BY ORDER OF THE COMMANDER
HOLLOMAN AIR FORCE BASE

HOLLOMAN AIR FORCE BASE
INSTRUCTION 11-100

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Flying Operations

G-RISK INDICATOR MANAGEMENT (GRIM)

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This instruction implements Air Force Policy Directive (AFPD) 11-4, *Aviation Service*. It provides guidance and procedures for the management of G-performance risk factors that may be experienced by student pilots in the USAF Basic Course (B-course) F-16C/D at Holloman Air Force Base (AFB), New Mexico. It references Air Force Manual (AFMAN) 11-404, *Fighter Aircrew Acceleration Training Program.* This instruction applies to all flying squadrons in the 54th Fighter Group (54 FG). Air Force Instruction (AFI) 11-403, *Aerospace Physiological Training Program*, complements this instruction by providing detail on the training requirements for aerospace physiologists and centrifuge technicians. Air Force Pamphlet (AFPAM) 11-419, *G Awareness for Aircrew*, provides comprehensive information on the physiology of acceleration in flight. This publication applies to the Air Force Reserve Command (AFRC) and Air National Guard (ANG) pilots flying 54 FG aircraft with Formal Training Unit (FTU) students. Refer recommended changes and questions about this publication to the Office of Primary Responsibility using the AF Form 847, *Recommendation for Change of Publication*; route AF Forms 847 from the field through the appropriate functional chain of command. The authorities to waive wing/unit level requirements in this publication are identified with a Tier ("T-0, T-1, T-2, T-3") number following the compliance statement. See AFI 33-360, *Publications and Forms Management*, for a description of the authorities associated with the Tier numbers. Submit requests for waivers through the chain of command to the appropriate Tier waiver approval authority, or alternately, to the requestor's commander for non-tiered compliance items. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with (IAW) AFMAN 33-363, *Management of Records*, and disposed of IAW Air

Force Records Information Management System (AFRIMS) Records Disposition Schedule (RDS).

Chapter 1

INTRODUCTION

1.1. Purpose and Need for G-performance Risk Management. The F-16 aircraft operated by Holloman AFB student pilots are easily capable of causing G-induced loss of consciousness (GLOC). An effective anti-G straining maneuver (AGSM), optimum physical conditioning, functioning anti-G equipment and adequate G-oriented situational awareness are all important to aircrew G-performance. Early detection of G-performance risk indicators can aid in the establishment of tailored ground training programs designed to optimize a student's performance under G.

1.1.1. GRIM consists of initial assessment of a student's previous high-G performance and present physical condition at the start of F-16 B-course ground training and assessment of student's performance under G while flying the F-16. Observations from these assessments are used to quantitatively determine the level of risk for the student and, if necessary, assist in the development of tailored training programs for the student's specific needs.

1.1.2. The purpose of GRIM is to optimize combat capability and increase flying safety through the following methods:

1.1.2.1. Identify aircrew with a propensity towards poor G-performance prior to F-16 flying training or while in F-16 flying training (if not previously identified).

1.1.2.2. Assist F-16 pilots in the development of habit patterns and lifestyle decisions/management that will optimize their G-performance throughout the B-course and beyond.

1.1.2.3. If students in Transition (TX) courses or Specialized Officer Courses (SOC) demonstrate problems with G-performance while at Holloman AFB, GRIM program definitions, courses of action and control measures may be utilized at the discretion of the Fighter Squadron (FS)/Commander (CC) or FS/Director of Operations (DO). However, these students need not be officially in the GRIM program nor follow the precise flow of the GRIM program as intended for B-course students.

1.2. Explanation of Terms:

1.2.1. Anti-G Straining Maneuver. Sustained lower body muscle tensing/straining and short air exchanges against a closed glottis in 3-second cycles.

1.2.2. G. Any force that produces an acceleration of 32.2 feet per second, which is equivalent to the acceleration produced by earth's gravity.

1.2.3. G-tolerance. The ability or capacity to maintain vision, consciousness, and effective performance when under G.

1.2.4. G-endurance. The ability to sustain G over time, specifically for the period of time required by the flying scenario.

1.2.5. Inadequate G-performance. Any G-related incident to include light loss, blackout, or inadequate AGSM mechanics (as determined by an Instructor Pilot (IP)/Aerospace

Physiologist (AP)/Flight Surgeon (FS)) that results in a failure to meet training objectives or requires modification of the usual G profiles associated with flying activity.

1.2.6. Light Loss. Any peripheral light loss or general vision loss experienced under G which adversely impacts mission accomplishment and/or causes deviation from the prescribed maneuver or mission profile (e.g., Terminate or Knock-It-Off (KIO) due to light loss). **NOTE:** IP judgment will determine what constitutes a significant impact to the mission. It is important to recognize that *transient peripheral vision loss* that is easily recovered by either appropriate reduction of G loading or by increased intensity of the AGSM are a normal part of flight in the high-G arena and should not be confused with a *light loss incident*.

1.2.7. Blackout. Complete vision loss experienced under G, but not accompanied by subsequent loss of consciousness.

1.2.8. GLOC. The transition from normal consciousness to a state of unconsciousness that results when blood flow to the nervous system under G is reduced below critical levels to support conscious function. GLOC symptoms include: loss of consciousness followed by myoclonic convulsive activity (muscle twitching), confusion, disorientation and memory loss.

Chapter 2

GRIM RISK CONTROL INDICATIONS, PROCEDURES AND ADMINISTRATION

2.1. Overview. Many variables come into play in maximizing G-performance and in preventing GLOC. Although the individual aviator is ultimately responsible for his or her mental and physical condition, there are sources of information available to supervisors that may reveal a student's predisposition for poor G-performance in the F-16. The following paragraphs describe some of these risk indicators and the preferred procedures and protocols for their control or elimination.

2.1.1. Records Review: A thorough review of training records can reveal trends that may indicate poor G-performance.

2.1.1.1. Flight (FLT)/CCs or the AP will check for problems with AGSM and G-tolerance by reviewing the student's Introduction to Fighter Fundamentals (IFF) grade book and previous acceleration qualification training report AF Form 4293. Should the AF Form 4293 not be in the student's IFF grade book, the AP will contact the appropriate centrifuge training facility and request additional information on the student's centrifuge training performance.

2.1.1.2. The AP will document findings of significance and provide GRIM recommendations to the Flying Course Manager (FCM), FS/CC and FS/DO during the initial B-course screening committee. Based upon inputs from the FCM, AP and FLT/CC, the FS/CC or FS/DO will make the final determination of whether a student be placed in the GRIM program. FLT/CCs may use **Attachment 3** as a reference to document students placed in the GRIM program.

2.1.1.3. Implement appropriate risk control if necessary (see **Chapter 3**).

2.1.2. Fighter Aircrew Conditioning Program (FACP) assessment (see AFMAN 11-404):

2.1.2.1. Assess all B-course students prior to start fly date and screening committee.

2.1.2.2. The AP will administer FACP assessment.

2.1.2.3. A summary of results will be documented and forwarded to the screening committee. Students exhibiting marginal physical abilities will be highlighted for discussion at the screening committee and brought to the attention of the FS/CC or FS/DO.

2.1.2.4. Implement appropriate risk control, if necessary (see **Chapter 3**).

2.1.3. Centrifuge Video Review. The AP can request a centrifuge video review from the appropriate centrifuge for students demonstrating problems in any of the previously mentioned areas.

2.2. Inadequate G-performance resulting in significant mission impact:

2.2.1. Squadron Aircrew Flight Equipment (AFE) personnel will check the student's equipment/gear in accordance with appropriate procedures to verify it was properly fit and functional. Report any malfunctions or discrepancies to the student's FS/CC and/or FS/DO.

2.2.2. Evaluation.

2.2.2.1. The AP and/or Flight Surgeon will review Heads Up Display (HUD) video and will interview the student and IP.

2.2.2.2. Consider referring the student to Flight Medicine for physical examination.

2.2.2.3. Implement appropriate risk control (see **Chapter 3**) and consider placing the student in the GRIM program.

2.2.2.4. No physiological safety report is required. The Flight Surgeon or AP will complete an incident report and distribute to the FS/CC, FS/DO, FLT/CC and Flight Medicine for review.

2.2.2.5. The student will fly dual on the next sortie and shall continue normal syllabus training if no further problems are encountered. Consider placement in the GRIM program for the remainder of the current phase.

2.3. GLOC (Incapacitation):

2.3.1. Squadron AFE personnel will check the student's equipment/gear in accordance with appropriate procedures to verify it was properly fit and functional. Report any malfunctions or discrepancies to the student's FS/CC and/or FS/DO.

2.3.2. Evaluation.

2.3.2.1. The student should be referred to Flight Medicine for physical examination.

2.3.2.2. The AP or Flight Surgeon will review HUD video and interview the student and IP.

2.3.2.3. If necessary, the AP may conduct a physical training test to quantify any suspected physical performance inadequacies.

2.3.2.4. The student's high-G performance and options for risk control will be evaluated jointly by the Flight Surgeon or AP, FLT/CC, FS/DO and FS/CC.

2.3.2.5. The student is restricted to dual flying until cleared by the FS/CC or FS/DO to fly solo and resume normal syllabus directed training.

2.3.3. Notify 49 WG Flight Safety when a GLOC event occurs.

2.3.4. Implement the appropriate risk control (to include placement in the GRIM program, if necessary (see **Chapter 3**)). If the FS/CC chooses to utilize Commander Directed Acceleration Training (CDAT), the AP will help the flying squadron schedule the training with the centrifuge. If the CDAT option is used, the FS/CC shall review the CDAT report and recommendation from the centrifuge physiologist. (See AFMAN 11-404 for more details on CDAT).

2.3.5. The student will fly dual on the next sortie and shall continue normal syllabus training if no further problems are encountered. Consider placement in the GRIM program for the remainder of the current phase.

2.4. Centrifuge failure or persistently inadequate G-performance: The FS/CC may recommend the student be considered for removal from the F-16 flying training program and considered for a lower-G aircraft.

2.5. Administration.

2.5.1. Following each GRIM monitored flight, a record shall be included in the student gradebook documenting the evaluation of the pilot's HUD video review and any AGSM issues.

2.5.2. The student's IP for the next flight should review the grade sheet documentation for the previous flight for AGSM and G-related issues.

2.5.3. In the event that a HUD video/audio is not captured, the next available sortie can stand as a suitable substitute for GRIM review.

2.5.4. The Flight Surgeon and AP should be granted access to the student's gradebook (GTIMS).

2.6. Removal from GRIM supervision.

2.6.1. GRIM program supervision will normally expire after the Basic Fighter Maneuvers (BFM) phase. However, if during the final BFM review the Flight Surgeon or AP note AGSM deficiencies, a recommendation may be made to maintain the student in the GRIM program. Once the student's AGSM is consistently satisfactory, the student should be removed from the GRIM program.

2.6.2. FLT/CCs will generate a removal from GRIM letter upon recommendation from the Flight Surgeon or AP and with approval of the FS/CC.

2.6.3. In order to facilitate continuity with gaining units, the FS/CC or FS/DO should notify gaining unit DOs via email or phone of any students who struggled with G-performance or were in the GRIM program during the B-course.

Chapter 3

GRIM RISK CONTROL OPTIONS

3.1. Potential Options. Risk control options include but are not limited to AGSM technique employment coaching, HUD reviews, Physical Conditioning Program (PCP), CDAT, and elimination from formal training.

3.2. Monitored PCP:

3.2.1. Purpose: Optimize G-tolerance and endurance through a specialized PCP.

3.2.2. Indicators:

3.2.2.1. Inadequate strength and/or endurance noted as a problem area during centrifuge qualification training or observed by an AP. **NOTE:** If physical conditioning is deemed a significant limiting factor following centrifuge training or by an AP, temporary removal from flying training may be necessary to allow sufficient time to improve the inadequacy.

3.2.2.2. CDAT failure.

3.2.3. Control Decision: Students who demonstrate inadequate strength and/or endurance should be considered for placement in the PCP. The Flight Surgeon or AP should make recommendations for continued placement in the PCP.

3.2.4. Control Implementation: Specialized/Personalized PCP.

3.2.4.1. The PCP should be developed via consultation with the student and the Flight Surgeon or AP. The program will be designed to improve leg/core muscular strength/endurance. It may be tailored to meet the unique needs of each student.

3.3. AGSM Technique Employment Coaching/HUD Review:

3.3.1. Purpose: Decreases cognitive burden of performing the AGSM during mentally intense high-G flight maneuvers.

3.3.2. Indicators: Inconsistent or inefficient AGSM mechanics noted as a problem area during centrifuge qualification training, IFF grade sheets and/or HUD reviews.

3.3.3. Control Decision: Students who demonstrate an inconsistent or inefficient AGSM should be considered for counseling, AGSM coaching and the GRIM program.

3.3.4. Control Implementation: Execution will include but not be limited to:

3.3.4.1. Practicing AGSM techniques during chair flying and simulator training to make it a natural part of the student's flying skills/habit patterns.

3.3.4.2. HUD AGSM reviews of all flights experiencing greater than seven Gs. Any other sortie deemed necessary by squadron leadership, AP or Flight Surgeon should also be reviewed.

3.3.4.3. Development of consistently correct AGSM mechanics.

3.4. Commander Directed Acceleration Training (CDAT):

3.4.1. Purpose: CDAT is a tool that can be used by any FS/CC to evaluate and improve pilot performance under G. It can be used as a remedial tool for any degree of G-related problems (see AFMAN 11-404).

3.4.2. Indicators: All the risk indicators outlined in **Chapter 2** of this instruction should be considered.

3.4.3. Control Decision: The FS/CC may direct a CDAT after a HUD AGSM review indicating inadequate AGSM performance, a significant light loss event, a GLOC or other physiological issue.

3.4.4. Control Implementation: Schedule a CDAT with an appropriate centrifuge base.

3.5. Elimination from Training:

3.5.1. Purpose: Limits the student's exposure to the risks of high-G flight by removing him or her from F-16 training with potential redirection to a lower-G aircraft.

3.5.2. Indicators: CDAT failure, persistent inadequate G-performance or any of the risk indicators outlined in **Chapter 2** of this instruction may be considered.

3.5.3. Control Decision: The FS/CC may recommend a student be removed from an F-16 flying training program.

3.5.4. The FS/CC will notify the 54 FG/CC and 54 TRS/DO immediately when recommending elimination of a student from a formal training course.

3.5.5. Control Implementation: Refer to applicable Air Education and Training Command (AETC) syllabus, AFMAN 11-402, *Aviation and Parachutist Service,* for administrative procedures on elimination.

RYAN P. KEENEY, Colonel, USAF
Commander, 49th Wing

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

AFMAN 11-402, *Aviation and Parachutist Service,* 24 January 2019, AFGM 2020-01, 11 February 2020

AFI 11-403, *Aerospace Physiological Training Program,* 30 November 2012, AFGM, 2020-01, 15 April 2020

AFMAN 11-404, *Fighter Aircrew Acceleration Training Program,* 26 Nov 2019

AFPAM 11-419, *G Awareness for Aircrew,* 17 October 2014

AFPD 11-4, *Aviation Service,* 12 April 2019, Corrective Action Applied, 7 May 2019

Prescribed Forms

None

Adopted Forms

AF Form 847, *Recommendation for Change of Publication,* 22 September 2009

Abbreviations and Acronyms

AP—Aerospace Physiologist

AETC—Air Education and Training Command

AFE—Aircrew Flight Equipment

AGSM—Anti-G Straining Maneuver

BFM—Basic Fighter Maneuvers

CC—Commander

CDAT—Commander Directed Acceleration Training

DO—Director of Operations

FACP—Fighter Aircrew Conditioning Program

FCM—Flying Course Manager

FLT—Flight

FS—Fighter Squadron

GLOC—G—Induced Loss of Consciousness

GRIM—G—Risk Indicator Management

HUD—Heads Up Display

IFF—Introduction to Fighter Fundamentals

IP—Instructor Pilot

KIO—Knock-It-Off

PCP—Physical Conditioning Program

TM—Training Management

TRS—Training Squadron

Attachment 2

GRIM FLOW CHARTS

Figure A2.1. GRIM Selection Process.

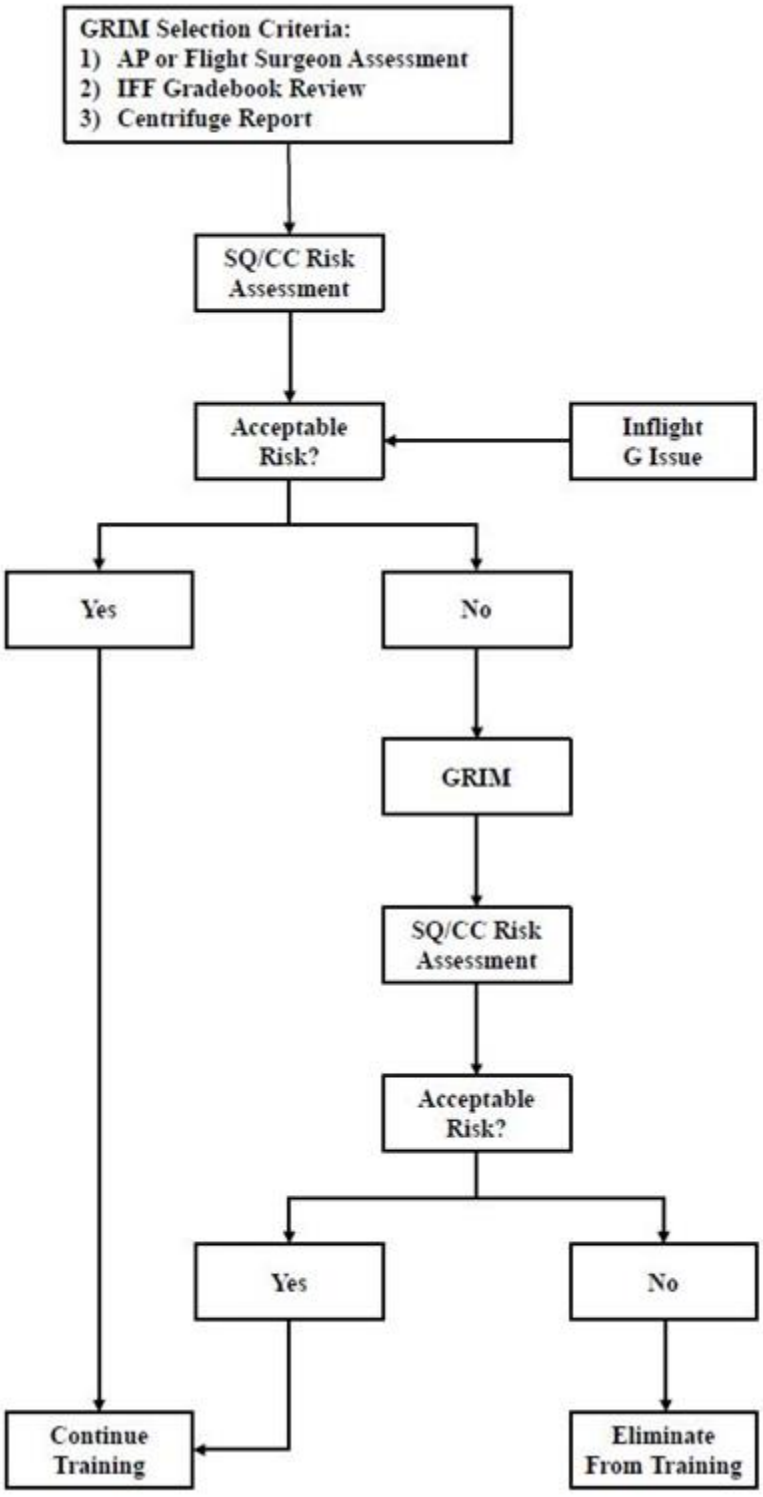
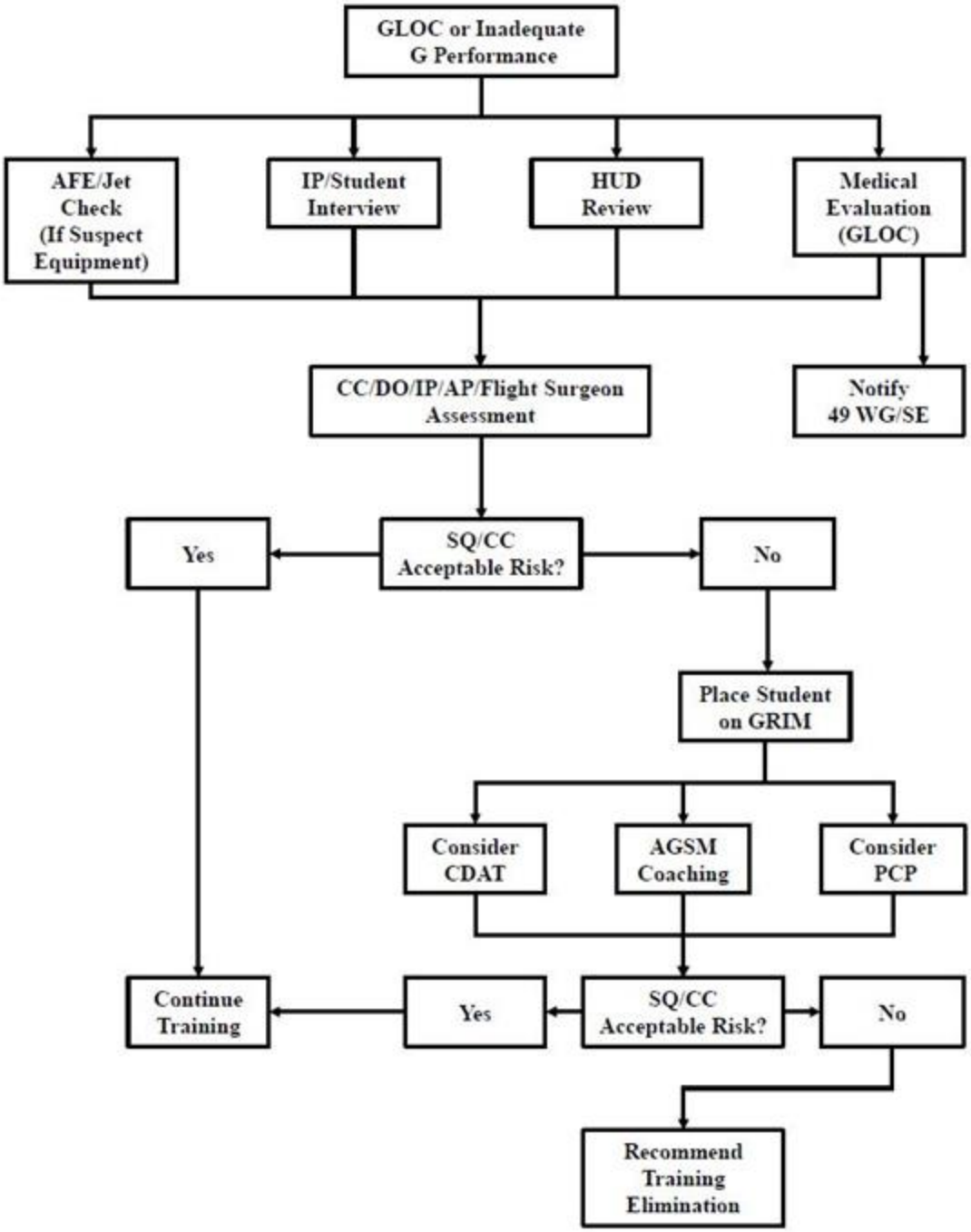


Figure A2.2. GLOC or Inadequate G-Performance (Significant Mission Impact).



Attachment 3

SAMPLE GRIM LETTER

Figure A3.1. Sample GRIM Letter.

XX Month XXXX

MEMORANDUM FOR RECORD

FROM: XXX FS/CC

SUBJECT: G-Risk Indicator Management (GRIM) Program Assignment

1. Lt Ima B. Courser is assigned to the GRIM program. He struggled with proper AGSM procedures at IFF and marginally passed centrifuge training. The 49 WG Aerospace Physiologist recommends Lt Courser receive additional AGSM training/coaching and additional supervision throughout the BFM phase.

2. Lt Courser should receive the following training/supervision (annotate training in GTIMS):

   a. AGSM coaching/practice (conducted by Aerospace Physiologist).

   b. AGSM HUD video review of all BFM flights.

   c. RCP IP on all flights expected to exceed 7 Gs (if AGSM graded less than a "2" on previous flight).

3. Lt Courser's overall AGSM performance shall be re-evaluated at the end of the BFM phase. If performance is adequate, he may be removed from the GRIM program. If not, administrative action should be considered.

Viper C. Driver, Lt Col, USAF
Commander