Strike Military Training Route (MTR) Operations

INTRODUCTION

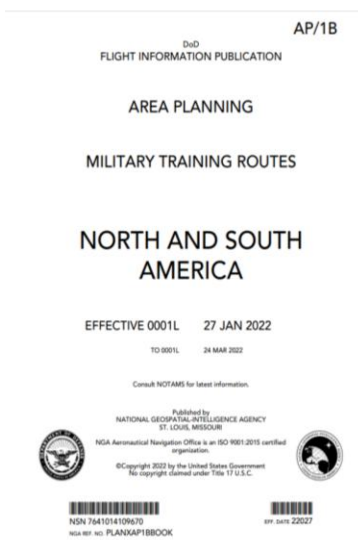
The purpose of the Strike MTR stage is to introduce SNFOs to the basic considerations and procedures required for maneuvering in the low altitude environment in order to execute a planned strike on a target, at a specific time. Following the Strike VNAV block, the next low-level flights will be conducted on the Military Training Routes (MTRs) defined in the AP-1/B. The VFR low level routes are called Visual Routes (VRs). These flights include detailed preflight planning, specific mission timeline, and a thorough brief and debrief.

Plan to launch most sorties IFR and cancel with Approach prior to route entry. All routes shall be flown VFR on AP-1/B defined MTRs. The syllabus begins with single ship operations and then progresses to section flights. SNFOs shall plan to arrive at the Target at a precise ETA. Strike MTR events are flown at prescribed altitudes and should be no lower than **1,000 feet AGL** along any route segment. SNFOs are encouraged to use radio navaids and GPS for the entirety of the single and dual ship STK Low Level phases of training.

Strike MTR sorties, to the max extent possible, will be flown using ICS in "**cold-mic**". Aircrew will use "hot-mic" during target attack, in the terminal environment, or during emergencies/when safety of flight dictates.

SNFOs will call "***Platform***" passing through 5,000' AGL. "**Platform**" alerts the crew to begin honoring the "**minute-to-live**" rule during IMC (i.e. 4,000 FPM at 4,000', 3,000 FPM at 3,000', etc.).

FLIGHT PREPARATION


AP/1B

DoD
FLIGHT INFORMATION PUBLICATION

AREA PLANNING

MILITARY TRAINING ROUTES

NORTH AND SOUTH AMERICA

EFFECTIVE 0001L 27 JAN 2022

TO 0001L 24 MAR 2022

Consult NOTAMS for latest information.

Published by
NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY
ST. LOUIS, MISSOURI

NGA Aeronautical Navigation Office is an ISO 9001:2015 certified organization.

©Copyright 2022 by the United States Government
No copyright claimed under Title 17 U.S.C.

NSN 7641014109670
NGA REF. NO. PLANXAP1BBOOK

EFF. DATE 22027

Route descriptions, administrative details, scheduling information, and other data for MTRs, can be found in the AP-1/B. The AP/1B has five chapters: Chapter 1 – General Guidance, Chapter 2 – IFR Military Training Routes (IR), **Chapter 3 – VFR Military Training Routes (VR),** Chapter 4 – Slow Speed Military Training Routes (SR), Chapter 5 – USAF Air Refueling Tracks.

Chapter 3

VFR MILITARY TRAINING ROUTES (VR)

I. General. STANDARD

II. Route Development. STANDARD

III. Scheduling and Coordination. STANDARD

IV. Flight Plans. STANDARD

V. In Flight.

A. Entry/Exit. Standard

B. Route Adherence. Standard

C. Speed. Standard

D. Weather.

1. Operations on VR MTRs shall be conducted only when the weather is at or above VFR minima except that:

   a. The flight visibility shall be 5 miles or more; and

   b. Flights shall not be conducted below a ceiling of less than 3000 feet AGL.

E. Communications.

1. Pilots should monitor 255.4 MHz while on VRs, if practicable. This does not preclude the use of tactical or discrete frequencies. The Remarks/Special Operating Procedures section of the MTR may direct mandatory radio calls on specific radio frequencies to warn other aircraft of possible traffic conflicts.

2. In the event of communications failure (unless otherwise agreed to in a letter of agreement) the pilot should remain VMC, continue the flight VFR, and land as soon as practicable at the most suitable airport.

F. Transponder. Squawk Code 4000 while operating on a VR MTR unless otherwise assigned by ATC.

VI. Aircraft Separation. STANDARD

Chapter 3 begins with guidance that applies to all operations on VRs. Weather along the route shall be at least 3,000 and 5. All aircraft shall monitor FSS frequency 255.4 and squawk 4000 when entering the route.

(c) Crosses VR-1020, between Points E-F and F-G.
(d) Parallels VR-1021 same direction after Point B. Crosses at Points E and G.
(e) Crosses VR-1023 at Point B.
(f) Crosses VR-1024, between Points B-C and C-D.
(g) Crosses VR-1030, between Points E-F and at Point G.
(h) Crosses VR-1083, between Points C-D and E-F and F-G.
(i) Crosses VR-1196 at Point C.
(j) Crosses IR-037/IR-040 between Points C-D.

FSS's Within 100 NM Radius:
ANB, GNV, GWO

VR-1023

ORIGINATING ACTIVITY: Training Air Wing Six, Pensacola, FL 32508-5509 DSN 922-2305, C850-452-2305.

SCHEDULING ACTIVITY: NAS Pensacola, Pensacola, FL 32508-5217 DSN 922-4671, C850-452-2735.

HOURS OF OPERATION: 1200-0400Z++ weekdays, occasional weekends

ROUTE DESCRIPTION:

Altitude Data	Pt	Fac/Rad/Dist	Lat/Long
As assigned to Maintain 15 AGL until 7 NM NW of A	A	SJI 169/22	N30°22.00' W88°19.00'
05 AGL B 15 AGL to	B	SJI 230/13	N30°36.00' W88°34.00'
05 AGL B 15 AGL to Climb to cross 5 NM SE of D at 10 AGL	C	GPT 354/28	N30°52.00' W89°07.00'
10 AGL to Maintain 10 AGL until 5 NM WSW of D then	D	LBY 185/13	N31°12.00' W89°23.00'
05 AGL B 15 AGL to	E	MCB 138/17	N31°05.00' W90°03.00'
05 AGL B 15 AGL to	F	MCB 208/21	N31°00.00' W90°28.00'
05 AGL B 15 AGL to	G	BTR 056/36	N30°46.00' W90°41.00'

centerline from C to N.

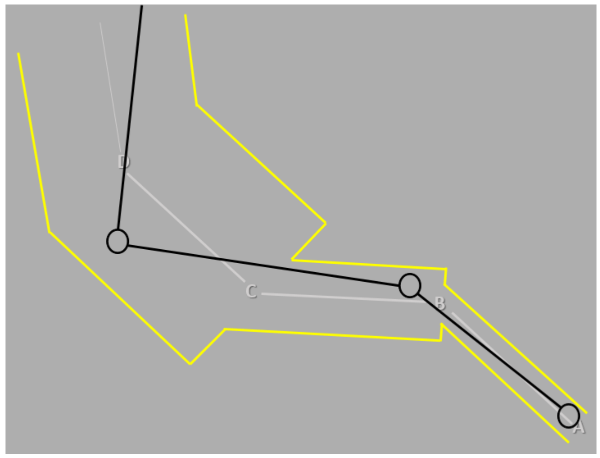
Special Operating Procedures:
(1) Scheduling Activity operating hours: Mon-Fri, 0600-1600 Central Time. To schedule use on Sat, Sun, or prior to 0830L on Mon, call prior to 1600 on previous Fri.
(2) Minimum altitude on route is 500' AGL.
(3) CAUTION: High density VFR traffic from Point A to D.
(4) Alternate Entry: Point C, G, and H.
(5) Alternate Exit: Point G, H, and M.
(6) Maximum airspeed 420 KTAS Mon-Fri.
(7) NOTE: Aircraft are required to transmit in the blind on 297.1 MHz their intention to transit Desota MOA prior to Point C.
(8) CAUTION: Between Point L and M, N30-42-45 W89-07-11, antenna tower 420' AGL/670' MSL.
(9) CAUTION: Between Point L and M, N30-42-13 W89-05-27, antenna tower 1176' AGL/1366' MSL.
(10) CAUTION: At Point D N31-16-08 W89-21-38 antenna tower 379' AGL/749' MSL.
(11) CAUTION: Between Point K and L, N30-41-19 W89-36-04, antenna tower 440'AGL/631' MSL.
(12) Cross 5 NM radius centered around N30-47.17 W090-26.32 at 1500' AGL.
(13) Avoid house located at N30-44.0 W90-24.0 by 1000' AGL or 2 NM.
(14) CAUTION: Between Points B-C, N30-36-21.7 W88-38-51.08, uncharted antenna tower 755' AGL/865' MSL.
(15) CONFLICTS: (Deconflict with the appropriate Scheduling Activity)
(a) Crosses VR-179 at Point B.
(b) Same direction as VR-1021 from Point A-B.
(c) Crosses VR-1022 at Point B
(d) Same direction as VR-1024 from Points A-E.
(e) Crosses VR-1196 between Points C-D, F-G, I-J, and J-K.
(f) Crosses IR-037 between Points D-E, K-L and at Point N.

FSS's Within 100 NM Radius:
DRI, GNV, GWO

VR-1024

ORIGINATING ACTIVITY: Training Air Wing Six, Pensacola, FL 32508-5509 DSN 922-2305, C850-452-2305.

The AP-1/B then describes each MTR in detail and lists specific procedures required for their use. Hours of operation, scheduling authority, altitudes, potential hazards, corridor width and the coordinates that define the corridor are all important information required for your pre-flight planning. While the AP1/B coordinates define the corridor, the aircrew can choose visual references within the corridor for planned flight path. The aircraft shall remain within the route structure.



Any VR may be used in the completion of syllabus events as long as proper JMPS planning is completed, the flight is operationally feasible, and it complies with MCG flight sequencing. Use the MTR overview chart available from the DOD FLIP program for a visual representation of the all the routes in the U.S. In the Pensacola area, VR-1024, VR-1020, and VR-1021 are available as out/in options from NAS Pensacola. Other MTRs may be used as part of a cross-country or detachment operations. Those events may include both instrument and low-level navigation legs. Pay special attention to alternate entry and exit points when formulating a plan to use an MTR.

MTRs are official routes that any military aircraft may fly. In order to ensure aircraft de-confliction, route entry times must be scheduled and strictly adhered to. You do not want to unintentionally get on the route a couple of minutes in front of an F/A-18 doing 480 KGS. To avoid this, reference the AP-1/B and contact the appropriate scheduling authority in order to get an entry time for the route you want to use (this should be scheduled for you by VT-10 Operations - reference the notes section of the flight schedule for your route and entry time). TW-6 is the scheduling authority for many local routes including VR-1024, VR-1020, and VR-1021, and uses an online scheduling tool to manage these routes. Use the online scheduling tool (DCAST) to see route availability and make changes.

This will be the first time in your training that you will need to get your aircraft to a specific point at a specific time, also known as Time on Target (TOT). TOT is a UTC time (or "Zulu" time) value derived by the mission commander based on multiple factors. In the Intermediate Strike stage, these factors include route scheduling, transit distance, route distance, and attack profile. In a real-world attack, a preplanned TOT may be determined by factors such as enemy air defense activity, blue force positioning and coordination, environmental factors, strike route selection, and weapon time-of-fall. Accurate flight planning is required to determine the time it will take to fly the planned route from takeoff to the target. Reference the flight schedule when determining the flight's timeline. For MTRs, the acceptable entry point window is **+/- 4 minutes** from the scheduled entry time. Students shall determine an appropriate takeoff time to reach the briefed entry time via normal routing with time to accomplish normal enroute tasks. Reasonable accommodation should be made to avoid undue delays and ensure the aircraft(s) returns to base by the scheduled land time. As a student Mission Commander, your focus is the TOT. The TOT is determined by adding the time needed to fly the route (from entry to target) to the scheduled entry time. Round the TOT to the nearest minute. Work backwards from the TOT to the entry point to the airfield and determine your takeoff time. Then you can determine appropriate taxi, walk, and brief times. Plan an enroute and low level airspeed of 240 KGS. For example, if you were scheduled for a 1400Z entry and the planned route elapsed time was 58+58, a good TOT would be 1459+00. Input your TOT into JMPS so that your jet log shows UTC times for each turnpoint. In case of a timeline slide or operational flex, have a jet log with elapsed times from the entry point ready as well.

IOAT	**IAS for 240 KTAS**
33°C and higher	230 KIAS
Below 33°C	235 KIAS

Your low level chart will be constructed similar to the ones in the Strike VNAV stage, but with a few differences:

1. Plan for 240 KGS instead of 180 KGS.
2. The route dimensions are fully defined by the AP-1/B. Place a copy of the AP-1/B route summary on the back of your chart.
3. The AP-1/B defines the center of the route corridor by establishing turnpoints, charted by latitude and longitude. VT-10 provides coordinates for a significant visual feature to use as our visual turnpoint. The turn circle is centered on this feature, not the published turnpoint. The route centerline that you will fly is drawn from the centers of the turn circles, not the published turnpoints in the AP-1/B.

Remember, as the student Mission Commander, you are expected to drive all aspects of the conduct of the flight, from brief to simulated weapons release to recovery. In the brief, special attention should be placed on weather and BASH. Per the AP-1/B, the required weather to fly a Visual MTR is a minimum of 3,000 ft. ceiling and 5 miles of visibility. Check bird hazard information for specific MTRs on USAHAS (www.usahas.com). Products required are kneeboard cards and jet logs for all crewmembers, flip charts, and a completed military flight plan. Review SOPs and training rules that apply to low level flights. Note, full EKB capability will be allowed during the Intermediate Strike Flight stage (at the discretion of the IP).

CREW COORDINATION

Crew coordination is an essential skill for any mission, but communication in the fast-paced, task-saturated, low-level environment needs to be clear and concise. For this reason, you are expected to start minimizing your communications as you work through your procedures. Attempt to have your answers formulated *before* you start talking. Do not express units such as knots, feet, or psi, unless there might be confusion. Standardizing terminology and the order of your calls will help in achieving this goal.

Headings are to be spoken as three single digits. For example, a heading of 295 is spoken as *"two-nine-five."* Do not preface a heading with the word "to." *"Turn to two-five-five"* could cause your IP to ask if the heading you want is 225 instead of 255. Directive calls of 10° or less of heading change should be prefaced with the term *"new heading."* Calls of 11° or more should be prefaced with *"Left/Right two-four-two."*

Airspeeds are to be spoken as a "one" number. For example, a speed of 225 is spoken as *"two-twenty-five."* Preface all airspeed calls with the word "set." *"Set two-twenty-five."*

ETAs will be spoken as four digits as "minutes plus seconds." For example, *"ETA to Bravo is one four plus two zero."*

An ideal Wings Level call should sound like:

"Three-five-five"
"Two-hundred"
"One thousand, two hundred"
"120 above MCF, continue"
"Half mile left of course, new heading zero-zero-five for two minutes. Time out one-three plus three-zero."
"10 seconds early. New ETA one-eight plus one-zero."
"Left of course and fast. Winds two-two-five at 10. New heading zero-zero-three. Set one-ninety-five."

Do not sacrifice accuracy for brevity, but you are expected to start working toward this standard. Also, avoid pointing to features or using the phrase "over there." Instead, use descriptive words and clock codes. Simple additions such as near, far, low, mid, or high can greatly expedite a crewmember's visual search. An example of a good descriptive call is, *"The intersection is at 2 o'clock low, just right of the tower."*

ADMIN

You are responsible for two systems: navigation and communication. By this stage, your operations of these systems should be flawless. Develop an exhaustive plan for both.

In this example, we are departing VFR from NAS Pensacola, flying VR1021, and recovering to Monroeville.

The comm plan for both UHF and VHF should be exhaustive, just like the Formation phase. Notice that VHF channel 4 is not listed. That is because on a VFR departure you are switched to Departure after airborne with a plan to talk with Atlanta Center on UHF for vectors RNAV 03 KMVC.

UHF	VHF
01	118.57
02	133.42
19	123.0
03	
04	
06	
15	
255.4	
267.9	

Here is an example of an exhaustive plan for the navigation systems. Note how you can choose whether to use the VOR or simply declutter the number one needle for the entire sortie. There is no requirement for NPA TACAN on a VFR departure, but you may want to dial it in because of habit pattern or additional SA. In this scenario, you are recovering via a GPS approach, but MVC VOR may provide immediate situational awareness exiting the route while you setting up the KLN 900.

GPS	VOR
KNPA RNAV Departing RWY	117.2?
Enroute Points	116.8?
FPL14 (Delete F-R)	
Enroute Points	
KMVC RNAV Arriving RWY	

After start up, you load the pre-set flight plan for VR-1021 (reference eIFG for Flight Plans) and delete F through R. Add departing airfield and planned route before the MTR. Add planned route after exiting the MTR and destination airfield. Add RNAV for the departing filed active runway. Set GPS to missed approach point of the active runway. Select “SET 2” page on left for continuous access to current time. Turn on OBS.

By this stage you should have a deliberate flow for setting up each of your systems. Random flows do not work…inevitably, you will forget things. Here is an example flow and proper setup of EHSI: NAV, MAP, RNG, L/R (Knobs), L/R (Needles).

- Nav: Nav Mode to GPS with groundspeed
- Map: Map mode with airfields only
- Range: 10 scale on takeoff
- Left knob: First assigned heading
- Right knob: Runway heading (the Planimetric line represents runway centerline to provide SA during an emergency immediately after takeoff)
- Left needle: Either displayed or decluttered IAW your navigation plan
- Right needle: GPS.

This is an exhaustive setup of the EHSI. At this stage, you should not be forgetting the heading bug, displaying airfields, or improper range. Strive for perfection.

This setup will best used for takeoff for all Strike missions, single ship or section. Since the purpose of the Planimetric line is to increase SA during an emergency, once airborne and normal engine operation is confirmed during the ops check, navigation systems should now be setup for enroute guidance.

On the KLN 900, a technique is to select “FP” page on left and “D/T 2” page on right. This will give ETA (to the nearest minute) of each point along the route. It is recommended to select OBS on.

On the EHSI, increase Range until the Active Waypoint is displayed. Move the Planimetric line to the point Alpha outbound heading. Turn OBS off as appropriate to enable auto-sequencing. Arc display is common for enroute operations, while 360 view (full EHSI) is better for maneuvering within an assigned block of airspace. Composite mode optional since the EHSI map mode has CDI at the bottom and we lag turn points on a low-level route. Composite mode is more useful on instrument flights to easily recognize the lead turn by seeing the CDI “snap” to next leg, but may be used on Strike flights.

1. Establish a timeline effectively use aircraft systems to monitor progress. Use corrections as necessary to return to timeline when deviations occur.

Time management is paramount. Establish a timeline from brief to the target. Be sure to walk, taxi, and takeoff on time. Then your adjustments airborne will be smaller. Once airborne, you can correct back to timeline view speed corrections or adjusting flight path.

The KLN 900 is useful for time management. First, you must constantly be aware of current time. “SET 2” page displays the Current Time in HH:MM:SS in various time zone formats.

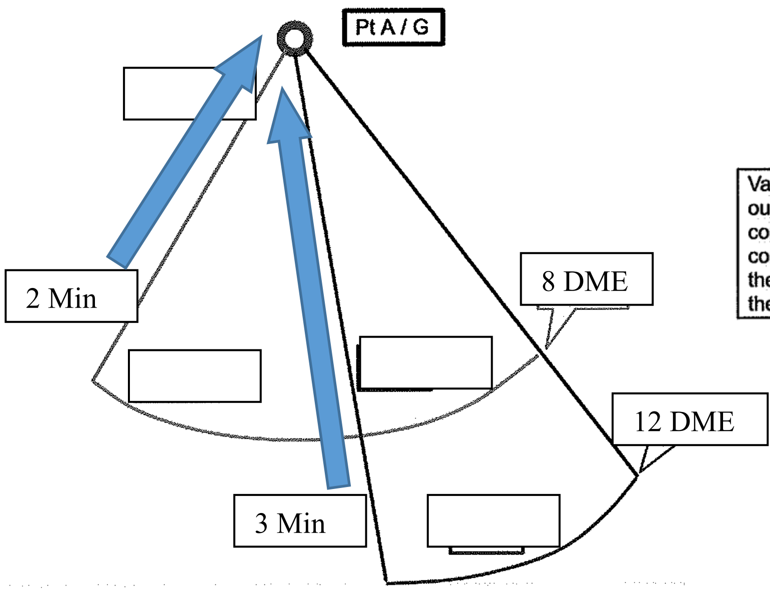
“D/T 2” page may enhance time management. “SET 2” on the left side and “D/T 2” on the right side simultaneously displays Distance & ETA (in HH:MM UTC) for two waypoints: active waypoint and the last waypoint. By changing to “FP” on left side, you now have an ETA adjacent for each point along the planned route. Unfortunately, “D/T 2” only displays hours and minutes while omitting seconds. Be aware, the ETA on “D/T 2” is based on current airspeed.

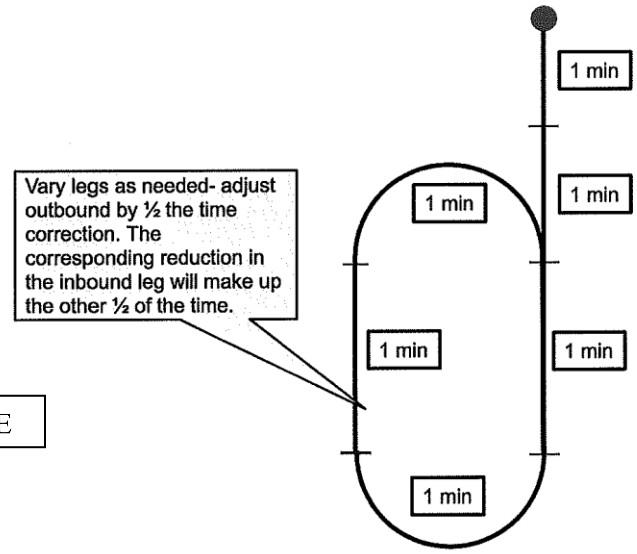
Now assess your timeline using time gates, “D/T 2”, or EKB (ETE added to current time). For small time corrections adjust the airspeed by 20 kts to achieve a 5” gain/loss every minute. For larger corrections, set max power (90% for a section) or min airspeed (180 KIAS). Once the airspeed has settled, re-evaluate arrival time to the entry point. Three scenarios are possible: On time, early, or late.

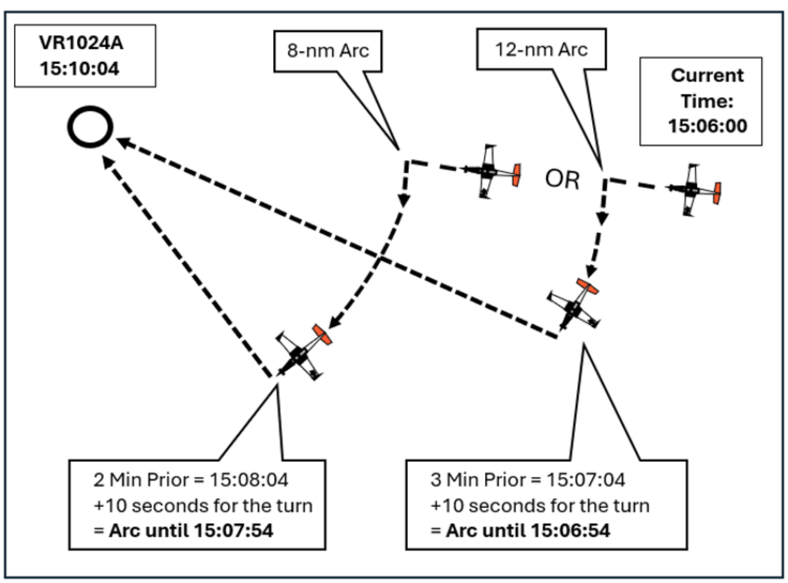
Let’s say we takeoff two minutes late. The standard correction would take too long. Simply set max (90% for a section). Then check “D/T 2” or EKB ETA. If ETA shows you on time, leave correction in until Pt A then reset 240 KGS. If ETA is late, we will NOT be on time at Pt A. You may be able to adjust route of flight. For example, if you are late, simply take a more direct (shorter) path to Pt A. If route cannot be shortened, then correction must be carried onto the route itself. Geo-cut (discussed later) should be used in conjunction with speed correction to achieve timeline more quickly. If ETA is early, then you will be back on timeline before entry. Use time gates based on 240 KGS to determine when to remove speed correction.

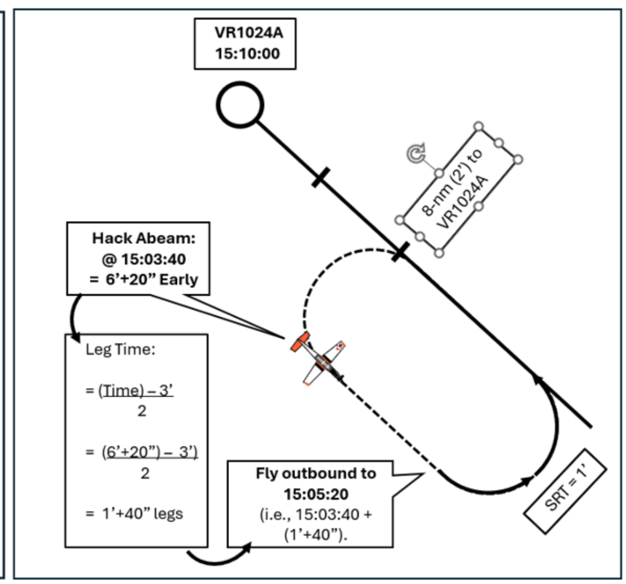
If significantly early, set minimum airspeed (180 KIAS). Re-assess your progress. If D/T 2 or EKB ETE shows you On Time, maintain current airspeed until Pt A then reset 240 KGS. We do not reset power immediately because the D/T 2 page and EKB ETE are based on current ground speed. If D/T 2 shows you late, you will be back on your timeline prior to Pt A. Use time gates based on 240 KGS to determine when to remove speed correction. If D/T 2 still shows you early, no other power options are available. Consider arcing or holding as time management options.

In this option, direct your IP to arc or hold as needed. A technique for arcing is to arc at a distance that keeps you 2 minutes from the entry point. At 240 KGS (4 miles/min) you would arc at 8 miles from Pt A. If an extended delay is expected, a standard holding pattern may be utilized similar to the holding performed in instruments. A common holding fix is 8 miles (2 minutes) from Pt A. Adjust your leg lengths or number of turns to arrive at your entry time.









If it will not be possible to make your route entry time, you can "rolex"/delay your entry time by five minutes (if you have two consecutive entry times scheduled for your MTR). Otherwise, coordinate with the SDO to get a new entry time or abort the mission. Maintain timeline SA and verbalize to your IP where you are on timeline. Develop a solid plan, execute it, and make your entry time!

2. Cancel IFR (if required) prior to entering the route.

3. Update the weather and winds prior to route entry.

TAC ADMIN

FENCE Checks/G-Warm. Two ways aircrew prepare their body and aircraft for dynamic maneuvering and mission conduct are through FENCE checks and the G-warm exercise. In the VT-10, The FENCE acronym has been modified.

F - Frequencies: Radio frequencies set, ATIS/AWOS as required, radio calls in accordance with local directives.
E - Emitters: Squawk appropriate transponder code
N - NAVAIDS: GPS/EHSI set, NAV needles as required
C - Checklist: Climb, operations, pre-stall/spin/aerobatics, descent
E – Equipment: G- Suit and weapons system (i.e. GPS number 2 needle)

FENCE-in will include completing the Pre-Stalling, Spinning and Aerobatic Checklist, setting transponder to appropriate code (4000 for VRs), and decluttering the number two needle (to simulate weapons systems are ready). The G-warm is conducted the same as in the FRM stage. Once complete, you will report over ICS that the checks are complete by stating FENCED-in, fuel state, and a successful G-warm has been accomplished. "FENCED-in, 8.6, Good G"

At completion of the mission conduct, the Lead aircraft will direct a FENCE-out. This FENCE-out will include conducting an Operations check, setting transponder to appropriate code (1200 exiting the route), and switching to cold mic. This also clears Dash 2 into the cruise position. If Training Rules have been conducted, a "Battle Damage Check" will be required from the formation. *"FENCED-out, 6.2. Good G*". "Good G" on FENCE-out means the aircraft has not been overstressed and can recover normally.

1. Five minutes prior to entering the MTR, make an entry call on 255.4. Monitor this frequency while on the MTR in order to de-conflict with other aircraft using the same or crossing routes. The call should sound like this:

"99, KATT XX, single Navy T-6, entering VR-1024 Point A at 1210, exiting point G at 1245, 1,000 feet, 240 knots." Note that the times are in Zulu and the altitude is AGL.

2. Squawk 4000 no later than the entry point.

3. Enter the route on time.

4. Post attack, FENCE-out and make an "off-route" call on 255.4. After FENCE-out, normal use of GPS needle #2 is permitted.

LOW-LEVEL CONDUCT

1. Students shall select cold mic on the audio panel after takeoff checks have been completed and remain in cold mic until calling to configure on an approach, executing an "attack," or for any safety-of-flight considerations. Students shall re-select cold mic post KIO or upon "FENCE-out" call following a target attack.

2. Normal VNAV turnpoint procedures will be used on the MTR, with a few exceptions:
- 2MP: The student may direct "240 Ground" for all outbound airspeeds.
- MOT: Real world time will be used. Drop the hours and just refer to minutes and seconds. Tell the IP to set "240 Ground".
- Shortening distance flown is now an option for timing corrections.

Normal VNAV turnpoint procedures will be used on the MTR, with a few exceptions. They are:

a. The route will be flown at 240 KGS. Initially set 230 KIAS (IOAT 33° and above) or 235 KIAS (IOAT 32° and below) then refine via GPS.
b. The timed course correction used at 240KGS will be 15° of heading change for 30 seconds to correct for 0.5 NM off-course
c. The standard speed adjustment for timing corrections at 240 KGS is 20 kts. This will increase/decrease 30 seconds of mission time over 6 minutes, or more simply, **5 seconds for every minute.** Minimum airspeed is 180 KIAS.
d. If late, turn early to make up time using geometry cut ROT:
    - 60° and greater: Turn on time.
    - 30° to 59° : Turn 1 NM early for every 5" late
e. Aircrews must ensure they remain clear of hazards when turning early
    - Possible hazards: Terrain, towers, airfields, airspace, Noise Sensitive Areas, Corridor, etc.
    - Do not turn earlier than corridor width or hazard on a 90º turn
    - At 45º turn: Displacement at rollout equals ~ **half** the distance of the early turn. It is possible to turn up to twice the corridor width and still be within the corridor at rollout.

f. Methods to check distance from corridor centerline:
    - The KML file on the EKB depicts the visual turn points and desired flight path
    - The KLN 900 has the AP-1/B coordinates and therefore gives SA on the corridor centerline
    - So a common technique is to use the right side of the KLN 900 in NAV 3 for a digital readout of distance from centerline. In this example it is directing us to fly right 2.1nm to get to the centerline. So we are 2.1 left of centerline. This is acceptable for a 5nm corridor. But from B to C on VR1024 the corridor width is only 2nm. So we need to fly right at least .1nm.

- Another method for maintain corridor awareness is the EHSI. The CDI, located at the bottom of the EHSI, shows displacement from the centerline on a +/- 5nm scale. The range of the EHSI may be also used to visual assess distance from centerline.

g. During pre-flight planning of the route, the SNFO should determine the following GeoCut parameters for each turnpoint.

- Amount of heading change
- Which GeoCut technique to apply.
    - 60° and greater: Turn on time.
    - 30° to 59° - Turn 1 NM early for every 5" late.
- Hazards effecting an early turn.
- Maximum lead turn available (avoiding hazards and remaining within the next leg's corridor.)
- Maximum time correction available: 10 Seconds

h. Z-diagram (to be addressed later in this chapter) will be adjusted for terrain elevation, depicted in the chart margin near the target, and annotated in MSL altitudes.

i. Students may be allowed to use the full GPS capability of the aircraft to augment and QA airwork calculations and turnpoint acquisition. EHSI shall be configured in GPS MAP mode with KGS displayed. ADI composite mode and ARC are authorized. The intent of this allowance is to provide students additional mission crosscheck time (MCT) to devote to outside scan and increasing SA. The AP-1B coordinates are loaded in the Flight Plan on the KLN 900. The aircraft GPS should be used for Corridor awareness. The AP/1B points may be different from the actual Turn Points. Therefore, the EKB should be used to identify actual turn point features. Prior to the brief and flight, students should compare the KML files to the AP/1B lat/longs and plan accordingly.

j. The JMPS Planning Guide lists the coordinates for the actual turn points. Use the KML file on your EKB for route study and turn point recognition.

3. The route should be flown at 1,000 ft AGL unless route restrictions dictate otherwise. During the preflight route study, students shall determine the highest terrain on a route leg (+/- 5 NM from route centerline) and add 1,000 ft. to it to determine an MSL altitude to fly for each leg.

k. At the target point, you will execute one of two target attacks listed below.

TARGET ATTACKS

Typically, strikers will be concerned with air-to-air threats until near enough to the target to commit to and focus on the ground attack. While many factors are used to derive this point, in the T-6A, the attack point will be ~10 NM from the target. Pick a visually significant feature as an attack point. Upon reaching this point, you will direct the IP to switch to an air-to-surface (A/S) mindset through recommending a directive *"attack"* call on ICS to the IP (Wing A/C stack level). You will then ensure the A/S checks are completed, switching from a simulated A/A (air-to-air) sanitization game plan to an air-to-surface mindset.

Air-to-Surface Checks

1. Ensure EHSI NAV mode is in GPS and bring up the #2 needle selected to GPS with the target as the active waypoint.

2. On ICS give a "Z-Brief" to review the Z-diagram. Go "Hot-Mic" prior to giving Z-Brief. Z-Briefs include number of degrees nose up, apex altitude, dive angle, planned release altitude, and minimum altitude. For example:

"20 up to 2,000, 10 down to 1,700, min alt 1,500."

Pop Attacks

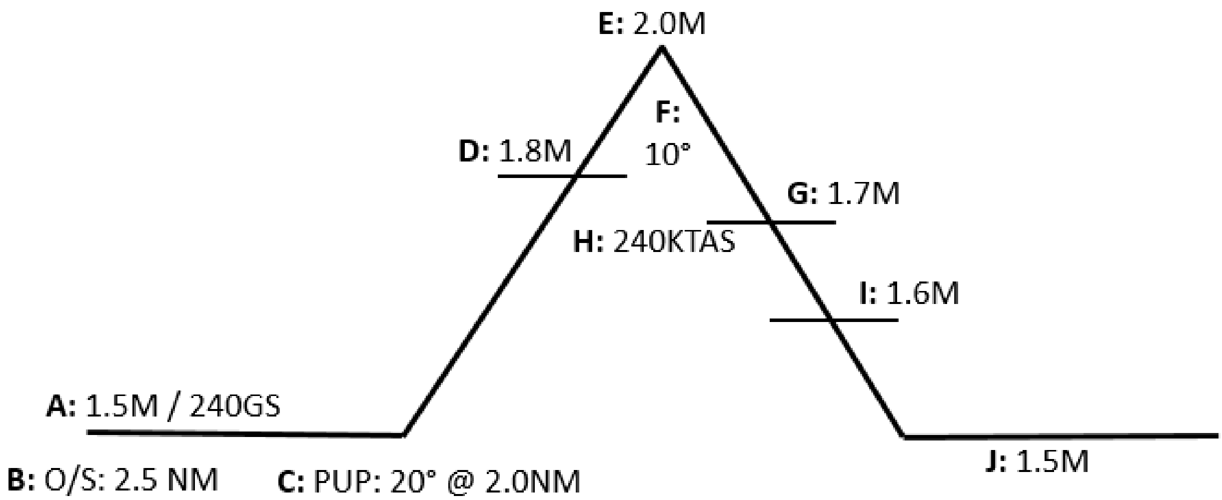
Pop attacks enable an attacker to ingress at low altitude and then rapidly climb to a higher altitude in order to achieve weapons release parameters. During the low-level phase of training, students will practice pop attacks as a single ship in preparation for flying these attacks as a section later in this stage. During section low-level events, we will introduce two basic pop attacks; the Shift Attack and the Crossing Attack.

Pop Z Diagrams

1. In the fleet, preflight planning will involve determining the proper flight parameters (airspeed, altitude, dive angle, etc.) needed at the instant of weapons release to successfully deliver your ordnance to the target. "Z" diagrams are useful presentations of this information and are to be included on briefing boards and kneeboard cards (Figures 7-1 & 7-2). To make an analogy, if releasing the ordnance is akin to pulling the trigger on a rifle, then the Z diagram details how to position and aim that rifle.

2. Since the T-6A does not have a heads-up display (HUD), radar altimeter (RADALT), or actual ordnance, this diagram is simplified from what you will see in future aircraft, but the concepts are the same. The T-6A 10-degree Offset Pop Attack Z diagram uses a 30-degree offset, 20-degree climb and 10-degree dive angle. First, determine the elevation of the target and then use the diagram to plan the target attack while staying inside the confines of the route

structure. Z diagrams are completed using MSL altitudes, which shall be denoted by an ‘M’ after the number.



T-6A Pop Attack Z Diagram

3. Each letter of the depicted Z diagram represents a specific piece of data.

A. Ingress Alt (MSL)/Airspeed (KGS) – Plan for 1,000 feet AGL and 240 KTS ground speed.

B. Offset Point – Distance to turn 30° off course. (PCL-Max, G’s to sustain current groundspeed. Reset PCL to maintain set KGS until Pop)

C. Pull-up-point (PUP) – Distance from target to execute 20° nose up pull. Use 2.0 NM. (PCL-Max)

D. Roll Altitude (MSL) – Start the roll-in to attack angle at this altitude

E. Apex Altitude (MSL) – Max altitude of the pop.

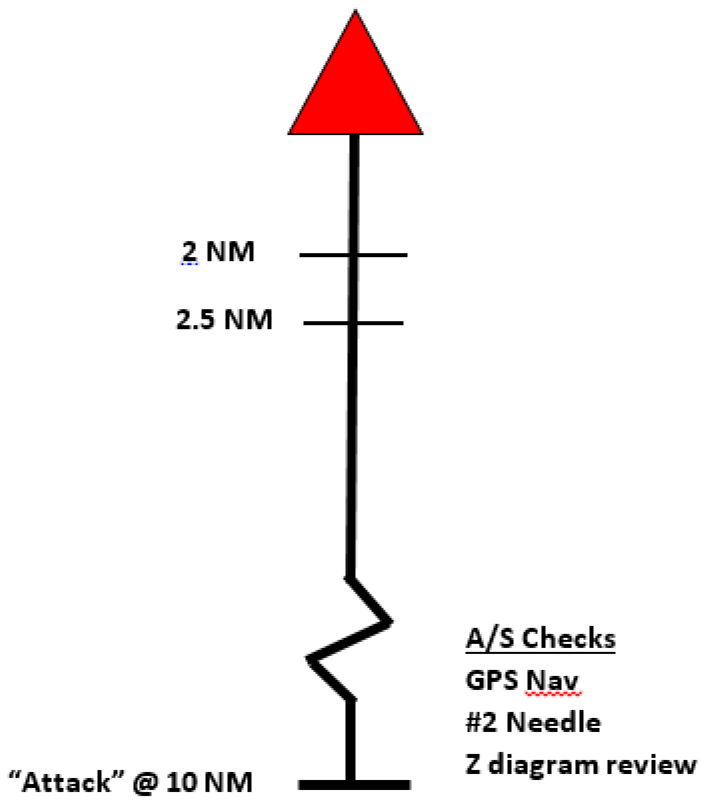
F. Dive Angle – The angle between the flight path and the ground. (PCL-Set as appropriate to maintain entry KGS once dive angle established)

G. Planned Release Altitude – The altitude at which, given planned parameters, a release solution is expected. The SNFO will call “MARK” on the ICS to notify the pilot the aircraft is passing the Planned Release Altitude.

H. Release Airspeed - The airspeed an aircraft must attain for desired weapons trajectory.

I. No Lower than Release Altitude (NLT) – The lowest acceptable altitude at which ordnance may be release without posing a safety of flight or training rule violation. The SNFO will call "PULL" if the pilot does not initiate a pull to level the aircraft by NLT.

J. Minimum altitude (MINALT) – An aircraft executing an air-to-surface attack shall not go below this altitude



Pop Mechanics Diagram

Pop Mechanics

At 2.5 NM prior to the target (0.5 DME prior to PUP), execute a level 30° offset by sharply turning 30° away (direction as desired) from the target (PCL-Max, G's to sustain 240 KGS). Roll wings level (Reset PCL to maintain 240 KGS), then at the PUP, your IP will set PCL to MAX, use 2-3 Gs to pitch nose-up, setting the required degrees of climb, and call *"[call sign], popping"* over TAC. At the roll-in altitude, your IP will roll 135° towards the target, place the aircraft's lift vector on the target, aggressively pull the nose of the aircraft to the target, set the required dive angle, and roll wings level (PCL-Set as appropriate to maintain entry KGS once dive angle established). During this pull, the aircraft should go no higher than the apex altitude. During the pull to the target, your IP will call *"[call sign], in, dry, XXX"* over TAC*,* where XXX indicates the aircraft's ultimate attack heading.

You will monitor the aircraft's compliance with the Z-diagram, scan for abort parameters, and make required ICS calls, during the attack and dive recovery. Approaching planned release altitude, you will say "*standby*" over the ICS. At planned release, you will say "*mark*" over the ICS. If the IP is not recovering by Release No Lower Than altitude, you will say *"pull"*. You will then ensure that your IP goes no lower than the minimum altitude by using a more emphatic "*Pull*" or *"PULL!"* command, as appropriate to ensure the minimum altitude is honored.

Abort parameters for the pop attack are +/- 5 degrees of planned dive angle, and +/- 20 knots of planned release airspeed. If the aircraft is exceeding parameters, you shall direct your IP to "*Abort!"* You should note the UTC time when passing directly over the target (simulated weapon impact). After weapons release, your IP will immediately apply positive G to stay above the MINALT and establish a climb, this is also known as a "safe escape" maneuver.

After safe escape is assured (noted by a positive rate of climb), you will deselect the #2 needle to simulate "safe'ing" a weapon system. Once the aircraft is climbing and the simulated weapon system is safe'd, your IP will call *"[call sign], off safe, sim one away"* over TAC.

Comm example for a shift attack (performed over ICS):

1. SNFO "*Attack*" at 10NM

2. IP: "*Popping*" at 2NM

3. During roll-in:
   IP: "*In, dry, 330*"

4. At planned release altitude:

SNFO: "*Standby…mark…pull*"

5. Approaching MINALT:

SNFO: "*PULL*!" (if necessary, i.e., decent through MINALT is imminent)

6. Safe-escape complete, aircraft "safed"

IP: *"[call sign] Off safe, sim one away*"

Off Target Tac Admin

1. SNFO: *"[call sign] Fence out"*

2. Lead SNFO*: "99 aircraft [ATC callsign] single USN T-6's off the VR-XXX point X at this time, switching"*

STRIKE SECTION MTR OPERATIONS

Now that we can fly a low level MTR to reach a target on time, we will discuss how to execute this mission and target attack as a Formation. After building your flight plan and loading the approach for the active runway, go direct to the target. Lead will conduct the nav check to the target while Wing verifies system accuracy. Then go direct to the MAP of the active runway for Planimetric line on runway heading for takeoff.

Enroute operations remain the same. Establish a timeline, then follow it or make required corrections to get back to it. With a section, you must determine position for wingman during each phase of flight. Remember power restrictions when making correction (i.e. max torque is 90% . min torque is 20%).

On the MTR, Lead must maintain SA on Wingman's position in relation to hazards, corridor, target attack, etc. Lead must also decide the type of turn to use at each turn point. While the 2 Minute Prior call remains the same, the Lead SNFO must add the type of turn recommended.

- "Two minutes prior to Bravo…"
- "…Outbound heading 290…"
- "…240 ground…"
- "…Climb 1300…"
- "…Road/Railroad Intersection.."
- "…VR179 crossing from our 4 O'clock…"
- "…**Recommend tac Left**."

The section will conduct a formation attack on the target leg. Two basic attack geometries are introduced in VT-10: The shift pop attack and the crossing pop attack.

An "Attack" call is made 10NM from target. The formation will switch to Air-to-Ground tactics. **The formation will "stack level" (i.e. Wing will descend 200 feet to Lead's altitude) and immediately adjust speed as required (regardless of timing) to 240 KGS.** Each SNFO will simulate Air-to-Ground Weaponry by selecting the number 2 GPS needle. Each SNFO will go "Hot Mic" and provide an internal attack brief.

An "Action" call is used to initiate the pre-briefed maneuver at the action point.

The "Offset" call is made at 2.5NM and the attacking aircraft will turn 30° off course

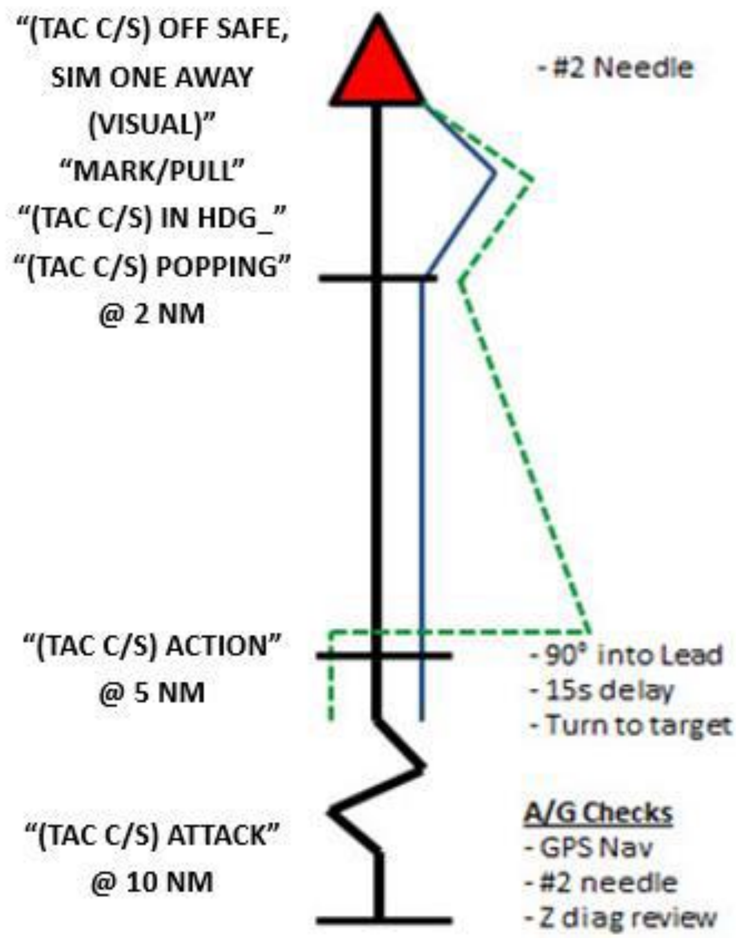
Shift Attack

A shift pop attack is a tactic that enables a section to create temporal separation between the two attacking aircraft in order to prosecute the same target. This has certain advantages and safety considerations that make it a viable and practiced tactic in the fleet. One of the main reasons is that the separation between aircraft allows for fragmentation avoidance from the explosion of the first aircraft's attack. Also, mutual support is maximized by the non-maneuvering aircraft providing cover to the attacking aircraft. Lead's attack gives the added benefit of identifying the target area for the Wing aircraft, which allows the Wing to adjust his aim off of Lead's hits. We will target 30 seconds of separation between aircraft (a common time separation for bomb fragmentation avoidance).

In T-6s, this separation will be created at 5 NM from the target (action point) by a "[tac call sign], action" call made by the Lead IP on TAC. Wing will maneuver their aircraft to turn 90° toward the Lead's flight path; in other words, Wing will cross behind Lead's tail and maintain the set KGS from lead depending on time, speed, distance to the target. After rolling out, the Wing will time 15 seconds before turning to put the target back on the nose, maintaining same KGS previously set prior to the attack call. Meanwhile, Lead will continue toward the target point and execute the pop attack on timeline. Wing will execute their attack on timeline in the same direction as Lead. Wing's initial 90° offset generates approximately 30 seconds of spacing.

Comm example for a shift attack:

1. Lead SNFO: "Raider, attack" at 10 NM.
2. Each aircraft will conduct an internal Z-Brief. Z-Briefs include the type of attack, number of degrees nose up, apex altitude, dive angle, planned release altitude, and minimum altitude. For example: "Shift attack, 20 up to 2,000, 10 down to 1,700, min alt 1,500."
3. Lead IP: "Raider, action" at 5 NM.
4. At PUP, Lead IP: "Raider 41, popping" at 2 NM.
5. During roll-in, Lead IP: "Raider 41, in, dry, 330."
6. At planned release altitude: Lead SNFO (ICS): "Mark"
7. Approaching MINALT, Lead SNFO (ICS): "PULL!" (if necessary, i.e. descent through MINALT is imminent)
8. Safe-escape complete, aircraft "safed", Lead IP: "Raider 41, off safe, sim one away."
9. Once off target, Lead SNFO states over ICS "Visual/Blind on Dash 2."
10. Wing at PUP (30 sec later), Wing IP: "Raider 42, popping."
11. During roll-in, Wing IP: "Raider 42, in, dry, 345."
12. At planned release altitude: Wing SNFO (ICS): "Mark"
13. Approaching MINALT, Wing SNFO (ICS): "PULL!" (if necessary, i.e. descent through MINALT is imminent)
14. Safe-escape complete, aircraft "safed", Wing IP: "Raider 42, off safe, sim one away, visual/blind."



T-6A Shift Attack Diagram

Crossing Attack

A crossing pop attack is a tactic that enables a section to conduct simultaneous attacks on the same target. Unlike a shift attack, a crossing pop attack masses firepower on the target while minimizing exposure to target area defenses. The crossing attack does not have a large separation maneuver; instead, the Lead will orient the geometric center of the section straight towards the target (bisecting the section to enable proper attack geometry). At the appropriate distance (0.5 NM from the PUP), the Lead IP will call "*[section tac call sign], action*" on TAC. Both aircraft will make an aggressive level turn *away* from each other for 30 degrees. At the PUP, the Lead pilot will execute a pop attack. Wing will execute a pop attack after a 2-second delay, appending *"visual"* to the "*in*" call. This delay is designed to keep Lead slightly forward of Wing and ensure de-confliction. Wing will ***not*** roll-in on the target without a visual. If blind, Wing will call as such with their altitude and pull away from the target.

Comm example for a crossing attack:

1. Lead SNFO: "Raider, attack" at 10 NM.

2. Each aircraft will conduct an internal Z-Brief. Z-Briefs include the type of attack, number of degrees nose up, apex altitude, dive angle, planned release altitude, and minimum altitude. For example: "Cross attack, 20 up to 2,000, 10 down to 1,700, min alt 1,500."
3. At 2.5 NM, Lead IP: *"Raider, action"*.
4. At PUP:
   Lead IP: *"Raider 41, popping."*
   After 2 second delay:
   Wing IP: *"Raider 42, popping."*
5. During roll-in:
   Lead IP: *"Raider 41, in, dry, 030."*
   Wing IP: *"Raider 42, in, dry, 330, visual."*
6. At planned release altitude (both aircraft), SNFO (ICS): "*Mark."*
7. Approaching MINALT (both aircraft), SNFO (ICS): *"PULL!"* (If necessary, i.e. descent through MINALT is imminent)
8. Safe-escape complete, aircraft "safed":
   Lead IP: *"Raider 41, off safe, sim one away."*
   Lead SNFO: "*Visual/Blind Dash 2."*
   Wing IP: *"Raider 42, off safe, sim one away, visual/blind."*

T-6A Crossing Attack Diagram