2023 USN NAVY F-35C AIRSHOW PROFILE MANEUVER DESCRIPTIONS

1. General Guidance

a. The F-35C FRS AFP consists of up to twelve maneuvers by a single aircraft. While no additional maneuvers are authorized, any maneuver may be deleted at the discretion of the pilot or safety observer.

b. All maneuvers, except takeoffs and landings, are performed outside a show line established parallel to and 500 feet (non-aerobatic passes) or 1,500 feet Clear Air Turbulence (CAT) I aerobatic passes, laterally from the crowd. Lateral offset differs from maneuver to maneuver and is crosswind corrected in order to be in compliance with FAA restrictions and are outlined in the individual maneuver descriptions. Takeoffs and landings are performed no closer than 500 feet laterally from spectators. Minimum runway length is 7,000 feet Takeoff Distance Available (TODA). Show sites with shorter runways must be approved by the Commodore. Maximum distance that the aircraft will ever be from the center point of the show line is 3.5 nautical miles (NM). Pilots may elect to utilize less than the full runway available for show center considerations, but Vrot should not be greater than maximum abort without prior approval from FRS CO.

c. Standard Terminology

(1) The standard termination of each pass is a high performance turn and climb with the option for a 270 degree opposite roll as the pilot positions the aircraft for the next pass.

(2) Throughout this document, the term "MAX A/B" is defined as selection of 150 percent Engine Thrust Request (ETR) and afterburner lite-off confirmation.

(3) Lift limit pulls are defined as stick full aft to the Complementary Low Altitude (CLAW) limit below corner airspeed (34 Alpha).

(4) Lift limit excursion pulls are defined as stick full aft to the CLAW limit below corner airspeed with pinky switch (S10) depressed (50 Alpha).

(5) Load limit pulls are defined as stick full aft to the CLAW limit above corner airspeed.

(6) The "waterline" is defined as where the nose of the aircraft is pointing and will be referenced in maneuver descriptions vice Flight Path Marker and Climb Dive Marker.

(7) The abbreviation "A/R" for a parameter means "as required" and "N/A" means "not applicable."

(8) A "staged show" is defined as an aerobatic box that is not geographically collocated with the airfield from which the jet is parked such as an over water show.

d. The maneuver should be terminated for any warning, latched Caution Integrated Caution Advisory Warning (ICAW), or recognition of AB blowout and failure to lite.

(1) Termination Nose High (NH) requires immediate NH recovery procedures, while Nose Low (NL) requires immediate NL recovery procedures utilizing:

(a) MAX AB below 250 Knots Calibrated Airspeed (KCAS).

(b) Throttle Idle above 250 KCAS.

1. If at any time the "dangerous condition" tone annunciates, accomplish Out-of-Control Flight recovery.

e. Ground Collision Avoidance System (GCAS) will be set to MIN.

f. Pilots should walk only with Flight Check List (FCL) and kneeboard.

g. PMD will be utilized to record in-flight execution.

2. Configuration. 3F (TVE-18 or greater) aircraft are required. The profile shall be flown in a standard configuration with Aircraft Maintenance Engineer -3 only. Internal unloaded BRU or LAU configurations are permitted. External fuel-tanks and stores and wing pylons are prohibited. Recommended start-up fuel:

a. Staged AFP: 13,000 pounds.

b. AFP + Legacy: 12,000 pounds.

c. AFP: 10,000 pounds.

3. Weather Minimums

a. AFP: 1,500 feet ceiling and 5 statute miles visibility.

b. 360 degrees defined horizon.

4. Altitude Restrictions

a. Maximum Altitude: 15,000 feet Above Ground Level (AGL) unless otherwise restricted by FAA airshow constraints.

b. Minimum Altitude: 200 feet AGL (except takeoff and landing).

5. Additional Takeoff Checklist Items. The items listed in subparagraphs 5a through 5p should be verbally checked with the ground safety observer after completion of the post-start and takeoff checklists.

a. Navigation (NAV) Master Mode
b. Altimeter - Set to 0 feet MSL
c. NAVAIDS - Set
   1. Portals - Set, SMS CTRL sublevel displayed
   2. HSI - 10nm scale, courseline set
   3. Threat unboxed
   4. FLC - Radar
d. JOKER BINGO DUMPCO - Set
e. Altitude Bugs
   1. LIS - 5000
   2. ALOW 2 - 2500
   3. ALOW 1 - 180
f. HMD - time boxed, scales displayed
G. RUD PED - Adjusted
h. Lap Belts - Tight
i. G-suit - Zipped and tested
j. FCL - Stowed
k. Map case - Locked
L. BUR - T/R
m. RECORDERS - Boxed
n. AGCAS - MIN
o. Mask - On
p. External lighting master switch - Off

6. Maneuver Profiles

a. Takeoff to MAX Vx CLIMB

(1) Execution: Hold brakes while selecting MIL. As engine thrust (actual) increases through 35 percent, release brakes. Select MAX AB and check engine conditions on the roll. Smoothly rotate at Vrot speed and select LG UP once weight off wheels. Continue to smoothly increase aft stick while the LG is in transition targeting 1.5 Gs. Confirm gear is retracted and the light is extinguished in the gear handle. Keeping MAX AB selected, continue 1.5 Gs to 60 degrees NH. At 100 KCAS, unload the waterline towards the horizon. Passing 4,000 feet AGL execute a slightly overbanking turn to descend for the next maneuver setup.

(2) Abnormal Procedures: If AB blows out or "warning" or "caution" ICAWs latch during the pull to 60 degree NH, abort the maneuver. If the AB blows out or "warning" or "caution" ICAWs latch during the climb, or the jet decelerates below 100 KCAS, abort the maneuver and execute a nose high recovery if appropriate.

b. Takeoff to MAX Vy CLIMB

(1) Execution: Hold brakes while selecting MIL. As engine thrust (actual) increases through 35 percent, release brakes. Select MAX AB and check engine conditions on the roll. Smoothly rotate at Vrot speed and select LG UP once weight off wheels. Confirm gear is

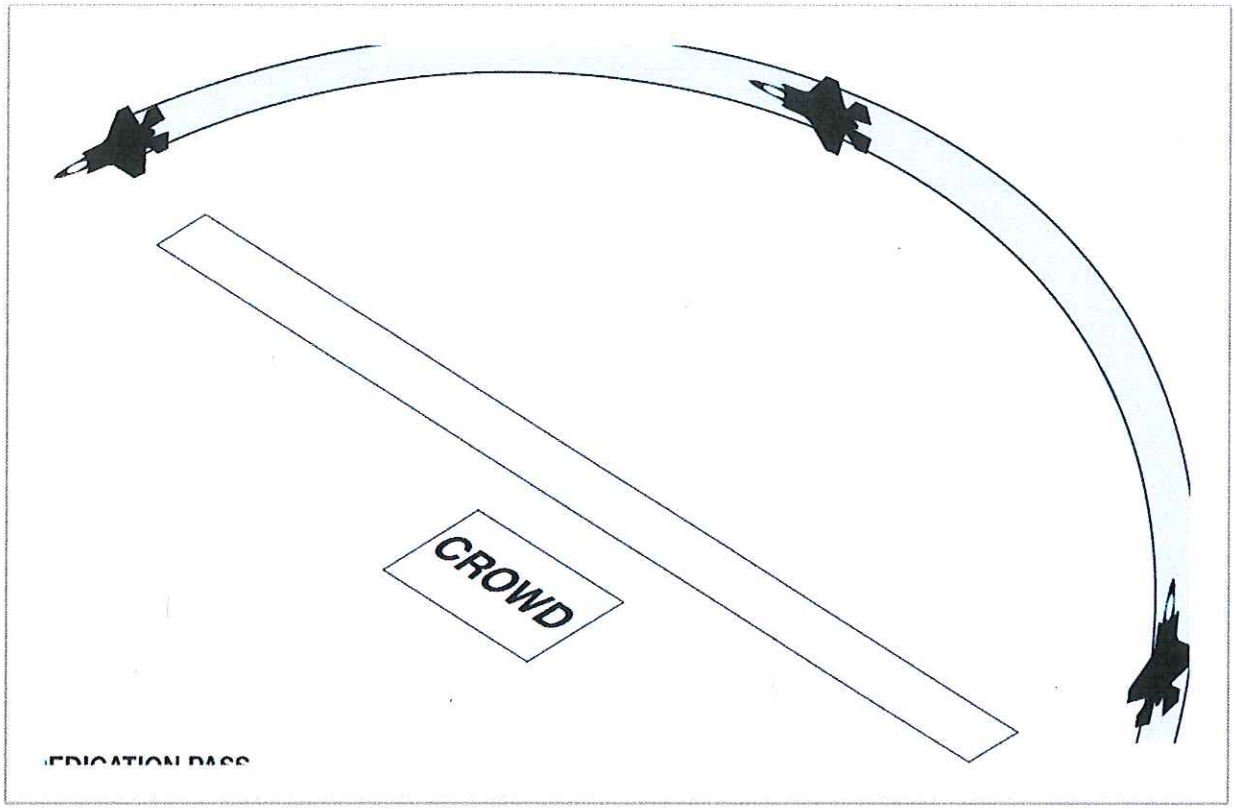
retracted and the light is extinguished in the gear handle. Accelerate in MAX AB with a positive rate of climb until reaching 40' AGL on runway centerline. At 325 KCAS, execute a Lift Limit Pull to 60 degrees NH. Hold 60 degrees NH until passing 4,000 feet AGL then execute a 2-3G slightly overbanking turn to descend and slow for the next maneuver setup.

(2) Abnormal Procedures: If AB blows out or "warning" or "caution" ICAWs latch during the accel or the pull to 60 degrees NH, abort the maneuver. If the AB blows out or "warning" or "caution" ICAW latches during the climb, or the jet decelerates below 100 KCAS, abort the maneuver and execute a nose high recovery if appropriate.

c. Dedication and Picture Pass

(1) Execution: This maneuver is flown beyond the 500-foot show line. The approach will be flown from behind the line, approximately two miles from show center, dive angle of 30 degrees, a maximum of 45-degrees off the show line (so as to not exceed 75 degrees of bank in turn), remaining outside of the near corner marker. Maintain beyond 500 feet horizontally from the crowd at all times. Upon reaching a point adjacent to the near corner marker at 300 feet AGL, roll the aircraft into a level 4G arcing pass using 75 degrees of bank so as to exit outside of the far corner marker. Select MAX AB until past the show line or until 400 KCAS is anticipated. In order to maintain 500 feet separation from the crowd at both corners, the apex of the arc will be greater than 500 feet from show center.

(2) Abnormal Procedures: Discontinue AB if 450 KCAS is reached.



Target parameters			
Altitude AGL	Mach/KCAS	Power Setting	Pull
Entry 300 feet	400	MAX	A/R
Exit 300 feet	400	MAX	A/R

Parameter limits			
Altitude AGL	Airspeed/Mach MIN/MAX	Power Setting	Pull
Entry Min 200 feet	350 / 450	A/R	Load limit
Exit Min 200 feet	350 / 450	A/R	Load limit

d. High Speed Pass

(1) Execution: This maneuver is flown beyond the 500-foot show line. The approach will be flown wings level with an approximate dive angle of 30 degrees. Maintain beyond 500 feet horizontally from the crowd at all times. Upon reaching a point 500 feet from the corner of the crowd at 300 feet AGL, select MAX AB until past the show line or until .94M is anticipated. Using idle power and speed brakes, decelerate below .90M, then execute a load limit pull to 60 degree NH. Hold 60 degree NH until passing 4,000 feet AGL then execute a 2-3G slightly overbanking turn to descend and slow for the next maneuver setup. Pilots should be careful not to over-G, or extend too far from show center during the reposition maneuver.

(2) Abnormal Procedures: Discontinue AB if .95M is reached.

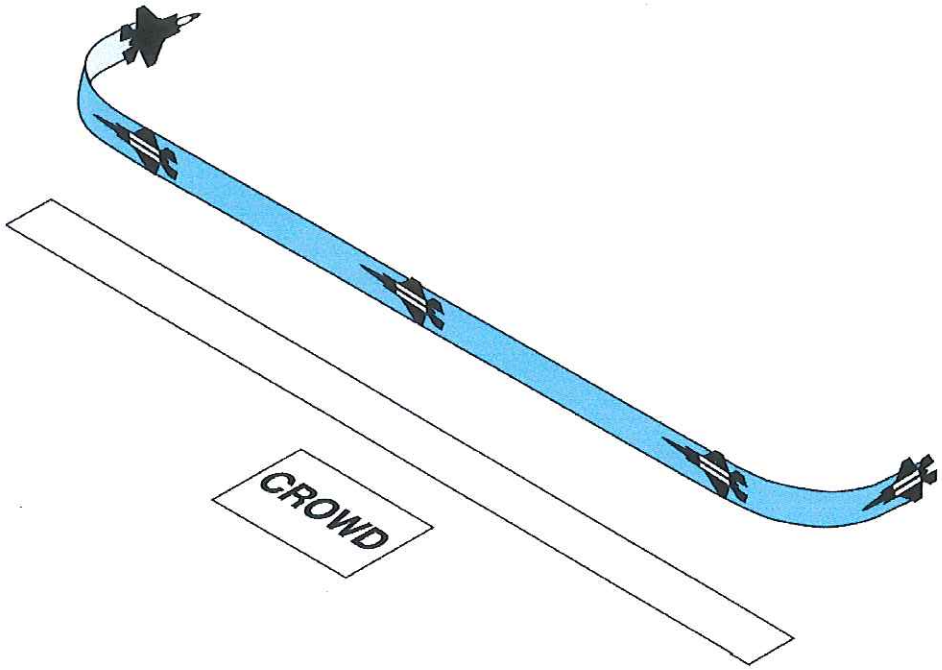
Target parameters			
Altitude AGL	Mach	Power Setting	Pull
Entry 300 feet	0.65-0.94	MAX	A/R
Exit 300 feet	0.65-0.94	MAX	A/R

Parameter limits			
Altitude AGL	Airspeed / Mach MIN/MAX	Power Setting	Pull
Entry Min 200 feet	0.5 / 0.95	A/R	Load limit
Exit Min 200 feet	0.5 / 0.95	A/R	Load limit

e. WBD Pass

(1) Execution: Enter at a 30-45 degree angle off in front of the crowd line and set 350 KCAS at 300 feet AGL. Pilot should strive to point towards the near corner marker, not the crowd, while inbound. Once wings level and approaching the 1,500 feet show line, open the weapons bay doors, bank away from the crowd using top rudder to maintain altitude, and apex no closer than the 500 feet show line. Once past show center, select MAX AB, close the weapon bay doors, and pull for next maneuver setup.

(2) Abnormal Procedures: Abort the pass if the doors do not open normally and symmetrically.



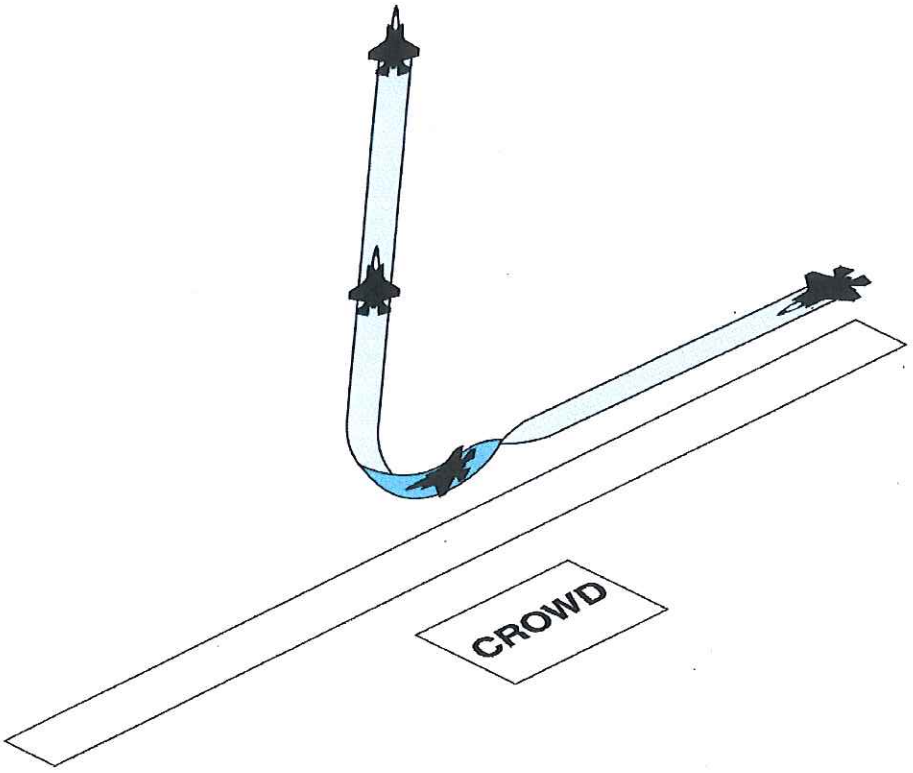
WEAPONS BAY DOORS PASS

Weapon bay doors pass target parameters			
Altitude AGL	Airspeed KCAS	Power Setting	Bank
Entry 300 feet	350	A/R	75
Exit 300 feet	350	A/R	75
Parameter limits			
Altitude AGL	Airspeed KCAS MIN/MAX	Power Setting	Bank
Entry Min 200 feet	250 / 400	A/R	90
Exit Min 200 feet	250 / 400	A/R	90

f. TAC Pitch

(1) Execution: Enter on the 500 feet show line at 300 feet AGL and 250-280 KCAS. Select MAX AB and at 300 KCAS set 30 degrees angle of bank, performing a lift limit excursion for 120-135 degrees of turn while depressing the S10 button. Slowing through 200 KCAS, smoothly ease the pull and neutralize to set a wings level climb approximately 45-60 degrees nose high with the waterline. This demonstrates the jet's ability to climb out after an aggressive change in nose position. Terminate the maneuver with a nose high recovery.

(2) Abnormal Procedures: If the AB blows out or airspeed decays below 125 KCAS, abort the maneuver by rolling wings level, command full forward stick (A/R) until less than 30 degrees of pitch, then accelerate away from the show line.



TACTICAL PITCH

Target parameters			
Altitude AGL	Airspeed KCAS	Power Setting	Pull
Entry 300 feet	300	MAX	LIFT LIMIT (S10)

NH RCVY	150	MAX	A/R
Parameter limits			
Altitude AGL	Airspeed KCAS MIN/MAX	Power Setting	Pull
Entry Min 200 feet	250 / N/A	MAX	N/A
NH RCVY Min	125 / N/A	MAX	N/A

g. Min Radius Turn

(1) Execution: Enter on the 1500 feet show line at 500 feet AGL and 380 KCAS. Select MAX AB and pull to maintain 400 KCAS through the first 135 degrees of turn placing the Climb Dive Marker (CDM) 1.5 degrees NH to make the turn appear level. After 135 degrees select MIN AB and gently ease the pull to appear symmetric. During the last 45 degrees of turn, reselect MAX AB setting 1.5 degrees NL and applying G to maintain 400 KCAS while rolling out on the 500 foot show line. Approaching show center, unload and roll back to wings level. Execute a Lift Limit Pull to 60 degrees NH. Hold 60 degrees NH until passing 4,000 feet AGL then execute a 2-3G slightly overbanking turn to descend and slow for the next maneuver.

(2) Abnormal Procedures: Abort the maneuver if the AB blows out at any time. Throttle modulate if the aircraft accelerates at 7.5 Gs. If the aircraft descends below 400 feet AGL or the airspeed decays below 250 KCAS, abort the maneuver by climbing and clearing the show line with a MAX AB, Lift Limit Pull.

TARGET PARAMETERS			
Altitude AGL	Airspeed KCAS	Power Setting	Pull
Entry 500 feet	400	MAX	Load limit
Exit 500 feet	400	MAX	Load limit
PARAMETER LIMITS			
Altitude AGL	Airspeed KCAS MIN/MAX	Power Setting	Pull
Entry Min 400 feet	380 / 425	A/R	Load Limit
Exit Min 400 feet	350 / 425	MAX	Load Limit

h. Carrier Break to Field Landing Carrier Practice Landing

(1) Execution: Align the aircraft to the runway. At 500 feet AGL, 320 KCAS over the numbers, select MAX AB. Reaching show center at 350 KCAS, initiate a MAX AB break for 150 degrees of turn then execute a normal decelerating break turn, driving out to arrive at the abeam position. Use full lateral stick to ensure crisp rolls into and out of the break. Passing through 90 of turn in the break, select idle and extend the speed brakes. Once established on downwind, perform landing checklist and closely monitor G force (G) while gear is in transition. Execute a normal Delta Flight Path (DFP) on-speed touch and go just prior to show center. Upon touchdown, select idle for a moment to avoid bolter logic, then reselect MAX AB and accelerate to 325 knots to set up for the next maneuver. Vy takeoff mechanics are authorized if practical for follow on maneuvers.

i. Hook Down Pass

(1) Execution: 250 knots (kt) Picture Pass with Hook Extended: Enter 10 degree aft of the 50 foot show line and set 250 kts at 300 feet AGL. Put the hook down below 275 KCAS and geometry set. Enter into a 15 degree bank angle towards show center, reversing NCT the 500 foot line. Place the hook up post show center and accelerate for the next maneuver.

(2) Abnormal Procedures: Do not exceed 300 kts or 1.5G until the hook light is out. Terminate the maneuver if the OVERSPEED HOOK ICAW asserts.

j. High Alpha Pass

(1) Execution: Stabilize the aircraft on the 500 feet show line targeting 27-30 alpha at 500 feet AGL. As a technique, target 600 feet AGL during setup expecting to settle 100 feet AGL during capture. Once stabilized inbound and below 200 KCAS, select SPEEDHOLD (T9) and modulate longitudinal stick to control Vertical Speed Indicator (VSI). While hawking alpha, work the airspeed back with up actuations of SPEEDHOLD until reaching 27-30 degrees AOA. Airspeed in level flight at this AOA is approximately 110-120 KCAS. The HMD Test Tape setting may be utilized for a more accurate Vertical Speed Indicator (VSI) visualization. Recover by selecting MAX AB after passing show center and climb away 45-60 degrees NH into the reposition.

(2) Abnormal Procedures: Execute an abort by selecting MAX AB and stablishing a positive rate of climb while accelerating. Abort anytime altitude is below 400 feet AGL, any warning or caution ICAW appears, or alpha parameters are not met.

Target parameters			
Altitude AGL	Alpha	Power Setting	Pull
Entry 500 feet	27-30 deg	A/R	N/A
Exit 500 feet	27-30 deg	MAX AB	N/A
Parameters limits			
Altitude AGL	Alpha (min/max)	Power Setting	Pull
Entry Min 500 feet	25 / 32	A/R	N/A
Exit Min 500 feet	25 / 32	MAX AB	N/A

k. Four Point Roll

(1) Execution: Setup at the 1,500 feet show line targeting 300 feet AGL and 350 knots. Initiate the maneuver so as to be inverted while passing show center by pulling to set seven degrees nose high with the climb dive marker. Upon reaching seven degrees nose high, initiate a smooth roll towards the crowd for 90 degrees bank angle degree (knife edge). Slight top rudder may be used to maintain aircraft attitude. Hold the knife edge position for one second, then continue roll in the same direction until inverted. Once inverted, execute a slight unload to maintain aircraft attitude with positive flight path angle and VSI and maintain for one second. Continue roll to knife edge away from the crowd and expect a slight nose low position while holding for one second. Lastly, roll the aircraft upright and execute reposition maneuver.

(2) Abnormal Procedures: Abort the procedure via an unloaded roll to wings level if a negative VSI is achieved, or if AGCAS chevrons appear in the HMD.

l. Aileron Roll

(1) Execution: Setup at the 1,500 feet show line targeting 300 feet AGL and 350 knots. Initiate the maneuver so as to be inverted while passing show center by pulling to set seven degrees nose high with the climb dive marker. Upon reaching seven degrees nose high, initiate a smooth roll towards the crowd for 360 degrees of roll. Once the aircraft is upright, execute the reposition maneuver.

(2) Abnormal Procedures: Abort the procedure via an unloaded roll to wings level if a negative VSI is achieved, or if AGCAS chevrons appear in the HMD.

7. Reposition Maneuvers. Reposition maneuvers may be flown in either direction at any time during the flight sequence as required. Per FAA regulations, 90 degrees of bank may be exceeded during repositions (if required). The standard repositioning maneuver is of a climbing check turn away from the show line, a 270 degree "Thunderbird" roll away from the crowd (i.e., roll left to turn right), and then a descending turn back toward the show line while setting up for the next maneuver.

8. Contingencies. If there is a remote launch site or a weather minimum check is required, the show will be commenced at show center. The sequence should then continue as appropriate for site constraints or weather. For a remote site with no runway or an overwater show, the show sequence will not include the Carrier Break to T and G, and the final maneuver will be the High Speed Pass.

CDR D. W. OLDHAM
Commanding Officer