or adding equipment by simple mechanical means.

It is not uncommon for a banner tow operator to configure aircraft for banner tow operations in a manner and to such an extent that the aircraft no longer meets the requirements of 14 CFR section 21.187. After proper application, these aircraft can be issued a special airworthiness certificate in the restricted category, and limited to banner tow operations only.

Aircraft that are modified and certificated under 14 CFR section 21.25 for special purpose operations will be issued operating limitations with the certificate of waiver. The operating limitations specify the type and scope of operations for which the aircraft may be used, and the aircraft must be operated as prescribed in 14 CFR section 91.313.

No person may operate a civil aircraft unless an appropriate airworthiness certificate and effective U.S. Registration Certificate are displayed in the aircraft at the cabin or cockpit entrance, so that it is legible to the passengers or crew as prescribed in 14 CFR part 203.

AC 20-65, U.S. Airworthiness Certificates and Authorizations for Operation of Domestic and Foreign Aircraft, provides guidance and general information regarding the issuance of Airworthiness Certificates for U.S. Registered aircraft.

II. Maintenance Requirements.

Aircraft with a special airworthiness certificate in the restricted category issued under 14 CFR section 21.25 are subject to the same maintenance and record keeping requirement as aircraft operated with a Standard Airworthiness Certificate, 14 CFR section 43.1(a)(1).

All maintenance, repairs, and alterations must be performed by and recorded in a form and the maintenance, repairs, and alterations must be recorded in a manner as prescribed by 14 CFR section 91.407.

All major repairs and alterations to the aircraft and appliances as defined in 14 CFR part 1, may be returned to service as long as the person approving the return to service is a person specified in 14 CFR section 43.7 or 43.17 and the approval for the return to service of the aircraft conforms to all regulatory requirements as prescribed in 14 CFR part 43, appendix B.

Title 14 CFR section 65.95(a)(1), states that the holder of an inspection authorization may return an aircraft to service after major repair or major alteration if the work was done in accordance with technical data approved by the Administrator. The owner or operator as prescribed in 14 CFR section 91.417(a)(b)(c) must maintain these records.

Aircraft that are used for a special purpose like banner towing must be inspected annually as required by 14 CFR section 91.409.

Banner tow aircraft that are operated with a special airworthiness certificate in the restricted category under 14 CFR section 21.25 must also be marked in accordance with 14 CFR section 45.23(a) and (b). Aircraft operated in the restricted category must display the word RESTRICTED near each entrance to the cabin or cockpit on that aircraft, in letters not less than 2 inches, or more than 6 inches in height.