BY ORDER OF THE SECRETARY OF THE AIR FORCE

AFI 11-2C-141V3 CL-1
1 JUNE 2000

Flying Operations

FORMATION AIR REFUELING

This checklist establishes procedures for the operation of the C-141 aircraft employed by Mobility Air Forces (MAF) to accomplish their worldwide missions.

This checklist complements AFI 11-2C-141V3, *C-141 Operations Procedures*, and is printed on standard 8 ½" x 11" bond paper then trimmed to a unique size 4 ½ " x 6 ½" that will fit the standard plastic C-141 aircrew checklist binders. Units may request copies of this checklist printed on a water proof-based media (in the size outlined) from the OPR. This product reduces weight and eliminates the need for plastic inserts. Limit water proof copies to aircrew only for use in-flight and training purposes.

Supersedes AMCR 55-141
OPR: HQ AMC/DOV (CMSgt Cummings)
Certified by: HQ USAF/XOO (Maj Gen Michael S. Kudlacz)
Number of Printed Pages: 34/ Distribution: F

FORMATION AIR REFUELING PROCEDURES

WARNING: It is all formation members' (both tanker and receiver) responsibility to ensure positive separation throughout refueling operations.

WARNING: Receiver formation members must know and understand where each of their wingmen are at all times. Question any maneuver or position which you do not understand.

(1) Plan refueling only on straight tracks. Do not plan to make any turns.

(a) If a turn must be accomplished (i.e. weather), tankers must coordinate well in advance with receiver formation before making the turn. Lead tanker will announce turn direction and approximate rollout heading on A/R primary. All receivers **must** acknowledge before the turn may commence. Receiver acknowledgment indicates there is proper separation (see definition below) between all receivers and tankers and proper separation will be maintained throughout the turn.

(b) If a receiver cannot maintain proper separation, call "**Receiver X, Standby Turn**." Tanker will maintain current heading until Receiver x can maintain proper separation and calls "**Receiver X, Ready for Turn**."

(2) Proper separation is defined as one of the following:

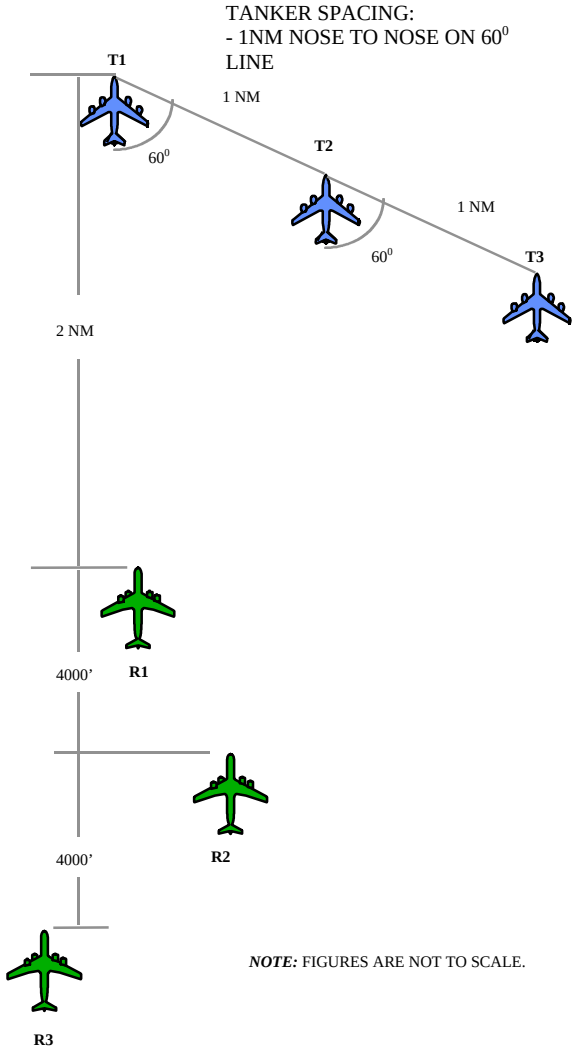
(a) Established in post-A/R.

(b) Established in awaiting-A/R.

(c) Established or approaching [within 0.5-NM] the precontact or contact position.

(d) 500-feet altitude separation and 0.5-NM lateral separation being attained and maintained from each tanker and receiver.

RENDEZVOUS (RZ) PROCEDURES



NOTE: Rendezvous is accomplished in the same manner regardless of the number of tankers or receivers. Figures are only used to demonstrate the positions of tankers or receivers if they are present.

RENDEZVOUS (RZ) PROCEDURES

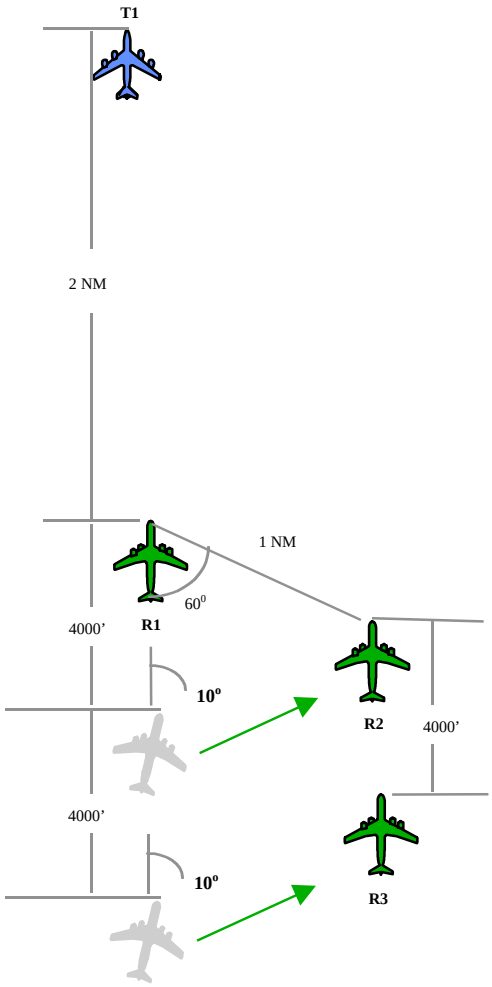
(1) R1 will verify lead tanker base airspeed. All other tankers will fly an adjusted airspeed based on altitude differential.

(2) R1 may direct the receiver formation to join SKE in-line or maintain normal SKE spacing until the closure begins. During the RZ all turns are echelon turns.

(3) Throughout the RZ, R1 will ensure all receivers are 1000-feet below T1. If using SKE in-line positions, wingman may stack out of wake turbulence no greater than 50-feet above preceding aircraft.

(4) If R1 does not have visual contact with T1 by 2-NMs, R1 will keep all receivers in SKE formation, remain 2-NMs in-trail of and 1000-feet below T1 until visual contact is made.

SKE TO AIR REFUELING ECHELON
(3 [or 2]-on-1)



NOTE: FIGURES ARE NOT TO SCALE

SKE TO AIR REFUELING ECHELON

(3 [or 2]-on-1)

(1) R1 will direct initiation of maneuvering to A/R echelon when in-trail of and in visual contact with tanker (no later than 2-NM behind tanker).

(2) On R1's **"A/R Echelon Now"** command, all wingmen will simultaneously turn 10 degrees right from base heading and accelerate. Set NRT, do not exceed 330 KCAS/.80 Mach.

(3) Approaching target cross-track (approximately 0.9-NM), R2 will turn to roll out on base heading. R3 will maintain 4000-feet in-trail of R2.

(4) R2 assumes a 1-NM 60 degree right echelon nose-to-nose position on R1.

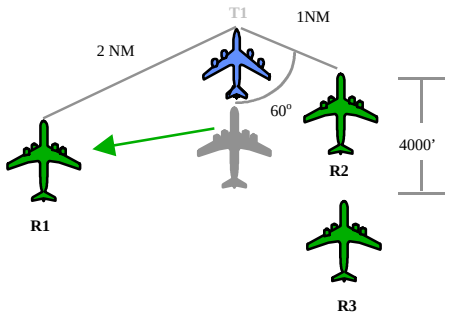
(5) R3 remains 4000-feet in trail of R2. As briefed by R1, R3 may either assume a SKE in-line (stacked up out of wake turbulence no greater than 50-feet) or 500-feet right cross-track of R2.

CAUTION: This procedure will require R3 to select R2 as the temporary leader. Care must be given to re-select R1 as the leader at the appropriate time.

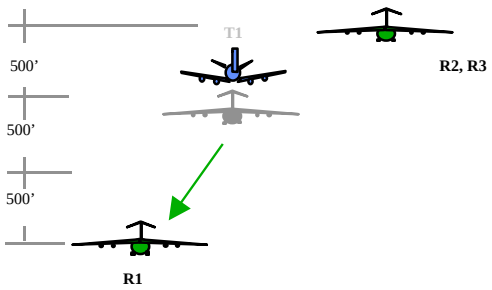
(6) If necessary, climb to element base refueling altitude on lead's command.

(7) R2 and R3 maintain R1's altitude (1000-feet below tanker) until R1 begins the closure to the tanker.

REFUELING PROCEDURES
(3 [or 2]-on-1)



NOTE: FIGURES ARE NOT TO SCALE



REFUELING PROCEDURES

(3 [or 2]-on-1)

R1 REFUELING

(1) R1 will begin climb to refueling altitude (from 1000-feet below) upon reaching 1-NM in-trail of tanker. R1 will be at 295 KCAS (or A/R base airspeed + 20) at 1-NM and continue closure in accordance with (IAW) normal procedures.

(2) When R1 departs RZ altitude, R2 and R3 continue to climb stacking 500-feet above tanker base altitude. R2 establishes the awaiting air refueling position (1-NM 60 degree right echelon nose-to-nose position from tanker).

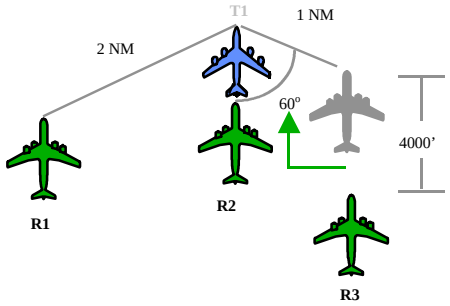
(3) R3 maintains 4000 in-trail of R2. Stack up 50-feet out of wake turbulence if using the SKE in-line position.

R1 REFUELING COMPLETE

(1) When refueling is completed, R1 will move to a position 2-NMs on a 60 degree left echelon 1000-feet below the tanker. Delay turning to the left until 500-feet below the tanker.

(2) Upon reaching the post-A/R position, R1 will state **"R1 Established in Post-A/R."**

REFUELING PROCEDURES
(3 [or 2]-on-1)



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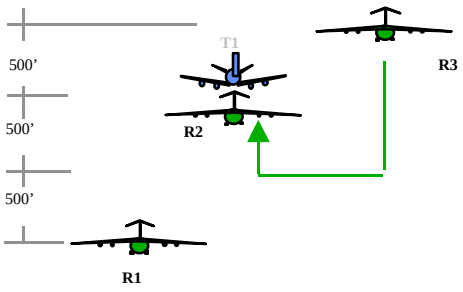


REFUELING PROCEDURES
(3 [or 2]-on-1)

R2 REFUELING

(1) When R1 calls established in post-A/R , R2 transitions to the contact position by accomplishing sequentially the following steps:

(a) Descend 1000-feet (500-feet below tanker altitude).

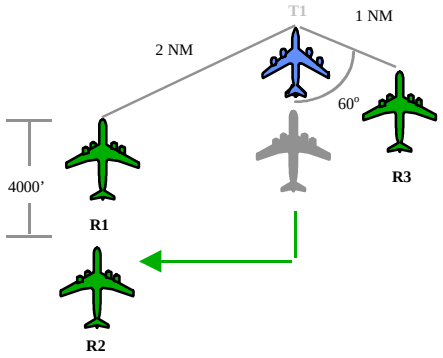
(b) Move laterally to the left to a position in-trail of the tanker.

(c) Establish contact with the boom operator and close IAW normal procedures.

(2) When in-trail of the tanker and 500-feet below tanker altitude, R2 will call “R2 Clear.”

(3) After R2’s clear call, R3 advances to the awaiting air refueling position.

REFUELING PROCEDURES
(3 [or 2]-on-1)



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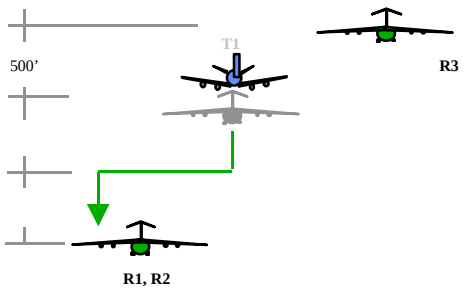


REFUELING PROCEDURES
(3 [or 2]-on-1)

R2 REFUELING COMPLETE

(1). Upon completion of refueling, R2 will transition to the post air refueling position by accomplishing sequentially the following steps:

(a) Move directly aft while descending 500-feet below the tanker (500-feet above R1).

(b) Attain positive radar, SKE, or visual identification on all preceding aircraft in the post A/R position and aircraft in the awaiting A/R position.

(c) When aft of abeam of R1, move laterally to the left to a position in-trail of R1 (4000-feet).

NOTE: Attempt to square off the rejoin as depicted in the diagram; do not make a large diagonal maneuver.

(d) When 4000-feet (or greater) in-trail of the previous receiver, descend to formation altitude and announce **"R2 established in Post-A/R."**

(e) If position in-trail of the previous receiver is greater than 4000-feet, continue to close to the SKE position. If rejoining to the SKE in-line position, stack up 50-feet out of wake turbulence.

R3 REFUELING

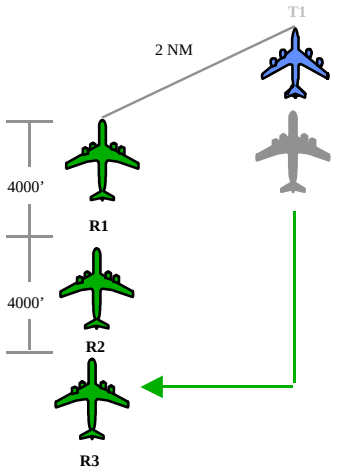
(1) When R2 calls established in post-A/R, R3 transitions to the contact position by accomplishing sequentially the following steps:

(a) Descend 1000-feet (500-feet below tanker altitude).

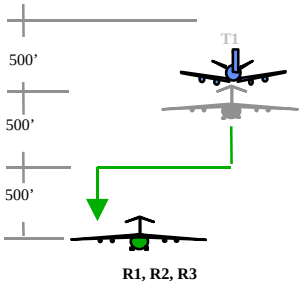
(b) Move laterally to the left to a position in-trail of the tanker.

(c) Establish contact with the boom operator and close IAW normal procedures.

REFUELING PROCEDURES
(3 [or 2]-on-1)



NOTE: FIGURES ARE NOT TO SCALE



REFUELING PROCEDURES

(3 [or 2]-on-1)

R3 REFUELING COMPLETE

(1) Upon completion of refueling, R3 will transition to the post air refueling position by accomplishing sequentially the following steps:

(a) Move directly aft while descending 500-feet below the tanker (500-feet above R1).

(b) Attain positive radar, SKE, or visual identification on all preceding aircraft and aircraft in the awaiting A/R position.

(c) When aft of abeam of R2, move laterally to the left to a position in-trail of R2 (4000-feet).

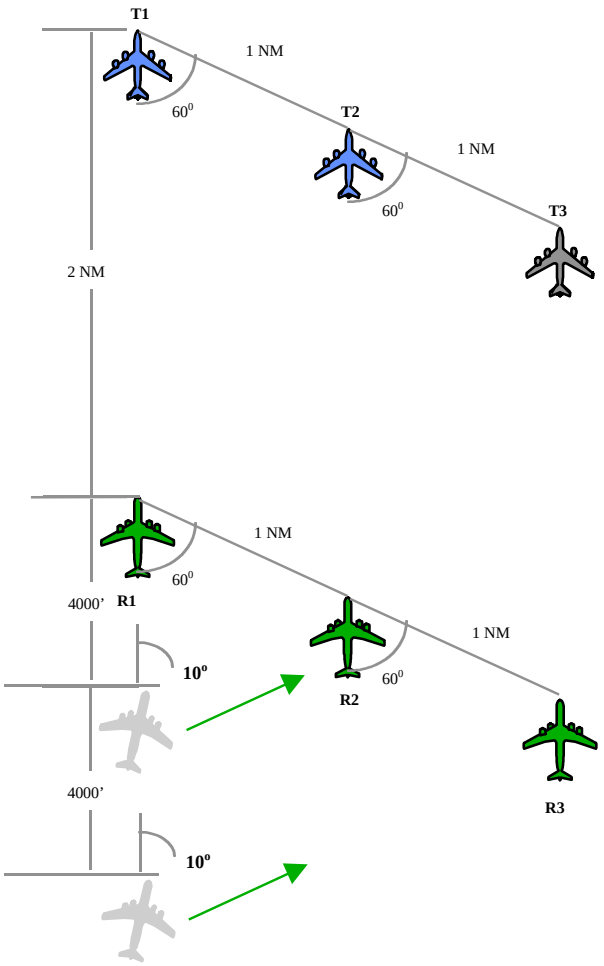
NOTE: Attempt to square off the rejoin as depicted in the diagram; do not make a large diagonal maneuver.

(d) When 4000-feet (or greater) in-trail of the previous receiver, descend to formation altitude and announce **"R3 established in Post-A/R."**

(e) If position in-trail of the previous receiver is greater than 4000-feet, continue to close to the SKE position. If rejoining to the SKE in-line position, stack up 50-feet out of wake turbulence.

SKE TO AIR REFUELING ECHELON

(3-on-2 or X-on-X)



NOTE: FIGURES ARE NOT TO SCALE

SKE TO AIR REFUELING ECHELON (3-on-2 or X-on-X)

(1) R1 will direct initiation of maneuvering to A/R echelon when in-trail of and in visual contact with T1 (no later than 2NM behind T1).

(2) On R1's "**A/R Echelon Now**" command, all wingmen will simultaneously turn 10 degrees right from base heading and accelerate. Set NRT, do not exceed 330 KCAS/.80 Mach.

(3) Approaching target cross-track (approximately 0.9-NM for R2, 1.7-NM for R3), receivers will turn to roll out on base heading.

(4) R2 assumes a 1-NM 60 degree right echelon nose-to-nose position on R1.

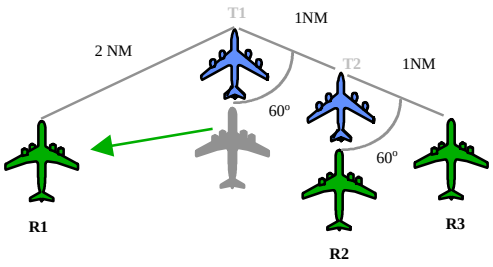
(5) R3 assumes a 1-NM 60 degree right echelon nose-to-nose position on R2.

(6) If necessary, climb to element base refueling altitude on leads command.

(7) R2 and R3 maintain R1's altitude (1000-feet below tanker).

(8) When the formation is ready to begin the closure to the tankers, lead announces "**Cleared to Conduct A/R** ."

REFUELING PROCEDURES
(3-on-2)



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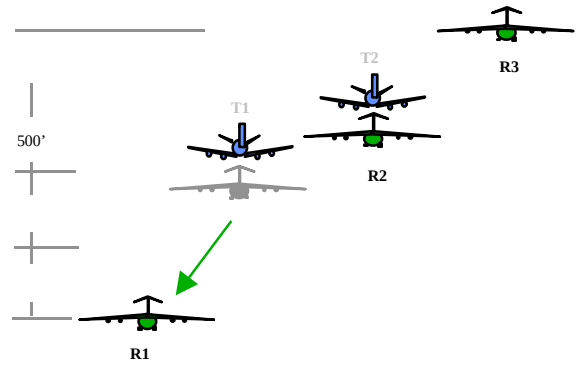


REFUELING PROCEDURES (3-on-2)

R1 REFUELING, R2 REFUELING (ONE-HALF OFFLOAD)

(1) R1 will begin climb to refueling altitude (from 1000-feet below) upon reaching 1-NM in-trail of tanker. R1 will be at 295 KCAS (or A/R base airspeed + 20) at 1-NM and continue closure IAW normal procedures.

(2) After R1's "cleared to conduct A/R " command and upon positive identification of and in-trail of T2, R2 will begin climb to refueling altitude. R2 will be at 295 KCAS (or A/R base airspeed +20) at 1-NM from T2 and continue closure IAW normal procedures. R2 receives one-half of planned off-load from T2.

(3) When R2 departs RZ altitude, R3 will continue to climb stacking 500-feet above T2's altitude. R3 establishes the awaiting air refueling position (1-NM 60 degree right echelon nose-to-nose position from T2).

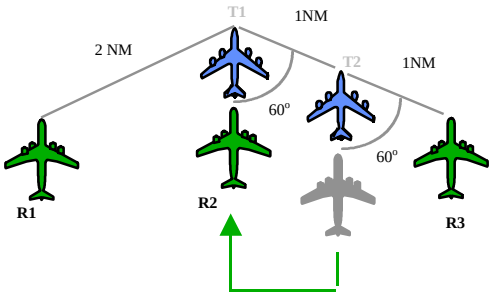
R1 REFUELING COMPLETE

(1) When R1 completes refueling move to a position 2-NMs on a 60 degree left echelon 1000-feet below the tanker. Delay turning to the left until 500-feet below the tanker.

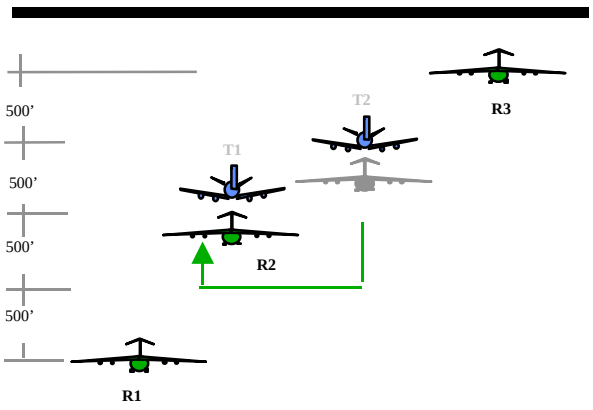
(2) When R1 reaches the post-A/R position, call, "**R1 Established in Post-A/R .**"

NOTE: R2 must remain in the contact or precontact position until R1 is established in the post-A/R position.

REFUELING PROCEDURES
(3-on-2)



NOTE: FIGURES ARE NOT TO SCALE



REFUELING PROCEDURES (3-on-2)

R2 REFUELING (ONE-HALF OFFLOAD COMPLETE)

(1) After receiving one-half of off-load and R1 has called established in post-A/R , R2 maneuvers to the lead tanker by accomplishing sequentially the following steps:

(a) Move directly aft while descending 1000-feet below the second tanker (500-feet below the lead tanker).

(b) Attain positive radar, SKE, or visual identification on all preceding aircraft and aircraft in the awaiting-A/R position.

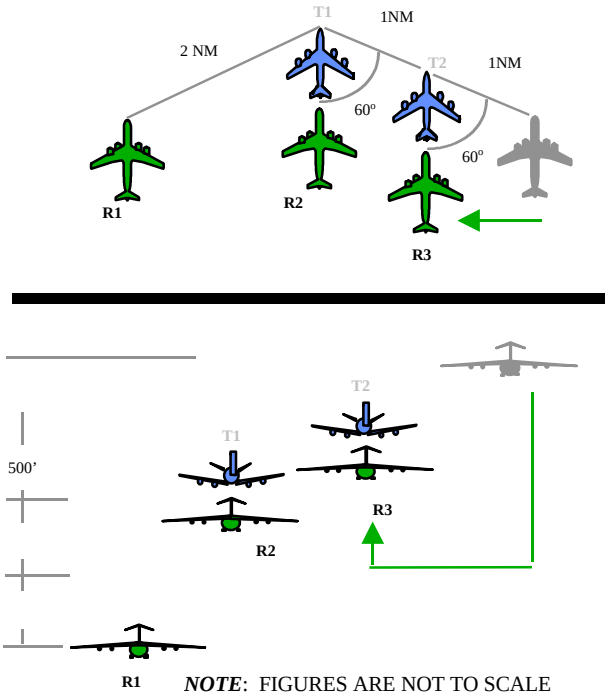
(c) When clear of the second tanker, move laterally to the left to a position behind the lead tanker (approximately 0.5-NM, 500-feet below lead tanker).

NOTE: Attempt to square off the closure as depicted in the diagram; do not make a large diagonal maneuver.

(d) When in-trail and 500-feet below the lead tanker, call "**R2 Clear**."

(e) Establish contact with the boom operator and close IAW normal procedures.

REFUELING PROCEDURES (3-on-2)



NOTE: FIGURES ARE NOT TO SCALE

R3 REFUELING

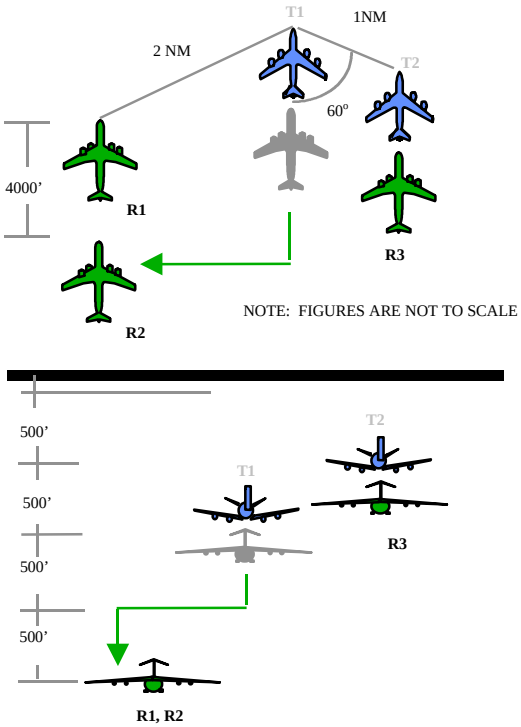
(1) After R2 calls clear, R3 transitions to the contact position with the second tanker by accomplishing sequentially the following steps:

(a) Descend 1000 -feet (500-feet below second tanker's altitude).

(b) Move laterally left behind the second tanker, establish contact with the boom operator and close IAW normal procedures.

NOTE: R3 must remain in the contact or pre-contact position until R2 is established in the post-A/R position.

REFUELING PROCEDURES
(3-on-2)



R2 REFUELING COMPLETE, R3 REFUELING

(1) When R2 completes refueling, transition to post air refueling position by accomplishing sequentially the following steps:

(a) Move directly aft while descending 500-feet below T1 (500-feet above R1).

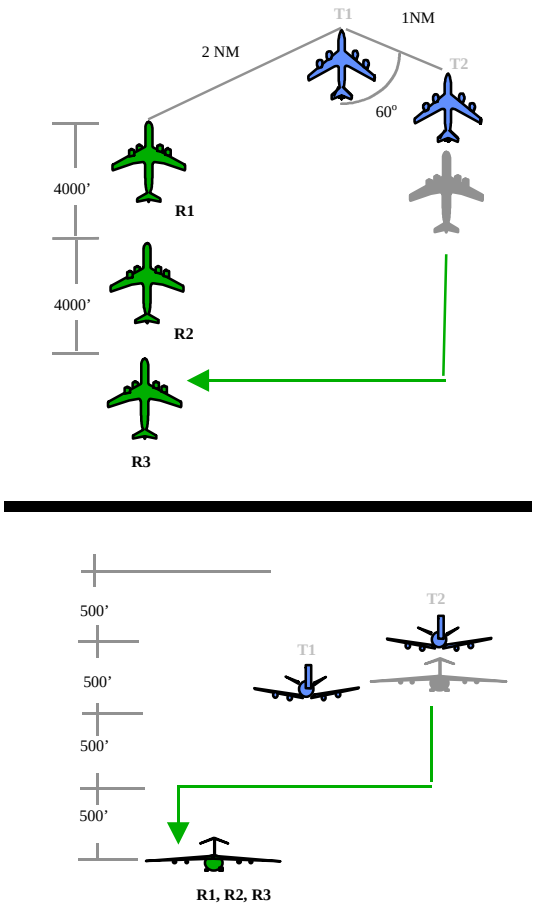
(b) Attain positive radar, SKE, or visual identification on all preceding aircraft. When aft of abeam of R1, move laterally to the left to a position in-trail of R1 (4000-feet).

NOTE: Attempt to square off the rejoin as depicted in the diagram; do not make a large diagonal maneuver.

(c) When 4000-feet (or greater) in-trail of the previous receiver, descend to formation altitude and announce "R2 established in Post-A/R ."

(d) If position in-trail of the previous receiver is greater than 4000-feet, continue to close to the SKE position. If rejoining to the SKE in-line position, stack up 50-feet out of wake turbulence.

REFUELING PROCEDURES
(3-on-2)



NOTE: FIGURES ARE NOT TO SCALE

REFUELING PROCEDURES
(3-on-2)

R3 REFUELING COMPLETE

(1) When R3 completes refueling, transition to the post air refueling position by accomplishing sequentially the following steps:

(a) Move directly aft while descending 1000-feet below T2 (500-feet above R1).

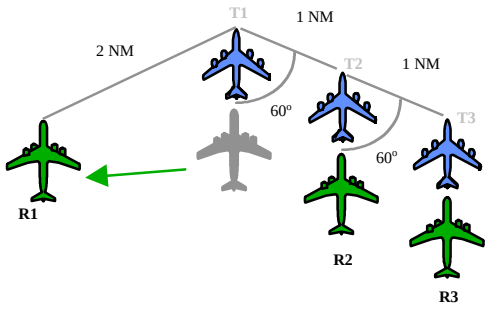
(b) Attain positive radar, SKE, or visual identification on all preceding aircraft. When aft of abeam of R2, move laterally to the left to a position in-trail of R2 (4000-feet).

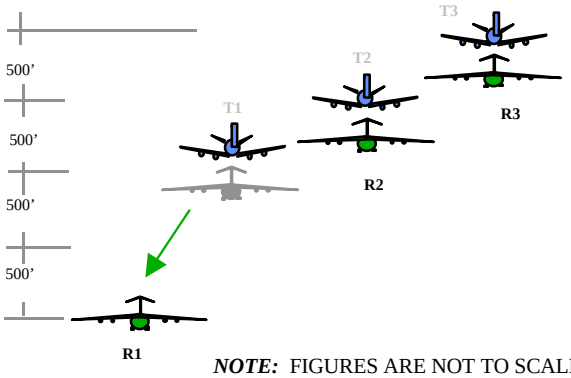
NOTE: Attempt to square off the rejoin as depicted in the diagram; do not make a large diagonal maneuver.

(c) When 4000-feet (or greater) in-trail of the previous receiver, descend to formation altitude and announce "**R3 established in Post-A/R** ."

(d) If position in-trail of the previous receiver is greater than 4000-feet, continue to close to the SKE position. If rejoining to the SKE in-line position, stack up 50-feet out of wake turbulence.

REFUELING PROCEDURES
(X-on-X)





NOTE: FIGURES ARE NOT TO SCALE

REFUELING PROCEDURES (X-on-X)

R1, R2, R3 REFUELING

(1) R1 will begin climb to refueling altitude (from 1000-feet below) upon reaching 1-NM in-trail of lead tanker. R1 will be at 295 KCAS (or A/R base airspeed + 20 kts) at 1-NM and continue closure IAW normal procedures.

(2) After R1's "**Cleared to Conduct A/R** " command and upon positive identification of and in-trail of their individual tankers, wingman will climb to their refueling altitude. Wingmen will be at 295 KCAS (or A/R base airspeed +20 kts) at 1-NM from their respective tanker and continue closure with normal procedures.

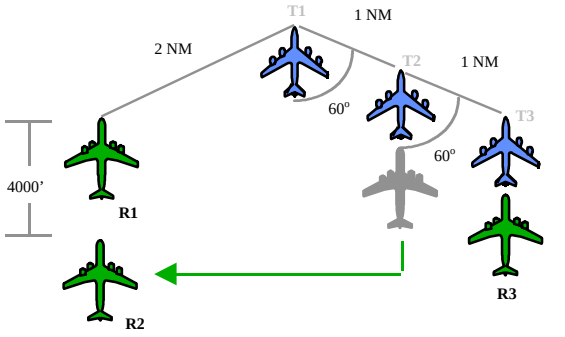
R1 REFUELING COMPLETE

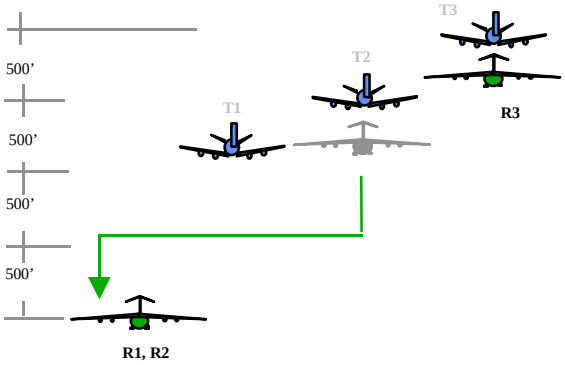
(1) When R1 completes refueling move to a position 2-NMs on a 60 degree left echelon 1000-feet below the tanker. Delay turning to the left until 500-feet below the tanker.

(2) When R1 reaches the post-A/R position, call "**R1 Established in Post-A/R** ."

NOTE: R2 and R3 must remain in the contact or pre-contact position until the previous receiver is established in the post-A/R position**.**

REFUELING PROCEDURES (X-on-X)





NOTE: FIGURES ARE NOT TO SCALE

REFUELING PROCEDURES
(X-on-X)

R2 REFUELING COMPLETE

(1) After R1 calls established in post-A/R and R2 completes offload, transition to the post-A/R refueling position by accomplishing sequentially the following steps:

(a) Move directly aft of T2 while descending 1000-feet (500-feet above R1).

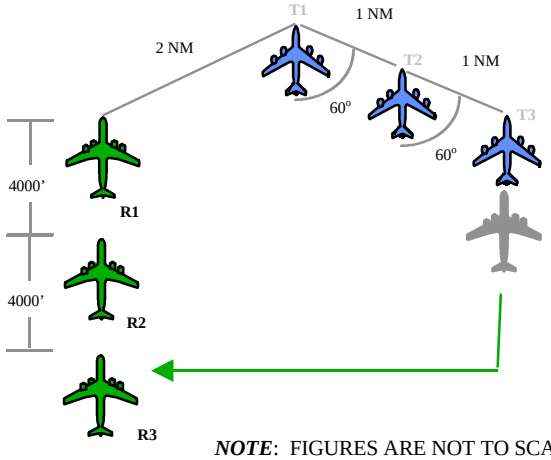
(b) Attain positive radar, SKE, or visual identification on all preceding aircraft. When aft of abeam of R1, move laterally to the left to a position in-trail of R1 (4000-feet).

NOTE: Attempt to square off the rejoin as depicted in the diagram; do not make a large diagonal maneuver**.**

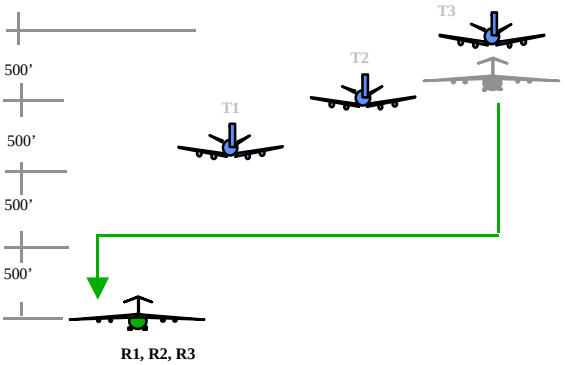
(c) When 4000-feet (or greater) in-trail of the previous receiver, descend to formation altitude and announce "**R2 Established in Post-A/R** ."

(d) If position in-trail of the previous receiver is greater than 4000-feet, continue to close to the SKE position. If rejoining to the SKE in-line position, stack up 50-feet out of wake turbulence.

REFUELING PROCEDURES
(X-on-X)



NOTE: FIGURES ARE NOT TO SCALE



REFUELING PROCEDURES
(X-on-X)

R3 REFUELING COMPLETE

(1) After R2 calls established in post-A/R and R3 completes offload, transition to the post-A/R refueling position by accomplishing sequentially the following steps:

(a) Move directly aft of T3 while descending 1500-feet (500-feet above R1).

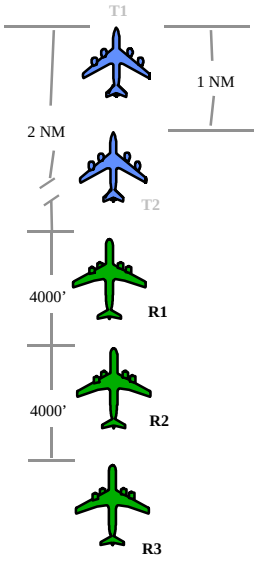
(b) Attain positive radar, SKE, or visual identification on all preceding aircraft. When aft of abeam of R2, move laterally to the left to a position in-trail of R2 (4000-feet).

NOTE: Attempt to square off the rejoin as depicted in the diagram; do not make a large diagonal maneuver.

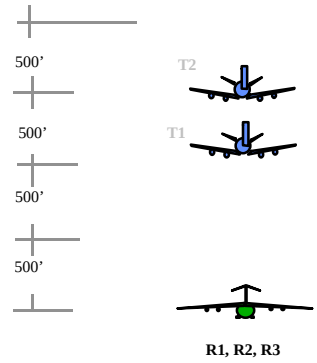
(c) When 4000-feet (or greater) in-trail of the previous receiver, descend to formation altitude and announce **"R3 established in Post-A/R** ."

(d) If position in-trail of the previous receiver is greater than 4000-feet, continue to close to the SKE position. If rejoining to the SKE in-line position, stack up 50-feet out of wake turbulence.

POST-A/R TURNS
AT END OF TRACK



NOTE: FIGURES ARE NOT TO SCALE



POST-A/R TURNS AT END OF TRACK

(1) After the last receiver has called established in post-A/R , R1 will maneuver the receiver formation to a position in-trail of the lead tanker.

(2) Lead receiver will maintain a minimum of 2-NMs in-trail of lead tanker.

(3) Subsequent receivers should stack up 50-feet out of wake turbulence if flying a SKE in-line position.

(4) Coordinate with lead tanker on direction of turn and heading. Advise, Tankers should plan to use 20 degrees of bank.

(5) A subsequent formation refueling may begin after the turn is complete and tankers are established on track and in a normal echelon position. Begin with the SKE to air refueling echelon procedures.

NOTE 1: Tanker wingman will assume a 1-NM in-trail position from lead tanker continuing to stack up 500-feet.

NOTE 2: Tanker aircraft guidance directs in-trail position for any turn over 30 degrees in tanker heading.

NOTE 3: 3-on-2 formation shown for demonstration purposes only. Consideration should be given to extend R1's distance to T1 if a third tanker is present. In no case will this distance be shorter than 2-NMs.

EXCEPTION: For 2-on-1 only, receiver in contact may remain in the contact position during the turn. Other receiver will move from either awaiting A/R or post A/R to the intrail position for the duration of the 180 degree turn. In trail aircraft will return to either awaiting-A/R or post A/R, whichever is appropriate, when established on track after the turn. Before maneuvering, the receiver in the contact/pre-contact position will remain in the contact/pre-contact position until the other receiver is reestablished in the awaiting A/R or post A/R position.

GLOSSARY OF TERMS

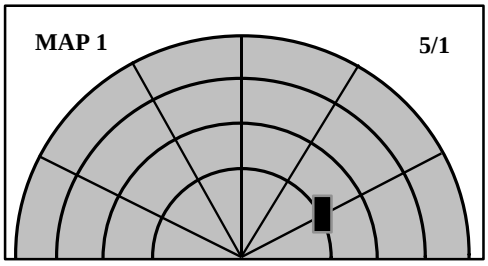
A/R Echelon--A 60 degree right echelon on formation lead (measured from receiver lead's longitudinal axis) with 1-NM separation nose-to-nose.

Post Air Refueling Position--The position a receiver proceeds to after completing refueling with the tanker. Receiver one's (R1) post-A/R position is a 60 degree left echelon on the lead tanker (measured from the lead tanker's longitudinal axis) with 2-NM nose-to-nose separation, stacked 1000-feet below the tanker. Refer to this Annex for a visual depiction of this position.

Awaiting Air Refueling Position--A 60 degree right echelon position from the tanker with 1-NM nose-to-nose separation, stacked 500-feet above the tanker. Refer to this annex for a visual depiction of this position.

Post A/R Turn--This maneuver places tankers and receivers in a trail position to facilitate a turn at the end of an A/R track. It is only accomplished after receivers are established in the post-A/R position. It is designed to place the formation in a position to conduct formation air refueling in the reverse direction (i.e. back up the track).

POST A/R (R1) POSITION SKE ILLUSTRATION



NOTE: This diagram depicts the position of the lead tanker when receiver one (R1) is in the proper post air refueling position (2-NM 60 degree echelon).

FORMATION AIR REFUELING COMMANDS

TANKER COORDINATION

Confirm the following with lead tanker on A/R frequency.

1. Tanker vertical stack
2. Tanker lateral separation
3. Refueling airspeed
4. Tanker operating beacon & A/A Tacan
5. Tanker announce heading changes after rendezvous
6. Receiver call sign(s) used during A/R
7. Receiver offload amount from each tanker

HEADING/AIRSPEED CHANGES AFTER ARIP

"_____SECTION; NEW BASE HEADING _____ TRUE/MAG; TURN NOW" or NEW BASE AIRSPEED _____, ACCELERATE/DECELERATE NOW"

TRANSITION TO A/R ECHELON

"____ SECTION, PREPARE TO TRANSITION TO A/R ECHELON; BASE AIRSPEED _____;

BASE HEADING _____ TRUE/MAG;

BASE ALTITUDE _____; ACKNOWLEDGE"

"_____SECTION, A/R ECHELON NOW"

FREQUENCY CHANGE/CONDUCT AIR REFUELING

"____ SECTION, NEW INTERPLANE FREQUENCY _____, ACKNOWLEDGE" "___ SECTION, CHECK IN"

"___ SECTION, CLEARED TO CONDUCT A/R , ACKNOWLEDGE"

POST AIR REFUELING

"RECEIVER xx, ESTABLISHED IN POST A/R "

CLEAR CALL

"RECEIVER xx, CLEAR"

MARVIN R. ESMOND, Maj General, USAF
DCS, Air and Space Operations