



CJAA SAFETY MANUAL

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The Membership of the CJAA

CJAA SAFETY OPERATIONS MANUAL
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PREFACE

Former military aircraft (warbirds) are certainly not new to the civilian fleet. They have appeared in increasing numbers since becoming available on the surplus market. Today, many air shows highlight warbirds because they bring an exciting part of aviation history to the public. This source has recently been expanded to include the early jet era, which now completes the story of military aviation history available for civilian display.

It is important that this segment of aviation be provided from the most knowledgeable source. Classic Jet Aircraft Association (CJAA) is that source and accepts the responsibility of its position as the leader in this field.

FOREWORD

This Safety Manual is designed to gather together pertinent data relating to the safe operation of former military jet aircraft (classic jets) in a civilian environment.

It is not the intent of CJAA to promote this Safety Manual as the only way to operate a classic jet nor does it supersede any FAR'S, military or manufacturers manuals and recommendations. When a conflict arises between the FAR's and CJAA policies, the FAR's take precedence, unless the procedures in this Safety Manual are more restrictive, in which case they are recommended. All CJAA members should become familiar with this Safety Manual.

By establishing this Safety Manual, CJAA seeks to offer ways to mesh with other parts of general aviation. Classic Jets will then be seen as a safe and responsible member of the aviation community, contributing positively to the preservation of an important segment of aviation history.

SECTION A - BACKGROUND

History of SMTPA

Former military jet aircraft have been a part of civilian aviation since the fifties. In fact, the first civilian jet airshow act was performed by a civilian pilot in an ex RCAF Vampire. Thirty-five years later, the early jets are still performing in front of airshow crowds. They provide an exciting, and educational link between the aircraft of World War II and our modern military equipment.

In the mid-eighties, the number of jet warbirds began to increase, albeit on a smaller scale than did their piston counterparts due mainly to a change in disposal procedures by the US military.

The recent availability of numerous eastern bloc jet aircraft has changed the visibility factor and attracted more attention to the movement. If the perception attached to the entity movement becomes negative, a typical result will be more regulation.

Proper communication of Classic Jet Safety Operations and Procedures is critical to the success of the movement.

In addition, Safety Operational concerns must be addressed as they relate to Classic Jet operations.

History of CJAA

The Classic Jet Aircraft Association emerged from a jet owners and operators meeting held in Denver, Colorado in February 1989. The meeting was called to address an FAA notice regarding Jet Warbirds and was the first successful attempt to bring this group together. It was decided that a separate organization was needed to serve as a focal point for the jet warbird fraternity. CJAA Directors were tasked to look after the needs of the members first, rather than attempt to become a membership driven organization open to everyone with an interest in jet warbirds. The term "Classic Jets" was used to reflect the organization's intent to preserve this important era of aviation history.

The CJAA soon grew to over 200 members, most of whom own or operate Classic Jets. A newsletter is offered, as is an annual convention. Each year, the convention moves to another city having both an aviation history and facilities where members can receive professional jet related training. Educational seminars are aimed at increasing members' awareness of the mechanical and pilot skills needed to safely operate Classic Jets. The CJAA is now open to membership by anyone with an interest in promoting the Classic Jet movement.

Purpose of SMTPA

SMTPA = Surplus Military Turbine Powered Aircraft (Classic Jets)

The category in which most SMTPA (Classic Jets) are certificated is EXPERIMENTAL, EXHIBITION, the purpose of which is to "exhibit the aircraft's flight characteristics at air shows, motion pictures, television and similar productions, and the maintenance of flight proficiency including flying to and from such air shows and productions."

CJAA prefers to use the term "Classic Jets," rather than SMTPA.

SECTION B – SAFETY PROGRAM

Purpose of the Safety Program

The purpose of the Safety Program is to establish parameters that we, as CJAA members, recommend as general operating practices to facilitate jet warbird operations within the U. S. civilian airspace environment.

By becoming sensitive to and addressing areas of concern, CJAA members may avoid unnecessary restrictions being placed on the majority of responsible operators as a result of the actions of a few.

CJAA has been asked to develop a Safety Program to address the operation of jet warbirds in the civilian environment. Some operations may create conflict because the civilian system was not designed to accommodate Classic Jets. Others, such as noise complaints, often lead to the perception that jet warbirds are dangerous and unsafe.

Rather than continue to expect more and more regulation, CJAA has offered to create a Safety Program by which its membership can develop appropriate methods to eliminate or reduce many of these problem areas. The title Safety Program aptly explains the intent of CJAA.

This Safety Manual will deal with generic considerations regarding aircraft, aircrew training, etc. Appendices will be added to discuss in detail, various specific types of aircraft.

CJAA training programs are constantly under development. These programs will also become a part of this Safety Manual once they are available.

This Safety Manual will become a useful tool for all CJAA members and will provide outside agencies with an accurate insight into the intentions of the membership.

Risk Management is priority. CJAA will work hand in hand with the FAA Regional Safety Program people to get safety materials that are current. Safety articles will be sent out weekly by email, monthly by CJAA newsletter, and quarterly by the CJAA magazine. CJAA and the FAA will work to update FAR regulations, Pilot requirements, and Maintenance procedures on a regular basis. FAA safety concerns will be addressed immediately and solutions will be forth coming on a timely basis.

SECTION C - AIRCRAFT

Ground Operations

Proper Ground Operations are critical to both safe operation of your jet and in creating a positive image of your operation. The following items should be considered in addition to abiding by the procedures listed in your aircraft manual:

Mission Planning

- Fuel burn at idle - Figure yours: _____ (pph or gph)
- Figuring fuel loads and enroute fuel performance check points
- Planning your pre start procedures for fuel efficiency (get clearance prior to start, etc.)
- How long can you hold prior to take-off and have sufficient fuel remaining at destination?

Choosing A Runway

- Accelerate/stop requirements
- Balanced field length/Critical field length
- Clear zones
- Off airport considerations
- Noise abatement procedures
- Proximity to rescue equipment and crews

Ground Crew

- Job knowledge and training (to include signals, emergencies, etc.)
- Noise attenuation (ear plugs, etc.)
- Emergency procedures (who is responsible for what)
- Safety items (fire bottles, chocks, intake screens, wands, etc.)
- Ensure airport crash crew (if available) are briefed on your aircraft (brief your ground crew as well).

FOD (Foreign Object Damage) -

- To your aircraft - suction capability at your aircraft intake(s) (idle and run-up)
- To others - as a result of your jet blast
- Condition of runways, taxiways and ramp areas
- FOD checks - are they done? How often?

Engine Start

- Jet blast zone
 - Personnel safety - crowd – crew
 - Loose articles, vehicles, gravel, dry grass, asphalt, people, etc.
 - General ramp condition
- Intake clear zone
 - Personnel safety

- Use of intake screens
- Establish guidelines and brief all crewmembers
- Noise consideration
 - Proximity of personnel
 - Hearing protection available
 - Front and rear noise levels
 - RPM/noise ratios
 - Duration of noise levels

Taxi/Take Off

- Light and full fuel loads
- Jet blast consideration
 - While taxiing and turning (watch jet blast in turns)
 - Lining up for take off (watch aircraft waiting behind you)
- Choosing the best route (noise, blast, FOD, efficiency)
- Activate egress equipment (last chance checkpoint)
- Review emergency procedures (take-off, climb, abort procedures, etc.)
- Watch for "Cleared Immediate Take-off" (spool up times)

Post Landing

- Determine servicing needs (air, oil, fuel, etc.)
- Securing ejection seats and external stores (tanks)
- Use of drag chutes (if applicable)
- Hot brakes (watch unwary spectators)
- Footprint on asphalt (especially on hot days)

Air Operations

Climb Profiles

- Fuel burns/checks/ transfer
- Pressurization and climb checks
- Noise abatement procedures vs. performance
- Enroute
- Flight for cruise clearance (Altitude Block - Aim 262)
- Fuel plan filing (experimental/fuel critical)
- Fuel transfer problems (update your options and alternate airports)
- Restart procedures - low, medium and high altitude
- Operating in the ATC Systems (ensure you are properly identified by ATC- you are not military)
- Alternate airport requirements
 - Field Status
 - Support equipment
 - Fuel availability and hookups
 - Gliding range

Maintenance and Inspection

All classic jets must have an approved inspection program. This may be based on a current manufacturer's or military program, or it may be an owner/operator developed program. In all cases, it must meet the requirements of FAR 91.409 (f)(4) and must be approved by the FSDO having jurisdiction over the area in which the aircraft is initially based.

NOTE: Owners must co-ordinate this requirement between their own FSDO and the FSDO where the aircraft is being certified, if they are different.

Records must be presented to verify times on airframe and engines, inspections, overhauls, repairs and in particular, time in service, time remaining and shelf life on life limited parts. It is the owner's responsibility to ensure these records are accurate.

The owner's must have all the necessary maintenance, inspection, overhaul, operating and flight manuals needed to operate the aircraft safely. All manuals must be accurately presented in the English language.

Further specific guidance can be obtained from the FAA in its latest Notice pertaining to the SMTPA.

Owners should be prepared to justify their purpose for having such an aircraft certified for use in the Experimental, Exhibition category. There are specific restrictions allocated to SMTPA and owners should be aware of them before they invest heavily in their projects(s). I.e. If aircraft is sold or changed after certification, must the "new" FSDO approve the inspection program?

SECTION D - AIRCREW

Qualifications

Much has been said about who should or should not be flying jet warbirds. What background should pilots have? What type of aircraft should be allowed? CJAA does not agree that flight hours alone should be the only criteria but it does understand some of the complications associated with alternative plans.

Proficiency check rides, ground briefings, hours (or sorties) required are all items to be considered. So much depends on a pilot's previous experience, judgment or/responsibility current operational format and overall flying environment that it is difficult for CJAA to offer specific recommendation for annual and proficiency level requirements. Possibly either an hourly requirement or a statement from an approved NDPER that allow for a variance based upon the history of the individual making the application would be the proper solution.

The pilot must have the ability to be safe in all operations. This will be a required criteria for every pilot .CJAA should support the requirements set forth in the Federal Aviation Regulations that pertain to check rides for type ratings. CJAA listed Pilot Examiners and instructors should work with the Safety Board Member in what areas safety could be improved. Educating pilots before and after check rides on safety areas that need improvement would benefit and improve Safe Operations at CJAA.

High Altitude Operations

CJAA recommends everyone who flies a jet warbird should attend an approved Physiological Training Course at the earliest possible time. CJAA chooses convention sites so that members can have access to this training at that time. However, there are several FAA approved locations available throughout the country (see FAA Form 3150-7 attached). CJAA can maintain a record of its member's attendance if so directed.

For many jet owners who are not military trained, the high altitude environment will be unfamiliar. Its characteristics must be thoroughly understood, both from a physiological standpoint and as they effect aircraft performance and flight planning.

Proper training in this area is invaluable and should be repeated at regular intervals. Operating in the high-level structure demands knowledge of the potential hazards to both aircraft and pilots. It is an unforgiving environment.

Pilot Responsibility

The most important advice anyone can heed is to learn one's own capabilities and never fly beyond them. If everyone would abide by this rule, pilot error accidents would all but cease.

How do you determine your limits? What procedures do you follow in doing so? If you don't have any, you will never know where you stand until the time comes when you find yourself outside your capabilities. If you survive that particular experience, you will definitely remember the excursion!

Here are some tips from CJAA members:

- Know your aircraft and its manuals. Review them periodically.
- Set personal limits and develop a system to monitor them (annually or as required)
- Obtain proper training and maintain proficiency in aerobatics, formation, etc.
- Develop and follow the checklist for your particular aircraft.
- Don't stray from your profile and don't fly with "squawks".
- Have an alternate plan of action for every situation (weather, facilities, etc.)
- Plan each flight and fly that plan. Avoid extemporaneous excursions.
- Safety is your first concern. Safety is no accident.

SECTION E - SAFETY PROGRAM

Minimum Runway Lengths

Establish minimum runway lengths for your aircraft, for varying conditions of density, altitude, operating weight, etc. This is a very important exercise because it will provide you with guidelines based on relative and current operating data, not on outdated or inaccurate information from the past.

Use your approved manufacturers or military aircraft manuals, current military recommendations for similar aircraft (if available) and actual performance figures obtained by you or other owners/operators of similar aircraft to give you a starting figure.

Once you have a "book" figure, CJAA recommends you add a SAFETY MARGIN. This can be anywhere from zero to whatever percentage makes you comfortable. It will depend on your proficiency level, operational requirements and personal feelings.

Once you have determined your personal minimum runway length, use the following checklist to help you decide about any runway you may plan to use:

- Is the length(s) adequate for my operation?
- Can I safely do touch and go landings? (What length do I need for T & G's?)
- How much and how often does density altitude affect me?
- Are the overruns adequate?
- Is runway slope a factor?
- How do adverse weather conditions (water, ice, and snow) affect the runway(s)?
- Are there adequate jet blast zones?
- Can I fly the desired approaches in my jet?
- Can I get stopped if I have to return to land with full fuel?

CJAA cannot effectively establish minimum runway lengths for each aircraft, situation and pilot. It is up to each member to look at his or her operation and establish guidelines that can be used, not only to qualify a home base, but any destination.

Proficiency is only a word. Everyone has his/her own idea of what it takes to be proficient - just as everyone has their own idea of what their minimum runway length should be.

It is your obligation to take every possible factor into consideration and add your CJAA SAFETY MARGIN to that number. Then you must abide by your decision and, unless one of the factors such as your proficiency changes, you must not accept any less.

$$\begin{array}{r} \text{_____} + \text{_____} \% = \text{_____} \\ \text{Minimum runway length} + \text{CJAA "Safety Margin"} = \text{My minimum runway length} \\ \text{(standard day/MSL)} \qquad \qquad \qquad \text{(standard day/MSL)} \end{array}$$

SECTION F - DISPLAYING YOUR AIRCRAFT

This is what we are all about. This is the reason you are allowed to operate your jet. And it's a good thing you can. For whether it is for static or flying display, jet warbirds are on center stage. Our challenge is to do so in a safe, professional manner. Here are some tips to help you do just that:

Secure Systems - Ejection seats, canopies, external stores and tanks. Be sure they are secured from the often unattended and always curious spectator. Develop written procedures and checklists. Don't trust an untrained "helper" to perform these critical tasks. Make sure the aircraft is completely secure when you are not around.

- Have ejection seats been secured? How? _____
- Has the canopy(s) been secured? How? _____
- Have external stores been secured? How? _____
- External emergency operation of the canopy is possible on many aircraft. Have you ensured yours cannot be accidentally activated? How? _____
- Aircraft Systems - residual pressures are often quite high in some aircraft and the inadvertent operation of a speed brake or flap could have dire consequences. Release all pressures (if practicable) and secure against operation of these systems by untrained personnel.
- Hot tail pipes can be an innocent trap for the unwary. Keep your aircraft isolated until you can safely install intake and exhaust pipe covers.
- FOD damage could ruin your day. Take precautions to prevent foreign objects from finding their way down your intake(s). With a jet engine, you must always think about FOD.
- Stand by and explain your machine. Especially after you arrive at a "new" location. You will be swamped by the curious. Display a sign telling about your aircraft when you are absent.

Once again, the purpose of an Experimental aircraft is to display it to the public. Owners should develop programs to satisfy this requirement. CJAA is in the process of developing a program on this subject and will include it in this manual.

SECTION G - TRAINING

Initial And Recurrent

Like anything else having to do with aircraft, training is an area everyone should investigate thoroughly. Know your trainer. What are his/her credentials? How current are they in your aircraft? How much total experience? What does the training program accomplish? How will you know you are trained to a standard? What are these standards? Has anyone else "approved" them?

Things to ask yourself:

- Are you mentally and physically prepared for your training?
- Is your background and experience adequate for the aircraft you plan to train in?
- Can you afford it?
- What if you take twice as long to attain proficiency?
- Can you maintain that level of proficiency?
- How?
- Can you recognize when you exceed your capabilities?
- Is Safety your first concern?

Other

Currently, CJAA is developing several training programs. These will be presented at CJAA conventions and at other times CJAA deems prudent. Other training programs will be implemented on an "as needed" basis and then included in this manual or as a separate part tied to this manual.

SECTION H - CHOOSING A BASE OF OPERATIONS

Where you choose to operate your jet can have a significant impact on the Classic Jet movement. The following should be considered when choosing your base of operations. Particular attention should be given to noise considerations and runway selection (see the following sections).

FRIENDLY ENVIRONMENT

Before you do anything else, thoroughly investigate any facility you are considering. Be sure it will accept your operation. Forcing your jet into a confrontational environment will not be in your best interest. To "Fly Safe" you must operate safely. Use the following checklist to learn more about your potential choice of home base before you move in:

1. Noise Abatement
2. Airport Manager/FSDO
 - a. Visit and discuss your operation in detail
 - b. Address all areas of concern
3. Flying Environment
 - a. Local traffic
 - i. Type
 - ii. Frequency
 - b. Local area
 - i. Population demographics
 - ii. Industry demographics
 - c. Other operations
 - i. GA training
 - ii. Military or Guard unit
 - iii. Commercial operators
 - iv. Corporate operators
 - d. Traffic patterns
 - i. Potential conflict
 - ii. Overfly zones
 - iii. Touch and goes
 - iv. Potential for 360 overhead patterns
 - v. Ability to control mixed traffic
 - vi. Visibility factors
 - vii. Ability to practice
 - e. Instrument flying
 - i. Suitable nav-aids
 - ii. Are approaches "flyable?"
 - iii. Airport lighting
 - iv. Suitable minimums (incl. circling)
 - v. Ability to practice
 - vi. Ability to file and operate
 - vii. 'Down' times for nav-aids

- f. Tower (if applicable) – capabilities
 - i. Any normal delays foreseen for your type of operation
 - ii. Ability to handle jets with other traffic
 - g. Local airspace - Class B, C, etc.
 - i. Unusual arrival and departure procedures
 - ii. Alternate airfields (approvals, capabilities, etc.)
 - iii. Note any conflicting operations nearby
4. Airport Environment
- a. Runway Length (Also see Section E)
 - b. Optional Runways
 - c. Overrun Areas
 - d. Barriers, Arresting Gear (Compatibility)
 - e. Crash and Rescue Equipment and Capabilities
 - f. Taxiways
 - i. Width
 - ii. Obstacles
 - iii. Distance to runway
 - iv. Clear areas (Jet blast)
 - v. Load bearing capacities
 - g. FOD
 - i. Is airport free of potential FOD hazard?
 - ii. Sweeping policy (ramps, taxiways, runways)
 - iii. Condition of hard surface areas you will see
 - h. Ability to use drag chute, afterburner, etc.
 - i. Run up areas (servicing and checks)
 - ii. Servicing capabilities
 - iii. Adequate hangar facilities
 - iv. Parts availability
 - v. FBO - (fuel, servicing)
 - vi. Available outside help (Guard, etc.)
 - vii. Any local restrictions
 - viii. A & P's
5. Meteorological Considerations
- a. Prevailing winds (crosswinds, runway use)
 - b. Average temperatures (density altitudes)
 - c. Adverse conditions
 - d. Local area peculiarities - icing, smog, fog, etc.
 - e. Availability of briefing personnel.

SECTION I - JET BLAST SAFETY

Jet Blast functions can provide special opportunities for specialized training. Some of this training may include aircraft demos, formation flights, recurrency checks, and other activities. These opportunities many times are not at our home base of operation. In addition, local traffic in those areas may not be familiar with jet operations as well. Below is a suggested Jet Blast Briefing format to help improve the above training environment. Anything that can improve situational awareness should be included.

Briefing Outline

1. Welcome
2. Jet Blast Procedures
 - a. Airport and aircraft security issues
 - b. Ground handling
 - c. Fueling procedures
 - d. Practice area scheduling
 - e. Appropriate radio call nomenclature for the event
3. Review FAR 91.103 and "IMSAFE" checklist
4. Weather
5. NOTAMS
6. Aerial view of airport layout
 - a. area of operations
 - b. taxiway review
7. Sectional review of area of operations
 - a. Practice areas
 - b. Local traffic customs
 - c. Noise sensitivity area
 - d. Diverts
 - e. Hazards
8. Review
 - a. Proficiency
 - b. Currency
 - c. Competence
9. Questions

SECTION J - NOISE ABATEMENT PROCEDURES

This is the CJAA recommended program for reducing the noise impact of Classic Jets.

Operations

1. Operators must accept responsibility for operating their aircraft in such a manner so as to reduce the noise impact to the lowest practicable level. Noise abatement procedures should be made part of the routine in operating aircraft in and out of all airports.
2. Aircraft operators must take the initiative and responsibility to obtain all pertinent information on the local noise abatement policies followed at any airport they currently use or expect to use in the future.

Local Communities and Airports

1. The noise abatement procedures recommended by CJAA are suggested as a national standard for classic jets. They may be applied to any noise sensitive airport. Procedures adopted at any locality should, whenever feasible or beneficial, conform to such a national standard to ensure proper understanding, acceptance and use.

CJAA Standard Departure Procedures

1. Climb at maximum practical rate at V_2+XX^1 Knots Indicated Airspeed (KIAS) to 1,000 feet above field level (AGL) with recommended takeoff flap setting².
2. At 1,000 feet AGL, accelerate to best climb speed and retract flaps. Reduce to a quiet climb power setting while maintaining 1,000 FPM maximum climb rate and airspeed not to exceed 190 KIAS³ until reaching 3,000 feet AGL. If ATC requires level off prior to reaching 3,000 feet AGL, power must be reduced so as not to exceed 190 KIAS³ until at or above 3,000 feet AGL.
3. At 3,000 feet AGL and above, resume normal climb schedule with gradual application of climb power.
4. Observe all airspeed limitations and ATC Instructions.

CJAA Close-In Departure Procedures

1. Climb at maximum practical rate at V_2+XX KIAS¹ above to 500 feet AGL with recommended takeoff flap setting.
2. At 500 feet AGL, reduce to a quiet climb power setting while maintaining 1,000 FPM maximum climb rate and recommended KIAS until reaching 1,000 feet AGL.
3. At 1,000 feet AGL, accelerate to best climb speed and retract flaps. Maintain reduced (quiet) climb power; 1,000 FPM climb rate and airspeed not to exceed 190 KIAS³ until

¹ Operator must determine a minimum safe climbing speed for the aircraft.

² It is recognized that aircraft performance will differ with aircraft type and takeoff conditions; therefore, the operator must have the latitude to determine whether takeoff thrust should be reduced prior to, during, or after flap retraction.

³ In some cases, the 190 KIAS limit may not be practical or prudent. The operator must make this determination.

reaching 3,000 feet AGL. If ATC requires level off prior to reaching 3,000 feet AGL, power must be reduced so as not to exceed 190 KIAS³.

4. At 3,000 feet AGL and above, resume normal climb schedule with gradual application of climb power.
5. Observe all airspeed limitations and ATC instructions.

CJAA Approach And Landing Procedure VFR & IFR

1. Inbound flight path should not require more than a 30 degree bank angle to follow noise abatement track.
2. Observe all airspeed limitations and ATC instructions.
3. Initial inbound altitude for noise abatement areas will be a descending path from 2,500 feet AGL or higher. Maintain minimum airspeed (1.3Vs or recommended KIAS) with gear retracted and minimum recommended approach flap setting.
4. At the final approach fix (FAF) or not more than 4 miles from runway threshold, extend landing gear. Final landing flap configuration should be delayed at pilot's discretion to enhance noise abatement.

SAFETY considerations override the above procedures, operators should attempt to comply as much as possible to these recommendations without compromising safety.

SUMMARY

This program has been designed to give guidance toward developing noise abatement procedures for Classic Jets. It is not intended to describe all the various types of noise abatement policies followed by airport and aircraft operators, nor does it pretend to describe the "best" or "only" way to handle the problem of airport noise. However, it is an attempt, to develop a generic approach for noise abatement procedures as a partial solution for the airport noise problem. Therefore, remember SAFETY FIRST in all your operations.

APPENDIX I - CREATING A POSITIVE IMAGE

The purpose of operating Experimental Exhibition Category Aircraft is to show them to the public, so you must be aware of the image you project while doing so. First impressions are lasting impressions.

Professional appearance goes hand in hand with professional operation (see Section E - Safety). Here are some tips to help CJAA members create and maintain a positive image:

- Use Common Sense - (Hard to define, hard to teach, but mandatory)
- Wear Proper Flight Gear - (Nomex Flight suit, gloves, helmet, etc.)
- Maintain Courtesy and Consideration
- Be Available to Represent Aircraft - (Promote classic jets in a positive manner.)
- Do Proper Pre and Post Flight Checks - Don't let spectators interrupt you
- Secure the area during start-up and shut-down
- Watch Your Jet Blast - Start and taxi in a safe manner.
- Be Knowledgeable About Your Operation - (Show you are a true professional)
- Maintain a Safe operation at all times.

APPENDIX II - GENERIC TYPE RATING TRAINING PLAN

As a minimum, all Type Rating applicants should receive ground instruction in the following areas (individual items can be waived if proof of training within the past 24 months is presented):

High-speed Aerodynamics*

- Compressibility
- Airflow & separation characteristics of high-speed wings
- TAS vs. IAS vs. EAS vs. CAS
- Sub/Trans/Supersonic shock wave progression, if applicable
- Stall Characteristics (normal and accelerated)

Turbojet Engines*

- Theory of operation
- Thrust available vs. required, "power curve"
- Engine acceleration characteristics
- Throttle techniques
- Ground operation (jet blast, FOD, noise, etc.)
- RPM/temperature limits

High Altitude Operation*

- IFR rules
- Equipment requirements
- Airways
- Climb and letdown techniques (profile optimization)
- High-altitude engine operation and flameout susceptibility
- Weather considerations

Aircraft-Specific Systems

- Overall aircraft layout and location of major components
- Operation of all systems and controls
- Flight controls
- Engine(s)
- Hydraulic system
- Electric system
- Fuel system
- Pneumatic system
- Pressurization/heat/air conditioning/anti-ice/oxygen
- Landing gear and alternate extension/retraction system
- Egress (Ejection seat(s), canopy jettison, etc.)
- Equipment requirements
- Avionics

- APU and other ground support equipment, if applicable

Takeoff and Landing Data

- Takeoff and landing distances/speeds
- Critical Engine Failure Speed (CEFS) or Takeoff Decision Speed (V1)
- Single-Engine Takeoff Speed (SETOS) or Takeoff Safety Speed (V2)
- Refusal Speed (Maximum Accelerate-Stop Speed)
- Minimum Acceleration Check Speed, if applicable
- Critical Field Length (CFL) or Balanced Field Length

Aircraft Operating Limitations

- Aircraft operating limits: memorize
- Other limitations: review

Aircraft Operating Procedures, Techniques and "Gotchas"

- Checklist usage
- Pilot tips
- System management
- Flight planning
- Electric system
- Aircraft idiosyncrasies
- Servicing requirements and equipment
- Interaction in the Air Traffic Control system and special requirements

Emergencies

- The four Rules of All Emergencies
 - MAINTAIN AIRCRAFT CONTROL
 - ANALYZE THE SITUATION
 - TAKE THE APPROPRIATE ACTION
 - LAND AS SOON AS CONDITIONS PERMIT
- Memorize all Critical Action Items (Boldface/Boldprint)
- Review all other emergency procedures in checklist
- Discuss ejection (parameters, ejection decision, procedures)
- Unusual attitude recovery

Flight Physiology*

- Hypoxia/Rapid decompression (Altitude chamber flight highly recommended)
- GLOC (G-induced Loss Of Consciousness)/Anti-G staining maneuver
- Spatial disorientation
- Ejection seat training, if available

Pilot Skills

- Self assessment (Background, rating, experience level, training, motivation, currency, your weak areas, etc.)
- Situational awareness
- Task management
- Personal Limits (Runway length, weather minimums, etc.)
- Safety is no accident

* *Note: Refer to FAA Advisory Circular 61-107 - Operation of Aircraft At Altitudes Above 25,000 feet MSL and/or Mach Numbers (Mmo) Greater Than .75*

APPENDIX III - GENERIC BRIEFING GUIDE

1. MISSION DESCRIPTION
2. PRE-MISSION REMARKS
 - a. Special Instructions
 - b. PIF
 - c. Time Hack
 - d. Mission Symbol
3. FLIGHT LINE-UP AND DATA
 - a. Call sign
 - b. PE and Station Time
 - c. Start Engine and Check-in Time
 - d. Takeoff and Landing Time
 - e. Active Runway
4. WEATHER
 - a. Takeoff
 - b. Enroute
 - c. Recovery/Destination and Alternate
5. PERSONAL EQUIPMENT AND PUBLICATIONS
6. AIRCRAFT PRE-FLIGHT
7. AFTER START
 - a. Pre-Taxi Checks
 - b. IFF/SIF
 - c. Abort/Spares
8. TAXI
 - a. R/T Procedures
 - b. Marshaling
 - c. Spacing
 - d. Maintenance Inspection/Aborts
 - e. Pre-Takeoff Checks
9. TAKEOFF
 - a. Line-up
 - b. Takeoff Data
10. TAKEOFF EMERGENCIES
 - a. Abort and Other Emergencies
 - b. Jettison Procedures
 - c. Land immediately After Takeoff
11. DEPARTURE
 - a. Post Takeoff Checks/Airspeed
12. ENROUTE
 - a. Route
 - b. Formation and Visual Signals
 - c. Systems Checks (Lanyard, Ops Check)
13. ENROUTE EMERGENCIES

- a. Airborne Abort and Emergency Airfields
 - b. Radio and IFF/SIF
 - c. Lost Procedures
14. PRIMARY MISSION DETAILS
15. BINGO FUEL
16. RECOVERY
- a. Route
 - b. Decent Check
 - c. Pattern Entry
 - d. Divert Airfields
 - e. Maintenance Inspection/Aborts
 - f. Pre-Takeoff Checks
17. TRAFFIC PATTERN AND LANDING
- a. Type
 - b. Landing Data
 - c. Touchdown Point
 - d. Go-around, Missed Approach, Low Approach
 - e. R/T Procedures
 - f. Wake Turbulence/Crosswind/Gust
18. AFTER LANDING
- a. Post Landing Procedures/Hot Brakes
 - b. Taxi
 - c. Parking/Shutdown
19. EMERGENCY OF THE DAY
20. SPECIAL SUBJECTS
- a. Spatial Disorientation
 - b. Recognition and Prevention of and Recovery From:
 - i. Accelerated Stalls
 - ii. Out-of-Control Conditions
 - 1. At Heavy Gross Weights
 - 2. With External Stores
 - 3. At High Angles of Attack
 - c. Landing Hazards – Porpoise
 - d. Status of Airfield and Associated Hazards to Operation
21. DUAL AIRCRAFT PROCEDURES
- a. Normal
 - b. Emergency
 - i. Decision Responsibility
 - ii. Bailout Procedures
 - iii. Interphone Inoperative
 - c. Transfer of Aircraft Control in Flight
22. QUESTIONS
23. CRITIQUE

- a. Ground Procedures
- b. Takeoff, Join-up, and Departure
- c. Conduct of Flight
 - i. R/T Procedures
 - ii. Formation
- d. Mission Accomplishments and Analysis
- e. Recovery
- f. Recommendations and Comments
- g. Any problems that safety was compromised