



DEPARTMENT OF THE NAVY
CHIEF OF NAVAL AIR TRAINING
250 LEXINGTON BLVD SUITE 102
CORPUS CHRISTI TX 78419-5041

CNATRAINST 6110.1A
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31 Dec 12

CNATRA INSTRUCTION 6110.1A

Subj: G-TOLERANCE IMPROVEMENT PROGRAM (GTIP)

Encl: (1) Navy Flight Demonstration Squadron Centrifuge-based
Flight Environmental Training Session

1. Purpose. To provide policy and guidance for the implementation of the G-Tolerance Improvement Program (GTIP) for the enhancement of G-tolerance in the Navy Flight Demonstration Squadron (NFDS, or the Blue Angels).

2. Cancellation. CNATRA INSTRUCTION 6110.1

3. Background. For NFDS pilots, the risk resulting from the use of G-suits outweighs the benefit they provide. G-suits can induce uncommanded stick movement, shift body position and inhibit full stick deflection maneuvers, jeopardizing safety of flight. Modified G-suits are of limited value in combating the adverse effect of G-forces. This instruction sets policy intended to mitigate the risks associated with high-G maneuvering without G-suits.

4. Policy. NFDS aviators shall participate in a comprehensive GTIP program that includes initial/refresher centrifuge training and a personal strength exercise program while ensuring proper hydration, nutrition and sleep habits. The main purpose of this program is to maximize G-tolerance while additionally improving the physical and mental health of team members.

5. Responsibilities. Given that NFDS aviators do not wear anti-G devices, it is essential each pilot master the anti-G straining maneuver (AGSM), maintain G-tolerance through regular fitness training and be prepared to fly daily through proper hydration, nutrition and sleep.

a. The NFDS Commanding Officer shall ensure compliance with this instruction and monitor all details of this program in consultation with the NFDS Flight Surgeon (FS).

b. All NFDS F/A-18 aviators shall:

(1) Complete initial and annual refresher Centrifuge-based Flight Environmental Training (CFET) without G-suits in order to refine and perfect their AGSM.

(2) Successfully complete a weekly anaerobic/aerobic training program with emphasis on core and lower body strength exercises to improve and maintain G-tolerance.

(3) Practice a daily routine of proper hydration, nutrition and sleep habits to maximize performance in a high-G environment. Proper daily nutrition includes limiting alcohol and caffeine intake.

(4) Be aware that frequent flights in high-G environments builds G-tolerance (endurance). Any break from the routine NFDS regime of flying six days a week will lead to a decrease in G-tolerance endurance.

c. The NFDS FS shall:

(1) Brief the details of this instruction to all new NFDS aviators who fly Blue Angel F/A-18 aircraft.

(2) Provide a comprehensive turnover of this program to include review of CFET performance records and all individual nutritional/physical fitness programs with the incoming NFDS FS.

(3) Attend and document all CFET training sessions.

(4) Participate in initial CFET training during the first year with the Blue Angels.

d. The CNATRA Aeromedical Safety Officer (AMSO) shall assist the NFDS FS with developing strength/G-tolerance programs for individual team members, coordinating with the ASTC Lemoore Director as required.

6. Centrifuge Training

a. Annual CFET will occur for NFDS team members one through seven prior to the start of winter training in El Centro, CA. All newly selected NFDS aviators will complete an initial training period designed to improve their AGSM prior to flying Blue Angel F/A-18 aircraft and preferably prior to checking aboard the Blue Angels. The CFET program shall include a series of lectures on G-tolerance, +Gz induced Loss Of Consciousness (G-LOC)/Almost Loss Of Consciousness (A-LOC), anatomic/physiological effects of G-forces, G-related spatial disorientation, nutrition, physical fitness and hypoxia awareness. These lectures shall be conducted by qualified CFET staff and/or the the NFDS FS.

b. The goal of CFET is to improve AGSM technique and efficiency and allow each NFDS pilot to continue to fly F/A-18 aircraft in high-G environments with maximum confidence and minimal physiological events. This training program should not be thought of as a "check in the box", but rather as a human performance improvement session tailored to each individual by the NFDS FS, ASTC Lemoore Director and reviewed by the CNATRA AMSO. As such, enclosure (1) describes five recommended profiles developed specifically for NFDS team members. Variation from these profiles is acceptable however written approval from CNATRA must be received prior to the day of training.

c. The NFDS CFET program consists of two separate training sessions each year. The first session is dedicated for new team members and consists of the five profiles in enclosure (1). Each member runs through all five profiles with a G-suit and then repeats the profiles without a G-suit.

d. Based on performance, the member may elect to repeat any of the profiles or may be directed to do so by the NFDS FS if he/she believes remediation is necessary. The number of profiles per session shall not exceed seven. A session is defined as strapping into the device securely, bringing the device to idle speed, the execution of a series of profiles, followed by exiting the device safely.

e. A member shall discontinue centrifuge training after two episodes of A-LOC, G-LOC, or a combination of either during a single training day.

f. Successful completion of training consists of performing a proper AGSM at the maximum on-set rate for the majority of time per each profile without experiencing a loss of conscienceness. The NFDS FS and the CFET instructor shall agree that the member has met the training objectives prior to issuing a completion letter.

g. All individual results shall be documented by the NFDS FS. Members returning for their second and third year will be encouraged to improve upon their previous results.

h. Members shall not perform flight duties for 12 hours following CFET training. Air travel as passengers is permitted.

7. Strength Training

a. Strength training plays a key role in improving G-tolerance. Team members shall maintain their own level of fitness through a personal strength program.

b. An aerobic exercise routine focusing on core and lower body fundamentals (or foundation) will contribute the greatest benefit for improving G-tolerance. Specifically, this routine shall include a combination of squat-type exercises, leg curls, leg extensions and calf raises. These exercises should be performed at least twice per week. Based on the number of musculoskeletal neck injuries in jet aviators, it is important to include neck/trapezius exercises in the weekly exercise routine.

c. Aerobic training improves "staying power" by allowing rapid recovery from straining against G-forces. Aerobic training shall be included in the program to allow for 20-30 minutes of moderate aerobic training three times per week and not to exceed five times per week.

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d. Proper nutrition/hydration is the cornerstone of G-tolerance. The recommended daily caloric intake should be individualized for each NFDS member by establishing a Basal Metabolic Rate(BMR) and/or Resting Metabolic Rate (RMR) to meet daily energy requirements. The use of creatine and other supplements by NFDS aviation personnel is prohibited.

C. HOLLINGSWORTH
Chief of Staff

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In each of the profiles the member will sit in the proper body position and control the onset rate by pulling back on the stick while referencing the appropriate cue (e.g. pipper on aircraft, Gz meter) in order to reach the required Gz levels.

Profile 1. Spin until individual has 60 percent visual degradation; this establishes the member's resting G-tolerance (RT).

Profile 2. Spin at one Gz above his/her RT for 15 seconds. During this profile the member's AGSM is critiqued and refined; concentrating primarily on their lower body engagement and proper breathing technique.

Profile 3. Spin to 6 Gz's for 10 seconds, down to 3 Gz's to rest for 20 seconds, then to 5.5 Gz's for six seconds. This profile evaluates the member's sustained G-tolerance and refines technique.

Profile 4. Spin to 5 Gz's for six seconds, down to 3 Gz's for 10 seconds, then 7 Gz's for four seconds, back down 3 Gz's for 20 seconds, then finally 6 Gz's for six seconds. This profile represents some of the solo maneuvers and the diamond/delta rendezvous.

Profile 5. Spin to 7 Gz's for five seconds, then 5.5 Gz's for 10 seconds. NOTE: Profile represents what the lead solo may experience during the minimum radius turn and what the delta would experience during the Pitch-Up Break.

NOTE: Initial CFET training for new team members (including the FS) will consist of two training sessions executing the profiles listed above and will be completed on the same day. The first session will be conducted with the use of a G-suit and then repeated without the benefit of a G-suit. Annual CFET training conducted by team members one through seven will be done without the use of a G-suit while executing the profiles listed above.