FORT WORTH vARTCC

Air Refueling Procedures Guide

"For Simulation Purposes Only"

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INTRODUCTION

A great number of VATSIM controllers experience hesitation when dealing with military aircraft, mainly due for the lack of knowledge and understanding some of the terminology or the mechanics of military flying. The intention of this guide is to provide ATC Controllers with the basic guidance on how to handle the different military operations often seen on VATSIM, and hopefully answer some of the questions that you might once had. Lastly you will soon realize that handling military aircraft is not much different than their civilians counterparts, in fact some of it is as basic as issuing a normal clearance when you sit at the Clearance delivery position with a few twists off course!

10-1-6. CHRONOLOGY

The following is a basic chronology of the events for a typical air refueling operation in tracks and anchors. The exact sequence may vary as dictated by operational circumstances. For air refueling tracks, the en route rendezvous differs from the point-parallel rendezvous only in that the tanker does not delay at the air refueling control point (ARCP) and both tanker and receiver aircraft enter the aerial refueling airspace simultaneously.

a. Aerial Refueling Track.

NOTE-
Normally, the tanker aircraft enters the track at the ARCP, and the receiver aircraft enters at the air refueling initial point (ARIP).

1. Tanker requests delay at the ARCP and advises ATC of the requested aerial refueling block altitudes.

2. ATC approves delay and issues clearance, or advises tanker to expect clearance, for the air refueling block.

NOTE-
If the delay is approved, the aircraft will enter the refueling pattern. If a hold is issued, aircraft will enter a standard holding pattern or as assigned by ATC.

3. Tanker enters orbit pattern airspace for delay at ARCP.

NOTE-
If no clearance is received, aircraft will hold in the direction of the air refueling pattern until their filed air refueling control time
(ARCT). If no clearance is received by the ARCT, the aircraft will proceed down the AR track on its flight plan route; refueling is not authorized.

4. Receivers are cleared to requested altitude and IFR separation is established prior to ARIP and release to tanker communication rendezvous (C/R) frequency.

5. Tanker declares MARSA (Military Assumes Responsibility for Separation of Aircraft).

6. ATC releases receiver to tanker C/R frequency not later than the ARIP.

7. ATC issues clearance to conduct aerial refueling along the track, and issues block altitude clearance, if not previously accomplished.

8. ATC shall ensure that nonparticipating aircraft remain clear of the area until the

rendezvous is complete.

9. Tanker and receiver aircraft complete rendezvous and proceed down track. During aerial refueling, the tanker is responsible for receiver aircraft navigation along the track and for all tanker/receiver communications with ATC.

10. Tanker advises ATC of tanker and receiver end aerial refueling altitude requests at least five (5) minutes prior to exit.

11. At or prior to the exit point, ATC issues tanker and receiver altitude clearances, transponder codes, and if requested, amended routing.

12. Prior to exit, tanker vertically positions the aircraft in the formation within the air refueling airspace to facilitate breakup at the exit point (normally, tanker at highest altitude of aerial refueling block and receiver at lowest altitude).

13. MARSA is terminated when standard ATC separation is established and ATC advises MARSA is terminated.

b. Anchor Aerial Refueling.

1. Anchor aerial refueling operations involve the same basic procedural elements as required for track refueling, except that both tanker and receiver aircraft file a delay in the anchor area and all air refueling activity is conducted within the anchor as per paragraph.

2. Additional requirements, such as, alternate entry/exit points, MRU procedures, etc., shall be specified in a letter of agreement, as required.

Where can I find information?

Data concerning specifics about Air Refueling can be found in the AP/1B under the air refueling section. On instructions on how to correctly file a flight plan that has refueling data in it consult the General Planning FLIP, Chapter 4. In the next section we provide some highlights different flight plans with refueling delays.

AIR REFUELING FLIGHT PLANS

Air refueling flight plans will look just like a normal flight plan, the main difference resides in the fact that the tanker or receiver aircraft will enter an entry point, delay and exit point into the Air Refueling (AR) anchor or track. Also these points are normally defined by a radial and DME off a VOR or TACAN. Ex. *JCT 315022* Notice there are no spaces left in between radial and DME.

TRACK - The aerial refueling track delay is normally applicable to the tanker only and is presented as one continuous flight on the flight plan form. The delay is indicated immediately following the aerial refueling control point (ARCP) in the route of flight segment (e.g., SPS 282078/D 0+20 AR013 TCC 202038). This entry depicts a 20 minute delay at the ARCP. No additional remarks pertaining to the delay are required. The receiver does not file a delay if normal refueling procedures are to be used.

Sample AR delay, Anchor

(9)i(3)b MQP J23 EDNAS JCT 315022 AUS 291061/D0+30
AR611 AUS 302044 AUS J21 SAT SKF
(9)h(2)a (9)h(2)b (3+30 [6+00] RND 0+10)

ANCHOR - Aerial refueling in an anchor is prepared in the same manner as the aerial refueling track, except the delay is indicated immediately following the anchor point and both the tanker and receiver file a delay.

For in-flight refueling (delay not applicable), receivers enter the ARIP and tankers enter the ARCP using the Navigational Aid identifier and radial/DME (if required), the track area and number, and the exit point. This information is inserted in the route of flight at the point to which it applies (e.g., SPS 282078 AR013 TCC 202038).

Sample AR delay, Track

(9)b					(9)i (3)a			
MQP	J23	BATIK	J58	SPS 282078/				
							(9)i (2)	
D 0+20	AR013	TCC 202038	TXO	LBB 300058				

COMMUNICATIONS

In FLIP (AP/1B), the column headed "CR Plan" lists the communication frequencies to be used during the air refueling mission. (See **Table 1.1**) Item "a" is the primary inter-plane UHF frequency used for communications during the air refueling mission; item "b" is the secondary UHF frequency. To use either frequency, simply type rw.avsim.net/348.90.

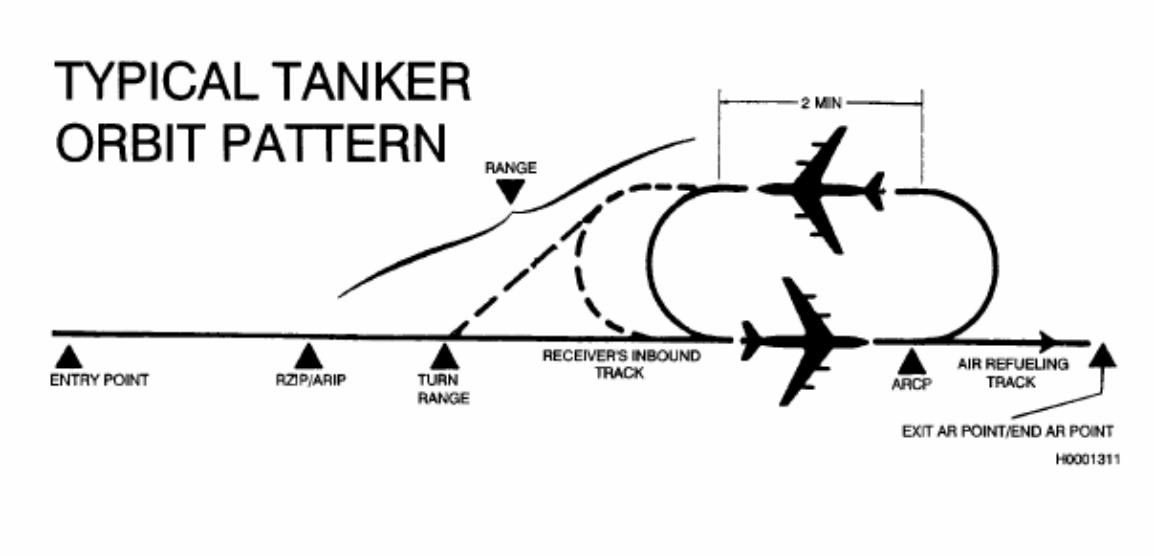
(Table 1.1)

NUMBER	ARIP	ARCP	NAVIGATION CHECK POINTS	EXIT	CR PLAN	REFUELING ALTITUDES	SCHEDULING UNIT	ASSIGNED ARTCC
AR108 (East)	N28°00.00' W93°30.00'	N28°01.00' W91°37.00'	N28°01.00' W90°18.00'	N28°00.00' W88°25.00'	a. 348.900 b. 260.200 c. 1-1-3 d. 3/1 e. 33/96	FL190/FL210 FL260/FL290	2 OSS/OSOSB Barksdale AFB, LA DSN 781-3828/5396 (SOCS 4036)	Houston ARCP-132.65 (KC-10) 306.3/133.4 (VHF Back-up) EXIT-133.85/269.5
(West)	N28°00.00' W88°25.00'	N28°01.00' W90°18.00'	N28°01.00' W91°37.00'	N28°00.00' W93°30.00'				Houston ARCP-132.65 (KC-10) 269.5/133.85 (VHF Back-up) EXIT-133.4/306.3

REMARKS: Houston ARTCC will resolve conflicts with W92, AR646 and AR103. Track is designed specifically for single tanker/receiver operations and is prohibited to fighter type aircraft.

TYPES OF RENDESVOUZ

There are two main methods of rendezvousing with the tanker: the P**oint Parallel (PP)** and the **Fighter Turn-On** (FTO)

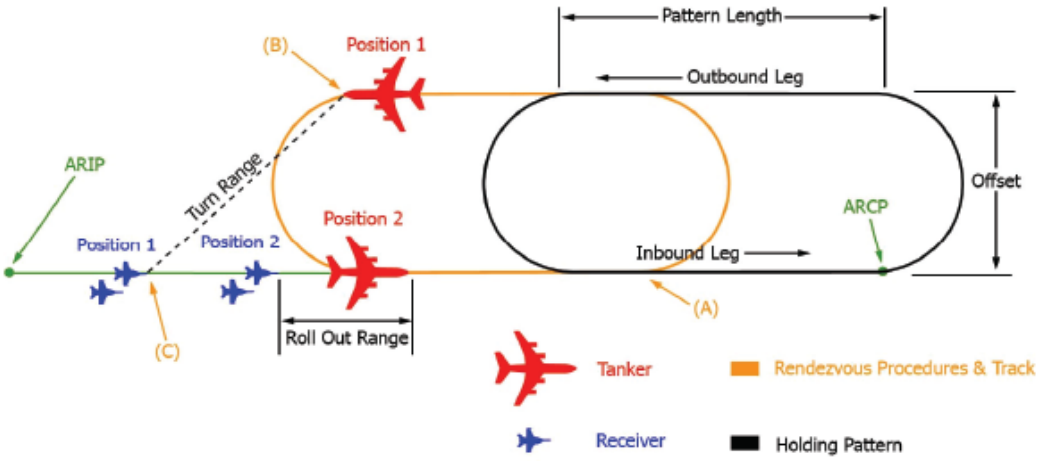


The **(PP)** is normally used any time the tanker has no aircraft refueling and the tanker is positioned at the Air Refueling Control Point (ARCP). The FTO is generally used when there are several flights scheduled for the same tanker and one flight is still refueling as the next flight begins its rendezvous, or when the tanker is in an anchor pattern.

PP's rendezvous are likely to be used more with heavy type aircraft or with aircraft not equipped with radar systems. In turn FTO's will be used more by "fast movers" equipped with AI RADAR.

Point Parallel Rendezvous (PP)
Normally, receivers will establish radio contact with the tanker NLT 15 minutes prior to the ARCT or arriving at the ARIP. This also gives the tanker a chance to request MARSA from ATC prior to the receiver entering the track/anchor. If both the tanker and receivers are on a common GCI/ATC frequency to obtain rendezvous assistance, the change to the air refueling frequency may be delayed until positive radar/visual contact is established. A typical rendezvous radar display is depicted in Figure 1.2.

(Figure 1.2)



Notes:
1. The minimum distance between the ARIP and the ARCP should be 70 nm.
2. The tanker is to hold at the appropriate AAR speed.
3. At the ARIP the receiver(s) call 'IP inbound' and ensure they are established 1000 ft below the base altitude. At the same time, regardless of position, the tanker (A) turns on to the reciprocal heading of the receiver(s) inbound track and maintains the computed offset.
4. At the turn range (B-C), the tanker turns onto the receiver(s) inbound track.

The terminal stage of the rendezvous is critical. The point-parallel rendezvous with proper airspeed will roll the tanker out 3 NM in front of the fighters.
As soon as the tanker achieves the desired offset and slant range it will turn into the receivers heading.

Tanker in the halfway turn, receiver closes in, receiver should report when visual with the tanker, radar equipped aircraft will report radar contact which at time ATC / GCI will cease to update tankers position. At this point ATC/GCI can clear the receiver aircraft to the tankers frequency.

Fighter Turn-on Rendezvous

- The fighters turn instead of the tanker.
- The fighters turn toward the tanker when the tanker is at 35° relative bearing and 15 NM slant range.
- Fighters maintain 350 KCAS throughout the rendezvous until the closure rate indicates an airspeed adjustment.
- The fighters will use 30° of bank during the turn.

Obtaining ATC/GCI vectors to the tanker allows fighters conduct a more expeditious rendezvous.

ATC ROLE IN AR OPERATIONS

- Normally when the AR Anchor or track is not active ATC has jurisdiction over the anchor or track. Therefore, this special use airspace will be released to the tanker prior to refueling.

- Tanker will pass an air refueling request to appropriate Center. (see scenario below)

- ATC in turn will provide tanker aircraft with a release and limitations brief in order to conduct AR operations on AR13E.

- If receiver requires it, give point outs to the tanker as required, or until visual contact with the tanker is obtained.

In-flight Air Refueling Scenario

The scenario is a KC-135R GASSER21 going to refuel a C-5 (FRED99) on AR 102A using the block altitude of FL240 to FL260 and point parallel rendezvous procedures with an ARCT of 0230Z. This is just to familiarize you with the dialogue that takes place among aircraft participating in an AR.

Tanker: Forth Worth Center, GASSER 21 with Air Refueling Request.

Center: GASSER 21 go ahead with request.
Tanker: Forth Worth Center, GASSER 21 request to delay at the Red Bluff 042 for 76 in the block FL240 to FL260 until 0215Z for AR 102A looking for FRED99.

Center: GASSER 21 cleared to delay at the Red Bluff 042 for 76, unable block altitude at this time, maintain FL220; FRED99 is 50 NM from the IP, report accepting MARSA with FRED99.

Tanker: Roger, cleared the delay, maintain FL220, we will report accepting MARSA with FRED99.

Tanker talks with FRED99 on AR Primary and confirms position and altitude (1,000 feet below tanker altitude) 15 min prior to ARCT.

Tanker: Center, GASSER 21 will accept MARSA with FRED99.

Center: Roger, GASSER 21 you are cleared to conduct air refueling operations along AR 102A with FRED99, maintain the block FL240 to FL260.

Tanker: Roger cleared to conduct AR along AR 102A with FRED99, maintain the block FL240 to FL260.

Center: FRED99, you are cleared to conduct air refueling operations along AR 102A with GASSER 21, maintain the block FL240 to FL260 and squawk standby 3 NM from the tanker.

Receiver: Roger cleared to AR on AR 102A with GASSER 21 in the block FL240 to FL260, squawk standby 3 NM form the tanker.

5 Min prior to the end of the track.

Tanker: Forth Worth Center, GASSER 21 with end AR request.

Center: GASSER 21 go ahead with your request.

Tanker: Center, after AR, FRED99 would like to go direct HRV at FL250 and GASSER 21 would like to go direct LTS at FL270.

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Center: Roger you can expect that.

Tanker: Center, GASSER 21 is at FL270 and FRED99 is at FL250, we are finished with refueling.

Center: Roger, GASSER 21 you are cleared direct to LTS, maintain FL270 and for FRED99, he his cleared direct HRV at FL250, have FRED come up 132.20 squawking 4710.

Tanker: Roger, GASSER 21 is cleared direct to LTS at FL270 and FRED99 is cleared direct HRV at FL250, have him come up 132.20 squawking 4710.

Receiver: Center, FRED99 Heavy with you direct HRV leveled at FL250.

Center: FRED99, radar contact, MARSA is terminated between you and GASSER 21, break, GASSER 21 MARSA is terminated between you and FRED99
Tanker: Roger MARSA is terminated.

Receiver: Roger MARSA is terminated.

GLOSSARY

Air Refueling Track	A flight path designated for air refueling.
ARCP	Air refueling control point; the planned geographic point over which the receiver(s) arrive in the observation /precontact position with respect to the assigned tanker.
ARCT	Air refueling control time; the planned time that the receiver and tanker will arrive over the ARCP.
ARIP	Air refueling initial point; a point located upstream from the ARCP.
Lag Pursuit	An attack geometry that will cause the attacker to fly behind the target.
Lead Pursuit	An attack geometry that will cause the attacker to fly in front of the target.
Pure Pursuit	An attack geometry that will cause the attacker to fly directly at the target.

Submit any questions or suggestions to:
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